Yosemite National Park

National Park Service
U.S. Department of the Interior

Final Yosemite Fire Management Plan

Environmental Impact Statement

March 2004

Deltoid Fire, 2002
Dan Horner, NPS

United States Department of the Interior

NATIONAL PARK SERVICE
Yosemite National Park
P. O. Box 577
Yosemite, California 95389

IN REPLY REFER TO:
Y1427 (YOSE)

Dear Friends:

I am pleased to present to you the *Final Yosemite Fire Management Plan/Environmental Impact Statement*. It represents a major effort by the public and park staff, and one that will greatly benefit Yosemite National Park and its neighbors.

Fire management is a complex and crucial subject, and one that requires a great deal of study, planning and commitment to action. The ecosystems of Yosemite National Park evolved under the influence of fire, and you could almost say they cannot live without it. Fire is needed to reduce fuels, maintain the diversity and structure of plant communities, and even open the seed cones of species such as giant sequoia. But fire cannot be taken lightly. There are risks involved, and there are benefits to be realized. Simply put, fire management is among the most important and difficult of things we do in managing Yosemite National Park.

The attached *Final Yosemite Fire Management Plan/Environmental Impact Statement* is a product of the discussions we've had with the public and local, state and federal cooperating agencies, and of the professional input of the park's fire and resource management staff. The outlined fire management program is also a product of evolution. The program at Yosemite is not a new one. It has benefited from over thirty years of implementation and refinement, research and monitoring, learning and doing. Revision processes, such as this one, give us a chance to revisit old issues, discuss how things are done, improve the ways of doing them, improve our communication with the public, and sort through the diverse public needs that drive fire management decisions. Air quality-related issues, for example, are difficult, but refinements have been made in our program and in our processes for communicating with the public and other agencies.

Changes were made between draft and final. For your ease of reference, these are described in the Executive Summary, and again in the Purpose and Need chapter.

To those of you who contributed comments, attended public meetings, and met with us—thank you. You have my appreciation for considering the draft and offering your input.

I hope you will remain involved as we continue in our implementation of the Yosemite fire management program.

Sincerely,

Michael Tollefson
Superintendent

Yosemite National Park

Lead Agency: National Park Service

ABSTRACT

The Yosemite National Park Fire Management Plan/Environmental Impact Statement guides the implementation of a complex fire management program. The program includes wildland fire suppression, wildland fire used to achieve natural and cultural resource benefits, fire prevention, prescribed fire, fire ecology research, and the use of mechanical methods to reduce and thin vegetation in and around communities.

One goal of the program is to reduce the threat of wildland fire to public safety and to the park's wildland urban interface communities as well as to its natural and cultural resources. Another goal is to return the influence of natural fire to park ecosystems so that they are restored to, and maintained in, as natural a condition as possible.

The Fire Management Plan /Environmental Impact Statement proposes to reduce risk to park wildland urban interface communities within six to eight years, and to restore park ecosystems within 15 to 20 years. Some of the work which will be done to reduce the risk of unwanted wildland fire in and adjacent to wildland urban interface communities will involve mechanical methods. The primary methods to reduce wildland fire risk and to restore park ecosystems, however, will be prescribed and wildland fire.

Yosemite National Park

National Park Service
U.S. Department of the Interior

Final Yosemite Fire Management Plan

Environmental Impact Statement

March 2004

Executive Summary

Introduction

This Environmental Impact Statement (EIS) presents several alternatives to implement National Park Service (NPS) fire policies in Yosemite National Park and in the El Portal Administrative Site (Map 1-1), hereafter referred to as the Project Area. The EIS supports the implementation document for the fire program - the fire management plan. The fire management plan would be prepared and approved subsequent to the issuance of a Record of Decision for the EIS.

Most of Yosemite National Park is designated Wilderness, but also includes, and is adjacent to, road and trail corridors, historical sites, residential communities and businesses, and administrative and recreational areas of several jurisdictions. Fire management reflects this diversity of land use. This document proposes alternatives for management of wildland and prescribed fire, for protection of human life and property, for restoration and maintenance of fire-dependent ecosystems, and for reduction of hazardous fuels. It also examines the environmental impacts of each alternative.

Purpose of and Need for the Fire Management Plan

Purpose of the Plan

The purpose and goals of the Yosemite fire management program include the following:

- To develop a plan that is consistent with NPS wildland fire management policy and adheres to guiding principles from the Federal Fire Policy. These principles include the following:
- Firefighter and public safety is the first priority in every fire management activity.
- Wildland fire is an essential ecological process and natural change agent.
- Fire management plans, programs, and activities support land and resource management plans and their implementation.
- Sound risk management is a foundation for all fire management activities.
- Fire management programs and activities are economically viable, based on values to be protected, costs, and land and resource management objectives.
- Fire-related plans and activities should be based upon the best available science.
- Fire management plans and activities incorporate public health and environmental quality considerations.
- Federal, state, tribal, local, and interagency coordination and cooperation are essential.

In accordance with the Federal Fire Policies, the Yosemite fire management program would specifically:

- Execute a fire management program that provides for the safety of firefighters and the public, including safe operations and safe fire management-related facilities (e.g., helibases, fire camps, fire stations).

- Use wildland and prescribed fire to restore and maintain park ecosystems to target conditions.
- Reduce the risk of fire to cultural resources (e.g., historic buildings and pictographs) through fuel reduction, prescribed burning, or fire suppression to prevent fires from damaging cultural resources. Fire would also be used as a tool to manage cultural landscapes.
- Reduce the risk of catastrophic fire to wildland/urban interface (WUI) communities by the use of prescribed fire and mechanical fuel reduction techniques.
- Ensure that fire management planning and operations support the goals and objectives of resource and Wilderness management programs.

Need for the Plan

The fire management plan translates NPS fire management policies into specific management actions. The Yosemite fire management program has followed these policies for over three decades. The program, while making significant inroads, has not been able to fully meet two of the park's primary objectives: ecosystem restoration, and mitigation of wildfire hazard through the use of prescribed and wildland fire on an ecologically significant scale.

Factors contributing to this shortfall include lack of funds and staff, smoke issues, subordination of prescribed fire projects to regional and national wildland fire emergencies, agency and interagency moratoriums on the use of prescribed and wildland fire, and a heavy reliance on the fall season for executing prescribed fire projects.

Particularly since the 2000 fire season, increased funding for staff and projects has been made available to fire management programs throughout the country. The National Fire Plan places new emphasis on the importance of executing risk reduction projects as well as restoring fire as a critically important ecological process. Emphasis has been placed on the use of mechanical measures to accomplish these projects near wildland/urban interface (WUI) communities. There are six communities in Yosemite National Park identified as WUI areas: Foresta, Hodgdon Meadow, Yosemite West, Yosemite Valley, El Portal, and Wawona. The reduction of hazardous amounts of wildland fuels in, and adjacent to, these communities is a central focus of the fire management program. Managers are being held accountable for identifying and implementing fuel reduction programs in WUI areas which have been identified in the Federal Register.

Because of these and other factors, the park's 1990 fire management plan requires revision to better support the National Fire Plan. A revised plan would apply information and experience gained from previous fire management plans and programs to the development of new strategies to better achieve program goals.

The *Final Yosemite Fire Management Plan EIS* presents and analyzes alternatives for the fire management program in Yosemite National Park. It also presents and analyzes effects that would occur as a result of implementing these alternatives in different areas of the park.

Decisions to be Made

Yosemite National Park's Superintendent would make a recommendation for the final decision to the NPS Regional Director, Pacific West Region, who is the Deciding Official for the *Yosemite Fire Management Plan EIS*. They would recommend and decide on:

1) Whether or not to implement the proposed action (Alternative D), an alternative to the proposed action, or to continue current fire management operations (Alternative A, the No Action Alternative).

2) The mitigation and monitoring that would be included in the decision.

Issues and Concerns Used to Develop Alternatives

Preliminary issues were identified using public and agency comments, consultations, and open house records from public scoping periods in 1999 and 2001. Issues raised and comments made by the public during scoping and through consultation were summarized as concern statements (these are listed in Chapter 1, Purpose and Need) and were used to develop action alternatives and determine the scope of analysis. Concerns related to the following subjects:

Planning Direction Comments addressed the process or scope of the planning effort, or suggested that certain process-related subjects should be central to the program or plan.

Fire Management Activities Many comments addressed actual management of the fire program, or various strategies, philosophies, or goals for fire management; many comments addressed prescribed fire, managed wildland fires, thinning, and mechanical treatment.

Community Protection Protecting communities and developed areas was a major concern to residents, while the effects of wildland fire on developed areas and/or protection activities concerned others.

Ecosystems and Fire Management Numerous comments addressed restoration of Yosemite's ecosystems and the role of fire as a natural process. Other comments emphasized that the NPS should conduct fire ecology studies.

Elements of the Natural Environment Concerns about the effects of fire on specific natural resources (e.g., wildlife, water, soil stability, vegetation, and others) were expressed.

Air Quality Numerous comments were received about compliance with air quality regulations, reduced air quality from smoke, and the differing effects on air quality from various fire management techniques.

Wilderness Comments were received on the role of fire in Wilderness, as well as the appropriateness of various fire management activities in Wilderness.

Access Numerous comments spoke to the appropriateness, inappropriateness, or need for roads, bridges, and trails providing access and firebreaks.

Social Environment Comments were received about whether or not the NPS should include cost recovery and other economic considerations, and use local labor for fuel reduction treatments. Others expressed concerns about noise related to fire management activities and scenic impacts.

Communication, Coordination, and Consultation Many comments addressed the need for, and role of consultation, communication, and coordination activities between the fire management program and communities, other agencies, organizations, and other groups.

Principal Differences and Clarifications Between The Draft EIS and Final EIS

- There are only six WUI communities in Yosemite National Park: Foresta, Hodgdon Meadow, Yosemite West, Yosemite Valley, El Portal, and Wawona. The reduction of hazardous amounts of wildland fuels in, and adjacent to, these communities is a central focus of the fire management program. The use of mechanical means to achieve forest restoration targets in Yosemite National Park would only occur within these six WUI areas.
- Maximum diameter of trees removed mechanically to achieve forest restoration target conditions within the six WUI areas has been reduced from 31.5" to 20" dbh (diameter at breast height).
- WUI areas are broken into two components: the core community plus a ¼ mile-wide belt around it (inner WUI; 6,425 acres), and a belt extending from ¼ mile up to no more than 1½ miles from the community (outer WUI; 22,316 acres). Actual perimeters are affected by topography, and in several areas are less than 1½ miles.
- The reduction of wildland fuels and the restoration of forest target conditions within the six WUI areas would occur through four steps:

    1) Inner WUI - Mechanical thinning of trees less than 12" would be done initially, generally followed by pile burning, to reduce threats from wildland fire. Prescribed fire, rather than mechanical thinning, would be used initially in areas where it can be done safely and effectively. In parts of inner WUI that are Wilderness, only hand thinning would be allowed.
    2) Outer WUI - Prescribed burning would be used as the initial treatment for both wildland hazard fuel reduction and to achieve forest restoration targets. This may be done concurrently with the first step, providing greater protection for the communities.
    3) Inner WUI - Mechanical thinning of trees up to 20" to achieve forest restoration target conditions would be done following these initial two actions. Where prescribed fire in the first step did achieve target conditions, this third step would be omitted.
    4) Outer WUI - Mechanical thinning of trees up to 20" dbh would occur after the first three actions, but only if a prescribed fire has failed to achieve forest restoration target conditions. If subsequent mechanical thinning is needed following prescribed fire to achieve forest restoration target conditions in any part of the six outer WUI areas, a separate environmental compliance document for public review would be prepared for each forest restoration thinning project. In parts of outer WUI that are Wilderness, only hand thinning would be allowed.

- Mechanical forest restoration activities to achieve target conditions would occur only in the six WUI areas. The focus throughout the remainder of the park is to allow natural processes to prevail to the fullest practical extent, consistent with the protection of public safety and environmental regulations.
- Wildland fuel reduction in the inner WUI areas to reduce the risk of wildland fire would occur within six to eight years, and forest restoration in the six WUI areas would take up to 20 years under the Preferred Alternative (Alternative D). Removal of 12 – 20 inch dbh trees to accomplish this latter objective would be spread out over this time period. Commercial sale of

timber would only be considered as a last resort if the woody material could not be burned, chipped, sold as firewood, or used for park administrative purposes, and if it poses a wildland fire risk if left on site. Implementation of all projects is subject to the availability of funds.

- Thinning for removal of hazardous wildland fuels along road corridors would be done to establish and maintain fuelbreaks and evacuation routes for wildland fire emergencies. Roadside thinning would be generally limited to trees and shrubs less than 12” dbh, and occasionally trees up to 20” dbh to break up continuous canopies along road margins. This thinning would occur no further than 200 feet from the road centerline, and would not occur in Wilderness.
- Road corridor thinning would occur along: 1) the portions of Wawona Road, Big Oak Flat Road, and El Portal Road (Highways 41, 120, and 140, respectively) that are within the Suppression Unit, 2) roads to Hetch Hetchy and Aspen Valley, 3) public roads within five WUI communities (Yosemite Valley is excluded), 4) the Mariposa Grove and Glacier Point roads, and 5) the fire motorway roads shown in red on Map 2-23.
- No new roads would be constructed, and no existing roads would be widened anywhere in the park to conduct hazard reduction or forest restoration thinning operations.
- Tracked or wheeled mechanical equipment would not be used anywhere in Wilderness to achieve forest restoration target conditions or to remove hazardous wildland fuels. Hand thinning of trees would be done for wildland fire or prescribed fire management in Wilderness areas.
- No trees or woody material would be sold to provide funding for either park operations or for the Yosemite fuels management program.
- Forest restoration targets are not based on any specific year in the park’s history, but rather on a general range of conditions that existed prior to 90-130 years ago, when fires influenced ecosystems in a more natural manner, and before the onset of fire suppression. The result of fire’s influence in Yosemite Valley, for example, is believed to have been a less dense conifer forest than exists today, with more oak habitat, larger meadows for wildlife, lower quantities of wildland fuels, and correspondingly lower intensities of wildland fires. Initial restoration of more natural conditions would be followed by the perpetual use of prescribed and wildland fire to maintain fire-dependent ecosystems. Mechanical restoration work would be done where prescribed fire or wildland fire could not be safely used, either due to the risk of fire escape or to smoke issues.

Description of the Wildland/Urban Interface (WUI)

Prescribed burning and mechanical fuel reduction would be used to restore and maintain ecosystems and target fuel loading in the wildland/urban interface (WUI). This area is defined as the primary park developments occupied throughout the year (Wawona, Foresta, El Portal, Yosemite West, Hodgdon Meadow, and Yosemite Valley) plus up to a 1½ mile-wide belt around them. The 1½ mile perimeter is part of the State of California definition of WUI.

In all alternatives, high priority would be given to the removal of unnaturally dense stands of small trees in the WUI zone. The removal of such trees would follow the guidelines of the Sierra Nevada Forest Plan Amendment Record of Decision (U.S. Forest Service 2001). Such trees are no greater than 20” dbh, with particular attention given to trees less than 12” dbh.

Generally, mechanical thinning to achieve fuel reduction target conditions would be done in a ¼ mile-wide belt immediately adjacent to the six WUI communities (inner WUI), followed by prescribed fire. If safe and practical to do so, prescribed fire would be used first in certain locations, rather than mechanical methods, to reduce wildland fuels. Work to achieve forest restoration targets conditions in this area would generally occur after work was done to reduce the risk of unwanted wildland fires. For example, under Alternative B, WUI protection through wildland fuel reduction would be done within 5 years, while forest restoration work could take up to 15 years.

From ¼ mile to 1½ miles from the six WUI communities (outer WUI), prescribed fire would be used first. If target forest restoration conditions were not achieved through the use of prescribed fire, mechanical thinning would occur following preparation of environmental compliance documents subject to public review.

The immediate focus for reducing the risk of wildland fire in WUI areas is on 6,425 acres, which is a combination of the acreage of the six WUI communities themselves, plus up to a ¼ mile-wide belt around each of them (i.e., the inner WUI area).

Alternatives, Including the Preferred Alternative

Process for Formulating the Alternatives

The action alternatives considered in the *Final Yosemite Fire Management Plan EIS* were developed from comments and concerns expressed by the public; input from federal, state, and local agencies; guidance from existing park plans; policy guidance from the NPS, the 2001 Federal Fire Policy, and the National Fire Plan; and research, monitoring, and experience from the existing fire management program.

Using issues first identified in 1999, fire management staff began consultations with fire and resource management specialists within the park and within other fire and land management agencies. Concepts for developing a range of alternatives began taking shape in December 2000, following consultations with the park's Resources Management Division. It was suggested that the alternatives vary in two ways:

1) by proposing various combinations of wildland fire, prescribed burning, fuels treatments, and fire suppression activities; and
2) by variations in the amount of time needed to reduce fuels in developed areas and to restore or maintain natural fire regimes throughout most of the park.

Finally, the comments received during the March and April 2001 scoping period were used to further develop the range of alternatives and identify needed analyses.

An analysis of the natural fire regime for each of the park's main vegetation types, combined with known fire history, yielded maps showing estimates of the number of natural fires that various areas of the park may have "missed" because of fire suppression. This estimate is called the *Fire Return Interval Departure (FRID)*. FRID estimates were used to identify and estimate acres of land that need reintroduction of fire for ecosystem restoration. Areas with higher numbers of missed natural fires are assumed to have unnaturally heavy accumulations of wildland fuels. Such areas are likely to burn with unnaturally high intensities, which could threaten natural and cultural resources, as well as communities and developments.

Areas of the park that show the greatest departure from the natural fire regime, and thus are at the greatest risk of unnaturally high-intensity wildfires, are on the west side of the park at lower elevations. This is also where the WUI communities occur. Much of this area was subject to intensive logging activity prior to being added to the national park. Without fire, second growth forests have grown in even-aged stands with high densities of wildland fuels.

The action alternatives (B, C, and D) were developed with three specific goals:

1. to reintroduce fire into areas that show adverse effects of fire suppression (i.e., vegetation is beyond its natural range of variability and has a high FRID value);
2. to maintain the natural fire regime in park ecosystems where vegetation is within its natural range of variability (i.e., FRID values are low); and
3. to reduce forest fuels near communities, roads, and other park developments so prescribed and wildland fire can be used more safely throughout the park, and to reduce the risk of unwanted wildland fire.

Chapter 2 describes target desired conditions for vegetation and fuels for vegetation types of the Sierra Nevada, which includes measurable variables that can be used to determine the need for, and achievement of, restoration and maintenance of more naturally balanced park forests. The variables were developed in conjunction with science and management personnel from Crater Lake, Lassen Volcanic, and Sequoia and Kings Canyon national parks. Based on this research, approximately 16,000 acres a year should be treated with prescribed and wildland fire in Yosemite to restore and maintain park fire cycles and more natural amounts of wildland fuels. While wildland fire activity would vary from year to year, projections can be made about the acreage that would be treated with prescribed fire for ecosystem restoration and fuel reduction purposes (Appendix 6).

The approximately 16,000 acres treated annually to achieve ecosystem restoration and maintenance, as well as greater protection from unwanted wildland fire, would include:

- acres of fuel reduction in the six WUI areas and the road corridors through prescribed fire and mechanical thinning;
- acres of ecological restoration and maintenance through prescribed fire and managed wildland fire; and
- acres burned by wildland fire that escapes initial control efforts in areas scheduled for prescribed burning but still achieves acceptable ecological effects, and by wildland fires or prescribed fires that are suppressed due to smoke issues. (Current federal fire policy does not consider fires that are suppressed to have any beneficial effects. Although such acreage will be reported by Yosemite National Park according to federal fire policy requirements, the Yosemite fire management plan will count such acreage for internal use such as in FRID calculations).

Alternatives Considered

The alternatives considered in the *Final Yosemite Fire Management Plan EIS* include the following:

Alternative A:	No Action (existing program)
Alternative B:	Aggressive Action

Alternative C: Passive Action

Alternative D: Multiple Action (Preferred Alternative)

Alternative D also is the environmentally preferred alternative, which is the alternative that causes the least damage to the environment and best protects, preserves, and enhances historic, cultural, and natural resources. Further discussion of the environmentally preferred alternative appears in Chapter 2.

Under the action alternatives, the three fire management zones currently in effect (NPS 1990) would be changed to two fire management units—a Fire Use Unit (83% of the park; 621,059 acres) and a Suppression Unit (17% of the park; 128,044 acres). In the Fire Use Unit, managed wildland fire would be the primary tool used to restore and maintain natural ecosystems and processes. In a portion of the Fire Use Unit (48,912 acres), additional prescribed burning may be necessary to reduce fuel loads near the Unit's boundary to a point where managed wildland fire would be safe and appropriate. In the Suppression Unit, all wildland fires would be suppressed using the appropriate management response.

Actions Common to All Alternatives

Fire Management Units

The park is divided into fire management units based on the need for both ecosystem restoration and protection of homes, businesses, historic buildings, and other developments. Under Alternative A (No Action Alternative), unit boundaries would remain the same as the three existing zones (Map 2-19) approved under the park's previous fire management plan. The 1990 plan intended that these boundaries would be dynamic—to be relocated as work was accomplished. Because of the amount of burning from prescribed and wildland fire over the last decade, and because of the direction received from the National Fire Plan, only two units - a large Fire Use Unit and a Suppression Unit - are proposed under Alternatives B, C, and D (Map 2-20).

Public Safety

Public and firefighter safety is the number one priority of all alternatives. The 2001 Federal Fire Policy states: "Firefighter and public safety is the first priority, and all fire management plans and activities must reflect this commitment." NPS Wildland Fire Policy (Director's Order 18) echoes this direction: "The NPS is committed to protecting park resources and natural ecological processes, but firefighter and public safety must be the first priority in all fire management activities." The *Yosemite Fire Management Plan*, regardless of which alternative is selected, would enact necessary measures and direction to ensure the safety of firefighters and the public.

Public Information and Education

An active partnership in fire education would be a component of yearly planning for park staff in the divisions of Interpretation and Resources Management and in the branch of Fire and Aviation Management. Fire education would be a component of the park's interpretation program. The Office of Media Relations would notify adjacent communities by press release before some prescribed fires are implemented. Media Relations would work closely with visiting Fire Information Officers who may be part of an Incident Management Team or Fire Use Management Team, to assure the park message is delivered effectively. During emergency wildland fire situations, park interpretive staff would provide information to visitors and would assist the incident information officer. A smoke communication strategy (Appendix 4) would be used during fire management activities as a blueprint for managing smoke events and communicating with communities and other agencies.

Mitigation Measures

To ensure protection of natural and cultural resources and the quality of the visitor experience, a set of mitigation measures would be applied to actions implemented under this plan. These mitigation measures also would be applied to future actions that are guided by this plan. Mitigation measures have been identified that relate to safety and human impacts, natural resources, cultural resources, treatment of snags and slash, visual quality, and communication/coordination. A general discussion of mitigation measures is presented below, and measures are addressed in more detail in Chapter 2 (Alternatives).

Protection of Resources of Management Concern

Yosemite has a variety of cultural and natural resources of particular concern to park managers, such as rare habitats, and listed plant and wildlife species. On-the-ground inventories of proposed prescribed fire units and managed wildland fire areas would be pursued if such resources were known, or had potential to occur within the unit, and appropriate protection measures would be taken.

Non-Native Plant Species Management

Fire would be used as a tool, when appropriate, to manage invasive non-native plant species. Prescribed burns would be scheduled for seasons when introduction or spread of such species would not be enhanced. If prescribed fires cause invasive non-native plants to increase and create a fire hazard, fire management funds may be used to mitigate the hazard, including the use of mechanical treatment methods.

Air Quality/Smoke Management

Strict adherence to state and federal air quality regulations would occur under all alternatives. This process mandates consultation with California Air Resources Board (CARB) and local (county) Air Pollution Control Officers (APCO), and other federal and state agencies that are involved with similar fire treatments. Ignition of prescribed fires would only be done on “burn days” or if allowed by a variance from the county APCO. Monitoring would document visual aspects of the smoke column or particulate matter levels using specialized equipment.

Air Quality Watershed Strategy

Smoke movement patterns have a direct relationship to watersheds, especially below 7,500 feet. If several fires were burning simultaneously in the same air-quality watershed, down-valley smoke might be extreme. Because of this, the park would control additional starts within an air-quality watershed that already had a fire burning within it, upon request of local or state air quality regulators. Cumulative smoke impacts also would be managed through coordination and scheduling of burn projects with neighboring burners and agencies

Research and Monitoring

Fire monitoring would include monitoring of wildland and prescribed fires, and systematic data collection on fuels, topography, weather, air quality, fire behavior, and ecosystem response. For cultural resources, cultural resource specialists (usually a fire archeologist) would identify any necessary pre-burn mitigation or resource protection measures required, and the most appropriate monitoring strategy for burns.

Current fire management strategies are based on more than 30 years of scientific studies and research. As the program continues to mature, additional information would be gathered and used to refine objectives and meet new challenges. New research needs and priorities would be identified by the Fire Management Office in conjunction with Yosemite's Resources Management Division and the research scientist from the USGS Western Ecological Research Center, Yosemite Field Station. Adaptive management would be used to guide fire management activities by drawing on the best available science, emergent technologies, and an ever-increasing database on the role and effects of fire on park resources.

Roads and Trails Used for Fire Protection

Roads, trails, and utility corridors within the park would provide access for monitoring and control of wildland fires (Maps 2-23 and 24). Roads, fire motorways, and trails would be used as boundaries for prescribed burns, anchor points for constructing fire line, and as fire line. They would provide access for engines and crew transports trying to get to an unwanted fire rapidly. No new roads are proposed under any alternative for fire or fuel management projects.

Yosemite Fire Management Organization and Responsibilities

The fire management program is directed by the Fire Management Officer (FMO). The Fire Management Officer reports to the Visitor Protection Division Chief, and supervises specialists in charge of other fire management functional areas, including wildland fire suppression, aviation, structural fire, prescribed fire, and wildland fire used for resource benefits.

Fire Reporting

Fire reporting follows guidelines established by Directors Order 18 and the associated reference manual, RM-18 (NPS 1998, 1999b). All fires, regardless of type, are required to have a written report, which is tracked at park and national levels.

Description of the Alternatives

Alternative A – No Action

Under Alternative A – the No Action Alternative – the fire management program would continue to use the strategies of the existing 1990 fire management plan. These strategies include prescribed fire, management of natural ignitions (managed wildland fire), fire suppression, and hand cutting followed by pile burning and prescribed fire. The use of mechanical means to achieve forest restoration target conditions would not occur.

The Fire Management Units for this alternative would be the same as the zones used in the 1990 plan: the Fire Use Unit equals Zone I – Prescribed Natural Fire Zone; the Conditional Unit equals Zone II – Conditional Fire Zone; and the Suppression Unit equals Zone III – Suppression Zone (see Map 2-19). Wildland/urban interface areas are not identified.

Under this program the park has averaged 1,472 acres of prescribed burning and 2,567 acres of managed wildland fire each year (Table ES-1). Levels of accomplishment under this plan are shown in Table A-6.3 in Appendix 6. Acreage treated each year with prescribed and wildland fire has varied widely.

While weather and wildfire activity contribute to these annual fluctuations, other important factors include smoke management regulations, and concern that a prescribed fire might escape into a community. Fuel reduction in and near these communities has not been sufficient to significantly reduce this latter concern, and thus a broader use of fire near communities has been precluded.

Acres treated under Alternative A have not approached the target of 16,000 acres that scientists believe would need to burn annually to simulate natural conditions. Over the last decade the park has reduced hazardous fuels near developed areas, but the goal of providing a more open and more fire-safe forest in and around every community may not be met at this rate.

Table ES-1
Summary of Alternatives (Alternative A uses terminology from in the 1990 Fire Management Plan).

	NO ACTION ALTERNATIVE	ACTION ALTERNATIVES		
	Alternative A	**Alternative B**	**Alternative C**	**Alternative D**
Years to Achieve Ecosystem Restoration Goals	Not achieved at present level of activity	10 to 15 years	25 years	15 to 20 years
Years to Achieve WUI Protection	Not a high priority under the 1990 *Fire Management Plan*	5 years	10 years	6 to 8 years
Average Number of Acres Treated Annually (inner WUI)	Less than 100 acres for all developed areas	approximately 1,285	approximately 766	approximately 1,095
Average Number of Acres Treated Annually – Prescribed Fire	1,472 acres per year (over the past 29 years)	2,520 to 12,872	1,260 to 6,436	1,817 to 9,194
Average Number of Acres Treated Annually - Managed Wildland Fire	2,567 acres per year (average over the past 27 years)	Maximize managed wildland fire with a target of 16,000 acres per year (all treatments) based on fire history data indicating what would have naturally burned.		

Alternative B – Aggressive Action

Under Alternative B, hazardous wildland fuels in the six WUI areas would be substantially reduced within 5 years, and fire-related ecosystem restoration goals would be achieved within 10 to 15 years (Table ES-1). Techniques in the six WUI communities (Table ES-2) would include use of chainsaws and handpiling (i.e., passive techniques), and use of feller bunchers, tractors, skidders, crushers, and similar equipment (i.e., aggressive techniques) to remove trees up to 12” dbh for wildland fuel reduction objectives and up to 20” for forest restoration objectives in the inner WUI. Thinning followed by prescribed fire would occur in the ¼ mile-wide zone adjacent to WUI communities (inner WUI), while prescribed fire followed by thinning (if needed and supported by a subsequent project level Environmental Assessment) would be done from ¼ up to 1½ miles from WUI communities (outer WUI).

Alternative B would reduce fuels on an average of 1,285 acres per year in inner WUI areas (Maps 2-6 through 2-18) over 5 years (6,425 acres total). Aggressive mechanical fuel reduction methods would be used on less than 1% of the park; following this treatment, prescribed fire would be used in WUI areas as much as possible for fuel and ecosystem maintenance.

Median and maximum fire return interval departure (FRID) analyses were used to determine locations and to set annual goals (range of acres) for treatments, using various restoration, maintenance, and fuel reduction strategies (Maps 2-4 and 2-5, Table 2.5).

Natural fire regimes would be restored in areas, generally in the Suppression Unit, that have missed four or more fire return intervals by treating between 2,520 and 12,872 acres per year, for a total of 31,503 to 160,894 acres within about 15 years. This alternative would treat WUI areas and accomplish restoration goals in the shortest amount of time compared to the other alternatives.

Table ES-2
Fire and Mechanical Treatments Used in Alternative B by Unit (XX indicates primary strategies for that area).

ALTERNATIVE B	Suppression Unit			Fire Use Unit		
Treatment Strategy	WUI	Non-WUI/ Non-Wilderness Road Corridors	Wilderness	WUI	Non-WUI/ Non-Wilderness Road Corridors	Wilderness
Aggressive Reduction	XX					
Passive Reduction	X	X	X	XX	XX	X
Managed Wildland Fire					XX	XX
Prescribed Fire	XX	XX	XX	XX	X	X

Alternative C – Passive Action

Under Alternative C, efforts would be taken to decrease fuels in WUI areas in 10 years, and accomplish ecosystem restoration goals in 25 years (Table ES-1). Because of this timeframe, the number of acres treated each year would be the least among the three action alternatives. Fuels would be reduced in the six inner WUI areas by an average of 766 acres per year over 10 years.

The fire regime would be restored in areas, generally in the Suppression Unit, that have missed four or more fire return intervals by treating between 1,260 and 6,436 acres per year (31,503 to 160,894 acres over 25 years). Prescribed burning would be increased over what the current program accomplished, but not as much as under Alternative B; mechanical treatment methods would be limited to chainsaws and hand piling. “Passive” therefore refers to a somewhat longer timeframe and less intensive mechanical treatment methods, relative to other action alternatives (Table ES-3).

Because of the extended timeframe, this alternative would depend on wildland fire to play a larger role in ecosystem restoration than other action alternatives. However, more areas may experience unnaturally large, high-intensity, stand replacement wildland fires, because of the hazardous levels of fuels that would remain for a longer period in the Suppression Unit. Under this alternative, it would take more time to accomplish the park’s goals than under other action alternatives, but less than under Alternative A. By the time all areas were treated, however, many areas would have missed another fire return interval or two, thus, the risk of stand replacement fire would remain high throughout the restoration period.

Table ES-3
Fire and Mechanical Treatments Used in Alternative C by Unit and Area **(XX indicates primary strategies for that area).**

ALTERNATIVE C	Suppression Unit			Fire Use Unit		
Treatment Strategy	**WUI**	**Non-WUI/ Non-Wilderness Road Corridors**	**Wilderness**	**WUI**	**Non-WUI/ Non-Wilderness Road Corridors**	**Wilderness**
Aggressive Reduction						
Passive Reduction	XX	XX	X	XX	XX	X
Managed Wildland Fire					X	XX
Prescribed Fire	XX	XX	XX	XX	XX	X

Alternative D – Multiple Action

Alternative D combines aggressive and passive fuel reduction techniques to achieve protection, fuel reduction, and ecosystem restoration goals. Under this alternative, passive and aggressive treatment strategies would be used in the WUI, while prescribed fire and passive mechanical fuel reduction techniques would be used to achieve ecosystem restoration goals in other areas, but at a rate intermediate between Alternatives B and C (Tables ES-1 and ES-4). In the inner WUI, hand thinning would generally be used to remove trees up to 12” dbh, while aggressive methods would be used to remove 12-20” dbh trees

This alternative would reduce fuels on approximately 1,095 acres per year for 6-8 years in the inner WUI (6,425 acres total). It would restore natural fire regimes to areas, generally in the Suppression Unit, that have missed four or more fires by treating between 1,817 and 9,194 acres per year for 15-20 years (31,503 to 160,894 acres total).

Aggressive and passive thinning methods would be used around the six WUI communities (Hodgdon Meadow, Foresta, Yosemite West, El Portal, Yosemite Valley, and Wawona). Mechanical thinning followed by prescribed fire would be used in the core and ¼ mile-wide area adjacent to the six communities (inner WUI). Prescribed fire followed by thinning (if needed and supported by a project level Environmental Assessment) would be done from ¼ mile up to 1½ miles adjacent to the six WUI communities (outer WUI) to restore target vegetation conditions. This alternative would require more time to accomplish WUI protection and ecosystem restoration than Alternative B, but less time than Alternatives A or C.

Table ES-4
Fire and Mechanical Treatments Used in Alternative D by Unit and Area **(XX indicates primary strategies for that area)**

ALTERNATIVE D	Suppression Unit			Fire Use Unit		
Treatment Strategy	**WUI**	**Non-WUI/ Non-Wilderness Road Corridors**	**Wilderness**	**WUI**	**Non-WUI/ Non-Wilderness Road Corridors**	**Wilderness**
Aggressive Reduction	XX					
Passive Reduction	XX	X	X	XX	XX	X
Managed Wildland Fire					XX	XX
Prescribed Fire	XX	XX	XX	XX	X	X

Alternatives Considered, But Dismissed

During public scoping for the *Draft Yosemite Fire Management Plan EIS*, several alternative actions were recommended by members of the public. Others were suggested by scientists, technical specialists, and NPS employees. While all were considered, and many were included as alternatives or elements of alternatives, some were eliminated from detailed study per 40 CFR 1504.14(a). Reasons for dismissing alternatives and elements include:

- Technical or economic infeasibility.
- Inability to meet project objectives.
- Duplicative with other less environmentally damaging alternatives.
- In conflict with an up-to-date and valid plan, statement of purpose and significance, or other policy, and therefore, would require a major change in that plan or policy to implement.
- Environmental impacts were too great.

Alternatives that were considered but dismissed include the following:

Suppress All Fires This alternative was dismissed for several reasons, including its inconsistency with NPS and federal wildland fire management policy and Yosemite's *General Management Plan*, which calls for allowing natural processes, including fire, to prevail.

Disallow the Use of Mechanical Fuels Treatment This alternative was dismissed because of the need to retain options when developing strategies for reducing fuels and the risk of harmful wildland fire along the WUI. Years of fire suppression have resulted in buildup of fuels and a change in forest structure in many locations. In some areas, even the use of prescribed burning to simulate the role of fire would likely be ineffective because changes in forest structure would be difficult to reverse through the use of fire alone. Prescribed fire may be unsafe to use near communities with heavy accumulations of wildland fuels, or because of health concerns related to smoke sensitivity.

Use Mechanical Treatments Only This alternative was dismissed because of its inability to meet park objectives and because it would be in conflict with federal and NPS policies. Even where mechanical techniques are effective in restoring forest structure and reducing risks near WUI areas, prescribed burning is needed after mechanical treatments because of the important ecological influences of fire. Mechanical treatments would rarely meet the minimum tool requirement in the Wilderness portions of the Fire Use Unit because managed wildland fire and prescribed fire can meet objectives in most of these areas.

Approaches to Protecting WUI Structures Without Fuel Treatment. One comment on the *Draft Yosemite Fire Management Plan EIS* suggested that the range of alternatives was inadequate because it did not include simply using fire retardant foam or heat reflective tents to protect structures in WUI areas. This comment was considered but was not included in the *Final Yosemite Fire Management Plan EIS* because it did not represent an alternative per se for managing fire to accomplish park and resource management objectives. It is a tactical option for protecting structures.

Affected Environment

A list of specific impact topics was developed to compare environmental impacts of fire management activities among the four alternatives. These topics were selected based on federal law, regulations, and executive orders; agency management policies; federal wildland fire management policies; information from subject matter experts; and concerns expressed by the public or other agencies during the public scoping periods.

The existing environment that could be affected by actions proposed in the *Final Yosemite Fire Management Plan EIS* is described in Chapter 3. Existing conditions establish the baseline for the analysis of effects found in Chapter 4 (Environmental Consequences).

Environmental Consequences

An impact analysis for each of the impact topic areas has been completed for each of the four alternatives in the Final Yosemite Fire Management Plan EIS. Chapter 4 (Environmental Consequences) describes both beneficial and adverse effects in detail. These consequences are briefly summarized below.

Alternative A, No Action

Biological Environment Application of Alternative A would result in adverse, long-term, minor to moderate effects on vegetation park-wide, and would result in high potential for catastrophic fire, including stand-replacement fires, in upper and lower montane forests. Effects of such fire on wildlife would be potentially adverse, long-term, and major because of the following:

1. loss of habitat through changes in vegetation structure and fuel loading;
2. potential for catastrophic fire; and
3. habitat type conversion, including potentially detrimental changes in groundwater.

Adverse, long-term, minor effects on special-status species plants are likely because of the small and fragmented location of populations. Greater effects on special-status wildlife species (including moderate and major effects for some species) are likely because of the adverse effects of catastrophic fire in upper and lower montane forests. Adverse, long-term, major effects are likely on wetlands because of fragmentation and the creation of barriers resulting from high-intensity fire, as well as through the effects of erosion, turbidity, and siltation.

Physical Environment Adverse, long-term, moderate effects are likely due to the potential for catastrophic fire in the western portions of the park. Fires could affect ridge, mid-slope and bottom slope areas of watersheds, increasing water yield, peak flows, nutrient yield, sediment yield, and stream system response. Lesser effects would be expected from prescribed fire activity and wildland fires allowed to burn in the Conditional and Fire Use zones. Major, adverse, short-term impacts on air quality could occur because of unwanted catastrophic fires that consume areas with high concentrations of fuels.

Cultural Environment Adverse, long-term, major impacts to archeological resources would occur due to the likelihood of catastrophic fire and emergency suppression actions and their effects on surface and subsurface materials, and risks associated with exposure of artifacts to looting and vandalism. Adverse, short-term, minor to moderate impacts to ethnographic resources would occur, mainly due to increased likelihood of catastrophic fire and its effects on traditionally gathered plant materials. Adverse, long-term, major effects on cultural landscape resources would occur, including impacts to significant historic structures and other elements on the landscape.

Social Environment Adverse, short-term, minor effects on recreation would occur from short-term closures and restrictions during fire management activities, including prescribed fire and thinning. During large, catastrophic fires, closures and other mandatory actions would result in adverse, short-term, major adverse effects, especially to businesses in and around the park. Adverse, long-term, major effects on scenic resources from high-intensity fires would occur, as would adverse effects on smoke-sensitive members of the community. Adverse, short-term, moderate to major effects on ambient noise levels would occur, especially in WUI areas and during large, catastrophic fires. Risk of direct effects (loss of property during fires) and indirect effects (loss of business during fire-related closures) would be highest under Alternative A. Beneficial, long-term, minor effects on minority and low income populations in park communities would occur due to reduction of risk of loss of work because of such closures.

Special Designations Wild and Scenic Rivers are discussed in Chapter 5. Fires allowed to burn would have beneficial, long-term, minor to moderate effects on Wilderness through actions that would maintain plant communities within their natural range of variability and reduce likelihood of large, high intensity fires that could spread into Wilderness. Unnaturally intense wildland fires would have adverse, long-term, major impacts on scenic resources. In Wilderness, helicopter and chainsaw noise would have adverse, short-term, and major impacts.

Energy Consumption This alternative would have adverse, long-term, negligible effects on the park's energy consumption, based on an estimate of 9,683 gallons of various fuels used in fire management activities in an average year.

Alternative B, Aggressive Action

Biological Environment Beneficial, long-term, moderate to major effects on vegetation would occur, due the amount of area treated by prescribed fire and biomass removal, especially in upper and lower montane forests, and from increased levels of wildland fire use. There would be a reduced threat of large, high-severity wildland fires in all areas of the park. Beneficial, long-term, major impacts on wildlife and habitat would occur because of the rapid restoration of forest structure to areas of the park that are significantly degraded because of the exclusion of fire. The threat of catastrophic fire and its impacts on wildlife and habitat would be reduced.

Impacts to special-status species would be, in general, beneficial and minor to major. Mitigation would be required to limit adverse effects of the more aggressive treatment methods. The potential exists for adverse effects on special-status plant species from mechanical treatments, but mitigation requirements would minimize these impacts. Beneficial, long-term, moderate impacts to wetlands would occur from treatments that would reduce the threat of catastrophic fire.

Physical Environment Beneficial, long-term, major impacts would occur due to a combination of effects of natural fire in the Fire Use Unit. Beneficial, long-term, major effects in the Suppression Unit would occur due to the reduction of unnaturally large amounts of wildland fuel through prescribed fire and mechanical treatment methods. Compared to Alternative A, the No Action Alternative, deleterious effects on water yield, peak flows, nutrient yield, sediment yield, and stream system response would be less. Increased use of prescribed fire would result in greater than

50% more emissions compared to Alternative A. Wildfire emissions would be less in comparison with Alternative A. This Alternative would generate the largest quantity of emissions among all alternatives, resulting in adverse, short term, major impacts on air quality.

Cultural Environment In general, impacts on cultural resources would be beneficial, long-term, and moderate. This alternative reduces, to the greatest extent of all alternatives, the potential for catastrophic fire and its resulting impacts on archeological material, ethnographic resources, and cultural landscape resources. This alternative also poses the greatest potential for adverse impacts to cultural resources, however, due to the use of heavy equipment to reduce fuel loads and the potential for high-intensity prescribed fire, when compared to the other three alternatives. Mitigation measures to reduce such effects would be used. Cultural landscapes in Yosemite and Pate valleys would be restored and maintained.

Social Environment Adverse, short-term, minor impacts on recreation would occur, due to the larger area subject to treatment, compared to Alternative A. Under this alternative, there would be less likelihood of high-intensity, catastrophic fires with effects as major as the 1990 A-Rock Fire in Yosemite. Thus, the potential for area or park closures would be reduced. Potential effects of catastrophic fire on recreation would likely be adverse, short-term, and moderate (compared to major under Alternative A). Effects on scenic resources would be beneficial, long-term, and major, if fire is used as a tool to restore and maintain open vistas. During fuel reduction work there would be adverse, short-term, major impacts to ambient noise levels, especially near WUI areas. The noise events would be similar to those found under Alternative A, but the number of events and the duration of fuel treatment operations would be substantially greater than under Alternative A. Noise impacts on Wilderness would be the same as under Alternative A.

Impacts to communities would be beneficial, long-term, and moderate to major, because prescribed fire and mechanical thinning would restore plant community conditions in and near communities and developed areas. Risks associated with large, catastrophic fires would be greatly reduced in this alternative; direct effects (loss of property during fires) and indirect effects (loss of business during fire-related closures) would be greatly reduced compared to Alternative A; effects on minority and low income populations in and near the park would be similar to effects on local communities.

Special Designations Wild and Scenic Rivers are discussed in Chapter 5. Effects on Wilderness would be beneficial, long-term, and moderate to major, due to actions that would be generally beneficial in maintaining plant communities within their natural range of variability, thereby maintaining Wilderness values. This is especially true for the Fire Use Unit. Benefits in the Suppression Unit would be greater than under Alternative A, due to the large amount of fuels treatment and prescribed fire, and reduced potential for large, high-intensity fires in Wilderness. Helicopter and chainsaw noises would continue to introduce short-term intrusions, with adverse, short-term, and major effects, the same as under Alternative A.

Energy Consumption This alternative would have adverse, long-term, major impacts on the park's use of energy, with approximately 250,330 gallons of various fuels used in fire management activities in an average year.

Alternative C, Passive Action

Biological Environment Under this alternative the impacts on biological resources would be beneficial, long-term, and minor to major. This is due to an increase in the area treated by prescribed fire and an increase in managed wildland fire, compared to Alternative A, but with potential for catastrophic fire during much of the restoration period. The timeframe for restoration is within the normal range of fire return intervals for all but five vegetation types. Beneficial, long-term, moderate impacts on wildlife and habitat would occur through eventual restoration of park habitats to a more natural, fire-influenced condition that would support a more natural abundance, diversity, and distribution of species. The long period of time (25 years) to reduce the threat of catastrophic fire under this alternative could lead to unwanted wildland fires, resulting in adverse, short- to long-term, major impacts on flora and fauna. Effects on special-status plant species would be similar to those under Alternative A, due to the locations of these plants. Effects on special-status wildlife species would be beneficial, compared to Alternative A, because of reduced potential for catastrophic fire. Individual wetlands could incur beneficial, long-term, minor to moderate impacts, but overall park wetlands would see only negligible ecological benefits.

Physical Environment Beneficial, long-term, moderate impacts on watersheds and soils would occur. Large, high-severity fires would likely occur during the life of the plan, but the treatments proposed would reduce their adverse effects on soils and watersheds, including the potential for adverse effects on water yield, peak flow, nutrient yield, sediment yield, and stream system response. Air quality impacts would be adverse, short term, and major; increases would be slightly above 50% of Alternative A for all emissions except volatile organic compounds (VOC). The increase in VOC emissions would be considered adverse, short term, and moderate.

Cultural Environment Beneficial, long-term, minor to moderate impacts on archeological materials, ethnographic resources, and cultural landscape resources would occur. Impacts would be similar to those described for Alternative B, but there would be a greater potential for catastrophic fire effects under this alternative. Cultural landscapes in Yosemite and Pate valleys would be restored and maintained.

Social Environment Alternative C would cause adverse, short-term, minor effects on recreation due to short-term area closures and restrictions during application of fire management treatments, including prescribed fire and thinning. The potential for large, catastrophic fire events and their likely effect on recreation would be similar to, but less intense than, under Alternative A. Beneficial, long-term, moderate effects on scenic resources would occur because of more annual accomplishments in prescribed fire and fuel reduction than under Alternative A. Impacts on ambient noise levels would be adverse, short-term, and major, especially near WUI areas. Noise events would be similar to those described under Alternative A. Risks associated with large, catastrophic fires would be reduced in this alternative, compared to Alternative A, resulting in beneficial, long-term, moderate impacts on local communities. Direct impacts (loss of property during fires) and indirect impacts (loss of business during fire-related closures) would be the higher under this alternative than under Alternatives B or D. This is because of a smaller amount of annual prescribed burning and mechanical thinning to restore plant communities in developed areas and elsewhere in the Suppression Unit. Effects on minority and low income populations in and near the park would be the same as on local communities.

Special Designations Wild and Scenic Rivers are discussed in Chapter 5. Wilderness ecosystem impacts would be beneficial, long-term, and minor to moderate, similar to Alternative A. The potential for large, high-intensity fires in Wilderness would remain fairly high during the life of the plan. Helicopter and chainsaw noises would continue to introduce short-term intrusions, with adverse, short-term, and major effects, the same as under Alternative A.

Energy Consumption Impact on the park's energy consumption would be adverse, long-term, and major because of the annual use of 22,368 gallons of various fuels used in fire management activities.

Alternative D, Multiple Action

Biological Environment Beneficial, long-term, moderate to major impacts on vegetation would occur, due to the amount of area treated by prescribed fire and biomass removal, especially in upper and lower montane forests, and from increased use of managed wildland fire. Reduced threat of large, high-severity wildland fires in all areas of the park and a reduced potential for type conversion of vegetation would occur. Impacts on wildlife and habitat associated with restoration of a more natural forest structure to areas of the park where fire has been excluded would have beneficial, long-term, major impacts. The threat of catastrophic fire and its impacts on wildlife and habitat would be greatly reduced under Alternative D. Generally, effects would be beneficial and minor to major for special-status animal species, because measures would be taken to limit adverse effects of treatments. Effects on special-status plants would be similar to Alternative A, although some adverse impacts would be possible from mechanical treatments. In wetlands, effects would be similar to Alternative B; park wetlands would experience moderate to major ecological benefits, due to the multiple action approach.

Physical Environment Beneficial, long-term, major effects, similar to those under Alternative B, would be expected. Fires would likely affect a smaller portion of the watershed (e.g., a portion of the slope rather than the entire vertical gradient), compared to Alternative A. Deleterious effects on water yield, peak flows, nutrient yield, sediment yield, and stream system response would be reduced compared to Alternative A. Increased use of prescribed fire would result in greater than 50% more emissions as compared to Alternative A. Air quality effects would be adverse, short term, and major.

Cultural Environment Generally impacts on cultural resources would be beneficial, long-term, and moderate because of reduced potential for catastrophic fire and its effects on archeological material, ethnographic resources, and cultural landscape resources. There is potential for adverse, long-term, moderate to major impact due to use of heavy equipment to reduce fuel loads, and due to the potential for high-intensity, prescribed fire. Cultural landscapes in Yosemite and Pate valleys would be restored and maintained.

Social Environment Compared to Alternative A, adverse, short-term, minor effects on recreation would be expected due to a greater area of treatment. The potential for large, catastrophic fire events would decrease, reducing the potential for area or park-wide closures. Effects of catastrophic fire on recreation would likely be adverse, short-term, and moderate. Scenic resource impacts would be beneficial, long-term, and major, if fire is used to restore and maintain open vistas. Adverse, short-term, major effects on ambient noise levels would be expected, especially near WUI areas. Noise events would be similar to those under Alternative A, but the number and duration of events would be greater. Impacts on communities would be beneficial, long-term, and moderate to major, because prescribed fire and mechanical thinning would restore plant community conditions in developed areas, thereby reducing the risk of catastrophic fire and associated losses. Direct effects (loss of property during fires) and indirect effects (loss of business during fire-related closures) would be greatly reduced compared to Alternative A; these effects would be the same for minority and low income populations in and near the park.

Special Designations Wild and Scenic Rivers are discussed in Chapter 5. Effects on Wilderness would be beneficial, long-term, and moderate to major due to actions that would be generally beneficial in maintaining plant communities within their natural range of variability, thereby maintaining Wilderness values, especially in the Fire Use Unit. Benefits in the Suppression Unit would be greater than under Alternative A due to a greater amount of fuels treatment and prescribed fire, and lower potential for high-intensity, catastrophic fires. Helicopter and chainsaw noises would cause short-term, adverse, and major effects, much like under Alternative A.

Energy Consumption Impacts to the park's use of fuel would be adverse, long-term, and major due to the annual use of 147,462 gallons of various fuels used in fire management activities.

Summary

The Yosemite National Park fire management program is based on the National Fire Plan, with its key feature of firefighter and public safety as the top priority for the Yosemite program. Other important components of the Plan are restoration of fire as an ecological process, as well as the development of partnerships with neighboring communities, local and state governments, and other agencies to reduce the risk posed by unwanted wildland fire.

In response, the Yosemite fire program would be interactive with its neighbors and partners. Fuels management projects would be selected in collaboration with residents of the six WUI communities discussed in the EIS. Smoke management strategies would be developed and implemented with information and concerns expressed by affected publics as well as state and local air quality regulators. Program objectives would be developed and refined through adaptive management as information from previous projects and operations are assessed by park managers, cooperators, and scientists.

The *Final Yosemite National Park Fire Management Plan EIS* has been developed with consideration of the views and thoughts expressed during the planning process by many citizens with a deep regard for the park. The park staff would continue to listen to concerns and issues that arise during implementation of the fire management program, and revise the program accordingly to ensure that the objectives of the National Fire Plan are met to the fullest extent possible.

Table of Contents

Chapter VI: Consultation and Coordination VI-1

Chapter VII: List of Preparers VII-1

Appendices

List of Tables

List of Maps (Maps follow the end of each chapter)

Chapter I: Purpose and Need

Introduction

The *Final Fire Management Plan/Environmental Impact Statement* (EIS) presents several alternatives to implement National Park Service and federal wildland fire policies in the Project Area (see map 1-1). Fire management is an integral part of the park's natural and cultural resources management program. The *Yosemite Fire Management Plan* will assist in achieving land management objectives that are defined in the 1980 *General Management Plan*, the 1993 *Resources Management Plan*, and the 1997 *Vegetation Management Plan* for Yosemite National Park.

All major forest and chaparral plant communities in Yosemite have evolved under the influence of periodic fires, and many plants have developed adaptations to a regime of frequently occurring fires. Some plants are dependent upon fire for successful reproduction. Unfortunately, decades of fire suppression have altered park vegetation and wildlife habitat. The restoration of fire to its natural role in park ecosystems is one of the highest natural resource management priorities of Yosemite National Park.

Cultural resource management also benefits from fire, which can be used to protect cultural sites or to maintain cultural landscapes. Historic buildings must be protected from wildland fire, and one method is to periodically burn surrounding trees and shrubs to maintain an open, fire-resistant forest. Fire was also used by American Indians to maintain the meadows and the open stands of oak and conifers in Yosemite Valley. Historically, this helped maintain important traditional plants and living spaces.

Today, the open vistas of Yosemite Valley's meadows are enjoyed by millions of visitors every year, yet the suppression of fire has allowed trees to encroach on these historic vistas and cultural landscapes, changing the appearance of many areas of the park. Thus, fire plays a role in sustaining not only the natural ecosystems, but also the cultural value of the landscapes in Yosemite National Park.

Most of Yosemite is a vast, mountain Wilderness intersected by road and trail corridors and dotted with cabins, historical sites, businesses, and administrative and recreational areas. The park is adjacent to communities, private lands, and public lands managed by other agencies. Because of this mosaic of land uses and designations, land management policies and activities are complex.

This is especially true for fire management actions, which must respond in different ways in the various areas of the park. This document proposes alternatives for managing wildland and prescribed fire and for maintaining and restoring ecosystems, reducing fuels, and protecting cultural resources in the Project Area. It also examines the environmental impacts of each alternative.

With the completion of the fire management plan, Yosemite National Park's fire management program would employ a variety of activities to accomplish land and resource management objectives and to reduce the risk of unwanted fire in and adjacent to the park. Depending on the area needing attention, the park would use different methods (also known as *treatments*) to manage fire and to reduce the decades of accumulation of burnable vegetation and woody debris (dead and dry wood, leaves, duff).

Strategies for implementation would be based on knowledge gained from fire and fuels research, monitoring, and experience in Yosemite over the last half century, and in particular in the last 30 years when National Park Service policy changed from the suppression of all fire to one of fire management. Under fire management, lightning-caused fires may be allowed to burn, prescribed fires may be set by park managers, and all unwanted fires are suppressed.

Fire management plans are fundamental strategic documents that guide the full range of fire management related activities permitted by policy. They are required by the National Park Service Director's Order 18 (NPS 1998a) which says: "Every park area with burnable vegetation must have a fire management plan approved by the Superintendent," and the 2001 Federal Wildland Fire Management Policy (hereafter, 2001 Federal Fire Policy), which states: "Complete, or update, Fire Management Plans for all areas with burnable vegetation."

The Decision to Prepare an Environmental Impact Statement

The decision to prepare an Environmental Impact Statement (EIS) on the *Draft Yosemite Fire Management Plan* was made by the Superintendent of Yosemite National Park after specific issues were raised by the public during preliminary scoping (conducted in 1999). Members of the public were concerned about wildland fires and the build-up of forest fuels near communities and developed areas in and near Yosemite National Park.

The *Final Yosemite Fire Management Plan/EIS* was prepared to comply with the requirements of the National Environmental Policy Act (NEPA) and National Historic Preservation Act as well as the Endangered Species Act and the Wild and Scenic Rivers Act. The legal authority for preparing and implementing the *Yosemite Fire Management Plan* is 16 USC 1 through 4, which is the 1916 Organic Act for the National Park Service.

Following the public comment period on the *Draft Yosemite Fire Management Plan/EIS* and consultations on any actions that affected historic resources or special-status species, this *Final Yosemite Fire Management Plan/EIS* has been prepared. At the conclusion of a 30-day waiting period, the National Park Service will issue a Record of Decision, signed by the Pacific West Regional Director of the National Park Service. Any changes that are made to Yosemite's fire management program will be implemented. An implementation document, the *Yosemite Fire Management Plan*, will also be prepared. It will become the working document for guiding fire management actions in Yosemite National Park.

Purpose Of and Need For the Yosemite Fire Management Plan

Purpose of the Plan

The purpose of the *Final Yosemite Fire Management Plan/EIS* is to present and analyze alternatives for carrying out the fire management program in Yosemite. It also presents and analyzes effects that would occur as a result of implementing these alternatives in different areas of the park. The specific purposes of the *Yosemite Fire Management Plan* are to:

- Identify and implement methods to restore and maintain park ecosystems and ecosystem processes that allow fire to play its natural role in the ecosystem, both as wildland fire and prescribed fire.

- Reduce the risk of fire to cultural resources (i.e., historic buildings, pictographs) through fuels reduction, prescribed burning, or fire suppression to prevent fires from damaging cultural resources. Fire will also be used as a tool to manage cultural landscapes.

- Reduce the risk of catastrophic fire, including near the wildland/urban interface (communities, government and commercial buildings, and other developed areas), while continuing to reverse the adverse effects from past fire suppression and prevention activities.

- Execute a fire management program that provides a safe environment for firefighters and the public, including safe operations and fire management related facilities (e.g., helibases, fire camps, fire stations).

- Provide a plan that is consistent with National Park Service wildland fire management policy and adheres to guiding principles from the 2001 Federal Fire Policy, which recognizes that:

  - Firefighter and public safety is the first priority in every fire management activity.

  - Wildland fire is an essential natural process

  - Fire management plans, programs, and activities support land and resource management plans and their implementation.

  - Sound risk management is a foundation for all fire management activities.

  - Fire management programs and activities are economically viable, based on values to be protected, costs, and land and resource management objectives.

  - Fire-related plans and activities should be based upon the best available science.

  - Fire management plans and activities incorporate public health and environmental quality considerations.

  - Federal, state, tribal, local, and interagency coordination and cooperation are essential.

  - Standardization of policies and procedures with other agencies is an ongoing objective.

Need for the Plan

Since the early 1970s, National Park Service fire policy has been to allow fire to play a more natural role in park ecosystems. The park's fire management program has pursued this policy for over three decades, yet the program, while making significant inroads, has not been able to meet park land management objectives of ecosystems restoration and providing protection for developed areas and cultural resources through reduction of hazardous quantities of wildland fuels.

The long-term buildup of fuels has continued under the existing plan in many areas of the Project Area. Increased application of prescribed fire and additional methods of hazard fuel reduction are needed to restore fire to ecosystems and reduce forest fuels in at-risk areas on a larger and more significant scale than has occurred historically.

A revised *Yosemite Fire Management Plan* is needed because:

- Fire has a natural role in maintaining and sustaining ecosystems in Yosemite National Park, some of which have been altered by past fire suppression activities. Refinements to the fire management program are needed that will promote ecosystem sustainability.

- Communities, cultural resources (i.e., historic structures, blazed trees, and pictographs), campgrounds, and other developed areas of the park need protection from unwanted, high-intensity wildland fires. Fire treatments and pretreatments (e.g., prescribed fire, mechanical thinning of understory vegetation, pile burning, chipping) are needed that will reduce the risk of catastrophic fire and ensuing property loss, and begin to reverse the fuel accumulation and ecosystem changes that have created these risks.

- Fire can help restore and maintain cultural and traditional landscapes valued by visitors and descendants of culturally associated American Indians.

- Management of wildland fires, prescribed burning, and fuel reduction treatments require up-to-date planning and preparation.

- Fire management activities require collaboration with federal, state, county, tribal and local agencies, and a fire management plan provides a basis for communication, coordination, and project planning with partner agencies.

- Yosemite National Park must comply with the 2001 Federal Fire Policy.

- Safety is paramount to all fire management operations. The use of helicopters is essential for monitoring and controlling wildland fires and to transport crews and equipment for fire management activities. Helicopters also provide emergency services for the Yosemite area. Three of the existing helibases have marginal safety clearances, are too close to populated areas, or have poor road access. Helibase upgrades are needed to ensure continued safe operations at Crane Flat, El Portal, and Wawona Meadow helibases.

Background

The Sierra Nevada has a high incidence of lightning fires. Over the past 30 years in Yosemite National Park, lightning has started an average of 55 fires, or 83 fires per million burnable acres each year (NPS 1990). Tens of thousands of acres have burned in some years, while in other years only a few acres have burned. It is conservatively estimated that an average of 16,000 acres per year may have burned under natural conditions in the park. This average is equivalent to 2.4% of the park's burnable vegetation every year. Additional acres were periodically burned by American Indians in Yosemite Valley and other areas. These fires affected the amount and types of vegetation in those areas—both of which, in turn, influence fire incidence and behavior.

Evolution of the Policy toward Natural Processes Management

An awareness that suppression of natural fires led to a disruption of ecological processes and a diminished visitor experience, along with an evolving body of knowledge which suggested that fires are an essential element in the survival of the giant sequoia groves, led to a reassessment of the traditional National Park Service policy of suppressing all lightning fires. A major step in this process was the report of the Advisory Board on Wildlife Management in the National Parks

(Leopold et al.1963). About the changing forest conditions in the Sierra Nevada, the board observed:

> *Today much of the west slope is a dog-hair thicket of young pines, white fir, incense-cedar, and mature brush—a direct function of overprotection from natural ground fires. Within the four National Parks – Lassen, Yosemite, Sequoia and Kings Canyon – the thickets are even more impenetrable than elsewhere … Is it possible that the primitive open forest could be restored, at least on a local scale?*

This report had a major influence on the National Park Service, which began to change its policy on natural processes management in the late 1960s. In 1970, Yosemite National Park initiated the use of prescribed fire, and in 1972 the park began to allow naturally-ignited wildland fires in the higher elevations to burn, shortly after similar programs were instituted at Sequoia and Kings Canyon National Parks.

Wildland Fire Conditions in Yosemite

All vegetation that can sustain a wildland fire in Yosemite National Park will burn from time to time. As a result, plants and plant communities exist within a cycle of burning and growth. Between burns, the structure of the forest changes as the smaller plants beneath the tree canopy (plants of the *understory*) grow larger and some plants out-compete or out-grow others. Some plant communities sustain fires that mainly burn the undergrowth and leave most of the overstory trees unharmed. Other communities, like lodgepole pine, must accumulate enough fuel to sustain larger, more intense fires, commonly called *stand replacement fires*.

Some areas burn more frequently than do others. Fire tends to move through ponderosa pine/bear clover forests often, about every two to six years, creating an open understory while leaving the larger, fire-resistant trees. On the other hand, in red fir forests, which may burn frequently or may not be visited by fire for decades, the range for fire frequency is wide, from 5 to 70 years. Because the return of fire can vary greatly depending on forest type, time between natural fires is expressed as a range and is the *fire return interval*.

It is important to note that the term “natural” does not refer to any specific point in time or year but rather to a range of conditions that existed prior to the arrival of European settlers in the region. Park managers and scientists from Yosemite, Sequoia and Kings Canyon, Lassen, and Crater Lake National Parks have worked to develop a definition of the range of conditions and characteristics which described the presettlement forest ecosystems of these parks.

These ranges are displayed in tables 2.3 and 2.4. It is also important to note that the park program will use as its management objectives the portion of the ranges which will require the least amount of manipulation to restore, particularly with mechanical means. Natural processes will be used to the fullest extent possible to restore or maintain the natural range of variability, i.e., the range of characteristics such as vegetation density and species composition that existed prior to the onset of wildland fire suppression.

The combination of the frequency, extent, duration, behavior, season, and effects of natural fire that typically would burn within a specific landscape is called the *fire regime*. When fires in a specific area are regularly put out, the natural fire regime is disrupted. In Yosemite, administrative fire records go back to 1930 and information is also available for about another decade of documented fire history. Thus, managers at Yosemite have 80 years of records on fire and fire suppression activities on which to rely, in addition to even earlier anecdotal information. In addition, tree ring studies provide a history of fire frequency sometimes dating back hundreds of years.

Measuring the difference between the natural frequency of wildland fires and the number of years fire has been suppressed provides an indication of how far vegetation communities in a particular vegetation type deviate from natural conditions, had fires been allowed to burn. The number of missed fire return intervals is the *fire return interval departure* or FRID.

If an area had a fire cycle of approximately 10 years between historic fires and all fires in the area have been suppressed for 50 years, the FRID would equal five. Information on the number of fire return intervals that have been missed can be used to estimate how much an area has been disrupted from the vegetation and structure that would have been seen had fires been allowed to burn naturally.

In Yosemite National Park, fire has been largely suppressed since the 1920s, and in some areas, fire has been suppressed since the mid-19th century. In these areas of decades-long fire suppression, vegetation types that have short fire return intervals have missed several fires and show a large deviation from natural conditions. This means that wildland fuel has accumulated and forest density has increased to dangerous levels. In the last two decades, the National Park Service has restored fire to many of these areas, especially in Wilderness. However, the present program has not been able to meet the needs of the whole park, especially in the areas contiguous with wildland/urban interface (WUI) communities.

Long-Term Effects of Fire Suppression on Yosemite's Natural Resources

Because the National Park Service suppressed wildland fires, natural plant community succession, species composition, and forest structure have been altered. These changes are most pronounced in the oak woodlands, ponderosa pine/mixed-conifer, and white fir/mixed-conifer communities. The forest canopy is becoming increasingly closed and forest openings smaller as shade tolerant species grow in dense thickets. Fewer grasses, forbs, and shrubs grow in the remaining openings. Small trees are also encroaching on meadows that once would have been maintained by frequent fires.

In addition, subtle but important hydrological changes may have occurred because of increased forest growth. Decreased runoff and infiltration may have altered the water table around meadows, helping to accelerate tree invasion. It is also acknowledged that the late 19th century removal of part of Yosemite Valley's terminal moraine by early Euro-Americans altered the hydrologic regime of the Valley. All of these changes have, in turn, caused a deterioration in the habitat favored by many forms of wildlife, and therefore in the value of the ecosystem to the park visitor as a "vignette of primitive America" (Leopold et al.1963).

Lack of fire has changed habitat that is critical for certain wildlife species. When the number and extent of forest openings, or gaps, is reduced as forest density increases due to fire suppression, key shade-intolerant herbaceous and shrub species (particularly nitrogen fixers such as ceanothus) are also diminished (Bonnicksen and Stone 1982). Wildlife that depends on these plants, such as deer, has less available habitat.

Other species are dependent on fresh, fire-created snags and, like the black-backed woodpecker, may suffer a decline in the absence of fire. Lack of burning can also extend higher up the food chain. For example, rodents are less abundant in areas where fire has been excluded, almost certainly leading to a reduction in the carnivorous populations that depend on them.

The reverse of fire exclusion is the catastrophic effects from the inevitable reoccurrence of fire in ecosystems in which it has been suppressed for an unnaturally long period. The problems associated with vegetation changes that have increased the risk of uncontrollable wildland fires are especially prevalent at lower elevations. There, the natural mosaic of diverse vegetation types and ages is slowly being replaced by dense, continuous stands of shrubs and trees because of the success of fire suppression. Lower-elevation forests are susceptible to high-intensity wildland fire because of the increase in living and dead vegetation, both of which are fuel for fires.

The density of trees and shrubs has created a hazardous arrangement, both horizontally and vertically, of closely-standing, burnable vegetation, or *fuel ladders*, in the understory. Fuel ladders help fires ascend into the larger trees, or *overstory*. This combination of fuel ladders and a high density of fuels also increase the potential for insect and pathogen infestations, which, if they cause tree die-off, increase the potential for fire. In the event of catastrophic fire, whole landscapes can be denuded and reverted to shrub communities, watershed processes can be compromised, and other values can be greatly altered.

Fire and Visitor Experiences

Early explorers in the Yosemite region reported open park-like stands of large ponderosa and sugar pine, California black oak, and other trees (Bunnell 1890; Clark 1894). Photographs of Yosemite in the 1860s and 1870s confirm that this situation existed in many areas, including Yosemite Valley and the giant sequoia groves. This forest structure, primarily maintained by natural fires and fires set by Miwok inhabitants, has largely disappeared. This change has not only disrupted natural ecological processes, but has also changed the look of the Valley and most of the western portion of the park. Visitors are affected by loss of vistas and forest openings, fewer opportunities to see wildlife because of habitat changes, and difficulties in off-trail hiking opportunities because of increased undergrowth.

Fire and Developed Areas

Yosemite Valley, Wawona, El Portal, Foresta and the other communities and developed areas in and near Yosemite (map 1.2) are all located within plant community types that have evolved under the influence of fire. For decades, aggressive fire fighting has helped protect private and public property, historic and cultural resources, and boundary areas. However, these actions have contributed to ever increasing accumulations of fuels in grass, woodland, and forest areas, and an increasing potential for large, high-intensity fires that are difficult to control. Fire suppression is becoming increasingly difficult and expensive, a pattern reflected throughout western wildlands.

Over the last two decades, public awareness about deteriorating forest conditions and the danger of wildland fires near communities has increased because of the large numbers of devastating fires across the western United States. In 2002, three states (Arizona, Colorado, and Oregon) experienced the largest wildfires in their histories. In 1990, the A-Rock Fire burned a significant amount of private and National Park Service property in Foresta and the surrounding area and forced the closure of the park to the public for several days. This fire exhibited an intensity not previously seen in the Yosemite area, which is attributed to the buildup of wildland fuels because of fire suppression activities over many decades.

Existing Situation

Today, after more than 30 years of proactive fire management, the park is far from restoring natural fire regimes to the entire park landscape, though significant inroads have been made (Caprio and Graber 2000). While fuel reduction and prescribed burning have increased since the 1990 A-Rock Fire, developed areas are still at risk from uncontrolled wildland fires. The 2001 Federal Fire Policy specifically mandates public land agencies to reduce the amount of forest and shrubland fuels around areas with homes and buildings, and to restore ecosystems to a more natural, fire-tolerant balance. In response, the National Park Service has issued new fire management guidelines that require updated fire management plans.

Wildland/Urban Interface

The wildland/urban interface has been noted as a topic of special concern under the federal fire policy. Communities at risk from wildland fire have been identified by local, state, and federal fire management agencies. Much of the fuel management funding appropriated by Congress is intended to be used to reduce the threat of wildland fire to these communities.

Risk and damage caused by wildland fire are not limited to buildings. Wildland fires can create a significant safety risk to the public not only from the fire itself but also by the panic its occurrence can cause. Public health is impaired by long-lasting and dense amounts of smoke. Natural resources, including wildlife, soil, water quality, and vegetation can be degraded for decades, or require millions of dollars to rehabilitate. Local economies, especially those dependent on tourism, can experience severe financial loss when wildland fire causes road and area closures, as well as postfire loss of recreational opportunities.

Most importantly, public and firefighter safety are the first priority in the federal fire policy. The implementation of a fuel management program on a sustained, landscape level has been consistently identified as needed to reduce the intensities of wildland fires burning in unnaturally dense fuel, and to decrease as fully as possible the number of firefighters who die every year fighting these fires.

The wildland/urban interface is larger than the immediate area around a building. The Yosemite fire management program, like that of other local, state, and federal fire management organizations in California, considers the wildland urban interface to extend approximately 1 ½ miles around the park's six wildland urban interface communities of Hodgdon Meadow, Yosemite West, Yosemite Valley, Foresta, El Portal, and Wawona.

Where natural features such as cliffs and rivers define a defensible boundary which firefighters can use to defend these communities, the wildland/urban interface area is smaller than 1 ½ miles. The wildland/urban interface area is further divided into the *inner WUI*, which is comprised of the core community plus a ¼ mile-wide belt around it, and the *outer WUI*, which is beyond the ¼ mile wide belt up to the maximum of 1 ½ miles. Hazard reduction activities in the inner WUI area are given a high priority under this document.

Goals and Objectives of the Yosemite Fire Management Plan

When completed, the *Yosemite Fire Management Plan* will describe a detailed program of actions to carry out fire management policies and objectives in Yosemite National Park and El Portal Administrative Site. The goals and objectives of the plan have their foundations in the park's guiding management documents: the *General Management Plan* (1980), *Resources Management Plan* (1993), *Vegetation Management Plan* (1997), *Merced Wild and Scenic River Comprehensive Management Plan* (2000); as well as in National Park Service and federal legislation and fire policy; the National Park Service Organic Act; and the legislation establishing Yosemite National Park, Yosemite Wilderness, and the Merced and Tuolumne Wild and Scenic Rivers.

Each goal has a set of related management objectives. These may evolve during implementation of the fire management program, as part of the adaptive management process to which the fire management program adheres. It is recognized that achieving every goal to its fullest extent is not possible due to inherent conflicts between the goals. That is to say that one goal cannot be completely emphasized to the exclusion of other goals.

Goals and Objectives

Goal: Ensure firefighter and public safety.

The protection of firefighters and the public is the first priority in every fire management activity and during all phases of the fire management program.

Management Objectives:

- Plan and carry out all other activities consistent with and subordinate to safety considerations.
- Provide the fire management workforce with the training, equipment, operating procedures, safety measures, and information needed to manage risks and carry out their activities safely.
- Identify, inform, and protect visitors, communities, and other groups and individuals that potentially would be affected by fire management activities.
- Manage wildland and prescribed fires within designated areas or management units using the most current planning and risk assessment techniques available.

  Establish a Suppression Unit comprised of areas where wildland fire would have a high potential to compromise firefighter and public safety, threaten property, or violate air quality laws or regulations and where prescribed fire and other fuel reduction treatments could be used to reduce risks and accomplish resource management goals.

  Establish a Fire Use Unit to include areas where wildland fire could be managed to accomplish resource management goals in a way that did not compromise firefighter and public safety, threaten property, or violate air quality laws or regulations.

Goal: Implement a fire program that allows the natural process of fire to prevail in the Yosemite Wilderness.

The natural interactions between fire and the environment should influence the type, abundance, and distribution of plants and animals in the park. A crucial goal of Yosemite's fire management program is to restore or maintain natural fire regimes so that ecosystems can function essentially unimpaired by human interference. In areas showing adverse effects from fire suppression, restoration of forest structure and reduction of fuel loads will allow natural processes to resume and reduce the risk of unwanted, high-intensity wildland fires that might cause undesirable changes in forest type and threaten human lives or property.

Management Objectives:

- Manage ecosystems within the natural range of variability for plant community structure and fuel loads.

- Ecosystems that are within the range of maintenance target conditions (see table 2.4) should be maintained through natural processes (naturally-caused and re-ignited wildland fire), within the constraints of policy.

  – Ecosystems that are not within the range of natural variability should be restored to restoration target conditions (table 2.3) and subsequently maintained through natural processes, within the constraints of policy. Mechanical fuel treatment methods will be used in wildland/urban interface areas where the use of prescribed or wildland fire is not practical for ecosystem restoration because of safety or smoke concerns. Even in these areas, however, prescribed fire will be used as fully as possible to maintain the natural range of variability once more natural fuel conditions have been restored mechanically.

- Avoid adverse impacts to special-status species and their habitat from fire management activities, unless cleared in advance through the appropriate regulatory process.

- Set priorities for treatment activities based on site-specific information on departure from natural fire return interval, target conditions, and other relevant factors.

Goal: Manage Special Management Areas for specific purposes as mandated by policy, safety, or other regulations.

Because these areas are unique, the fire program goals will be modified somewhat in and near the wildland/urban interface, in the giant sequoia groves, and near boundary areas. These areas will hereafter be referred to as Special Management Areas.

Management Objective:

- Adhere to goals and objectives specific to each Special Management Area.

Wildland/Urban Interface: Reduce the risk of wildland fire to communities and developed areas. In Wawona, Foresta, Yosemite Valley, Yosemite West, Hodgdon Meadow, and El Portal, the goal is to use fire management treatments, including mechanical fuel reduction methods, to reduce the risk of unwanted wildland fire while restoring plant community structure.

Management Objectives:

Restore ecosystems to at least the upper end of the range of restoration target conditions (see table 2.3) to promote fire tolerant plant communities and create defensible space. This should reduce risks and improve the manageability of fire.

- Forest fuels should be reduced within developed areas by thinning trees and removing underbrush and dead wildland fuels.

- Prescribed fire and other treatments should be used to provide optimum protection.
- Thinning protocols and size of trees removed will follow guidelines described in the Sierra Nevada Framework.

Base priorities for treatment activities on fuel hazard risk analysis, departure from natural fire return interval, target conditions, and other relevant information for each community.

Giant Sequoia Groves: Balance the restoration of natural process with the desire to preserve prime scenic and biological values. Preservation, restoration, and maintenance of the giant sequoia groves are the primary considerations.

Management Objectives:

Maintain natural giant sequoia groves, with a range of tree ages and site conditions characteristic of those in fire-maintained ecosystems.

Preserve scenic values, including open views of the groves, without interfering with the restoration or simulation of a lightning fire regime.

Boundary Areas: Simulate natural fire regimes along the National Park Service boundary. In most areas along the western park boundary, the goal is to simulate natural fire regimes in perpetuity. In areas where other agencies have goals similar to those in Yosemite National Park, collaboration might include a mutually acceptable range of treatment options.

Management Objectives:

Keep wildland fire within park boundaries if agreements with adjacent agencies have not been worked out.

If agreements have been or can be developed with other land management agencies, allow wildland fires to move across boundaries to meet goals of interagency fuel reduction and ecosystem restoration projects.

Goal: Allow fire to be used as a tool for special resource management projects.

There are numerous areas that may be sustained or helped by fire. For example, fire helps maintain meadows, scenic areas, cultural landscapes, and plant communities used by American Indians. It can discourage invasion by non-native plants.

Management Objectives:

- Use fire as a tool on special projects, consistent with the management objectives of the project plan, in collaboration with the proposing division.

Goal: Minimize impacts to cultural resources.

This goal recognizes that archaeological and historical sites, ethnographic resources, and cultural landscapes are more at risk when heavy fuel loads burn than when frequent fires burn in light fuel accumulations.

Management Objectives:

- Perpetuate natural fire processes to maintain light fuel loads on and adjacent to archaeological sites and historic structures.

- Protect significant cultural resources from adverse impacts of fire and fire management practices, to the extent feasible.

- Develop project protocols, through adaptive management, for using fire and other treatments to maintain the setting at historic sites and to maintain the integrity of other cultural resource sites.

- Consult and coordinate with American Indian groups to ensure the protection of traditional cultural resources.

Goal: Use the adaptive management process to effectively incorporate scientific knowledge and monitoring and evaluation results.

The adaptive management cycle includes the development of a plan with stated goals and objectives, means of carrying out the planned actions, monitoring of the results, evaluations of the outcome of the actions, and the use of hypothesis testing to refine prescriptions and methods.

Management Objectives:

- Conduct research that will help to understand the natural fire regimes, refine prescriptions, provide data for fire behavior models, and effectively implement the fire management program.

- Monitor and evaluate fire management activities (managed wildland fires, prescribed burns, and fuel reduction treatments), to assess their effects on natural and cultural resources and Special Management Areas.

- Update fire return interval departures, target conditions, prescriptions, and fire treatment priorities, as data becomes available.

Goal: Educate, inform, consult, and collaborate with stakeholders.

Management Objectives:

- Conduct wildland fire prevention, information, education, and other activities in communities within and abutting the park. Work in collaboration with local communities, county, state, and federal fire agencies with fire management interests.

- Develop interpretive displays and educational programs, working with the Division of Interpretation, to foster understanding and acceptance of the fire management program.

- Maintain relationships with the American Indian community, to encourage their participation in the management of traditional gathering areas. Facilitate the transfer of knowledge about fire management and traditional cultural practices.

- Collaborate with county and state air resources agencies to monitor smoke levels and manage smoke-related effects on visitors, residents, and employees.

Goal: Conduct a fire management program based on existing policy and in compliance with federal and state regulations.

It is the goal of the National Park Service that the activities described in the *Yosemite Fire Management Plan* be consistent with and implement existing National Park Service and federal wildland fire management policies and related federal regulations. This includes policies and regulations that provide direction about human safety, protection of property, coordination and communication with other agencies and jurisdictions, use of science, preparedness, suppression, prevention, and standardization of procedures.

Management Objectives:

- Implement a fire management program that is compliant with National Park Service and federal wildland fire management policy and applicable regulations.

Purpose and Significance of Yosemite National Park

Yosemite National Park was established and is managed in accordance with a series of laws, regulations, and executive orders.

On June 30, 1864, Yosemite Valley and the Mariposa Big Tree Grove were granted to the State of California by the federal government to "be held for public use, resort, and recreation" to be "inalienable for all time."

On October 1, 1890, Congress passed an act establishing Yosemite National Park as a "forest reservation" to preserve and protect "from injury, all timber, mineral deposits, natural curiosities, or wonders" within the park area, and to retain them in their "natural condition." The act excluded Yosemite Valley and the Mariposa Big Tree Grove, leaving them under the jurisdiction of the State of California, as provided for in the 1864 act.

A joint resolution of Congress on June 11, 1906 accepted the transfer of Yosemite Valley and the Mariposa Big Tree Grove from the State of California to the federal government as part of Yosemite National Park. Two primary purposes for Yosemite National Park were established in the 1864 act and subsequent legislation. They are:

- To preserve the resources that contribute to Yosemite's splendor and uniqueness, including its exquisite scenic beauty, outstanding Wilderness, and a nearly full diversity of Sierra Nevada environments.

- To make the varied resources of Yosemite available to people for their enjoyment, education, and recreation—now and in the future.

Under the California Wilderness Act of 1984, 95% of Yosemite National Park is designated Wilderness. The international importance of Yosemite National Park was recognized by the World Heritage Committee in 1984 when the park was designated a World Heritage Site. In 1958, Congress passed legislation for the Secretary of the Interior to provide an administrative site for

Yosemite National Park in the El Portal area (16 USC 47-1). The El Portal Administrative Site is under National Park Service jurisdiction, but is not included as part of Yosemite National Park.

Compliance with Federal Policy

Wildland fire management activities conducted by the National Park Service are guided by National Park Service management policies, Director's Order 18 (1998), and the 2001 Federal Fire Policy. Director's Order 18 guides the development of National Park Service policy relative to fire management, and dictates the program requirements for fire management plans. These requirements are listed in table 1.1. The *Final Yosemite Fire Management Plan/EIS* is in compliance with these policies.

Table I-1
National Park Service Fire Management Program Requirements

National Park Service Policy Directing Development Of Fire Management Plans— Director's Order 18: Wildland Fire Management Section 5: Program Requirements
Every park area with burnable vegetation must have a Fire Management Plan approved by the Superintendent.
All approved fire management plans will: Reinforce the commitment that firefighter and public safety is the first priority. Describe wildland fire management objectives, which are derived from land, natural and cultural resource management plans and address public health issues and values to be protected. Address all potential wildland fire occurrences and consider the full range of wildland fire management actions. Promote an interagency approach to managing fires on an ecosystem basis across agency boundaries and in conformance with the natural ecological processes and conditions characteristic of the ecosystem. Include a description of rehabilitation techniques and standards that comply with resource management plan objectives and mitigate immediate safety threats. Be developed with internal and external interdisciplinary input and reviewed by appropriate subject matter experts and all pertinent interested parties, and approved by the park superintendent. Comply with the National Environmental Policy Act (NEPA) and any other applicable regulatory requirements. Include a wildland fire prevention analysis and plan. Include a fuels management analysis and plan. Include procedures for short and long term monitoring to document that overall programmatic objectives are being met and undesired effects are not occurring.
Until a Fire Management Plan is approved, park areas must take an aggressive suppression action on all wildland fires, taking into account firefighter and public safety and resources to be protected within and outside the park.
Although resource impacts of suppression alternatives must always be considered in selecting a fire management strategy, resource benefits cannot be primary consideration unless there is an approved Fire Management Plan.

National Park Service Management Policies

National Park Service Management Policies, Section 4.5 – Fire Management, as revised in 2001, states the following:

> *Naturally ignited fire is a process that is part of many of the natural systems that are being sustained in parks. Human-ignited fires often cause the unnatural destruction of park natural resources. Wildland fire may contribute to or hinder the achievement of park management 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.*
>
> *Each park with vegetation capable of burning will prepare a fire management plan and will address the need for adequate funding and staffing to support its fire management program. The plan will be designed to guide a program that responds to the park's natural and cultural resource objectives; provides for safety considerations for park visitors, employees, neighbors, and developed facilities; and addresses potential impacts to public and private property adjacent to the park. An environmental assessment developed in support of the plan will consider the effects on air quality, water quality, health and safety, and natural and cultural resource management objectives. Preparation of the plan and environmental assessment will include collaboration with adjacent communities, interest groups, state and federal agencies, and tribal governments.*
>
> *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 resource management objectives.*
>
> *Parks lacking an approved fire management plan may not use resource benefits as a primary consideration influencing the selection of a suppression strategy, but they must consider the resource impacts of suppression alternatives in their decisions. Until a plan is approved, parks must immediately suppress all wildland fires, taking into consideration park resources and values to be protected, firefighter and public safety, and costs. Parks will use methods to suppress wildland fires that minimize impacts of the suppression action and the fire, and are commensurate with effective control, firefighter and public safety, and resource values to be protected.*

In addition, Section 6.3.9 states:

Fire management activities conducted in Wilderness areas will conform to the basic purposes of Wilderness. The park's fire management and Wilderness management 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 wildfires 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.

Federal Wildland Fire Management Policy

The Interagency Federal Wildland Fire Policy Review Working Group revised the Federal Wildland Fire Management Policy in 2001. Main elements of the policy are listed below in table I.2.

Table I-2
2001 Federal Wildland Fire Management Policy

Policy	2001 Federal Wildland Fire Management Policy
Safety	Firefighter and public safety is the first priority. All Fire Management Plans and activities must reflect this commitment.
Ecosystem Sustainability	The full range of fire management activities will be used to help achieve ecosystem sustainability including its interrelated ecological, economic, and social components.
Response to Wildland Fire	Fire, as a critical natural process, will be integrated into land and resource management plans and activities on a landscape scale, and across agency boundaries. Response to wildland fire is based on ecological, social, and legal consequences of the fire. The circumstances under which a fire occurs, and the likely consequences on firefighter and public safety and welfare, natural and cultural resources, and values to be protected dictate the appropriate management response to the fire.
Use of Wildland Fire	Wildland fire will be used to protect, maintain, and enhance resources and, as nearly as possible, be allowed to function in its natural ecological role. Use of fire will be based on approved Fire Management Plans and will follow specific prescriptions described in operational plans.
Rehabilitation and Restoration	Rehabilitation and restoration efforts will be undertaken to protect and sustain ecosystems, public health, and safety, and to help communities protect infrastructure.
Protection Priorities	The protection of human life is the single, overriding priority. Setting priorities among protecting human communities and community infrastructure, other property and improvements, and natural and cultural resources will be based on the values to be protected, human health and safety, and the costs of protection. Once people have committed to an incident, these human resources become the highest value to be protected.
Wildland Urban Interface	The operational roles of federal agencies as partners in the wildland/urban interface are wildland firefighting, hazardous fuels reduction, cooperative prevention and education, and technical assistance. Federal agencies may assist with exterior structural protection activities under formal Fire Protection Agreements that specify mutual responsibilities of the partners, including funding. (Some federal agencies have full structural protection authority for their facilities on lands they administer; they may also enter into formal agreements to assist state and local governments with full structural protection.)
Planning	Every area with burnable vegetation must have an approved Fire Management Plan. Fire Management Plans are strategic plans that define a program to manage wildland and

Policy	2001 Federal Wildland Fire Management Policy
	prescribed fires based on the area's approved land management plan. Fire Management Plans must provide for firefighter and public safety; include fire management strategies, tactics, and alternatives; address values to be protected and public health issues; and be consistent with resource management objectives, activities of the area, and environmental laws and regulations.
Science	Fire Management Plans and programs will be based on a foundation of sound science. Research will support ongoing efforts to increase our scientific knowledge of biological, physical, and sociological factors. Information needed to support fire management will be developed through an integrated interagency fire science program. Scientific results mush be made available to managers in a timely manner and must be used in the development of land management plans, Fire Management Plans, and implementation plans.
Preparedness	Agencies will ensure their capability to provide safe, cost-effective fire management programs in support of land and resource management plans through appropriate planning, staffing, training, equipment, and management oversight.
Suppression	Fires are suppressed at minimum cost, considering firefighter and public safety, benefits, and values to be protected, consistent with resource objectives.
Prevention	Agencies will work together and with their partners and other affected groups and individuals to prevent unauthorized ignition of wildland fires.
Standardization	Agencies will use compatible planning processes, funding mechanisms, training and qualification requirements, operational procedures, values-to-be-protected methodologies, and public education programs for all fire management activities.
Interagency Cooperation and Coordination	Fire management planning, preparedness, prevention, suppression, fire use, restoration and rehabilitation, monitoring, research, and education will be conducted on an interagency basis with the involvement of cooperators and partners.
Communication and Education	Agencies will enhance knowledge and understanding of wildland fire management policies and practices through internal and external communication and education programs. These programs will be continuously improved through the timely and effective exchange of information among all affected agencies and organizations.
Agency Administrator and Employee Roles	Agency administrators will ensure that their employees are trained, certified, and made available to participate in the wildland fire program locally, regionally, and nationally as the situation demands. Employees with operational, administrative, or other skills will support the wildland fire program as necessary. Agency administrators are responsible and will be held accountable for making employees available.
Evaluation	Agencies will develop and implement a systematic method of evaluation to determine effectiveness of projects begun under the 2001 Federal Fire Policy. The evaluation will assure accountability, facilitate resolution of areas of conflict, and identify resource shortages and agency priorities.

Relationship of the Yosemite Fire Management Plan to Other Yosemite National Park Plans

Planning in Yosemite National Park takes two different forms: general management planning and implementation planning. General management plans are required for national parks by the National Park and Recreation Act of 1978. Implementation plans, which tier off of general management plans, focus on "how to implement an activity or project needed to achieve a long-term goal" (DO#2, NPS 1998). Yosemite National Park's *General Management Plan*, completed in

1980, is the foundational document for managing the park. The *Merced Wild and Scenic River Comprehensive Management Plan* derives its authority from the 1968 Wild and Scenic Rivers Act. It amended certain specifics of the *General Management Plan*, but it did not alter its five broad goals.

The *Merced Wild and Scenic River Comprehensive Management Plan* provides the basis for preserving and maintaining the Outstandingly Remarkable Values of the Merced Wild and Scenic River, and for assessing whether the actions in the *Yosemite Fire Management Plan* would contribute to their preservation and maintenance (see Chapter 5, Wild and Scenic Rivers). Changes to the types of fire management practices to be used along the Tuolumne Wild and Scenic River are not being proposed. If changes to the fire treatments along the Tuolumne River corridor are needed in the future, then a Tuolumne Wild and Scenic River Comprehensive Management Plan (not currently prepared) would have the same relationship to the *Yosemite Fire Management Plan* as the *Merced Wild and Scenic River Comprehensive Management Plan*.

General Management Plan

The five goals of Yosemite National Park's *General Management Plan* are to:

- Reclaim priceless natural beauty
- Markedly reduce traffic congestion
- Allow natural processes to prevail
- Reduce crowding
- Promote visitor understanding and enjoyment

With respect to the *General Management Plan's* goal of allowing natural ecosystem processes to prevail, it recognizes that "controlled burns or mechanical removal of vegetation" may be needed to simulate the natural role of fire. The plan also calls for protecting the safety and security of all visitors and employees. The *Final Yosemite Fire Management Plan/EIS* furthers the fire management-related provisions of this *General Management Plan* goal and outlines the programs needed for protecting visitors, employees, and property from risks associated with wildland fire.

Table I-3
Fire Management-Related Objectives from the General Management Plan

OBJECTIVES OF YOSEMITE NATIONAL PARK'S GENERAL MANAGEMENT PLAN THAT INFLUENCE FIRE MANAGEMENT ACTIVIES
Restore and maintain natural terrestrial, aquatic, and atmospheric ecosystems so they may operate essentially unimpaired:
Conduct continuing research to gather and analyze information necessary for managing natural resources.
Restore altered ecosystems as nearly as possible to conditions they would be in today had natural ecological processes not been disturbed.
Protect threatened and endangered plant and animal species.
Identify and perpetuate natural processes in park ecosystems.

Permit only those types and levels of use or development that do not significantly impair park natural resources, and direct development and use to environments less vulnerable to deterioration. Limit unnatural sources of air, noise, visual, and water pollution to the greatest degree possible.
Preserve, protect, and restore scenic resources. Provide for the preservation or protection of existing scenic resources and viewing stations. Provide for historic views through vista clearing.
Preserve, restore, or protect significant cultural resources (historic and prehistoric). Provide for the preservation, restoration, or protection of significant cultural resources.
Assist all people in understanding, enjoying, and contributing to the preservation of the natural, cultural, and scenic resources. Provide interpretive services that relate the natural and cultural significance of Yosemite to visitors with a broad diversity of interests. Provide only for those types and levels of programs and activities that enhance visitor understanding and enjoyment of park resources. Provide the opportunity for a quality Wilderness experience.
Maintain a safe, functional, and orderly environment that provides compatible opportunities for resource preservation and enjoyment by visitors and employees. Classify parklands, specifying their management and use, to insure the achievement of all objectives. Protect the rights, safety, and security of all visitors and employees.
Support an integrated system of compatible regional land uses providing opportunities for recreation, community development, preservation, and economic utilization of resources.

Merced Wild and Scenic River Comprehensive Management Plan

The *Merced Wild and Scenic River Comprehensive Management Plan* works in concert with the goals set forth in the *General Management Plan*; it also outlines a set of goals for management of the Merced Wild and Scenic River. These are: protect and enhance river-related natural resources; protect and restore natural hydrological and geomorphic processes; protect and enhance river-related cultural resources; provide diverse river-related recreational and educational experiences; and provide appropriate land uses. The *Final Yosemite Fire Management Plan/EIS* adheres to these goals, furthering them through fire related ecosystem restoration and maintenance.

Although the *Final Yosemite Fire Management Plan/EIS* is not a development plan or visitor management plan, it is related to the *Merced Wild and Scenic River Comprehensive Management Plan* because fire is a major influence on watershed function and ecosystem health. The Outstandingly Remarkable Values of the Merced River are influenced by the condition of vegetation within the watershed, which in turn is maintained by the presence or absence of wildland fire.

Resources Management Plan

The *Resources Management Plan* for Yosemite National Park was updated in 1993. It describes the natural and cultural resource management programs needed to accomplish the legislated mandates of the National Park Service and Yosemite National Park and apply the policies, program emphases, and provisions of related planning documents. The *Resources Management Plan* identifies the need for fire management programs and includes project statements specific to fire management, the restoration and maintenance of natural ecosystems and ecosystem processes, and the maintenance and protection of cultural resources. It also recognizes the need for fuels reduction in areas with buildings and other development (wildland/urban interface).

Vegetation Management Plan

The *Vegetation Management Plan* for Yosemite National Park (1997) established broad objectives for the management of vegetation in the park. It describes the dynamic environment of park vegetation, discusses vegetation management issues, and identifies management strategies and techniques for achieving general desired conditions for the various plant communities in the park. One such strategy includes managing fire regimes. In this way, the *Vegetation Management Plan* sets general direction for the *Final Yosemite Fire Management Plan/EIS*. From this general direction are developed a range of fire management activities (see Chapter 2, Alternatives) and more specific target conditions for plant communities (tables 2.3 & 2.4). The goals and management objectives of the *Vegetation Management Plan* are listed in Appendix 10.

Decisions to be Made

The Superintendent of Yosemite National Park will make a recommendation for the final decision to the Regional Director of the National Park Service, Pacific West Region, who is the Deciding Official of the *Final Yosemite Fire Management Plan/EIS*. He will recommend and decide upon:

Whether or not to implement the proposed action, an alternative to the proposed action, or to continue current fire management operations (the No Action Alternative, Alternative A).

What mitigation and monitoring, if any, will be included in the decision.

Scoping and Public Involvement

Issues and Concerns Used to Develop the Alternatives

Preliminary issues were identified using public and agency comments, consultations, and open house records from the public scoping periods in 1999 and 2001. For a complete list of scoping activities during the preparation of the *Draft Yosemite Fire Management Plan/EIS*, see Chapter 6, Consultation and Coordination.

The issues raised and comments made by the public during scoping and through the consultation process were summarized as concern statements. These concern statements were used in developing action alternatives and determining the scope of analysis in the *Draft Yosemite Fire Management Plan/EIS*. These concerns are listed below by subject:

Planning Direction. A number of comments addressed the process or scope of the planning effort, or suggested that certain process-related subjects should be central to the program or plan. Comments received from the public included:

- The National Park Service should consider the effects of future projects (projects in general) on the fire management program.
- The *Yosemite Fire Management Plan* should include detailed maps that show fuel loading and proposed treatments.
- The *Yosemite Fire Management Plan* should primarily address ecosystem restoration and property risk reduction.
- The *Yosemite Fire Management Plan* should adhere to National Park Service and federal fire policies, be coordinated with local fire agencies, and be adequately funded and staffed.
- The current fire management planning effort should not preclude subsequent NEPA review at the project level.
- Prescribed fire policies should be addressed in Yosemite's *General Management Plan*.
- The National Park Service should provide more opportunity for public involvement by having additional public meetings and at times when people can attend without taking time off from their own work.
- The National Park Service should use professional planners and consultants to prepare studies and Environmental Impact Statements.
- The National Park Service should prepare disaster plans specific to communities and developed areas.
- The *Yosemite Fire Management Plan* should clearly specify the National Park Service's priorities for protection of resources, government facilities, and private property.

Fire Management Activities. Many of the comments addressed the actual management of the fire program, or about various strategies, philosophies, or goals for fire management:

- The *Yosemite Fire Management Plan* should address emergency response to wildfires.
- Fire suppression activities should not be overly aggressive.
- The National Park Service should use prescribed fires and wildland fires to reduce fuel accumulations and restore natural fire regimes.
- The National Park Service should conduct large burns to efficiently reduce fuel accumulations.
- The National Park Service should minimize the use of mechanical thinning to reduce fuel accumulations, in order to protect ecosystem health and avoid the appearance of logging in a national park.
- The National Park Service should secure funding to implement wildland fire prevention actions.

- The National Park Service should consider use of multiple techniques to reduce fuel accumulations, including mechanical thinning and prescribed fire.
- The National Park Service should not conduct prescribed burning.
- The National Park Service should suppress most or all naturally ignited fires.
- The National Park Service should cautiously manage prescribed burns on very small scales, at times, to promote mosaics of vegetation and specific resource management goals.
- The National Park Service should utilize mechanical treatments in such a way that they leave the large tree boles to perform the ecological function of coarse woody debris.
- The *Yosemite Fire Management Plan* should address restoration of areas after fire suppression efforts.
- The National Park Service should give preference to mechanical fuel treatment over prescribed burning.
- The National Park Service should mitigate or avoid impacts related to the use of heavy equipment.
- The National Park Service should expand and enforce a fire prevention program.
- The National Park Service personnel should actively manage burn piles and debris piles.
- The National Park Service should consider grazing as a fuel management treatment.
- The National Park Service should consider additional personnel, equipment, and staff housing for the fire program throughout the developed areas of the park.

Community Protection. Protecting communities and developed areas was a major concern to residents, while the affects of developed areas and/or protection activities concerned others:

- The National Park Service should restore a natural fire regime, except in situations, which pose a threat to human life or property.
- The *Yosemite Fire Management Plan* should address liability for damage to structures from wildfires.
- The National Park Service should give first priority to reducing fuel loads on parklands that surround communities.
- The National Park Service should allow non-commercial salvage of firewood and wood chips and thinning by property owner volunteers to create defensible space.
- The National Park Service should implement the National Fire Plan and Wildland Urban Interface Initiative using all treatment methods.

- The National Park Service should consider removing structures in certain areas for forest health.

Ecosystems (general discussions) and Fire Management. Numerous comments addressed restoration of Yosemite's ecosystems and the role of fire as a natural process. Other commentaries emphasized that the National Park Service should conduct studies needed to understand the fire ecology of Yosemite National Park:

- The *Yosemite Fire Management Plan* should focus on restoration of ecosystem health.
- The National Park Service should elevate natural resource protection to the same priority as property protection.
- The National Park Service should not consider resource protection and property protection to be in conflict.
- The *Yosemite Fire Management Plan* should include a fire effects monitoring program.
- The National Park Service should use the best science in management including studies to identify appropriate fire frequency and intensity patterns.
- The *Yosemite Fire Management Plan* should consider the effect of fire on the spread of exotic species, both plant and animal.
- The National Park Service should not consider ecosystem restoration.

Elements of the Natural Environment. The effects of fire on specific natural resources (wildlife, water, soil stability, vegetation, and others) were described as concerns:

- The *Yosemite Fire Management Plan* should consider the effect of fire on vegetation communities, wildlife species, special-status species, and seasonal habitat.
- The *Yosemite Fire Management Plan* should consider the effects of fire on soil nutrient levels, erosion, and water quality.
- The National Park Service should consider use of multiple techniques, such as prescribed fire and mechanical thinning, to restore meadow communities including hydrological processes and features.

Air Quality. Numerous comments were received about compliance with air quality regulations, reduced air quality from smoke, and the differing effects on air quality from various fire management techniques:

- The *Yosemite Fire Management Plan* should comply with federal, state, and local air quality regulations.
- The *Yosemite Fire Management Plan* should consider the effects of fire on regional air quality.
- The National Park Service should consider smoke impacts on health, visual resources, and events.

- The National Park Service should consider fuel reduction and ecosystem restoration techniques that minimize adverse effects on air quality.

- The National Park Service should consider limiting campfires for air quality.

- The National Park Service can manage the effects of smoke from planned prescribed burning but not from large, unwanted, wildland fire events.

Wilderness. Comments were received on the role of fire in Wilderness, as well as the appropriateness of various fire management activities:

- The National Park Service should allow natural fire processes to prevail in Wilderness.

- The National Park Service should consider potential Wilderness suitability and the wildland/urban interface in *Yosemite Fire Management Plan* planning for McCauley Ranch.

- The National Park Service should consider using fuel reduction measures in Wilderness.

Access. Numerous comments spoke to the appropriateness, inappropriateness, or need for roads, bridges, and trails providing access and firebreaks:

- The *Yosemite Fire Management Plan* should address accessibility of park roads to fire suppression equipment.

- The National Park Service should not consider building new roads to allow machinery into parts of the park.

- The National Park Service should maintain existing roads, trails, and bridges and consider constructing additional roads to provide access and create firebreaks.

Social Environment.

- The National Park Service should use cost recovery and other economic considerations and local labor in fuel reduction treatments.

- The National Park Service should not let economic considerations direct management strategy.

- The National Park Service should use mechanical thinning in maintaining scenic vistas.

- The National Park Service should consider the effects of fire management activities on natural quiet.

Communication, Coordination, and Consultation. Many comments addressed the need for and role of consultation, communication, and coordination activities between the fire management program and communities, other agencies, organizations, and other groups:

- The National Park Service should give neighboring communities advance notice about scheduled burns.

- The National Park Service should consult, coordinate, and collaborate with neighboring communities, businesses, non-governmental organizations, governmental entities, and the scientific community to resolve fire management concerns and to assure that fire management is carried out safely, efficiently, and effectively.

- The National Park Service should educate the public on the value and necessity of fuel reduction treatments and wildland fire as an ecosystem process.

- The *Yosemite Fire Management Plan* should address federal, state, and local emergency communications.

Public Comments on the Draft Environmental Impact Statement

Public comments on the *Draft Fire Management Plan/EIS* and the responses to these comments are shown in Appendix 12. Principal areas of public concern included:

- The removal of trees up to 31.5" to meet target conditions is too large; in response, the maximum diameter was reduced to 20."

- Mechanical work should not be done in Wilderness; in response, no mechanical thinning with tracked or wheeled vehicles to achieve hazard reduction or forest restoration targets will be done in Wilderness. Hand thinning may be done to prepare an area for a prescribed fire, or to protect an area from wildland fire, such as in the inner WUI. Hand thinning may also be done in support of wildland fire management operations.

- No new roads should be constructed for thinning operations; in response, it is affirmed that no new roads would be built or improved for mechanical thinning projects.

- No commercial logging should occur in Yosemite National Park to fund either park operations or the park's fuels management program. In response, it is affirmed that no funds from thinning activities can be retained for use within the park.

- No specific year should be selected for the forest restoration target. In response, it is clarified that no specific year forms the basis for target conditions. Target conditions are a general range of vegetation characteristics that existed 90-130 years ago, prior to the onset of wildland fire suppression.

- Mechanical thinning would be too widespread around the park; in response, under this EIS, mechanical thinning for forest restoration is limited to ¼ mile around six wildland/urban interface communities (i.e., the inner WUI). Mechanical thinning for forest restoration goals beyond the inner WUI would require a separate environmental compliance document subject to public review and comment. Mechanical thinning in support of wildland fire and prescribed fire operations would be limited to hand thinning methods, unless other methods are approved by the Superintendent because of risk to human life, property, and significant natural and cultural resources.

Issues Beyond the Scope of the Yosemite Fire Management Plan

Non-native Plant Management

Although various methods of burning or thinning may be used to treat non-native plant invasions, restore natural conditions, or introduce a change in vegetation, the *Yosemite Fire Management Plan* does not specifically address non-native species management. The *Vegetation Management Plan* (1997) for the park identifies the general goals, objectives, and strategies for non-native plant management and directs the preparation of a non-native plant species management plan. When plans for non-native plant control identify the need to use fire as a tool, prescribed fire plans will be prepared consistent with the *Yosemite Fire Management Plan* and this EIS. The prevention or eradication of non-native plant species introduced during fire suppression operations will be addressed in individual Burned Area Rehabilitation plans.

Project-Specific Planning

Reference Manual 18 (USDI NPS, 2002), which describes the procedures to be followed in the development of a fire management plan, states:

The FMP will incorporate a programmatic approach to the National Environmental Policy Act of 1969 (NEPA) that covers all activities described in the fire management plan. This will reduce the need for NEPA documents for individual projects addressed in the FMP. Additional NEPA (Environmental Assessments (EAs) or Categorical Exclusions (CEs) for specific burns would need to be done only if external controversial issues arise.

The *Final Yosemite Fire Management Plan/EIS* is an implementation document that would allow the use of prescribed and wildland fire, as well as mechanical fuels reduction techniques, in defined areas of the park without additional NEPA compliance. The effects of using prescribed fire, wildland fire, and mechanical techniques to meet management objectives in specific areas of the park are described in the EIS. The *Final Yosemite Fire Management Plan/EIS* establishes prescribed fire and mechanical treatment units (locations) and identifies the range of treatments available to use within them and the potential effects. With regard to prescribed fire, fire will be applied within a specific range of conditions (the prescription), which in turn is expected to produce a consistent range of effects.

Site specific prescribed fire plans are directed by National Park Service policy (Director's Order 18 and Reference Manual 18) and will be prepared by fuels management specialists for each prescribed fire. These plans will be reviewed by park biologists, botanists, and archaeologists to ensure protection of sensitive resources. Consultation under Section 106 of the National Historic Preservation Act or Section 7 of the Endangered Species Act would be completed if needed. Projects with activities and effects not described in this EIS require additional NEPA documentation. Additional NEPA documents may also be prepared for mechanical treatment projects in wildland/urban interface areas if potential environmental effects of the mechanical methods are not well understood or in need of further analysis.

Special Resource Management Projects

Special projects may include vista clearing, cultural landscape maintenance, and endangered species habitat management. The *Final Yosemite Fire Management Plan EIS* does not develop specific objectives for restoring and maintaining vistas and cultural landscapes, or for managing special-status species and restoring habitat, but considers them as issues. When other plans indicate the need to employ fire as a tool, then a prescribed fire plan will be prepared consistent with the *Yosemite Fire Management Plan*. If the scope of the effects are already considered in this *Environmental Impact Statement*, then it will apply. If the scope of the effects have not been considered, additional NEPA documentation may be needed.

Emergency Fire Suppression Activities

Emergency fire suppression activities are urgent responses to natural- or human-caused wildland fires, taken to protect health, safety and property, including historic property, as guided by National Park Service, Department of Interior, and Federal Wildland Fire Management policies. As such, emergency fire suppression actions and their immediate effects are beyond the scope of this document and will not be evaluated.

The range of emergency fires suppression actions, as taken under the guidance of the above mentioned policies, would be too broad, speculative, or conjectural to lend themselves to meaningful analysis, because of the great range of variability with respect to prevailing conditions (e.g., weather, fuels, and site topography), suppression resources available, and strategy and tactics needed to deal with actual fire behavior and spread on the site of the unplanned ignition (i.e., they do not occur within a well-evaluated and scheduled window of opportunity; decisions must be made on a case by case basis).

All unplanned ignitions in the Suppression Unit in the Project Area will be suppressed using an emergency suppression response that is appropriate for the circumstances. The response procedures applied are listed in Appendix 3, Wildland Fire Response, Planning, and Implementation Procedures. The development of the response should include representatives from not only the Branch of Fire Management, but also from other disciplines in the park as well.

Although suppression actions are beyond the scope of this document, for the above reasons, the following topics are within the scope, and are evaluated in this document:

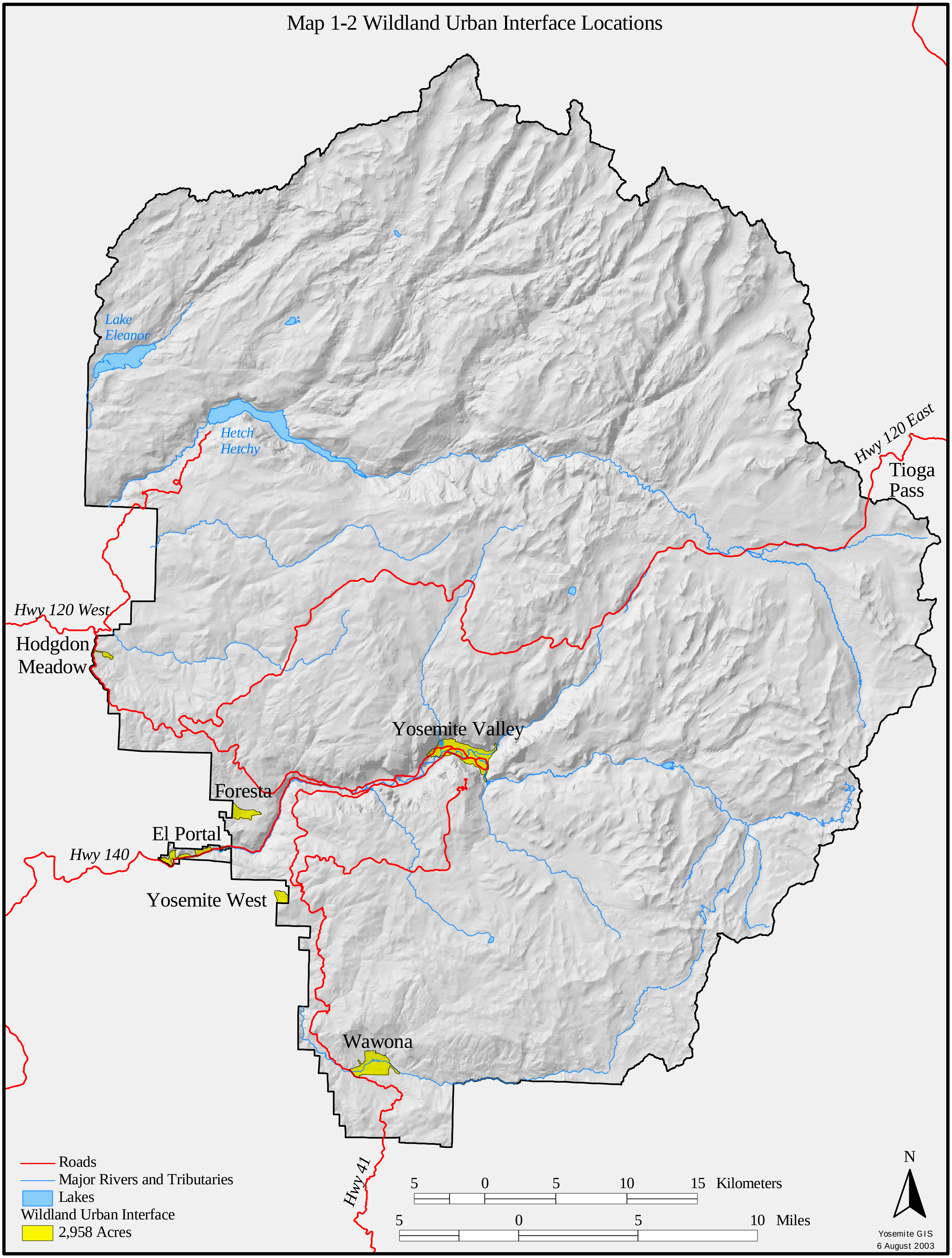
- ***Units and their boundaries.*** Units are based on the values at risk and the potential for managing those risks through fire management activity (e.g., prescribed fire, wildland fire, and fuel treatment and thinning). Where the risks associated with wildland fire cannot be adequately managed or are unacceptable because of the risk/threat to life, health, property, and/or natural and cultural resource values, the areas are zoned as the Suppression Unit (17% of the park would be in this zone under the action alternatives). Where the risks associated with wildland fire can be managed, such that it can be utilized to accomplish resource management objectives, the park is zoned as the Fire Use Unit (83% of the park would be within this zone under the action alternatives). Even in the Fire Use Unit, under some conditions and because of risks, the appropriate management response might be to suppress a fire or to take control actions along edges; this is within scope and is assessed.

- ***Long-term effects of emergency fire suppression activity.*** These effects are considered in the analysis as part of "Potential for Catastrophic Fire," for each alternative. The long-term effects of fire suppression (such as changes in forest structure and fuel loading), are considered in combination with the actions taken to reverse those trends, restore ecosystems, and reduce risks.

- ***The effects of fire management treatments used to reduce risks and/or restore ecosystems.*** Prescribed fire, managed wildland fires (i.e., natural fires allowed to burn for resource benefits), and fuel reduction treatments are applied according to a previously evaluated and pre-determined window of opportunity, which allows these treatments to be utilized to accomplish resource management objectives (there is no suitable window for managed wildland fires in the Suppression Unit because of the risks).

- ***Standard mitigation.*** Mitigation identified in this document for use when applying fire management treatments to species of concern (prescribed fire, managed wildland fire, and mechanical fuel reduction) would also be used, as appropriate, to mitigate effects and help in decision making during emergency fire suppression actions.

Map 1-1 Yosemite National Park


Map 1-2 Wildland Urban Interface Locations
Lake Eleanor
Hetch Hetchy
Hwy 120 East
Tioga Pass
Hwy 120 West
Hodgdon Meadow
Yosemite Valley
Foresta
El Portal
Hwy 140
Yosemite West
Wawona
Hwy 41
Roads
Major Rivers and Tributaries
Lakes
Wildland Urban Interface
2,958 Acres
5 0 5 10 15 Kilometers
5 0 5 10 Miles
N
Yosemite GIS
6 August 2003

Chapter II: Alternatives (Including the Preferred Alternative)

Introduction

This chapter describes the three action alternatives selected for analysis for the *Final Yosemite Fire Management Plan/Environmental Impact Statemen*t (EIS). It also describes the No Action Alternative that represents the existing fire management program. Each of the three action alternatives presents a separate comprehensive proposal for the restoration of fire to park ecosystems and the management of hazardous levels of vegetative fuels. Each alternative proposes to use prescribed and managed wildland fire, as well as mechanical methods to reduce forest fuels in developed areas. Alternatives differ in the time and methods used to accomplish restoration and fuel reduction. A detailed description of the effects on the environment of each alternative follows in Chapter 4, Environmental Consequences.

The No Action Alternative, as required by the National Environmental Policy Act (NEPA), would continue the current fire management program. This program includes hand cutting and pile burning of trees generally less than 12”dbh, prescribed fire, managed wildland fire, and suppression strategies. It has been in effect since roughly 1970, but has not been meeting the park’s land management objectives at the rate needed for comprehensive ecosystem maintenance and restoration. In addition, the current program does not satisfy the new requirements of the National Fire Plan and the 2001 Federal Fire Policy, such as emphasizing the importance of protection of wildland urban interface (WUI) communities from unwanted wildland fire.

The action alternatives (Alternatives B, C, and D) propose new operational methods and objectives for ecosystem maintenance, ecosystem restoration, and hazardous fuel reduction for the Yosemite fire management program. These methods also would meet the long-term goals of Yosemite’s *General Management Plan*, *Resources Management Plan*, and *Vegetation Management Plan*, as well as fulfill the requirements of the National Fire Plan and Federal Fire Policy.

Process for Formulating the Alternatives

The *Yosemite Fire Management Plan* was last revised in February 1990. Yosemite National Park has long recognized that fire management should evolve as results from research and monitoring reveal new information about fire ecology, fire behavior, and fuels management. This process is known as adaptive management. Scientific knowledge and experience have been critical in developing methods to manage fire in the park. In addition, participation from the public and federal, state, and local agencies is an important component in planning processes in Yosemite.

The action alternatives considered in the *Final Yosemite Fire Management Plan/EIS* were developed from comments and concerns expressed by the public; federal, state, and local agencies; guidance from existing park plans; policy guidance from the National Park Service, the National Fire Plan, and Federal Fire Policy; and research, monitoring, and experience from the existing fire management program and the U.S. Geological Survey Biological Research Division, Yosemite Field Station.

The 2001 Federal Fire Policy emphasizes the use of prescribed and wildland fire to meet land management goals, restore ecosystems, and assure public and firefighter safety. The National Fire Plan calls for increases in fuel reduction to protect WUI areas (communities, developed areas, structures, and utilities) from fire. These guiding principles provided direction as the alternatives in the *Draft Yosemite Fire Management Plan/EIS* were developed.

Members of the public; federal, state, and local agencies; and the National Park Service identified important issues during two periods of public scoping. Preliminary scoping took place in early 1999. In March and April of 2001, an additional scoping period was announced with the Notice of Intent to prepare an EIS on the *Yosemite Fire Management Plan*. Scoping comments focused on air and water quality, mechanical fuel reduction, Wilderness, sensitive species, and other matters. The issues identified during public scoping are summarized as concern statements in Chapter 1.

The Yosemite fire management staff used the issues first identified in 1999 to begin consultations with fire and resource management specialists in Yosemite National Park and in other fire and land management agencies to develop goals and objectives and to evaluate potential fire management activities. Concepts for developing a range of alternatives began taking shape in December of 2000, following consultations with the park's Resources Management Division. It was suggested that the alternatives vary in two ways:

- By various combinations of wildland fire, prescribed burning, fuels treatments, and fire suppression considered in the program, and
- By the amount of time needed to reduce fuels in developed areas and restore or maintain the natural fire regime throughout most of the park.

Finally, the comments received during the March and April 2001 scoping period were used to further develop the range of alternatives and identify needed analyses.

The appropriate type, amount, location, and boundaries of proposed fire management activities were based on the identification of existing conditions, departures from the natural fire return interval, and target conditions (see Ecological Basis for the Alternatives, below). In addition, because program development based on sound science and practical experience is vital to Yosemite's fire management program, adaptive management became a component of each alternative.

Proposed fuel reduction and fire activities were evaluated as to whether they were reasonable and/or feasible. Some actions were considered and dismissed from detailed study. The Council on Environmental Quality regulations state that only a reasonable number of examples covering the full spectrum of alternatives must be analyzed and compared [40 CFR Parts 1500-1508 (1987)].

National Park Service staff used project goals and objectives, policies and planning guidance, and public concerns to combine individual actions, and thus fully develop the three action alternative concepts that were carried forward for detailed analysis. Once the alternative concepts had been developed, they were more fully evaluated within the framework of meeting or, as appropriate, balancing the criteria outlined below.

Evaluation of the alternative concepts also determined if they would need to be modified to meet the broad goals of the *General Management Plan, Resources Management Plan, Vegetation Management Plan*, and *Merced Wild and Scenic River Comprehensive Management Plan*. Alternatives were assessed for how well they adhered to laws and regulations pertaining to special land designations, in particular the Wilderness Act, the Wild and Scenic Rivers Act, and the California Wilderness Act of 1984 which established Yosemite's designated Wilderness and the Tuolumne Wild and Scenic River.

The environmental consequences of implementation were identified by the planning team and other park staff members. Following an internal administrative review, the proposed alternatives were modified and refined, and suggestions were made to modify the analysis of environmental consequences to better address effects on park resources and other fire management issues including WUI protection.

The Preferred Alternative was chosen after evaluating each alternative based on: (1) how well it achieved the purpose of and need for the *Yosemite Fire Management Plan*; (2) how well it achieved the goals of the *General Management Plan, Resources Management Plan*, and *Yosemite Vegetation Management Plan*; and (3) how well it addressed issues and concerns expressed by the public. The planning team recommended Alternative D as the preferred alternative in the *Draft Yosemite Fire Management Plan /EIS*, and this remains so in the final EIS.

Reviewing and Modifying the Draft Plan

The *Draft Yosemite Fire Management Plan/EIS* was mailed to the public on May 10, 2002. The document also was available for public review on the park's website. Written comments were accepted through August 27, 2002. Each of the public comment letters and other communications (including emails, faxes, and public hearing transcripts) was read and analyzed. The planning team examined public comments in the context of improving the proposed alternatives to better achieve goals and to meet the project's Purpose and Need.

Each member of the planning team was given responsibility for evaluating public comments and developing responses to them. These comments and responses are shown in Appendix 12. Each substantive issue was evaluated in terms of its:

- Magnitude
- Linkage(s) to other issues
- Basis for modification of proposed alternatives, including technical and fiscal feasibility, compliance, planning, and implementation
- Compliance with guidance and direction provided by National Park Service and Federal Fire Management Policy
- Ability to achieve planning goals for resource protection and visitor experience

The team recommended changes to the draft alternatives, including the Preferred Alternative, and the *Final EIS* was prepared. A Record of Decision (ROD) will be completed following release of the *Final Yosemite Fire Management Plan/EIS* to the public, and the completion of a 30-day waiting period.

After the ROD is approved, a separate document, the *Yosemite Fire Management Plan,* will be prepared and made available upon request. This plan will present a detailed description of the fire management program selected for implementation, and discuss any recommendations and actions that were recorded as part of the ROD.

Criteria

National Park Service staff used the project goals and objectives described in Chapter 1, policies and planning guidance, and public concerns to fully develop the three action alternative concepts that were carried into detailed analysis. In addition, the alternative concepts were examined again to verify that they satisfied a set of criteria based on the many acts, laws, and regulations under which Yosemite National Park operates.

For the Yosemite Fire Management Plan the criteria are:

- **Restore or maintain natural fire regimes.**
  - Actions should move toward restoration of the natural fire regime in areas of the park where natural or prescribed fire is an acceptable method of vegetation management.
  - Actions should move toward restoration and maintenance of the natural range of variability for plant community structure and fuel load
- **Focus on ecosystem processes.**
  - Actions should allow natural processes to prevail where they do not threaten structures or protected areas.
  - Actions should further ecosystem restoration so fire processes may be used to help sustain or maintain park ecosystems.
- **Protect and maintain cultural landscapes and historic and prehistoric resources.**
  - Actions should help maintain and protect cultural landscapes and landscape features.
  - Actions should maintain relatively light surface fuel loading on, and adjacent to, archaeological sites and historic structures.
  - Actions should protect cultural resources, to the extent feasible, from the damaging effects of fire and fire management actions.
  - Actions should sustain traditional cultural and natural resources where traditional activities such as plant gathering are important.
- **Manage consistently with other land use designations within Yosemite National Park.**
  - Actions should support Wilderness characteristics.
  - Actions should protect and enhance Outstandingly Remarkable Values (ORVs) within the boundaries of Wild and Scenic Rivers and protect ORVs outside the boundaries. In the case of the Tuolumne Wild and Scenic River, values for which the river was designated should not be degraded.
- **Establish and manage Special Management Areas to accomplish area specific goals**.

- Actions should protect and provide for the special management needs found in:
    - Giant sequoia groves
    - wildland/urban interface areas
    - boundary areas
- Actions should reduce the risk of high-intensity wildland fire and restore more natural plant community structure and fuels loads in areas adjacent to Special Management Areas.

Ecological Basis for the Alternatives

Information on fire history and fire ecology was used to assess the current ecological condition of plant communities in the park and to develop a set of target conditions for vegetation and fuels. Target conditions were developed in conjunction with fire specialists at Sequoia and Kings Canyon National Parks (Table 2.3). Existing and target conditions were used to determine the appropriate type, amount, and location of fire management activities and the boundaries of fire management units in the action alternatives in this plan.

Fire Return Interval Departure (FRID)

Process

The relative magnitude of difference between existing and target conditions in various plant communities around the park can be displayed using the fire return interval departure (FRID). A *fire return interval* is derived from fire history research and is the number of years between fires at a specific location or plant community. For example, a fire scar analysis of a sample of ponderosa pine trees might show that fire occurred in that stand before the arrival of pioneers from as frequently as every two years (*minimum value*) to as infrequently as every six years (*maximum value*). The *median value* for the stand would be approximately four years.

The fire return interval for a given vegetation type can be used in conjunction with modern fire history maps to determine where naturally occurring fires have been absent for an unusually long period, generally because of fire suppression activities. This information is known as the *fire return interval departure* (FRID).

Maximum fire return interval departure ($FRID_{max}$) represents the most conservative estimate of how severe the deviation from natural conditions might be in terms of fuels and vegetation. *Median fire return interval departure* ($FRID_{med}$) gives a more moderate view, while the *minimum fire return interval departure* ($FRID_{min}$) presents the most extreme indication of how far the stand is from its natural condition. The *Final Yosemite Fire Management Plan/EIS* presents a range of fuel reduction target acreages based on the median and maximum fire return interval departures.

For example, if fires were suppressed in the above-mentioned stand of ponderosa pine trees for 60 years, the stand would have missed 30 fires based on the minimum fire return interval of 2 years, 15 fires based on the median interval of 4 years, and 10 fires based on the maximum interval of 6 years.

A geographic information system (GIS) based analysis was used to display FRID on a landscape scale. This analysis, originally developed in Sequoia and Kings Canyon National Parks (Caprio and et al. 1997), uses deviations from the natural fire return interval as an indicator of change in natural conditions (van Wagtendonk et al. 2002). Larger deviations are interpreted to be areas at greater risk of unnaturally intense and extensive wildland fires.

The first step in the FRID analysis was to group vegetation types into fire vegetation types that are based on similar fuels and fire behavior (see Appendix 10 and Map 2-1). The second step was to assign median and maximum fire return intervals to fire vegetation types (see Map 2-2). The third step was to use fire scar, fire history, and stand structure studies conducted in the Sierra Nevada to create a map of when each acre of the park had last burned (see Map 2-3).

Fire history maps date back to 1930 for the park in general and to 1958 for the El Portal Administrative Site. The period when fire suppression became a significant ecological factor, or "effective," varies throughout the park, and is the subject of debate. Fires were suppressed in Yosemite Valley as early as the 1860s. The removal of American Indians and their traditional use of fire in the area certainly affected the fire history of the park, as did fires set deliberately by sheepherders or accidentally by miners.

It is also likely that Cavalry patrols, especially between 1890 and 1916, found and suppressed many fires. More organized suppression programs occurred with Civilian Conservation Crews in the 1930s, and have continued to the present time with increasingly sophisticated methods of fire suppression. However, small fires burning in more natural fuel conditions decades ago that were suppressed using simple methods could, if left alone, have eventually grown to large, ecologically significant fires. Scientists at Yosemite and at Sequoia and Kings Canyon National Parks agree that fire suppression probably became significant between approximately 1870 and 1910 (Stephenson 2003).

The final steps were to calculate departures from the natural fire return interval and to create maps depicting the number of interval departures for both the median (Map 2-4) and maximum (Map 2-5) fire return interval departures (FRIDs). The algebraic formula used was:

$$\text{FRID} = \frac{|\text{Fire Return Interval} - (\text{Current Year} - \text{Year Last Burned})|}{\text{Fire Return Interval}}$$

For example, if the fire return interval is considered to be 20 years, the current year is 2004 and the area last burned in 1904, the FRID is the absolute value of (20-100)/20 = 4.

The FRID process resets the FRID value back to zero after an area is burned. It is recognized that resetting the FRID back to zero after an area has burned may not be correct, since the fire may have burned in a very patchy manner, leaving some areas lightly or even unburned. Additional sampling of burned areas, such as the Ackerson Fire, will be needed to determine if the conditions created by the fire are similar to those which existed under a more natural fire cycle.

Results

Results of the median FRID analysis indicate that 62% of park vegetation is considered to be in acceptable ecological condition (i.e., low deviation from natural fire regime; Table 2.1; FRID is 0 or 1). These areas are expected to remain in acceptable ecological condition as long as the natural fire regime is maintained. Thirteen percent of park vegetation shows moderate deviation from natural conditions (FRID is 2 or 3), and 25% of park vegetation is considered highly compromised by past fire suppression (FRID is 4 or more). In the El Portal Administrative Site, 38% of the area is considered to be in an acceptable condition, 43% shows moderate deviation from natural conditions, and 19% shows a high departure (Table 2.2).

Much of the area with a moderate or high deviation from natural conditions is in the western portion of the park, in lower elevation forests where fires have been suppressed either because of the presence of nearby communities or of park boundaries. Of the approximately 47,000 acres that burned due to the 1996 Ackerson Fire near Hetch Hetchy and Aspen Valley, almost 36,000 acres had a FRID of 5 or more.

The analysis shows positive effects from fire management activities, as many areas are in acceptable condition, but also underscores the fact that large areas require attention. Therefore, while the current fire management program has been successful in some areas of the park, a significant portion of the park is continuing to trend toward significantly unnatural ecological conditions.

This deviation is particularly serious because it occurs in areas of high public presence and is near communities. In all alternatives, wildland fires would continue to be suppressed in these areas due to safety constraints. The areas would be managed to restore ecosystems while reducing risk of unwanted fire through prescribed fire and mechanical fuel reduction in the WUI, along road and utility corridors, and in other areas with resources needing protection.

Table II-1
Fire Return Interval Departures by Percentage of Vegetation Type for Median Fire Return Intervals in Yosemite National Park

Vegetation Type in Yosemite National Park	Percentage of Vegetation Type		
	Low 0-1 $FRID_{med}$	Moderate 2-3 $FRID_{med}$	High $\geq 4FRID_{med}$
Whitebark pine and/or mountain hemlock forest	100	0	0
Lodgepole pine forest	100	0	0
Red fir forest	100	0	0
Western white pine/Jeffrey pine forest	31	2	67
Montane chaparral	100	0	0
Giant sequoia/mixed conifer forest	83	0	17
White fir/mixed conifer forest	51	1	48
Ponderosa pine/mixed conifer forest	54	3	43
Ponderosa pine/bear clover forest	53	5	42
California black oak woodland	29	7	64
Canyon live oak forest	50	2	48
Dry montane meadow	16	7	77
Foothill pine/live oak/chaparral woodland	89	0	11
Foothill chaparral	100	0	0
All Vegetation Types in Yosemite National Park	**62**	**13**	**25**

Table II-2
Fire Return Interval Departures by Percentage of Vegetation Type for Median Fire Return Intervals at the El Portal Administrative Site

Vegetation Types in El Portal Administrative Site	Percentage of Vegetation Type		
	Low 0-1FRID$_{med}$	Moderate 2-3 FRID$_{med}$	High ≥4FRID$_{med}$
Ponderosa pine//mixed conifer forest	8	92	0
Canyon live oak forest	0	100	0
Foothill pine/live oak/chaparral woodland	31	1	68
Foothill chaparral	100	0	0
Blue oak woodland	71	5	24
All Vegetation Types in El Portal Administrative Site	38	43	19

Target Conditions for Vegetation and Fuels

Target conditions for vegetation and fuels in Yosemite have been established using information from a number of sources including scientific studies, monitoring data, and professional evaluations (Table 2.3). Target conditions describe vegetation in two ways: as a set of structural features for the vegetation types, and as a set of fire-related ecosystem processes that help sustain the vegetation types. Target conditions are a range of monitoring variables that measure the effectiveness of program implementation.

In general, target conditions for restoration are based on plant community structure, while target conditions for maintenance are based on ecosystem processes. The general objectives for vegetation in fire management terms are to:

- *Restore* fire and a more natural ecosystem structure to plant communities that have missed more than three fire return intervals.
- *Maintain* plant communities that have missed less than four fire return intervals and are within, or close to, their natural range of variability.

Restoration Targets

Vegetation *restoration* is needed when an ecosystem has missed so many naturally occurring wildland fires that the types and ages of plants are not what would be expected in that vegetation type if fires had been allowed to burn. Restoration actions aim to establish a vegetation structure that will allow natural ecosystem processes, including fire, to maintain them over time. The structural targets developed for major vegetation types of the Sierra Nevada (Table 2.3) are used to determine if an ecosystem is within its natural range of variability. Targets are not based on ecosystem conditions that existed on any specific date in history, but on a general range of conditions that existed prior to the onset of fire suppression in the latter part of the 19th century, when the area was settled by pioneers and by the military.

Most areas slated for restoration are on the western side of the park. Reducing the fuel load either by prescribed burns, or by removing live and dead vegetation mechanically and then burning the area, would decrease the risk of unnaturally intense stand replacement fires and would help restore vegetation structure in plant communities to more natural conditions. Restoration target conditions were developed for each vegetation type using variables that measure plant community structure. These include gap distribution, density, frequency by species composition, and fuel load (Table 2.3). These variables are discussed below.

Gap distribution describes the occurrence of open spaces in the forest canopy. Three gap sizes were used: small (0.1-1 hectare); medium (1-10 hectare); and large (10-100 hectare). For example, restoration targets for ponderosa pine/mixed conifer forest would result in many small gaps, indicative of a forest with a relative fine-grain mosaic of age classes and predominantly low intensity surface fires. Among all gaps in this community, 75-95% should be small, 5-25% should be medium, and less than 1% should be large (Table 2-3).

Density is the number of trees per acre. For fire management analyses, trees are separated into two size classes, based on age to diameter relationships and the length of time fires have been suppressed. Very generally, trees greater than 31.5" diameter at breast height (dbh) tend to have been established prior to the onset of fire suppression in the latter half of the 19th century, but this can vary widely by site and local growing conditions.

Establishment of new trees, especially shade tolerant trees such as white fir and incense-cedar, increased when wildland fires were suppressed. Over the decades, these trees have grown without the influence of fire as a natural thinning agent. Thus, it can generally be said that the existing density of trees less than 31.5" dbh, and especially less than 20" dbh, is higher than during periods in which fires burned freely, which is estimated to be before 90 to 130 years ago (Stephenson 2003)

The 31.5" dbh breakpoint should be applied with caution, because the study trees that suggested this diameter were from a specific location and elevation - Giant Forest in Sequoia National Park, at approximately 6500' elevation. Data from the Sequoia study do not present a complete picture of what Yosemite's forests looked like before fire suppression.

Because of the caution required when applying limited research findings, actual tree thinning by mechanical means to meet forest restoration objectives will only occur on trees up to 20" dbh in the inner WUI under this EIS. This size is consistent with the *Sierra Nevada Forest Plan Amendment Final EIS Record of Decision* (USDA 2001). This limitation is also in response to many comments received from the public during the review of the *Draft Yosemite Fire Management Plan/EIS* (Appendix 12).

In Yosemite, the actual age distribution of trees would be measured in each stand before developing thinning prescriptions and undertaking activities to restore the stand to forest target conditions through mechanical methods. This would occur both under this EIS for forest restoration thinning in the inner WUI as well as for any future environmental compliance documents developed for forest restoration thinning projects in the outer WUI area.

Frequency by species composition is the composition of trees that comprise a given vegetation type, and is derived by counting the number of trees by species greater than 31.5" dbh in fire effects study plots. If plots were not available in Yosemite for a particular vegetation type, data from fire effects plots in similar vegetation types in Sequoia and Kings Canyon National Parks were used.

Fuel load is a measurement of dead and down wood, litter, and duff expressed in tons per acre. Dead and down fuels were evaluated across the landscape and put into categories: light fuel load is 5-30 tons per acre, moderate fuel load is 30-60 tons per acre, and heavy fuel load is greater than 60 tons per acre. Target conditions for fuel load in ponderosa pine/mixed conifer forest would be light across 20-40% of the landscape, moderate across 20-50% of the landscape, and heavy across 5-20% of the area.

Table II-3
Restoration Target Conditions

Preliminary target conditions by vegetation type for restoring plant communities by reintroducing the natural fire regime in Yosemite National Park. Restoration target conditions are based on structural features of vegetation types. Variables are number and size of forest openings or gaps, tree size, species composition, and amount of live and dead vegetative fuels.

Vegetation Type	Gap Distribution (gap size and % landscape) 1 ha = 2.47 acres	Density and Frequency by Species Composition (density: on stand level frequency: % of landscape)	Fuel Load (% of landscape)
	Gaps smaller than 0.1 ha are difficult to detect. Gaps are based on consensus expert opinion from Sequoia and Kings Canyon National Parks and work from Lassen Volcanic National Park by Dr. Alan Taylor and will be refined for Yosemite as research and monitoring is accomplished. Numbers are relative percentage of gap size compared to all gaps.	*DBH indicates diameter at breast height in inches. General guidelines are based on age/diameter relationships established for some species. Greater than 31.5 inches is assumed to be pre-settlement (generally established prior to latter half of 19th century). The smallest tree within the size range is considered to be 4.5 feet tall (i.e., breast height)*	*A complete lack of fuel in a measurable area occurs infrequently due to the patchiness of fire.* *Fuel bed depth, height to the base of live crown (canopy), and crown bulk density are not currently program goals; these inputs are needed to model crown fire potential or risk.*
Red Fir Forest	0.1-1 ha = 70-95% 1-10 ha = 5-30% 10-100 ha < (less than) 1% and 0-1% of the gaps < (are less than) 1 year old	20-202 trees/acre < (is less than) 31.5 inches[1] 4-30 trees/acre > (is greater than) 31.5 in[2a] and Composition is 70-100% fir + 0-30% pine [2a]	1-25% = (of the area has) 5-30 tons/ac 30-70% = 30-60 tons/ac 5-20% > (of the areas is greater than) 60 tons/ac
Montane Chaparral	Not Applicable – woodland/savannah type	4-61 trees/acre < 31.5 in[1] 2-20 trees/acre > 31.5 in[2a] Composition is 60-80% pine + 20-40% fir[2a]	1-30% = 5-30 tons/ac 25-75 = 30-60 tons/ac 5-20% > 60 tons/ac
Giant Sequoia/ Mixed Conifer Forest	0.1-1 ha = 75-95% 1-10 ha = 5-25% 10-100 ha < 1%	20-101 trees/acre < 31.5 in[1] 4-26 trees/acre > 31.5 in[2] Composition is 35-65% fir, 0-20% sequoia, 40-55% pine[2]	20-40% = 5-30 tons/ac 20-50% = 30-60 tons/ac 5-20% > 60 tons/ac
White Fir/Mixed Conifer Forest	0.1-1 ha are 75-95% 1-10 ha are 5-25% 10-100 ha < 1%	20-89 trees/acre < 31.5 in[1] 4-20 trees/acre > 31.5 in[2] Composition is 40-65% fir, 15-50% pine, 0-10% cedar[2]	20-40% = 5-30 tons/ac 20-50% = 30-60 tons/ac 5-20% > 60 tons/ac
Ponderosa Pine/ Mixed Conifer Forest	0.1-1 ha are 75-95% 1-10 ha are 5-25% 10-100 ha < 1%	4-91 trees/acre < 31.5 in[1] 4-30 trees/acre > 31.5 in[2] Composition is 60-95% pine, 15-40% cedar, 1-10% oak[2]	20-40% = 5-30 tons/ac 20-50% = 30-60 tons/ac 5-20% > 60 tons/ac
Ponderosa Pine/Bear Clover Forest	Will be determined through research and monitoring, i.e., through the adaptive management process. Application strategies would be revised and refined, using the results of monitoring and new research, to improve methods for achieving target conditions and expand monitoring objectives.		
California Black Oak			
Canyon Live Oak Forest			

Vegetation Type	Gap Distribution (gap size and % landscape) 1 ha = 2.47 acres	Density and Frequency by Species Composition (density: on stand level frequency: % of landscape)	Fuel Load (% of landscape)
Low Meadows/Dry Montane Meadows	Lessons learned are documented in post-burn evaluation and factored into future prescribed burn plans.		
Foothill Pine/Live Oak/Chaparral Woodland			
Blue Oak Woodland			

[1] Based on consensus expert opinion for Sequoia and Kings Canyon National Parks; the smallest tree in the range would be 4.5 feet tall (i.e., breast height).

[2] Based on fire effects monitoring data for 'pre-settlement' tree from Yosemite; additional databases may be available to refine targets.

[2a] Sequoia and Kings Canyon National Parks fire effects monitoring data.

Table II-4
Maintenance Target Conditions

Preliminary target conditions by vegetation type, for maintaining the natural fire regime within plant communities in Yosemite National Park. Maintenance of ecosystems is based on ecosystem process variables of fire return interval, seasonality of fire occurrence, and severity.

Vegetation Type	**Fire Return Interval Range[1]**	**Season[1] (% of area burned)**	**Fire Size[2]** ***Largest natural fire recorded in type since 1930 through 2000.***	**Fire Severity[3]**	**Fire Intensity[4] [British Thermal Unit (BTU)/ft/sec]**
Assumptions:	*Distribution (and variation) is important.*	*Fires can start anywhere (including outside of vegetation type).*	*Indicative of natural fire behavior in higher elevations, and effects of fire suppression in lower elevations.*	*Severity = mortality of dominant vegetation*	*Percent of landscape*
Whitebark Pine and/or Mountain Hemlock Forest	4-508 years Median = 187 *l*	0-5% Jan-Jul 90-100% Aug-Oct 0-5% Nov-Dec	20 acres	Low 60-90% (surface) Mod 5-20% High 5-20% (single tree)	1-40 (mean = 10)
Lodgepole Pine Forest	4-163 years Median = 102 *j*	0-10% Jan-Jul 80-90% Aug-Oct 0-10% Nov-Dec	773 acres	Low 15-30% (surface) Mod 35-50% (surface) High 15-35% (crown?)	1-40 (mean = 10)
Red Fir Forest	9-92 years Median = 30 *l*	0-10% Jan-Jul 80-90% Aug-Oct 0-10% Nov-Dec	1,265 acres	Low 30-60% Mod 20-40% High 0-15%	1-120 (mean = 25)
Western White Pine/Jeffrey Pine	4-96 years Median = 12 *c*	Yet to be determined	3274 acres	Yet to be determined	20-1000 (mean = 100)
Montane Chaparral	10-75 years Median = 30 *k*	0-20% Jan-Jul 50-70% Aug-Sep 10-30% Oct-Dec	641 acres	Low 30-90% Mod 10-60% High 0-25%	1-60 (mean = 30)
Giant Sequoia/Mixed Conifer Forest	3-15 years Median =10 *g*	0-20% Jan-late Aug 40-60% late Aug-Oct 30-50% Oct-Dec	Less than 1 acre	Lower slopes: 60-100% L, 5-35% M, 5-10% H Upper slopes: 0-35% L, 20-35% M, 30-90% H	20-1000 (mean = 100)
White Fir/Mixed Conifer Forest	3-35 years Median = 8 *f*	0-20% Jan-late Aug 40-60% late Aug-Oct 30-50% Oct-Dec	1,092 acres	same as above	Same as above
Ponderosa Pine/ Mixed Conifer Forest	3-14 years Median = 9 *e*	0-30% Jan-late Aug 50-70% late Aug-Oct 30-50% Oct-Dec	960 acres	Same as above	same as above
Ponderosa Pine/ Bear Clover Forest	2-6 years Median = 4 *d*	Yet to be determined through the adaptive management process.	1,247 acres	Yet to be determined through the adaptive management process.	Yet to be determined through

Vegetation Type	Fire Return Interval Range[1]	Season[1] (% of area burned)	Fire Size[2] *Largest natural fire recorded in type since 1930 through 2000.*	Fire Severity[3]	Fire Intensity[4] [British Thermal Unit (BTU)/ft/sec]
California Black Oak	2-18 years Median = 8 *a*		37 acres		the adaptive management process.
Canyon Live Oak Forest	7-39 years Median =13 *c*		3,517 acres		
Low Meadows-Dry Montane Meadows	1-5 years Median-2 *h*		35 acres		
Foothill Pine/Live Oak/Chaparral Woodland	2-49 years Median = 8 *b*		41 acres		
Foothill Chaparral	30-60 years Median = 30 *k*	0-30% Jan – Jul 50-70% Aug – Sep 30-50% Oct – Dec	43 acres	0-1% low 1-10% moderate 90-100% high	50-6330 (mean = 3,000)
Blue Oak Woodland	2-49 years Median = 8 *b*	Yet to be determined	311 acres	Yet to be determined	Yet to be determined

1. Based on several sources: a Stephens 1997; b MacClaran and Bartolome 1989; c Taylor and Skinner 1998; d Caprio and Swetman 1993; e Kilgore and Taylor 1979; f Skinner and Chang 1996; g Swetnam et al 1991; h Anderson 1993; i Caprio et al 1997; j Keifer 1991; k U.C. Davis 1996; and, l Bahro 1993.
2. Based on GIS analysis. Included only as information on relative fire size by community type since 1930.
3. Based on unpublished A. Taylor's work at Lassen Volcanic National Park and need to be refined for Yosemite.
4. Based on BEHAVE outputs

Maintenance Targets

Maintenance targets are characterized by process variables that include fire return interval range, season of burn, fire size, fire severity, and fire intensity (Table 2.4).

Maintenance would be appropriate after restoration techniques have returned forest characteristics to within a natural range of variability (Table 2.3), and in areas that have not been significantly affected by fire suppression. In Yosemite, areas that have missed fewer than four fire return intervals are considered to be within their natural range of variability and would be managed using maintenance targets. Areas where natural process can be allowed to occur are typically found in vegetation types with long fire return intervals, in areas that have been regularly burned, and where there are no threats to buildings or other valued resources. Targets have not yet been developed for all vegetation types; additional targets will be developed and applied as information from research and monitoring becomes available.

Fire return interval range is the span of years between the shortest and longest periods between fires in a vegetation type as determined through tree ring or fire history analysis. Return intervals used are from forests in Yosemite or, if not available, the next closest location in the Sierra Nevada. Variability within the return interval is extremely important ecologically because atypical plant communities can populate an area when fire is less frequent or when stand replacement (e.g., forest replaced by chaparral) occurs following unnaturally intense fires.

Season of burn reflects the percentage of a vegetation type that has tended to burn on average for each season. For example, data on the season of burn for ponderosa pine/mixed conifer forest indicates that if an average of 10,000 acres of this vegetation type burned per year, then 20% (2,000 acres) would burn in June through early August, 50% (5,000 acres) would burn in late August through September, and 30% (3,000 acres) would burn in October through December.

Fire Size is not a target, but is indicative of the magnitude of fire size that can be expected in higher elevation communities, where natural fires have been allowed to burn. The effects of suppression can be seen in the small sizes of fires in lower elevations, such as in giant Sequoia groves. The three large wildland fires that burned in the park (A-Rock and Steamboat in 1990, and Ackerson in 1996) were excluded from this list because they are believed to have been outside of the natural range of variability for fire.

Fire severity is a measure of fuel consumption and effect on vegetation caused by fires of different intensity and/or season. Severity is divided into three categories: low, moderate, and high. Levels of severity of any wildland fire are distributed unevenly across the landscape. The variability and pattern of fire severity can be critical for establishing some species and for the formation of gaps.

Fire intensity is a physical measure of the flames, in British Thermal Units per foot per second (BTU/ft/sec). This information can be generated using BEHAVE, a fire behavior prediction computer model.

Adaptive Management

Adaptive management is a fusion of science and management used to improve and care for natural resources. It is also defined as “the process of continually adjusting management in response to new information, knowledge, or technologies (USFS 2001).” Adaptive management would be used to guide fire management activities, while drawing on the best available science, emergent technologies, and an ever-increasing database on the role and effects of fire on park resources.

The adaptive management cycle includes development of a plan with stated goals and objectives, implementation of planned actions, monitoring of results, evaluations of the outcome of the actions, and hypothesis testing to refine prescriptions and methods (Kaufmann et al. 1994). In the fire management program, evaluations will help refine fire management strategies and assess how well the program has met goals and objectives leading to ecosystem restoration and maintenance, including fuel reduction. After each event, evaluation by fire experts and managers will determine if the action had the desired effects, if more information is needed, and if a change in actions is necessary to meet objectives. Target conditions, as outlined above, provide measurable variables through which to achieve more generally stated objectives.

Determination of Projected Annual Work

The action alternatives (Alternatives B, C, and D) were developed with three specific goals: 1) to re-introduce fire into areas of Yosemite that show adverse effects of fire suppression; 2) to maintain the natural fire regime in park ecosystems where vegetation is within its natural range of variability; and 3) to restore more natural levels of forest and fuel characteristics near communities, roads, campgrounds, and park resource values (e.g., historic sites, cultural landscapes, cabins).

The total of acres burned and mechanical fuel reduction work completed each year would include:

- Areas (acres) of fuel reduction in wildland/urban interface (through prescribed fire and mechanical cutting).
- Areas (acres) of ecological restoration and maintenance (through prescribed fire and managed wildland fire).
- Acres burned by wildland fire that escapes initial control efforts in areas scheduled for prescribed burning but still achieves acceptable ecological effects, and by wildland fires or prescribed fires that are suppressed due to smoke issues. (Current federal fire policy does not consider fires that are suppressed to have any beneficial effects. Although such acreage will be reported by Yosemite National Park according to federal fire policy requirements, the Yosemite fire management plan will count such acreage for internal use such as in FRID calculations).

Because of variability in fire and lightning occurrence from year to year, no precise estimate can be made about the number of acres that will burn annually by managed wildland fire and unwanted wildland fire. Similarly, the actual acres of prescribed fire will vary as well; years with more active wildland fires will tend to have fewer prescribed fires. It is expected, however, that the total number of acres treated from all three sources will be relatively consistent.

Establishing Priorities for Areas to be Restored

Prioritization of areas to be restored using prescribed fire or various fuel reduction techniques would be based on several factors. Priorities for treatment are the same for all alternatives. However, the amount of work done varies by alternative based on time-specific accomplishment goals. A multi-year burn schedule details proposed work (see Appendix 6). Unplanned wildland fires may also shift priorities. The priorities would generally be:

Level 1: Special Management Areas, including:

- Wildland/urban interface areas
- Giant sequoia groves
- Park boundary areas

Level 2: Prescribed fire units adjacent to Special Management Areas, some of which would be managed using maintenance targets because, due to prior burning, they are within target conditions. Prescribed fire units close to Special Management Areas would provide an additional buffer from an approaching wildland fire because fuels would be reduced, thus lowering the risk and intensity of a wildland fire.

Level 3: Maintenance burning of prescribed fire units that have been previously treated could have a higher priority than first entry (initial) burns. Keeping previously treated areas in their restored condition would be more important than treating new areas in many cases, and in particular would avoid the repeated buildup of fuels. This is especially true of burned areas that have a FRID value approaching 4.

Level 4: Areas requiring the reintroduction of fire to mitigate the potential for high-intensity fire due to four or more missed fire return intervals. These would likely be areas that have no record of being burned since the establishment of the park in 1890

Level 5: All other areas.

Acreage Determination

The Multi-Year Prescribed Fire Schedule (Appendix 6) presents tables of proposed restoration burning, maintenance burning, and fuel reduction work in the WUI. Achievement will depend on the number of burn days in a given year and other factors described below. The objective would be to meet the proposed timetable over the long run, therefore the schedule would be reevaluated and updated as necessary. Appendix 11 describes the prescribed fire units.

Restoration acreage figures in Table 2.5 are derived using Maps 2-4 and 2-5, which show areas that have missed four or more fire return intervals (based on median and maximum fire return intervals for these vegetation types). Acreage figures then were divided by the timeframe proposed in each alternative for restoration work only. This provided a range of acres to be restored annually to meet the timeframe proposed in each alternative. This average is shown in each of the years scheduled in the Multi-Year Prescribed Fire Schedule (Appendix 6).

Table II-5
Acres to be Treated in Ecosystem Restoration Areas and Wildland/Urban Interface: Comparison of Action Alternatives (Numbers rounded to nearest whole)

	Proposed duration for fuel reduction and ecosystem restoration WUI = wildland/urban interface	Ecosystem Restoration Range of Average Annual # of Acres to be Treated		Wildland/Urban Interface (inner) Average Annual # of Acres to be Treated[2]
		Median FRID Total[1] = 160,894	Maximum FRID Total[1] =31,503	Total = 6,425
Alternative B: Aggressive Action	WUI = 5 years Ecosystem Restoration in 10 – 15 years. Mean = 12.5 years	12,872	2,520	1,285
Alternative C: Passive Action	WUI = up to 10 years Ecosystem Restoration in 25 years	6,436	1,260	766
Alternative D: Multiple Action	WUI = 6-8 years Ecosystem Restoration in 15 – 20 years. Mean = 17.5 years	9,194	1,817	1,095

1 Fire Return Interval Departure (FRID) totals are the sum total of all areas that have missed four or more fire return intervals.
2 Annual averages are not annual targets but serve to show the amount of land that would need to be treated, on an average, to meet the time frame of each alternative.

The average number of acres to be treated annually in inner WUI areas is derived by dividing the total area of the designated WUI (Maps 1-2 and 2-6 through 2-18) by the number of years proposed for doing the work. These acres are also included in the multi-year burn schedule. Maintenance acres are included in the multi-year burn schedule as well. They were determined based on the length of time when last burned. It is expected that maintenance burning would make up the larger portion of the yearly burn schedule as more areas are treated and put into a rotational plan for re-treatment.

Annual Constraints to Burning

Some years are better than others for prescribed burning and, because of short-term climatic patterns such as El Nino and La Nina, natural wildland fire activity also varies greatly between years. In drier years, managed wildland fire may play a very large role in the fire program, while prescribed fire may be used only minimally. In years of higher rainfall, wildland fires are infrequent, while prescribed fires conditions may be favorable. Thus, prescribed fire may be used extensively while wildland fire activity is low in wet years.

Under all action alternatives, the amount of mechanical fuel reduction would decline after fuels in and near WUI areas were reduced. After fuel levels were within target conditions, it should be possible to use prescribed fire to maintain fuel levels and vegetation within targeted conditions. Similarly, the number of wildland fires that would be allowed to burn could be expected to increase over time, as more and more prescribed fire units were brought within target conditions. Wildland fire would then be used as feasible to maintain ecosystem health and function, as it currently does in most parts of the Wilderness. Prescribed fire would continue to be used where natural fires cannot be allowed to burn for safety reasons.

Following safety issues, the largest constraints to burning will be smoke management and air quality regulations. Prescribed fires and wildland fires that may burn for longer than two weeks will generate complaints to local air districts. Smoke management techniques, including the division of large burn units into smaller blocks to facilitate checking fire spread when dispersion conditions deteriorate, will continue to be incorporated into prescribed fire and wildland fire plans. Smoke emissions should decrease as target conditions are reached.

Alternatives Considered in the Final Yosemite Fire Management Plan/EIS

The range of Alternatives considered in the *Final Yosemite Fire Management Plan/EIS* include:

Alternative A: No Action (Current Program)

Alternative B: Aggressive Action

Alternative C: Passive Action

Alternative D: Multiple Action

Each action alternative (B, C, and D) proposes a full range of fire management strategies to maintain and restore ecosystems and protect people, communities, valued resources, structures, and utilities from unwanted fire. Fire management strategies include managed wildland fire (typically lightning-ignited), prescribed fire (management-ignited), fire suppression, and mechanical fuel reduction.

Each alternative aims to meet the ecological target conditions described earlier in this chapter. The alternatives differ in the time required and the methods used to accomplish restoration and fuel reduction goals. Under the current program, the park is divided into three fire management *zones*, each with a different prescription for management (Map 2-19). These are redefined as three *units* (reflecting a change in national fire terminology) in the No Action Alternative. Under the action alternatives (Alternatives B, C, and D), the park would be divided into two fire management *units* as directed in the National Fire Plan—a Fire Use Unit and a Suppression Unit (Map 2-20).

Common to All Action Alternatives

Safety

Public and firefighter safety is the number one priority for all alternatives. The Federal Fire Policy states: “Firefighter and public safety is the first priority, and all fire management plans and activities must reflect this commitment.” National Park Service Wildland Fire Policy (Director’s Order 18) echoes this direction: “The NPS is committed to protecting park resources and natural ecological processes, but firefighter and public safety must be the first priority in all fire management activities.”

The *Yosemite Fire Management Plan*, regardless of the alternative selected, will enact the following to ensure the safety of firefighters and the public:

- Every firefighter and fire line supervisor, the fire program manager, and the park Superintendent will take positive actions to ensure compliance with safe fire management practices.
- Experience, training, physical fitness, and knowledge of safety practices will be required of all people in leadership roles in fire operations.
- All wildland fire safety standards [including the 10 Fire Orders, 18 Watchout Situations, Downhill/Indirect Line Checklist, Four Common Denominators of Fatality Fires, Lookouts-Communications-Escape Routes-Safety Zones (LCES), and Risk Management/Situational Awareness] will be required annual training for all personnel involved in wildland fire operations.
- Annual hands-on fire shelter deployment training will be mandatory.
- The safety training requirements listed in Chapter 3 of National Park Service Reference Manual 18 (RM-18; NPS 1999b) will be adopted and adhered to.
- Qualifications standards for ICS (Incident Command System) positions as listed in National Wildfire Coordinating Group 310-1 "Wildland Fire Qualification Subsystem Guide" will be adopted.
- All project plans will address safety concerns in an attached Job Hazard Analysis (JHA).
- A safety briefing will be given prior to initiating work on any project.
- All Type 3 fire incidents and all prescribed burns will have an Incident Action Plan (IAP) developed for each operational shift. Every IAP will include a safety message.
- Every project or incident will have at least one person charged with incident safety oversight; complex situations will require multiple safety officers.
- All personnel will be authorized and obligated to exercise emergency authority to stop and prevent unsafe acts.
- All employees will have the right to turn down unsafe assignments; they will also have the responsibility to identify safe alternatives to accomplish the mission.
- The use of SAFE NET ground-based safety incident reporting system will be adopted and implementation procedures will be included in the employee handbook.
- After Action Reviews (AARs) will be conducted by the project leader or incident commander after each shift of a project or incident to evaluate safety and effectiveness of work performed and identify and discuss encountered hazards.
- All wildland fire incidents that result in human entrapment, fatalities, or serious injuries, or that have the potential to result in such, will be reported and investigated as required by RM-18, Chapter 3 (NPS 1999b).
- The park Superintendent (or designee) will manage critical incidents following checklists and processes contained in the National Wildfire Coordinating Group's "Agency Administrator Guide to Critical Incident Management."
- All personnel on wildland fires will be equipped with proper personal protective equipment (PPE) as described in Chapter 3 of RM-18. All personnel will carry a fire shelter on wildland fires at all times unless in a designated safety zone.

- All personnel on projects or fire management activities will adhere to special PPE requirements specific to those operations, i.e., power saws, helicopters.
- All visitors traveling inside wildland fires in Yosemite National Park will be equipped with Nomex clothing, gloves, hardhat, and fire shelter, and will be accompanied by an operationally qualified person that can maintain communications with the incident management team and recognize potential problem fire behavior.
- All visitors traveling along the margins of wildland fires in Yosemite National Park will be equipped with a hardhat and will be accompanied by an operationally qualified person that can maintain communications with the incident management team and recognize potential problem fire behavior.
- All vehicles and drivers engaged in fire management activities will meet Government Services Administration (GSA) and agency standards, as well as state licensing requirements.
- All personnel engaged in wildland fire activities in Yosemite National Park will adhere to the health screening/medical surveillance and fitness requirements of RM-18, Chapter 3.
- All fire management personnel will be provided three hours per week of duty time to achieve and maintain physical fitness levels as prescribed in RM-18, Chapter 3. Firefighters whose full-time duties are 100% arduous duty-related (helitack, handcrew, engine crew, prescribed fire) will be provided one hour per day for fitness training when circumstances allow.
- Radios will be assigned to all fire crews and monitors when working on wildland fires. Special permission must be obtained from the incident manager for individuals to work alone on actively burning fires.
- Perimeter control will be assigned on all fire management projects and incidents to prevent non-fire personnel from entering the project/incident area without escort or proper personal protective equipment (PPE). The intent of perimeter control is to prevent injury to the public from unmitigated hazards of smoke, heat, falling debris, and machinery.
- Trails and roads providing access to mechanical fuel reduction projects, managed wildland fire fires, unwanted wildland fires, or prescribed fires will be closed if such fires and/or projects present unacceptably hazardous conditions to park visitors. Wilderness permits will not be issued for trailheads leading to hazardous areas. Roads and trails will remain closed until the hazard is abated.
- Smoke warning signs on roadways and/or traffic control will be instituted during wildland fires as conditions warrant and at the direction of the Burn Boss, Incident Commander, Safety Officer, or a visitor protection representative.
- Portions of the park or the entire park may be closed by order of the park Superintendent when there is any threat to the public or firefighter safety from wildland fire or fire management activities. When and if such an action occurs, adjacent agencies and authorities will be notified as soon as possible to help manage or evacuate the closure.
- Areas of hazardous fuels adjacent to publicly or privately owned structures or along likely evacuation routes will be kept clear of debris. This requirement will fall on the owner or the agency having jurisdiction, or the renter. The minimum requirement for creating defensible space is a 30-foot radius around any structure and 10 feet on either side of a roadway. These

specifications will provide only the minimum degree of safety for firefighters and the public and are the same as prescribed by California Public Resource Code (PL 4290 and 4291).

Fire Management Units

Fire Use Unit

The Fire Use Unit is by far the largest management unit, containing 83% (621,059 acres) of the park. In this unit, managed wildland fire (typically lightning-ignited) would be the primary tool used to meet ecological target conditions. In a small portion of the Fire Use Unit (48,912 acres), additional prescribed burning may be necessary to reduce fuel loads to a point where managed wildland fire would be safe and appropriate, especially near the boundary of the Fire Use and Suppression Units. In these areas, prescribed fire units would be designated (Map 2-21).

Suppression Unit

The remaining 17% (128,044 acres) of the park would be in the Suppression Unit. Many areas in the Suppression Unit are at high risk of large, high-intensity, stand replacement fires due to high fuel loads and vegetation characteristics that create hazardous conditions. Community and visitor protection would be paramount. All wildland fires in the Suppression Unit would be immediately suppressed using the Appropriate Management Response strategy (Appendix 3). Prescribed burning and mechanical fuel reduction techniques would be used in specific areas to reduce the risk of uncontrollable wildland fires, to restore and maintain ecosystems, and to reduce hazardous fuel loads. Lightning fires would not be allowed to burn in this unit for resource benefits, as they will in the Fire Use Unit.

Special Management Areas

Special Management Areas occur in both the Fire Use and Suppression Units. They include WUI communities and other developed areas, three giant sequoia groves (Mariposa, Tuolumne, and Merced), and the boundaries of Yosemite National Park. These areas require special management because unwanted, high-intensity wildland fire could alter these areas substantially with potentially irretrievable results. They also indicate some of the logic behind the selection and prioritization of fire management projects within Yosemite National Park.

Wildland/Urban Interface (WUI)

Fire management objectives for the WUI are to restore ecosystem structure and fuel loads to more natural conditions so the potential for intense fire is reduced, to make communities safer to defend from wildland fire, and to facilitate safer evacuations in the event of wildland fire. Site-specific prescribed fire and hazard fuel burn plans would be developed for each WUI area. Burn units covered under this EIS are listed in Appendix 11. Hazard fuel and forest restoration treatments would only occur on public lands.

There are six WUI areas in Yosemite: Hogdgon Meadow, Yosemite Valley, Wawona, El Portal, Foresta, and Yosemite West. These areas contain homes, businesses, campgrounds, historic structures, and other valued resources that require special management to reduce threats to life and property from unwanted wildland fire (Map 1-2 and 2-6 through 2-18).

The six areas within the red line plus the ¼ mile buffer on Maps 2-6 through 2-18 represent the only areas (approximately 6,425 acres) in which mechanical thinning would be used to achieve forest restoration objectives under this EIS. The red line on the maps represents the core of the WUI community area. The core plus the ¼ mile buffer is the inner WUI area, while from ¼ mile up to 1½ mile is the outer WUI area. The inner WUI and outer WUI areas are consistent with the dimensions of the "urban wildland intermix zone" described in the Sierra Nevada Forest Plan Amendment Final Environmental Impact Statement Record of Decision (USD 2001, Appendix A).

Various distances, such as 300'-400' from a structure, have been cited as the area in which vegetation and fuel management activities can make the greatest difference in the structures wildfire survivability (Summerfelt, 2003). However, in some locations the use of prescribed fire as a restoration tool for thinning would be extremely difficult within ¼ mile of structures, particularly because of the potential for embers to cause spotfires on and near buildings. Safety is the first concern for all fire management activities, and the ¼ mile buffer provides fire crews the necessary margin of safety both for themselves and for the structures they are defending from prescribed and wildland fire.

The acreage encompassed within each of the six WUI areas is derived from a combination of factors such as vegetation type, topography, expected weather, and potential fire behavior for each WUI area. However, the areas would be no farther than the 1½ mile distance used by the State of California to define the WUI zone, and is often significantly less because of these factors.

No other areas besides the six inner WUI communities are included in this EIS for mechanical thinning to restore forest target conditions. Any additional areas proposed in the future for mechanical thinning to restore forest target conditions would require further site-specific environmental compliance.

Hand thinning for hazard fuel reduction may occur parkwide for the preparation of units for prescribed fire projects or wildland fire operations without further site-specific environmental compliance. Pre-burn thinning could include removal of dead trees and dense understory near firelines, as well as removal of trees that may burn and damage or kill the canopy of high natural resource value trees, such as Yosemite Valley black oaks.

Restoration of forest structure would typically be limited to the denser end of the range of density/frequency shown in table 2.3. Fallen trees, limbs, dense understory thickets, and other fuel conditions that could contribute to intense forest fires or excessive heat or fire spread would be removed to meet target conditions.

Inner WUI Management

The inner WUI zone that immediately surrounds structures and facilities in the six WUI areas would be managed first to reduce hazard fuels using prescribed fire or mechanical means, within five to ten years depending on the alternative. Trees thinned in this initial phase would be 12" dbh and less, and would be removed with passive or aggressive methods (Table 2.6), depending on the alternative. Prescribed fire also would be used where safe and practical.

Subsequent to hazard reduction work, mechanical and prescribed fire projects would be done to restore forest structure to within target conditions, within 10 to 25 years, depending on the alternative. Under this EIS, no trees larger than 20" dbh would be removed mechanically to meet forest restoration target conditions without additional specific environmental compliance documents prepared for pubic review.

Aggressive mechanical methods would generally be used only once per site to restore forest target conditions, to minimize impacts. Aggressive methods to reduce hazard fuels and restore forest target conditions could be done concurrently in sensitive areas to reduce the need to enter an area twice with these methods. After the use of aggressive methods, passive mechanical methods and prescribed fire would be used to maintain target conditions.

Outer WUI Management

From the edge of the ¼ mile wide inner WUI zone to the limit of the outer WUI zone, at no more than 1½ miles from the WUI community, prescribed fire would be used initially for the achievement of both restoration and fuel reduction targets.

If prescribed fire does not achieve restoration target conditions in this outer WUI zone, mechanical thinning of trees up to 20" dbh, or larger, could be done to achieve these targets, but only following preparation and public review of separate environmental compliance documents. Prescribed fire would be used subsequently to maintain target conditions.

Beyond the six WUI areas, prescribed fire, and where feasible, wildland fire, would be used for forest restoration and maintenance activities. Smaller developments, such as backcountry cabins, would be protected from wildland fire by hand thinning wildland fuels near them. Mechanical work, such as handline construction, would be done to prepare an area for a prescribed fire and to protect the area from an approaching wildland fire. It would also be used within 200' of road centerlines and under utility lines to reduce hazardous wildland fuel loads.

Until a comprehensive management plan is completed for the Tuolumne Wild and Scenic River, only treatments allowable in the 1990 *Fire Management Plan* (hand cutting trees less than 6" dbh, chipping, prescribed burning) will be used in the Tuolumne River watershed (Map 5-1). Most of the plant communities within the Tuolumne River watershed are characterized by long fire return intervals and are within the natural range of variability for plant community structure and fire. Therefore, most of this drainage is in the Fire Use Unit.

Giant Sequoia Groves

Yosemite National Park contains the Mariposa, the Merced, and the Tuolumne groves of giant Sequoias. The natural regeneration of the giant Sequoia is strongly dependent on conditions produced by recurring, moderately intense fires (Harvey et al. 1977). These fires produce optimum conditions for giant Sequoia reproduction by: 1) removing thick layers of dead and downed debris; 2) leaving behind mineral soil covered by a thin layer of ash; 3) maintaining an open canopy; and 4) heating the canopy of mature Sequoias, causing them to release large numbers of seeds.

The primary management objective for each grove would be to preserve, maintain, and propagate giant Sequoias. Other localized objectives within the groves would be to maintain selected areas for aesthetic beauty and scenic vistas, to restore cultural landscapes, and to preserve historic resources such as the Merced Grove cabin. Park vegetation specialists would review plans for actions proposed that might affect the giant Sequoia groves. Mechanical thinning of trees smaller than 12" dbh with passive means may be used, especially to reduce the potential effects of unnaturally intense fire which can scorch and injure giant Sequoias.

Boundary Areas

Boundary areas are a priority for fuels management because of the risk of unwanted wildland fires that could burn into or out of the park. For example, part of the western boundary of the park from Chiquito Pass in the south to Kibbie Pass in the northwest is particularly flammable and at high risk of wildland fire due to current high fuel loading. Other boundary areas have a low risk of unwanted wildland fire.

The fire management objectives for boundary areas are to re-establish natural fuel loads and vegetation conditions to meet target ecological conditions. Fire management projects within boundary areas would require review by all agencies that share jurisdiction. Agreements may be developed with neighboring agencies to allow fires to burn across jurisdictional boundaries, if safe and appropriate. If an agreement with a neighboring agency were not in place, the Yosemite fire management staff would keep wildland fires within park boundaries.

Re-ignition of Wildland Fire

Re-ignition could occur for any wildland fire within the Fire Use Unit that had been extinguished because of high fire danger, lack of resources, or unacceptable smoke conditions. Burning the area would be done by re-igniting the original perimeter later during the fire season or at some time within three years of the fire. Within the initial fire season, the fire would be re-lit and allowed to burn and would be managed using a Wildland Fire Implementation Plan (Appendix 3). If the re-ignition were conducted during the following three fire years a prescribed fire plan would be prepared. The intent would be to burn the area the original fire would have burned. This area would be modeled using fire behavior and spread projections.

Use of Fire as a Tool on Special Resource Management Projects

Over the years, vegetation has grown and obscured numerous scenic vistas in the park, notably in Yosemite Valley. These areas no longer provide the visual opportunities that were present when the park was set aside. Other culturally important areas no longer provide the same historic value due to fire suppression. Special-status species habitat may benefit from fire management activities. The Resources Management Division would identify culturally or biologically significant areas that would benefit from the use of fire and actions would be identified to restore and maintain these sites. Each proposed site would have an operational Hazard Fuel Plan or Prescribed Fire Plan prepared and reviewed by the appropriate resource and fire specialists.

Helibase Upgrades

Three primary helibases in Yosemite National Park and the El Portal Administrative Site are used for emergency purposes, mostly medical evacuations and seasonal fire operations. All of these helibases are in or close to developed areas of the park. The projects described below are maintenance projects aimed at making three of the sites that are already in use safer for helicopter operations. At a minimum, helipads consist of a safe, flat place to land a helicopter, and vegetation is maintained to facilitate clear flight paths. None of these helibases is located in Wilderness.

Crane Flat Helibase

Over the years, several improvements have been made to the Crane Flat Air Operations Facility. In 1996, a new office was installed at Crane Flat Lookout, which allowed the park to rehabilitate the historic lookout that has been on this ridgetop since 1929. Since 1962, this facility has been used as the primary helibase for fire suppression and rescue operations. There are three helipads and vegetation is managed for approximately 300-500' around the perimeter of the lookout to promote safe air operations and for visibility when spotting wildland fires.

The original helipad has been taken out of service because of its proximity to the lookout and the new office, but the need for three pads continues to exist since one must be kept open for emergency landings. This pad is lighted for night-time landings. The *Final Yosemite Fire Management Plan/EIS* proposes the installation of a new helicopter pad adjacent to the existing pads. Installation of the new pad would require filling an area approximately 100' by 75' on the east side of the existing pads to the existing grade. After allowing the fill to settle, a top-coat of crushed gravel would be installed and the area would be paved. All fill dirt used would be material left over from the 1997 flood that is stockpiled within the park.

The second phase of this upgrade would consist of constructing a heli-rappel training tower in the Crane Flat Lookout parking lot. This would be used so that currency training could be done without using the helicopter, thereby limiting exposure to risk and increasing safety to personnel. The tower would be 10' wide and 20' tall and would be constructed using old bridge I-beams that were salvaged from washed out bridges in the park.

El Portal Helibase

The El Portal Helibase is located on Foresta Road between the Merced River and the El Portal Sewage Treatment Facility. This helibase is used mostly for emergency medical evacuations and meets an essential need for the El Portal community. Typically, the area is used less then 10 times a year (in non-fire years). However, in years of high fire activity it can become a vital part of air operations. The proposed improvements would provide for better public and pilot safety. Currently, lack of a safe, adequate location often results in the use of Highway 140 or the schoolyard at the El Portal Elementary School. Both of these sites have serious safety risks associated with landing helicopters due to power lines and exposure to residents and the public.

Improvements would consist of installing one gate to restrict traffic and using the existing road that was reconstructed following the 1997 flood. The existing road apron would be widened and additional asphalt would be laid to provide for the installation of two 50'x 50' helipads. An asphalt spill abatement berm along the grouted rip-rap bank on the river side of the road also would be installed.

Wawona Meadow Helibase

The facility is accessed from the Meadow Loop road adjacent to the Wawona Golf Course. Road access poses risks to Wawona traffic and people trying to access the helipad. Parking is currently along the road in a forested area. Improvements to this area would involve defining and upgrading: 1) the parking area to keep vehicles from driving into forest areas to park and turn around, and 2) access from the Wawona Road, which would involve seasonal signing to reduce traffic congestion at this turn off. No work in the meadow itself would occur under this proposal.

Strategies Used to Maintain and Restore Ecosystems

Managed Wildland Fire

Any fire that burns within wildlands and is not a prescribed fire (or a structural fire) is called a *wildland fire*. Lightning ignites most wildland fires in the park, though human-caused fires may also become wildland fires. Managed wildland fire is the primary tool for restoring and maintaining vegetation in the Fire Use Unit.

Managed wildland fire is the practice of allowing a naturally-ignited wildland fire to burn while keeping it within a specific area called a *maximum manageable area* (MMA). Safety of firefighters and the public is the primary concern in managing a wildland fire. Through pre-planning, monitoring, and holding actions, many wildland fires can be kept well away from people, buildings and infrastructure, and valued resources such as historic buildings. Adverse effects on special resources (i.e., historic buildings, special-status species) can often be mitigated through a variety of actions. Elements of managing a wildland fire include public information and education, coordination with other agencies, and fire behavior research.

Because fire is a natural process in the Sierra Nevada, allowing wildland fires to burn meets park goals to maintain a natural environment. Wildland fires have been managed in Yosemite to meet resource objectives since 1972. Allowing natural fires to burn also helps maintain cultural resources such as landscapes and archaeological features.

Managed wildland fires were originally associated with Wilderness portions of the park. The first managed wildland fires were restricted to barren areas of the Sierra Crest, which rarely burned. As knowledge about fire ecology and fire behavior increased, and as management experience increased, this area was expanded.

From 1972 through 2002, 586 wildland fires have been managed, burning a total of 81,264 acres of the park. The largest number of acres burned with managed wildland fire in one year was in 1999 (14,870 acres). The second and third largest years were 1988 (12,265 acres), and 2001 (9,410 acres). Recurring fire events in Yosemite have validated scientific theories of fire ecology that were developed several decades ago.

Wildland fires that are ignited by lightning can be allowed to burn if they occur in the Fire Use Unit and meet the criteria shown in Appendix 3. The majority of managed wildland fires are less than ¼ acre. Most of these small fires occur in red fir and lodgepole pine forests and burn only a few days. During a dry year, a larger percentage of ignitions burn until the end of the season, usually late October when the first substantial precipitation occurs.

Fires that grow large and burn for weeks or months typically experience three phases of activity. The first phase is the establishment period when, after an electrical storm has passed, the fire spreads slowly on damp fuels. This phase usually lasts from 1 - 14 days. In the second phase, area and linear rates of spread and intensity can greatly accelerate as fuels dry out. Depending on the prevailing winds, relative humidity, the fire's potential for upslope movement, and the existence of natural barriers, the fire displays alternating episodes of rapid movement and relative dormancy.

Phase two may be temporarily interrupted by precipitation from additional electrical storms. This phase may continue for several weeks until the fire is confined, either by natural barriers or rains from a major frontal storm system (NPS 1990). During exceptionally dry years and periods of drought, it is common for these fires to burn actively into late November and December if no moisture arrives.

In phase three, after late September, shorter days and lower seasonal temperatures will cause an overall decrease of activity. The fire may continue to burn for several weeks, but does not actively advance as in phase two. In Yosemite National Park, there is a 90% chance of a fire-season ending event by October 17th.

Because a fire may burn throughout the summer and fall, the effects of a managed wildland fire on plants, animals, soils, and cultural resources can vary throughout the fire area. A large fire typically burns from late-spring or early-summer, when vegetation may or may not be completely cured, through the entire summer and into fall.

Effects mimic the phases noted above with extensive fuel reduction occurring during periods of high activity when fuels are driest, and less so as the season progresses. Depending on fuel moisture conditions, within one fire there are areas of very little fuel consumption as well as areas of total fuel consumption. Hotter areas create an arrangement of small to large openings (gaps) in the canopy, which allow light onto the forest floor to start new plants or restore plants that require more sunlight than is found in dense, overgrown forests. The variability of environmental conditions and wildland fire creates a mosaic of effects on the landscape. This mosaic is hard to replicate using small prescribed fires, and is even more difficult to replicate with mechanical methods.

Prescribed Fire

Prescribed fires are management-ignited fires that are intentionally lit to meet resource objectives when predetermined and approved conditions are met. Prescribed fire has been used in Yosemite National Park since 1970 to meet a variety of resource objectives. Meadows have been burned to remove thatch (mat of dead grasses and sedges), and giant Sequoia groves have been burned to reduce undergrowth and promote Sequoia germination and new tree growth. Prescribed fire has been used to replicate traditional burning by American Indians and to improve the quality of plant material in traditional gathering areas. It has also been used widely to reduce fuels around developed areas and to restore lower elevation forests in areas where wildland fires have been suppressed for many years.

Prescribed fire can be applied in strategic locations using special techniques. By igniting fires that burn hot enough to create openings in a forest canopy, gaps can be created that would provide protection from unwanted wildland fire. These openings, typical of a naturally fire-influenced forest, can break up vegetation continuity that supports crown fires near areas where protection of life and property is critical. Prescribed burns used in this manner provide a fuel-transition area that will help prevent rapid, uncontrollable fire spread for a decade or more. These treated areas can also provide locations where tactical plans can be implemented to stop the spread of an unwanted wildland fire.

From 1970 through 2002, fire managers in Yosemite have ignited 205 prescribed fires, burning a total of 46,791 acres. In only two years, 1978 and 1997, have more than 4,000 acres been treated. This amount of burning has not been enough to undo the impacts of several decades of landscape-scale fire exclusion.

Prescribed burn units usually require multiple burns to meet resource objectives. The first prescribed burn typically kills understory vegetation and consumes ground fuels. A second burn cleans up fuel that is deposited from burned vegetation and thins the new plants that sprouted following the first burn. Subsequent burns maintain a fire-influenced forest and reduce fuel that has built up since the last fire. In Yosemite National Park, 7 to 12 years typically pass between prescribed burns. Prescribed fire is thus used to keep specific areas within target conditions.

Pre-treatment for Fire Protection

Pre-treatment of prescribed burn units involves removing trees, shrubs, and snags prior to the burn to help keep the fire within the designated area or to protect specific resources. The use of mechanical equipment to remove trees and shrubs can increase the safety and effectiveness of a prescribed burn, especially in areas surrounding the WUI. In addition, pre-treatment significantly increases protection of cultural resources from the potentially damaging effects of prescribed burning. Removing fuels prior to burning increases the ability of firefighters to control the burn. Many communities in and near Yosemite will need considerable pre-treatment before burning can be performed in adjacent areas on a scale large enough to protect areas from unwanted wildland fire.

Hazard Fuel Reduction Options

Numerous techniques are available to reduce or remove hazardous fuels in forest systems. In general, live and dead vegetation can either be burned or mechanically removed. Prescribed fire, managed wildland fire, and mechanical removal of trees and shrubs are proposed in all action alternatives to remove or reduce fuels. Specific laws prohibit the use of some mechanical fuel reduction techniques in specific areas. For example, the use of vehicles to remove fuel in Wilderness is prohibited. No new roads will be constructed for hazard reduction or forest restoration activities.

The action alternatives propose a variety of methods to mechanically remove live and dead trees and surface fuels. These methods are classified as either aggressive or passive reduction techniques (Table 2.6). Both techniques are used to accomplish the dual objectives of removing hazardous fuels and restoring vegetation target conditions. Aggressive and passive tree and shrub removal techniques for restoration of target forest conditions would occur only on public lands in the core and inner WUI zones of the six wild-urban interface areas (Wawona, Yosemite Valley, Foresta, Yosemite West, Hogdgon Meadow, and El Portal).

Only passive methods for reducing wildland hazard fuels would be used to clear non-Wilderness roadside vegetation (shrubs and small trees less than 20" dbh) within 200' of the centerline and under utility lines. Public roads subject to this treatment would be inside five WUI communities (Yosemite Valley is excluded), the El Portal, Big Oak Flat, and Wawona Roads within the Suppression Unit; the roads to O'Shaughnessy Dam at Hetch Hetchy, Aspen Valley, and Glacier Point, and the fire motorway roads shown on Maps 2-23 and 2-24. **No new roads would be constructed for thinning operations anywhere in the park.**

Aggressive fuel removal techniques would more quickly restore target structural conditions and reduce the risk of unwanted wildland fire near the six WUI communities. Aggressive fuel reduction techniques would not be used in any Wilderness areas in Yosemite National Park, and would generally only be used once per site. Passive fuel reduction methods and prescribed fire would subsequently be used to maintain forest structure target conditions, as well as to prevent the reoccurrence of hazardous amounts of wildland fuel. Wildland fire would be allowed to burn to maintain these conditions as well, where safe and practical to do so. The overall goal is to allow natural processes to manage fuel and ecosystem conditions as fully as possible.

Table II-6 Hazardous Fuel Reduction
Techniques for Tree and Shrub Cutting and Removal (both live and dead)

Technique Used for Hazard Fuel Reduction	Description
Aggressive Reduction Techniques (Alternatives B and D only)	
Mechanized Tree and Shrub Removal (feller-bunchers and forwarding)	Tracked equipment with cutting head severs stem and mechanically lays tree down; stem is stacked whole or mechanically de-limbed and cut-to-length, then decked (stacked) for transport by self-loading rubber-tired forwarder. Used for removal of live trees.
Conventional Tree and Shrub Removal (saws, skidders, and grapplers)	Hand crews walk to each tree and fell tree and limb with a chainsaw; tracked or rubber-tired tractors grapple or winch trees or logs and drag them to landings where they are loaded onto trucks to pile for burning. Used for removal of live and dead trees and shrubs.
Machine Crushing/Shredding	Tracked equipment travels to each tree or stump (or within reach of stump—max. 30 feet for "Brontosaurus" shredder head on excavator arm); vegetation is crushed under tracks or shredded by flail cutters, and left onsite. Various equipment types can be used. Used for removal of live trees and shrubs and dead and down material.
Machine Piling	Tracked or rubber-tired tractor grapples or pushes vegetation with front blades and piles it. or tracked excavator with bucket and thumb grapples and piles vegetation. Used following tree removal techniques or for preparing dead and down material for burning or chipping.
Passive Reduction Techniques (Alternatives B, C, and D)	
Yarding (various methods)	Cables are suspended from landings and trees or logs are attached to the cables and lifted or dragged to natural openings or landing areas. May involve use of fetching arches, which would reduce surface disturbance. Used to remove freshly cut or dead and down material from burn units.
Hand Cutting/Piling	Hand crews drive or walk to fuel reduction areas and cut with a chainsaws; hand crews pile in place or carry, roll, or drag vegetation to burn sites. Cultural resource technicians clear burn pile. locations.
Cutting/Chipping	Vegetation is transported to the chipper or the chipper is towed through the treatment units or located at approved staging areas. Chips may be broadcast 1” deep, trucked to other areas for use in the park, sold, or given away for cost.
Low-Impact Skidding	Trees are cut by conventional methods and the stem is skidded using horses or ATVs. May involve use of fetching arches, which would reduce surface disturbance. This technique is size limiting in that large trees both live and dead exceed the capability of the technique. Use would limit the ability to achieve restoration in some areas where larger trees need removal.
Girdling (promote tree mortality over a period of time)	Hand crews walk to each tree and cut a four-inch ring into the xylem, or trees are wrapped with fireline explosives and "shot"; ponderosa pines may be baited with pheromone lures to produce bug-kill.
Limb Removal (trees standing after project is done)	Lower (up to 6-10 feet) limbs (living or dead) are cut to remove ground and ladder fuels.
Wildland Fuel Disposal Options (Alternatives B, C, and D)	
Pile Burning (machine or hand piles)	Piles are allowed to cure, covered with water repellent material, and ignited when fuel and weather conditions are right. Used to remove surface and ladder fuel component which reduces risk for broadcast burning at a latter date.
Pile and Leave (area would be broadcast burned within five years)	Piles remain on site longer but are removed over time. Wildlife considerations taken into account when leaving piles for longer duration.
Lop and Scatter	Vegetation is dispersed onsite and cut to maximize soil contact. Depth of material does not exceed 24 inches. Eventually consumed during broadcast burning. Drawback is that many saw scars may be visible until area is burned.
Chip and Broadcast (broadcast burn after fuel reduction)	Vegetation is chipped at landings or throughout treatment unit; chip depth, fuel moisture, and ignition pattern are considered in burn prescription development to mitigate smoke production and fire effects concerns.
Chip and Broadcast (leave one inch depth)	Chips are dispersed directly from chipper chute to avoid chip accumulations >1 inch, or chip piles are distributed

Technique Used for Hazard Fuel Reduction	Description
	by hand crews or machines to depth not to exceed 1 inch.
Chip and Haul (give for cost)	Chips are generated into a commercial chip van, or chips are piled and loaded into trucks for use as fiber or fuel. Chips can be donated for outside needs or hauled to sites in park but may also be sold or given away for cost.

Alternative A – No Action

Under the No Action Alternative, the existing direction and level of accomplishment of Yosemite National Park's fire management program as described in the 1990 *Fire Management Plan* would continue. This alternative would use a range of fire management strategies that include prescribed fire, managed wildland fire, fire suppression, and hand cutting followed by pile burning and prescribed fire.

The Fire Management Units for this alternative are the same as the "zones" used in the 1990 *Fire Management Plan*. Zone I, Prescribed Natural Fire Zone would become the Fire Use Unit; Zone II, Conditional Fire Zone would become the Conditional Unit; and Zone III, Suppression Zone would become the Suppression Unit (Map 2-19).

Since the inception of the fire management program in Yosemite, natural fire regimes have been restored and fuel build-up has been reduced in some areas, but not at the rate needed for comprehensive ecosystem maintenance and restoration. In the past, the park fire program has averaged 1,472 acres of prescribed burning and 2,567 acres of managed wildland fire each year. This does not approach the annual target of 16,000 acres that would need to burn annually to simulate natural conditions.

Over the last decade the park has reduced hazardous levels of fuels near developed areas, but the goal of providing an open defensible forest in and around every community may not ever be met at the current rate of work. Less than 25 acres per year in each of the larger WUI areas (Yosemite Valley, El Portal, Wawona, Foresta, Hodgdon Meadows, and Yosemite West) had been treated through 2001.

The current fire management program focuses on achieving hazard fuel reduction, reaching land management objectives such as a more open forest where appropriate, protecting developed areas and cultural resources, and restoring natural processes. Each fire is evaluated individually, under direction provided for each fire management unit. Unwanted fires are aggressively suppressed from the moment of detection. Factors that could lead to suppression include extreme drought, certain air quality and atmospheric conditions, and proximity to residential, administrative, or commercial areas. Past staffing levels and air quality constraints have limited the park's ability to complete larger landscape-scale prescribed fires and managed wildland fire projects.

Alternative B – Aggressive Action

Under Alternative B, aggressive techniques would be used to reduce fuels in and near developed areas (inner WUI) within a period of 5 years, and accomplish fire-related ecosystem restoration goals within 10 to 15 years. This alternative would reduce fuels on an average of 1,285 acres per year in the WUI (Maps 2-6 through 2-18) over 5 years (6,425 acres total). Aggressive fuel reduction methods would be used on less than 1% of the park. The natural fire regime would be restored to between 2,520 and 12,872 acres per year, for a total of between 31,503 and 160,894 acres over the next 10 to 15 years.

This alternative would treat WUI areas and accomplish restoration goals in the shortest time compared to other alternatives. Prescribed burning would increase dramatically over present levels and lightning fires would be allowed to burn where practicable. Median and maximum fire return interval departure analyses were used to determine locations and set annual goals (range of acres) for treatments, using the various restoration, maintenance, and fuel reduction strategies (Maps 2-4 and 2-5 and Table 2.5). Appendix 6 displays a multi-year burn schedule for ecosystem restoration, maintenance burning, and fuel reduction work in WUI areas.

Description of Actions under Alternative B

This alternative divides the park into two fire management units: the Fire Use Unit (83% of the park) and the Suppression Unit (17% of the park; Map 2-20).

Suppression Unit (17% of the park)

Wildland/Urban Interface Alternative B proposes the most aggressive treatments among all alternatives to reduce fuels, restore ecosystems, and protect people, homes, developed areas, valued resources, facilities, and utilities. A combination of physical removal of live and dead trees, shrubs, and woody debris, and prescribed burning would be used. Managers would aim to achieve the more dense forest structure within the natural range of variability for the system (see density/frequency ranges in Table 2.3), which would require the least amount of manipulation to achieve from the present condition.

It is expected that some secondary, or midstory, canopy trees in the 12”-20” dbh range would be removed from inner WUI forests to achieve the desired semi-open canopy condition. The reduction in forest stand density would reduce the risk of high-intensity wildland fire near communities and administrative and commercial areas in the 6,425 acres of the inner WUI.

This alternative would use the full range of options identified in Table 2.6 to remove some trees and shrubs, both live and dead, from areas near residences, commercial and administrative buildings, and other sensitive sites within public lands in the six core and inner WUI areas.

From the WUI community itself out to ¼ mile (inner WUI), mechanical methods would be used initially to accomplish fuel reduction objectives, followed by the use of prescribed fire. Where safe and practical to do so, prescribed fire could be used as the initial method rather than mechanical means. From ¼ mile to no more than 1½ miles from the WUI community (outer WUI), prescribed fire would be used initially to meet both fuel reduction and forest restoration objectives. Mechanical means to accomplish forest restoration targets in outer WUI areas would be used only after prescribed fire had been shown to not accomplish these targets, and only after preparation of environmental compliance documents subject to public review.

Woody material would be chipped, burned, and/or removed from the areas to provide immediate protection and defensibility from wildland fire, unless leaving the material on site did not create a wildland fire hazard. Logs from thinning would be used within the park to the fullest extent possible for administrative and maintenance projects. Logs that cannot be used by the park would be removed following methods used by the Hazard Tree Removal program for many years. This would be a last resort for removal of this material.

One or more communities would be targeted each year over a five-year period, to complete fuel reduction for the six WUI areas (Maps 2-6 through 2-18). In the first year of treatment for each community, 90% of site preparation, tree and shrub reduction, and piling would be completed. It would be necessary to hire contractors, under the supervision of park staff, to complete the work this quickly. Prescribed burning would be completed within the next five years. A site-specific prescribed fire plan would be identified for each WUI area.

Most work would be scheduled during periods of low visitation, outside of the summer fire season. Pile burning would be simultaneous with tree and shrub removal, and would continue through fall and winter. After initial mechanical or prescribed fire reduction work was accomplished, prescribed fire units within the WUI areas would be set up for rotational burning to maintain an open forest structure.

Non-Wildland/Urban Interface, Non-Wilderness Beyond the 1½ mile radius around the six WUI areas, wildland fuel and vegetation would only be treated with prescribed fire to achieve target restoration and maintenance conditions. Hand thinning of live and dead tress would be done to prepare these areas for prescribed burning. After the initial fuel reduction work was accomplished, the prescribed fire units would be burned to maintain an open forest structure. Mechanical thinning of small trees less than 20" dbh would occur within 200' of the centerline of roads in areas where crowns are densely compacted.

Wilderness Areas Some of the identified WUI in Wawona is located within designated Wilderness. Aggressive fuel reduction with heavy equipment would not be performed in this or any other Wilderness area, nor could such equipment "reach over" from non-Wilderness to Wilderness land. Limited hand cutting, pile burning, and prescribed fire would be the tools available for reducing wildland fuels and for reaching ecological target conditions in the designated Wilderness area inside the Wawona WUI.

Fire Use Unit (83% of the park)

Managed wildland fire would be the primary tool to achieve fire-related ecosystem restoration goals in the Fire Use Unit. Occasionally, other passive fuel reduction treatments would be used for special needs, such as preparing an area for managed wildland fire. Certain areas within this unit would require treatment with prescribed fire before being fully eligible for managed wildland fire.

Non-Wildland/Urban Interface, Non-Wilderness There is very little development in this unit. These areas are located mostly along road corridors and include Glacier Point, Tuolumne Meadows, White Wolf, and other areas where the Wilderness boundary is set back from existing human intrusions and development. Prescribed fire and thinning of small trees generally less than

6" dbh would occur to protect these areas if wildland fire approaches. Hand cutting and pile burning would be used to prepare a prescribed fire unit for burning. Trees, including dead trees, would be cut as needed to provide safe and secure firelines.

These activities would be designed to reduce wildland fire intensity as fires approach non-Wilderness roads and utility corridors. Managed wildland fire would be acceptable where it did not endanger buildings or sensitive sites (e.g., cultural resources).

Table II-7
Fire and Mechanical Treatments Used in Alternative B by Unit

(an X indicates the treatment is used in the alternative and a bold X indicates extensive use)

ALTERNATIVE B	Suppression Unit			Fire Use Unit		
Treatment Strategy	**Wildland /Urban Interface**	**Non-WUI/ Non-Wilderness Corridors**	**Wilderness**	**Wildland /Urban Interface**	**Non-WUI/ Non-Wilderness Corridors**	**Wilderness**
Aggressive Reduction	X					
Passive Reduction	X	X	X	X	X	X
Managed Wildland Fire					X	X
Prescribed Fire (in prescribed fire units)	X	X	X	X	X	X
WUI = wildland/urban interface						

Wilderness Managed wildland fire would be the primary tool used to restore and maintain ecosystems. Hand cutting and pile burning would be used only to prepare units for prescribed fire or to protect developments from an approaching wildland fire. Fuels left after trail maintenance and clearing activities would be burned in piles in late fall or early winter. Prescribed fire plans would be prepared for designated prescribed fire units. Managed wildland fire would be permitted anywhere in the Fire Use unit, pending authorization of a wildland fire implementation plan (Appendix 3).

Alternative C – Passive Action

Under the Passive Action Alternative, efforts would be taken to decrease fuels in WUI areas within a period of 10 years and to accomplish ecosystem restoration goals throughout the park in 25 years. Under Alternative C, fuels would be reduced in WUI areas by an average of 766 acres per year (6,425 acres over 10 years) and the natural fire regime would be restored to areas that have missed four or more fire return intervals by treating between 1,260 and 6,436 acres per year (31,503 to 160,894 acres over 25 years). Prescribed burning would be increased over the current program, but not to the levels proposed in Alternative B. Fuel reduction would be accomplished by using passive reduction techniques and lower fuel profile treatments (Table 2.6).

This alternative would achieve goals over a longer timeframe than Alternative B, and fire managers would depend on lightning and associated managed wildland fire to play a greater role in ecosystem restoration. Despite the focus on ecosystem restoration, areas of the park could be consumed by large, high-intensity (and unwanted) wildland fires because of the hazardous levels of fuels that would remain until near the end of the planning period.

Under this alternative, it would take more time than under Alternative B, but less than under Alternative A, to accomplish the park's minimum goals for restoration and fuel reduction. By the time all areas were treated, many areas would have missed another fire or two; thus, the risk of stand replacement fire would remain high.

Median and maximum fire return interval departure analyses were used to determine locations and set annual goals (range of acres) for treatments, using the various restoration, maintenance, and fuel reduction strategies (Maps 2-4 and 2-5; Table 2.5). Alternative C proposes a long timeframe so the number of acres treated each year is the least among the action alternatives. Appendix 6 displays a multi-year burn schedule for accomplishing ecosystem restoration, maintenance burning, and fuel reduction work in WUI areas.

Description of Actions under Alternative C

This alternative divides the park into two fire management units: the Fire Use Unit (83% of the park) and the Suppression Unit (17% of the park; Map 2-20).

Suppression Unit (17% of the park)

Wildland/Urban Interface Under Alternative C, passive reduction mechanical techniques would be used to reduce tree density and hazardous fuel loads in the six core and inner WUI public land areas. Tree cutting to achieve ecological targets for specific vegetation types would be done by hand felling only. Thus, trees, branches, and shrubs would be removed more slowly under Alternative C than under Alternatives B and D.

No heavy equipment would be used and logs would be removed using low-impact methods (All Terrain Vehicles, horses, and fetching arches). Smaller trees and shrubs would be removed by hand cutting and pile burning or chipping to achieve the desired vegetation structure defined under restoration targets. Under this alternative, most work would be performed by inmate crews, volunteers, park fire crews, and the park forestry crew. The timeframe involved would allow the use of smaller crews.

The tools available for use in this alternative would limit the number of trees that could be removed annually in the 6,425 acres of inner WUI area.

Non-Wildland/Urban Interface, Non-Wilderness Beyond the 1½ mile radius around the six WUI areas, wildland fuel and vegetation would only be treated with prescribed fire to achieve target restoration and maintenance conditions. Thinning of live and dead tress would be done to prepare these areas for prescribed burning. After the initial fuel reduction work was accomplished, prescribed fire units would be set up for rotational burning to maintain an open forest structure. Thinning of small trees less than 20" dbh would occur within 200' of the centerline of roads where canopies are densely packed along road corridors and below utility lines.

Wilderness Prescribed fire would be the primary tool used to accomplish ecosystem restoration in designated Wilderness areas of the Suppression Unit, such as in part of Wawona. Hand piling would be used where prescribed fire is not safe. Chainsaws and other tools and equipment would have to meet the minimum tool requirements for Wilderness. Use of passive reduction techniques to remove trees less than 20" dbh in non-Wilderness within 200' of the centerline would be permitted along roads and utility corridors, and near buildings to protect them from wildland fire. Pile burning in late fall and winter would be used in areas where cutting has created fuel concentrations

Fire Use Unit (83% of the park)

Non-Wildland/Urban Interface, Non-Wilderness Passive reduction techniques would be used in non-WUI areas but would be restricted to non-Wilderness roads to keep them open, and under electrical utility corridors to mitigate wildfire occurrence and damage. Tree removal would be restricted to low-impact methods. Passive methods to remove dead and down material would be the primary tool used along with hand cutting and pile burning to prepare prescribed fire units for burning. Managed wildland fire would be used in this unit.

Wilderness Managed wildland fire would be the primary fire management strategy used in Wilderness. Hand cutting and pile burning would be used to prepare units for prescribed fire or to protect them from approaching wildland fire. Prescribed fire plans would be prepared for work in designated burn units. Managed wildland fire would be permitted anywhere in the unit pending authorization of a wildland fire implementation plan. Chainsaws and other equipment would have to meet minimum tool requirements.

Table II-8
Fire and Mechanical Treatments Used in Alternative C by Unit

(an X indicates the treatment is used in the alternative and a bold X indicates extensive use)

ALTERNATIVE C	Suppression Unit			Fire Use Unit		
Treatment Strategy	**Wildland /Urban Interface**	**Non-WUI/ Non-Wilderness Corridors**	**Wilderness**	**Wildland/ Urban Interface**	**Non-WUI/ Non-Wilderness Corridors**	**Wilderness**
Aggressive Reduction						
Passive Reduction	X	X	X	X	X	X
Managed Wildland Fire					X	X
Prescribed Fire (in prescribed fire units)	X	X	X	X	X	X
WUI = wildland/urban interface						

Alternative D – Multiple Action (Preferred Alternative)

Alternative D uses a combination of aggressive and passive fuel reduction techniques to achieve protection, fuel reduction, and ecosystem restoration goals. Under the Multiple Action Alternative, aggressive and passive treatment strategies would be used in the six inner WUI areas, while prescribed fire and wildland fire would be used to achieve ecosystem restoration goals in other areas. Alternative D achieves fuel reduction and target restoration objectives more quickly than Alternative C, but less quickly than Alternative B.

The Multiple Action Alternative is the National Park Service's Preferred Alternative. It would decrease fuels in WUI areas over a period of 6 to 8 years and restore fire to the ecosystem in 15 to 20 years. This alternative would reduce fuels on up to 1,095 acres per year in the inner WUI (6,425 acres total) and would restore the natural fire regime by treating between 1,817 and 9,194 acres per year (31,503 to 160,894 acres total).

Alternative D would require more time to accomplish WUI protection and ecosystem restoration than Alternative B, but less time than Alternative C. Median and maximum fire return interval departure analyses were used to determine locations and set annual goals (range of acres) for treatments, using the various restoration, maintenance, and fuel reduction strategies (Maps 2-4 and 2-5; Table 2.5).

Appendix 6 displays a multi-year burn schedule for accomplishing ecosystem restoration, maintenance burning, and fuel reduction in WUI areas. Work would be accomplished with a combination of fire crews, the park forestry crew, and some contract labor.

Descriptions of Proposed Actions under Alternative D

This alternative divides the park into two fire management units: the Fire Use Unit (83% of the park), and the Suppression Unit (17% of the park; Map 2-20).

Suppression Unit (17% of the park)

Wildland/Urban Interface Alternative D would combine aggressive and passive techniques to remove hazardous fuels and restore target forest conditions in the identified time frames, which are slower than Alternative B but faster than Alternative C. In areas close to development in the six WUI communities (i.e., inner WUI areas) mechanical methods would be used to remove trees up to 12" dbh to reduce tree density. In some areas, shrubs and ladder fuels would be removed to improve the defensibility of the communities. Passive methods would generally be used to thin vegetation up to 12" dbh to reduce hazardous fuels, while aggressive methods would generally be used to restore forest target conditions in the inner WUI. Aggressive methods could be used to concurrently reduce hazard fuels and restore target conditions in sensitive inner WUI sites to eliminate the need for more than one entry into the site with aggressive tools.

Thinned areas would generally be broadcast burned after an initial mechanical fuel reduction treatment. However, where safe and practical, prescribed fire would be used as the initial fuels treatment. Woody material, such as logs generated during implementation of mechanical methods, would be used within the park to the fullest extent possible. Otherwise, logs would be removed following methods used by the Hazard Tree Program for many years, but only as a last resort if material could not be burned, chipped, or used inside the park, and did not pose a fire hazard if left on site.

Passive reduction techniques would be used in highly sensitive locations of the WUI (i.e., cultural sites, important wildlife habitat, or areas with highly erosive soils). These areas would be identified during the preparation of the operational plan; the plan would be given interdisciplinary review by park archaeologists, biologists, and other specialists Alternative D would use different treatments depending on the level of risk, sensitivity of the area, and associated values to be protected.

Non-Wildland /Urban Interface, Non-Wilderness Beyond the 1½ mile radius around the six WUI areas, wildland fuel and vegetation would only be treated with prescribed and managed wildland fire to achieve target restoration and maintenance conditions. Thinning of live and dead tress would be done to prepare these areas for prescribed burning. After initial fuel reduction work was accomplished, prescribed fire units would be set up for rotational burning to maintain an open forest structure. Passive thinning of small trees less than 20" dbh would occur within 200' of the centerline of roads and under utility lines where canopies are closely packed.

Wilderness Prescribed fire would be used generally to accomplish ecosystem restoration work in designated Wilderness areas of the Suppression Unit, such as near Wawona. Hand thinning and pile burning would be used where prescribed fire would not be safe. Limited passive reduction techniques would be used in non-Wilderness within 200' of the centerline along road and utility corridors, generally on shrubs and tress less than 20" in diameter; all heavy mechanical equipment would remain outside the Wilderness boundary, and would not "reach over" from non-Wilderness to Wilderness areas. Equipment used in the Wilderness would need to meet the minimum tool requirements for Wilderness.

Fire Use Unit (83% of the park)

Non-Wildland/Urban Interface, Non-Wilderness: There is very little development in this unit. These tracts are located mostly along road corridors and include Glacier Point, Tuolumne Meadows, White Wolf, and other areas where the Wilderness boundary is set back from existing human intrusions and development. Prescribed fire and thinning of small trees generally less than 6" dbh would be done to protect these areas as a wildland fire approaches. Hand cutting and pile burning would be used to prepare a prescribed fire unit for burning. Trees, including dead trees, would be cut as needed to provide safe and secure firelines. These activities would be designed to reduce wildland fire intensity as fires approach non-Wilderness road and utility corridors. Managed wildland fire would be acceptable where it did not endanger buildings or sensitive sites (e.g., cultural resources).

Wilderness Managed wildland fire would be the primary fire management strategy used in Wilderness. Use of equipment would meet minimum tool requirements for Wilderness. Hand cutting and pile burning would be used to prepare units for prescribed fire or to protect them from approaching wildland fire. Prescribed fire plans would be prepared for work in designated burn units. Managed wildland fire would be permitted anywhere in the unit pending authorization of a Wildland Fire Implementation Plan.

Table II-9. Fire and Mechanical Treatments Used in Alternative D by Unit
(an X indicates the treatment is used in the alternative and a bold X indicates extensive use)

ALTERNATIVE D	Suppression Unit			Fire Use Unit		
Treatment Strategy	**Wildland/ Urban Interface**	**Non-WUI/ Non-Wilderness Corridors**	**Wilderness**	**Wildland/ Urban Interface**	**Non-WUI/ Non-Wilderness Corridors**	**Wilderness**
Aggressive Reduction	X					
Passive Reduction	X	X	X	X	X	X
Managed Wildland Fire					X	X
Prescribed Fire (in prescribed fire units)	X	X	X	X	X	X
WUI = wildland/urban interface						

Public Information and Education

There would be an active partnership among Fire Management, Interpretation, and Resources Management staff to promote fire education among park staff and visitors. Fire education would be a component of interpretive staff training. Throughout the year, interpreters would incorporate wildland fire management and the role of fire in ecosystems into interpretive walks and evening programs. An exhibit would be located in the Yosemite Valley Visitor Center to provide education regarding wildland fire and its role in parks and Wilderness. Mobile exhibits would be developed as fire management projects are developed.

During fire season, as staffing allows, interpreters would be present at significant prescribed fires or managed wildland fires near visitor use areas to provide educational services. Where fires are particularly visible from major park scenic overlooks or traditional high use visitor areas (such as Glacier Point), a roving Fire Information Officer, qualified personnel, or trained park interpreters would give talks about fire and smoke. Updates would be posted in the park's Daily Report.

The Office of Media Relations would notify adjacent communities by press release before some prescribed fires are implemented. Media Relations would work closely with visiting Fire Information Officers, who may be part of an Incident Management Team or Fire Use Management Team, to assure that information is delivered effectively. Prompt reply to all media and public queries would be an essential element of public information. Information about wildland fire and smoke would be readily available, as would information about the fire management plan and ecosystem restoration if appropriate.

During emergency wildland fire situations, park interpretive staff could be brought in from other districts to assist in providing information to visitors and to assist the incident information officer. A smoke communication strategy (Appendix 4) would be used during fire management activities as a blueprint for managing smoke events and communicating with communities and other agencies.

Utility Corridor Treatments

Wildland fires caused by aerial or overhead electric power transmission and distribution lines have a propensity for becoming much larger and more damaging than fires from any other cause in California. Power line-caused fires become conflagrations because during the long, hot, and dry fire season commonly experienced in California, the high winds and high temperatures that cause power line faults (unwanted short circuits for electric current) also lead to rapid spread and high resistance to control of wildland fire. Almost all of the aerial utility lines in Yosemite National Park are in the lower elevations (lower montane forests and woodlands vegetation types) where fire return intervals and fuel accumulations are at hazardous levels.

Vegetation under aerial overhead utility lines including electric transmission and distribution lines within the park (Map 3-5 and Table 2.10) would be thinned to reduce potential for fire starts and to meet code requirements. Trees growing or anticipated to grow within ten feet of the lines, and trees which show signs of falling on lines would be trimmed or taken down. Limbs, shrubs, and ground fuels beneath hazardous areas would be removed. Vegetation cut along these corridors would be removed to protect the utility infrastructure in the event of wildland fires (planned or unplanned) and to facilitate fire control.

In accessible areas, woody debris would be removed to landings or wood yards and in inaccessible areas it would be piled and burned. In heavily wooded inaccessible areas, clearings would have to be created for burn piles. Large tree boles in inaccessible areas would be limbed and bucked for maximum soil contact to increase moisture and accelerate natural decomposition. Utility workers would access power lines directly in areas accessible by road, and be confined to specified service roads in roadless areas. Tree work in Potential Wilderness Additions would be subject to the Wilderness minimum tool requirement decision process.

Table II-10 Utility Corridors Subject to Tree Hazard Mitigation and Vegetation Management Activities

Corridor/Site Name	Location	Special Concerns
Electric Transmission Lines		
Exchecquer Transmission Line	El Portal to Cascades Powerhouse	72Kv Wild and Scenic River
Electric Distribution Lines		
Fish Camp	From boundary near Summerdale Campground to South Entrance	Archeological sites
Big Trees (Mariposa Grove)	From South Entrance to Upper Mariposa Grove	Potential Wilderness Addition Giant sequoias Cultural Landscape
Meadow Loop	From South Entrance to Wawona	Wetlands
Wawona	Throughout Section 35 and western Wawona	Wild and Scenic River Archeological sites Mixed land ownership
Indian Flat	Throughout El Portal and Foresta	Wild and Scenic River Archeological sites Mixed land ownership
El Portal	Throughout western El Portal	Wild and Scenic River Archeological sites
Cascades	From Cascades to Big Oak Flat and Wawona Tunnels	Wild and Scenic River
Yosemite Valley	Mostly underground, some aerial	Wild and Scenic River
Glacier Point	From Yosemite Valley to Sentinel Dome	Potential Wilderness Addition
Hodgdon Meadow	Big Oak Flat Entrance to Hodgdon facilities	Traverses Campground
Telephone Lines		
South Entrance	South Entrance to Lower Mariposa Grove	Giant sequoias
Wawona	Throughout Section 35 and western Wawona	Mixed land ownership Archeological sites
El Portal	Throughout Administrative Site	Archeological sites T1 communication line
Yosemite Valley	From Cascades along Southside Drive and	Archeological sites

Corridor/Site Name	Location	Special Concerns
	throughout eastern Yosemite Valley	
Foresta	Throughout Foresta Town Planning Area	Archeological sites
Communication Equipment Sites		
Wawona Point	Upper Mariposa Grove of Giant Sequoia	Park radio net
Henness Ridge	Yosemite West	Park radio net Historic structure
Sentinel Dome	Glacier Point Road	Park radio net
Turtleback Dome	Above Yosemite Valley along Wawona Road	Park radio net
Crane Flat	Helibase	Park radio net Historic structure

Mitigation Measures

To ensure that the action alternatives protect natural and cultural resources and the quality of the visitor experience, a consistent set of mitigation measures would be applied to actions proposed in this plan. The National Park Service would complete appropriate environmental review (i.e., as required by NEPA, the National Historic Preservation Act, the Endangered Species Act and other relevant legislation) for future actions not covered in the *Final Yosemite Fire Management Plan/EIS*. As part of the environmental review, the NPS would avoid, minimize, and mitigate adverse impacts to the greatest extent possible. A Biological Opinion issued by the U.S. Fish and Wildlife Service, including mitigation actions, is included in Appendix 9.

Natural Resources During the planning phase of any fire management activity, the presence or absence of special-status species in the area would be determined. Park subject matter experts would evaluate existing databases and maps, and, if necessary, request additional surveys or field verification. Site-specific mitigations would be developed and implemented consistent with the mitigation measures identified in Appendix C of the Biological Opinion (Appendix 9 of this document). If a project could cause an adverse impact on federally listed species, consultation with the U.S. Fish and Wildlife Service is required. Managed wildland fires would be constrained if they pose undesirable disturbance to important habitat for special-status wildlife or threaten populations of special-status plants.

During any fire management activity, impacts to soils would be minimized by using the best available technology, the minimum tool, avoidance of sensitive areas, and by rehabilitation of disturbed soil. If mechanical treatments were prescribed, methods and equipment as described in "Understory Biomass Reduction Methods and Equipment" (USFS 2000b) would provide guidance. Disturbed soils would be rehabilitated by restoring slope contour and using other best practices. Areas with a high probability of erosion would be stabilized using best available methods, as determined by the park's Resource Management Staff.

Fire management activities can create disturbance, and there is potential for fire projects to result in opportunities for non-native plant species to colonize or spread into disturbed areas. Sites would be surveyed before and after prescribed fire and mechanical fuel reduction to determine the presence or absence of non-native plant species. The Division of Resource Management would develop a list of high-priority target species, and surveys for such species would be conducted prior to fire management actions. If high priority target non-native plants were discovered on a project site, the Fire Ecologist and park Vegetation Management Specialist would develop appropriate mitigation measures.

Snags and Slash Generally, snags (dead trees) and other standing vegetation would not be cut during fire management activities unless they presented a threat to human life or safety, or presented a hazard to property or a valued resource. They may also be cut to control a wildland fire. If it was necessary to cut down a snag or live vegetation, the stump would be cut flush with the ground (as close to the ground as possible).

Debris from cut vegetation would either be removed from the site, lopped and scattered to a depth of no more than 24 inches and burned during a subsequent prescribed fire, piled and burned outside of fire season, or chipped on site. If chipped, the chips would be spread on site at a depth of no more than one inch, hauled for use elsewhere in the park, or transported to a commercial plant for processing. Disposal methods would depend on the amount of material to be disposed of, land use regulations, proximity to existing roads, and need for chipped wood outside or inside the park.

Air Quality All proposed prescribed burns would adhere to requirements of Title 17 California Code of Regulations regarding Agricultural Burning Guidelines, as well as regulations developed by Tuolumne County Air Management District, Mariposa County Air Management District, and/or San Joaquin Unified Air Management District, all of which have jurisdictional boundaries within Yosemite National Park. Additionally, park staff would monitor air quality adjacent to project areas and within developed areas of the park. Unhealthy or hazardous accumulations of smoke may trigger an aggressive management action that includes completely extinguishing the fire. When adjacent land management agencies are managing prescribed fires or wildland fires, cooperation and coordination would be initiated to minimize cumulative smoke impacts. The Smoke Communication Strategy would be employed if fire management activities could produce smoky conditions near populated areas (Appendix 4). This strategy outlines a series of steps that the agency would take to notify the public and other agencies of increasing degradation of the air.

Cultural Resources During planning for any fire management activity, cultural resource specialists would review available information to determine the presence, absence, or likelihood of occurrence of significant cultural resources. Consultation would be initiated with park-associated American Indian tribes if there is potential for occurrence of resources of traditional significance. If little or no data are available, and if there is potential for significant resources to occur within the fire management area, additional inventory for such resources would be conducted.

Significant resources that could be affected by fire or fire management activities would be assessed for risk conditions and site-specific mitigation measures would be developed. Mitigations could include manually reducing fuel loads on or adjacent to resources, documenting flammable resources, identifying and avoiding archeological sites during ground-disturbing activities, and collecting at-risk artifacts or materials.

For traditional resources, mitigation would include measures such as coordinating fire management activity to allow for traditional gathering prior to burning, developing burn prescriptions to foster desired plant characteristics, or protecting sensitive resources from fire. Managed wildland fires may be constrained if they have potential to significantly impact or destroy important cultural resources. Given the limited response time and potential for loss or damage to significant cultural resources in wildland fire situations, a proactive program of inventory, hazard assessment, and fuel reduction would be implemented.

Cultural resource specialists would participate in fire management activities where necessary to reduce or avoid impacts to cultural resources, and where there is potential for resources to be discovered during activity. Post-burn assessments would be made to document the changed condition of known resources. In some cases post-burn inventory would be conducted to document newly exposed resources.

Since data are limited on effects of fire on cultural resources, fire effects research and monitoring will be developed in conjunction with regional and National Park Service initiatives. Information resulting from cultural resource activities conducted in support of fire management would be incorporated into existing resource information systems. These activities would be reported as part of the annual program or as project-specific documentation.

Visual Impacts Aesthetic impacts would be judged on a case-by-case basis; any mitigation measures would be approved by the park Superintendent.

Safety and Human Impacts Impacts to visitors, employees, and park residents would be minimized by planning fire management activities during daylight hours and on workdays whenever possible. Before starting any project, the public and employees would be notified of proposed activities through road signs, trail signs, postings at visitor centers, entrance stations, post offices, or other areas of frequent use.

Communication/Coordination Communication, cooperation, and collaboration with neighboring agencies and communities, park partners, visitors, residents, and employees would be an essential component of all plans for fire management activities. Communication with adjacent agencies would be conducted when projects occur at or near their boundaries or when there is an identified impact that might or would affect park neighbors.

Protection of Sensitive Resources

Yosemite has a variety of special places and sensitive cultural and natural resources. If known sensitive cultural resource sites or habitats for a special-status species are within any proposed prescribed fire or managed wildland fire area, the area would be evaluated and suitable mitigation measures would be applied as needed.

Prescribed fire protocols require that resource specialists be involved in the project review process. On-the-ground inventories of prescribed fire units would take place as necessary. If inventories are required, burning would be delayed until the inventory and suitable mitigation was completed. If a prescribed fire unit has potential to provide habitat for special-status species, steps would be taken to work around nesting season and other sensitive periods of time for animals and plants. This would be done by altering the time of burning, providing direct protection of certain areas such as nesting trees, or simply not allowing fire into parts of the unit.

With wildland fires, which are unplanned events, resource advisors would be notified of the intent to manage a fire in a certain part of the park. The location of the ignition would be reported and efforts would be made to get specialists into the area to perform basic inventory work as part of the cost of the incident.

If features are located that require mitigation, *action points* (geographic locations at which, if the fire reaches them, an action to mitigate is triggered) would be established and mitigation plans would be developed. Once the fire reached the action point the mitigation plan would be implemented. It could take several days to weeks before these actions were needed and the fire may not ever reach the identified resource at risk. The *maximum manageable area* (MMA) could also be set to exclude resources of concern.

Non-Native Species Management Activities

Non-Native Species Control Fire can be an effective tool in managing some non-native species. However, the *Yosemite Fire Management Plan* is not the primary planning instrument for control of non-native species. If the Resources Management Division prepares a non-native species control plan that recommends the use of fire, or requests specific burns be conducted to manage non-native plants, the fire management office would prepare a prescribed fire plan. This plan would include fire prescriptions, site preparation plans, and monitoring needed to help carry out the non-native species control plan.

Non-Native Species Invasion and Fire Management Activities There are occasions when fire management activities contribute to the invasion of non-native species. For example, in some areas, the timing of prescribed burns has contributed to the invasion of non-native thistle. As a result of knowledge gleaned through monitoring, prescribed burns in these areas are now scheduled for seasons when invasion is not enhanced by fire. Monitoring for non-native species would continue and, as the Resources Management Division identifies practices in the prescribed fire program that require modification, changes would be made.

Air Quality/Smoke Management

With all actions in Yosemite National Park or the El Portal Administrative Site involving prescribed or managed wildland fire, there would be strict adherence to state and federal regulations. This process mandates consultation with California Air Resources Board (CARB) and local (county) Air Pollution Control Officers (APCO), and other federal and state agencies that are involved with similar land treatments.

Ignition of prescribed fires would only be done on “burn days” or would be allowed by a variance from the county air pollution control officer. Visual aspects of the smoke column and/or particulates would be monitored for all prescribed fires. Air quality monitors would be placed at strategic locations and smoke sensitive areas when appropriate. Monitoring data would be available to the county Air Pollution Control Officers upon request.

A Prescribed Fire Plan, including smoke management, would be provided to the Air Pollution Control Officers prior to a burn so that a burn permit can be issued. Coordination with neighboring agencies would assure that the airshed is shared. This would normally mean that Yosemite would not be burning the same day as a neighboring agency, or that there would be adequate distance between the burn units for smoke dispersion.

Air Quality Watershed Strategy Smoke movement patterns have a direct relationship to watersheds, especially below 7,500 feet, since smoke tends to collect and flow downstream at night. Air quality watersheds of Yosemite are shown on Map 2-22. Smoke from lower elevation fires (below 7,500 feet) can be intense and tends to move downslope, settling and concentrating down valley from a fire. Fires above 7,500 feet rarely cause smoke problems because of different fuel types that tend to have a slow rate of fire spread.

The park would likely control new starts within an air quality watershed that already had a wildland fire being managed within it, if the new starts would result in a violation of PM-10 health standards. For example, if a large fire is burning in the Illilouette Creek drainage, it is possible that no other fire would be allowed to burn in that drainage or in the adjacent Merced River, Tenaya Creek, or Yosemite Creek drainages, which all flow into Yosemite Valley. Similar relationships exist for the Bridalveil Creek area, the area around Hetch Hetchy Reservoir, and the South Fork of the Merced River.

Coordination with neighboring agencies would be initiated if the agencies had wildland fires in the same drainage that have potential to cause significant smoke problems. A decision would be made to either control one or more of the fires or to mitigate the amount of emissions that would be produced. For example, holding actions applied to one or more flanks of a fire will herd it into higher elevations where fuels are sparser and fire activity, and thus smoke production, is not as intense.

Smoke Problems A smoke problem is considered to be any level of smoke that generates complaints. Mitigation of smoke problems will occur through scheduling, public notification of planned and ongoing projects, and subdivision of projects with handlines to facilitate control. “Burn day/no burn day” determinations are made by meteorologists at the California Air Resources Board and passed on to the county Air Pollution Control Officers and park fire personnel. However, it is not uncommon for a burn to be ignited during excellent conditions but persist so long that the atmosphere stabilizes and causes a smoke problem. In the event of heavy smoke accumulations, the public would be notified as per the Smoke Communication Strategy (Appendix 4).

Roads and Trails Used for Fire Protection

Trails and roads closed to vehicular traffic because of Wilderness designations will not be driven on unless approved by the Superintendent.

Roads and trails enable fire personnel to get to a fire rapidly. Roads, trails, and utility corridors within the park provide access for monitoring and control of wildland fires. Roads and trails are used as boundaries for prescribed burns, anchor points for constructing fire line, and as fire line. To be useful, maintenance would be done to keep the main road corridors open and in a condition that provides for firefighter safety as a defensible fire line.

Maintenance would be done to keep road (but not trail) corridors free from fuel accumulation. Removing brush and downed trees also would reduce the risk of a fire crossing a road and threatening another area or becoming established below firefighters. The work would thin trees and shrubs less than 20” dbh up to 200’ from the centerline of roads in the Suppression Unit. Aggressive methods for roadside thinning will not be used in Wilderness.

Roads treated (map 2-24) would include the El Portal Road (Highway 140), Big Oak Flat Road (Highway 120), and Wawona Road (Highway 41) in the Suppression Unit; Glacier Point, Hetch Hetchy, Mariposa Grove, and Aspen Valley roads; public roads in five WUI communities

(Yosemite Valley is excluded); and fire motorways shown on Map 2-23. Table 2.11 displays roads and trails that are commonly used as fire access for summer wildland fires and as control lines for prescribed fires. **No new roads would be created anywhere in the park for thinning operations.**

Since many of the roads and trails are important cultural resources, maintenance activities would be designed with guidance from Resource Management and Resource Protection to preserve important historic characteristics and to avoid impacts to contributing features. Work along utility corridors also would be conducted to avoid impacts to cultural resources.

Maintenance would be done as needed, annually on some fire roads and every five to eight years on other roads. Most park trails are periodically maintained by Trail Crews to permit stock traffic and hiking access, and some of them are used as fire breaks when the need arises.

Table II-11. Roads and Trails Used for Fire Management Activities

Road Name	Location	Special Concerns
Maintained Fire Roads		
Aspen Valley Rd. to Wilderness Boundary		Historic Great Sierra Wagon Rd.
Chowchilla Mtn Rd. to USFS Boundary	Wawona to park boundary	historic Mariposa Rd.
Chowchilla Mtn/4-Mile Cut-off		historic road
Davis Cut-off		historic road
El Portal Saddle Hill Rd	Rancheria Ct to NPS Boundary	
Foresta Rd. to El Portal	Foresta	historic road
Garnett Ridge	Highway 120 to Crane Flat	potentially historic road
Henness Ridge Lookout Rd.	Azalea Lane to Henness Ridge Lookout	historic road and railroad grade
Henness Ridge Cut-off Rd.	Azalea Lane to 11 Mile Rd-South	potentially historic road
Hodgdon Meadow to Park Boundary	Hodgdon Woodyard Rd.	historic Big Oak Flat Rd
Koon Holler Rd. Extension	Koon Holler to SDA Cut-off Rd., Wawona	
Larke Lane Extension	North of Loop Rd to dead-end	
Slaughterhouse Rd.	From Golf Course to Big Creek, Wawona	potentially historic road
South Landing Rd .to USFS Boundary		potentially historic road
Swinging Bridge Rd. - North	Swinging Bridge to Chilnualna Rd., Wawona	potentially historic road
Tioga Gravel Pit Heli-Pad Rd.		
Tuolumne Grove Rd.	Crane Flat to Hodgdon Meadow	historic Big Oak Flat Rd.
Wawona Hotel Rd.	Highway 41 to Forest Drive	
Sequoia Grove Roads		
Merced Grove Rd.	From gate along Big Oak Flat Rd. to ranger cabin	historic Coulterville Rd. and railroad grade
Merced Grove Jct. to Park Boundary		historic railroad grade
Merced Grove Rd. - Hazel Green Spur		historic Coulterville Rd.
Mariposa Grove Fire Rd.	From Tram Rd. to USFS Rd 5S06	Potentially historic road
Clothespin Tree Fire Rd.	Museum to Tram Rd by the Clothespin Tree	historic road
Numbered Roads		
4 Mile Rd.	So. Entrance to Chowchilla Mtn Rd.	historic road
11 Mile Rd.	Hwy 41 to Henness Ridge Rd.	historic Wawona Rd.
11 Mile Meadow Rd-North	From 11 Mile Rd to north side of 11 Mile Mdw	historic Wawona Rd.
11 Mile Meadow Rd – South	From 11 Mile Rd to the NPS/Halsey property boundary	
Wilderness Trails		
SDA Cut-off Trail	Wawona	Closed to vehicles
SDA Camp Rd. from Hwy 41	Wawona	Closed to vehicles
YI to Gin Flat Trail	Off Tioga Corridor; historic Big Oak Flat Road	Closed to vehicles
School House Extension Hiking Trail	North from Chilnualna Falls Rd. to dead-end	Closed to vehicles

Monitoring

Fire Monitoring

Monitoring of wildland and prescribed fires involves systematic collection and recording of data on fuels, topography, weather, air quality, and fire behavior. Monitoring would generally follow the protocols outlined in the National Park Service Fire Monitoring Handbook (NPS 1992a). A fire monitoring plan is a required element in NPS fire management plans. The *Yosemite Wildland and Prescribed Fire Monitoring Plan* provides detailed descriptions and additional protocols for wildland and prescribed fires. This monitoring would be completed by the fuels and ecology group within the Branch of Fire and Aviation at Yosemite National Park and placed in the approved Yosemite Fire Management Plan; assistance would be provided by other park staff as needed.

Monitoring is key to successful understanding of wildland and prescribed fires. Development, evaluation, and refinement of restoration and maintenance target conditions for key vegetation types would help establish priorities for carrying out prescribed fires in the Suppression Unit (Tables 2.3 and 2.4). Measurement and analysis of plots, photo points, and vegetation transects would be used to indicate attainment or non-attainment of short- and long-term objectives. Monitoring data would be archived and reviewed for future refinement of target conditions and burn prescriptions and to determine program success and effectiveness.

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

Cultural Resources Monitoring

The NPS recognizes that the effects of fire and the thresholds for unacceptable damage to some types of cultural resources (i.e., archaeological resources) are not well understood. An ongoing effort to obtain baseline information and develop this understanding will make it possible to refine risk management for fire planning. Monitoring the effects of fire in field situations would be an important component of this work. However, until systematic laboratory experiments can be conducted, field-based fire effects monitoring would be limited to empirical observations.

For resources such as cultural landscapes and historic districts, systematic fire effects research and monitoring would focus on indicators or criteria for landscape restoration and maintenance. All cultural resources fire effects monitoring efforts would be coordinated with those of the natural resource fire monitors to collaborate on methodology, ensure consistency in data collection, and take advantage of multidisciplinary applications of data.

Outlined below is the minimum level of effort for monitoring the effects of fire on cultural resources. This monitoring would provide feedback on the effectiveness of current resource protection measures, such as site avoidance and pre-burn fuel load reduction. This monitoring would be designed to document pre- and post-burn resource conditions that are readily observable, such as preservation of flammable historic fabric, preservation of milling slicks on archaeological sites, visually identifiable changes in surface artifacts and surface conditions, and changes in landscape conditions in historic districts and cultural landscapes.

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

Pre-burn Prior to a prescribed burn, known cultural resources would be located and current conditions would be assessed, using standard operating procedures. This would include documentation of current fuel loads, likely duration and intensity of a fire, threats to features and artifacts, and potential for subsurface impacts through burning roots and stumps. These data would be assessed to determine: (1) which protection measures should be implemented (if any); (2) the potential for fire effects studies; and (3) additional monitoring needs. All three measures would be used on prescribed burns, while monitoring of managed wildland fires would typically begin after a fire started. Results of monitoring would enhance the understanding of the effects of fire and fire management activities on cultural resources. Burn prescriptions and techniques used to protect resources also would be refined accordingly.

During Burn Criteria for monitoring and protecting sites during burns are outlined in the standard operating procedures. For selected fires, an archeologist would be assigned as Cultural Resource Advisor or as a technical specialist providing recommendations to an interdisciplinary Resource Advisor. Although this would be primarily for resource protection, it also would provide documentation of fire behavior and immediately observable effects of fire in and adjacent to cultural resources. If suppression or holding actions were to be taken, the Cultural Resource Advisor would monitor as needed and advise on site-specific actions.

Post-burn An archeologist would revisit known cultural resources in burn areas to document any changes in condition and to assess post-burn protection needs. Fire effects to cultural resources would be documented and subsequently added to the database on cultural resource fire effects.

Research

Fire Research Program

The current fire management program is based on more than 30 years of scientific studies and research. As the program continues to mature, additional information will be needed to refine objectives and meet new challenges. New research needs and priorities would be identified by the Fire Management Office in conjunction with Yosemite's Resources Management Division and research scientists from the Western Ecological Research Center, Yosemite Field Station.

Information gaps in several areas have been identified. For example, the National Park Service needs to continue to improve its understanding of Yosemite's fire history, and data on fire return intervals, season of burning, and fire severity is needed for vegetation types other than the giant Sequoia and ponderosa pine types (Table 2.4). Research is needed to better understand the structural component of lower elevation vegetation types, thus providing a basis for target conditions. These features include gap distributions, species composition, and density. As new remote sensing technologies develop, the fuel model map for the park would need to be refined, updated, and verified. Finally, additional information on the effects of fire on California black oaks, invasive non-native species, air quality, water quality, and sensitive species habitats would improve Yosemite's fire program. Research also is needed on the influence of topography and smoke dispersion, as well as on short- and long-term health effects from periodic smoke events.

Cultural Resource Research

To determine the most effective techniques for protection and preservation, Yosemite's fire management program must first understand more precisely how heat affects archaeological objects, how fire was used by indigenous people in managing specific plant resources and the pre-contact and prehistoric landscapes, and how fire can be used to restore and maintain historic and traditional cultural landscapes. These data would then be used to develop protocols to avoid or mitigate the potentially damaging effects of burning. The need for better data on fire effects on cultural resources is a nationwide issue (Table 2.12). All efforts to conduct fire effects research at Yosemite would be coordinated with the Pacific West Region, other NPS units, and other agencies.

Table II-12.
Sample of Cultural Resource Research Needs

Fire Effects	Research Needs	Sources of Information
Material Culture	Determine relationship between fire duration and temperature and effects on artifacts.	Conduct controlled laboratory experiments with different material types, different temperatures and length of heating, and record the threshold for damage or change. Record duration and temperature of fire and physical attributes of artifacts before and after fire.
Traditionally Gathered Plants	Determine how fire can be used to maintain traditionally gathered plants. Document the seasonality and frequency of burning necessary to create preferred plant characteristics.	Tribal consultation and literature review to bracket the range of desired conditions for traditionally gathered plants and frequency and timing of fires. Develop effective monitoring strategy for traditional gathered plants.
Wildland vs. Prescribed Fire	Determine whether nature and extent of effects to cultural resource differ between wildland fires and prescribed fires.	Compare expected effects of fire, based on projected burn temperature and duration differences between wildland and prescribed fires. Monitor fuel loads, current condition, and post-fire observations of cultural resources while recording duration and temperature of fire during managed wildland fires.
Effect of fire on obsidian hydration dating	Determine possible impacts of past fires on obsidian hydration data. Investigate the assumption that moderate fires, and their associated effects, have been sustained in the past.	Cross-reference fire scar and obsidian hydration dates on specific archaeological sites. Obtain information about site formation processes such as bioturbation, etc. that might obscure surface-evident changes in obsidian hydration data.
Cultural Landscapes	Determine the impact of cultural phenomena on the landscape (e.g., burning for American Indian purposes) to develop a better understanding of what a "natural" fire regime is.	Multi-disciplinary fire history data that compares areas of low frequency of prehistoric resources with areas such as major village concentrations, aboriginal trails corridors, etc.

A recent review and synthesis of literature on the effects of fire on cultural resources demonstrates that little systematic or rigorous research has been conducted on this topic (Ryan and Jones 1999).

Many studies (e.g., Eininger 1990) consist of post-fire observations that cannot be compared to pre-fire data, thereby limiting their contribution to understanding the direct and negative effects of burning. A smaller number of studies (e.g., Picha et al. 1991) have been carried out in conjunction with controlled burns.

These experiments compare post-burn observations to pre-burn data but often lack information about important variables such as site-specific temperature and duration of heating. Laboratory experiments, notably Bennett and Kunzman (1985), have been conducted to simulate fire effects on various artifact types. There is a need, however, to standardize controlled burn and laboratory experiments that measure the effects of fire on cultural resources. These studies need to account for variation within cultural resource material types as well as variation in fire and environmental conditions. The end goal of these studies is to predict the effects of heating, under various conditions, on archaeological objects and the resultant loss of important information.

In addition to the effects of heating on particular material cultural objects, there is a need to understand the extent and objectives of indigenous (American Indian) and historic fire-based management of plant and animal resources. Specifically, how fire-based management affected the distribution, abundance, and diversity of wildlife and plant life is not well understood.

Yosemite Fire Management Organization and Responsibilities

The fire management program in Yosemite National Park is directed by the Fire Management Officer (FMO). The FMO works for the Chief, Division of Visitor Protection, and supervises four specialists in charge of four functional areas. These areas are: wildland fire suppression/aviation, structural fire, prescribed fire/fire use, and telecommunications. Program management for each functional area is done by the specialists in coordination with the other specialists. Total coordination and integration with other park divisions is done by the FMO. All positions except the telecommunications position are involved with all facets of wildland fire management.

The Wildland Fire Specialist and the Structure Fire Specialist function as Battalion Chiefs; each supervises two fire stations that are run by Station Captains. Stations are located in Yosemite Valley, Wawona, El Portal, and Hodgdon Meadow. Each of the four primary stations has both wildland and structural firefighting equipment. The Valley Station is staffed with three permanent and two seasonal employees. The three boundary stations have a module of three permanent employees and, during wildland fire season, four seasonal employees. Two of the boundary stations are interagency stations; the U.S. Forest Service provides some seasonal employees, but work is directed by the NPS Station Captain.

The park also has an exclusive-use helicopter program that is supervised by the Wildland Fire Suppression Specialist. This person supervises a Helicopter Foreman, who supervises two additional permanent employees and five seasonal employees. The helicopter contract starts May 12th and ends October 20th. The aviation program engages in firefighting and search and rescue. The helicopter is flown within a pre-designated response area and normally is required to be back in the park by nightfall. In extreme-need situations, it can be requested to stay at an incident if not needed in the park.

The Prescribed Fire/Fire Use Specialist is responsible for planning and implementing prescribed fires, managed wildland fire activities, fuel management projects, and the fire ecology program. This program has eight permanent employees and numerous seasonal employees. It has an operations branch, a fire effects branch, and, during the summer, a fuels crew. The fire effects branch is the primary liaison between the fire management program and the Division of Resources Management. All historic records maintenance is done by the prescribed fire program.

Fire Reporting

Fire reporting follows guidelines established by National Park Service policy and Directors Order 18 and the associated reference manual, RM-18 (NPS 1998b, 1999b). All fires, regardless of type, are required to have a written report, which is tracked at the park and at national levels. As soon as a fire is declared "out", the report is finalized and delivered to the dispatch office where it is entered into a national database known as the Shared Automated Computer System (SACS). This system permits the entry of statistical data on wildland fire occurrence and the use of prescribed fire. It also permits a wide variety of screen queries and batch reports for the analysis of this data. The Department of Interior uses Form DI-1202 to report such fires. The Fire Occurrence System generates the report in this format. The following reports can be generated and printed in Boise, Idaho or at remote sites (not an inclusive list):

- Summary of Fires by Discovery Type
- Summary of Suppressed Fires/Size Class
- Summary of Suppressed Fires by Month
- Summary of Wildfires National Fire Danger Rating System (NFDRS) Risk Analysis
- Cause Analysis Reports
- Summary of Multiple Starts for Wildfires
- Fire Type Summary
- Fire Occurrence Summary; Wild or Natural
- Individual Fire Report by Park or Region
- Fire Occurrence Summary/Park or Region

Park fire activity is reported daily to the Geographic Area Coordination Center. This sharing of information is discussed in both the California Mobilization Guide and the National Mobilization Guide. The information is processed and shared with all fire agencies so all are aware of commitments of firefighters and equipment within the region and the nation. In California, like other regions, when a management unit reports a new start virtually every neighbor is aware of it. Common radio frequencies are monitored for information on the dispatch to that unit of equipment, personnel, and aircraft.

Fire Management Budgeting

The budget process for wildland fire funds is handled in a similar process for all national parks. Fire management funding for the NPS is derived from three sources:

FIREPRO funds are allocated by the Fire Management Program Center in Boise, Idaho, and managed through annual operating program accounts or through project work accounts, depending on the activity. Activities covered include preparedness activities, permanent staffing, training, monitoring, and equipment purchases. FIREPRO is intended to identify the minimum acceptable standards that each park fire management program should achieve. The FIREPRO analysis would be used as a vehicle for seeking adequate funding to implement these standards.

Operation of the National Park Service (ONPS) funds are used to support programs that were in place before FIREPRO and to provide enhanced fire management capabilities in many parks. In the event that adequate FIREPRO funds were not appropriated, parks need to supplement FIREPRO funding with ONPS funding to achieve minimum fire management capability. Parks might also use ONPS funds to augment the basic FIREPRO-funded preparedness operation to achieve a higher level of response capability or to retain a stronger initial attack capability outside the defined fire season.

Wildland Fire Operations funds within the NPS portion of the Department of Interior firefighting account could be insufficient to cover expenditures for suppression, severity, rehabilitation, and hazard fuels management during severe fire years. For these situations, the NPS would first request that the department transfer wildland fire management funds from other bureaus or, if these funds were exhausted, use the emergency authority under Section 102 of the general provisions of the Interior Appropriations Act to transfer funds from other programs. The National Park Service would then seek to restore funds to affected programs through a supplemental appropriation.

Alternatives Considered and Dismissed

For any project or activity in Yosemite National Park or the El Portal Administrative Site, a number of alternative actions could be considered. During the course of the public scoping process for the *Draft Yosemite Fire Management Plan/EIS*, several alternative actions were recommended by members of the public. Others were suggested by scientists, technical specialists, and NPS employees. While all were considered, and many were included as alternatives or elements of alternatives, some were eliminated from detailed study per 40 CFR 1504.14(a). Reasons for dismissing individual actions include the following:

- technical or economic infeasibility;
- inability to meet project objectives or resolve need for the project;
- duplicative with other less environmentally damaging alternatives;
- in conflict with an up-to-date and valid plan, statement of purpose and significance, or other policy; and therefore, would require a major change in that plan or policy to implement; and
- environmental impacts are too great.

Alternatives that were considered but dismissed include the following:

Suppress All Fires

This alternative was dismissed for several reasons, including its inconsistency with NPS and federal wildland fire management policy and Yosemite's *General Management Plan*, which calls for allowing fire and other natural processes to prevail. In addition, suppression of all fires throughout the park would fail to meet the purpose and need for revision of the *Yosemite Fire Management Plan,* which seeks restoration and maintenance of park ecosystems while protecting people, valued resources, and developed areas from fire. Although it would appear that suppression of all fires would help reduce risk and protect structures and developments, especially along the WUI, this path would ultimately lead to different outcomes. A return to the "suppress all fires" policy was dismissed because it would result in fuel accumulations and changes in forest structure that would increase (rather than reduce) the risk of uncontrollable, catastrophic wildland fire and the potential for loss of life and property.

Disallow the Use of Mechanical Fuels Treatment

This alternative was dismissed because of the need to retain options when developing strategies for the reduction of fuels and the risk of harmful wildland fire along the WUI. Years of fire suppression in Yosemite have resulted in the buildup of fuels and a change in the forest structure in many locations. The use of prescribed fire in these fuels near communities presents risks to both firefighters and to the communities. An additional risk is from smoke; air quality regulators have requested fire agencies to consider the use of mechanical fuel reduction methods in lieu of prescribed fire wherever possible.

Yosemite's *General Management Plan* recognized these changes in fuel and vegetation and directed the use of "controlled burning and mechanical removal of vegetation" to simulate the natural role of fire in developed areas. Disallowing the use of mechanical fuels treatment was dismissed because it would not likely be possible to achieve the purpose of the *Yosemite Fire Management Plan* if fire were the only tool available for vegetation and wildland fuel management, especially near WUI areas.

Use Mechanical Treatments Only

This alternative was dismissed because of its inability to meet park objectives and because it would be in conflict with NPS and other federal policies and mandates. Mechanical treatment is an effective method for restoring forest structure in locations where changes have occurred because of past fire suppression activities. It is also effective in reducing risks near WUI areas. However, even in these areas, prescribed burning is needed. Fire promotes nutrient recycling, exposes mineral soil, and maintains other ecosystem dynamics. With mechanical treatment only, resource management objectives would not be fully met.

"Mechanical treatments only" would not meet the test of minimum tool in the Wilderness portions of the Fire Use Unit, since managed wildland fire and prescribed fire can meet objectives in most of these areas. This alternative was dismissed from further consideration because thinning and other mechanical treatment would not further resource management objectives in most areas of the park.

Use of Different Target Conditions

Some public comments on the *Draft Yosemite Fire Management Plan/EIS* suggested that additional alternatives be considered that include targets based on the reduction from 31.5” to 20” dbh of the maximum diameter of trees thinned mechanically to achieve forest restoration target conditions in the six WUI areas. The 31.5” dbh tree size referenced in the comments is from the restoration target condition, which is based upon the management objective, “Manage ecosystems within the natural range of variability for plant community structure and fuel loads.” All alternatives attempt to accomplish this objective. Therefore, although no tree greater than 20” dbh will be thinned mechanically to achieve forest restoration target conditions under this EIS, it is still the objective of the fire management program to achieve these target conditions, generally through the use of prescribed and wildland fire.

Approaches to Protecting WUI structures without fuel treatment.

One comment on the *Draft Yosemite Fire Management Plan/EIS* suggested that the range of alternatives was inadequate because it did not include simply using fire retardant foam or heat reflective tents to protect structures in the WUI. This comment was considered but not included in the *Final Yosemite Fire Management Plan/EIS* because it did not represent an alternative per se for managing fire to accomplish park and resource management objectives. It is a tactical option for protecting structures.

Environmentally Preferable Alternative

The environmentally preferred alternative is determined by applying criteria identified in Section 101 of the National Environmental Policy Act (NEPA) to each alternative considered. In accordance with the NEPA, the environmentally preferred alternative would best: (1) fulfill the responsibilities of each generation as trustee of the environment for succeeding generations; (2) assure for all generations safe, healthful, productive, and esthetically and culturally pleasing surroundings; (3) attain the widest range of beneficial uses of the environment without degradation, risk of health or safety, or other undesirable and unintended consequences ; (4) preserve important historic, cultural, and natural aspects of our natural heritage and maintaining, wherever possible, an environment that supports diversity and variety of individual choice; (5) achieve a balance between population and resource use that will permit high standards of living and a wide sharing of life’s amenities; and (6) enhance the quality of renewable resources and approaching the maximum attainable recycling of depletable resources.

The National Park Service has considered all alternatives in this analysis in accordance with NEPA and CEQ regulations (CEQ Regulations, Section 1505.2) and has determined that Alternative 4: Multiple Action, as presented in the *Yosemite Fire Management Plan/Environmental Impact Statement* is environmentally preferable. After review of potential resource and visitor impacts, and developing mitigations for impacts to visitors as well as natural and cultural resources, the preferred alternative achieves the greatest balance between the restoration of wildland fire as a critically important ecosystem process and the protection of life, property, natural resources, and cultural resources from unwanted wildland fire.

Summary of Alternatives

Table II-13
Summary of Alternatives (Alternative A uses terminology from in the 1990 Fire Management Plan)

		No Action (Status Quo)	ACTION ALTERNATIVES		
		Alternative A	**Alternative B**	**Alternative C**	**Alternative D (Preferred)**
Theme of the Alternative		Continue current fire management programs and activity level	**Aggressive Action:** rapidly restore fire to ecosystems and reduce risks in wildland/urban interface areas.	**Passive Action:** restore fire to ecosystems and reduce risks in wildland/urban interface areas over greater time.	**Multiple Action:** variable approach to restoring fire to ecosystems and reducing risks to wildland/urban interface areas in an acceptable time frame. A full range of fuel-reduction techniques would allow flexibility in achieving habitat restoration goals.
# Years to Accomplish Objectives	**Ecosystem Restoration**	Not achieved at present level of activity	10 to 15 years (median = 7 years)	25 years	15 to 20 years (median=17.5 years)
	Wildland/Urban Interface (WUI) Protection	Objective not a high priority under the 1990 *Fire Management Plan*	WUI: 5 years	WUI: up to 10 years	WUI: 6 to 8 years Median = 7 yrs
Mean amount (acres) of annual accomplishment	**Wildland/Urban Interface**	Less than 100 acres per year for all developed areas	Approximately 1,285 acres treated per year with mechanical and prescribed fire methods	Approximately 766 acres treated per year with mechanical and prescribed fire methods.	Approximately 1,095 acres treated per year with mechanical and prescribed fire methods.
	Prescribed Fire	1,472 acres per year (over the past 29 years)	2,520 to 12,872 acres per year	1,260 to 6,436 acres per year	1,817 to 9,194 acres per year
	Managed Wildland Fire	2,567 acres per year (average over the past 27 years)	Maximize managed wildland fire with a target of 16,000 acres per year (all treatments) based on fire history indications (from research) of what would have naturally burned with no human interference.		
Acreage by Fire Management Unit		Fire Use Unit: 583,365 acres (75%) Conditional Unit: 59,496 acres (8%) Suppression Unit: 106,256 acres (17%)	Fire Use Unit: 621,059 acres (83% of park) Suppression Unit: 128,044 acres (17% of park) Under new National Park Service policy, the park is divided into Fire Management Units. The 1990 plan used the term *Zone* and divided the park into 3 Fire Management Zones. By applying the concept of Appropriate Management Response, the need for a "conditional" area is eliminated.		

	No Action (Status Quo)	**ACTION ALTERNATIVES**		
	Alternative A	**Alternative B**	**Alternative C**	**Alternative D (Preferred)**
Acreage in Prescribed Fire Units, by Fire Management Unit	Fire Use Unit: 57,630 acres Conditional Unit: 11,944 acres Suppression Unit: 86,245 acres.	Fire Use Unit: 48,912 acres Suppression Unit: 107,040 acres There are a total of 133 burn units		
Special Management Areas requiring management different then the general objectives of the Fire Management Plan	Sequoia Groves Boundary Areas Yosemite Valley	Sequoia Groves Boundary Areas Wildland/Urban Interface: (Wawona, Foresta, El Portal, east half of Yosemite Valley, Yosemite West, Hodgdon Meadow). For additional areas with single to multiple buildings see map 1-2. No new treatments in Tuolumne Meadows until a comprehensive management plan is developed for the Tuolumne Wild and Scenic River.		
TREATMENTS AVAILABLE UNDER EACH ALTERNATIVE				
Wildland Fire Use	Fire Use and Conditional Units	Fire Use Unit only. Wildland fires would be managed to accomplish resource management objectives and to maintain or restore ecological target conditions. Fire would be monitored. Holding and mitigating actions used as needed.		
Re-ignition	Not in this alternative	Allowed In Fire Use Unit only, in same year or within 3 years. Used to restore or maintain target conditions and take advantage of the natural selection process. Some extinguished fires may be modeled and burned later using prescribed fire.		
Prescribed Fire	Conditional and Prescribed Fire Units primarily	Fire Use Unit and Suppression Unit. Prescribed fire would be used separately or in combination with other treatments, to restore target conditions in the Fire Use Unit, and to restore and maintain target conditions in Suppression Unit and Special Management Areas.		
Aggressive Reduction Techniques Mechanized Tree/Shrub Removal (feller bunchers, forwarders) Conventional Tree/Shrub Removal (saws, skidders, grapplers), Machine crush, shred, Machine Pile	Not in this alternative	Used in Suppression Unit. Only used near six developed areas (inner WUI) to restore forest community structure and to remove hazard fuels. Normally followed by prescribed fire.	Not in this alternative	Used in Suppression Unit. Only used near six developed areas (inner WUI) to restore forest community structure. May be used to reduce hazard fuels in the inner WUI. Normally followed by prescribed fire. Rate of restoration slightly slower than Alternative B.
Passive Reduction Techniques Yarding Hand Cutting/Piling Cutting/Chipping Low- Impact Skidding Girdling Limb Removal (trees left standing)	Several of these techniques (chipping, cutting and piling, limb removal) were experimented with during the life of the existing *Yosemite Fire Management Plan*. The main goal was to reduce the amount of fuel that was burned by broadcast burning so that impacts to air quality were reduced. High quality cedar	Used in the Suppression Unit and the Fire Use Unit where there is no need for the use of mechanized tree removal. Used to restore plant community structure in the developed areas, or clear roadsides and utility lines of small trees. Used in Wilderness only after meeting minimum tool requirements. Many of these techniques are follow-up or	In the Suppression Unit as the primary method to reduce tree density in the wildland/ urban interface, or along roadsides and utility lines, In the Fire Use Unit to remove some trees from developed areas to prepare for management of wildland fire. Many of the techniques are used alone (cutting and piling, cutting and chipping) to prepare a	Used In the Suppression Unit as the primary method to reduce tree density in the wildland/ urban interface, or along roadsides and utility lines, Many of the techniques are used alone (cutting and piling, cutting and chipping) to prepare a prescribed fire unit for burning at a latter date. Used in Wilderness only after meeting minimum tool requirements, and for the

		No Action (Status Quo)	ACTION ALTERNATIVES		
		Alternative A	**Alternative B**	**Alternative C**	**Alternative D (Preferred)**
		chips were made available to locations within the park and to outside markets for the cost of hauling only.	accompany aggressive reduction techniques. Many of the techniques are used alone (cutting and piling, cutting and chipping) to prepare a prescribed fire unit for burning.	prescribed fire unit for burning at a latter date. Used in Wilderness only after meeting minimum tool requirements.	management of a wildland fire.
	Wildland Fuel Disposal Options: Low-Impact Skidding Pile Burning Pile and Leave Lop and Scatter Chip and Broadcast (burn) Chip and Broadcast (<1")	Experimented with successfully in areas under the 1990 plan	These techniques would be used in all alternatives in both the Suppression Unit and the Fire Use Unit. These support techniques would accompany actions discussed above or they could be used alone depending on the amount of tree or shrub removal needed. No heavy equipment would be used in Wilderness. Chainsaws would be used in Wilderness only after meeting minimum tool requirements.		
Smoke Management		Managed wildland fire: Control decisions based on smoke conditions— permitted only under favorable conditions, as negotiated with the county air pollution control district. Prescribed fire: Ignitions under favorable conditions, as negotiated with the county air pollution control district.	Managed wildland fire: Smoke managed under a watershed strategy to control effects. Additional starts in the watershed, affecting the same downwind targets, could be controlled or managed depending on current and potential level of impact. Fire use only under favorable conditions, as agreed to by the county air pollution control district. Prescribed fire: Ignitions made only under favorable conditions, as agreed to by the county air pollution control district.		
Standard Mitigations		Surveys and protection of special status species and known critical habitat. Cultural resource protection, preservation, or mitigation. Adherence to Title 17, California Code of Regulations regarding Agricultural Burning. Rehab of disturbed soils, through slope contouring and best available practices. Cutting of snags and standing vegetation only if a threat to life and safety or to controlling burns. Trimmed Vegetation will be either: Piled ("car size") and burned Chipped on site and broadcast, no greater than 1" depth Lopped and scattered, no greater than 18" depth, and subsequently broadcast burned Treatments timed to discourage invasion of non-native species. Case-by-case measures to limit impacts to aesthetic values. Communication measures to inform visitors, residents, adjacent land managers, and county fire protection personnel.			
Fire Monitoring		All vegetation and fuel effects monitored, using established protocols, by fuels and ecology experts. All cultural resources effects monitored, using established protocols, by cultural resource experts. Results used to revise prescriptions and application procedures according to adaptive management strategy. Monitoring program evolves as needed to understand and interpret effects.			

	No Action (Status Quo)	ACTION ALTERNATIVES		
	Alternative A	**Alternative B**	**Alternative C**	**Alternative D (Preferred)**
Fire Research	Information gaps identified, and communicated to USGS Biological Resources Division and academic community. Hypothesis testing in support of an Adaptive Management process of program improvement			
Adaptive Management	Past activity focused on data collection from vegetation monitoring without ecological targets	Application strategies are revised and refined, using the results of monitoring and new research, to improve methods for achieving target conditions and expand monitoring objectives. Lessons learned are documented in post-burn evaluation and factored into future prescribed burn plans.		

Current Assumptions: Time for wildland/urban interface protection – Calculated from wildland/urban interface funding proposals prepared in November 2000, divided by years.
Prescribed Fire - Acres for the action alternatives are based on Fire Return Interval Departure analyses, using mean and maximum intervals.
Managed Wildland Fire – Based on a minimum of 16,000 acres per year normally burned in the park under purely natural conditions.
* Forest Management Burning Handbook, California EPA, 1994, p. 7

Summary of Environmental Consequences

Table II-14
Summary of Environmental Consequences: Overall Impacts by Topic

IMPACT TOPIC	ALTERNATIVE A – NO ACTION	ALTERNATIVE B – AGGRESSIVE ACTION	ALTERNATIVE C – PASSIVE ACTION	ALTERNATIVE D – MULTIPLE ACTION (Preferred)
BIOLOGICAL ENVIRONMENT				
Vegetation	Adverse, long-term and minor to moderate impacts. High potential for high-intensity, catastrophic fires with adverse, major impacts, in lower and upper montane forests in the Suppression Unit. Type conversion of vegetation outside of the natural range of variability could occur some vegetation types.	Beneficial, long-term and moderate to major impacts, due the area treated by prescribed fire and biomass removal, especially in upper and lower montane forests, and from maximizing wildland fire use. Aggressive reduction techniques would accomplish wildland/urban interface restoration within natural range of fire return intervals in all but	Beneficial, long-term and minor to major impacts. This is based upon on an increase in the area treated by prescribed fire and the increase in wildland fire use, compared to Alternative A, but with a potential for catastrophic fire during much of the restoration period. Use of passive reduction techniques would limit site impacts but reduce the amount of treatment	Beneficial, long-term, and moderate to major; similar to Alternative B. A combination of aggressive and passive reduction techniques would limit site impacts in sensitive resource areas but accomplish wildland/urban interface restoration within the natural range of fire return intervals in all but two vegetation types.

IMPACT TOPIC	ALTERNATIVE A – NO ACTION	ALTERNATIVE B – AGGRESSIVE ACTION	ALTERNATIVE C – PASSIVE ACTION	ALTERNATIVE D – MULTIPLE ACTION (Preferred)
		two vegetation types. Reduced threat of large, catastrophic wildland fire in all areas of the park. Reduced potential for type conversion of vegetation.	in wildland/urban interface area compared to other action alternatives. The time frame for restoration is within the natural range of fire return intervals for all but five vegetation types.	
Wetlands	Adverse, short-term, and minor to moderate impacts. Potential for catastrophic wildfire, and possible fragmentation and the imposition of unnatural barriers to plant and wildlife movements.	Beneficial, long-term, and moderate impact to wetlands because of aggressive treatment to reduce threat of catastrophic fire; short-term, adverse impacts on wetland resources from activities, unless mitigated.	Beneficial, long-term, and minor to moderate impacts, due to reduced potential for catastrophic wildland fire.	Beneficial, long-term, and moderate impact to wetlands. Similar to Alternative B; but moderate to major ecological benefits for park wetlands due to multiple action approach.
Wildlife	Adverse, long-term, and major impacts, due to direct effects of high-fuel loads on habitat structure and quality in some areas, and the continued threat of catastrophic fire which has the potential to: cause wide-scale, long-term changes in park habitats; change wildlife abundance and diversity in affected areas; and require high impact suppression actions.	Beneficial, long-term, and major impacts on wildlife and habitat by rapidly restoring a more natural forest structure that would support a more natural abundance, diversity, and distribution of species. The threat of catastrophic fire and its impacts on wildlife and habitat would be greatly and quickly reduced.	Beneficial, long-term, and moderate impacts on wildlife and habitat by restoring forest structure to a more natural, fire-influenced condition that would support a more natural abundance, diversity, and distribution of species. The threat of catastrophic fire would be reduced, although the 25 years to achieve restoration would lead to unwanted wildfires.	Beneficial, long-term, and major impacts on wildlife and habitat by rapidly restoring a more natural forest structure that would support a more natural abundance, diversity, and distribution of species. The threat of catastrophic fire and its impacts on wildlife and habitat would be greatly reduced.
Species of Special Concern – Plants	Adverse, long-term, and minor impacts but catastrophic fire would cause large areas of potentially adverse, long-term, and minor to moderate impacts due to the likelihood of extreme sun exposure on site (due to loss of overstory cover and shade), and the probability of encroachment into these sites by non-native species.	Adverse, long-term, and minor impacts due to the potential increased impacts to species from mechanical treatments. Mechanical thinning and removal of fuels around developed areas, and increased burning will have an overall minimal effect on these species, due to their relative isolation, sparsely vegetated habitats, and occurrence beyond areas that would be managed aggressively.	Adverse, long-term, and negligible to minor impacts due to potential for increased manual thinning and removal as compared to Alternative A (but less than other alternatives), increased management of fuels around developed areas and increased burning would have an overall minimal effect on these species due to their relative isolation, sparsely vegetated habitats, and occurrence beyond areas that would be managed aggressively.	Adverse, long-term, and minor impacts, same as Alternative B.
Species of Special Concern – Animals				

IMPACT TOPIC	ALTERNATIVE A – NO ACTION	ALTERNATIVE B – AGGRESSIVE ACTION	ALTERNATIVE C – PASSIVE ACTION	ALTERNATIVE D – MULTIPLE ACTION (Preferred)
Sierra Nevada bighorn sheep	Beneficial, long-term, and negligible impacts.	Same as Alternative A	Same as Alternative A	Same as Alternative A
Valley elderberry longhorn beetle	Adverse, long-term, and minor impacts from potential catastrophic fire in El Portal.	Beneficial, long-term, and minor impacts due to reduction in potential for catastrophic fire.	Same as Alternative B	Same as Alternative B
California red-legged frog	Adverse, long-term, and minor impacts, due to no known populations in Yosemite	Beneficial, long-term, and minor impacts due to improvement in suitable habitat.	Same as Alternative B	Same as Alternative B
Bald Eagle	Adverse, long-term, and moderate potential impacts due to potential reduction in snags and large trees.	Beneficial, long-term, and moderate impacts due to reduced potential for catastrophic fire.	Beneficial, long-term, and minor impacts due to reduced potential for catastrophic fire.	Same as Alternative B
Mountain yellow-legged frog	Beneficial, long-term, and negligible impacts due to restoration of habitat.	Beneficial, long-term, and minor impacts due to restoration of habitat.	Same as Alternative B	Same as Alternative B
Yosemite toad	Beneficial, long-term, and negligible impacts due to potential for restored fire regime near habitat.	Beneficial, long-term, and minor impacts due to restoration of fire regime near habitat.	Same as Alternative B	Same as Alternative B
California spotted owl	Adverse, long-term, and major impacts due to potential for catastrophic fire.	Beneficial, long-term, and major impact from restoration of forest structure and reduced risk of catastrophic fire.	Beneficial, long-term, and moderate impacts from restoration of forest structure and reduced risk of catastrophic fire.	Same as Alternative B
Pacific Fisher	Adverse, long-term, and major impacts due to threat of catastrophic fire.	Beneficial, long-term, and major due to restored forest structure.	Beneficial, long-term, and moderate due to some restored forest structure.	Beneficial, long-term, and moderate to major due to restored forest structure.
Great gray owl	Adverse, long-term, and moderate impacts due to potential loss of habitat from catastrophic fire.	Beneficial, long-term, and moderate impacts due to reduced risk of catastrophic fire in owl habitat.	Same as Alternative A	Same as Alternative B
Willow flycatcher	Adverse, long-term, and minor impacts due to potential intrusion of catastrophic fire into habitat.	Beneficial, long-term, and moderate impacts due to restored conditions near riparian habitat.	Same as Alternative B	Same as Alternative B
PHYSICAL ENVIRONMENT				
Watersheds, Soils, and Water Quality	Adverse, long-term and moderate impacts based on a combination of beneficial, long-term, moderate to major impacts in the Fire Use and Conditional Units, and the	Beneficial, long-term, and major impacts, based on a combination of beneficial, long-term, moderate to major impacts in Fire Use Unit and the potential for areas of beneficial,	Beneficial, long-term and moderate impacts, based on a combination of beneficial, long-term, moderate to major impacts in Fire Use Unit and the potential for areas of beneficial,	Similar to Alternative B, beneficial, long-term, and major effects.

IMPACT TOPIC	ALTERNATIVE A – NO ACTION	ALTERNATIVE B – AGGRESSIVE ACTION	ALTERNATIVE C – PASSIVE ACTION	ALTERNATIVE D – MULTIPLE ACTION (Preferred)
	potential for adverse, long-term, and major impacts because of catastrophic fire in the Suppression Unit. Fires would potentially affect ridge, mid-slope and bottom slope areas of watersheds, increasing water yield, peak flows, nutrient yield sediment yield and stream system response.	long-term, and major impacts in Suppression Units, compared to No Action. Fires would likely affect only a portion of a slope rather than the entire vertical gradient. Reduced impacts on water yield, peak flows, nutrient yield, sediment yield, and stream system response.	long-term, and moderate impacts in the Suppression Unit. Large, high-severity fires would likely occur during the life of the plan, but the treatments proposed would reduce their effects upon soils and watersheds, including the potential for adverse effects upon water yield, peak flow, nutrient yield, sediment yield, and stream system response.	
Air Quality	Adverse, short-term, and major impacts on air quality because of continuing risk of unwanted catastrophic fires consuming areas of high fuel loadings. Impacts from prescribed fire activity would be less.	Adverse, short-term, and major impacts; largest quantity of emissions among alternatives. Intensity of impact of would be well above 50% greater than Alternative A because of prescribed fire activity.	Adverse, short-term, and major impacts; increases would be slightly above 50% of Alternative A for all emissions except volatile organic compounds (VOC). The impact on VOC emissions would be moderate.	Adverse, short-term, and major impacts since the increases in air emissions would be well above 50% of Alternative A.
CULTURAL ENVIRONMENT				
Archaeology	Adverse, long-term, and major impacts to archaeological resources mainly due to the likelihood of catastrophic fire and high-impact suppression actions. Managed wildland and prescribed fire could result in direct and indirect adverse impacts to archaeological resources, depending on the intensity of burning, the related soil and below-soil temperature, and the post-burn landscape condition, but planning and site-specific mitigations can be applied for known resources.	Beneficial, long-term, and moderate impacts, due to the reduced potential for catastrophic fire impacts; greatest reduction in the potential for these impacts on archaeological material. Potential adverse, long-term, moderate impacts from high-intensity burning during prescribed and managed wildland fires. Greatest potential for adverse impacts due to use of heavy equipment to reduce fuels. Planning and site-specific mitigations to reduce impacts.	Beneficial, long-term, and minor to moderate impacts. Similar to Alternative B, but with greater potential for catastrophic fire impacts. Potential adverse, long-term, and moderate impacts from high-intensity burning during prescribed and managed wildland fires. Planning and site-specific mitigations to reduce impacts.	Beneficial, long-term, and moderate impacts, similar to Alternative B, but with slightly greater potential for catastrophic fire and its effects on archaeological material. Potential adverse, long-term, and moderate impacts from high-intensity burning during prescribed and managed wildland fires. Planning and site-specific mitigations to reduce impacts.
Ethnographic Resources	Adverse, short-term, and minor to moderate impacts to ethnographic resources mainly due to the threat of catastrophic	Beneficial, long-term, and moderate impacts due to reductions in the potential for catastrophic fire and its impacts.	Beneficial, long-term, and minor to moderate impacts due to some decrease in the potential for catastrophic fire effects.	Beneficial, long-term, and moderate impacts. Similar to Alternative B, but with greater potential for catastrophic fire

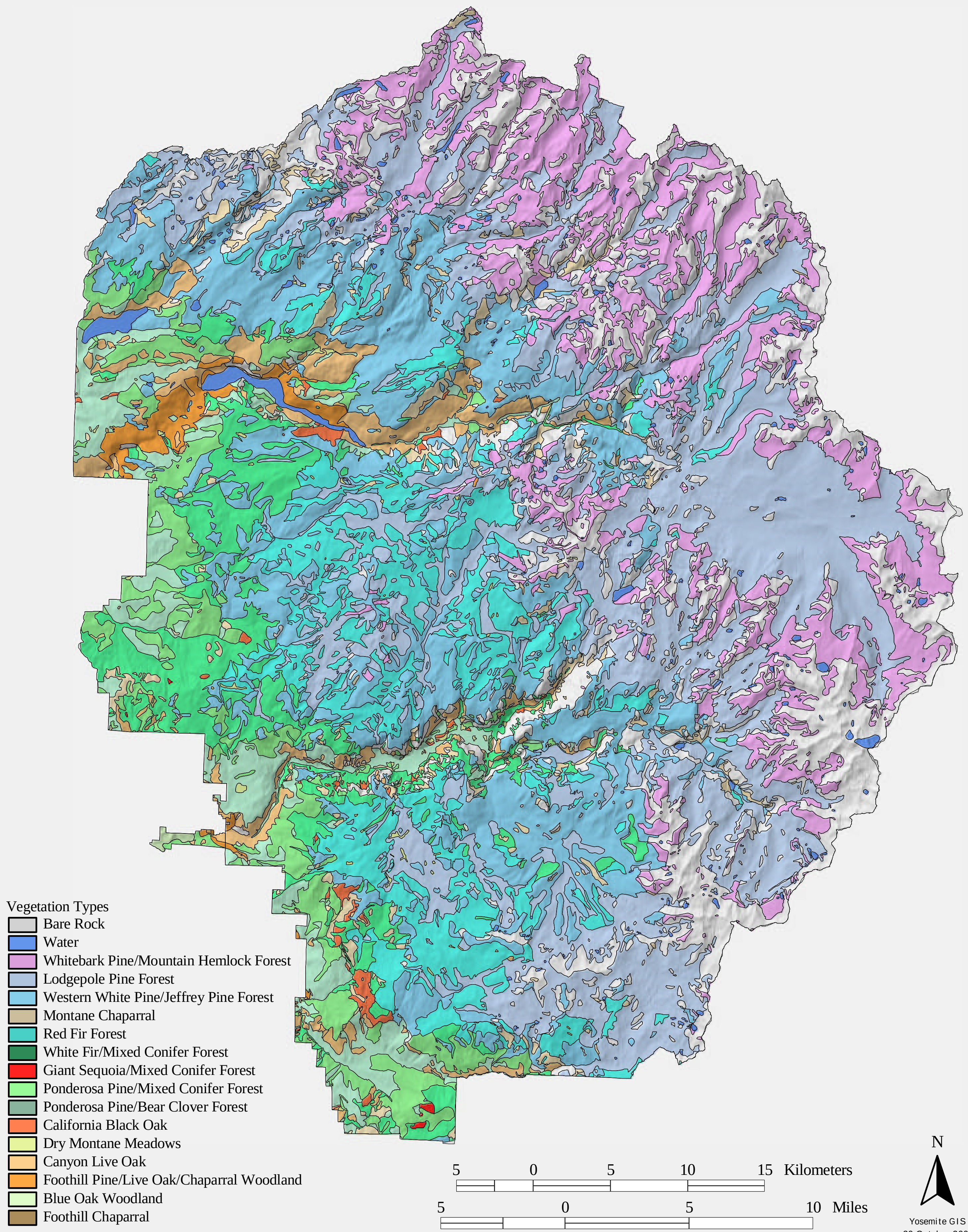
IMPACT TOPIC	ALTERNATIVE A – NO ACTION	ALTERNATIVE B – AGGRESSIVE ACTION	ALTERNATIVE C – PASSIVE ACTION	ALTERNATIVE D – MULTIPLE ACTION (Preferred)
	fire. Managed wildland fire and prescribed fire could also result in indirect adverse impacts to ethnographic resources, depending upon the timing and intensity of fire.	Potential adverse impacts to ethnographic resources due to the increased potential for high-intensity prescribed fire and the use of heavy equipment to reduce fuel loads. Impacts would be mitigated.		effects but less potential for heavy machinery impacts. Impacts would be mitigated.
Cultural Landscape Resources	Adverse, long-term, and moderate to major mainly due to the increased threat of catastrophic fire. Of all fire management situations and treatments, catastrophic fire and emergency response actions result in the most frequent and severe impacts to cultural landscape resources. Impacts would be mitigated through planning and site-specific mitigations.	Beneficial, long-term, and moderate impacts. Greatest reduction in the potential for high intensity catastrophic fire, and the effects of suppressing it. Possible impacts from high intensity prescribed fire and use of equipment for fuel treatments. Impacts would be mitigated to the extent possible through planning and site-specific mitigations.	Beneficial, long-term, and minor impacts. Potential for catastrophic fire reduced somewhat compared to Alternative A. Impacts would be mitigated to the extent possible through planning and site-specific mitigations.	Beneficial, long-term, and moderate; similar to Alternative B. Adverse impacts would be mitigated through planning and site-specific mitigations.
SOCIAL ENVIRONMENT				
Recreation	Adverse, short-term, and minor impacts from short-term closures and restrictions because of fire management activities. During large, catastrophic fire events, closures and other needed actions would result in adverse, short-term, and major impacts.	Adverse, short-term, and minor impacts from short-term closures and restrictions because of fire management activities. The potential for large, catastrophic fires would decrease, reducing with it the potential for closures. Impacts of catastrophic fire on recreation would likely be adverse, short-term, and moderate.	Adverse, short-term, and minor impacts from short-term closures and restrictions because of fire management activities. The potential for large, catastrophic fires and the likely effect upon recreation would be similar to but less than under Alternative A.	Same as in Alternative B
Scenic Resources	Beneficial, long-term, and minor impacts from fire management actions that would maintain open vistas and natural forest structure conditions. Adverse, long-term, and major impacts from catastrophic, stand-replacement fires.	Beneficial, long-term and major impacts if fire is used as a tool to restore and maintain open vistas. Under this alternative, there would be less likelihood of large, stand-replacement fires.	Beneficial, long-term and moderate impacts due to fuel reduction and prescribed fire in the Suppression Unit. However, the potential for large, stand-replacement fires would be only slightly less than under Alternative A.	Beneficial, long-term and major impacts; similar to Alternative B.
Noise	Adverse, short-term, and moderate to major impacts, especially in wildland/urban	Short-term, adverse, and major, especially near wildland/urban interface areas. Fuel reduction	Short-term, adverse, and major impacts, especially near wildland/urban interface areas.	Adverse, short-term, and major impacts; similar to Alternative B.

IMPACT TOPIC	ALTERNATIVE A – NO ACTION	ALTERNATIVE B – AGGRESSIVE ACTION	ALTERNATIVE C – PASSIVE ACTION	ALTERNATIVE D – MULTIPLE ACTION (Preferred)
	interface areas and particularly during large, catastrophic fire events. In Wilderness, helicopter and chainsaw noises would continue to introduce short-term intrusions, with adverse and major impacts.	activity and the duration of fuel treatment operations would be substantially greater than under Alternative A. In Wilderness, effects would be the same as in Alternative A.	The noise events would be similar but more than that found in Alternative A. During catastrophic fire events and in Wilderness, effects would be the same as in Alternative A.	
Local Communities	Beneficial, long-term, and minor impacts. Small reduction in risk of wildland fire in local communities; due to limited amount of prescribed fire and fuel treatment. Potential for catastrophic fire would remain high; the risk for direct effects (loss of property during fires) and indirect effects (loss of business during fire-related closures) would be highest among the alternatives.	Beneficial, long-term, and moderate to major impacts because prescribed fire and mechanical thinning would restore plant community conditions near communities, reducing the risk of catastrophic loss. Risks associated with large, catastrophic fires would be greatly reduced in this alternative; direct effects (loss of property during fires) and indirect effects (loss of business during fire-related closures) least among alternatives.	Beneficial, long-term and moderate impacts due to long-term reduction in risk of catastrophic fires; direct effects (loss of property during fires) and indirect effects (loss of business during fire-related closures) would be reduced, but would remain the highest among the action alternatives. This is because of a smaller amount of annual prescribed fire and mechanical thinning to restore plant communities in the Suppression Unit.	Beneficial, long-term, and moderate to major impacts; similar to Alternative B.
Environmental Justice	Beneficial, long-term, and minor impacts upon minority and low income populations in park communities due to risk reduction work, which would be focused upon the most immediate risks associated with wildland/urban interface areas	Beneficial, long-term, and moderate to major impacts upon minority and low-income populations in park communities due to risk reduction work. Prescribed fire and fuel treatment would continue to be focused upon the immediate risks associated with wildland/urban interface areas.	Beneficial, long-term, and moderate impacts upon minority and low income populations in park communities. Prescribed fire and fuel treatment would continue to be focused upon the immediate risks associated with wildland/urban interface areas.	Beneficial, long-term and moderate to major impacts, similar to Alternative B.
SPECIAL DESIGNATIONS				
Wilderness	Beneficial, long-term, and minor to moderate impacts due to allowing natural processes, thus maintaining Wilderness values, especially in the Fire Use and Conditional Units. Effects in the Suppression Unit limited by amount of prescribed burning and high risk of catastrophic	Beneficial, long-term and moderate to major impacts due to actions that would maintain plant communities within their natural range of variability, and thus maintain Wilderness values, especially in the Fire Use Unit. Reduced potential for catastrophic fires that could	Beneficial, long-term and minor to moderate impacts. Similar to Alternative A, but greater amount of fuels treatment and prescribed fire. However, the potential for catastrophic fires that could spread into Wilderness would remain high during most of the planning	Beneficial, long-term, and moderate to major effects; similar to Alternative B.

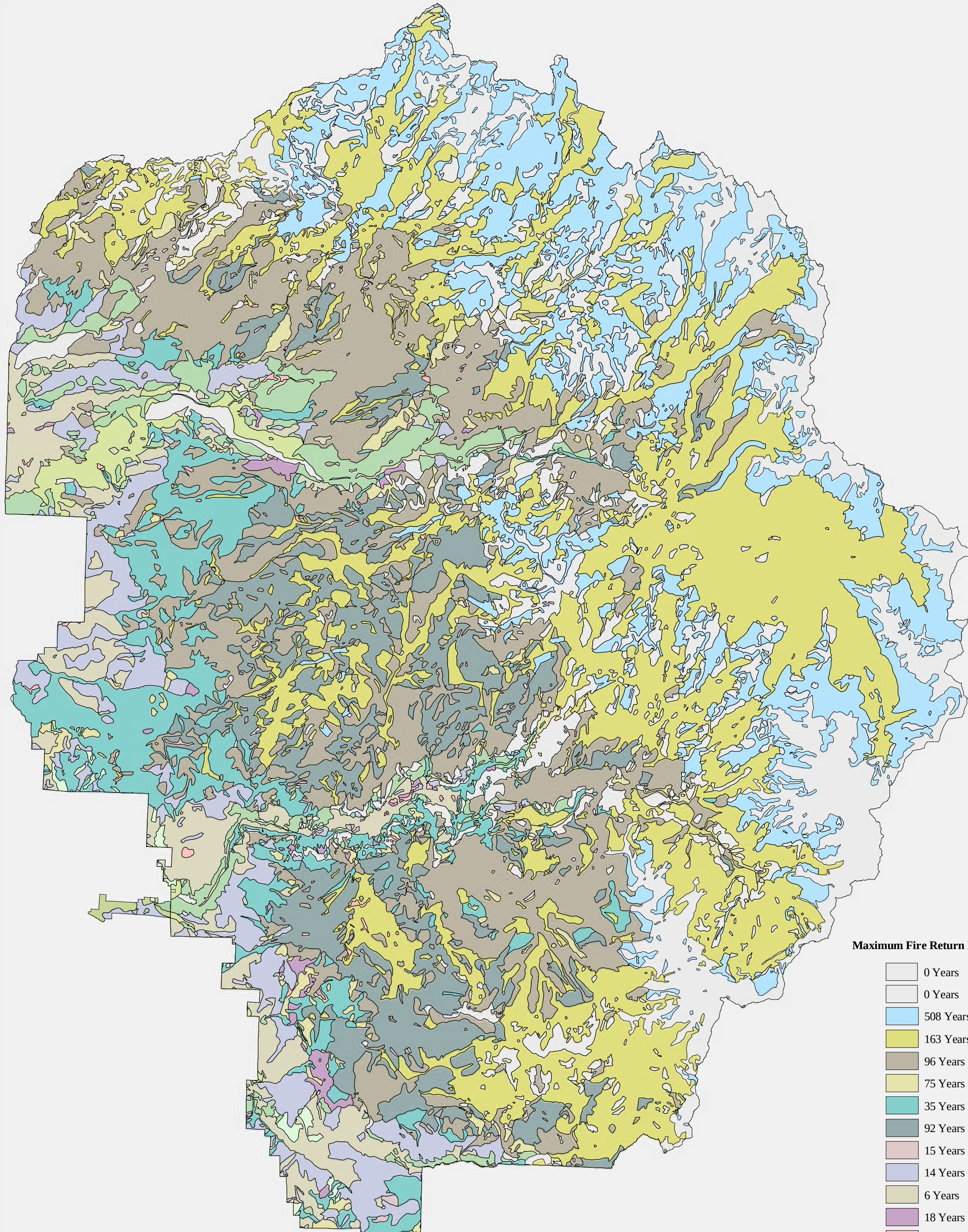
IMPACT TOPIC	ALTERNATIVE A – NO ACTION	ALTERNATIVE B – AGGRESSIVE ACTION	ALTERNATIVE C – PASSIVE ACTION	ALTERNATIVE D – MULTIPLE ACTION (Preferred)
	fires. In Wilderness, helicopter and chainsaw noises would continue to introduce short-term intrusions with adverse and major impacts.	spread into Wilderness. In Wilderness, helicopter and chainsaw noises would continue to introduce short-term intrusions which would have adverse and major impacts.	period.	
ENERGY				
Energy Consumption	Adverse, long-term, and negligible. Estimate of 9,683 gallons of various fuels used in fire management activities in an average year.	Adverse, long-term, and major, with approx. 250,339 gallons of various fuels used in fire management activities in an average year.	Adverse, long-term, and minor, with approx. 22,368 gallons of various fuels used in fire management activities, in an average year.	Adverse, long-term, and major, with approx. 147,462 gallons of various fuels used in fire management activities in an average year.
DETERMINATION OF POTENTIAL IMPROVEMENT OF PARK RESOURCES				
Potential for Impairment of Park Values	Increasing potential for catastrophic fire in or near giant sequoia groves, historic districts, and highly scenic areas. Loss of these natural and cultural resources would likely constitute impairment.	This alternative represents the most aggressive effort to reduce the potential for catastrophic fire and to restore and maintain forest structure and other natural and cultural resource values. No impairment.	The least aggressive of the action alternatives; would reduce the potential for catastrophic fire compared to Alternative A. Actions would restore and maintain forest structure and other natural and cultural resource values. No Impairment.	Similar to Alternative B but slightly less aggressive effort to quickly reduce the potential for catastrophic fire and restore and maintain forest structure and other natural and cultural resource values. No Impairment.
POTENTIAL CONFLICTS BETWEEN EACH ALTERNATIVE AND OTHER LAWS AND POLICIES				
Potential conflict with Section 101, NEPA or other laws	Conflicts with Section 101, NEPA and results in continued environmental degradation. Increased risk of catastrophic fire; values at risk include communities, historic districts, and other cultural resources; limited amount of accomplishment addresses neither requirements for restoring resources or protecting communities; fails to enhance quality of renewable resources.	Resolves conflicts of Alternative A: Most aggressively reverses environmental degradation, with a high dependence upon aggressive means; reduces risk for high intensity, catastrophic fire. Addresses the need to restore natural resources and protect communities and cultural resources. Addresses need to enhance renewable resources. No identified conflicts with other laws.	Resolves the conflicts of Alternative A: Limited amount of accomplishment toward reducing risk of catastrophic fire, restoration of natural resources and protection of communities and cultural resources. Limited actions to addresses need to enhance renewable resources. No identified conflicts with other laws.	Resolves conflicts of Alternative A: Reverses environmental degradation with a balanced approach to use of both aggressive and passive/low profile techniques; reduces risk of catastrophic fire. Addresses need to restore natural resources and protect communities and cultural resources. Addresses need to enhance renewable resources. No identified conflicts with other laws.

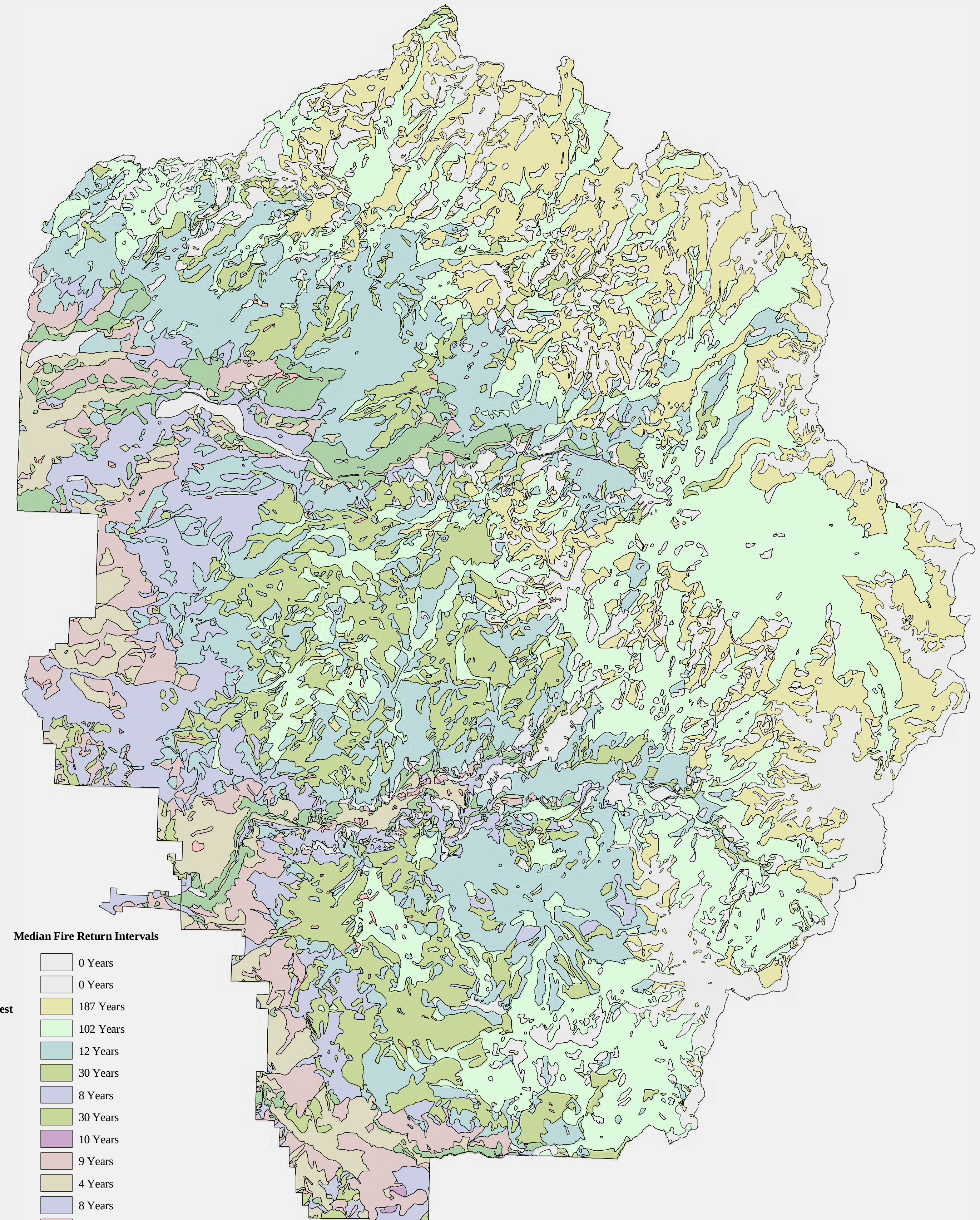
IMPACT TOPIC	ALTERNATIVE A – NO ACTION	ALTERNATIVE B – AGGRESSIVE ACTION	ALTERNATIVE C – PASSIVE ACTION	ALTERNATIVE D – MULTIPLE ACTION (Preferred)
Consistency with Federal Fire Policy	Is inconsistent with the Federal Fire Policy.	Is consistent with the Federal Fire Policy.	Is consistent with Federal Fire Policy.	Is consistent with Federal Fire Policy.

Map 2-1 Fire Management Plan Vegetation Types



Map 2-2 Fire Return Intervals/Vegetation Relationship





Maximum Fire Return Intervals	Vegetation Types	Median Fire Return Intervals
0 Years	**Bare Rock**	0 Years
0 Years	**Water**	0 Years
508 Years	**Whitebark Pine/Mountain Hemlock Forest**	187 Years
163 Years	**Lodgepole Pine Forest**	102 Years
96 Years	**Western White Pine/Jeffrey Pine Forest**	12 Years
75 Years	**Montane Chaparral**	30 Years
35 Years	**White Fir/Mixed Conifer Forest**	8 Years
92 Years	**Red Fir Forest**	30 Years
15 Years	**Giant Sequoia/Mixed Conifer Forest**	10 Years
14 Years	**Ponderosa Pine/Mixed Conifer Forest**	9 Years
6 Years	**Ponderosa Pine/Bear Clover Forest**	4 Years
18 Years	**California Black Oak**	8 Years
5 Years	**Dry Montane Meadows**	2 Years
39 Years	**Canyon Live Oak**	13 Years
49 Years	**Foothill Pine/Live Oak/Chaparral Woodland**	8 Years
49 Years	**Blue Oak Woodland**	8 Years
60 Years	**Foothill Chaparral**	30 Years

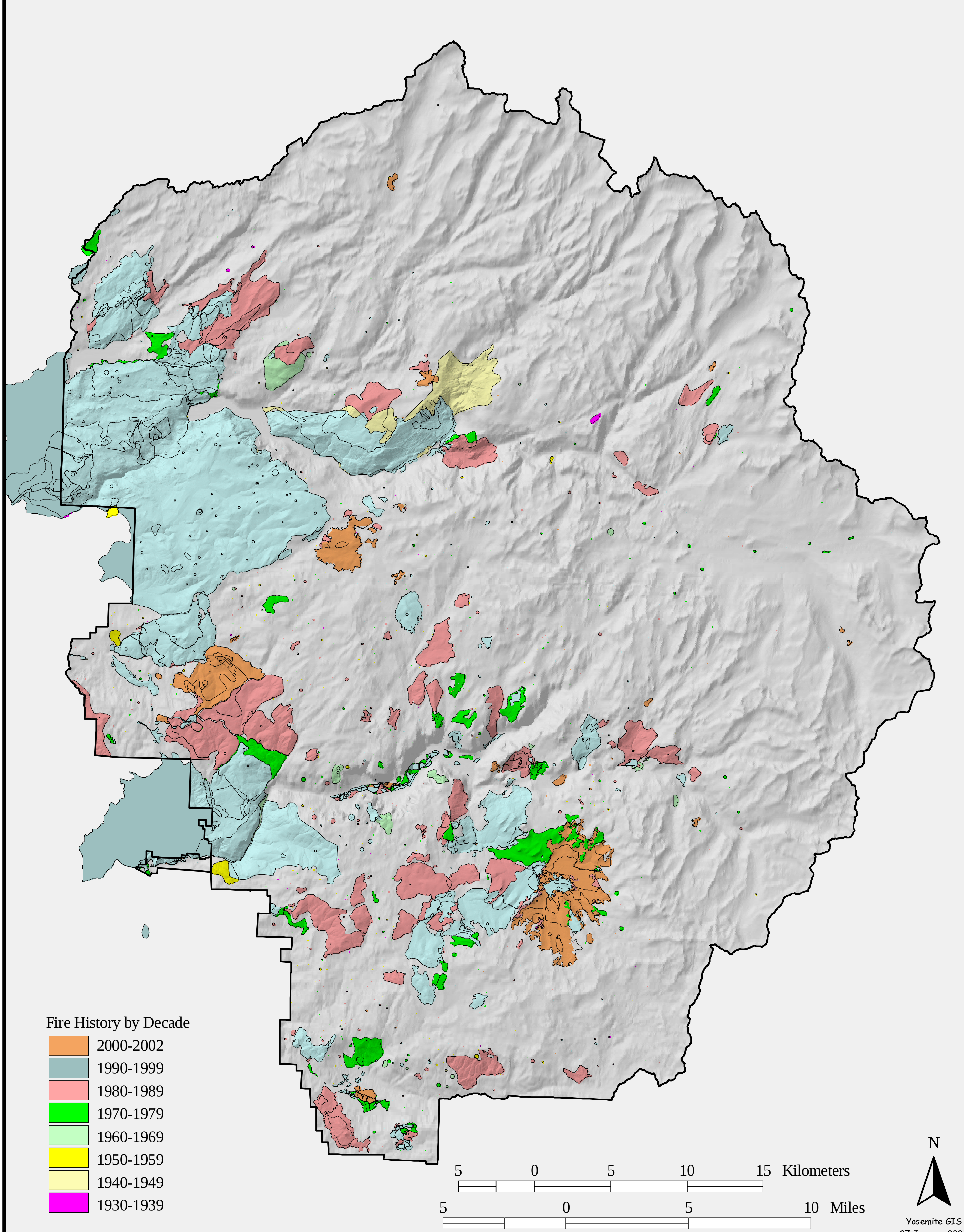
5 0 5 10 15 Kilometers

5 0 5 10 Miles

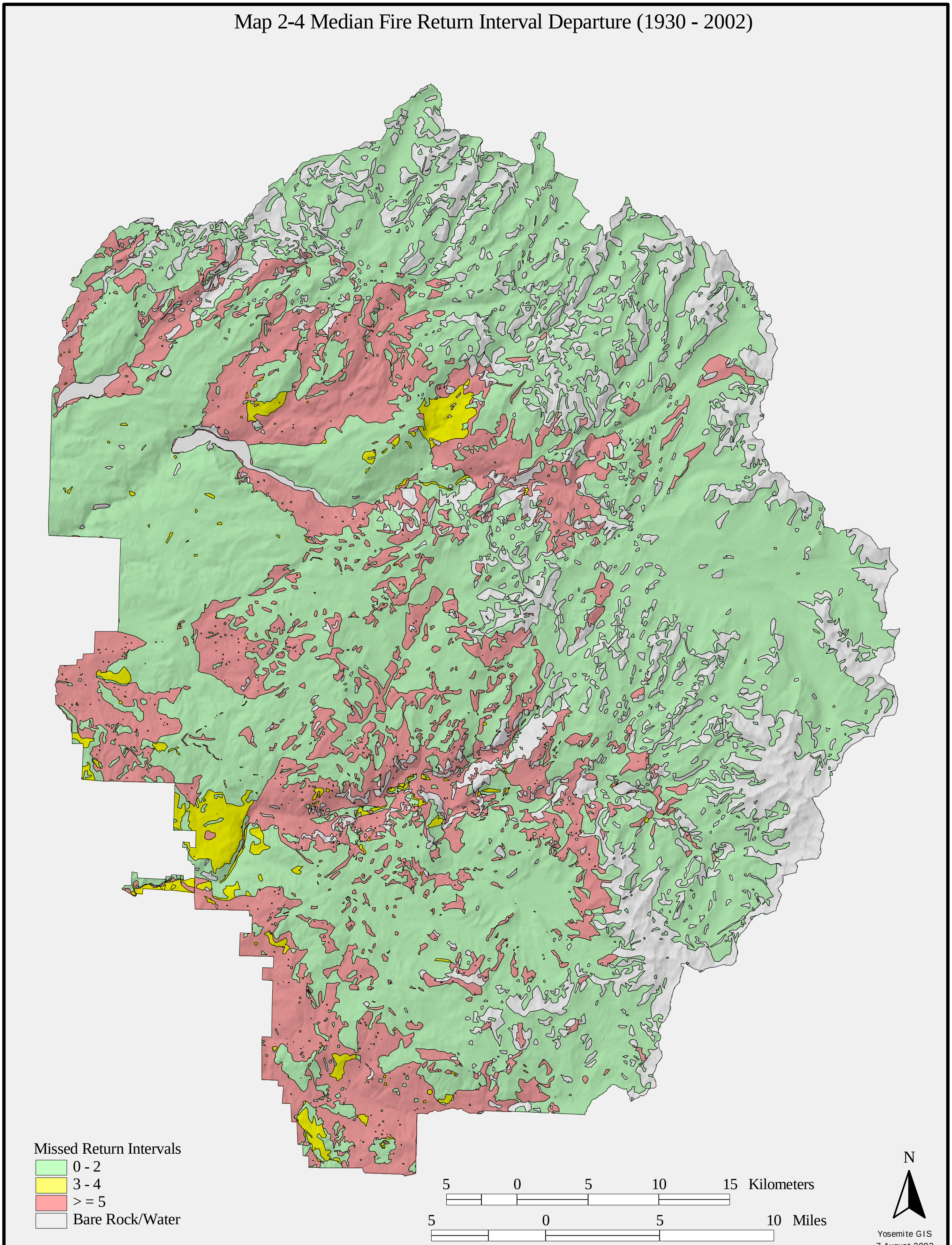
N

Yosemite GIS
25 October 2001

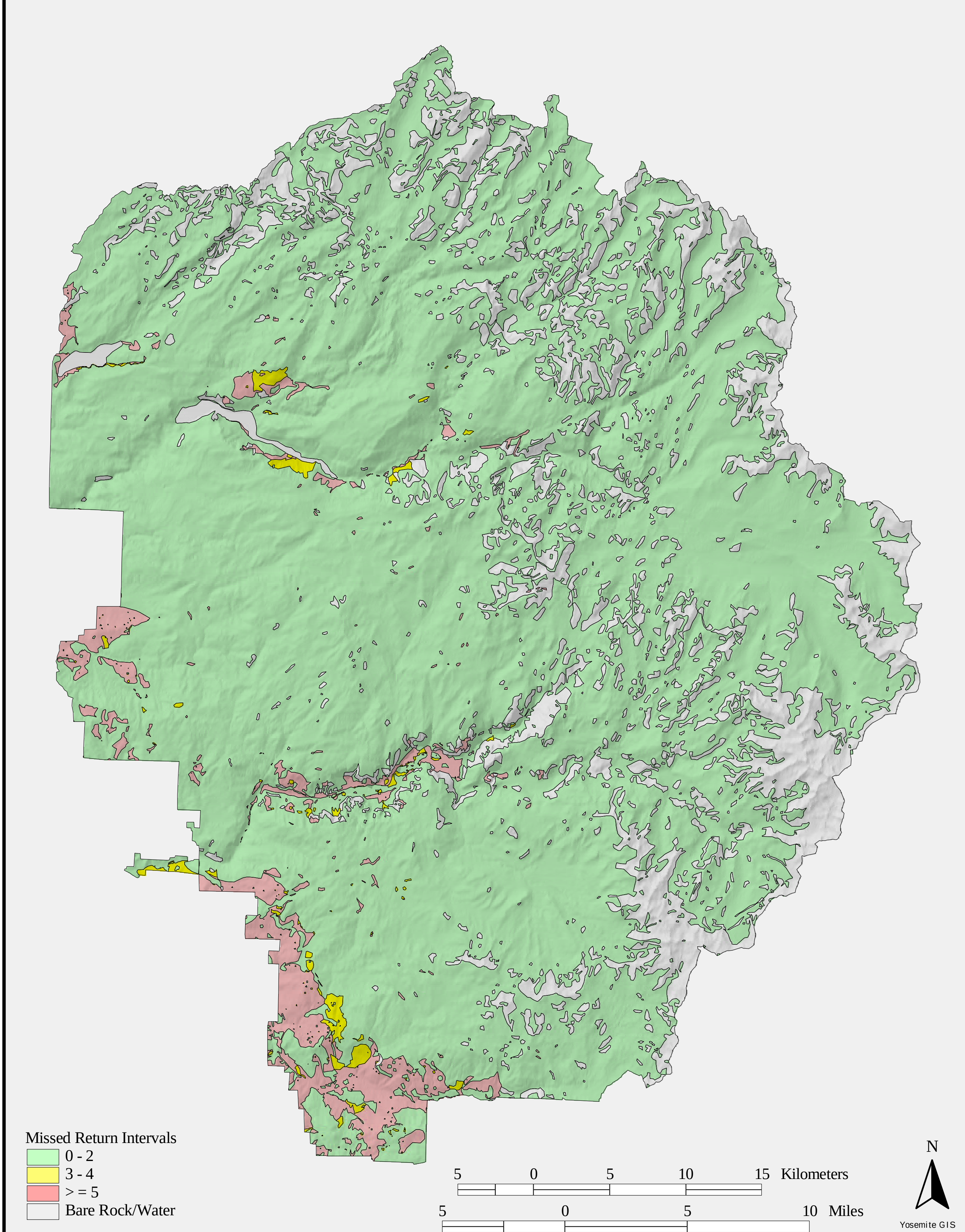
Map 2-3 Fire History: Fires By Decade (1930-2002)

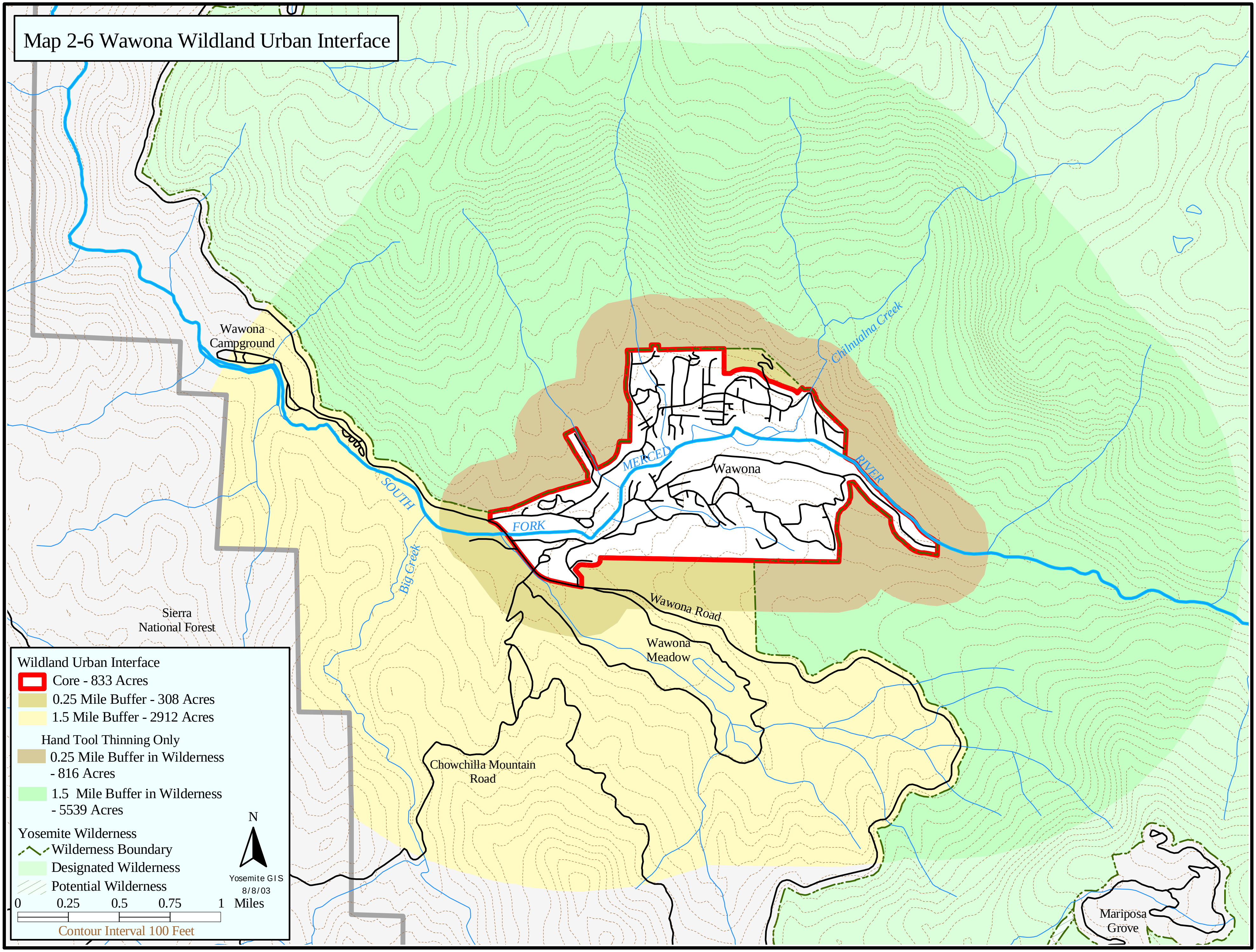


Map 2-4 Median Fire Return Interval Departure (1930 - 2002)

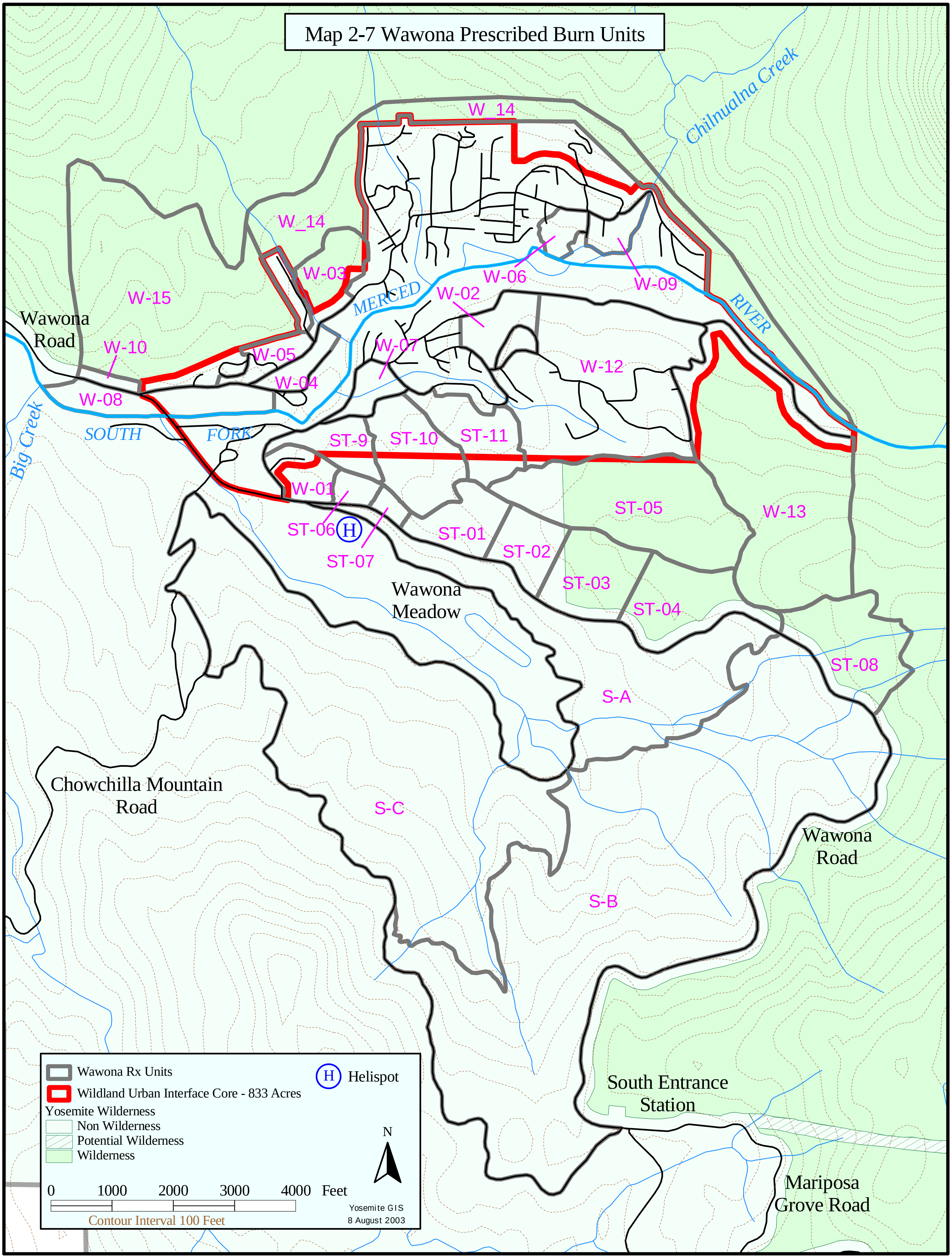


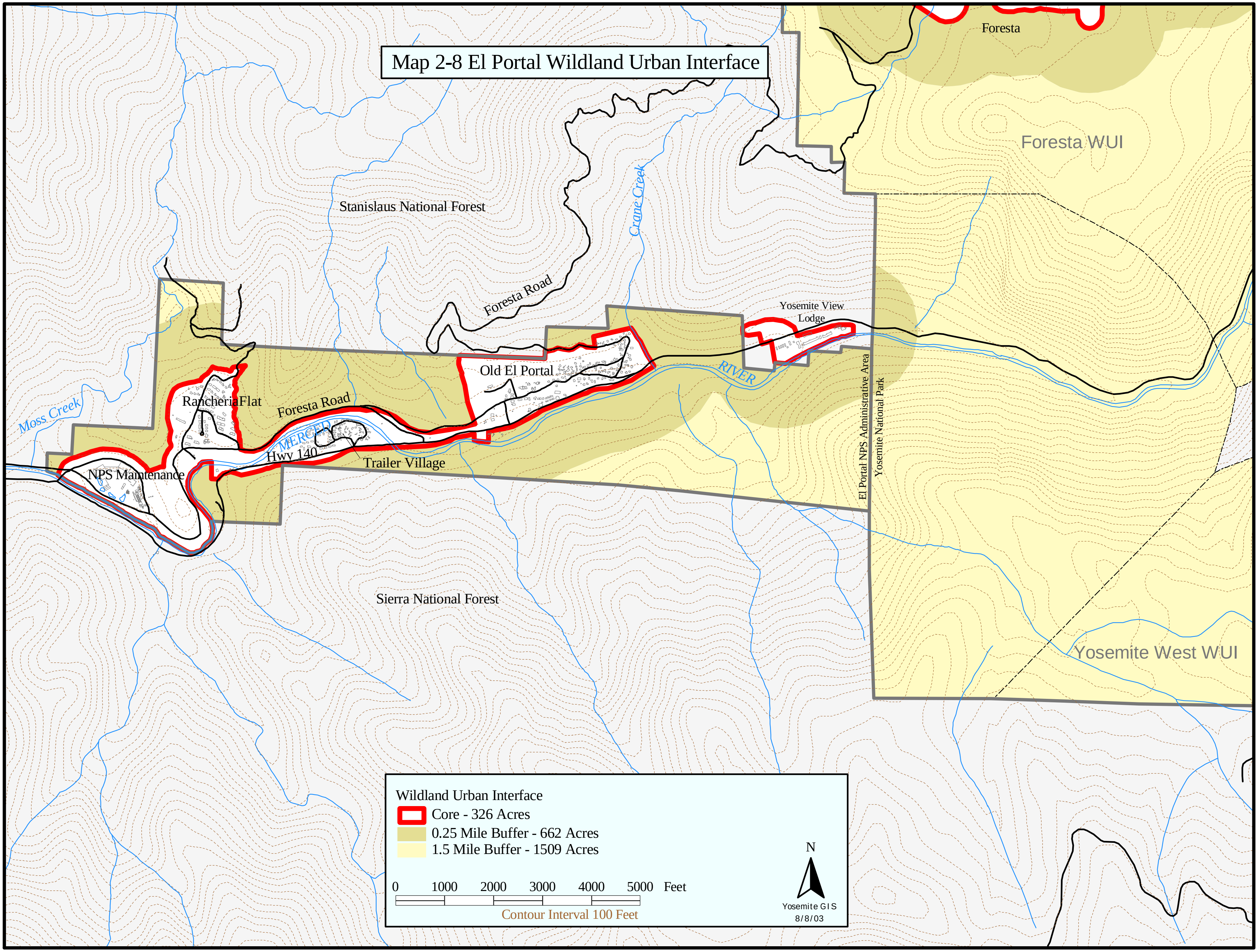
Map 2-5 Maximum Fire Return Interval Departure (1930 - 2002)



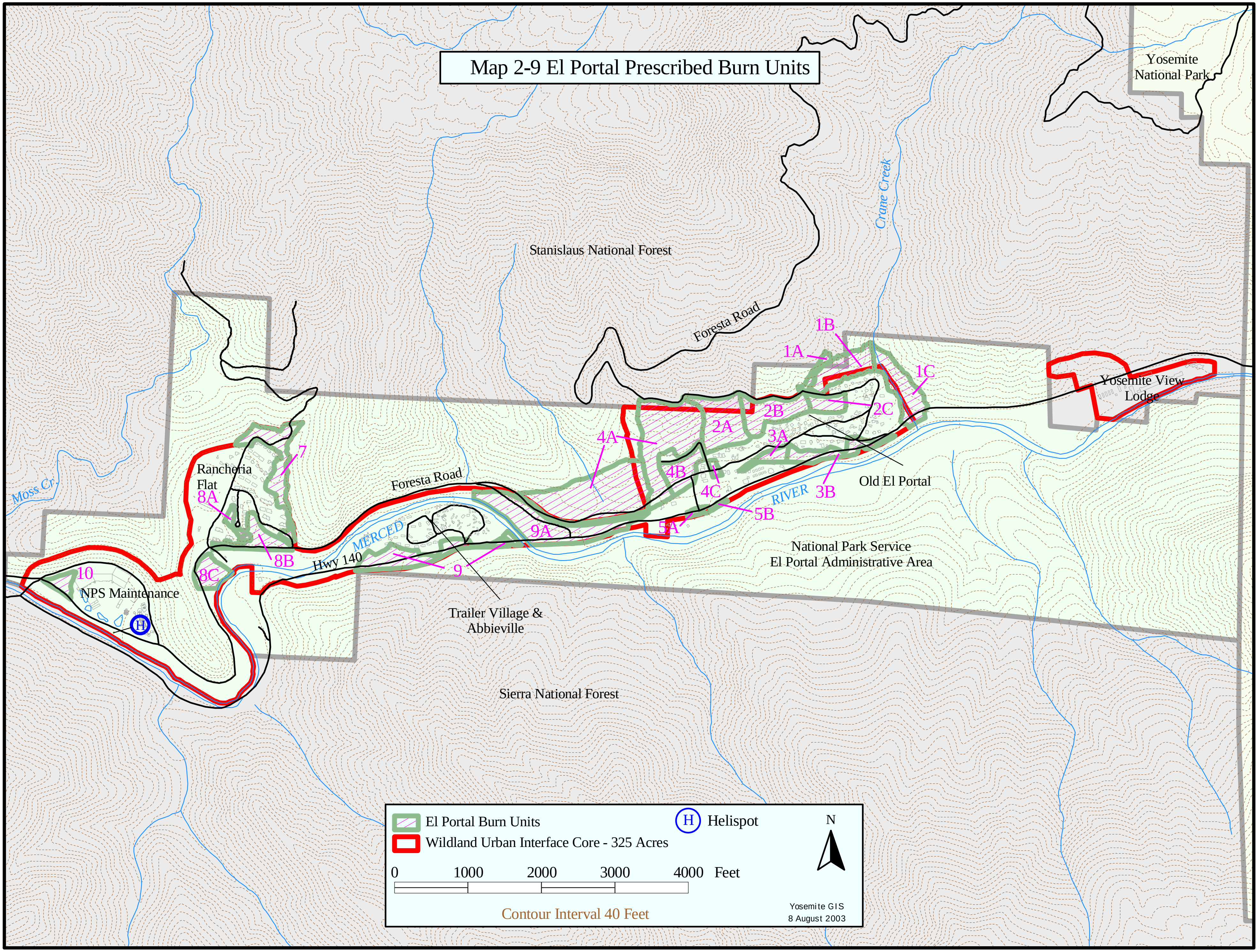


Map 2-6 Wawona Wildland Urban Interface
Wawona Campground
SOUTH
FORK
MERCED
RIVER
Wawona
Chilnualna Creek
Big Creek
Wawona Road
Wawona Meadow
Sierra National Forest
Chowchilla Mountain Road
Mariposa Grove
Wildland Urban Interface
Core - 833 Acres
0.25 Mile Buffer - 308 Acres
1.5 Mile Buffer - 2912 Acres
Hand Tool Thinning Only
0.25 Mile Buffer in Wilderness - 816 Acres
1.5 Mile Buffer in Wilderness - 5539 Acres
Yosemite Wilderness
Wilderness Boundary
Designated Wilderness
Potential Wilderness
N
Yosemite GIS
8/8/03
0
0.25
0.5
0.75
1
Miles
Contour Interval 100 Feet

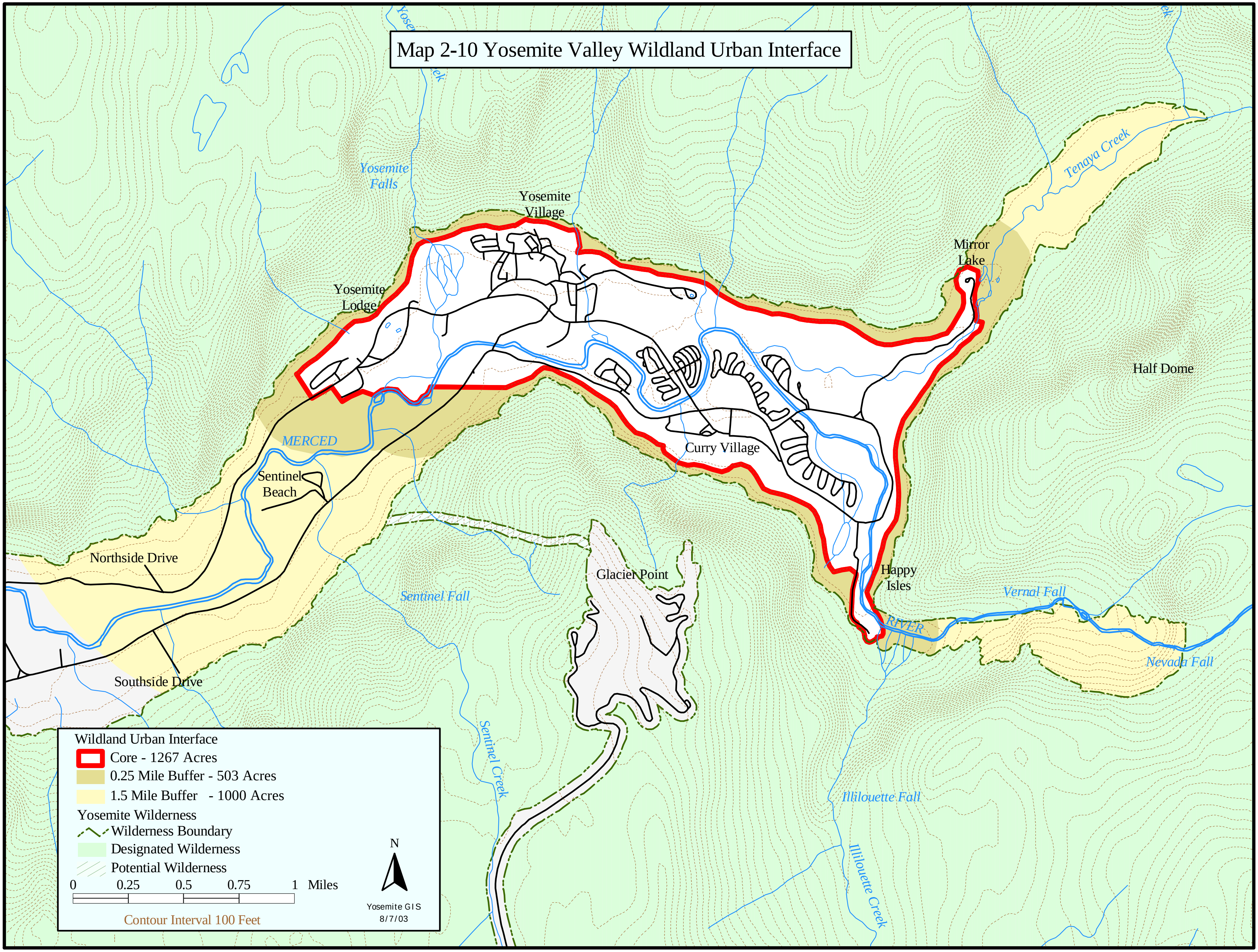

Map 2-7 Wawona Prescribed Burn Units
W_14
W_14
W-03
W-15
Wawona Road
W-10
W-05
W-04
W-08
MERCED
W-02
W-06
W-09
W-07
W-12
RIVER
Chilnualna Creek
Big Creek
SOUTH
FORK
ST-9
ST-10
ST-11
W-01
ST-06
ST-07
ST-01
ST-02
ST-03
ST-04
ST-05
W-13
ST-08
Wawona Meadow
S-A
S-B
S-C
Chowchilla Mountain Road
Wawona Road
South Entrance Station
Mariposa Grove Road
Wawona Rx Units
Wildland Urban Interface Core - 833 Acres
Helispot
Yosemite Wilderness
Non Wilderness
Potential Wilderness
Wilderness
N
0
1000
2000
3000
4000
Feet
Contour Interval 100 Feet
Yosemite GIS
8 August 2003



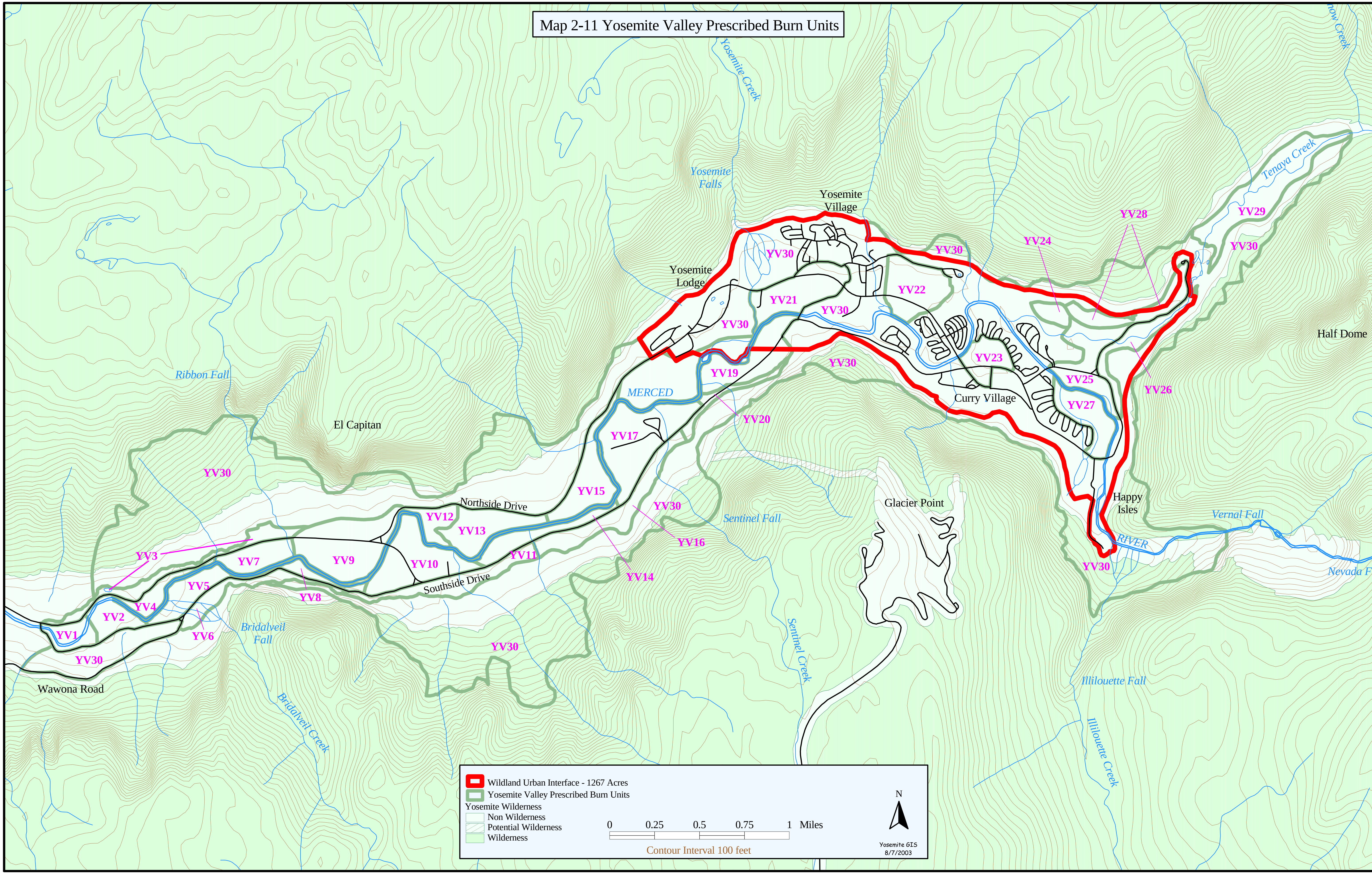
Map 2-8 El Portal Wildland Urban Interface
Foresta
Foresta WUI
Stanislaus National Forest
Crane Creek
Foresta Road
Yosemite View Lodge
Old El Portal
Rancheria Flat
Foresta Road
Moss Creek
MERCED
RIVER
Hwy 140
Trailer Village
NPS Maintenance
El Portal NPS Administrative Area
Yosemite National Park
Sierra National Forest
Yosemite West WUI
Wildland Urban Interface
Core - 326 Acres
0.25 Mile Buffer - 662 Acres
1.5 Mile Buffer - 1509 Acres
0 1000 2000 3000 4000 5000 Feet
Contour Interval 100 Feet
N
Yosemite GIS
8/8/03

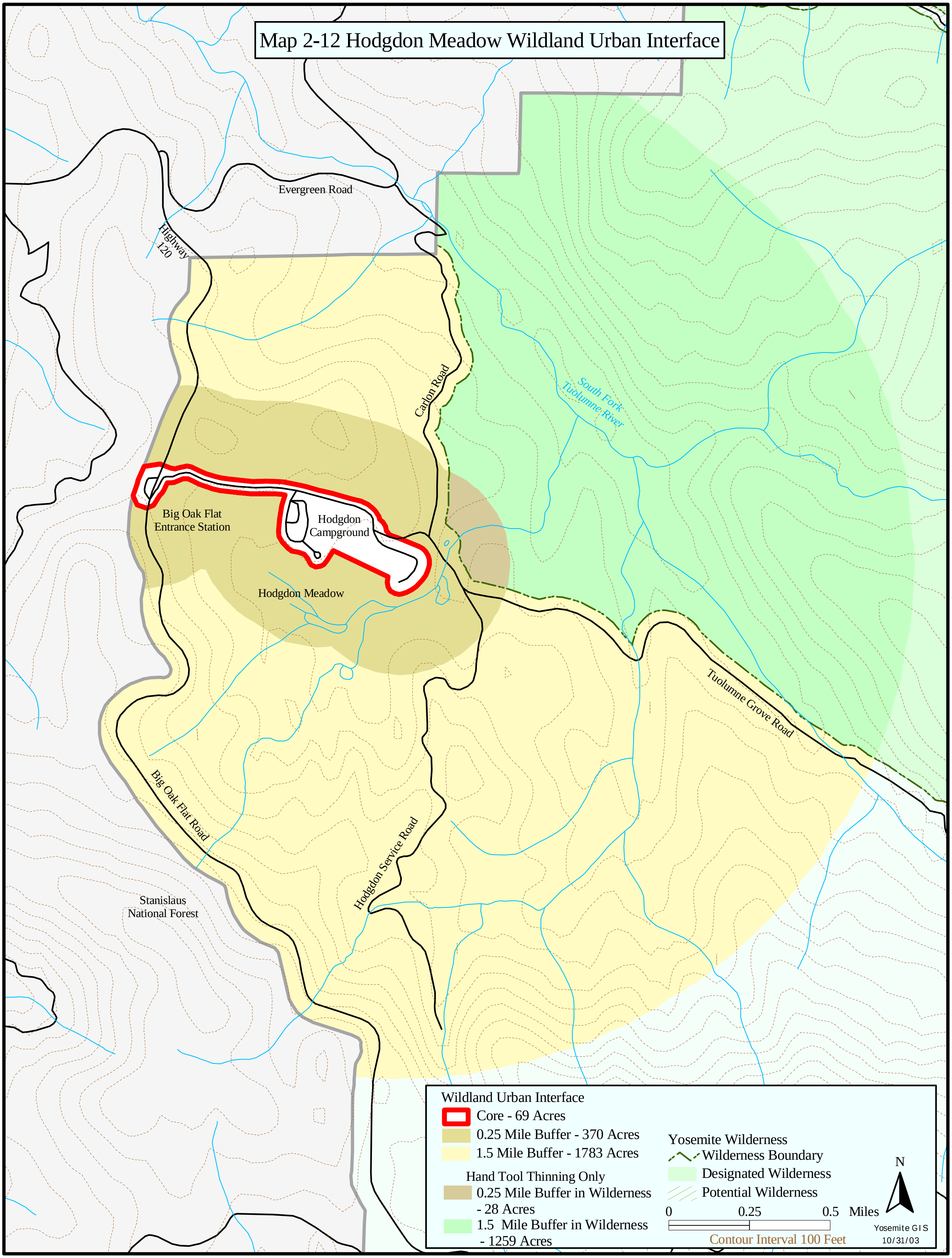


Map 2-9 El Portal Prescribed Burn Units
Yosemite National Park
Stanislaus National Forest
Crane Creek
Foresta Road
1A
1B
1C
2A
2B
2C
3A
3B
4A
4B
4C
5A
5B
7
8A
8B
8C
9
9A
10
Yosemite View Lodge
Old El Portal
RIVER
MERCED
Hwy 140
Foresta Road
Rancheria Flat
Moss Cr.
NPS Maintenance
H
Trailer Village & Abbieville
National Park Service
El Portal Administrative Area
Sierra National Forest
El Portal Burn Units
Wildland Urban Interface Core - 325 Acres
H Helispot
N
0 1000 2000 3000 4000 Feet
Contour Interval 40 Feet
Yosemite GIS
8 August 2003

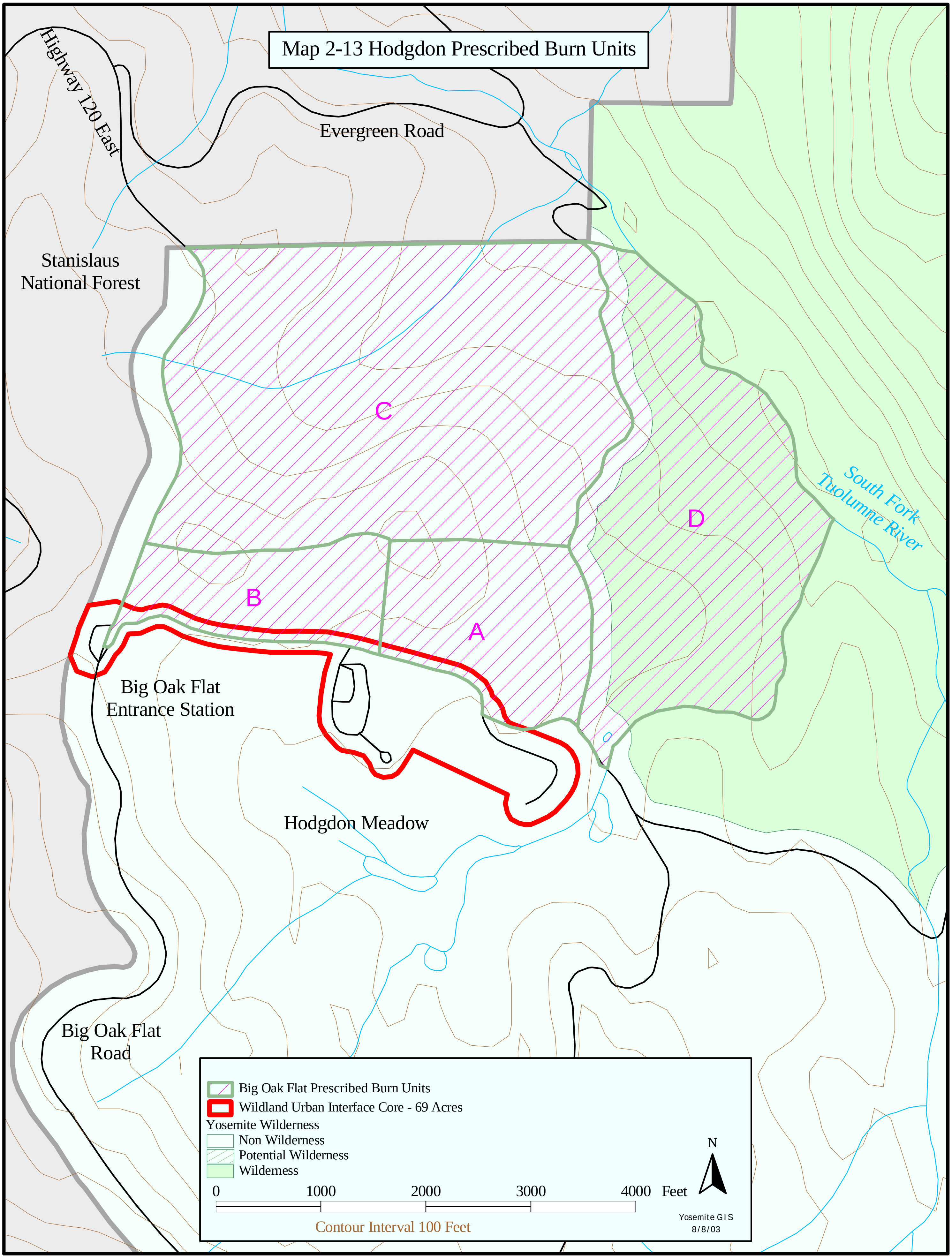

Map 2-10 Yosemite Valley Wildland Urban Interface
Yosemite Falls
Yosemite Village
Yosemite Lodge
Mirror Lake
Tenaya Creek
Half Dome
MERCED
RIVER
Sentinel Beach
Curry Village
Northside Drive
Southside Drive
Glacier Point
Happy Isles
Sentinel Fall
Vernal Fall
Nevada Fall
Sentinel Creek
Illilouette Fall
Illilouette Creek
Wildland Urban Interface
Core - 1267 Acres
0.25 Mile Buffer - 503 Acres
1.5 Mile Buffer - 1000 Acres
Yosemite Wilderness
Wilderness Boundary
Designated Wilderness
Potential Wilderness
0 0.25 0.5 0.75 1 Miles
Contour Interval 100 Feet
N
Yosemite GIS
8/7/03

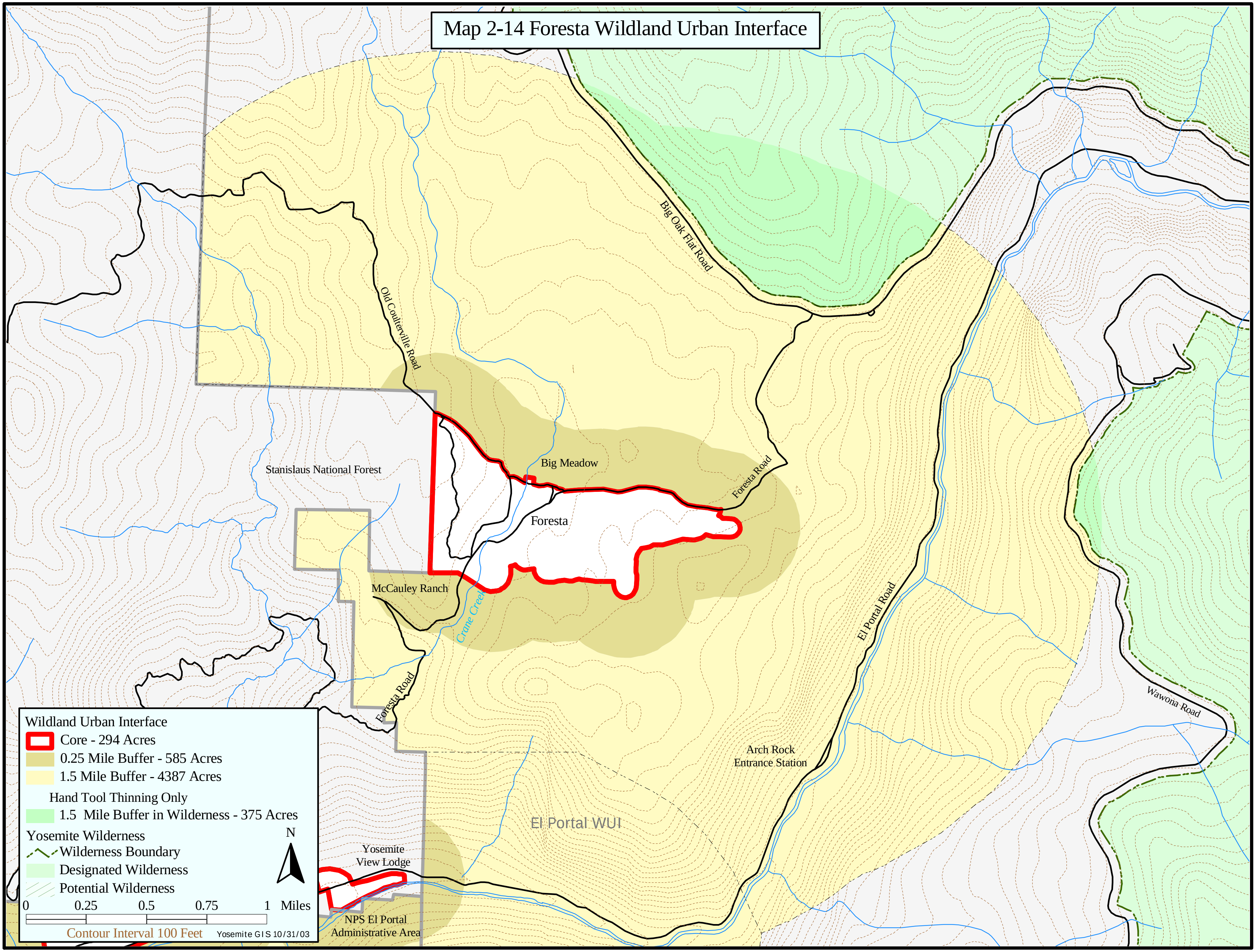
Map 2-11 Yosemite Valley Prescribed Burn Units



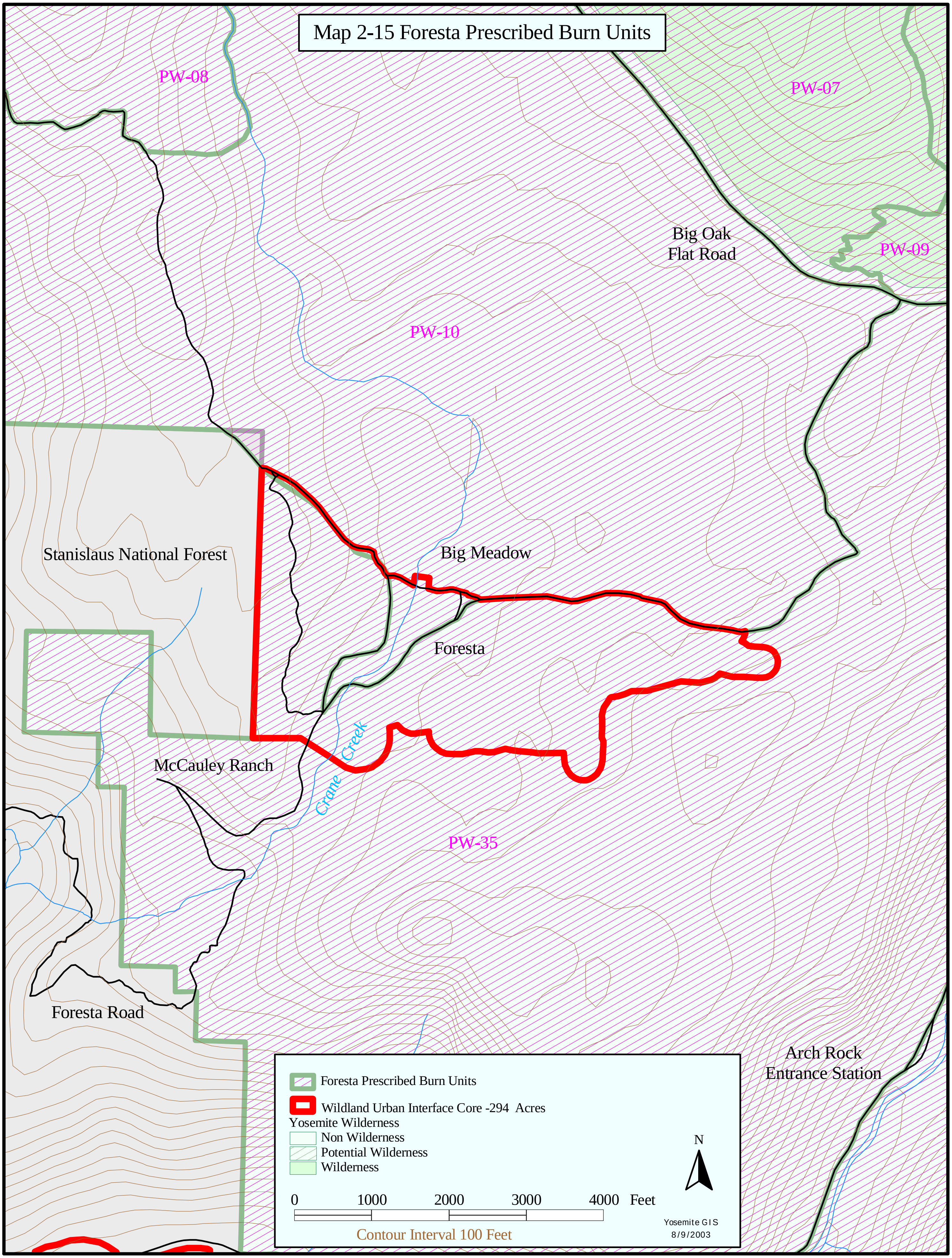


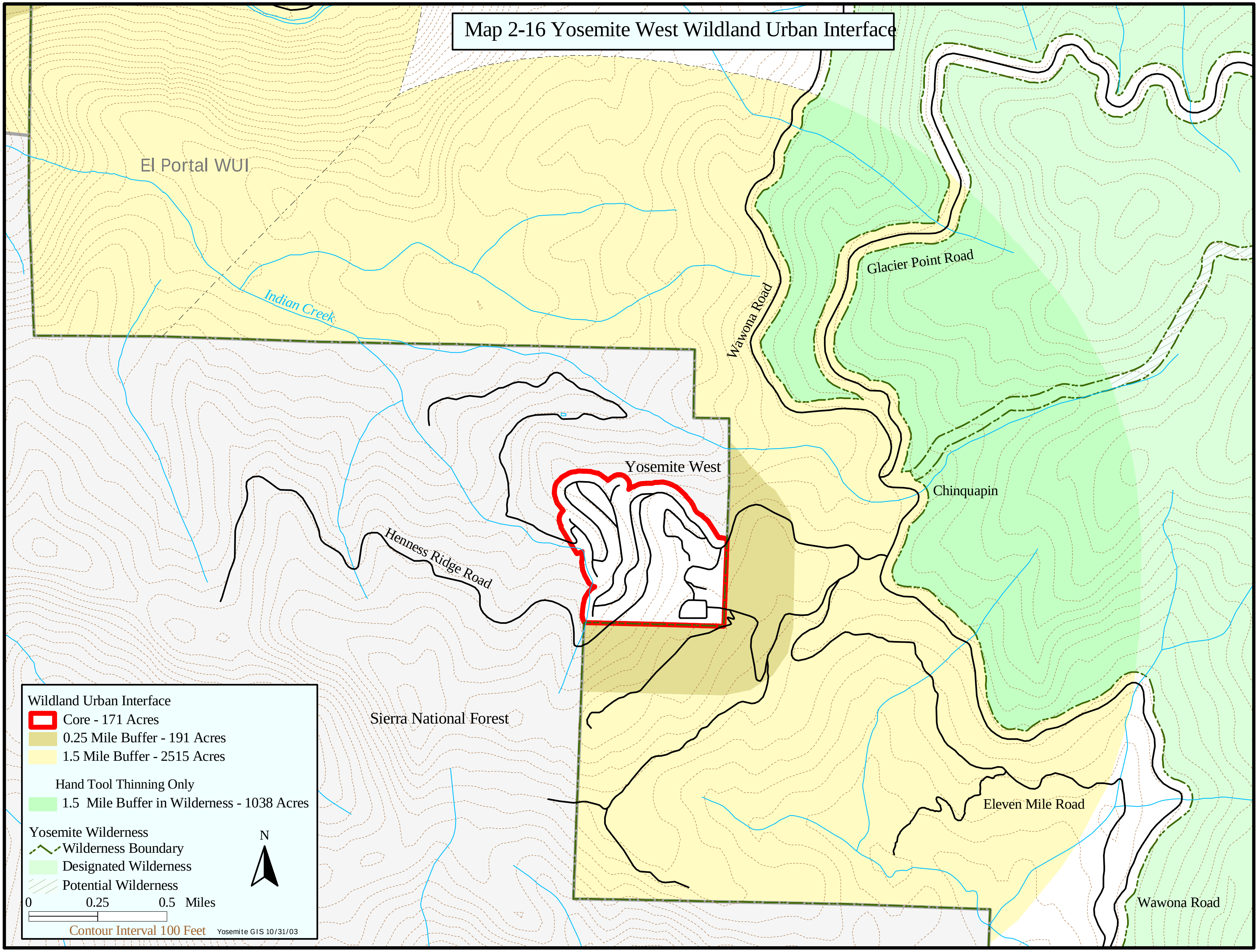
Map 2-12 Hodgdon Meadow Wildland Urban Interface
Evergreen Road
Highway 120
Carlon Road
South Fork Tuolumne River
Big Oak Flat Entrance Station
Hodgdon Campground
Hodgdon Meadow
Tuolumne Grove Road
Big Oak Flat Road
Hodgdon Service Road
Stanislaus National Forest
Wildland Urban Interface
Core - 69 Acres
0.25 Mile Buffer - 370 Acres
1.5 Mile Buffer - 1783 Acres
Hand Tool Thinning Only
0.25 Mile Buffer in Wilderness - 28 Acres
1.5 Mile Buffer in Wilderness - 1259 Acres
Yosemite Wilderness
Wilderness Boundary
Designated Wilderness
Potential Wilderness
0
0.25
0.5
Miles
Contour Interval 100 Feet
N
Yosemite GIS
10/31/03

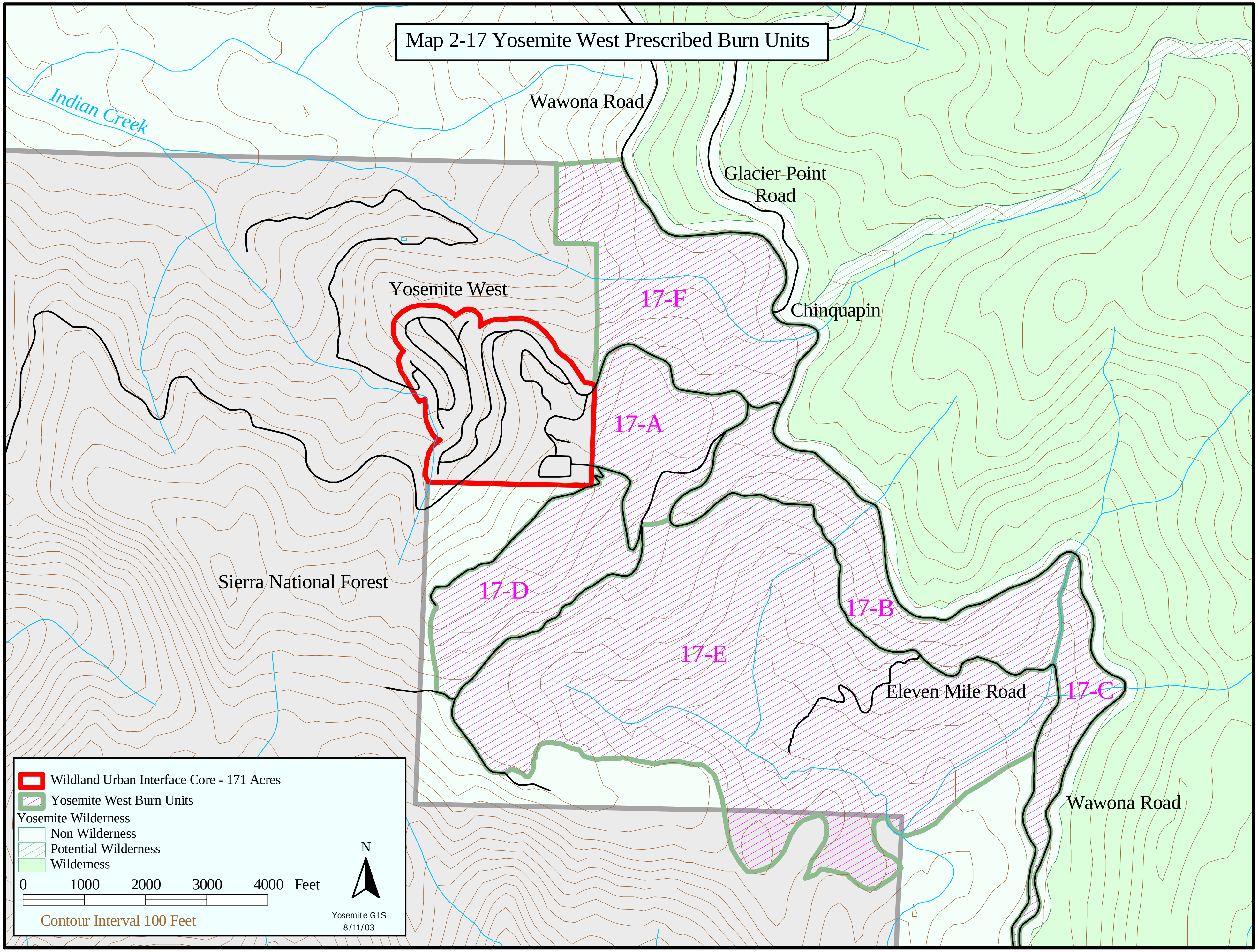

Map 2-13 Hodgdon Prescribed Burn Units
Highway 120 East
Evergreen Road
Stanislaus
National Forest
C
B
A
D
South Fork
Tuolumne River
Big Oak Flat
Entrance Station
Hodgdon Meadow
Big Oak Flat
Road
Big Oak Flat Prescribed Burn Units
Wildland Urban Interface Core - 69 Acres
Yosemite Wilderness
Non Wilderness
Potential Wilderness
Wilderness
N
0
1000
2000
3000
4000
Feet
Contour Interval 100 Feet
Yosemite GIS
8/8/03



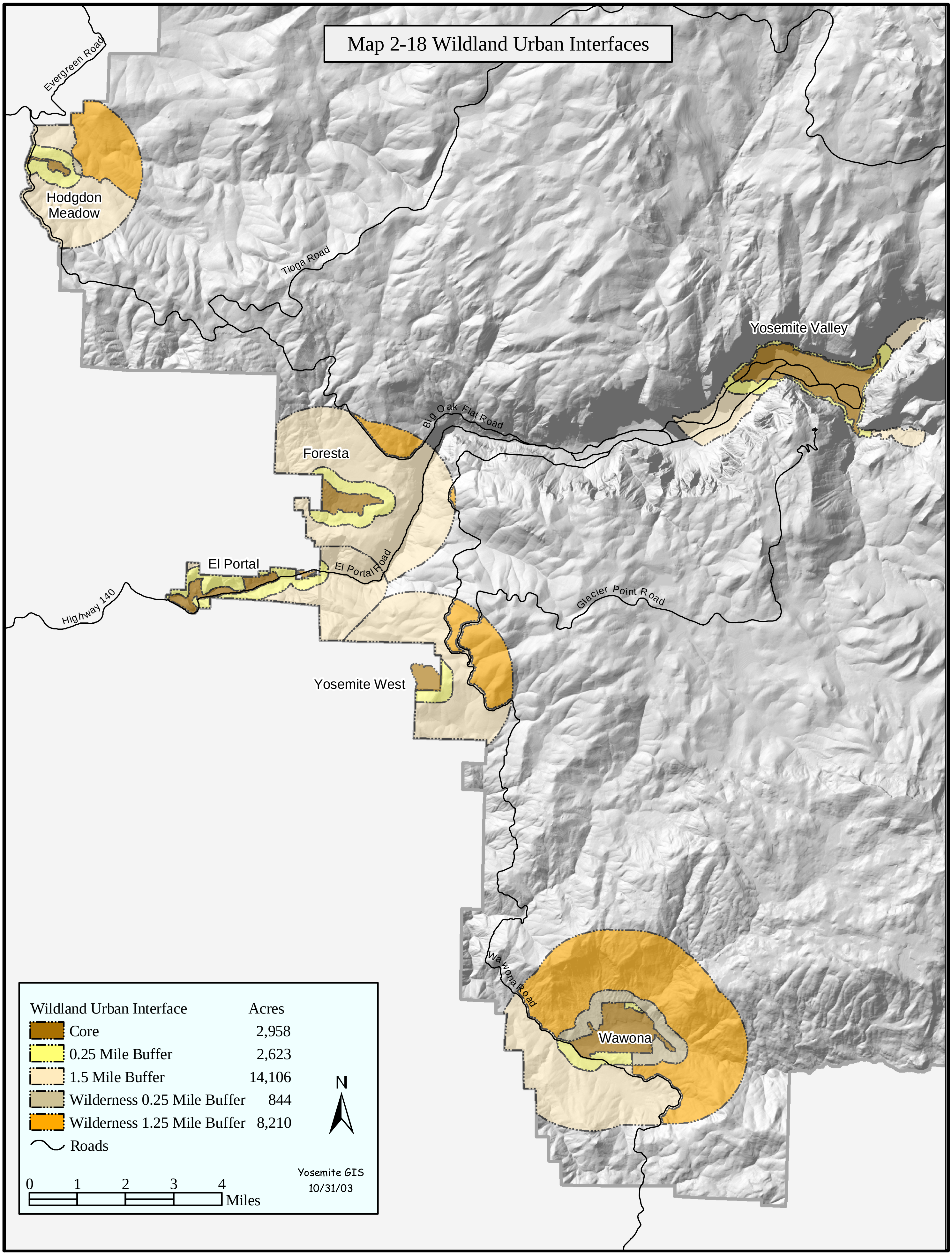
Map 2-14 Foresta Wildland Urban Interface
Big Oak Flat Road
Old Coulterville Road
Stanislaus National Forest
Big Meadow
Foresta Road
Foresta
McCauley Ranch
Crane Creek
El Portal Road
Foresta Road
Wawona Road
Arch Rock
Entrance Station
El Portal WUI
Yosemite
View Lodge
NPS El Portal
Administrative Area
Wildland Urban Interface
Core - 294 Acres
0.25 Mile Buffer - 585 Acres
1.5 Mile Buffer - 4387 Acres
Hand Tool Thinning Only
1.5 Mile Buffer in Wilderness - 375 Acres
Yosemite Wilderness
Wilderness Boundary
Designated Wilderness
Potential Wilderness
N
0 0.25 0.5 0.75 1 Miles
Contour Interval 100 Feet
Yosemite GIS 10/31/03


Map 2-15 Foresta Prescribed Burn Units
PW-08
PW-07
PW-09
Big Oak
Flat Road
PW-10
Big Meadow
Stanislaus National Forest
Foresta
McCauley Ranch
Crane Creek
PW-35
Foresta Road
Arch Rock
Entrance Station
Foresta Prescribed Burn Units
Wildland Urban Interface Core -294 Acres
Yosemite Wilderness
Non Wilderness
Potential Wilderness
Wilderness
N
0
1000
2000
3000
4000
Feet
Contour Interval 100 Feet
Yosemite GIS
8/9/2003


Map 2-16 Yosemite West Wildland Urban Interface
El Portal WUI
Indian Creek
Wawona Road
Glacier Point Road
Yosemite West
Chinquapin
Henness Ridge Road
Sierra National Forest
Eleven Mile Road
Wawona Road
Wildland Urban Interface
Core - 171 Acres
0.25 Mile Buffer - 191 Acres
1.5 Mile Buffer - 2515 Acres
Hand Tool Thinning Only
1.5 Mile Buffer in Wilderness - 1038 Acres
Yosemite Wilderness
Wilderness Boundary
Designated Wilderness
Potential Wilderness
N
0 0.25 0.5 Miles
Contour Interval 100 Feet
Yosemite GIS 10/31/03

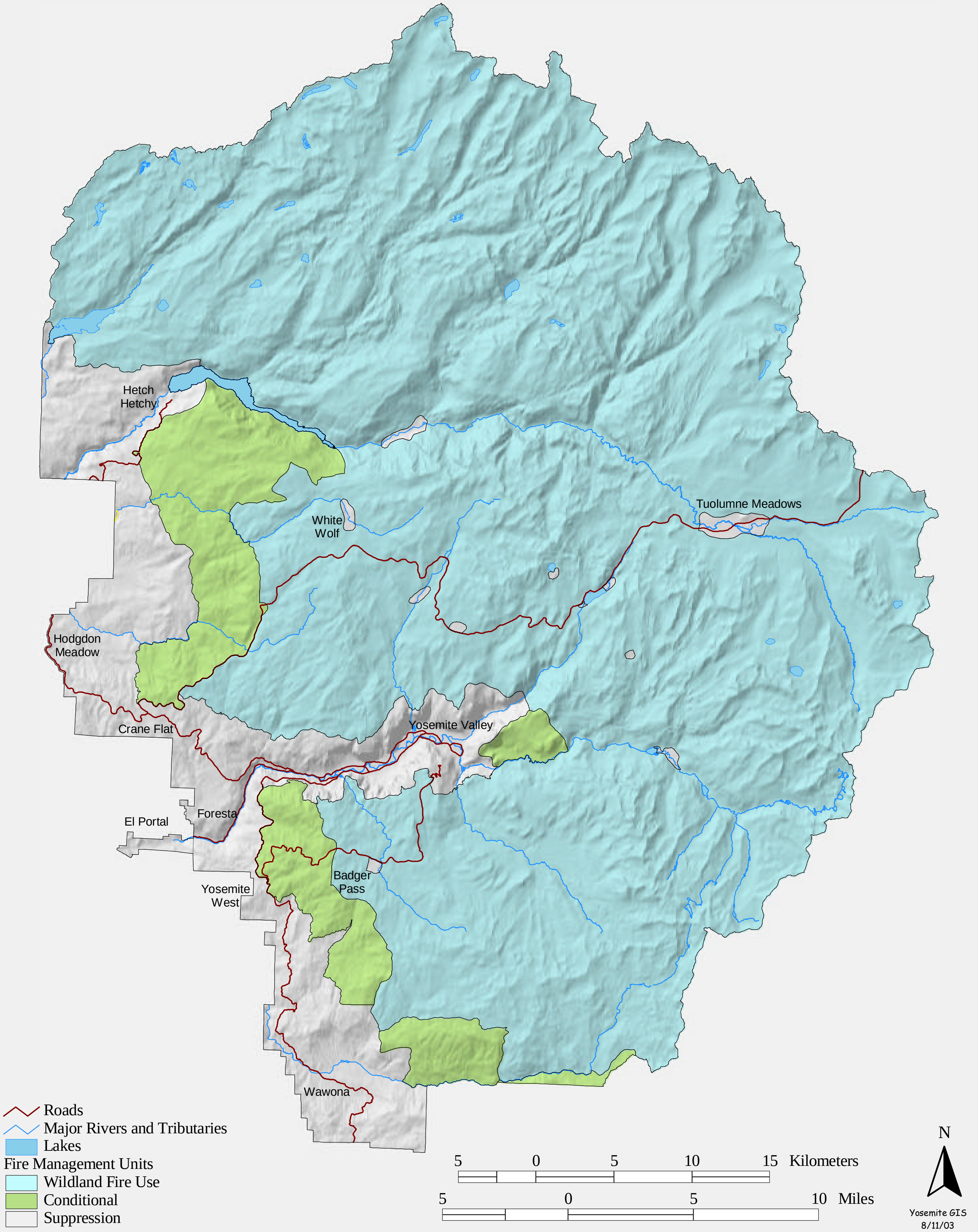


Map 2-17 Yosemite West Prescribed Burn Units
Indian Creek
Wawona Road
Glacier Point Road
Yosemite West
Chinquapin
17-F
17-A
17-D
17-B
17-E
17-C
Sierra National Forest
Eleven Mile Road
Wawona Road
Wildland Urban Interface Core - 171 Acres
Yosemite West Burn Units
Yosemite Wilderness
Non Wilderness
Potential Wilderness
Wilderness
0 1000 2000 3000 4000 Feet
N
Contour Interval 100 Feet
Yosemite GIS
8/11/03

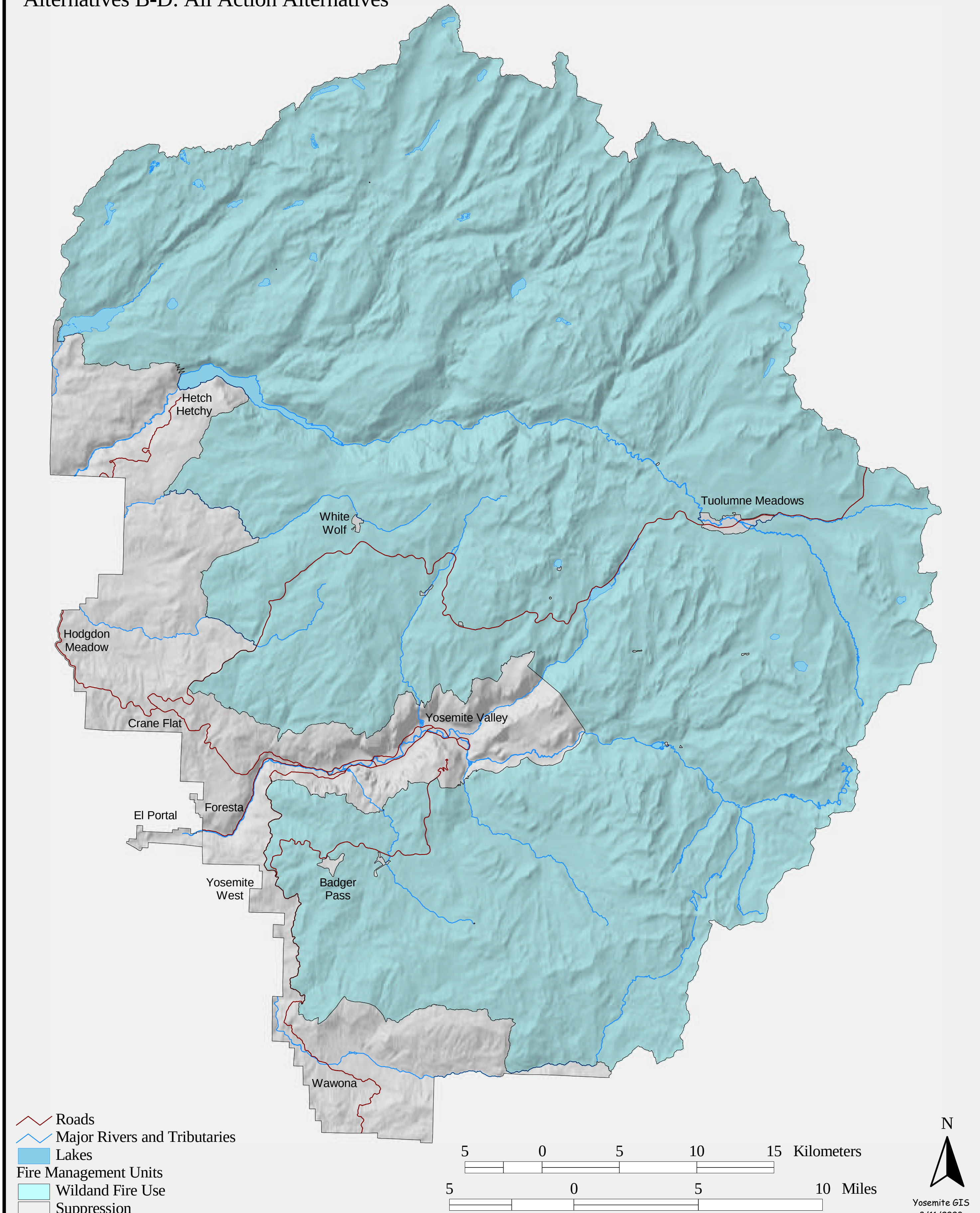


Map 2-18 Wildland Urban Interfaces
Evergreen Road
Hodgdon Meadow
Tioga Road
Yosemite Valley
Big Oak Flat Road
Foresta
El Portal
El Portal Road
Highway 140
Glacier Point Road
Yosemite West
Wawona Road
Wawona
Wildland Urban Interface Acres
Core 2,958
0.25 Mile Buffer 2,623
1.5 Mile Buffer 14,106
Wilderness 0.25 Mile Buffer 844
Wilderness 1.25 Mile Buffer 8,210
Roads
N
0 1 2 3 4
Miles
Yosemite GIS
10/31/03

Map 2-19
Fire Management Units
Alternative A: No Action Alternative

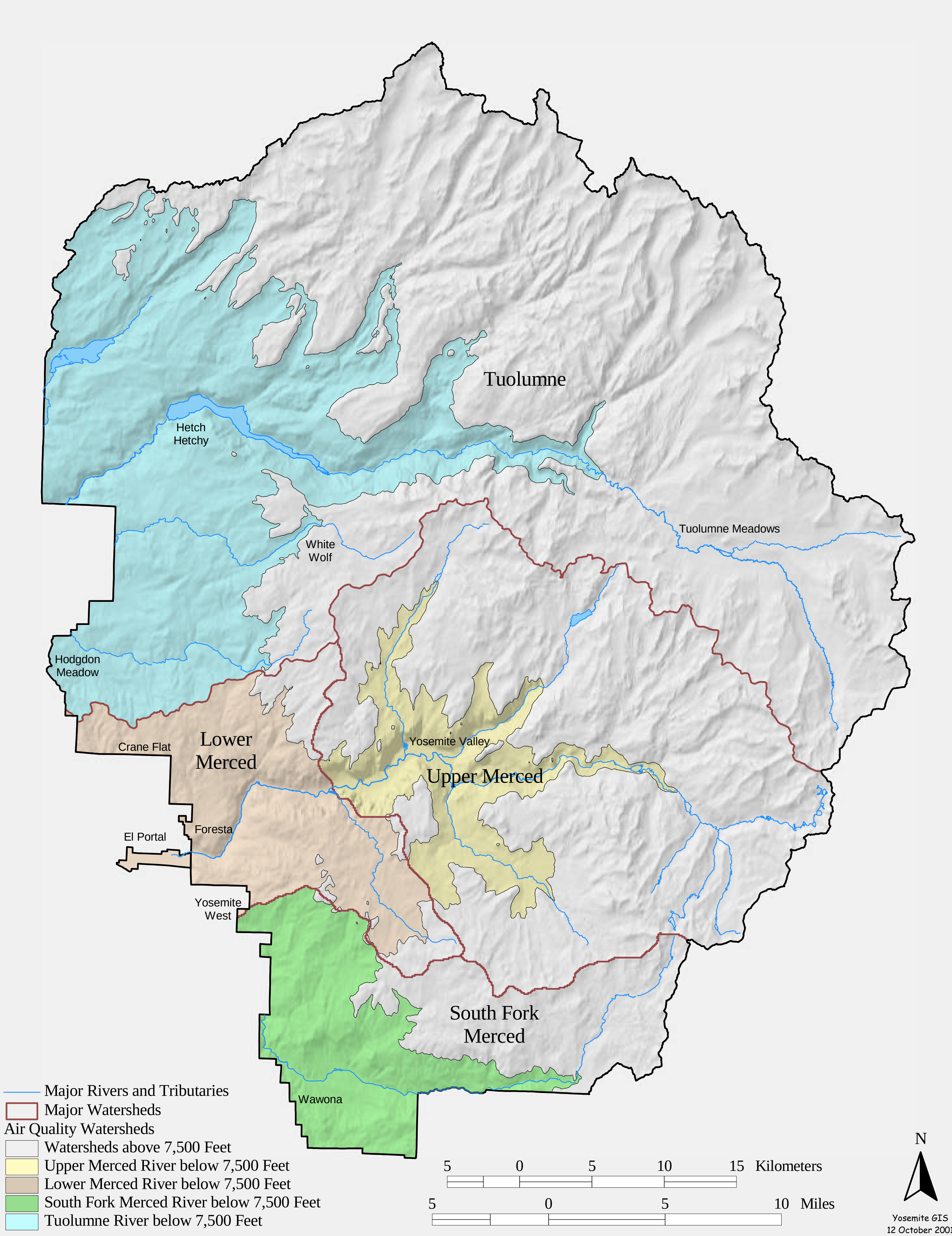


Map 2-20
Fire Management Units
Alternatives B-D: All Action Alternatives

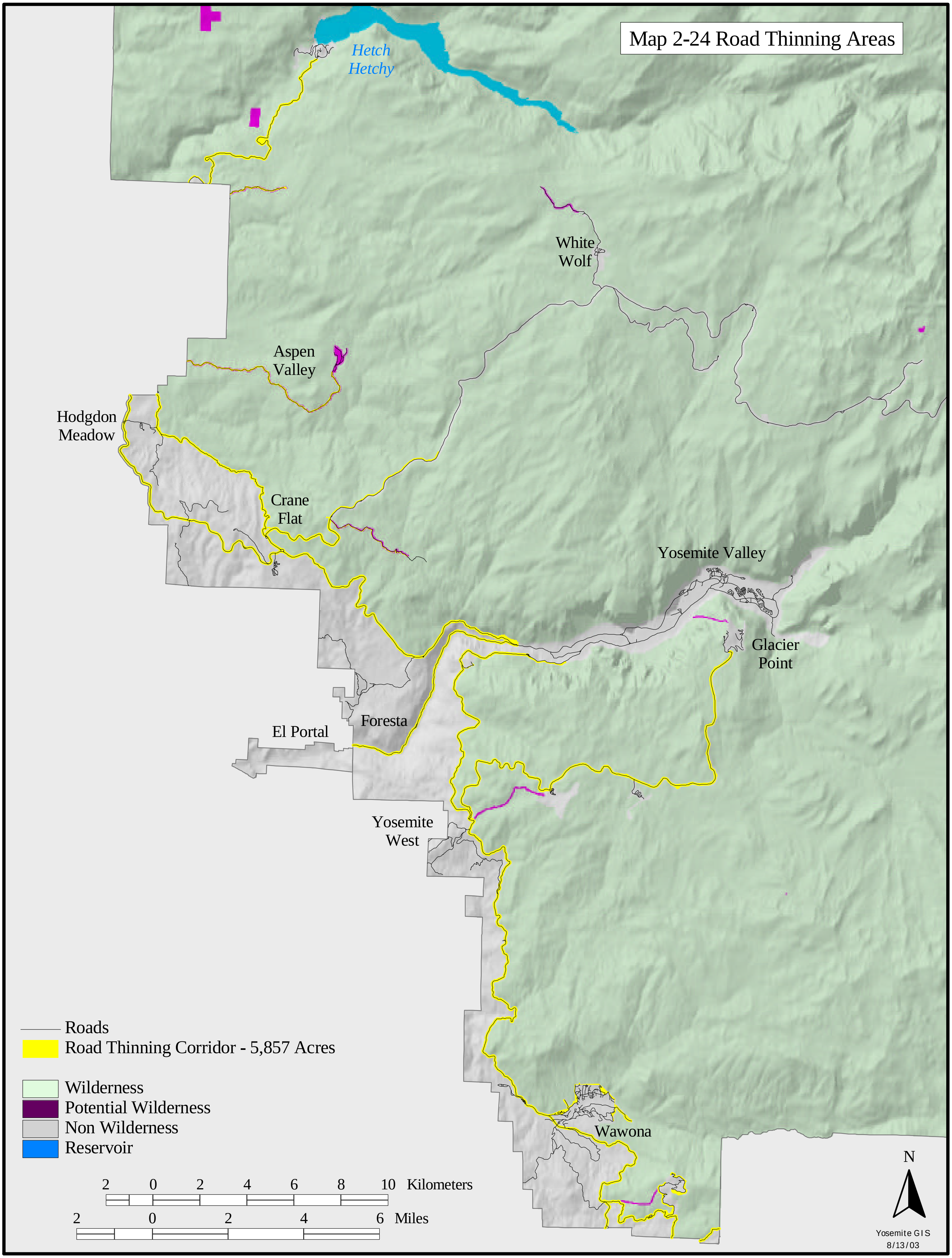


Map 2-21 Parkwide Burn Units
Hetch Hetchy
PW-39
PW-40
PW-37
PW-38
PW-01
PW-02
Hodgdon Meadow
PW-04
PW-03
PW-41
PW-28
PW-05
PW-06
PW-09
Yosemite Valley
PW-07
PW-36
PW-11
PW-12
PW-08
PW-10
PW-YV
PW-13
El Portal
PW-35
PW-14
PW-EP
PW-34
PW-15
Yosemite West
PW-17
PW-16
PW-18
PW-19
PW-20
PW-21
PW-22
PW-33
PW-32
PW-23
PW-WA
PW-24
PW-31
Wawona
PW-26
PW-25
PW-MG
PW-27
PW-29
PW-30
Trails
Roads
Major Rivers
Lakes
ParkWide Burn Units
156,013 Acres
0
5
10
Kilometers
0
5
10
15
Miles
N
Yosemite GIS
8/11/03

Map 2-22 Air Quality Watersheds



Map 2-23 Maintained Fire Roads and Trails


Map 2-24 Road Thinning Areas
Hetch
Hetchy
White
Wolf
Aspen
Valley
Hodgdon
Meadow
Crane
Flat
Yosemite Valley
Glacier
Point
Foresta
El Portal
Yosemite
West
Wawona
Roads
Road Thinning Corridor - 5,857 Acres
Wilderness
Potential Wilderness
Non Wilderness
Reservoir
2 0 2 4 6 8 10 Kilometers
2 0 2 4 6 Miles
N
Yosemite GIS
8/13/03

Chapter III: Affected Environment

Introduction

Yosemite National Park occupies about 1,170 square miles, or 748,955 acres (302,816 hectares), on the western slope of the Sierra Nevada, the highest and most continuous mountain range in California. The Sierra Nevada runs half the length of the state, dividing the Central Valley of central and northern California from the arid, western edge of the Great Basin to the east. Yosemite National Park lies within three counties – Mariposa, Tuolumne, and Madera – and abuts a fourth, Mono. The park shares boundaries with the Stanislaus, Sierra, Inyo, and Toiyabe National Forests. Ninety-four percent of the park (about 704,624 acres) is designated Wilderness.

Elevations in the park rise to 13,114 feet (3,998 m) near the eastern boundary, and drop to 2,127 feet (648 m) at the western boundary. This wide elevation range supports a variety of environments, each with distinct climatic conditions, vegetation, and animal life. Yosemite, like much of California, has a Mediterranean climate. Cool, moist winters and hot, dry summers prevail. The extreme differences in elevation and terrain affect both temperatures and precipitation. At higher elevations, most of the precipitation falls as snow.

Elevation and weather patterns result in large-scale vegetation zones along the north-south axis of the Sierra. On the west side, forest types change with increasing elevation from live oak to mixed conifer to mountain hemlock and pine at high elevations. Straddling the crest of the Sierra Nevada is a zone of subalpine and alpine vegetation. Secondary vegetation patterns are created by deep river canyons and the east-west orientation of watersheds that drain the Sierra Nevada. The range contains the headwaters of 24 major east-west river basins, two of which are in the park—the Merced and the Tuolumne Rivers.

Fire ignited by lightning and American Indians prior to the mid-1800s has influenced ecosystems in the Yosemite for millennia. Fire has affected plant and animal life, insect outbreak and disease cycles, wildlife habitat, and soil and nutrient cycling (U.C. Davis 1996b). In most low-elevation oak woodland and conifer forest types, fires were frequent. Fires collectively covered large areas and burned for months at a time. Most fires were of a low to moderate intensity, though patterns of severity were complex and fires were at times extreme. Over the last 150 years, fire suppression and changes in land use have dramatically changed fire regimes and consequently altered ecological structure and function in plant communities. Live and dead fuels in conifer forests, especially at lower elevations, are more abundant and continuous than in the past.

Humans have been a part of Sierra Nevada ecosystems for at least 10,000 years. Numerous, distinct American Indian cultures were widely distributed throughout the region well before settlement by Euro-Americans in the mid-19th century. Although the record is incomplete, archaeological evidence indicates that, prior to the 1850s, the American Indian population in the Sierra Nevada may have been as large as 90,000 to 100,000 people (Anderson and Moratto 1996).

The human population of the Sierra Nevada doubled between 1970 and 1990. Official projections indicate that the 1990 Sierra Nevada population of 650,000 will triple by the year 2040. Projected population trends show that more and more homes will be intermixed with flammable wildlands. Unless hazardous fuels are reduced more and more homes and people will be at high risk of loss from wildland fire. Only about one-third of the Sierra Nevada is privately owned.

The Sierra Nevada region is a popular tourist destination, containing some of the world's most renowned natural features. Annually, millions of visitors from around the country and the world are drawn to destinations like Lake Tahoe, Mono Lake, Yosemite National Park, and Sequoia and Kings Canyon National Parks.

Wildland Fire Management Situation

Wildland fires can potentially burn throughout the year in Yosemite, but the general fire season is May to November, when fuels are driest and the weather is more conducive to fires starting and spreading. The suppression of wildland fires for the last 80 to 100 years has changed the forests in Yosemite by allowing an accumulation of fuels. In what once were forests with a high frequency, low-severity fire regime, fire suppression has resulted in forests prone to high-severity fires. During the 1990's, Yosemite experienced three of the largest and most severe fires in the history of the park: the Steamboat and A-Rock Fires (22,000 acres) in 1990, and the Ackerson Fire (47,000 acres) in 1996. No evidence exists that these types of large, stand-replacing fires had ever previously occurred in the park (van Wagtendonk 2000).

Since 1972, approximately 75% of the park has been managed to allow wildland fires to burn in a "Prescribed Natural Fire Zone." Another 8% has been managed as a "Conditional Zone" where fires have been allowed to burn under some conditions. Almost 80,000 acres have burned in 30 years. Fires that start within these zones or fires that burn into these zones from neighboring public land are managed for resource benefits.

The Prescribed Natural Fire Zone extends from the northwest park boundary near Kibbie Creek and Lake Eleanor, skirts around Yosemite Valley and the southwest corner of the park, and terminates at Chiquito Pass on the southern boundary (see map 2-12). Natural and human-caused barriers and prominent topographic features form the western edge of this zone, while the park boundary forms the north, east, and south edges. Wildland fire is the primary fire management tool, although prescribed fire may be used. Hand thinning has been used to protect values at risk such as backcountry camps, cabins, and archaeological resources.

The other 17% of the park is in a "Suppression Zone." This area encompasses the western edge of the park, including the El Portal Administrative Site. Most of the park's developed areas are within this zone, including Hodgdon Meadow, Aspen Valley, Crane Flat, Foresta, El Portal, Yosemite Valley, Glacier Point, Wawona, and Yosemite West which is adjacent to the west boundary. All of the park's sequoia groves (Tuolumne, Merced, and Mariposa) are also within this zone. Unplanned ignitions that occur within this zone are suppressed, using *appropriate management response* strategies.

This concept offers managers a full spectrum of responses based on objectives, environmental and fuel conditions, constraints, safety, and the ability to accomplish objectives. It includes wildland fire suppression at all levels, including aggressive initial attack. Use of this concept dispels the interpretation that there is only one way to respond to each set of circumstances (Zimmerman and Bunnell 1998). Most prescribed fires and fuel reduction techniques take place in this zone, especially in and around developed areas and Special Management Areas (sequoia groves, wildland/urban interface, and boundary areas). Since 1970, when the prescribed fire program was initiated, through 2001, 43,065 acres have been burned.

Because Yosemite has distinct wet and dry seasons, the fire season is concentrated during the dry, hot summer. In the upper elevations, moisture levels in dead and down fuel can remain high late into the summer, resulting in a short fire season. The average number of years between fires, or *fire return interval*, ranges from 4 to 508 years in the upper elevations (above 8000 feet) depending on vegetation type. In the mid-elevations, at 5000 to 8000 feet, fire return intervals range from 3 to 75 years, depending on vegetation type. At lower elevations fire return intervals can range from 1 to 60 years, again depending on vegetation type.

The park averages 55 wildland fire starts per year, most of which are from lightning (map 3-1). Most starts go out quickly or are contained at less than 10 acres. In the past 10 years, the consequences of suppressing fires, with the resultant build-up of fuels, have exacerbated fire danger, especially at lower elevations along the park's western boundary. During fire season, fires starting in early afternoon on steep slopes, when vegetation is dry, have the potential to grow large rapidly, despite aggressive initial attack. When slope, wind, and temperature are all in alignment, fires can burn with rapid rates of spread and high flame lengths through the abundant, continuous fuels. This problem becomes more complex when summer thunderstorms cause gusty, erratic winds and multiple ignitions on the same day.

During dry conditions in places where fuels are not continuous, *spotting*, or fires started at a distance from the main fire by wind-blown embers, can also facilitate fire spread and resistance to control. For example, an individual tree or a group of trees may *torch* (go up in flames) and spread airborne embers one half mile or more. Trees in these areas might then ignite, torch, and then spread additional embers—thus starting more spot fires. Fires that spread by spotting are difficult to control.

Another potential control problem unique to this portion of the Sierra Nevada are strong easterly winds called foehn or Mono winds. However, there is no record or evidence of fires being driven by Mono winds in the park.

Biological Environment

Vegetation and Fire Ecology

The vegetation of Yosemite is varied and complex. At least 1,374 vascular plant species and numerous bryophytes and lichens occur in the park (NPS 1997a). Yosemite's forests include three world record trees: the largest red fir and white fir, and the world's tallest pine tree—a sugar pine. Approximately 54% of Yosemite National Park supports high quality, late successional forest (Franklin and Fites-Kaufmann 1996). A number of species are considered globally or locally rare. The park has five plants that are species of concern, no federally listed plant species, four State of California listed species, and 109 special-status plant species (NPS 1997a; Appendix 11).

The vegetation zones of the park follow general elevation bands (Sawyer and Keeler-Wolf 1995). At about 2000 feet, slopes are covered with chaparral and oak woodland. Lower montane mixed-conifer forests range from about 3000 to 6700 feet, changing to upper montane conifer forests from 6000 to 10,000 feet in elevation. Subalpine conifer forests occur from 8,000 to 11,000 feet, although alpine communities dominate above 10,000 feet.

For the purpose of this plan, data from the park's 1934 vegetation map was reclassified so that it matched current vegetation community typology while grouping vegetation communities by fuel type and fire behavior. The groupings are based on the analysis for the *Vegetation Management Plan* (based on 1934 data), a map of the dominant species from the 1934 data, the park's 1982 Botti vegetation map, and a determination by fire professionals on the similarity of potential fire behavior in each type. Appendix 10 includes a table showing how the various *Vegetation Management Plan* types were grouped into the 15 fire management vegetation types.

Neighborhood analyses were performed for meadows, riparian vegetation types, and western juniper. These were lumped into the fire management vegetation types according to their physical proximity. For example, if a subalpine meadow adjoins a lodgepole pine forest, it would be lumped with the forest since the meadow would be likely to burn if the forest were ignited. If, however, the meadow were surrounded by barren rock, it would be lumped with the rock since it would be unlikely to be ignited.

The 15 vegetation types and the bare rock and water categories are listed in Table 3.1 for the 747,955 acres in Yosemite National Park and in Table 3.2 for the 1,137 acres in the El Portal Administrative Site. The types are listed generally from higher to lower elevation. More detailed descriptions for each type are found in the *Vegetation Management Plan*. For convenience, types were further grouped, based on elevation.

Table III-1
Vegetation groups, corresponding fire vegetation types, and acreage for Yosemite National Park

Yosemite National Park		
Vegetation Group	Vegetation Type	Acres
Subalpine forests	Whitebark pine/mountain hemlock forest	87,582
	Lodgepole pine forest	175,516
Upper montane forests	Red fir forest	68,125
	Western white pine/Jeffrey pine forest	132,708
	Montane chaparral	15,137
Lower montane forests	Giant sequoia/mixed-conifer forest	218
	White fir/mixed-conifer forest	46,871
	Ponderosa pine/mixed-conifer forest	33,998
	Ponderosa pine/bear clover forest	33,846
	California black oak woodland	3,156
	Canyon live oak forest	21,344
Montane meadow	Dry montane meadow	1,530
Foothill woodlands	Foothill pine/live oak/chaparral woodland	6,984
	Foothill chaparral	1,768
Barren	Bare rock	112,022
	Water	7,150
Total Acres		**747,955**

Table III-2
Vegetation groups, corresponding fire vegetation types, and acreage for the El Portal Administrative Site

El Portal Administrative Site		
Vegetation Group	Vegetation Type	Acres
Lower montane forests	Ponderosa mixed-conifer forest	372
	Canyon live oak forest	129
Foothill woodlands	Foothill pine-live oak-chaparral woodland	146
	Foothill chaparral	17
	Blue oak woodland	473
Total Acres		**1,137**

Fuel Models

Vegetation types are represented by fire behavior fuel models. The models quantify the fuel bed characteristics and are used in fire behavior models to predict the likelihood of ignition, the rate of spread, and the intensity of fire in a vegetation type. Fuel models take into account fuel load, ratio of surface area to volume for each size class of fuel, the depth of the fuel bed, and fuel moisture, including the moisture at which a fire will not spread in that fuel. Fuels are roughly classified in Yosemite and El Portal as grass, brush, and conifers (see map 3.2). For fire behavior analysis, each vegetation type is assigned to at least one fuel model, depending on its characteristics (see table 3.3).

Table III-3
Fuel Models and Vegetation Types of Yosemite and El Portal

Fuel Model	Typical Fuel Complex	Corresponding Vegetation Types
	Grass/Grass Dominated	
1	Short Grass	dry montane meadow blue oak woodland
2	Trees with grass understory	lodgepole pine (substantial herbaceous understory) ponderosa pine/bear clover
3	Tall Grass	
	Chaparral and Shrub Fields	
4	Chaparral (6 feet)	whitebark pine/krummholz, pine/oak/chaparral woodlands (brush > 6′) foothill chaparral (brush > 6′)
5	Brush (2 feet)	western white pine/Jeffery pine w/ chaparral understory montane chaparral canyon live oak crown fires pine/oak/chaparral woodlands (brush < 6′) foothill chaparral (brush < 6′)
6	Dormant brush, hardwood slash	
7	Southern rough	
	Conifer	
8	Short-needled Conifer	whitebark pine and/or mountain hemlock lodgepole pine (fuel loads ~30 tons/ac.) red fir giant sequoia white fir/mixed-conifer canyon live oak surface fires
9	Long-needled Conifer	western white pine/Jeffery pine ponderosa pine/mixed-conifer California black oak
10	Short-needled Conifer—heavy fuels	giant sequoia w/ heavy fuels white fir/mixed-conifer w/ heavy fuels

Vegetation Classification: Ecology and Natural Fire Conditions

Subalpine Forests

The subalpine zone includes whitebark pine and/or mountain hemlock forests and lodgepole pine forests (see map 2-1), which together occupy about 35% of the park. Characteristic tree species include lodgepole pine, mountain hemlock, and whitebark pine, with smaller amounts of red fir, western white pine, and western juniper (UC Davis 1996e). Although this zone receives approximately 35% of the lightning strikes in the park, fires are infrequent and rarely become large (van Wagtendonk 1991). These fires usually smolder or spread as low intensity surface fires.

Whitebark pine/mountain hemlock forest

Whitebark pine and mountain hemlock forests cover 87,582 acres of the park and comprises much of the subalpine forest from 9,600 to 11,000 feet. Pure stands of whitebark pine and intermixed stands of mountain hemlock, whitebark pine, and lodgepole are common. Mountain hemlocks occasionally form pure stands on north-facing slopes and occur as low as 8,000 feet. At or near tree line, this community can be open forest or dense shrub like krummholz. Fuel loads average about 44 tons per acre underneath clusters of whitebark pines and about 54 tons per acre underneath mountain hemlock (van Wagtendonk et al. 1998). Fuel Model 8 (see table 3.3) is most appropriate for this type, although Fuel Model 4 should be used for krummholz stands of whitebark pine.

Between 1930 and 2000, 56 lightning fires burned a total of 121 acres of the whitebark pine/ mountain hemlock type once and less than one acre twice. The largest area burned in the type by a single lightning fire was 20 acres. Over the same time period, three human-caused fires burned slightly more than one-quarter acre in the whitebark pine/mountain hemlock type, and no prescribed burns have been conducted. Based on the area in the park burned by all lightning-caused fires that were allowed to burn in whitebark pine forest between 1972 and 1993, van Wagtendonk (1994) calculated that the *fire rotation* (the number of years it would take to burn all of the type in Yosemite at the present rate of burning) would be over 23,000 years. Fire scar analyses of whitebark pine and mountain hemlock forests indicate that fire return intervals range from 4 to 508 years with a median of 187 year. Due to the long median and maximum return intervals for this group, the fire return interval departures (FRID) tend to be low with all of the type within the maximum and median fire return intervals ($FRID_{max/med} = 0$). This indicates existing vegetation does not have a severely altered fuel load or stand structure because of fire exclusion.

Lodgepole pine forest

Lodgepole pine forest is the most common vegetation type in the park covering 175,516 acres. It often grows in dense pure or almost pure stands of trees up to 130 feet tall. Lodgepole pine tolerates large variation in soil type and moisture conditions. It commonly occurs on rocky, well-drained soils from 6,800 to 10,400 feet and at lower elevations in cold-air drainages. It is nearly continuous between 8,500 and 10,000 feet and in long narrow stringers at lower elevations. Fuel Model 8 best represents lodgepole pine forests where fuel loads average 30 tons per acre (van Wagtendonk et al. 1998). In areas where there is a substantial amount of herbaceous understory, Fuel Model 2 can be applied.

A total of 465 fires have burned 9,110 acres of lodgepole pine forest since 1930. Fires include 427 lightning fires, 25 human-caused fires, and 13 prescribed fires. Of the total area, 7,467 acres have burned once, 989 acres twice, and 157 acres three times. The largest area of lodgepole pine forest to burn with a single lightning fire was 773 acres in 1987. These fires usually remain as very low intensity surface fires, often spreading from log to log or smoldering in the thin, densely packed duff. The fire rotation is 764 years (van Wagtendonk 1994). Kiefer (1991) determined that fire return intervals for lodgepole pine forests range from four to 163 years with a median value of 102 years. Based on both the maximum and median fire return interval, all of the lodgepole pine forest has a FRID of zero ($FRID_{max/med}=0$). Consequently, the structure of this type does not appear to have been altered by fire exclusion.

Upper Montane Forests

The upper montane zone includes red fir forest, western white pine/Jeffrey pine forest, and montane chaparral and makes up about 30% of park vegetation. Characteristic trees include red fir, western white pine, Jeffrey pine, western juniper, and aspen (U.C 1996e). This zone receives 23% of the lightning strikes in the park, and fires are numerous, generally remain small, and are of low intensity (van Wagtendonk 1991). However, under extremely dry and windy conditions, large stand replacing fires can occur.

Red fir forest

Red fir forest covers 68,125 acres of the park and is associated with the areas of greatest snow accumulation in the park. This plant community dominates at elevations between

6,500 and 9,000 feet. Forests occur in large stands, separated by barren areas, ridges, meadows, or lower-elevation lodgepole pine forest. In drier sites and at lower elevations, it intergrades with Jeffrey pine and montane chaparral. Because fires have been suppressed, the community is currently shifting to favor more shade-tolerant red fir and moving into areas that were dominated by lodgepole pine, montane chaparral, and Jeffrey pine. Fuel loads are relatively high, averaging about 49 tons per acre (van Wagtendonk et al. 1998). Despite the heavy fuel loads, Fuel Model 8 best fits the red fir forest because surface fires are usually carried by fuels less than one inch in diameter.

Since 1930, 591 lightning fires have burned 16,767 acres, 18 human-caused fires have burned 1004 acres, and five prescribed fires have burned 307 acres of red fir forest. Out of the total 18,074 acres, 16,084 have burned only once, while 1,476 acres have burned twice, 81 acres three times, and one acre four times. The Lost Bear Fire that burned 1,265 acres of red fir forest in 1999 has been the largest to occur in this type. It would take 197 years to burn all of the red fir forest in Yosemite given the rate of burning that occurred between 1972 and 1993 in the Prescribed Natural Fire Zone (van Wagtendonk 1994). Return intervals determined from fire scars indicate a minimum of nine years, a median of 30 years, and a maximum of 92 years (Caprio and Lineback 1997). In red fir, 50,484 acres have missed one maximum fire return interval ($FRID_{max} = 1$), while and additional 17,641 acres have not missed any ($FRID_{max} = 0$). Minor departures in stand structure are beginning to occur.

Western white pine / Jeffrey pine forest

The park contains 132,708 acres of western white pine and Jeffrey pine forest. They grow in pure stands and intergraded with montane chaparral and other species. Both western white and Jeffrey pine tend to occur in dry sites. Western white pine grows from 8,000 to 10,000 feet. Trees are widely spaced and may have an understory of montane chaparral. Existing vegetation is probably within the natural range of variability. Jeffrey pine grows from 6,000 to 9,000 feet intergrading with montane chaparral, red fir, and white fir/mixed-conifer forest. Fuel loads range from 13 tons per acre for western white pine to 43 tons per acre for Jeffrey pine (van Wagtendonk et al. 1998). Fuel Model 9 can be used for both species, although in some cases Fuel Model 8 may be necessary for western white pine. In areas where montane chaparral exists in the understory, Fuel Model 5 is appropriate. Existing conditions at lower elevations and more mesic sites show an increase of shade-tolerant conifers, such as white fir, in the understory and accumulations of surface fuels.

The western white pine/Jeffrey pine forest burns frequently and fires burn with high intensity. Lightning is prevalent and has resulted in 893 fires burning 41,982 acres between 1930 and 2000. The largest number of acres of this type burned by a lightning was during the Starr King fire in 1974 when 3,274 acres burned. Forty-seven human-caused fires have burned an additional 6,385 acres, and 24 prescribed fires have restored 5,584 acres. Over 25% (34,477 acres) of the forest has been burned once. Reburns have been common and 6,884 acres have burned two times, 2,423 acres three times, 243 acres four times, and 13 acres five times. About 21,071 acres of this type have burned in the last 12 years.

Fire return intervals are variable; some are very long because many of the stands are isolated by broad expanse of granite while others are short because of the presence of montane chaparral species that help spread fire. Taylor and Skinner (1998) reported a minimum fire return interval of four years, a median of 12 years, and a maximum of 96 years. If the maximum fire return interval is used, all of the type would have a FRID equal to zero ($FRID_{max}=0$). However, calculations based on the median fire return interval show that 15,929 acres have missed one interval ($FRID_{med}=1$), 3,970 acres have missed two

($FRID_{med}=2$), 326 acres have missed three ($FRID_{med}=3$), 2,709 have missed four ($FRID_{med}=4$), and 88,703 acres have missed five intervals ($FRID_{med}=5$). This indicates that some of the existing vegetation has an increased fuel load and altered stand structure due to fire exclusion.

Montane Chaparral

Montane chaparral covers 15,137 acres of the park, normally on south facing slopes ranging from 5,500 to 9,500 feet. Dominant species include greenleaf manzanita, pinemat manzanita, mountain white thorn, huckleberry oak, and, at lower elevations, bitter cherry and chinquapin. Mature stands form dense brush fields between one and five feet in height. Fuel Model 5 best describes montane chaparral fuels, although this model under predicts flame length (van Wagtendonk and Botti 1984). This community intergrades with Jeffrey pine, red fir, and white fir/mixed-conifer forest types. The size and extent of the community has probably decreased with fire suppression. However, existing conditions show mature fields with higher densities of Jeffrey pine than in the historic range of variability.

Since 1930, lightning has ignited 126 fires that have burned 2,651 acres of montane chaparral. Eleven human-caused fires have burned 1,175 acres and 22 prescribed fires have burned 755 acres. The largest lightning fire to burn in montane chaparral covered 641 acres during the Le Conte fire in 1999. Of the total acreage, 2,787 acres have burned once, 874 acres have burned twice, 185 acres have burned three times, and six acres have burned four times. Skinner and Chang (1996) reported fire return intervals from 10 to 75 years with a median of 30 years. Based on the maximum fire return interval, all of the type had a FRID of zero ($FRID_{max}$ =0). However, the median return interval shows 430 acres that have missed one interval ($FRID_{med}$ =1) and 11,293 acres have missed two intervals ($FRID_{med}$ =2). This indicates that some of the existing vegetation has an increased fuel load and altered stand structure, including an increase of Jeffrey pine in unburned areas.

Lower Montane Forests

The lower montane zone, which includes giant sequoia, white fir, ponderosa pine/mixed-conifer forests, and ponderosa pine/bear clover forest, covers about 15% of the park. Dominant tree species include ponderosa pine, sugar pine, incense-cedar, and white fir. This zone also contains Douglas-fir/mixed-conifer forest, California black oak woodlands, canyon live oak forests, and dry montane meadows. The most common understory shrubs are white leaf manzanita and deerbrush.

Although the lower montane forest receive only 17% of the lightning strikes in the park, this mixed-conifer community experiences frequent, low-intensity fires (van Wagtendonk 1991). Nearly 100 years of fire suppression has resulted in a change from open forest to dense thickets of shade-tolerant tree species (including incense-cedar, white fir, and Douglas-fir) at the upper elevations of the zone and an increase in shrubs at the lower elevations. Under natural conditions, the return interval for fire is estimated to be from two to 35 years (NPS 1990b). Existing conditions, however, often generate fires of much greater intensity than under a natural fire regime.

Giant sequoia/mixed-conifer forest

Giant sequoia/mixed-conifer forest covers 218 acres in three groves found between 5,300 and 6,700 feet. Mariposa Grove, the largest of the groves, contains about 86% of the sequoias in the park. The giant sequoia type is a subset of the white fir/mixed-conifer forest, but because the ecological and cultural significance of this species this type is treated separately. The groves are Special Management Areas and are discussed in Chapter 1, Goals and Objectives. This type exists in micro sites that are remnants from extensive giant sequoia forests existing about 100,000 years ago (Raven and Axelrod 1979). Giant sequoia is currently limited in its distribution by soil moisture, water table, air temperature, and ecological tolerance of seedlings (Rundel 1972). The groves are wetter and more moist than typical in the white fir/mixed-conifer forest. Dominant species include giant sequoia, white fir, sugar pine, and incense-cedar. Broadleaf lupine and little-leaf ceanothus dominate the abundant shrub and herbaceous layer. Existing vegetation has more shade-tolerant seedling, pole, and small, overstory conifers, particularly white fir and incense-cedar, than would have been present historically. Fuel load averages 75 tons per acre and is evenly split between duff and woody fuels (van Wagtendonk et al. 1998). Fuel Model 8 best represents the giant sequoia forest, although Fuel Model 10 should be used for areas with heavy fuel concentrations.

Only one lightning fire has been recorded in the giant sequoia groves since 1930. That fire burned in the top of a single giant sequoia tree in 1976 and was extinguished. Two human-caused fires burned less than one acre. In 1971, prescribed burning in the groves started as a result of reports that fuel conditions threatened the survival of the giant sequoias. Since the initiation of the program, 14 prescribed fires have burned 241 acres in the Mariposa Grove, and three fires have burned nine acres in the Merced Grove. Of the three groves, 88 acres of giant sequoia have burned once, while 81 acres have burned twice, nine acres three times, two acres four times, and two acres five times. Fire scars have been used to determine fire return intervals for giant sequoias and found a minimum value of three years, a maximum value of 15 years, and a median value of 10 years. Only 82 acres have departed one interval from the maximum value ($FRID_{max}$ =1), while 45 acres have departed one interval ($FRID_{med}$ =1) and 80 acres have departed two intervals from the median value ($FRID_{med}$ =2). In addition, 36 acres surrounding the Clark Cabin have missed seven fire return intervals ($FRID_{med}$ =7). This shows that the recent burning in the groves has returned much of the area to within the natural range of variability. However, in the areas that have moderate to high departures from the median FRID, increased fuel loading and altered stand structure are seen.

White fir/mixed-conifer forest

White fir/mixed-conifer forest covers 46,871 acres, forming an almost continuous band of dense forest between 5,500 and 7,500 feet in elevation. Conditions vary from almost pure stands of white fir on north facing slopes to white fir mixed with co-dominant sugar pine, Jeffrey pine, Douglas-fir, and incense-cedar. Existing vegetation has thickets of shade-tolerant seedling, pole, and small, overstory conifers, particularly white fir and incense-cedar, that would not have been present historically. These thickets and a lack of adequate seedbed have limited sugar and Jeffrey pine regeneration as well. Fuel loads vary from 33 tons per acre for Douglas-fir to 46 tons per acre for sugar pine; white fir and incense-cedar fall in between with 41 and 43 tons per acre, respectively (van Wagtendonk et al. 1998). Fuel Model 8 is generally appropriate for white fir/mixed-conifer forests, and Fuel Model 10 can be used where heavy fuels exist (van Wagtendonk and Botti 1984).

Since 1930, 569 fires have burned 28,407 acres of white fir/mixed-conifer forest. Out of that total, 427 lightning fires have burned 20,436 acres, 25 human-caused fires have burned 625 acres, and 13 prescribed burns have restored fire to 7,387 acres. Although 22,426 acres have not burned in over 70 years, 20,000 acres have burned once, 3,797 acres twice, 448 acres three times, and 18 acres four times. The largest area of white fir/mixed-conifer forest to burn with a single lightning fire was 1,092 acres in the Walker fire in 1988. The fire rotation for white fir forests based on lightning fires allowed to burn in the Prescribed Natural Fire Zone between 1972 and 1993 was 82 years (van Wagtendonk 1994). Fire return intervals range from three years to 35 years with a median of eight years. Departures from the maximum fire return interval included 274 acres that have missed one interval ($FRID_{max}$ =1) and 22,429 acres that have missed two ($FRID_{max}$ =2). Based on the median fire return interval, 6,925 acres have missed one interval ($FRID_{med}$ =1) and 2,928 acres have missed two intervals ($FRID_{med}$ =2). Many areas have missed from three to seven intervals and 22,436 acres have missed eight intervals ($FRID_{med}$ =8). Much of this vegetation type shows moderate to high departures from median fire return intervals. The fuel load has increased and stand structure has been altered by an increase of seedlings, poles, and small, overstory white fir and incense-cedar.

Ponderosa pine/mixed-conifer forest

Ponderosa pine/mixed-conifer forest covers 33,998 acres of the park and forms a fairly continuous band between 3,000 and 5,500 feet in elevation. In the El Portal Administrative Site, this type covers 146 acres on north facing slopes down to 1,800 feet. It intergrades with several other vegetation types including white fir/mixed-conifer forest at higher elevations and ponderosa pine/bear clover forest, California black oak woodland, foothill pine/live oak/chaparral woodland, canyon live oak forest, and foothill chaparral at lower elevations. Ponderosa pine is a dominant species with white fir and California black oak as co-dominants. Mariposa manzanita and deerbrush are often found in forest openings. Existing vegetation has thickets of shade-tolerant seedling, pole, and small, overstory conifers; particularly white fir and incense-cedar, that would not have been present historically. Incense-cedar and white fir have increased in dominance in the overstory tree canopy as well. Continued fire exclusion in this forest will cause a type conversion from ponderosa pine to incense-cedar and white fir dominated forests. Ponderosa pine surface fuels average 57 tons per acre for ponderosa pine, 41 tons per acre for white fir, 43 tons per acre for incense-cedar, and 12 tons per acre for black oak (van Wagtendonk et al. 1998). Fuel beds dominated by ponderosa pine or black oak are best modeled by Fuel Model 9 (van Wagtendonk and Botti 1984). Surface fuels will continue to increase in the absence of periodic fire, and, combined with the thickets of understory vegetation, may lead to catastrophic fires.

In the ponderosa pine/mixed-conifer forest, fires burn regularly and with relatively low intensities. Since 1930, 341 lightning fires have burned 15,536 acres. Exclusive of the A-Rock and Steamboat fires in 1990, which were burning in unnaturally high surface and understory fuels under extreme weather conditions, the largest area of the park burned by a lightning fire in ponderosa pine/mixed-conifer forest occurred during the Eleanor fire in 1999 when 960 acres burned. The A-Rock fire burned 17 acres of this type in the El Portal Administrative Site. Nineteen human-caused fires have burned an additional 809 acres of the ponderosa pine/mixed-conifer type. This forest type has been the focus of much of the park's prescribed fire program. Seventy-nine prescribed burns have restored fire to 10,976 acres in the park, and nine burns have restored fire to 32 acres in the El Portal Administrative Site. Although 14,300 acres have not burned, 12,609 acres have burned once, 6,178 acres twice, 792 acres three times, 45 acres four times, and two acres have burned five times.

The fire rotation for this type, based on the small number of acres of ponderosa pine forests that were allowed to burn in the Prescribed Natural Fire Zone between 1972 and 1993, is 138 years (van Wagtendonk 1994). Compared to calculated fire return intervals, this number is unexpectedly high and indicates that these forests are falling further and further behind in maintaining their natural fire regime. Fire return intervals are short in this type, ranging from a low of three years to a high of 14 years, with a median of nine years (Kilgore and Taylor 1979). Departures from the maximum fire return interval range up to five missed intervals (14,399 acres) while the highest number of missed median return intervals is seven (14,403 acres). Much of this vegetation type shows moderate to high departures from median fire return intervals. The fuel loads has increased and stand structure altered by an increase of seedlings, poles, and small, overstory white fir and incense-cedar. Stands will be converted to white fir/mixed-conifer forest if fire is not reintroduced throughout the type.

Ponderosa pine/bear clover forest

Ponderosa pine/bear clover forest covers 33,846 acres of the park's south and west facing slopes and ridgelines between 3,000 and 5,500 feet. It intergrades with ponderosa pine/mixed-conifer forest at higher elevations and with California black oak, foothill pine/live oak/chaparral woodland, canyon live oak forest, and foothill chaparral at lower elevations. Ponderosa pine is a dominant species with California black oak and canyon live oak as common associates. The type is characterized by areas of almost continuous understory of bear clover. Existing vegetation has thickets of shade-tolerant seedling, pole, and small overstory conifers, particularly white fir and incense-cedar, that would not have been present historically. Incense-cedar and white fir have increased in dominance in the overstory tree layer. The vigor of California black oak overstory trees has been reduced and regeneration of this species is uncommon. Natural fuel loads were kept relatively low by periodic low intensity surface fires, but are currently accumulating in unburned areas. Typical fuel loads are 47 tons per acre for ponderosa pine and in areas where bear clover is present Fuel Model 2 is the best fit (van Wagtendonk and Botti 1984; van Wagtendonk et al. 1998). There is a large potential for type conversion due to the unnaturally high fuel loads and effects of high severity fires.

Fire is common in the ponderosa pine/bear clover forest. Between 1930 and 2000, 247 lightning fires burned 19,160 acres, 59 human-caused fires burned 1,494 acres, and 121 prescribed fires burned 11,619 acres. The largest lightning fire other than the A-Rock fire burned 1,247 acres in this type in 1987. Combined, these fires have resulted in 12,441 acres burning once, 7,201 acres burning twice, 1,731acres burning three times and 295 acres burning four times. An additional 40 acres have burned from five to seven times. Caprio and Swetnam (1995) reported a minimum fire interval of two years, and median of four years, and a maximum of 6 years. Because of the relatively short fire return intervals and years of fire suppression in this type, 12,169 acres have missed up to 11 maximum return intervals ($FRID_{max}$ =11) or 17 median intervals ($FRID_{med}$ =17). Much of this vegetation type shows moderate to high departures from median fire return intervals. The fuel load has increased and stand structure altered by an increase of seedlings, poles, and small, overstory white fir and incense-cedar. California black oak will continue to decrease in number and stands will be converted to white fir/mixed-conifer forest if fire is not reintroduced throughout the type.

California black oak woodland and forest

From 4,000 to 6,000 feet in elevation, 3,156 acres of the park are covered in California black oak woodland and forest. These are in almost pure stands or as the co-dominant species. It intergrades with ponderosa pine/bear clover at higher elevations and foothill pine/live oak/chaparral woodland and canyon live oak forest at lower elevations. It is rarely found without Ponderosa pine as a component. Other common trees found in this type include, incense-cedar and canyon live oak. Bear clover is a common shrub in this type, which often has a well developed understory. The extent and vegetation in this type have been severely altered by decades of fire suppression and the change in fire regime brought about by other human influences. This type composes less than 0.5% of all park land. In Yosemite Valley, black oak woodlands are estimated to cover less than 10% of the area indicated by 1860s photographs (Gibbens and Heady 1964). Existing vegetation has thickets of shade-tolerant seedling, pole, and small overstory conifers, particularly white fir and incense-cedar, that would not have been present historically. Ponderosa pine and other species now dominate the overstory while the vigor of California black oak overstory trees is reduced and regeneration of this species is uncommon. Fuel loads are low (12 tons per acre) underneath black oaks, and Fuel Model 9 is appropriate for those locations.

Because of the low fuel loads, low intensity surface fires with flame lengths less than one foot are typical. Only 24 lightning fires have ignited in the California black oak forest since 1930, and these fires burned only 353 acres. Three human-caused fires have burned an additional 81 acres, and 22 prescribed fires have been used to restore 868 acres of black oak forest. Repeated prescribed burning has resulted in some areas of black oak burning two or three times 158 acres and 27 acres, respectively). However, most the type has not burned at all (2,012 acres) or burned only once (959 acres). Fire return intervals are difficult to determine, but Stephens (1995) and Skinner and Chang (1996) believed that intervals from two to 18 years with a median of eight years would be appropriate. Based on those estimates, 2,013 acres of California black oak forest have a maximum FRID of three ($FRID_{max}$ =3) and a median FRID of eight ($FRID_{med}$ =8). Two thirds of this type has not burned and shows high departures from median fire return intervals. The fuel load has increased and stand structure altered by an increase of seedlings, poles, and small, overstory white fir and incense-cedar. California black oak will continue to decrease in number and stands will be converted to ponderosa pine/mixed-conifer forest if fire is not reintroduced throughout the type.

Canyon live oak forest

Canyon live oak forest covers 21,344 acres of the park on both north- and south-facing talus slopes. It often forms pure or almost pure stands between 2,500 and 5,000 feet in elevation. In the El Portal Administrative Site, the type covers an additional 129 acres down to 1,900 feet. Structure of the forest varies from low shrub-like trees on south-facing slopes to erect forest up to 65 feet in height in more mesic sites. Canyon live oak is the dominant species with some incense-cedar and California laurel but little understory vegetation. Information about historical vegetation composition and patterns for this type is lacking (UC Davis 1996e). Because of this we are unable to compare existing vegetation with a historic range of variability. Photographs of this type taken in the 1860s and 1870s in Yosemite Valley indicate that communities are denser today. Fuels have not been quantified in this type, but loads of up to 25 tons per acres seem reasonable. Fuel Model 5 is used for crown fires, while surface fires are best characterized by Fuel Model 8.

Frequent torching and occasional crown fires are typical for canyon live oak. Between 1930 and 2000, these forests have been ignited 108 times by lightning—the fires burned 10,510 acres. Human-caused fires are less common but larger. In Yosemite, 21 human-caused fires have burned 5,001 acres. A total of 22 prescribed fires in canyon live oak forests have burned 2,025 acres. Over half of the type in the park has been burned once (4,871 acres) or twice (5,596 acres), while only 661 acres have burned three times, and 94 acres have burned four times. No fires have burned in canyon live oak in the El Portal Administrative Site since 1930. The Le Conte fire burned 3,517 acres of canyon live oak forest in 1999. Taylor and Skinner (1998) determined fire return intervals for canyon live oak that range from seven years to 39 years with a median of 13 years. Departures from the maximum return interval include 10,615 acres that have missed only one interval ($FRID_{max}$ =1). However, half of this type shows high departures from median fire return intervals. The fuel load has increased and stand structure has been altered. Reduction of this fuel load should reduce the probability of high intensity fires moving into neighboring ecotypes.

Meadow

Montane meadow

Montane meadows cover 1,530 acres from 4,000 to 6,000 feet in elevation on fine-textured, continuously moist or wet soils. Some of these meadows dry out late in the growing season. This type is made up of grasses and sedges with sedges predominating in wetter areas. These areas are generally less than 100 acres in size and normally surrounded by California black oak or ponderosa pine/mixed-conifer and ponderosa pine/bear clover forest. Fuel loads are usually less than one ton per acre, making Fuel Model 1 the appropriate model.

Most of Yosemite's meadows are also classified as wetlands. They are included in this discussion of montane meadows to assure that fire management activities are discussed as they relate to all fire-dependent communities, including meadows. Meadows are also discussed under the heading wetlands, but meadows are only one of the types of sites that fall under that heading.

These meadows compose less than 0.5% of all park land and are ecologically and culturally significant. All areas have had severe encroachment by conifer species. One study of Yosemite Valley estimates that at least 50% of the meadows have succeeded to forest in the last 120 years (Ernst 1961). There is little information about historical vegetation composition and patterns for this type (SNEP 1996) so we are unable to compare existing vegetation with historic conditions. Kentucky bluegrass and other a non-native cool season grasses and non-native forbs are found throughout many of the montane meadows. Many of these communities, particularly in Yosemite Valley, have been altered by development and/or alteration of the hydrologic regime. Intensive ecological restoration efforts are on going in some of these areas.

Fires can burn rapidly through the grasses and flame lengths can range from two to 10 feet. Only 16 lightning fires have occurred in this type since 1930. Those fires burned 421 acres. The largest lightning fire burned 35 acres of meadows in the Walker fire in 1988. Humans have caused three meadow fires, which burned 54 acres. Meadows have been burned with 36 prescribed fires for a total of 433 acres. Over one-fourth of the acres (402) have burned once, while another 218 acres have burned twice or more. Fire return intervals are low in areas that were maintained by American Indians; in other areas the interval was more likely determined by the adjacent forest. Anderson (1993) reported anthropogenic fire regimes of from one to five years with a median of two years. Such short return intervals produce maximum departures of one for 911 acres of meadows ($FRID_{max}=1$) and median departures of 35 ($FRID_{med}=35$) for the same 911 acres. Most of the meadows show high departures from median fire return intervals. Fuel loads have increased and encroachment has altered much of this type.

Foothill Woodlands

The foothill woodlands zone includes foothill pine/live oak/chaparral woodland, foothill chaparral, and blue oak woodland vegetation types (UC Davis 1996e). This zone covers about 5% of the park at 1,700 to 6,000 feet elevation. Dominant tree species include California black oak, foothill pine, canyon live oak, interior live oak, and blue oak. Many of the vegetation types are better recognized by the dominant shrubs which include redbud, poison oak, various manzanitas, deerbrush, buckbrush, and mountain mahogany. Only 2% of the park's recorded lightning strikes hit the foothill zone (van Wagtendonk 1991). Even when made proportional to the size of the zone, only 8% of the strikes occur there—but when lightning fires occur they spread quickly and burn intensely.

Foothill pine/live oak/chaparral woodland

The foothill pine/live oak/chaparral woodland covers 6,985 acres in Yosemite and 372 acres in the El Portal Administrative Site. It is found on canyon sides and open rocky areas between 2,200 and 6,000 feet. The type covers a fairly contiguous area around Hetch Hetchy and Poopenaut Valleys. Dominant species include foothill pine, canyon live oak, interior live oak, Mariposa manzanita, deerbrush, buckbrush, and mountain mahogany. Little information about historical vegetation composition and patterns (UC Davis 1996e) exists so it is not possible to compare existing vegetation with historic vegetation condition or extent. This community has been invaded by cheat grass and other non-native annual grasses. Fuel loads can reach 22 tons per acre for foothill pine but are usually much lower (van Wagtendonk et al. 1998). In most cases, Fuel Model 5 depicts fire behavior in this type, but if brush over six feet tall is present Fuel Model 4 is a better fit.

Fires spread quickly and often torch and crown in trees and brush in the foothill pine/live oak/chaparral woodlands. Lightning is infrequent. Since 1930, 34 lightning fires have burned 8,514 acres in the park, and the A-Rock fire burned 41 acres of the type in the El Portal Administrative Site. Five human-caused fires have burned 1,424 acres in Yosemite, and three have burned 17 acres in El Portal. Only three prescribed burns have been conducted in these woodlands in the park covering 302 acres, while none have been ignited in El Portal. Over 90% of the foothill pine/live oak/chaparral woodland have burned during the past 70 years, leaving only 607 acres unburned. A total of 3,637 acres in the park have burned one time, 2,340 acres have burned two times, 312 acres have burned three times, and 90 acres have burned four times. In El Portal, 29 acres have burned once and 17 acres have burned twice. The small area burned in the Prescribed Natural Fire Zone in this type resulted in a fire rotation of 615 years, considerably longer than the fire return interval (van Wagtendonk 1994). McClaran and Bartolome (1989) determined that the minimum fire return interval for the woodlands was two years, the maximum 49 years, and the median eight years. Based on maximum intervals, 657 acres have missed one interval ($FRID_{max}$=1). Median departures ranged from 189 acres missing one interval ($FRID_{med}$=1) to six acres having missed two ($FRID_{med}$= 2). It is assumed that the fuel load and stand structure are not significantly altered from the natural range of variability.

Foothill chaparral

Foothill chaparral covers 1,768 acres of the park on the north side of the Merced River Canyon between 1,600 and 5,000 feet in elevation and 17 acres in the El Portal Administrative Site near the park boundary. Manzanita, whitethorn, buckbrush, deerbrush, mountain mahogany, and interior live oak are all types of shrubs that occur in chaparral. This type grows on rocky dry sites on steep slopes with little soil and seldom has any understory vegetation. There is little information about historical vegetation composition and patterns for this type (UC Davis 1996e) and it is not possible to compare existing vegetation with historic vegetation. It is assumed that fire suppression has significantly altered typical species diversity and the age class mosaic that would have existed in this community under a natural fire regime. Fuel loads can reach 13 tons per acre but are usually much lower. In most cases, Fuel Model 5 depicts fire behavior in this type, but if brush over six feet tall is present, Fuel Model 4 is a better fit.

Between 1930 and 2000, seventeen lightning fires burned 520 acres of the foothill chaparral type in the park, and all 17 acres in El Portal were burned by the A-Rock fire. Other than the A-Rock Fire, the largest lightning fire to burn in this type in the park covered 43 acres during the Stanislaus Complex fires in 1987. Three human-caused fires in the park burned 25 acres, while six prescribed fires burned another 110 acres. In El Portal, the only human-caused fire was the Canyon fire that burned 12 acres in 1968. There have been no prescribed fires in foothill chaparral in El Portal. Although 1,243 acres of foothill pine/live oak/chaparral have not burned, 503 acres have burned once, and 39 acres have burned twice, including 12 acres in El Portal that were burned by the A-Rock Fire but which had previously burned in the Canyon Fire. Reported fire return intervals include a median interval of 30 years and a maximum interval of 60 years (SNEP 1996). Maximum departures of one interval occurred on 1,243 acres in the park ($FRID_{max}$ =1), while median departures of two intervals occurred on those same acres ($FRID_{med}$ =2). In El Portal, the type was within one fire return interval ($FRID_{max}$ =0). The natural mosaic of fuel load and patch ages may be moderately altered from the natural range of variability.

Blue oak woodland

Blue oak woodland covers 473 acres on the north side of the Merced River Canyon between 1,700 and 2,600 feet in elevation in the El Portal Administrative Site. Blue oak, interior live oak, foothill pine, California buckeye, and poison oak are the common woody species. A grassy understory is composed of non-native annual grasses and some native forbs. The grassy understory is the dominate ground cover between widely spaced shrubs and trees. Yellow star thistle, an invasive non-native, is also found in this type. There is little information about historical vegetation composition and patterns for this type (UC Davis 1996e) and we are unable to compare existing vegetation with a historic range of variability. Because non-native annual grasses have invaded the community, it can be assumed that the composition and structure of this grassland is significantly different than the native grassland. Fire suppression may have increased the density of shrub and trees in this area as well. Fuels are sparse and Fuel Model 1 best approximates fire behavior in this type.

Fires burn rapidly through the light fuels with flames from two to 10 feet in length. Since 1930, only two lightning fires have burned 315 acres of blue oak woodland; 311 acres were in the A-Rock fire alone. An additional 120 acres have been burned by three human-caused fires, and seven prescribed fires have burned 62 acres. A total of 208 acres have burned once, and re-burns have occurred twice on 135 acres and three times on 16 acres. The fire return intervals derived by McClaran and Bartolome (1989) for foothill pine/live oak/chaparral are used for blue oak woodland. All areas were within the maximum departures ($FRID_{max}=0$), while the median fire return interval showed 322 acres missing one interval ($FRID_{med}=1$), 21 acres missing two intervals ($FRID_{med}=2$), and 114 acres missing four intervals ($FRID_{med}=4$). The natural mosaic of fuel load and patch ages may be moderately altered from the natural range of variability.

Wetlands

This heading addresses areas that have attributes of wetlands, some of which do not sustain fire-dependent plant communities, but do nonetheless, require protection or consideration during fire management activities. Most meadows are considered wetlands, and thus, they are included in this discussion, as well as under Vegetation and Fire Ecology. Wetlands, as defined by the U.S. Fish and Wildlife Service and adopted by the National Park Service, are lands transitional between terrestrial and aquatic systems, where the water table is usually at or near the surface or the land is covered by shallow water. These ecosystems act to buffer hydrologic and erosional cycles, control and regulate biogeochemical cycles of nitrogen and other key nutrients, and create unique microclimates for animal species (Rundel and Stuner 1998). Wetland types in Yosemite include meadows, and wet areas along rivers, streams, lakes, and ponds. Wetlands greater than five acres were mapped through interpretation of aerial photography by the US Fish and Wildlife Service in 1995 as part of the National Wetlands Inventory (USFWS 1995). For the purposes of the *Final Yosemite Fire Management Plan/EIS* meadows and riparian areas were classified according to the surrounding vegetation type. Montane meadows are also addressed under Vegetation and Fire Ecology due to their ecological and cultural significance. Wetlands burn infrequently and are unlikely to play a role in fire ignition or maintenance. However, they are important in inhibiting fire spread. When wetlands do burn the fire usually spreads into them from adjacent vegetation.

Wildlife

Wildlife in Yosemite National Park is diverse and abundant, reflecting the wide range of Sierra Nevada habitats and vegetation types that are in relatively intact condition (table 3.4). Areas of concentrated human use in Yosemite and the El Portal Administrative Site have affected wildlife and their habitats, primarily by displacing animal populations that may have once been much more abundant. Fire suppression for over 70 years has significantly impacted habitat, also affecting wildlife populations.

Forest habitats and microclimates are in part created by forest structure. Structure is influenced by fire, or a lack of fire. For example, a stand replacement fire opens the forest and changes vegetation composition and thus, habitat, while fire suppression may allow the forest to fill with dense underbrush, again changing the habitat. Catastrophic events may replace large areas of old growth with plant communities not seen in those areas for many decades. Animals that use mature forests will likely leave the area and animals that favor more open vegetation will move in. Following a stand replacement fire, deerbrush ceanothus and greenleaf manzanita are early seral species that provide high quality forage for deer.

Wildlife populations respond to fire-caused habitat changes in many ways. If increased nutrients follow a fire, vegetation production will increase and it is likely that herbivores and other animals relying on the increase in nutrients will move into the area. If a change in forest structure creates favorable conditions for a prey species to increase substantially, the predators that rely on this prey will soon increase in numbers. Similarly, if the structure of a forest is deteriorating in condition, due to the absence of natural changes, certain wildlife species may move out because they cannot find the requirements to live. Many elements required by wildlife are increased or reduced by the presence or absence of fire.

The greatest impacts to wildlife and habitat from fire are those from fires exhibiting behavior that is unnatural to the fire regime for that area. Forest conditions conducive to large stand- replacement fires hold the biggest threat to wildlife because mature old growth forests can be converted to early seral stage communities more often and over a larger area then historically occurred. During and after these large, high-intensity fires there is significant displacement of wildlife. Yosemite National Park protects sizable tracts of old growth forest types that have disappeared from much of the Sierra Nevada because of logging. These protected habitats benefit California spotted owls (Verner et al. 1992), northern goshawk (Maurer 2000) and many other wildlife species that are dependent on them. Although logging no longer occurs in Yosemite, old growth habitats are at risk of catastrophic fire because of the long history of fire suppression in Yosemite and surrounding forests.

Habitat

For wildlife populations to be viable, resources and environmental conditions must be sufficient for animals to forage, hide, nest or den, and disperse. Distribution, types, and amounts of territory, shelter, and food must be sufficient for the needs of viable populations daily, seasonally, and annually. Habitat must be well distributed over a broad geographic area to allow breeding individuals to interact spatially and temporally within and among populations.

The burned area often responds beneficially within two or three growing seasons. The fire management program in Yosemite is a landscape level program applied to allow natural processes to maintain heterogeneity of the vegetation and wildlife in the park. Fire in its natural role would create and maintain a mosaic of different kinds and age structures of the native vegetation types. As of the year 2001, the habitat associated with the lower montane forests is that most impacted by fire exclusion prior to 1970.

Fire exclusion or altered fire regimes have two major effects on wildlife habitat that cause significant population shifts. As fire is excluded, there becomes a greater continuity and abundance of late-successional plants. This reduces open space and creates landscapes with extensive ladder fuels and nearly continuous thickets of dense tree regeneration. The results of this are not clearly known but it can be postulated that the composition of wildlife that once occupied these areas has likely been shifting with this increased biomass.

Mammals

Approximately 85 native mammal species in six families inhabit Yosemite. Of the insectivore family, five shrews and one mole live here. Seventeen species of bats inhabit the forests and cliffs of Yosemite, nine are either California species of special concern or federal species of concern. Many of these bat species depend on riparian and meadow habitats for foraging and large trees or snags for roosting. Carnivores include black bears, bobcats, coyotes, raccoons, weasels, gray foxes, mountain lions, and ringtails. Six species of squirrels, eight species of chipmunks, eight species of mice, and other species of rodents, including wood rats, voles, gophers, and porcupines inhabit the park and El Portal. Yosemite's largest mammal, the grizzly bear, was extirpated from the region and from the state in the 1920s. There are two native species of hoofed mammals: the Sierra Nevada bighorn sheep and mule deer. Other mammal species that occur but are rarely seen are the fisher, wolverine, and Sierra Nevada red fox.

Birds

Yosemite's wide range of elevations and habitats support a diversity of bird species. Approximately 150 species regularly occur in the park, and about 80% of these are known or suspected to breed there. Members of most of the bird species begin to migrate to lower elevations or latitudes in the late summer and fall. For example, of the 84 species that nest in Yosemite Valley, 54% are rare or absent in winter. Noticeable population declines have been detected in numerous bird species in the Sierra Nevada, including Yosemite. Possible causes for these declines include grazing, logging, fire suppression, development, recreational use, pesticides, habitat destruction on wintering grounds, and large-scale climate changes.

Table III-4
Wildlife Species Inhabiting Vegetation Types

Vegetation Zone	Vegetation Types	Some Species Likely to Occur
Subalpine Forests	Whitebark pine/mountain hemlock forest	Golden eagle, Clark's Nutcracker, golden-mantled ground squirrel, alpine chipmunk, long-tailed vole, yellow-bellied marmot, porcupine, coyote, ermine, black bear.
	Lodgepole pine forest	Sagebrush lizard, western terrestrial garter snake, northern goshawk, red-tailed hawk, white-throated swift, Williamson's sapsucker, dusky flycatcher, mountain chickadee, pine siskin, deer mouse, long-tailed vole, coyote, ermine, long-tailed weasel, American badger, black bear.
Upper Montane Forests	Red fir forest	Western terrestrial garter snake, red-tailed hawk, golden eagle, great gray owl, olive-sided flycatcher, red-breasted sapsucker, golden mantled ground squirrel, deer mouse, bushy-tailed woodrat, coyote, long-tailed weasel, black bear.
	Western white pine/Jeffery pine forest	Sagebrush lizard, northern goshawk, red-tailed hawk, golden eagle, mountain quail, Lewis' woodpecker, northern flicker, olive-sided flycatcher, western wood-pewee, Steller's jay, lodgepole chipmunk, golden-mantled ground squirrel, striped skunk, black bear, gray fox, fisher, bobcat, mule deer, black bear.
	Montane chaparral	Gilbert's skink, southern alligator lizard, red-tailed hawk, California quail, mountain quail, bushtit, barn swallow, ruby-crowned kinglet, brush rabbit, California ground squirrel, Botta's pocket gopher, coyote, California pocket mouse, badger, striped skunk, black bear.

Vegetation Zone	Vegetation Types	Some Species Likely to Occur
Lower Montane Forests	Giant sequoia/mixed-coniferous forest	Western fence lizard, western rattlesnake, sharp-shinned hawk, American kestrel, acorn woodpecker, violet-green swallow, barn swallow, yellow warbler, chipping sparrow, California ground squirrel, mountain pocket gopher, coyote, badger, striped skunk, black bear.
	White fir/mixed-conifer forest	Western fence lizard, northern alligator lizard, sharp-shinned hawk, great horned owl, Steller's jay, common raven, fox sparrow, dark-eyed junco, big brown bat, Botta's pocket gopher, deer mouse, brush mouse, coyote, ermine, gray fox, striped skunk, badger, black bear.
	Ponderosa pine/mixed-conifer forest Ponderosa pine/bear clover forest	Western fence lizard, northern alligator lizard, red-tailed hawk, American kestrel, flammulated owl, western wood-pewee, Hammond's flycatcher, ruby-crowned kinglet, big brown bat, long-tailed vole, California ground squirrel, deer mouse, coyote, gray fox, ermine, striped skunk, black bear.
	California black oak	Western fence lizard, northern alligator lizard, sharp-shinned hawk, Cooper's hawk, band-tailed pigeon, red-breasted sapsucker, acorn woodpecker, big brown bat, brush rabbit, coyote, gray fox, long-tailed weasel, striped skunk, black bear.
	Canyon live oak forest	Western fence lizard, Western rattlesnake, scrub jay, California towhee, Hutton's vireo, oak titmouse, acorn woodpecker, western harvest mouse, western gray squirrel, California ground squirrel, ringtail, coyote, black bear, striped skunk.
Meadow	Dry montane meadow	California newt, California mountain kingsnake, western aquatic garter snake, Pacific tree frog, mallard, great blue heron, common snipe, great gray owl, northern rough-winged swallow, mountain bluebird, California meadow vole, montane vole, western mastiff bat, yellow-bellied marmot, mountain beaver, black bear, ermine.
Foothill Woodlands	Foothill pine/live oak/chaparral woodland Foothill chaparral Blue oak woodland	Northern alligator lizard, red-tailed hawk, American kestrel, great horned owl, Anna's hummingbird, red-breasted sapsucker, scrub jay, western bluebird, wrentit, big brown bat, black tailed jackrabbit, California ground squirrel, deer mouse, brush mouse, coyote, gray fox, long-tailed weasel, striped skunk, black bear.
Barren	Barren (includes bare rock and water)	Mount Lyell salamander, mountain yellow-legged frog, rosy finch, American pipit, rock wren, raven, Belding's ground squirrel, American pika, yellow-bellied marmot.

Reptiles and Amphibians

Compared to most mountain regions of the west, Yosemite has a large number of native reptile and amphibian species: 14 snakes (one poisonous), 7 lizards, 1 turtle, 2 toads, 1 tree frog, 3 true frogs, and 5 salamanders (including newt and ensatina). As in the rest of the Sierra Nevada, amphibians in Yosemite have suffered population declines (Drost and Fellers 1996). At higher elevations, mountain yellow-legged frogs and Yosemite toads are still present; however, they are severely reduced in population size and range. Research continues to identify the causes of decline in Sierra Nevada amphibians. Possible causes include habitat destruction, non-native fish and frogs, pesticides, and diseases. Two of the species of true frogs once found in Yosemite are now apparently extirpated: foothill yellow-legged frog and California red-legged frog. Possible factors in their disappearance include a reduction in perennial ponds and wetlands and predation by non-native bullfrogs.

Fish, including Non-Native Species

Most fish inhabiting Yosemite's lakes and streams have been introduced. Prior to trout stocking for sport fishing, native fish were limited in both range and number of species.

The last period of glaciation eliminated all fish from the high country and the high waterfalls prevented repopulation by upstream migration so that only the lower systems of the Tuolumne and Merced Rivers were populated with native fish. Rainbow trout and Sacramento sucker were abundant; less common were the Sacramento pike-minnow, hardhead, California roach, and riffle sculpin.

Brown trout and non-native strains of rainbow trout have been introduced to lower reaches of the Merced and Tuolumne Rivers, which has altered the aquatic ecosystems. The widespread introduction of brown, rainbow, and brook trout in higher-elevation lakes and streams, all of which were naturally fishless, has likely altered those ecosystems as well. Such introductions of fish are suspected of being the primary factor in declines of native amphibian species in the Sierra Nevada (Drost and Fellers 1994; 1996).

Because of severe climatic conditions, low nutrient availability associated with snowmelt over granitic watersheds, and a lack of spawning habitat, fish introduced in many of Yosemite's lakes have not survived. Fishery surveys conducted in the mid-1970s found 62 lakes with self-supporting fish populations, and 195 with little or no natural reproduction. Approximately 550 miles of streams in Yosemite National Park are thought to support fish (NPS 1977).

After recognizing that non-native species were causing damage to aquatic ecosystems, in 1978 the park implemented a policy that by 1991 had ended almost 100 years of stocking lakes with non-native fish in Yosemite. Human activity has undoubtedly altered fish populations in the Merced River in the Yosemite Valley section where rafting, trampling, camping along the streams, and tree removal was allowed for many years. Non-native brown trout now outnumber rainbow trout in many stretches of the Merced River, and introductions of non-native rainbow trout have altered the genetics of Yosemite Valley's native strain.

Non-Native Wildlife Species

Besides the several species of introduced trout, non-native wildlife in Yosemite National Park includes white-tailed ptarmigan, wild turkey, brown-headed cowbird, European starling, house sparrow, and bullfrog. Feral pigs have recently been sighted near the park and could establish territories in the park.

The full impact of bullfrogs on native species in the park is unknown, but studies in other areas of California have concluded that bullfrogs prey on a wide variety of animals, including insects, fish, other amphibians, birds, reptiles, and small mammals. Recent observations suggest that they currently occupy standing and slow-moving water throughout the Yosemite Valley.

Brown-headed cowbird populations in the Sierra Nevada have increased (Verner and Ritter 1983) and now threaten native bird species. Cowbirds lay their eggs in the nests of other birds, usually songbirds. This parasitism can have a devastating effect on the populations of some native songbird species. Cowbirds have been implicated as a factor in the disappearance of willow flycatchers from Yosemite Valley. Currently, brown-headed cowbirds are common in Yosemite and can be found in large numbers at the park's stables, campgrounds, and residential areas.

Wild turkeys were introduced widely in California by state authorities, and have moved into Yosemite along its western boundary. The impact of this species on park ecosystems is unknown, but likely includes predation of small animals, competition with native species for food, destruction of native plants and reduction of their seeding rates (especially in oaks), soil and forest litter disturbance, and support of unnaturally high predator populations.

White-tailed ptarmigan were introduced as a game species to high elevation areas east of Yosemite, and they have become widespread in the park's alpine habitats. The impact of ptarmigan has not been determined, but their herbivory likely affects native plants that have a very low rate of growth and productivity.

The European starling and house sparrow are two non-native species found in El Portal that affect native bird species through competition for nest cavities, a limited resource. Both species are known to aggressively evict native bird species from occupied cavities. The existing development in El Portal has likely increased the abundance of both species by providing additional nesting sites and food sources.

Special-Status Species

Some species of plants and animals have undergone local, state, or national declines, which has raised concerns about their possible extinction if they are not protected. As a result, the USFWS and California Department of Fish and Game (CDFG) have established a classification system that reflects the urgency of species' status and the need for monitoring, protection, and recovery. Collectively, species in these categories are referred to in this document as "special-status species." In addition, the park has a classification system that reflects the prevalence of species within the park. These are "park rare" plants and are tracked by the park.

The Federal Endangered Species Act of 1973, as amended, requires federal agencies to consult with the USFWS before taking actions that (1) could jeopardize the continued existence of any federally listed plant or animal species (e.g., listed as threatened or endangered) or species proposed for listing, or (2) could result in the destruction or adverse modification of critical or proposed critical habitat. The first step in the consultation process is to obtain a list of protected species from the USFWS.

The *Council of Environmental Quality Regulations for Implementing the National Environmental Policy Act* (Section 1508.27) requires considering whether an action may violate federal, state, or local law or requirements imposed for the protection of the environment. For this reason, species listed under the California Endangered Species Act (i.e., those considered endangered or threatened) by the CDFG are included in this analysis. Those species proposed for listing in either of the two categories are also included.

The various federal and state categories for special-status species are defined as:

Federal endangered: Any species that is in danger of extinction throughout all or a significant portion of its national range.

Federal threatened: Any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its national range.

California endangered: Any species that is in danger of extinction throughout all or a significant portion of its range in the state.

California threatened: Any species that is likely to become an endangered species with the foreseeable future throughout all or a significant portion of its state range.

California rare (plants only): A native plant that, although not currently threatened with extinction, is present in small numbers throughout its range, such that it may become endangered if its present environment worsens.

Special-Status Plants

A total of four plant species known to occur in Yosemite National Park and/or the El Portal Administrative Site have been listed as "rare" by the State of California: Yosemite onion, Tompkin's sedge, Congdon's wooly-sunflower, and Congdon's lewisia (Table 3.5). These species are considered restricted and limited throughout all or a significant portion of their range, and may represent disjunct populations at the extremes of their range. The *Natural Resources Management Guidelines* (NPS-77) state that the identification of a plant as a rare species warrants heightened management concern. In the study area, these four plants are at lower elevations in the Lower Montane and Foothills Woodlands vegetation zones—mainly in and near El Portal.

There are six federal Species of Concern (not listed but tracked by the USFWS). In addition, 103 'park rare' species have limited distribution in Yosemite but are not necessarily limited in their range. These are tracked by the park although they are not listed as endangered or threatened. They are not included for analysis in this section.

Table III-5
California State Rare Plants Known to Occur in Yosemite National Park or the El Portal Administrative Site

Common Name *Scientific Name*	**Vegetation Zone [a]: Habitat Type/Occurrence**
Yosemite Onion *Allium yosemitense*	LM, FW: Confined to open metamorphic slabs, talus slopes, and scree. Restricted to the Merced River watershed.
Tompkin's sedge *Carex tompkinsii*	LM, FW: Limited to foothill oak woodland and chaparral areas and along lower talus slopes. Found sporadically from Arch Rock to El Portal in the Merced River canyon.
Congdon's woolly-sunflower *Eriophyllum congdonii*	LM, FW: Restricted to dry, mostly south-facing metamorphic and metasedimentary outcrops. Occurs on dry ridges on metamorphic rocks, scree, and talus.
Congdon's lewisia *Lewisia congdonii*	LM, FW: Grows on moist, exposed metamorphic rock faces and slopes. Occurs in chaparral and mixed-conifer forest on north-facing slopes in shade.

a LM=Lower Montane, FW=Foothills Woodland.

Special-Status Species – Wildlife

Table 3.6 presents both state and federal listed threatened or endangered animal species (valley elderberry longhorn beetle, limestone salamander, California red-legged frog, bald eagle, American peregrine falcon, great gray owl, willow flycatcher, Sierra Nevada red fox, California wolverine, and Sierra Nevada bighorn sheep) and four species that are proposed for listing (Yosemite toad, mountain yellow-legged frog, California spotted owl, and Pacific fisher). These species are known to be or could be present in Yosemite National Park or the El Portal Administrative Site and therefore could be affected directly or indirectly by the action alternatives. A Biological Opinion (Appendix 9) has been prepared, in accordance with Section 7 of the Endangered Species Act.

Table III-6
Special Status Wildlife Species

Special-Status Species – Wildlife				
Species	**Status [a]**			**Vegetation Zone [b]: Habitat Type/Occurrence**
	USFWS	**State**	**Park**	
INVERTEBRATES				
Valley elderberry longhorn beetle *Desmocerus californicus dimorphus*	FT			FW: Found in conjunction with its host plant, the elderberry (*Sambucus* spp.), below 3,000 feet in elevation.

Special-Status Species – Wildlife				
Species	**Status[a]**			**Vegetation Zone[b]: Habitat Type/Occurrence**
	USFWS	**State**	**Park**	
REPTILES AND AMPHIBIANS				
Limestone salamander *Hydromantes brunus*	FSC	CT		FW: Very limited distribution along Merced River and its tributaries between elevations of 800 and 2,500 feet, usually in association with limestone outcrops. El Portal lies within elevational range, but not recorded there or elsewhere in park.
Yosemite toad (**Proposed**) *Bufo canorus*	FSC	CSC		SA, UM, BA: Restricted to areas of wet meadows in central Sierra Nevada between elevations of 6,400 and 11,300 feet.
California red-legged frog *Rana aurora draytonii*	FT	CSC		LM, CO, ME: Found in quiet pools in permanent streams in mixed-conifer zones and foothills. Prefers riparian deciduous habitat. Many park museum specimens from one lake (6,000 feet elevation). Once found in Yosemite Valley, but now apparently extinct due to loss of habitat and predation by bullfrogs and other species.
a Status: FT=Federal Threatened, FE=Federal Endangered, FSC=Federal Species of Concern, FD=Federal De-listed, CE=California Endangered, CT=California Threatened, CSC=California Species of Concern. b SA=Subalpine Forest, UM=Upper Montane, LM=Lower Montane, FW=Foothills Woodland, ME=Meadow, BA=Barren.				
Mountain yellow-legged frog *Rana muscosa* (**Proposed**)	FSC	CSC		SA, UM, LM, BA: A species of mountain habitats, occurring between elevations of 4,500 to over 12,000 feet; found in streams, lakes, and ponds in a variety of vegetation types.
BIRDS				
Bald eagle *Haliaeetus leucocephalus*	FT	CE		LM, CO, ME, BA: Forages over river, streams, and lakes. Primarily eats fish, also carrion, water birds, and small mammals. Transient in the park. No nesting in the park.
American peregrine falcon *Falco peregrinus anatum*	FD	CE		LM, CO, ME, BA: Usually nest on high cliffs near water and searches for prey along cliffs and over surrounding habitats. Four known active nest sites in Yosemite. Species has shown recovery, but numbers may continue to be affected by pesticide contamination.
California spotted owl *Strix occidentalis occidentalis* (**Proposed**)	FSC	CSC		UM, LM, FW: Breeds in oak and ponderosa pine forests upslope to lower-elevation red fir forests (up to elevations of 7,600 feet), with mixed-conifer the optimum type. Presence of California black oak in the forest canopy also enhances habitat suitability. Likely cause for decline is habitat destruction and fragmentation from logging and development. Severe wildland fire in mixed-conifer forests may represent the greatest threat to existing spotted owl habitat in Yosemite.
Great gray owl *Strix nebulosa*		CE		UM, LM, CO: Entire California population of this species is restricted to the Yosemite region, where it reaches southernmost extent of its North American range. Breeds in mixed-conifer/red fir forests bordering meadows. Winters in mixed-conifer down to blue oak woodlands. Research suggests that human disturbance could affect foraging success of this species, which may explain its absence from the Valley.
Willow flycatcher *Empidonax trailii*	FSC *(ssp. Brewsteri)*	CE		LM, FW, ME: Breeds in mountain meadows. and riparian areas from 2,000 to 8,000 feet elevation in the Sierra Nevada, with lush growth of shrubby willows. Has disappeared from much of its range, due to habitat destruction and parasitism from brown-headed cowbirds.

Special-Status Species – Wildlife				
Species	Status[a]			Vegetation Zone[b]: Habitat Type/Occurrence
	USFWS	State	Park	
a Status: FT=Federal Threatened, FE=Federal Endangered, FSC=Federal Species of Concern, FD=Federal De-listed, CE=California Endangered, CT=California Threatened, CSC=California Species of Concern. b SA=Subalpine Forest, UM=Upper Montane, LM=Lower Montane, FW=Foothills Woodland, ME=Meadow, BA=Barren.				
MAMMALS				
Sierra Nevada red fox *Vulpes vulpes necator*	FSC	CT		SA, UM, LM, BA, ME: Primarily found in red fir, lodgepole pine, subalpine forests, and alpine Sierra. Found mostly above 7,000 feet and rarely below 5,000 feet elevation. Reports for Yosemite Valley and Foresta, but these sightings could have been of eastern red fox, a non-native species that is present on the west slope of the Sierra Nevada.
California wolverine *Gulo gulo luteus*	FSC	CT		SA, UM, ME, BA: Found in a wide variety of mountain habitats. Needs water, caves, logs, or other cover for denning. No wolverine has been recorded in California since the 1970s.
Pacific fisher **(Proposed)** *Martes pennanti pacifica*	FSC	CSC		UM, LM: Occurs in conifer forests and deciduous-riparian habitats with a high canopy closure, mostly above 6,000 feet elevations. Carnivorous, but may also eat fruit and fungi. Densities in the central Sierra Nevada appear to be very low, for unknown reasons; higher densities in both the northern and southern Sierra Nevada. Fishers have been seen within the last 10 years near Henness Ridge and Crane Flat.
Sierra Nevada bighorn sheep *Ovis canadensis sierrae*	FE	CE		BA: High-elevation species that was reintroduced to the park in 1986. Population numbers have fluctuated between a high of 85+ animals in 1991 to less than 20 today.
a Status: FT=Federal Threatened, FE=Federal Endangered, FSC=Federal Species of Concern, FD=Federal De-listed, CE=California Endangered, CT=California Threatened, CSC=California Species of Concern. b SA=Subalpine Forest, UM=Upper Montane, LM=Lower Montane, FW=Foothills Woodland, ME=Meadow, BA=Barren.				

Physical Environment

Geologic Overview

The geologic story of the Sierra Nevada can be considered in two parts: (1) the deposition and formation of sedimentary and volcanic rock over a period of hundreds of millions of years and the intrusion of granitic rocks, and (2) the uplift, erosion, and glaciation of the environment to form today's landscape (Huber 1989).

At its foundation, the Sierra Nevada is an enormous deposit of granitic rock (UC Davis 1996a). About 200 million years ago, as the granitic rocks were formed, heated, and melted, they slowly migrated toward the surface of the earth. The surface of the earth at the time was composed of massive layers of sedimentary rock deposited by ancient seas and volcanic rock that was deposited by ancient volcanic eruptions. As the granitic plutons rose, they altered some of the sedimentary and volcanic rock and created metamorphic rock.

Between 65 and 100 million years ago, magma formation slowed and a long period of erosion began in the Sierra Nevada. About 25 to 15 million years ago, mountain building activity reactivated, uplifting the Sierra Nevada to form its relatively gentle western slopes and the more dramatic, steep eastern slopes. A combination of uplift and tilt is the underlying geologic process that created the range as we see it today (Huber 1989).

As the world grew colder between two and three million years ago, the Sierra Nevada had risen high enough for glaciers and mountain ice fields to form at the higher alpine elevations. At least three major glacial periods occurred during the ice age in the Sierra Nevada. The down slope movement of the ice masses cut and sculpted valleys, cirques, and other glacially formed landforms throughout the Yosemite region and the Sierra Nevada. The last glaciation event began as late as 60,000 years ago. In the Yosemite area, this glaciation pushed fingers of ice into the major drainages on the west slopes, until it reached the maximum extent about 20,000 years ago, near Bridalveil Meadow in Yosemite Valley.

Climate

The climate of Yosemite is Mediterranean. Precipitation amounts vary from 36 inches (915 mm) at 4000 feet (1,200 m) to 50 inches (1,200 mm) at 8,600 feet (2,600 m). Most of the precipitation falls as snow between October and April. From May through September, precipitation is infrequent.

Mean daily temperatures range from 25 to 53 degrees Fahrenheit at Tuolumne Meadows at 8,600 feet (2,600 m). At South Entrance Station (elevation 6,192 feet) mean daily temperature ranges from 36 to 67 degrees Fahrenheit. At the lower elevations, below 5,000 feet, temperatures are hotter; mean daily high temperature at Yosemite Valley (elevation 3,966 feet) varies from 46 to 90 degrees Fahrenheit. Frequent summer thunderstorms, along with snow that can persist into July, moderate the hot, dry summers, especially above 8,000 feet. The combination of dry vegetation, low relative humidity, and thunderstorms results in frequent lightning caused fires as well (NPS 1990).

Soils

More than 50 soil types exist within the park; general or local variations depend on glacial history and the ongoing influences of weathering and stream erosion and deposition. Topography influences surface water runoff, groundwater, distribution of stony soils, and the separation of alluvial soils (Zinke and Alexander 1963). Local variations also result from differences in microclimates due to aspect and major vegetation types.

Soils of the Yosemite region are primarily derived from underlying granitic bedrock and are of a similar chemical and mineralogical composition. Except for meadow soils, most soils at high elevations were developed from glacial material (glacial soils) or developed in place from bedrock (residual soils). Extensive areas above 6,000 feet are covered by glacial moraine material, a mixture of fine sand, glacial flour, pebbles, cobbles, and boulders of various sizes. *Alluvial* soils, along streams, tend to have sorted horizons (layers) of sandy material. Colluvial soils along the edges of the Valley in areas where landslides and rockslides have occurred are composed of variously sized particles and rocks and have high rates of infiltration and permeability.

Organic content within the upper soil profile varies with the local influences of moisture and drainage. Thick sedges and grasses have contributed to the organic content of soils near ponds, lakes, and streams. Coniferous forest soils have a relatively high organic content and are relatively acidic. Soils lacking organic accumulations are frequently a result of granitic weathering, consist largely of sand, and support only scattered plants tolerant to drought-like conditions.

Certain soil types have been identified in Yosemite as highly valued resources (NPS 2000c). Highly valued resource soils are found in or adjacent to meadows and riparian areas, hydric soils, and soils associated with lateral or terminal moraines. The Leidig fine sandy loam found in and around Leidig Meadow is an example of a highly valued resource soil.

Hydric soils are legally protected because they form in wetlands, which are protected by federal law. Hydric soils are found primarily in the river valleys of the Merced River and Tenaya Creek and in low meadows.

Interaction of Fire and Soil

All fire, whether natural or human-caused, changes the cycling of nutrients and the biotic and physical characteristics of soils. The magnitude and longevity of these effects depend on many factors including fire regime, severity of a particular fire, vegetation and soil type, topography, season of burning, and pre- and post-fire weather conditions. Effects can also be indirect, through changes in soil biota and changes in erosional rates. Sites that historically had frequent fires are generally better adapted to the reintroduction of fire and repeated burning.

Fire causes soil nutrients to change in form, composition, distribution, and amount. These changes are from the release of elements during combustion of fuel and organic matter. The *volatilization*, or release, is temperature dependant. Nitrogen, and to a lesser extent sulfur and phosphorus, are most readily lost. Other nutrients are generally lost as ash via convection or through leaching. Burning can decrease total nitrogen availability at a site while increasing nitrogen available for plant growth. Following prescribed burns in Giant Forest in Sequoia National Park, inorganic soil ammonium-nitrogen (NH_4^+-N) levels increased from 1.90 mg/k of soil under sequoias and 1.66 mg/k of soil under sugar pines to 68.63 mg/k and 62.71 mg/k respectively immediately after the fire (Haase and Sackett 1998). By five years, NH_4^+-N had returned to pre-burn levels (1.54 and 1.60 mg/k soil respectively) and by seven years had dropped below pre-burn levels (1.12 and 1.52 mg/k soil respectively). Changes in nitrate-nitrogen (NH_4^--N) were similar except peaks occurred two years after the burn. Other nutrients (CA, Mg, K, and SO_4) also increased with SO_4 increasing by an order of magnitude (Chorover et al. 1994; Williams and Melack 1997).

Biotic soil communities are complex and still poorly understood, particularly in relation to fire effects. Fire can influence soil biota directly by killing or injuring organisms, or indirectly by altering properties of the above- and below-ground soil environment. Burning generally results in declines in soil invertebrates and fungi while microorganisms such as bacteria increase in abundance. Changes in aboveground biotic communities due to changes in the fire regime may also impact soils and interact with soil nutrient status. For example, nitrogen-fixing plants are suppressed in some fire-excluded forests (Newland and DeLuca 2000). Additionally, the effects of fire on cryptogramic crusts, (important nitrogen fixers in some ecosystems) has not been explored.

Changes in physical characteristics of soil following fire are a result of complex interactions among geomorphic processes, climate, vegetation, and landforms. Fire can affect changes in organic horizons, water repellency, infiltration capacity, porosity, structure, temperature, hydrologic properties, and, most importantly, erosional processes and sedimentation rates. Fire generally increases the potential for erosion by removing vegetation and exposing mineral soil and by altering organic matter and the physical properties of soil. Generally, the more severe a fire, the greater its effects will be. These effects are further affected by soil erodibility, slope steepness, and the timing, intensity, and amount of precipitation. The magnitude of fire's impact on soils is highly dependent on the situation and the physical and biotic properties of the area. Recent studies show that the deliberate use of prescribed fire may dramatically reduce erosion potential from wildland fires. In one study, erosion and sediment from a high intensity wildfire event was ten times higher than that measured off a low intensity prescribed burn (Wohlegmuth et al. 1999).

In most park ecosystems prior to Euro-American settlement, fire affected both the soils and geomorphic processes. The alteration of the natural fire regime by nearly a century of human intervention can be considered a significant alteration of and stressor to soil properties and processes. Understanding changes from fire suppression and restoration of fire is important. For example, there is the potential for increased erosion in areas of chaparral vegetation due to the complete removal of most aboveground biomass by fire. This differs from Sierran mixed-conifer forest where overstory vegetation is generally maintained after fire.

Because of the landscape scale of some effects of fire, they could have significant impacts both inside and outside the park. Impacts and processes within the park may be considered ecologically natural, while the same process may produce effects outside the park that are considered undesirable. For example, it would be important to understand whether there are significant erosional and sedimentation risks associated with certain types of fire because of downstream structures, such as dams, flumes, and hydroelectric generation plants, on the Tuolumne and Merced Rivers.

Water Resources and Watersheds

Within the boundaries of Yosemite flow the headwaters and significant stream reaches of the Tuolumne and Merced Rivers, both of which are tributaries of the San Joaquin River basin. The park also contains approximately 3,200 lakes (greater than 100 square meters), two reservoirs, and 1,700 miles of streams, all of which help form these two large watersheds.

The Tuolumne and Merced River watersheds originate along the ragged crest of the Sierra Nevada. Waters tumble down rocky, sparsely vegetated mountainsides; course through forests underlain with granitic bedrock and strewn with boulders; and flow through nearly flat, glacially-carved valleys on their paths to the Central Valley. Areas of small lakes and meadows, typically underlain with thin, granitic soils, can be quite extensive despite the rugged landscape. Above 9,600 feet, alpine and subalpine zones have little vegetation and low soil permeability. From 8,000 to 9,600 feet, the upper montane zone has limited ability to hold soil moisture. Lower montane forests grow on thin to moderate depth soils from 4,000 to 7,000 feet.

The Tuolumne River drains the entire northern portion of the park, an area of approximately 428,115 acres (669 square miles). It flows into Hetch Hetchy reservoir, a major water supply for the City and County of San Francisco, before it leaves the park. The main stem and the South Fork of the Merced River drain the southern portion of the park, approximately 319,840 acres (499 square miles). Below Yosemite Valley, the main stem flows through the El Portal Administrative Site.

Regional Watershed Characteristics

Merced River (Main Stem) Watershed. The main stem of the Merced River watershed drains 250,000 acres (391 square miles) of the park. Principal tributaries of the Merced River include the Merced Peak, Lyell, Triple Peak, and Red Peak Forks, as well as Echo, Sunrise, Illilouette, Tenaya, Yosemite, Bridalveil, Cascade, Grouse, Avalanche, Indian, and Crane Creeks. For the purpose of this discussion, the main stem of the Merced River is divided into three hydrologic segments: the upper Merced River, Yosemite Valley, and the

Merced River gorge (which includes the El Portal Administrative Site). This division is based upon the unique watershed characteristics of the three river areas.

Upper Merced River. The upper Merced River watershed encompasses approximately 114,840 acres (181.9 square miles) above Happy Isles in upper Yosemite Valley. Elevations range from 4,000 feet to over 13,000 feet at Mt. Lyell. Located within the watershed are the sub-basins of Merced Peak, Lyell, Triple Peak, and Red Peak Forks; Echo, Sunrise, and Illilouette Creeks; and over 1,000 lakes and ponds (Williamson et al. 1996a). The upper Merced River descends from its headwaters through a glacially carved canyon at a gradient of about 8,000 feet over 24 miles (USGS 1992). The average daily discharge rate measured at the Happy Isles gauging station is approximately 355 cfs (USGS 1998).

Yosemite Valley. The Yosemite Valley watershed includes Yosemite Valley and its tributary areas. Tributaries include Tenaya, Yosemite, Sentinel, Ribbon, and Bridalveil Creeks. Above Pohono Bridge, the Merced River basin encompasses 205,000 acres (321 square miles) (USGS 1999). Historic discharge in the river, measured at the Pohono Bridge gauging station, has ranged from a high of about 25,000 cfs to a low of less than 10 cfs. During the last glaciation, a glacier extended to below Bridalveil Fall—leaving the nearly flat valley floor through which the river flows in a shallow channel approximately 100 to 300 feet wide in most places. The bed and banks of the channel are composed of smaller sediments and cobbles, material created and deposited by the succession of glaciers that helped form the Valley. The river alters its course periodically by eroding and re-depositing this loose material.

Merced River Gorge. As the river exits Yosemite Valley, it cascades at an average gradient of approximately 70 feet per mile through the narrow, steep-sided Merced River gorge. The Merced River gorge watershed includes the area from Pohono Bridge through the El Portal Administrative Site. At the western end of Yosemite Valley, where the river transitions into the steep river gorge, Cascades Diversion Dam collects suspended sediments and bedload discharging from the Valley. Tributaries along the gorge include Cascade, Tamarack, Wildcat, Grouse, Avalanche, Indian, Crane, and Moss Creeks. The riverbed and banks are largely composed of boulders and cobbles, ranging in size from a few inches to several yards in diameter. Much of the riverbank has been developed and hardened for road and facility protection. Because of the steep gradient and development, the river channel usually only shifts during periods of large floods. There are no flow gauges in the gorge.

South Fork Watershed. The headwaters of the South Fork originate near Triple Divide Peak at an elevation of approximately 10,500 feet. The South Fork flows westward over granitic bedrock to Wawona and then flows northwest over an area underlain by sedimentary rocks at a 3,500-foot elevation (USGS 1995a) and into the Merced River downstream from El Portal. Chilnualna, Big, Alder, and Bishop Creeks are major tributaries to the South Fork. The watershed area of the South Fork at Wawona is approximately 63,000 acres (98 square miles) and about 154,000 acres (approximately 70,000 acres within the park) by the time it reaches the main stem. Upstream from Wawona, tributaries enter the steep-walled glacial gorge of the South Fork from the north and south. In the Wawona area, the river meanders through a large floodplain meadow (part of a deep alluvial valley), building substantial gravel bars within the channel. The average annual flow at its confluence with the Merced River is 356 cfs (USGS 1989). Between 1958 and 1968, upstream of the Big Creek confluence, the average annual flow was 174 cfs.

Tuolumne River Watershed. The Tuolumne River originates in the peaks above Tuolumne Meadows and is the major drainage system for the northern part of Yosemite. The river and its tributaries drain in excess of 669 square miles of the park. The Tuolumne has two principal sources: the Dana Fork, which drains the west-facing slopes of the 13,053-feet-high Mount Dana, and the Lyell Fork, which begins at the base of the glacier on Mount Lyell at an elevation of 13,114 feet. Confluence of the two forks occurs at the eastern end of Tuolumne Meadows. The Tuolumne River continues through Tuolumne Meadows and the associated park developments at an elevation of 8,600 feet. It then cascades on its westward decent through the Grand Canyon of the Tuolumne, and enters the eastern end of Hetch Hetchy Reservoir, still within the park, at an elevation of about 4,000 feet. Return, Paiute, Rancheria, and Falls Creeks enter the Tuolumne River upstream of the reservoir and along the reservoir's shores. At O'Shaughnessy Dam, which impounds the Tuolumne, water is diverted through Canyon Tunnel to the Kirkwood Powerhouse. Water that is not diverted continues downstream in the Tuolumne River channel, reaching the park boundary about six miles downstream, near the Mather Ranger Station.

Hetch Hetchy and Lake Eleanor Reservoirs. These two reservoirs are in Yosemite, within the Tuolumne watershed and are part of a massive system of water and power production operated by the City and County of San Francisco. Hetch Hetchy is on the main stem of the Tuolumne River and Lake Eleanor is on Eleanor Creek, upstream of its confluence with Cherry Creek. Cherry Creek joins the Tuolumne River downstream of the park's western boundary. Hetch Hetchy is dammed by the 430-foot-tall O'Shaughnessy Dam and has a storage capacity of 360,360 acre-feet. It is the primary water source for about 2.5 million residents of the San Francisco Bay area. Lake Eleanor's maximum volume of 27,100 acre-feet was created by building the 70-foot-tall Lake Eleanor Dam in 1918.

Middle Tuolumne River. The Middle Tuolumne River drains a small portion of the park's extreme western edge, south of Hetch Hetchy Reservoir and northwest of the Tioga Road. The headwaters are between 7,000 and 8,000 feet in elevation. Cottonwood Creek is a major tributary. The Middle Tuolumne River exits the park at an elevation of 5,000 feet and joins the South Fork Tuolumne River downstream of the park.

South Fork Tuolumne River. The South Fork Tuolumne River drains a small portion of the western edge of the park. The headwaters begin between White Wolf and Yosemite Valley at elevations between 8,000 and 8,500 feet. The South Fork Tuolumne River exits the park at an elevation of 4,500 feet, just north of Hodgdon Meadow and upstream of its confluence with the main Tuolumne River.

Influence of Fire on Watersheds

Through changes in soil and vegetative characteristics, fire influences the rate at which water flows and the volume of water in watersheds. Fire can be destructive to watershed processes, but when natural processes are allowed to occur, fire helps maintain watersheds. Fire affects several major attributes of watersheds, including water yield, peak flows, sediment yield, nutrient yield, and stream system response.

The proportion of a watershed that is burned and the proximity of the burned area to a stream channel largely determine the effects of fire on streams. A stream draining a watershed of which over 90% of the land has burned will show much greater effects than a stream emanating from a similar watershed in which only the upper slopes and ridge tops were burned. Fire intensity is often highly variable over a landscape, and patches of unburned or lightly burned vegetation (especially near streams) can reduce the adverse effects of intensely burned, upslope areas (Kattelmann 1996).

Although fire is a natural part of many ecosystems, high-intensity fire can produce some of the most extensive changes in watershed conditions of any disturbance. Intense fire kills vegetation, volatizes organic matter in the litter layer, and often forms a layer in the soil that reduces infiltration of water into deeper soil layers. The combined effect of these changes increases water yield and overland flow, possibly increasing peak flows months, or years, later. High-intensity fire may also create the conditions for shallow debris flows. Under the conditions of bare soil, increased overland flow, and lack of vegetation and litter, soil particles are transported into streams, increasing sediment loads.

Water Yield. Although the National Park Service does not manage Yosemite National Park to maximize water yield, it is a major indicator of the relative influence of fire in a watershed. Because of Hetch Hetchy Reservoir, water yield is of interest to the City and County of San Francisco.

Fire effects water yield primarily by killing vegetation and reducing the amount of water intercepted by plants, however, it also affects snow accumulation and melt rates. Plant transpiration is virtually stopped wherever a high-intensity fire has burned (Kattelman 1996). The daily cycle of plant water uptake affects hourly stream flow and this daily cycle can be changed completely by catastrophic fire. Seasonal water yield may also be affected by fire. Snow accumulation and melt rates may change after a fire. For example, melt rates would increase if more light reached the forest floor, while snow accumulation rates could either increase (small openings), or decrease (large openings). These changes may increase annual runoff in the first years after a fire.

Peak Flows. Peak flows can be expected to increase after large (relative to the watershed) fires because of increases in soil moisture caused by reduced plant transpiration, decreased soil infiltration, and higher rates of snowmelt (Kattelmann 1996).

Infiltration is usually the most important factor affecting peak flows. It is decreased in two ways. Removal of vegetation and the litter layer exposes bare mineral soil to raindrops, which can physically force the solid particles closer together and disperse soil aggregates into surface pores, thereby reducing the infiltration capacity. Secondly, fires can vaporize organic compounds in the litter layer, some of which move into the soil until the vapor condenses and forms a layer that is water repellent, or *hydrophobic*. These hydrophobic layers tend to be more coherent under very hot fires, where a thick litter layer and/or organic horizon is present, and in course textured soils, such as the decomposed granitics found in Yosemite. The continuity of these layers determines their overall impact on hill-slope water movement. Although the water repellent layers tend to break down in a year or two, those formed in soils that are hydrophobic even without fire may be more persistent. Under some conditions, a hydrophobic layer forms on the surface of the soil and acts as a binder and sealant, maximizing overland flow while minimizing erosion. Studies in the western United States have shown dramatic increases in peak flows following wildland fires.

Sediment Yield. Sediment yields increase markedly after some fires, particularly if riparian vegetation was burned (Kattelmann 1996). This increase in sediments happens through several processes. Erosion from the land surface usually increases after a fire, especially if overland flow increases—sediments may then wash into streams. In the absence of streamside vegetation, banks become less stable and soil particles move into the channels from *dry ravel erosion* (the particle-by-particle transport of material down slope due to gravity). Increases in total discharge and peak flows cause channel erosion as well. Debris torrents may scour streams if extreme climatic events follow the fire. If a fire is particularly hot, woody debris that helped stabilize the channel may be consumed, increasing water velocity and stream-bank erosion.

Nutrient Yield. During a fire, some materials are volatilized into the atmosphere, while the remainder is left as ash on and near the soil surface in forms that are readily mobile. Thus, fires provide an opportunity for nutrients that have been stored in vegetation and soils to move into streams (Kattelmann 1996). Concentrations of nitrates and other ions in streams usually increase dramatically after a fire, although the absolute amounts often remain almost negligible or at least within water quality standards. After some fires, potential is high for large nutrient losses from soil erosion carrying nutrients into streams.

Stream System Response. Both physical and biological features of streams change over time. In a fire maintained system, after a fire, initially the channel may agrade and widen in response to higher flows of water and sediment. As vegetation becomes re-established, the channel usually returns to pre-fire size within several years. In the Sierra Nevada, vegetation community similarity, density, and taxa richness will be comparable between burned and unburned reaches in one to three years after a fire (Kattelmann 1996).

Water Quality

An inventory of water quality in Yosemite revealed excellent water quality in most of the park, although some water quality degradation is occurring in areas of high visitor use (NPS 1994). Water quality is generally above state and federal standards. The surface water quality of most park waters is considered valuable by the State of California for wildlife and freshwater habitat and recreation [Central Valley Regional Water Quality Control Board's Water Quality Control Plan (Basin Plan)].

Surface water that drains granitic bedrock in the park exhibits considerable variability in chemical composition, despite the relative homogeneity of bedrock chemistry (Clow et al. 1996). Surface water in most of the Merced River basin is diluted (lacking in dissolved solids), making the ecosystem sensitive to human disturbances and pollution (Clow et al. 1996).

Good water quality is critical for the survival and health of species that are part of riparian and aquatic ecosystems. Water quality elements that affect aquatic ecosystems include water temperature, dissolved oxygen, suspended sediment, nutrients, and chemical pollutants. These elements interact in complex ways within aquatic systems to directly and indirectly influence patterns of growth, reproduction, and mobility of aquatic organisms. For example, sediment may not be directly lethal to fish, but sediment deposited on the streambed may disrupt the productivity and life cycles of fish and aquatic insects. The Merced River has been extensively monitored for water quality.

Merced River Watershed. The chemistry of surface waters in the Merced River watershed is characterized by low electrical conductivity (limited ions due to a lack of dissolved solids), near-neutral pH, low alkalinity, and low nutrient concentrations (NPS 1994). Calcium and bicarbonate are the predominant ions in the waters. Within the Merced River, major ion concentrations slightly increase downstream, but levels remain relatively low and no significant changes have been observed in pH, alkalinity, or nutrient concentrations (NPS 1994). Due to the low alkalinity of the stream water, the *buffering capacity* (ability to absorb water chemistry changes or additions) of the Merced River and its tributaries is limited.

Water quality within the South Fork watershed is very similar to that of the main stem of the Merced River. Water quality is excellent in most areas although some water quality stressors have been exhibited near human development.

Tuolumne River Watershed. Water quality of the Tuolumne River watershed is similar to that of the Merced River watershed, and generally appears to be of high quality (NPS

1994). The quality of the Tuolumne River water above Hetch Hetchy Reservoir can be attributed to the river's free flow, its location high in the watershed, its confluence of a low order of streams, and its position in an area of minimal development. Because of the reservoir's use as a water supply, the park has taken a preventive approach to watershed health and the maintenance of high water quality.

Fire and Water Quality

High-intensity Wildland Fire. The riparian systems in Yosemite are resilient and typically return to their previous condition after low-intensity fire events. High-intensity wildland fire, on the other hand, can reduce or remove protective riparian vegetation that regulates stream temperature; traps and transforms nutrients, chemicals, and sediment; and moderates the flow of organic materials (stems, leaves, insects, microorganisms, etc.). Catastrophic fire also increases the amount of flowing water on exposed bare soils, causing erosive overland flow (*sheetflow*), rills, or gullies, and substantially increasing the sediment load into streams. This accelerated loss of soil adversely affects terrestrial and aquatic ecosystems—it depletes the land of nutrients and overloads streams with sediments.

Prescribed Fire. Because prescribed fires burn under controlled fuel moisture and weather conditions, time of day, and spatial patterns of ignition, the impacts to soils and vegetation are considerably less than with high-severity wildland fires. Prescribed fires generally retain a portion of the duff layer that helps to prevent soil erosion. In contrast to the impacts from high-severity wildland fire, infiltration rates are not greatly reduced, therefore, prescribed fire treatments tend not to exacerbate overland flow. Without overland flow, movements of soil into stream channels is limited to soil creep and ravel on steep slopes, at rates only slightly higher than areas not receiving prescribed fire.

Mechanical Treatments. The potential effects of mechanical treatments on water quality decreases as the distance from streams increases. Research in Yosemite shows that, within 300 feet of a stream, activities that compacted more than 5% of the area significantly reduced the population of sediment intolerant aquatic invertebrates (McGurk and Fong 1995). Activities that prescribe stream buffers or limits to ground disturbance can control amounts of sediment reaching the aquatic ecosystem. The risk of accelerated erosion or alteration of soil conditions from mechanical fuel reduction treatments varies depending on factors such as total acres treated, method of treatment, type of equipment used, amount and type of materials yarded or piled, soil type, soil moisture conditions, degree of slope, and history of past disturbance. The primary potential source area for sediment would be ephemeral channels and skid roads, and their immediate vicinity.

Air Quality

Yosemite National Park is classified as a mandatory Class I area under the Federal Clean Air Act (42 USC 7401 et seq.). This most stringent air quality classification is aimed at protecting national parks and Wilderness areas from air quality degradation. The Act gives federal land managers the responsibility for protecting from adverse air pollution impacts on air quality and related values, including visibility, plants, animals, soils, water quality, cultural and historic structures and objects, and visitor health.

Yosemite National Park lies within three California counties: Tuolumne and Mariposa which are within the Mountain Counties Air Basin, and Madera which is within the San Joaquin Valley Air Basin—part of the San Joaquin Valley Unified Air Pollution Control District. Yosemite Valley is in Mariposa County, which is regulated by the Mariposa County Air Pollution Control District.

National Ambient Air Quality Standards. The federal Clean Air Act, as amended in 1990, requires the Environmental Protection Agency (EPA) to identify national ambient air quality standards to protect public health and welfare. Standards have been set for six pollutants: ozone (O_3), carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), particulate matter less than 10 microns (PM_{10}), and lead (Pb). In 1997, the EPA released revised national ambient air quality standards for ozone and for particulate matter less than 2.5 microns ($PM_{2.5}$). In the spring of 1999, a U.S. Court of Appeals panel remanded the new standards to the EPA for further consideration. However, in early 2001, the Supreme Court upheld the EPA's authority to set these new, more stringent standards.

While the EPA's authority to set the new eight-hour ozone standard was upheld, the Supreme Court ordered it to rework its policy for implementing the new ozone standard in non-attainment areas. Although the Court of Appeals prohibited the EPA from implementing the eight-hour ozone standard, it did note that the Clean Air Act required the EPA to finalize area designations within specific timeframes. The California Air Resources Board updated the proposed area recommendations with the most current air quality monitoring data and transmitted California's recommendations to the EPA in July 2000. These recommendations include non-attainment designations for the federal eight-hour standard for the Mountain Counties and San Joaquin Air Basins.

The pollutants are called criteria pollutants because the standards satisfy criteria specified in the Act. An area where a standard is exceeded more than three times in three years can be considered a non-attainment area subject to planning and pollution control requirements, which are more stringent than in areas that meet standards. Table 3.7 presents the federal and California ambient air quality standards. Table 3.8 shows the California and federal air quality standards attainment designation for the counties containing portions of Yosemite National Park.

While air quality in an air basin is usually determined by emission sources within the basin, pollutants transported from upwind air basins by prevailing winds can also affect it. For example, the California Environmental Protection Agency concluded that the ozone exceedences in 1995 in the southern portion of the Mountain Counties Air Basin (i.e. Tuolumne and Mariposa Counties) were caused by transport of ozone and ozone precursors from the San Joaquin Air Basin. Air quality in the Mountain Counties Air Basin also is affected by pollutant transport from the metropolitan Sacramento and San Francisco areas.

Table III-7
Federal and California Ambient Air Quality Standards

Pollutant	Averaging Time	Federal Standards		California Standards	Objective
		Primary	Secondary		
Ozone (O_3)	1-hour	0.12 ppm (235 μg/m^3)	0.12 ppm (235 μg/m^3)	0.09 ppm(180 μg/m^3)	To prevent breathing difficulties, eye irritation, and biological effects to sensitive species
	8-hour	0.08 ppm (157 μg/m^3)	0.08 ppm (157 μg/m^3)	NS	
Carbon Monoxide (CO)	1-hour	35 ppm (40 mg/m^3)	35 ppm (40 mg/m^3)	20 ppm (23 mg/m^3)	To prevent carboxyhemoglobin levels greater than 2%
	8-hour	9 ppm (10 mg/m^3)	NS	9.0 ppm (10 mg/m^3)	
Nitrogen Dioxide (NO_2)	1-hour	NS	NS	0.25 ppm(470 μg/m^3)	To prevent breathing difficulties, reduce smog formation, and improve visibility
	Annual Average	0.053 ppm (100 μg/m^3)	0.053 ppm (100 μg/m^3)	NS	
Sulfur Dioxide (SO_2)	1-hour	NS	NS	0.25 ppm (655 μg/m^3)	To prevent increased respiratory disease, acid

Pollutant	Averaging Time	Federal Standards Primary	Federal Standards Secondary	California Standards	Objective
	3-hour	NS	0.5 ppm (1300 μg/m^3)	NS	rain, crop damage, and odor nuisance, and to improve visibility
	24-hour	0.14 ppm (365 μg/m^3)	NS	0.04 ppm (105 μg/m^3)	
	Annual Average	0.03 ppm (80 μg/m^3)	NS	NS	
Respirable Particulate Matter (PM_{10})	24-hour Average	150 μg/m^3	150 μg/m^3	50 μg/m^3	To prevent chronic diseases of the respiratory tract and improve visibility
	Annual Mean	50 μg/m^3 (arithmetic)	NS	30 μg/m^3 (geometric)	
Fine Particulate Matter ($PM_{2.5}$)	24-hour	65 μg/m^3 (arithmetic)	65 μg/m^3 (arithmetic)	NS	
	Annual Mean	15 μg/m^3 (arithmetic)	15 μg/m^3 (arithmetic)	NS	
Lead	30-day Average	NS	---	1.5 μg/m^3	To prevent neurological system damage
	Calendar Quarter	1.5 μg/m^3	1.5 μg/m^3	NS	
Sulfates	24-hour	NS	NS	25 μg/m^3	To improve visibility and prevent health effects
Visibility-Reducing Particles	One Observation	NS	NS	No reduction in prevailing visibility to <10 miles when relative humidity <70%	
Hydrogen Sulfide	1-hour	NS	NS	0.03 ppm (42 μg/m^3)	To prevent odor nuisance

ppm = parts per million, μg/m^3 = micrograms per cubic meter, NS = No standard

California Ambient Air Quality Standards. To protect public health and welfare, the California Air Resources Board has set stricter ambient air quality standards than national standards. Under the 1988 California Clean Air Act, air basins were designated as attainment, non-attainment, or unclassified for the state standards.

State Implementation Plan. State implementation plans define control measures that are designed to bring areas into attainment. Currently, Mariposa and Tuolumne Counties are in attainment or are unclassified for all national ambient air quality standards, but Madera County is in non-attainment for the PM_{10} and ozone national ambient air quality standards. Basic components of a state implementation plan include legal authority, an emissions inventory, an air quality monitoring network, control strategy demonstration modeling, emission limiting regulations, new source review provisions, enforcement and surveillance strategies, and other programs necessary to attain standards.

Table III-8
Status of Ambient Air Quality Designations

A = **A**ttainment **N** = **N**on-attainment **U** = **U**nclassified

Pollutant	Tuolumne County		Mariposa County [a]		Madera County	
	California	Federal	California	Federal	California	Federal
Ozone (one-hour) (O_3)	N	U/A	N	U/A	N	N
Carbon monoxide (CO)	A	U/A	U	U/A	U	U/A
Nitrogen dioxide (NO_2)	A	U	A	U	A	U/A
Sulfur dioxide (SO_2)	A	U	A	U	A	U

Particulate matter	U	U	N	U	N	N
Lead [b] (Pb)	A	—[b]	A	—[b]	A	—[b]

a Yosemite National Park portion of Mariposa County
b EPA does not designate areas for the lead standard in the same manner as for other pollutants. However, there are no areas in California that exceed the national standard for lead.

Applicable Air Quality Rules, Regulations, and Guidelines. The California Air Resources Board is responsible for disseminating regulations about air quality, including state ambient air quality standards and area designations, emissions from motor vehicles, fuels and consumer products, and airborne toxic control measures. Title 17 of the California Code of Regulations, titled Smoke Management Guidelines for Agricultural and Prescribed Burning, provides direction to air pollution control and air quality management districts (air districts) for the regulation and control of agricultural burning, including prescribed burning. The guidelines are intended to provide for the continuation of prescribed burning as a resource management tool, while minimizing smoke impacts on the public. Local and regional authorities have the primary responsibility for control of air pollution from prescribed burning. These agencies and the regulatory citations that address prescribed burning are:

Mariposa County: Mariposa County Air Pollution Control District,
Rule 307 – Wildland Vegetation Management Burning
Tuolumne County: Tuolumne County Air Pollution Control District,
Rule 307 – Wildland Vegetation Management Burning
Madera County: San Joaquin Valley Unified Air Pollution Control District,
Rule 4103 – Open Burning

These air district rules generally specify that the agency planning a prescribed fire must notify the air district and provide burning location, acreage, vegetation type, fuel conditions, schedule, location of sensitive receptors, and other information. Fees may also be required.

The EPA has developed regional haze regulations to improve visibility or visual air quality in national parks and Wilderness areas across the country (US EPA 1999). In developing these rules, the EPA recognized that fires of all kinds, including prescribed fire and wildland fires, contribute to regional haze and there is a complex relationship between what is considered a natural source of fire versus a human-caused source of fire. Given that in many instances the purpose of prescribed fires is to restore the natural fire regime to forest ecosystems, the EPA is working with states and federal land managers to support development of enhanced smoke management plans to minimize the effects of fire emissions on pubic health and welfare.

National Park Service Guidance and Policies. As noted earlier (Chapter 1, Purpose And Need), a principal management objective is to manage air quality effects of prescribed fires by working with county and state air resources personnel and using the latest technology to monitor and manage the amount of smoke reaching visitors, residents, and employees. In addition to complying with state and local air quality rules and regulations, the National Park Service also has developed guidance on air quality and smoke management related to wildland and prescribed fires (NPS 1999b). This is supplemented by guidance and policies from the EPA. These include the Interim Air Quality Policy on Wildland and Prescribed Fires, Federal Wildland Fire Management Policy, and PM_{10} Natural Events Policy. In 1998, the EPA developed an interim policy for addressing impacts of managed wildland fires and prescribed fires on public health and welfare.

Ambient air quality below the national ambient air quality standards for $PM_{2.5}$ and PM_{10} is used as the principal indicator of adverse impacts to public health. Poor visibility is used as the principal indicator of adverse impacts to public welfare. This policy complements the Natural Events Policy, which addresses public health impacts from wildland fires.

Sensitive Receptor Areas. One objective of the California Air Resources Board and National Park Service mandates and policies is to minimize smoke impacts on people and *sensitive receptor* areas in and near the park. Sensitive receptor areas can include towns, villages, hospitals, schools, nursing homes, shopping centers, campgrounds, recreational areas, trails, public events, scenic vistas, and Class I areas. Selection was based on guidance from the California Code of Regulations Title 17, Smoke Management Guidelines for Agricultural and Prescribed Burning and by assessing regional demographics and population dynamics, local wind patterns, climatic conditions, smoke transmission/fire behavior, and input from affected air districts.

Yosemite National Park Inventory of Air Pollution Emission Sources. Air quality in the park is affected by internal and external air pollution sources. Internal air pollution sources include mobile sources and stationary sources (furnaces, boilers, and woodstoves). External air pollution sources or area sources include campfires, barbecues, and prescribed and wildland fires.

Most of the stationary and area sources are associated with the operations of the National Park Service and the Yosemite Concession Services Corporation; however, most campfires are controlled by visitors. Emissions associated with visitor vehicles and tour buses constitute the largest sources of mobile source emissions in Yosemite Valley and other heavily visited areas.

There is a number of air quality monitoring stations in and near the park. Monitors in the park include an ozone monitor and an Interagency Monitoring of Protected Visual Environments (IMPROVE) site at Turtleback Dome and a particulate monitor at park headquarters near the visitor center in Yosemite Valley. Table 3.9 lists the monitors near the park.

Table III-9
Air Quality Monitoring in the Vicinity of Yosemite National Park

State	County	Community	Pollutant[a]				
			PM_{10}	SO_2	O_3	CO	NO_2
California	Fresno	Clovis	x		x	x	x
		Fresno	x	x	x	x	x
		Parlier			x		x
		Shaver Lake			x		
	Madera	Madera			x		x
	Mariposa	Yosemite National Park	x		x		
		Jerseydale			x		
	Merced	Merced			x		x
	Mono	Lee Vining	x				
		Mammoth Lakes	x		x	x	
		Mono Lake	x				
	Tuolumne	Sonora			x	x	
Nevada	Douglas	State Line	x		x	x	x
		Minden	x				
		Gardnerville	x				

a PM10 = Suspended Particulate, SO2 = Sulfur Dioxide, O3 = Ozone, CO = Carbon Monoxide, NO2 = Nitrogen Dioxide

According to the latest California Air Resources Board air monitoring data (table 3.10), ambient air quality exceeded the state 1-hour ozone standard during three days in 2000, which compares to ten days in 1998, at the Turtleback Dome monitoring station. If the new eight-hour ozone national standard were in effect, the standard would have been exceeded nine, four, and six times in 1998, 1999, and 2000, respectively. The Yosemite Valley monitoring station exceeded the state 24-hr PM_{10} standard in 1999 on two days and in 2000 on one day. No exceedences of the PM_{10} federal 24-hr annual standard were recorded for those years at this station.

Table III-10
Highest Recorded Ozone and PM_{10} Measurements at Yosemite National Park

	Year					
	1998		1999		2000	
Highest Hourly Ozone Measurement (ppm)						
Highest	Sep 2	0.106	Jun 28	0.096	Aug 3	0121
2nd Highest	Aug 12	0.104	Jul 12	0.095	Aug 2	0.110
3rd Highest	Aug 5	0.103	Jul 14	0.095	Jul 12	0.095
4th Highest	Aug 25	0.103	Sep 15	0.095	Jun 16	0.093
Days Exceeding California Standard	10		4		3	
Days Exceeding National Standard	0		0		0	
8-Hour Ozone Averages (ppm)						
Highest	Aug 25	0.099	Jul 12	0.089	Aug 3	0099
2nd Highest	Sep 2	0.098	Jul 23	0.087	Aug 2	0.097
3rd Highest	Aug 5	0.094	Jul 27	0.087	Jul 12	0.090
4th Highest	Aug 12	0.094	Jun 23	0.085	Jun 16	0.087
Days Exceeding National Standard	9		4		6	
Particulate Matter or PM_{10} ($\mu g/m^3$)						
Highest	Sep 2	40	Jan 6	82	Jan 1	60
2nd Highest	Jan 27	39	Jan 12	74	Jan 7	42
3rd Highest	Jul 16	37	Oct 3	47	Jan 4	39
4th Highest	Oct 6	37	Jun 17	46	Feb 6	37
Days Exceeding California Standard	0		2		1	
Days Exceeding National Standard	0		0		0	

Conformity Rule. In 1993, the EPA adopted regulations implementing section 176 of the Clean Air Act, as amended. Section 176 requires that federal actions conform to state implementation plans for achieving and maintaining the national standards. Federal actions must not cause or contribute to new violations of any standard, increase the frequency or severity of any existing violation, interfere with timely attainment or maintenance of any standard, delay emission reduction milestones, or contradict State Implementation Plan requirements. The conformity rule applies only in federal non-attainment areas, such as Madera County. However, the California Air Resources Board indicates that Mariposa County, which includes Yosemite Valley, is likely to be declared a non-attainment area for the new eight-hour ozone standard in the near future, at which time conformity must be demonstrated.

Cultural Environment

Cultural resources in Yosemite National Park and the El Portal Administrative Site (the “project area”) include prehistoric and historic archaeological sites, historic sites and structures, cultural landscapes, and traditional cultural properties or ethnographic resources (both natural and cultural resources) that are important to the continuing culture and traditions of park-associated American Indian people. Some of the cultural resources are housed in museum collections. These resources reflect early settlement, use, and management of the lands by indigenous people; westward expansion of Euro-American people (as well as Asian and other non-European people) and their conflict with American Indian groups; resource extraction such as logging, mining, and herding; early tourism; early environmental conservation efforts; development of water resources; and park planning, design, and land management—they are the physical evidence of human presence spanning the majority of the Holocene.

While Yosemite National Park holds important museum collections, these are not discussed in depth in the *Final Yosemite Fire Management Plan/EIS* because they are not generally affected or threatened by wildland or prescribed fire management practices. However, actions associated with implementation of elements of the alternatives could indirectly affect the museum collections. Such changes would typically involve additions to the collections generated from archaeological data recovery conducted as mitigation for direct site impacts. These changes would be minimal and would require additional museum storage space and ongoing collections maintenance and management. Specific facilities designed for museum collections preservation and protection, and are addressed in other documents such as the *Structural Fire Management Plan* and the *Collections Management Plan*.

The following discussion of cultural resources is based on general overview studies and specific cultural resource research (Hull and Moratto 1999; NPS 1987a, 1990b, 1998c, 2000d, 2001b). It is important to note the limitations inherent in the information about cultural resources. Yosemite National Park lacks three key overview studies: an overview and assessment of ethnographic resources, cultural affiliation studies, and an administrative history. Yosemite is also lacking a systematic inventory of ethnographic resources, although Bibby (1994) conducted an evaluation of ethnographic resources in Yosemite Valley. Some limited, anecdotal information regarding ethnographic resources is available for other park areas. Only about 8% of the park has been inventoried for archaeological sites; within this area 1,375 sites have been recorded. While most historical eras and events are documented, the location, extent, condition, and significance of many of the physical resources reflecting these episodes are unknown. The exception is part of the park's Wilderness area, where approximately 2,000 historic resources have been recorded. The documentation available for known resources typically lacks data necessary to determine whether there is potential for fire-related impacts to occur.

Of the known physical resources, many of the historic structures are either listed or considered eligible for listing in the National Register of Historic Places. Few archaeological sites have been individually nominated for listing in the National Register, but many areas with site concentrations have been listed or determined eligible for listing.

The build-up of fuels from years of fire suppression in some areas of the park puts many cultural resources at risk from damaging effects of high-intensity fire. However, it is likely that, except for the archaeological resources from the late 1800s and early 1900s, archaeological sites have been burned over in the past. Therefore, the susceptibility of these sites to fire depends on fuel accumulation near each site and the types of resources present that might be affected by fire. Many of the park's historical resources, however, may not have been exposed to fire. Wooden buildings, blazed trees, and other flammable historical resources are the most susceptible to damage from fire and require the most intensive management during wildland fires. To facilitate decision making during a fire event, a set of digital cultural resource maps has been developed and incorporated into the park's geographic information system (GIS). This information is currently available for prescribed fire planning and to incident commanders during wildland fire situations. Details about the types of resources and effects of fire are presented in Chapter 4, Environmental Consequences. The remainder of this chapter provides a framework for discussing the specific cultural resources in Yosemite that require special consideration in fire management.

Human Occupation

American Indian Occupation

Preliminary archaeological evidence indicates people may have been living in the area now comprising Yosemite National Park and the El Portal Administrative Site as long as 9,500 years ago. The park area contains thousands of archaeological sites, evincing technological change through time, a highly developed trade network, at least one population replacement, and significant environmental manipulation through the use of fire. The arrival of the Spanish in California in the late-18th century brought profound changes. As a result of Spanish colonization and continuing after the independence of Mexico, which included the Territory of California, American Indians from the foothill and coastal regions migrated to the Sierra Nevada—bringing with them European goods and diseases and aligning themselves with tribes already living there.

When Euro-Americans first entered Yosemite Valley in 1851, American Indians living there were most likely a mixture of Southern Sierra Miwok, Mono Lake Paiute, and Central Sierra Miwok, as well as former Mission Indians likely from Yokuts, Plains Miwok, and Ohlonean groups. The upland areas of the Merced River drainage were frequented by Southern Sierra Miwok, possibly Mono Lake Paiute, and at least traversed by Western Monos and possibly Chukchansi Yokuts. El Portal was inhabited by Southern Sierra Miwok people. The Wawona area was home to Southern Sierra Miwok people, and perhaps some Western Mono and Chukchansi Yokuts. The Tuolumne watershed area was home to Central Sierra Miwok, Southern Sierra Miwok, Mono Lake Paiute, and Bridgeport Paiute.

Euro-American Occupation

Euro-American use of the Yosemite area has been relatively short in the span of human occupation. During this brief time, many large-scale changes have occurred, which have dramatically altered the landscape. While Euro-Americans passed through the Yosemite area beginning in the 1830s, it was not until the mid-1850s and 1860s that the natural scenery of Yosemite Valley was brought to America’s attention. By 1860, entrepreneurs constructed hotels, trails, and homes; filed claims and homesteads; planted orchards and field; and built cabins in what would become Yosemite National Park. In 1864, President Abraham Lincoln and the US Congress set aside the Big Tree Grove (Mariposa Grove) and Yosemite Valley, granting them to the state of California as a public park to preserve the monumental scenic qualities of the area.

By the 1870s and 1880s roads were established to bring tourists to Yosemite Valley. During this period, settlers and entrepreneurs began extracting resources such as barium, silver, gold, while they grazed livestock and logged trees in the Yosemite Sierra. Reaction to this “exploitation” preceded the early conservation movement and lead to the congressional act establishing Yosemite National Park in 1890. The logging industry profoundly changed the forest landscapes in and adjacent to the park. Beginning in the early 1900s, the Madera Sugar Pine Company extracted timber in the Southern portion of the park. By 1912, the Yosemite Lumber Company was surveying railroad routes to the Alder Creek area where it owned land within the park boundaries. In addition to the large scale logging industries, many smaller logging operations worked in the forests of Yosemite Valley, Aspen Valley, Canyon Ranch, Foresta, and Wawona.

Beginning in 1933, the Civilian Conservation Corps under the auspices of the Public Works Administration also completed an extensive range of projects in Yosemite, including construction of roads, trails, bridges, fire roads, fire buildings, fire lanes, fire trails, comfort stations, and campgrounds. Additional projects included river and creek bank stabilization, revegetation, extensive landscaping, and debris cleanup.

Fire in Early Yosemite History. While it has been hypothesized that the reduction in fire frequencies seen in the early 1800s was due to the decline in American Indian population, the use of anthropogenic fire did not stop when the Euro-Americans arrived. Fire was used by miners during the gold rush era to aid in general land clearing (Caprio and Swetnam 1995; Kilgore and Taylor 1979; UC Davis 1996e). John Muir (1938) noted "fire was also heavily employed by the early sheep and cattle men who pastured their herds in the mountains and burned the land behind them as they descended from the mountains each year."

By the mid- to late-19th century fire was seen by most as "dangerous" and ecologically devastating. The 1866 California State Legislature Act that accepted the Yosemite Grant stipulated that:

It shall be unlawful for any person willfully to … cut down or carry off any wood, underwood, tree, or timber, or girdle, or otherwise injure any tree or timber, or deface or injure any natural object, or set fire to any wood or grass upon said premises…Any person committing either or any of said acts … shall be guilty of a misdemeanor, and on conviction thereof, shall be punished by fine, not exceeding five hundred dollars, or by imprisonment in the County Jail…

~ (Commissioners 1867: 24)

The impacts of fire suppression soon changed the scenic qualities for which Yosemite Valley was set aside. The dichotomy between suppressing fire and wanting open, "park-like grounds" can be seen as early as 1880 when J. M. Hutchings, in his Report of the Guardian, stated: "A dense growth of underbrush, almost from one end of the Valley to the other, not only offends the eye and shuts out its magnificent views, but monopolizes and appropriates its best land, to the exclusion of valuable forage plants and wild flowers" (Commissioners, 1880: 7). He goes on to state the danger of fire, while setting a policy of fire suppression and selected thinning and pile burning which would stand for almost one hundred years:

This magnificent forest of giant forms [the Mariposa Grove of Big Trees], commanding, as it deservedly does, the admiration of every beholder, is in great danger of being irreparably injured, if not destroyed, by fire. Immense masses of rotten wood, and of fallen trees, full of pitch, lie immediately contiguous to, and, in many instances, directly against the base of these noble monarchs, inviting their destruction, should fire ever enter their impressive precincts. There can be but little doubt that no time should be lost in removing this inflammable material to a safe distance, and carefully burning it, to protect this wonderful grove from destruction

~ (Commissioners 1880: 9).

The conflicts surrounding the encroachment of underbrush and buildup of fuels and the appropriate use of fire has been a continuing struggle since the cessation of American Indian burning practices.

Archaeological Resources

In general, archaeological sites are important for the information they can provide regarding prehistoric and historic lifeways. They are also important to people as a tangible link with the past. Prehistoric sites in Yosemite generally contain: flaked and ground stone tools, waste from tool manufacture, food processing features, fire hearths, structural remains, human burials, and rock art. Historic archaeological sites provide important information not available in written records, such as cultural patterns typically omitted from historical literature (related to gender and ethnic groups), early building construction techniques, lifestyles of early settlers, trade and procurement of goods and materials, and interactions with native peoples. Historic sites include such things as structural remains, waste dumps, work camps, and remains of logging, hydrological manipulation, and mining activities.

Table III-11
Archeological Surveys and Known Sites in 1990 Fire Management Plan Zones

Fire Management Zone	% of Zone Surveyed	Acres Surveyed	Known sites
Suppression	24 %	26,331	612
Prescribed Natural Fire	8 %	25,726	767
Conditional	4%	4,473	67

In most cases, archaeological inventories have been conducted in support of park development projects. Most of this work has focused on lower elevation developed areas and road corridors. The archaeological database is, thus, not a representative sample of the park (Hull and Moratto 1999). The lack of surveys extends to the existing fire management zones (table 3.11 and map 3-3).

In general, archaeological resources are at greater risk of damage and/or loss from high-intensity burns than low-intensity burns. The heavy fuel loads and unnaturally dense forest stands existing in parts of Yosemite today, decrease ground visibility, which in turn decreases the probability that archaeological resources will be detected during inventories. Large fuel loads also increase the risk of high-intensity wildland fires, thus increasing the potential for damaging archaeological resources.

Recent studies on the historic American Indian use of fire (Anderson and Moratto 1996) suggest that fires lit by American Indian would have been centered around late prehistoric and protohistoric occupation sites. It is possible this pattern of land management also extends into the more distant past and areas surrounding many of the prehistoric occupation sites may have been subject to a greater degree of fire than similar areas that did not contain such occupation sites (Wickstrom and Roper 1987). The extent of fire, both lightning- and American Indian- ignited, prior to 20th century suppression efforts makes it likely that many prehistoric archaeological resources have been repeatedly exposed to fire in the past. Therefore, we can assume most of the damage that could occur to these archaeological sites from low-intensity fires has already occurred at many of these sites. A prescribed fire regime, that maintains relatively light fuel loads, can therefore actually protect many archaeological sites from damage of intense wildfires (Jackson 1997).

Ethnographic Resources

The National Park Service defines ethnographic resources as any "site, structure, object, landscape, or natural resource feature assigned traditional, legendary, religious, subsistence, or other significance in the cultural system of a group traditionally associated with it" (NPS 1998a). A traditional cultural property is an ethnographic resource that is eligible for listing in the National Register of Historic Places. Two places in Yosemite Valley have been proposed as traditional cultural properties.

Many American Indian people and groups continue their traditional cultural association with park lands and resources. At least seven federally recognized tribal groups and nonrecognized American Indian communities are associated with the park. These park-associated tribes and groups include the American Indian Council of Mariposa County, Inc. (Southern Sierra Miwok); the North Fork Mono Rancheria; the Tuolumne Band of Me-Wuk Indians; the Picayune Rancheria; the Mono Lake Indian Community; the Bridgeport Paiute Indian Colony; and the Bishop Paiute Tribe.

The National Park Service consults with park-associated American Indian tribes and groups regarding annual fire programs and in emergency wildland fire situations. In general, American Indian groups have expressed concern about landscape changes caused by fire exclusion, the abundance and vigor of traditionally used plants (many of which were managed by fire), damage to traditionally used plants resulting from cutting or burning in the wrong season, and protection of archaeological objects and features—both from damaging effects of heating and direct impacts associated with fire management activities (thinning trees, building hand-lines, etc.).

Based on consultations with American Indian tribes and groups as well as research related to American Indian use of fire, park objectives to manage cultural resources are to develop project-specific objectives. Mitigating measures related to ethnographic resources will be taken where necessary and appropriate, in consultation with park-associated American Indian tribes and groups.

American Indian Use of Fire to Influence the Environment. American Indians have intensively managed biotic resources in the Sierra Nevada for thousands of years. Resource management practices were widespread, producing ecological and evolutionary consequences in ecosystems of the region (Anderson and Moratto 1996). In order to meet their requirements for firewood, fish and game, plant foods, craft supplies, and building materials, American Indian peoples shaped the distribution, structure, composition, and extent of certain plant and animal communities. This was accomplished using proto-agricultural techniques such as pruning, sowing, weeding, tilling, selective harvesting, and burning.

Fire was the American Indians' most important management tool in the Yosemite region, and was used most commonly in the foothill woodland, chaparral, mixed conifer, riparian corridors, and meadow vegetation types. Generally fire was used "to clear brush, maintain grasslands and meadows, improve browse for deer, enhance production of basketry and cordage materials, modify understory species composition in forests, and reduce fuel accumulation that might otherwise sustain intense fires" (Anderson and Moratto 1996). Fire was used to foster desirable attributes in certain plants and "individual shrubs or clusters of shrubs were burned to manipulate the plant architecture and keep the plants insects and pathogen-free" (Anderson 1993).

In addition, "burning at higher elevations was for the expressed purpose of removing shrub and duff layer… causing ephemeral creeks and streams to run longer in the summer" (Anderson and Moratto 1996). Fire was also used in hunting and driving small mammals, insects, and birds. The broad result of American Indian-based management was continuous introduction of small disturbance regimes that created openings or clearings in various plant community types. These clearings allowed early-seral plants to grow in, which created a greater diversity of species and increased productivity.

In areas where American Indians lived, fuel loads and forest conditions were further altered by daily firewood use. Anderson and Moratto (1996) estimate that each household would have used an average of 10 kg (22 lb) of firewood each day. Some larger villages (300 to 500 members) could use 250 metric tons of firewood annually.

Use of fire by American Indians may have encouraged a diverse habitat near areas of human habitation. For these and other reasons noted above, it is critical that land managers understand American Indian burning objectives and practices for management of different plants and landscapes. It is only with an understanding of these previous human-based disturbance regimes that current land managers can assess current landscape conditions and re-integrate fire into the ecosystem.

Cultural Landscape Resources (Including Historic Sites and Structures)

A cultural landscape is a reflection of human adaptation and use of natural resources and is often expressed in the way land is organized and divided, patterns of settlement, land use, systems of circulation, and the types of structures that are built. Shaped through time by historical land use and management practices, as well as politics and property laws, levels of technology, and economic conditions, cultural landscapes provide a living record of an area's past, a visual chronicle of its history. The National Park Service defines and actively manages four types of cultural landscapes: designed landscapes, vernacular landscapes, historic sites, and ethnographic landscapes (NPS 1998a). Sixty-five potential cultural landscapes are identified within the park.

Preservation of cultural landscapes requires long-term management of the characteristics and features that give them their historical significance. These characteristics are not managed in isolation but as a whole. What makes the cultural landscape significant is the relationship among isolated features such as roads and fences, orchard trees and outbuildings, grinding stones and house remains. In this regard, protection of cultural landscapes in fire regimes requires a broad view of effects and holistic preservation strategies.

Historic structures are significant because they reflect important eras or the influence of individuals important in the human history of the park. Five National Historic Landmarks are located in Yosemite: The Ahwahnee, the LeConte Memorial Lodge, Parsons Memorial Lodge, the Rangers' Club and garage, and the Wawona Hotel. These reflect the highest level of historic significance. The National Park Service is charged with maintaining all historically significant structures to prevent any degradation of significant characteristics. The List of Classified Structures (1998c) for Yosemite identifies nearly 500 historic structures. Many of these are listed or eligible for listing on the National Register of Historic Places. The existing accumulation of burnable materials across Yosemite's landscape means that many historic sites such as homesteads, mining cabins, railroad grades, and other resources – and the information contained within these historic sites – are at risk of being lost to wildland fires.

Although the park lacks a comprehensive, parkwide inventory of historic sites and structures, there is a great deal of information about Yosemite's historical resources. An overview of historic resources was conducted in 1987 and an inventory of historic resources in Wilderness areas was conducted in the late 1980s and early 1990s (NPS 1989, 1990). Approximately two thousand historic trails, tree blazes, buildings, structures, and miscellaneous features were documented. In addition, comprehensive inventories and evaluations of historic sites, structures, and cultural landscape resources have been undertaken for Yosemite Valley and El Portal (NPS 1994, 1998b, 2001). Many different historic resource property types are documented (and expected) in Yosemite (Hull and Moratto 1999).

Social Environment

Recreation

This topic describes the relationship between fire management activities and recreation in Yosemite National Park. It provides the basis for the subsequent evaluation of recreational issues, as they are influenced by routine fire management activities, such as prescribed fire, managed wildland fires, and fuel reduction. Yosemite National Park, as guided by its enabling legislation and the National Park Service Organic Act of 1916, has two interwoven purposes:

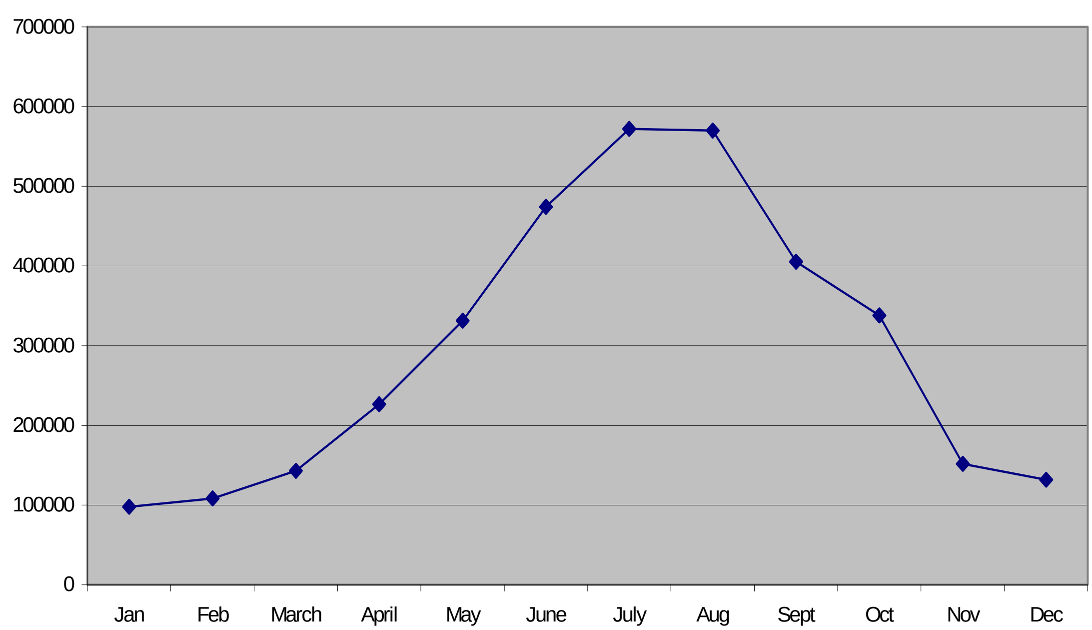
The first is the preservation of the resources that contribute to Yosemite's uniqueness and attractiveness its exquisite scenic beauty; outstanding Wilderness values; a nearly full diversity of Sierra Nevada environments, including the very special sequoia groves; the awesome domes, valleys, polished granites, and other evidences of the geologic processes that formed the Sierra Nevada; historic resources, especially those relating to the beginnings of a national conservation ethic; and evidences of the Indians who lived on the land. The second purpose is to make the varied resources of Yosemite available to people for their individual enjoyment, education, and recreation, now and in the future.

~ (1980 General Management Plan)

Visitor Use

For the last decade, park visitation has been between 3.5 and 4.1 million people annually. Most people come during late spring through early autumn. Over half of Yosemite's visitors enter Yosemite Valley. Visitation to Yosemite increased steadily from 1990 through 1996. In the aftermath of the flood of 1997, fewer people came to Yosemite, however, visitation may again be on the rise. In 2000 visitation was slightly over 3.5 million (figure 3.1)

Figure III-1
January - December 2000 Visitation, Yosemite National Park. Number of Visitors by month. Total Visitation = 3,550,065



Fire management activities can affect visitors in several ways. Smoke is the most obvious – it can affect visitors throughout the park – especially during wildland fire season in the Sierra Nevada. Because of the need to protect people and buildings, the most heavily visited areas of the park are also the areas most impacted by prescribed burning. Visitors are most likely to be exposed to prescribed burning during the months of May and June (spring burning) and September through mid-December (fall burning). This includes work in Yosemite Valley, Wawona, and other developed areas. Visitors from late May through late October are the most likely to be exposed to the effects of wildland fires since most of these fires occur between late June and late September. Wilderness hikers may be prohibited from entering an area in which a wildland fire is burning or may elect to avoid areas because of smoky conditions.

Valley Visitation. The number of visitors to the Valley tends to vary by month in a pattern similar to parkwide visitation. More than 50% of the total annual visitors come to the Valley in July and August. During August 1998, on an average day, an estimated 10,950 day visitors and 6,383 overnight visitors were in the Valley for at least a portion of the day. Daily visitation in April averaged 7,624, that year, substantially lower than in the peak season.

Wilderness Visitation. In Yosemite, 704,624 acres are designated Wilderness. Nearly 50,000 visitors per year enter the Wilderness areas. They are the most likely to be exposed to effects from managed wildland fires. This would occur primarily between late June and late September, when the frequency of lightning fires is greatest.

The Yosemite Experience

For many visitors, driving through the park is the primary means for experiencing the spectacular views of Yosemite. And en route, the drive into the park is also usually a pleasurable experience, contributing to visitors' enjoyment of the park. Many visitors make informal stops along park roads to take advantage of the unique and varied scenery. Visitor activities in Yosemite National Park include sightseeing, walking and hiking, bicycling, climbing, stock use, picnicking, and nature photography.

Many people come to Yosemite to see the Valley's grandeur—it's waterfalls and geologic features. In the Valley the continuum of visitor experiences extends from highly social to isolated, from independent to directed, from spontaneous to controlled, from easy to challenging, and from natural to more urban. For many, the Valley provides a transition zone, a place neither urban nor Wilderness, but with elements of both. Quiet, an important characteristic of a quality visit for many visitors is sometimes difficult to find, as roads carry traffic on both sides of the Merced River for nearly the entire length of the Valley.

Because of its limited facilities and access, many of the Valley's more natural experiences are found in the west Valley. A hiking and stock trail loops around the Valley perimeter, but bicyclists currently have access to the west Valley only by sharing roads with motor vehicles. A concessionaire-operated tram/bus tour provides narrated tours of the entire Valley for a fee, but the free shuttle bus system serves only the east end of Yosemite Valley.

For visitors to Yosemite Wilderness, the vast area allows visitors to explore and discover the natural beauty of many geologic features, the rivers, streams, lakes and many species of plants and animals. The remote areas of the Wilderness provide outstanding opportunities for solitude and a primitive and unconfined type of recreation. The Wilderness area is accessed by almost 800 miles of marked and maintained trails, as well as several hundred miles of cross-country zones. Visitor use and access is managed by trailhead quotas, through a Wilderness permit system. Camping is generally allowed anywhere in the

Wilderness provided it is at least 100 feet from any water body, and is discouraged in sensitive areas (i.e., meadows and other areas with fragile vegetation).

Fire Information

Most prescribed burns and wildland fires take place using limited closures or management restrictions. Emphasis is placed on providing information to visitors, to reduce impacts on their visit, and to promote public safety. Visitors to Yosemite National Park can use park and other information resources to receive information on the fire management activities that might have an influence upon their visit. The park's public information office and incident fire information personnel distribute information through press releases, special notices and other communications, as needed to inform other agencies, communities and individuals of fire management activities. For some fire management activities, visitors are given information at park entrance stations, while signs are used to inform visitors along major thoroughfares, including roads and trails. Staff at park visitor centers post information on cautions, closures, and restrictions, as needed, and are available to answer questions and provide interpretation regarding fire management activities and their purposes.

Scenic Resources

The visual resources of Yosemite include not only the iconoclastic views within the Valley, but also expansive views in the Yosemite Wilderness, views seen along the major roads, and views within other major destinations. Fire management activities, especially smoke, while seeming to spoil scenic views, can enhance scenic resources in Yosemite. Fires can help restore open vistas and maintain ecosystem health—thereby contributing to scenic resource values.

Visual Resources of Yosemite National Park

Yosemite Valley. Scenic resources have been studied and analyzed in Yosemite National Park since at least 1865, when a board of commissioners appointed by the governor of the State of California commissioned three artists to study and document the scenery of Yosemite. The 11 most important features within Yosemite Valley have been identified as Half Dome, Yosemite Falls, El Capitan, Bridalveil Fall, Three Brothers, Cathedral Rocks and Spires, Sentinel Rock, Glacier Point, North Dome, Washington Column, and Royal Arches (NPS 1980). Other important scenic resources viewable in Yosemite Valley include: Nevada, Illilouette, and Ribbon Falls; the cliffs at Yosemite Point/Lost Arrow Spire; and the scenic interface of river, rock, meadow, and forest throughout the Valley.

Wilderness. Visual resources in the Wilderness are less studied than those in Yosemite Valley and other developed areas, but exhibit equivalent scenic resource value. The Merced and Tuolumne watersheds and their many lakes, falls, and valleys; granite domes; and the peaks of the Sierra crest dominate the scenery of Yosemite's Wilderness. Only a small fraction of the visitors to the park ever directly experience the scenic resources beyond the view of roads and highways but the lack of people and modern intrusions enhances the beauty of the area, as well as the opportunity to enjoy these landscapes.

Major Thoroughfares. Tioga Road offers broad alpine views of meadows, domes, distant peaks, and Tenaya Lake. Exfoliating granite surfaces along the Tioga Road provide a unique view of the geologic processes at work in Yosemite. Approaching Yosemite Valley from the north and south, visitors are afforded views from above the lower canyon of the Merced River. Views from major thoroughfares are important to most visitors. Many vistas are being obscured by vegetation.

Wawona Area. Scenery in the Wawona Area includes the South Fork of the Merced River, forests, granite features such as Wawona Dome, and the Wawona Hotel and the elements (including golf course) of its historic landscape. Near views include managed landscapes throughout the private development (i.e., Section 35) downriver to the Wawona Campground.

El Portal. Scenery in El Portal includes the V-shaped Merced River gorge, with its steep, unglaciated terrain and woodland and grassland cover, and the rocky, boulder strewn, river bed.

Noise

This section describes the relationship between fire management activities and the soundscape in Yosemite National Park. For the purpose of this analysis, *noise* is defined as human-caused sound. Noise levels in any one area of the park are influenced by the number of people, the amount and type of traffic and other mechanical noise, and distance to sources of noise. Atmospheric effects such as wind, temperature, humidity, topography, rain, fog, and snow can affect the presence or absence of noise. *Natural sound* from Yosemite's waterfalls, flowing water, animals, wind, and rustling tree leaves may be quite loud, however it is not considered to be noise. Natural sound levels in Yosemite vary by location, time of day (birdsong), and season (water in the waterfalls and rivers is highest in the spring).

Whether a noise or sound is considered unpleasant depends on the individual listening; an individual's tolerance for noise, expectations of noise levels, and activity when the sound is heard (i.e., working, playing, resting, sleeping) all influence the perception of noise and sound. Noises have different effects on people depending on where they are and where the noise originates (for example, visitors are less sensitive to certain sounds in Yosemite Valley than to the same sounds when heard in Wilderness).

Existing Sound/ Noise Environment

Measurements were obtained using a Larson Davis sound-level meter (Model 700) calibrated with a Larson Davis sound-level calibrator. For the purpose of this analysis, sound and noise levels are expressed in decibels on the "A" weighted scale (dBA) because it most closely approximates the response characteristics of the human ear to low-level sound. At each measurement location observations of the background sound level were made over a period ranging from one to five minutes. In addition, observers noted the sources contributing to the background level and noted any sources that caused intrusive noises above the typical background level (NPS 2000c).

In Yosemite Valley, measured sound levels indicated that the background (minimal) sound level is 31 to 32 dBA (measured near the Upper Pines Campground in the early morning). Near rivers, when water flow is minimal, sound levels averaged 37 dBA, but near flowing water sound levels averaged 44 dBA and near cascading water sound levels averaged 55 dBA. Finally, near the base of waterfalls, sound levels averaged 68 dBA. Sound levels associated with rivers increase as the flow of water increases and in areas where rocks and waterfalls were present. Yosemite Valley noise levels ranged from 44 to 47 dBA along the Lower Yosemite Fall trail when no water was running in Yosemite Creek to 59 dBA near Happy Isles, mainly from people using trails and facilities nearby. At Upper Pines Campground, sound levels were at 55 dBA when human activity levels were high. At Devils Elbow, when the sound of the river was minimal, noise levels were 44 dBA but peaked at 67 dBA when a bus passed by on Northside Drive.

In Wawona, sound levels were measured in the middle of the old Wawona Bridge and west of the Covered Bridge near the Pioneer Yosemite History Center. Sound levels in these areas were 50 and 44 dBA, respectively, with maximum-recorded levels of 59 dBA near the old Wawona bridge.

In Yosemite, 55% of visitors surveyed about aircraft noise reported hearing aircraft sometime during their visit (NPS 1994b). Recognition of noise from aircraft was highly variable from location to location, and impacts to visitors were greater in areas with less vehicle noise and fewer people. In 1993, measurements made at four locations within the park indicated that aircraft were audible 30% to 60% of the time during each six-hour measurement period. Most overflights are from high-altitude jet aircraft.

Table III-12 shows some representative noise and sound sources, their associated dBA levels, and corresponding effects (FICN, 1992). Also listed is the relative loudness at which an average person would rate the sound sources, using noise levels during a quiet urban daytime as a reference level. For the average human, a 10 dB increase in the measured sound level is subjectively perceived as being twice as loud. The decibel change at which the average human will indicate that the sound is just perceptibly louder or perceptibly quieter is 3 dB.

Fire Management Related Sources of Noise. The noises associated with fire management activities are generally from mechanical equipment, motor vehicles, and aircraft. Machinery used and amount of noise produced while performing specific fire or fuel management activities varies by the location of the activity (different equipment is used in Wilderness than along road corridors, for example).

Mechanical Equipment. Mechanical equipment associated with fire management activities comprises both portable equipment used in remote areas and large equipment used near roads and the wildland/urban interface. Noises from chainsaws, wood chippers, and portable water pumps are very loud (table III-12) and this equipment is generally used in remote areas, away from concentrations of people or major thoroughfares. However, remote areas typically have low background noise levels and visitors are likely to be more noise sensitive. Noise from large mechanical equipment, like feller-bunchers, is similar to that of a caterpillar (table III-12). These are likely to be used where background noise and expectations of noise would be higher, such as near roads in wildland/urban interface communities.

Table III-12
Sound Levels and Relative Loudness of Typical Noise Sources

dB(A)	Source	Relative Loudness	Human Judgment
115	Pneumatic Chipper at 1 meter[1]		Uncomfortably loud
100	Bell J-2A Helicopter at 100ft.	128 times as loud	Uncomfortably loud
100	Chainsaw[2]	128 times as loud	Uncomfortably loud
90	Motorcycle at 25 feet	32 times as loud	Very loud
85	D8 Caterpillar dozer at 50 feet		
80	Diesel truck, 40 mph at 50 feet	16 times as loud	Loud
75	Average car, 40 mph at 25 feet		
65	Conversation at 3 feet		
50	Quiet residential	Twice as loud	
45	Bird calls	Quiet	
40	Lower limit urban daytime ambient	**Reference loudness**	
30	Background quiet suburban at night	1/2 as loud	
20	Quiet whisper	1/4 as loud	Barely Audible
0	Threshold of hearing		

Sources: FICN, 1992, except: 1 Canadian Centre for Occupational Health and Safety; 2 National Institute for Occupational Health and Safety.

Motor Vehicle Noise. Fire management vehicles include pickup trucks and wildland fire engines (trucks equipped with water tanks, pumps, and hoses). The noises associated with use of these vehicles would be similar to the noise from automobiles, recreational vehicles, commercial buses, shuttle buses, and trucks using the park road system. Noise from motor vehicles is obviously loudest immediately adjacent to the roadways, but due to generally low background sound levels in much of Yosemite, can be audible a long distance from the roads. Noise levels from motor vehicles will be loudest where and when activity levels are the greatest.

Aircraft Noise. Aircraft are often used in fire management activities. Helicopters are used to move equipment and personnel for managing and monitoring wildland fires. The National Park Service also uses helicopters in carrying out its other responsibilities, including search and rescue, medical evacuations, law enforcement, and other special operations (NPS 1993). Helicopter noises can be quite loud (table 3.12) and intrusive.

Socioeconomics

This section examines the social and economic environments that may be affected by the alternatives. The discussion covers local communities in and near Yosemite and emphasizes characteristics that have the potential to be affected by fire management activities in and around the park.

The effected environment includes the five primary gateway counties to Yosemite National Park: Madera, Mariposa, Merced, Mono, and Tuolumne Counties. The four main access roads to the park pass through all five gateway counties: Highway 41 through Madera and Mariposa Counties, Highway 140 through Mariposa and Merced Counties, Highway 120 east through Mono County, and Highway 120 west through Tuolumne County (map 1.1). The affected environment generally includes those cities within 100 miles, or two and one half hours driving time, from Yosemite Valley, which is used as the central measuring point for the park. Travel and lodging expenditures within the 100-mile radius of Yosemite Valley are likely to be Yosemite-related, since the park is the dominant tourist destination in the region (Dornbusch & Company, Inc. 1999).

The main developed areas within park boundaries and the El Portal Administrative Site are in Mariposa County. Communities of Yosemite Village, El Portal, Wawona, Foresta, Yosemite West, and Aspen Valley are within or abutting the park or El Portal.

Stanislaus, San Joaquin, and Fresno Counties were excluded from the analysis because it is difficult to distinguish the portions of the tourist economies of these counties that are associated with Yosemite visitation versus other tourist destinations. Also, tourism is a relatively small component of these counties' overall economies.

Table III-13
Regional Population by County

County	Population (1998)
Madera	114,748
Mariposa	15,877
Merced	197,730
Mono	10,288
Tuolumne	53,248
Total	**391,891**

Source: U.S. Bureau of the Census 1999

Regional Comparison

Population. In 1998, the total population of the five-county affected region was approximately 391,891 (table III-13) Merced County is the most populous county, with roughly 197,730 residents.

Table III-14
1998 Total Taxable Retail Sales by County (in millions of 1998 dollars)

County	Total Taxable Sales
Madera	$777.3
Mariposa	$122.2
Merced	$1,462.5
Mono	$157.9
Tuolumne	$408.5
Total	**$2,928.3**

Mono County is the least populous of the five counties, with about 10,288 residents, despite having the largest land area. Mariposa County has a total population of approximately 15,877 residents. Madera County has 114,748 residents, while Tuolumne County has 53, 248. The populations of all five counties in the affected region are predicted to grow steadily through the year 2040.

Taxable Retail Sales. Taxable retail sales are a good indicator of annual spending in the travel-service sectors, since they represent the taxes paid for transactions with consumers. The total taxable retail sales figures include the taxes paid by businesses on raw materials and services (Dornbusch & Company, Inc. 1999). In 1998, the total taxable retail sales for the five counties was nearly $3.0 billion (1998 dollars). Merced County accounted for approximately 49.9% of total taxable sales in the five-county affected region, followed by Madera County, which accounted for 26.5%. Mariposa County, which includes service areas of Yosemite Valley, El Portal, and Wawona, accounted for about 4.2% of total taxable sales. Table 3.14 shows total taxable retail sales by county.

Visitor Spending. Table 13.15 provides estimates of total Yosemite visitor spending within the Yosemite region. Using estimated daily per capita spending figures for each visitor category and 1998 visitation figures, the total Yosemite visitor spending in 1998 is estimated to be approximately $240 million (1998 dollars). This figure represents only Yosemite visitor spending in the park and surrounding region. Yosemite visitors staying overnight outside of the affected region are recognized as day visitors. As a result, their spending on lodging and other services outside the affected region is not included (Dornbusch & Company, Inc. 1999).

Table III-15
Total Spending by Yosemite Visitor Population Categories in 1998 (in 1998 dollars)

Visitor Category	Average Length of Stay in Region (days/Yosemite visit)	Average Total Daily Spending ($ per capita)	Total Spending in Region ($ millions)
Park Overnighters	2.7	$61.30	$97.3
Local Overnighters	1[1]	$66.68	$102.3
Day Visitors	1	$25.54	$39.2
Total			**$238.8**

1 Local overnighter typically make multiple visits to the park during their Yosemite trip. However, each day trip into the park corresponds to one day of spending in the region.
Source: Dornbusch & Company Inc. 1999.

County Profiles

Madera County. The central economic activity in Madera County is agriculture, which constitutes nearly one-third of the county's total employment and over 20% of the county's personal income and economic output. The agricultural sector stimulates production in related sectors of the economy, including jobs in food processing, transportation, and wholesale trade (Dornbusch & Company, Inc. 1999). Total wage and salary employment in Madera County is expected to grow by approximately 22% from 1995 to 2002. Most of the new job growth is expected to be in services and manufacturing (Dornbusch & Company, Inc. 1999). The portion of the county most likely to be affected by fire management activities is located along Highway 41, including the community of Oakhurst, which is highly dependent upon tourism.

Mariposa County. The county's primary recreation area/tourist attraction is Yosemite National Park, much of which lies within the county as do the developed areas of Yosemite Valley, Wawona, and the El Portal Administrative Site. Major recreation areas in Mariposa County include Stanislaus National Forest and Sierra National Forest, including the U.S. Forest Service and Bureau of Land Management recreation areas along the Merced River. Other recreation sites in Mariposa County include Lake McSwain and Lake McClure, where camping is available (Dornbusch & Company, Inc. 1999).

Recreation and tourism are major industries in Mariposa County and lodging, food and beverage, and other service industries that cater to tourism are central to the county's economy. Tourism accounted for nearly 50% of employment and over one-third of personal income and economic output in 1996. Government is also a major economic sector in the county, accounting for 23.1% of employment, 21.7% of income, and 13.3% of total output. The finance, insurance, and real estate sector accounted for 17.9% of income and 15.3% of economic output, although only about 4% of total employment.

Merced County. Merced County, located west of Yosemite National Park, has the largest economy in the region. Agriculture is the largest economic sector in Merced County and in 1996 it accounted for over 20% of employment, 17.7% of personal income, and 19.7% of economic output. The primary commodities include milk products, chicken, and cattle. The economy has a light industry component, much of which is geared toward agricultural products (Dornbusch & Company, Inc. 1999). Merced County's primary tourist attraction, particularly for the city of Merced, is Yosemite National Park, which is located over 50 miles from the county's eastern boundary (Dornbusch & Company, Inc. 1999).

Mono County. Mono County is the primary gateway county for visitors entering through the eastern park entrance. Park access via the road is not plowed of snow and the entrance is closed in the winter from November to late May. Lodging, food and beverage, and other services are central to Mono County's economy, which is also bolstered by extensive natural resources and recreational opportunities. In 1996, approximately 50% of employment and over one-third of personal income and economic output in Mono County were provided by hotels and lodging, food and beverage, and other service industries. Mammoth Lakes, which is located in southern Mono County, is the center of the county's winter tourism industry and is the fastest growing community in the county. Related employment is erratic since it depends heavily on snowfall at Mammoth Lakes Ski Resort (Dornbusch & Company, Inc. 1999).

Tuolumne County. Yosemite National Park is in the southeastern portion of Tuolumne County. The services sector was the largest employer in the county in 1996, accounting for 24.4% of employment and over 18% of personal income and economic output. Non-farm employment in Tuolumne County is projected to grow by 15% from 1995 to 2002 as the county experiences continued population growth. Most of the job growth is expected in the services, retail trade, construction, and manufacturing sectors. The services sector is expected to create the greatest number of new jobs, reflecting an increased demand for business, health, personal, and hospitality services (Dornbusch & Company, Inc. 1999). Other recreational attractions in Tuolumne County include Columbia State Park, Stanislaus National Forest, Dodge Ridge Ski Area, and Leland Meadows.

Local Communities

The communities of El Portal, Wawona, Foresta, Yosemite West, Aspen Valley, and those in Yosemite Valley are in or abutting Yosemite National Park and the El Portal Administrative Site. There is also an administrative area at Hodgdon Meadow, at the Big Oak Flat entrance to the park, occupied by National Park Service personnel year round.

Yosemite Valley. Yosemite Valley is the park's most popular visitor destination and over 80% of self-driven tourists visit the Valley (Nelson\Nygaard Consulting Associates 1998). It is also home to park and concessionaire employees and their families. The Valley is the economic center of Yosemite National Park.

Facilities. Yosemite Valley hosts the most concentrated array of visitor services and facilities in the park. Yosemite Village is the core area for most of the development and day use in Yosemite Valley and includes a visitor center, museum, concessionaire Village Store complex and food service, and National Park Service and primary park concessionaire administration offices. Camping in Yosemite Valley is provided at six campgrounds that provide a total of 475 campsites. The three drive-in campgrounds, Upper Pines Campground, Lower Pines Campground, and North Pines Campground, operate on a reservation system though the National Park Reservation Service. Camp 4 is a first-come, first-served walk-in campground. Backpackers Campground, another walk-in campground, is reserved for pre- and post-trip nights for Wilderness permit holders. Yellow Pine is primarily a National Park Service volunteer walk-in campground. Although the campgrounds are not concession operated, campers use concession facilities located elsewhere, including showers, coin-operated laundries, stores, and restaurants. The revenue-generating services in Yosemite Valley are predominantly operated by the primary park concessionaire. Major concessionaire facilities outside of Yosemite Village include the 245-room Yosemite Lodge, 123 rooms at The Ahwahnee, the 264-unit Housekeeping Camp, the 631-unit Curry Village, and the Valley stable. The lodging facilities are accompanied by concession- operated food service and stores. The concessionaire operates several equipment-rental establishments that provide bicycles, rafts, and cross-country skis.

Employment. Approximately 20% of park employees work seasonally—most of them work during summer, the peak season. During the summer of 1998, the National Park Service employed approximately 412 people in the Valley. Each summer, the primary park concessionaire employs approximately 1,378 people in Yosemite Valley.

Population and Housing. The residential population during the peak season is approximately 1,500 (employees and their families). National Park Service employees are generally housed in single-family homes or apartments. The National Park Service provides approximately 73 housing beds in Yosemite Valley. The primary park concessionaire provides approximately 1,167 housing beds in Yosemite Valley during the peak season. There is high seasonal variation in the number of concession employees housed in the Valley, ranging from about 1,167 employees during the summer to about 800 in the winter. Most of the park concessionaire seasonal employees reside in dormitories or camps of tent cabins.

El Portal. The El Portal Administrative Site is a 1,398-acre area that was designated as an administrative area for the park in 1958. It is located on Highway 140, approximately 16 miles west of Yosemite Valley. The community of El Portal is generally considered to extend west from the Yosemite View Lodge near the Yosemite National Park boundary to Savage's Trading Post near the South Fork of the Merced River. The El Portal Town Planning Advisory Committee represents the community concerns and issues raised throughout the El Portal area. It is an official body sanctioned by Mariposa County ordinance and recognized by the National Park Service.

Facilities. El Portal functions primarily as a National Park Service employee residential area and a maintenance and utilities site. The National Park Service also has administrative and research facilities in El Portal. Concession facilities in El Portal include a small grocery store and a gas station. Concessionaires other than the primary park concessionaire operate these facilities. A 278-room hotel, with restaurant facilities and a grocery/gift store, is located on private land near the park boundary. El Portal also is the headquarters for the Yosemite Association housed in the historic Bagby train station, and the Yosemite Institute housed in the former El Portal Hotel.

Employment. The National Park Service employs approximately 263 people in El Portal. The school, grocery store, Yosemite Association, and Yosemite Institute offer additional seasonal and year-round employment.

Population and Housing. El Portal is a small community of approximately 700 residents. Individuals living in El Portal generally work for the National Park Service or the primary park concessionaire. Compared to Yosemite Valley, greater proportions of El Portal residents are married and have children. Many employees who reside in El Portal do not live in government- or company-owned housing. Many homes in Old El Portal are privately owned and are administered through the park's special-use permit program. Presently, regulations are being developed to describe the administrative relationship between these private homeowners and the National Park Service.

Wawona. Wawona is located in the southwestern portion of Yosemite National Park on the Wawona Road. The town is generally considered to encompass all developed areas within Section 35. The Wawona Town Planning Advisory Committee represents the community concerns and issues raised throughout the Wawona area. It is an official body sanctioned by Mariposa County ordinance and is recognized by the National Park Service.

Facilities. The National Park Service operates the 93-site Wawona Campground, the 2-campsite Wawona Horse Camp, and the Pioneer Yosemite History Center, which is a collection of historic buildings relocated to the Wawona area from various locations throughout the park. The National Park Service offers stagecoach rides across the Wawona Covered Bridge to the Pioneer Yosemite History Center. Concession facilities in Wawona include the 104-room Wawona Hotel complex, which features a dining room, bar, golf course, pro shop, and snack bar. Other concession facilities include a grocery store, gift shop, service station, and stables (NPS 1992).

Employment. The National Park Service employs approximately 60 people in Wawona during the peak season and the primary park concessionaire employs approximately 130 people, the majority of whom are employed at the Wawona Hotel complex.

Population and Housing. The population of Wawona varies from a summer high of about 1,000 to a winter low of about 160 residents. Many individuals living in Wawona are retired, have external incomes, and are seasonal residents. Most of the residences in Wawona are located in Section 35, which includes about 350 homes. Approximately 300 residences are privately owned (some of these residences are included in the National Park Service land acquisition program), 50 residences are managed and used by the National Park Service, and five residences are managed by the National Park Service and leased to individuals (including three to the primary park concessionaire) under fixed-term or lifetime leases. The primary park concessionaire provides approximately 62 housing beds in Wawona. Concession housing includes individual residences, group houses with dormitory-style beds, and tents.

Foresta. Foresta is located to the west of Yosemite Valley and north of El Portal at approximately 5,000 feet in elevation. The community of Foresta is generally considered to extend from near the Foresta Road/Old Coulterville Road junction (near the Foresta wood lot), west to a location near the McCauly Ranch. The Stanislaus National Forest is immediately adjacent to Foresta. The Foresta Association represents Foresta property owners. This group facilitates communications between Foresta property owners, with the objective of presenting a unified position to the National Park Service regarding land-use issues.

Facilities. Foresta is predominately a residential community with no services. Before the 1990 A-Rock Fire, the population of Foresta was made up mostly of individuals who were not employed by the National Park Service or concessionaires. In the summer of 1990, a wildland fire (A-Rock) destroyed many of the homes in Foresta.

Population and Housing. Foresta provides a small amount of housing for National Park Service, concessionaire, and Yosemite Institute employees. Currently, 12 homes located in Foresta are occupied by approximately 25 to 50 residents. All houses in Foresta are small, single-family units. A number of the homes have been rebuilt since the fire, and there are now about 45 homes in Foresta. The National Park Service owned 15 houses in 1990, 14 of which burned.

Yosemite West. Yosemite West is located immediately outside the park boundary and is accessed from the Wawona Road via Henness Ridge Road. The Yosemite West Town Planning Advisory Committee represents community concerns and issues raised by residents throughout the Yosemite West area. The committee is an official body sanctioned by Mariposa County ordinance. As such, the National Park Service recognizes the Town Planning Advisory Committee as the official representative to Mariposa County for the residents of the Yosemite West area.

Facilities. Yosemite West is a small community with few amenities. Currently, in the immediate area of Yosemite West, only about half of the developable lots are built on. Most individuals living in Yosemite West do not work for the National Park Service or the concessionaire. Many are retired, have an external income, and are seasonal residents. Others are home-based business owners. Though outside the park boundary, Yosemite West can be reached only by traveling through the park. Access into and out of the area is available via one road, essentially making the area a cul-de-sac.

Population and Housing. Yosemite West has both permanent and seasonal residents, with a summer population that rarely exceeds 500. Yosemite West is an established subdivision made up of permanent residents, including National Park Service and concessionaire employees, retirees, transient rental owners and their employees, and second homeowners who spend weekends and summers there. Yosemite West property owners have formed the Yosemite West Property and Homeowners, Inc. Housing types range from older, modest cabins to condominiums and large, modern homes. All homes in Yosemite West are privately owned, and many are managed as transient rental properties or as “bed and breakfast” inns. For this reason, many residents act as onsite business owners/operators.

Aspen Valley. Aspen Valley is a small area of private inholdings located on the Old Tioga Road. Historically a resort complex, the area now contains 21 tracts, totaling 5.99 acres. This community consists of summer cabins and people reside there primarily in the summer. There are 24 cabins and approximately 41 smaller structures on lots. The community has limited amenities, in an area that is completely surrounded by Wilderness. There are no schools or businesses in Aspen Valley. Utilities are primitive, consisting of individual generators, wells, and pit toilets.

Services in Yosemite National Park and the El Portal Administrative Site

Fire Protection. The National Park Service has exclusive jurisdiction and sole responsibility for fire protection within Yosemite National Park. The Mariposa County Fire Department may provide assistance during the most serious fires within the park. The National Park Service provides equipment and training, and fire response comes from employee and volunteer members in the Valley, Foresta, and Wawona. In El Portal, the federal land is proprietary interest land, and the National Park Service cooperates with the county to provide area fire protection services. Through a cooperative agreement, the National Park Service provides first response assistance to any fire in the area. The county also operates a volunteer fire protection squad and provides firefighting equipment at El Portal.

Emergency Medical Services. The National Park Service has a concession contract with Doctors Medical Center to provide medical services within the park. A medical clinic is staffed in Yosemite Valley to provide basic medical attention for minor medical conditions, and initial first aid for incidents within the park. For more serious medical conditions, patients are sent to Mariposa or elsewhere for treatment. Rangers, fire management personnel, emergency response volunteers, and the Yosemite Medical Clinic generally provide the first response to medical incidents within Yosemite National Park and the El Portal area (including nonfederal lands). However, at this time, the county is primarily responsible for providing ambulance services. Mariposa County pays the National Park Service $22,000 a year for training to provide medical first responses to the local area outside the park.

Road Maintenance. The National Park Service is responsible for all roadways exclusively on federal property, including most of the access roads within El Portal. The California Department of Transportation (Caltrans) is responsible for the maintenance of Highway 140. Mariposa County is responsible for maintaining paved roads within Section 35 in Wawona. In Foresta, roads are maintained by both the county and National Park Service. The National Park Service retains responsibility for the first mile of paved road leading off of Big Oak Flat Road and for all dirt roads in the community. The county maintains the paved Foresta Road beyond this one-mile mark though Foresta and the dirt continuation of this road down to El Portal. Besides Foresta Road (noted above), the only roadway in the El Portal area under county jurisdiction is the section of Foresta Road from Clark Community Hall east to the boundary of the El Portal Administrative Site.

Environmental Justice

Demographics

The demographic mix of people living in the five counties surrounding Yosemite National Park is similar to that of the state as a whole except numbers of African-American and Asian-American populations are somewhat lower than the state as a whole and American Indian populations are significantly higher (Gramann 1992). A 1990-1991 survey of Yosemite visitors provides the most recent and complete information on the ethnic background of Yosemite visitors; findings are presented in table 3.16. As the table shows, non-Anglo visitors to the park are underrepresented compared to the California population or that of the nation (Gramann 1992).

Table III-16
Ethnic Background of Yosemite Visitors and Residents of California and Yosemite Region

Ethnic Background	Auto Travelers	Bus Travelers	California Residents	Yosemite Region Residents[a]
Anglo	86.6	80.6	57.4	62.7
Hispanic	3.6	4.5	11.6	11.0
Asian	3.3	5.8	9.6	5.0
American Indian	1.4	2.4	0.8	1.5
Other	4.7	2.9	13.1	16.1

a. Yosemite Region includes Madera, Mariposa, Merced, Mono, and Tuolumne Counties.
Source: Dornbusch & Company, Inc. 1999

Annual Household Income

Fire management activities have the potential to affect residents of several communities within the Yosemite region, including El Portal, Wawona, Yosemite Village, Foresta, Yosemite West, and Aspen Valley. As shown in table 3.17, annual household incomes of $20,000 to $39,000 constitute the highest percentage of the region's population (29%), followed by those who make less that $20,000 (26% of the population). Those who make more than $70,000 per year in annual household income are more represented in the region than in the state in general (15% compared to 6%), but how represented they are within the local communities is unknown.

Table III-17
Annual Household Income Category: Yosemite Visitors and Residents of California and the Yosemite Region

Annual Household Income Category	Yosemite Visitors	California Residents	Yosemite Region Residents[a]
< $20,000	5%	37%	26%
$20,000 – $39,000	14%	34%	29%
$40,000 – $49,000	21%	10%	12%
$50, 000 – $59,000		13%	18%
$60,000 – $69,000	19%		
$70,000 – $79,000		6%	15%
$80,000 – $99,000	14%		
More than $100,000	26%		
Total	**100%**	**100%**	**100%**

a. Yosemite Region includes Madera, Mariposa, Merced, Mono, and Tuolumne Counties.
Source: Dornbusch & Company, Inc. 1999

Much of the property in Wawona is owned by individuals who claim residence but have property elsewhere. National Park Service and concession employees, and year-round residents, also live in Wawona. Yosemite West also has year-round and seasonal residents. El Portal and Foresta residents are generally either employees of the National Park Service or one of its concessionaires or partners. Yosemite Valley residents are largely National Park Service and concession employees. A large portion of the summer population is represented by the lower salaried, seasonal employee.

Special Designations

Wild and Scenic River Designations

The two major river systems in Yosemite National Park are part of the national Wild and Scenic Rivers System–the Tuolumne River (designated by Congress in the California Wilderness Act in 1984) and the main stem and South Fork of the Merced River (designated by Congress in 1987). These rivers have special protection under the Wild and Scenic Rivers Act, which aims to protect the free-flowing condition and protect and enhance the unique values of designated rivers for the benefit and enjoyment of present and future generations.

The National Park Service prepared the *Merced Wild and Scenic River Comprehensive Management Plan* to ensure that development and use of areas of Yosemite National Park and the El Portal Administration site along the Merced River is consistent with the provisions of the Wild and Scenic Rivers Act. The study delineated river segments and identified presence or absence of Outstandingly Remarkable Values (ORVs) by segment. The *Merced Wild and Scenic River Comprehensive Management Plan* identifies several fundamental elements that are used to evaluate actions in the Merced River corridor, such as boundaries, classification, outstandingly remarkable values, and river protection overlay.

Section 7 determination, management zones, and research and monitoring. These elements must be applied as a set of decision-making criteria to evaluate proposed projects and actions in the Merced River corridor.

Prior to its designation as a Wild and Scenic River, the *Final Environmental Impact Statement and Study Report, Tuolumne Wild and Scenic River*, was completed in October 1979. The National Park Service has not completed a management plan for the Tuolumne Wild and Scenic River, but is in the process of collecting data on relevant natural and cultural resources to be used in the formation of a future *Tuolumne Wild and Scenic River Comprehensive Management Plan*.

Wilderness

The California Wilderness Act designated about 94% (or 704,624 acres) of the park as Wilderness in 1984. An additional 1.5% of the park was designated as potential Wilderness additions. Aside from road corridors and developed areas, the primary non-Wilderness areas of the park are along the southwestern boundary, west of the Tuolumne Grove Road, Big Oak Flat Road, and the Wawona Road. Wilderness in Yosemite is generally defined by the Tuolumne and Merced River drainages, with lands ranging in elevation from 2,900 feet below Wawona to 13,114 feet at the summit of Mt. Lyell.

The National Park Service is required to manage Wilderness in accordance with the Wilderness Act of 1964. The Wilderness act directs managers to "preserve Wilderness character," and mandates that both wildness and naturalness be preserved. Congress defined Wilderness as " ….an area where the earth and its community of life are untrammeled by man," meaning unmanipulated, unmanaged, self-willed, autonomous, wild; that "retains its primeval character and influence."

Congress further defined Wilderness to be an area that is "….managed so as to preserve its natural conditions and which (1) generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable…" The Act further stipulates that Wilderness areas must have "outstanding opportunities for solitude or a primitive and unconfined type of recreation."

The Act also states that there shall be no commercial enterprise and no permanent roads within Wilderness, and "except as necessary to meet minimum requirements for the administration of the area for the purpose of the Act" (the purpose defined as preserving Wilderness character and "the public purposes of recreational, scenic, scientific, educational, conservation, and historical use"), there shall be no temporary road, no use of motor vehicles, motorized equipment or motorboats, no landing of aircraft, no other form of mechanical transport, and no structure or installation…" Congress also made a special provision that allows aircraft use "as may be necessary in the control of fire…"

Energy Consumption

Green Energy Parks

In April 1999, the U.S. Department of the Interior entered into a formal Memorandum of Understanding with the Department of Energy to promote the use of energy-efficient and renewable energy technologies and practices in the national parks. This partnership officially inaugurated the program titled "Green Energy Parks: Making the National Parks a Showcase for a Sustainable Energy Future." This initiative will help to fulfill provisions of the Energy Policy Act of 1992, which directs the use of energy-efficient building design and equipment and the use of alternative motor fuels where practicable. It will also help fulfill provisions of two Executive Orders: Executive Order 12902, Energy Efficiency and Water Conservation at Federal Facilities and Executive Order 13031, Federal Alternative Fueled Vehicle Leadership, which promotes increasing the use of alternative-fueled vehicles in the federal motor vehicle fleet.

Energy Consumption in the Fire Management Program

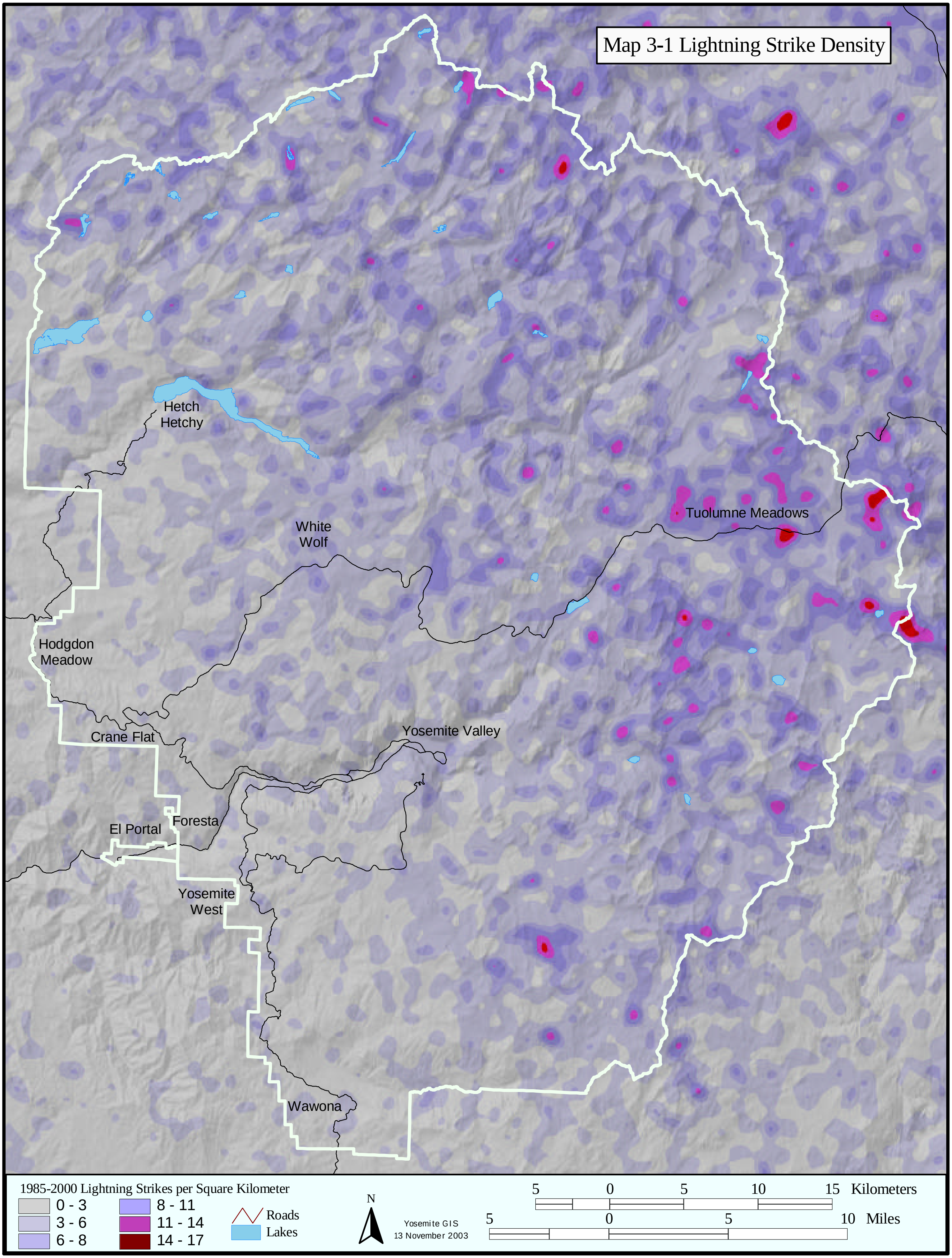
The majority of activities proposed under each of the action alternatives have the potential to effect energy consumption due to of fire management activities, which include use of trucks, heavy equipment, aircraft, drip torches, and other ignition devices.

Changes in Yosemite's fire management program will have little to no influence upon energy use for personal vehicles and/or shuttle bus use, or for housing in Yosemite Valley, El Portal, Wawona, and other locations. Wood from fuels treatment could be made available for use in home heating, reducing the amounts of fuel oil, propane, and electricity used for that purpose, but because of potential inconsistencies with air quality objectives, it would be difficult to justify promoting the use of wood to heat resident's homes. However, many homes are already heated with wood obtained from the National Park Service wood lot (wood available from the removal of tree hazards) or U.S. Forest Service lands (with wood collecting permits).

Topics Dismissed from Further Analysis

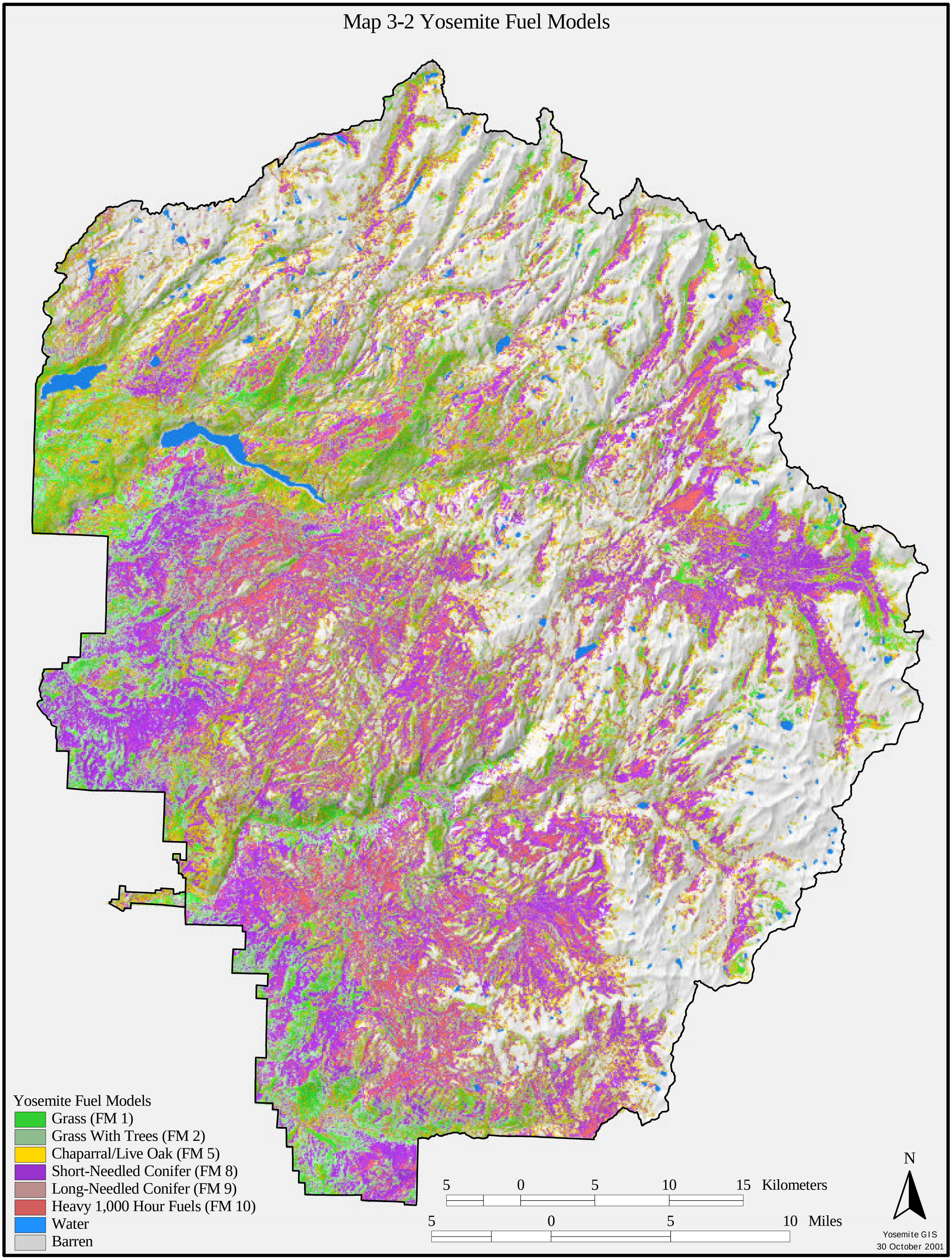
Prime and Unique Agricultural Lands. Yosemite does not contain prime and unique agricultural lands. The orchards in Yosemite Valley are managed as historic properties and are discussed under Cultural Landscapes above.

100-year and 500-year Floodplains. The *Draft Yosemite Fire Management Plan/EIS* does not propose permanent development activities in 100-year or 500-year floodplains. General effects within floodplains are considered in the discussion on watersheds.

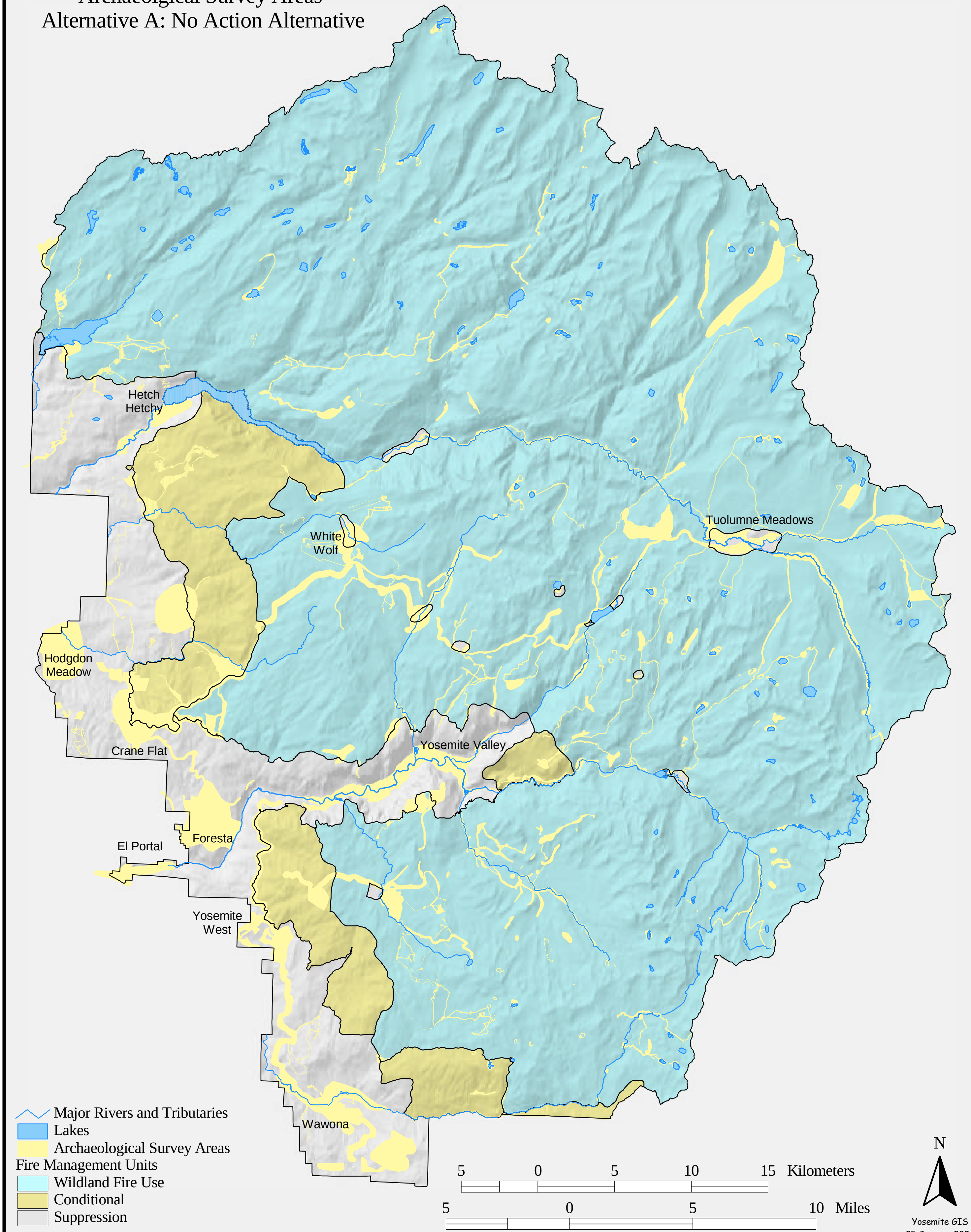


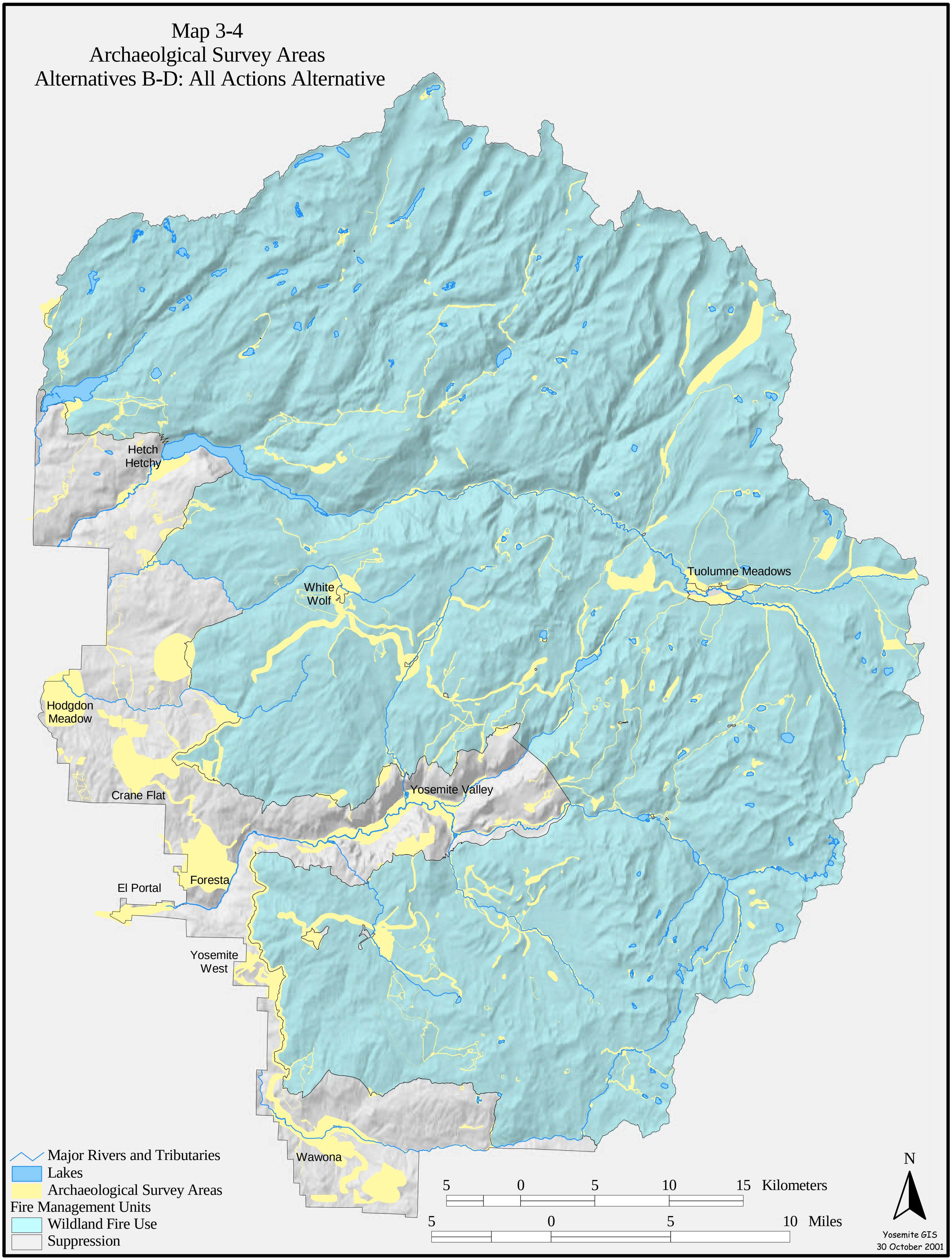
Map 3-1 Lightning Strike Density
Hetch Hetchy
White Wolf
Tuolumne Meadows
Hodgdon Meadow
Crane Flat
Yosemite Valley
Foresta
El Portal
Yosemite West
Wawona
1985-2000 Lightning Strikes per Square Kilometer
0 - 3
3 - 6
6 - 8
8 - 11
11 - 14
14 - 17
Roads
Lakes
N
Yosemite GIS
13 November 2003
5 0 5 10 15 Kilometers
5 0 5 10 Miles

Map 3-2 Yosemite Fuel Models

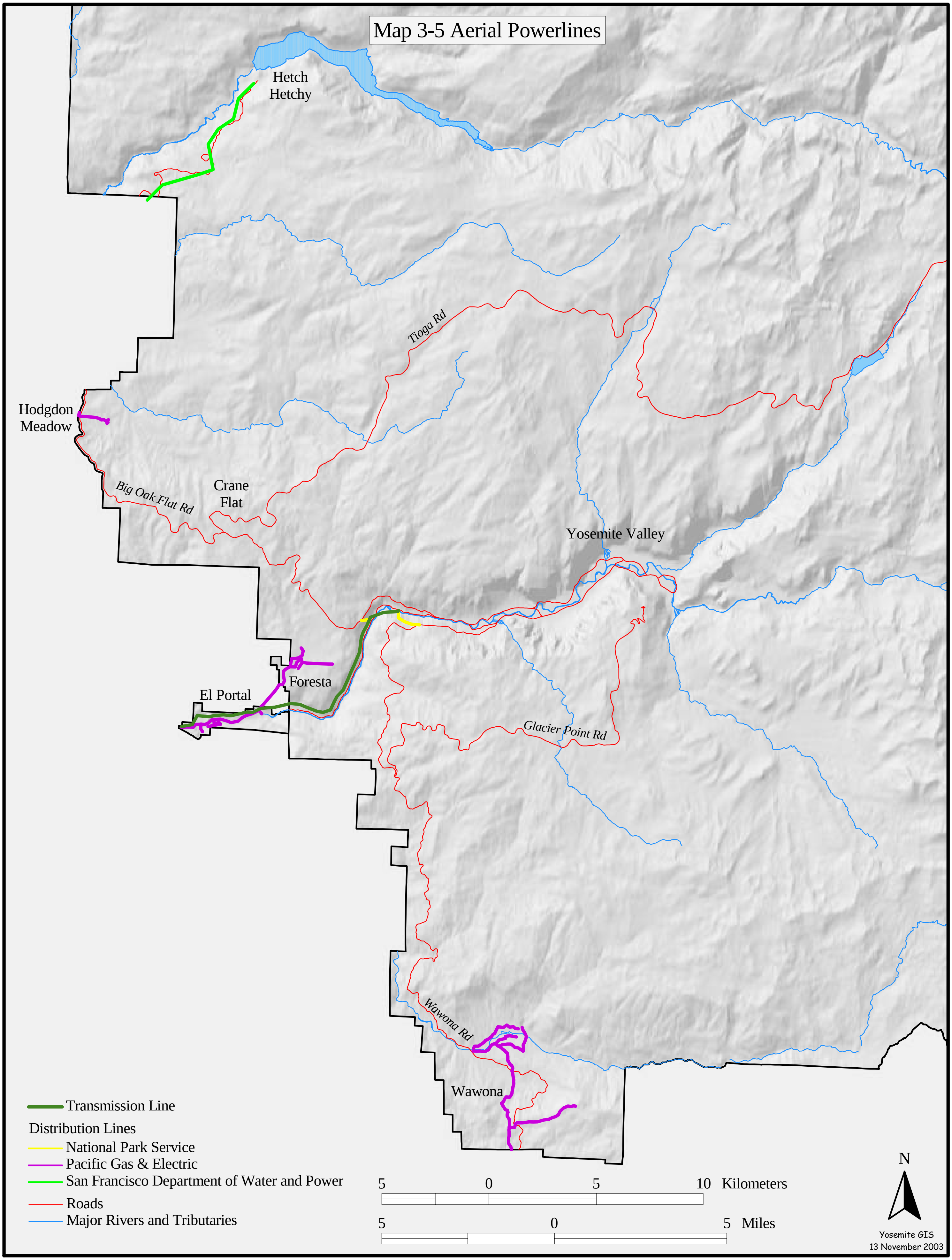


Map 3-3
Archaeolgical Survey Areas
Alternative A: No Action Alternative





Map 3-4
Archaeolgical Survey Areas
Alternatives B-D: All Actions Alternative
Hetch Hetchy
White Wolf
Tuolumne Meadows
Hodgdon Meadow
Crane Flat
Yosemite Valley
El Portal
Foresta
Yosemite West
Wawona
Major Rivers and Tributaries
Lakes
Archaeological Survey Areas
Fire Management Units
Wildland Fire Use
Suppression
5 0 5 10 15 Kilometers
5 0 5 10 Miles
N
Yosemite GIS
30 October 2001



Map 3-5 Aerial Powerlines
Hetch Hetchy
Tioga Rd
Hodgdon Meadow
Crane Flat
Big Oak Flat Rd
Yosemite Valley
Foresta
El Portal
Glacier Point Rd
Wawona Rd
Wawona
Transmission Line
Distribution Lines
National Park Service
Pacific Gas & Electric
San Francisco Department of Water and Power
Roads
Major Rivers and Tributaries
5 0 5 10 Kilometers
5 0 5 Miles
N
Yosemite GIS
13 November 2003

Chapter IV: Environmental Consequences Methodology

Introduction

In analyzing the environmental consequences of the alternatives proposed in the *Final Yosemite Fire Management Plan*/EIS, three factors are looked at for each resource: type of impact, duration of impact, and intensity of impact. After the environmental consequences of the alternative are examined for separate topics, the impact of implementing the alternative is considered along with the impacts of other relevant actions in the area. This is the cumulative impacts analysis, explained below. Whether or not an impact will cause impairment is included for some resources, also explained below.

The *type of impact* describes a relative measure of beneficial or adverse effects on biological or physical systems, cultural resources, or on the social environment. For example, adverse impacts on ecosystems might be those that would degrade the size, integrity, or connectivity of a specific habitat. Conversely, beneficial impacts would enhance ecosystem processes, native species richness, or native habitat quantity or quality.

Because impacts could have short-term adverse impacts while having long-term beneficial impacts, it is important to look at the duration of the effect of an impact. Effects from fire management activities described within this document are likely to occur within nested long- and short-term time scales. Many of the adverse impacts may occur for relatively short time periods while concurrent improvements to the ecosystem are just beginning. For example, on a small scale, after a fire some areas are likely to begin to resemble pre-fire conditions within one or two growing seasons, while, on a landscape scale, the benefits from a change in forest condition and restoration of the fire regime may take years.

Examining the type and duration of an impact is not enough because an impact could cover a large area or a large portion of a population or could be highly noticeable or even irreversible. Impacts are of varying intensities from small and imperceptible to large and substantial. Measures of intensity consider whether an impact would be negligible, minor, moderate, or major. These designations are used to describe both beneficial and adverse impacts.

A *cumulative impact* is described in the Council on Environmental Quality regulations (1508.7) as: “the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions.” Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

A comprehensive list of present and reasonably foreseeable future actions is provided in Appendix 5. These actions are evaluated in cumulative impact analyses in conjunction with the impacts of each alternative to assess whether they have any additive or interactive effects on a particular environmental, cultural, or social resource. Because most of these cumulative actions are in the planning stages, the evaluation of cumulative impacts has been based on a general description of the project.

This document also evaluates whether resources might suffer *impairment*. Impairment is not a NEPA issue but instead relates to the National Park Service Organic Act (1916). Impairment that is prohibited by the Organic Act is an impact that, in the professional judgement of the responsible National Park Service manager, would harm the integrity of park resources or values, including the opportunities that otherwise would be present for the enjoyment of those resources or values. Nonetheless, an impact is less likely to constitute impairment if it is an unavoidable result of an action necessary to preserve or restore the integrity of park resources or values.

According to National Park Service Policy, "An impact would be more likely to constitute an impairment to the extent that it affects a resource or a value whose conservation is: a) Necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the park; b) Key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park; or c) Identified as a goal in the park's general management plan or other relevant National Park Service planning documents." (NPS Management Policies, Part 1.4.5)

Biological Environment

Vegetation and Fire Ecology

The alternatives will be evaluated by looking at structure and composition of the vegetation, and fuels. Because of similarities in fire regimes and the mosaic of vegetation types found at any elevation, the fifteen vegetation types listed in Chapter III will be lumped into five clusters for this analysis. Subalpine forests, upper montane forests, lower montane forests, meadows, and foothill woodlands are the groups. The types in each group are found in Chapter III, tables III-1 and III-2.

Type of Impact

- Adverse: Moves the system outside of or away from the natural range of variability for vegetation (structure, composition, and fuels).
- Beneficial: Moves the system inside of or toward the natural range of variability for vegetation (structure, composition, and fuels).

Duration of Impact

- Short-term: Can be reversed within one or two fire return intervals.
- Long-term: Requires three or more fire return intervals to reverse effects.

Intensity of Impact

- Negligible: Imperceptible or undetectable effects upon vegetation.
- Minor: Slightly perceptible and localized effects.
- Moderate: Apparent change in plant community structure, composition, or fuels that would result in a change of the role of fire on a small scale.
- Major: Substantial change in plant community structure, composition, or fuels that represents a change in the role of fire, ecological function, vegetation type, or fire return interval on a landscape scale.

Wetlands

A programmatic approach has been developed to minimize wetland impacts from National Park Service activities. The protection of wetlands is facilitated through Executive Order 11990, *Protection of Wetlands*; National Park Service Directors Order 77-1, *Wetland Protection* and its accompanying Procedural Manual 77-1 (DO 77-1 and PM 77-1); Clean Water Act, Section 404; and the "no net loss" goal outlined by the White House Office on Environmental Policy in 1993. Executive Order 11990 requires that leadership be provided by involved agencies to minimize the destruction, loss, or degradation of wetlands. Directors Order 77-1 and Procedural Manual 77-1 provide the procedural structure in which Executive Order 11990 may be implemented. Section 10 of the Rivers and Harbors Act and Section 404 of the Clean Water Act authorize the U.S. Army Corps of Engineers to grant permits for construction and disposal of dredged material in waters of the United States.

Several tools were used to determine potential fire management impacts on wetlands within the park boundary. Information from the National Wetlands Inventory (USFWS 1995) and a park-wide vegetation map (NPS 1994e) were overlain with known fire management units and use areas. An assumption was made that all meadow and riparian communities on the vegetation map were likely to be classified as wetlands in future, site-specific (< 5acre) delineations of wetlands in the park. This information provided a conservative and broad estimate of potential wetlands in Yosemite.

Impacts were assessed with three criteria in mind:

- Federal laws, regulations, and executive orders; similar state laws (for example, the California Endangered Species Act); or National Park Service management policies.
- Issues and concerns expressed during public scoping.
- Projected impacts on the natural history of a species or the known sensitivities of a habitat.

The assessment of fire management impacts also needs to occur within the context of wetland condition and natural disturbance processes. For this analysis, several assumptions were made. The greater the size of a biotic community and the stronger its links to neighboring communities, the more valuable it is to the integrity and maintenance of biotic processes. Although specific fire management activities may result in short-term fragmentation and the disassociation of communities from each other, these same impacts may result in long-term ecological benefits.

Type of Impact

- Adverse: Degrades the size, integrity, or connectivity of wetlands.
- Beneficial: No detrimental effects. Enhances native ecosystem processes, native species richness or diversity, or native habitat quantity and quality.

Duration of Impact

Wetlands are likely to begin to resemble the pretreatment condition within one or two growing seasons following fire events or management activities (Davis et. al 1998). The benefits following changes in forest condition and upland fire regimes are likely to occur at much longer time scales.

- Short-term: Lasts less than 10 years following the implementation of an alternative.
- Long-term: Lasts or appearing 10 years after implementation of an alternative.

Intensity of Impact

Three primary measures were used to evaluate the intensity of impacts on wetlands: the size and type of the wetland, the integrity of the wetland, and the connectivity of the wetland to adjacent habitats.

- Negligible: Imperceptible or not detectable.
- Minor: Slightly detectable, localized within a small area, and would not affect the overall viability of wetlands in the park.
- Moderate: Apparent but could be reversed.
- Major: Substantial, highly noticeable, and could be permanent.

Wildlife

For many thousands of years, fire has been a strong force in the formation of the natural structure, distribution, and diversity of wildlife habitats in the Sierra Nevada. As a result, Sierra Nevada wildlife have developed behaviors and life history characteristics that are adapted to the influence of fire on their habitat. As there are successions of species and age classes of plants that occur between fires, there are successions of animal species that are favored or disfavored as habitats change. Prehistorically, the pattern of fire has fluctuated—climate and the use of fire by American Indians have varied over time.

With the arrival of Euro-Americans in the Sierra Nevada, the patterns of fire changed dramatically, mostly from intense fire suppression activities in the 20th century. Some forest habitats in Yosemite have become denser, and more prone to catastrophic, stand-replacing fires. Such changes have been detrimental to the natural diversity, abundance, and distribution of wildlife in the park. In addition, fire control activities can adversely affect wildlife through direct disturbance of animals and habitats; management actions designed to benefit habitat, such as prescribed fire, can have inadvertent adverse effects on wildlife. With these factors in mind, the following parameters were used to evaluate the effects of the various alternatives given in the *Final Yosemite Fire Management Plan/EIS*.

Type of Impact

- Adverse: Likely to result in unnatural changes in the abundance, diversity, and distribution of wildlife species. Changes could occur through direct disturbance or mortality, or through destruction or alteration of habitat.
- Beneficial: Likely to protect and/or restore the natural abundance, diversity, and distribution of wildlife species. This would occur through protection and restoration of the natural structure, succession, and distribution of habitat.

Duration of Impact

- Short-term: Immediate changes in the abundance, diversity, and distribution of wildlife, but a return to the original condition within 20 years, without further impacts.
- Long-term: Changes in the abundance, diversity, and distribution of wildlife that persist for more than 20 years.

Intensity of Impact

- Negligible: Imperceptible or undetectable impacts.
- Minor: Slightly perceptible, and limited in extent. Without further impacts, adverse impacts would reverse and the resources would recover.
- Moderate: Readily apparent, but limited in extent. Without further impacts, adverse impacts would eventually reverse and the resource would recover.
- Major: Substantial, highly noticeable, and affecting a large area. Changes would not reverse without active management.

Special-Status Species - Plants

Fire plays a role in the management of many special-status plant species by maintaining open habitat, encouraging reproduction, and affecting competing species. Fire may injure or kill individual plants while the effects on the species as a whole is beneficial because competition has been reduced or openings created. Fire suppression activities can adversely affect these same species because of ground disturbance. Prescribed fires can also be detrimental, especially when timing, frequency, and intensity of fire are outside of the natural fire cycle to which the species is adapted (Hessl and Spackman 1995). Keeping these factors in mind, the following parameters have been used to evaluate the consequences on special-status plants of the various alternatives proposed in the *Final Yosemite Fire Management Plan/EIS*.

Type of Impact

- Adverse: Viability of known populations and/or potential habitats of special-status species are threatened. May lead to loss of habitat, increased competition by both native and non-native species, or reduce and/or prevent reproduction.
- Beneficial: Actions that improve habitat conditions and enhance the viability of populations. May eliminate competitive species, thereby increasing available habitat, or improve reproductive output and success.

Duration of Impact

- Short-term: May immediately affect the population or species, but with no long-term effects to population trends or species viability.
- Long-term: May lead to a loss in population or species viability—exhibited by a trend suggesting decline in overall species abundance, viability, and/or survival.

Intensity of Impact

- Negligible: Imperceptible or undetectable.
- Minor: Slightly perceptible and localized, without the potential to expand if left alone.
- Moderate: Apparent and sufficient to cause a change in the resources (e.g., abundance, distribution, quantity, or quality).
- Major: Substantial, highly noticeable, and with the potential for landscape-scale effects.

Special-Status Species – Animals

Like most wildlife in the Sierra Nevada, special-status species have adapted to natural fire regimes. In many areas, including Yosemite National Park, however, a history of fire suppression has led to dense, overgrown stands, with high accumulations of forest fuels. This affects special-status species by altering habitat and placing these species and their habitats at risk of high-intensity, stand-replacement fire. In addition, stand-replacement fire could create unsuitable habitat conditions that would last for many years. Fire control activities could also adversely affect special-status species through direct disturbance of animals and habitats. Even management actions designed to benefit habitat, such as prescribed fire, can have inadvertent adverse effects on special-status species. With these factors in mind, the following parameters have been used to evaluate the effects on special-status animals of the various alternatives proposed in the *Final Yosemite Fire Management Plan/EIS.*

Type of Impact

- Adverse: Likely to result in unnatural changes in the abundance or distribution of a special-status species. This could occur through direct disturbance or mortality, or through destruction or alteration of habitat.
- Beneficial: Likely to protect and/or restore the natural abundance and distribution of a special-status species. This would occur through protection and restoration of structure, succession, and distribution of habitat.

Duration of Impact

- Short-term: Immediate changes in the abundance and distribution of a special-status species, but a return to the original condition occurs within two generations of that species, without further impacts.
- Long-term: Changes in the abundance and distribution of a special-status species that persists for greater than two generations of that species.

Intensity of Impact

- Negligible: Imperceptible or undetectable.
- Minor: Slightly perceptible and limited in extent. Without further actions, adverse impacts would reverse, and the resource would recover.
- Moderate: Readily apparent but limited in extent. Without further actions, adverse impacts would eventually reverse, and the resource would recover.
- Major: Substantial, highly noticeable, and affecting a large area. Changes would not reverse without active management.

California Wildlife Habitat Relationships was used to generate a list of suitable habitat for each species (Mayer and Laudenslayer 1988). For each habitat that occurs in Yosemite, an *average suitability value* was generated. This process examines the size and stage classes of vegetation that are likely to occur for each habitat type and then looks at how these vegetation classes fulfill the requirements for reproduction, cover, and feeding for each animal species. The California wildlife habitat relationships information was evaluated and adapted to the situations in Yosemite using in-house knowledge about species occurrence and habitat use specific to the park. The average suitability value and knowledge of habitat conditions, distribution, and ecology of each species in Yosemite was used to assign high, medium, and low values to each suitable habitat type. These ranked habitats were then compared to the fire return interval departure (FRID) maps and the fire unit maps to determine how habitats of different values correspond to current fire-related habitat conditions and different treatment scenarios under the various alternatives. For a more extensive description of the status, biology, and distribution of special-status species, see Appendix 9, Biological Opinion.

Physical Environment

Watersheds, Soils, and Water Quality

Water resources, watershed, and soils are interrelated in their reactions to the treatments proposed by the alternatives. Due to these relationships, the analysis has been done on them as a group. Effects upon soils and watersheds are assessed by considering the likely scale of the effect—whether fire would affect all or part of the watershed slope (ridge, mid-slope, bottom)—and as a result, the likely effect upon water yield, peak flows, sediment yield, nutrient yield, and/or stream system response.

Type of Impact

- Adverse: Moves the system outside of or away from the natural range of variability for watershed conditions (water yield, peak flows, sediment yield, nutrient yield or stream system response).
- Beneficial: Moves the system inside of or toward the natural range of variability for watershed conditions (water yield, peak flows, sediment yield, nutrient yield, or stream system response).

Duration of Impact

- Short-term: Can be reversed within two fire return intervals.
- Long-term: Requires three or more fire return intervals to reverse effects.

Intensity of Impact

- Negligible: Imperceptible or undetectable.
- Minor: Slightly perceptible and localized, without the potential to expand if left alone.
- Moderate: Apparent, but would remain localized.
- Major: Substantial, highly noticeable, with the potential for landscape (watershed)-scale effects.

Air Quality

Fire management activities could potentially affect air quality in the Yosemite area through smoke emissions from wildland and prescribed fires and exhaust from machinery used in site preparation, monitoring, and thinning activities.

Smoke Emissions

In order to quantify smoke emissions predicted to result from each alternative, the First Order Fire Effects Model 5.0 (FOFEM) was used to generate emission factors for PM_{10}, $PM_{2.5}$, volatile organic compounds (as CH_4), CO, and CO_2. FOFEM is a computer-based planning tool that is used to provide a variety of quantitative predictions for planning prescribed fires, impact assessment, and long-range planning and policy development. FOFEM provides quantitative fire effects information for tree mortality, fuel consumption, mineral soil exposure, and smoke (USDA 1997). The smoke module of FOFEM models the productions of emissions but not smoke dispersion or visibility. The smoke module requires a number of inputs related to burn characteristics, including fuel category, cover type, fuel loading, moisture content, and percent of crown burn. For this analysis, park fire management staff provided burn parameters for each burn unit (Appendix 6); burn parameters were assumed to be consistent throughout a prescribed burn unit regardless of mosaic of vegetation cover types.

The area of each cover type in a given prescribed burn unit was determined using GIS data. This was done by intersecting two GIS datasets: the prescribed burn unit area and the vegetative cover type. The burn unit cover types were then correlated with the Society for American Foresters (SAF)/Society for Range Management (SRM) cover types available in FOFEM. In some cases, direct correlation between cover types was not possible, and a surrogate SAF/SRM cover type was selected. Table IV-1 provides a cross-reference for cover types. Not all cover types exist within all burn units. Several burn units include areas of bare rock or water for which no smoke emissions are expected.

For a given prescribed burn unit and pollutant, the emissions were quantified by the following equation:

$$E = \sum_{c=1}^{n} EF_c * A_c, \text{ where}$$

$$\mathrm{E} = \text{emissions, tons/year}$$

$$\mathrm{EF_c} = \text{emission factor for coverage c, in tons/acre}$$

$$\mathrm{A_c} = \text{area of coverage c, in acres}$$

Average emission factors for all prescribed burns were calculated from the FOFEM predictions to facilitate comparison of alternatives. The average emission factors were used to quantify emissions from prescribed fire and managed wildland fire since both are expected to have similar burn characteristics. However, separate FOFEM runs were used to develop emission factors for unwanted wildland fires which typically burn under drier conditions and consume more fuel, particularly crown and branch fuels, and therefore, produce higher emissions. In order to develop average wildland fire emission factors, representative burn parameters for unwanted wildland fire were provided by park staff for three of the predominant cover types: Pacific ponderosa pine, Sierra Nevada mixed conifer, and white fir. These are the types representative of the vegetation in the park where fire has been suppressed and which are targeted for treatment.

Both the prescribed and wildland fire emission factors predicted by FOFEM are considerably higher than similar emission factors in the Environmental Protection Agency's *Compilation of Air Pollution Emission Factors* (AP-42*)* for the same region. However, the AP-42 derived emission factors are generalized for large regions and "can vary by as much as 50 percent with fuel and fire conditions" (EPA 1996). Since fuel loadings in many areas of the park may be heavier than normal due to decades of fire suppression, the average emission factors used here can be considered more representative of park conditions. Finally, the FOFEM model does not provide emission factors for NO_x. According to EPA AP-42, the emission factors for NO_x from wildland and prescribed fires are approximately 35 times less than those for CO emissions. Therefore, the CO emission factors produced by the FOFEM model were scaled down proportionately to estimate NO_x emission factors. Table IV-2 provides the emission factors used for each fire type.

The median number of years to achieve ecosystem restoration or a natural background for Alternatives B, C, and D are 12.5, 25, and 17.5 years, respectively. For prescribed fire, comparison of the alternatives is based on a listing of tentative prescribed fire projects and associated number of acres to be treated by prescribed burning for the years 2003-2009. This list of tentative prescribed fire projects includes areas that are part of the ecosystem restoration goals, wildland/urban interface goals, and maintenance burning to keep previously treated areas within their range of variability.

Table IV-1
Vegetative Cover Types Used in Air Quality Emissions Analysis

FMP Code	Fire Management Vegetation Types	SAF[a]/SRM[b] Type	SAF/SRM Description
ba1	Bare Rock	NA	NA
ba2	Water	NA	NA
bu1	California Black Oak	246	California Black Oak (Eastern Black Oak - SAF 110 used as surrogate)
bu2	Foothill Pine/Interior Live Oak	250	Blue Oak - Digger Pine
bu3	Canyon Live Oak	249	Canyon Live Oak (SAF 250 used as surrogate)
bu4	Blue Oak Woodland	201	Blue Oak Woodland (SAF250 used as surrogate)
lm1	PonderosaPine/Bear Clover Forest	245	Pacific Ponderosa Pine
lm2	Ponderosa/Mixed Conifer Forest	243	Sierra Nevada Mixed Conifer – FOFEM 081
lm3	White Fir/Mixed Conifer Forest	211	White Fir [c]
lm4	Giant Sequoia/Mixed Conifer Forest	243	Sierra Nevada Mixed Conifer – FOFEM 081
me1	Dry Montane Meadows	216 (SRM)	Montane Meadows
sa1	Whitebark Pine/Mountain Hemlock Forest	208	Whitebark Pine
sa2	Lodgepole Pine	218	Lodgepole Pine
sc1	Montane Chaparral	209 (SRM)	Montane Shrubland
sc2	Foothill Chaparral	208 (SRM)	Ceanothus Mixed Chaparral
um1	Red Fir	207	Red Fir [c]
um2	Western White Pine/Jeffrey Pine	215	Western White Pine [c]

a Society for American Foresters (SAF), b Society for Range Management (SRM), c ex, from CA., van Wagtendonk and Sydoriak, '98

Table IV-2
Smoke Emission Factors by Fire Type

Type of Fire	Emission Factor (tons/acre) [a]					
	PM_{10}	$PM_{2.5}$	CH_4	CO	NO_x	CO_2
Prescribed Fire	0.73	0.61	0.48	8.66	0.25	39.18
Managed Wildland Fire	0.73	0.61	0.48	8.66	0.25	39.18
High-Intensity Wildfire	1.20	1.02	0.61	13.36	0.38	67.27

a PM_{10} = Suspended Particulate, $PM_{2.5}$ = Fine Particulate Matter, CH_4 = Methane , CO = Carbon Monoxide, NOx = Nitrogen Oxides, CO_2 = Carbon Dioxide

Each alternative is compared using the decade average number of acres of wildland fire (wildfire) per year of 5,760 acres (average from 1991 to 2000, including both lightning and human-caused fires). However, as the park is returned to an ecologically natural state and heavy fuel loadings are reduced, it is expected that unwanted wildland fires would occur less frequently and burn less intensely in the future. Air emissions from fire will diminish when fire regimes are restored to forest ecosystems since fuel loads and fuel consumption will decline—thus, the park will be under a regime of maintenance burning. To illustrate this effect a proposed burn unit, the PW-17 Elevenmile project on the west park boundary, was analyzed. Pre-burn characteristics were assumed to be heavy fuel loading with a concentration of heavy fuels (larger size branches, logs, etc.), and post-burn characteristics were assumed to be approximately one-third of the pre-burn fuel loading and size. The FOFEM model was run and the results are noted in table IV-3. As anticipated, the air emissions are reduced in proportion to the fuel loading reduction.

Table IV-3
Modeled Pre-Burn and Post-Burn Emissions using Prescribed Fire Unit PW-17, the Elevenmile project on the west park boundary

PW-17 Unit Burn Conditions	Fuel Loading (tons/acre)	Fire Factors (tons/acre) [a]				
		PM_{10}	$PM_{2.5}$	CH_4	CO	CO_2
Pre-burn: Heavy Fuel Loading	48.8	1.66	1.40	0.85	18.50	87.70
Post-burn: Light Fuel Loading	15.2	0.54	0.46	0.28	6.09	27.45

a PM_{10} = Suspended Particulate, $PM_{2.5}$ = Fine Particulate Matter, CH_4 = Methane, CO = Carbon Monoxide, CO_2 = Carbon Dioxide

Mechanical Treatments Emissions

Depending on the alternative, air pollutants would be generated by various mechanical thinning and site preparation methods. Motorized equipment used in thinning and site preparation activities include chainsaws, chippers, feller-bunchers, skidders, haul trucks, and all terrain vehicles (ATVs) used for low-impact skidding. These six types of equipment are a representative sample of the types of equipment used in Yosemite. Table IV-4 shows the emission factors used to figure emissions under each alternative.

Table IV-4
Emissions Factors for Equipment Used in Fire Management Activities

Operating Parameters				Emission Factor (gm/horse power – hour) [a]			
Machine Type	Fuel Type	Ave. HP	Load	CO	Particulate Matter	NO_x	VOC
Chainsaws	Gasoline	6	0.5	519.0	7.7	1.82	160.0
Chippers	Gasoline	50	0.5	486.0	7.7	0.29	3.3
Feller/Bunchers	Diesel	200	0.65	15.3	2.0	10.30	3.3
Skidders	Diesel	200	0.65	15.3	2.0	10.30	3.3
Haul Trucks	Diesel	200	0.65	15.3	2.0	10.30	3.3
ATV Skidding	Gasoline	50	0.68	408.8	0.06	3.5	5.2

a Particulate Matter = PM_{10} (Suspended Particulate) and $PM_{2.5}$ (Fine Particulate Matter), CO = Carbon Monoxide, NOx = Nitrogen Oxides, VOC = Volatile Organic Compounds (total hydrocarbons) . No data for CO_2.

Type, duration, and intensity of air quality impacts are described as follows:

Type of Impact

- Beneficial: Reduces emissions or lowers pollutant concentrations.
- Adverse: Increases emissions or raises pollutant concentrations.

Duration of Impact

- Short-term: Associated with the duration of a specific fire event.
- Long-term: Occurs at the time that the park restores the natural fire regime.

Intensity of Impact

For this analysis, the percent increase or decrease in air emissions between the alternatives is the same as those adopted for the air quality analysis in the *Yosemite Valley Plan/SEIS* (NPS 2000c). These are:

- Negligible: Less than 5 % increase or decrease compared to the existing program.
- Minor: 5 to 20 % increase or decrease compared to the existing program.
- Moderate: 21 to 50 % increase or decrease compared to the existing program.
- Major: > 50 % increase or decrease compared to the existing program.

Cultural Environment

This impact analysis methodology applies to three primary types of cultural resources: archeological sites, ethnographic resources, and cultural landscape resources (including individually significant historic structures).

Section 106 of the National Historic Preservation Act requires a federal agency to consider the effects of its actions on properties included in, eligible for inclusion in, or potentially eligible for inclusion in the National Register of Historic Places, and provide the Advisory Council on Historic Preservation a reasonable opportunity to comment. A programmatic agreement was developed among the National Park Service at Yosemite, the California State Historic Preservation Officer, and the Advisory Council on Historic Preservation, in consultation with American Indian tribes and the public, to take into account the effects of park planning and operations on historic properties (NPS 1999c, also see Appendix 8, Cultural Resources, Programmatic Agreement).

Impact analysis follows established procedures and stipulations outlined in the programmatic agreement. These include: (1) identifying areas and types of resources that could be impacted; (2) assessing information regarding historic properties within this area and conducting additional inventories and resource evaluations as necessary; (3) comparing the location of the impact area with that of important cultural resources; (4) identifying the extent and type of effects; (5) assessing those effects according to procedures established in the Advisory Council on Historic Preservation's regulations; and (6) considering ways to avoid, reduce, or mitigate adverse effects.

Site specific compliance, with project specific details will be completed for prescribed fire and fuel treatments, consistent with the cultural resources programmatic agreement.

Cultural resource impacts in this document are described in terminology consistent with the regulations of the Council on Environmental Quality, and in compliance with the requirements of both the National Environmental Policy Act (NEPA) and Section 106 of the National Historic Preservation Act. The Section 106 determination of effect for the undertaking (implementation of the alternative), required by the programmatic agreement, is included in the "Section 106 Summary" for each alternative, presented later in this chapter.

This methodology focuses on specific treatments discussed in Chapter II, Alternatives, as well as areas containing cultural resource that, when burned, are most likely to be adversely affected. These areas are identified through the Fire Return Interval Departure (FRID) analysis. Using the median FRID analysis (Chapter II, pages II-5 to II-7), areas with a median FRID value of four or greater are more likely than those with a value less than four to burn at an intensity that would impact cultural resources. Burns in these areas would also be more difficult to control to the degree needed to protect known resources, unless mitigation measures were implemented prior to the burn (see Mitigations of Impact, below).

Type of Impact

Impacts are considered either adverse or beneficial to historic properties (cultural resources) when analyzed under NEPA. However, impact type is not viewed this way when conducting analysis under Section 106 of the National Historic Preservation Act. For the purposes of assessing effects to historic properties under the National Historic Preservation Act, effects are either adverse or not adverse. Effects under both NEPA and the National Historic Preservation Act are considered adverse when they diminish the significant characteristics of a historic property.

Duration of Impact

Impacts to historic properties (cultural resources) could be of short term, long term, or permanent duration. Analysis of the duration of impacts is required under NEPA, but is not required and is not usually considered in assessing effects in terms of National Historic Preservation Act.

Intensity of Impact

- Negligible: Impacts would be barely perceptible changes in significant characteristics of a historic property.
- Minor: Impacts would be perceptible and noticeable, but would remain localized and confined to a single element or significant characteristic of a historic property (such as a single

archeological site containing low data potential within a larger archeological district or a single contributing element of a larger historic district).

- Moderate: Impacts would be sufficient to cause a noticeable but not substantial change in significant characteristics of a historic property.
- Major: Impacts would result in substantial and highly noticeable changes in significant characteristics of a historic property.

Impacts can be either direct or indirect. Direct impacts result from specific actions, such as biomass removal or fire line construction using a bulldozer. Indirect impacts generally occur after an action, and are a result of changes in the condition of the landscape (such as loss of vegetation and subsequent erosion).

Mitigation of Impacts to the Cultural Environment

NEPA calls for a discussion of the "appropriateness" of mitigation, and an analysis of the effectiveness of mitigation. A reduction in intensity of impact from mitigation is an estimate of the effectiveness of this mitigation under NEPA. It does not suggest that the level of effect, as defined by implementing regulations for Section 106 of the National Historic Preservation Act, is similarly reduced. Although adverse effects under Section 106 may be mitigated, the effects remain adverse.

Mitigation in this document is based on the cultural resources programmatic agreement and includes the avoidance of adverse effects or the application of one or more standard mitigation measures as described in stipulations VII (C) and VIII (Appendix 8). Avoidance strategies may include protecting historic resources from fire and fire-related impacts through onsite fuels reduction or use of portable sprinkler systems and protective shelters. Stipulation VIII requires the National Park Service to notify the State Historic Preservation Officer, American Indian tribes, and members of the public of its decision to implement standard mitigation measures for individual actions having an adverse effect on historic properties.

Outlined below are the mitigating measures that would be taken, under all alternatives, to reduce or avoid impacts to cultural resources:

Pre-Incident Planning

- Known cultural resources would be assessed for hazardous fuels, and these hazards would be reduced as part of ongoing fuel reduction programs.
- The National Park Service would continue to consult with park-associated American Indian tribes and groups about fire management planning and specific fire management actions in order to identify issues and resources of concern and implement the most appropriate treatments.
- In traditional use areas fire planning would consider the needs of cultural practitioners to access and use of traditional resources.
- In fire management units lacking cultural resource inventory data, background research and inventory would be conducted to identify resources that may be important and would be susceptible to adverse impacts from fire or fire management actions.
- Planning for fire management actions would include protection of known cultural resources.

- Cultural resources typical of those found at Yosemite would be included in long-term research and experimentation about the effects of fire on cultural resources.
- Incident Response
- Archeologists or cultural resource specialists would be involved as resource advisors or technical specialists to advise fire management teams of cultural resource issues and concerns.
- Archeologists or cultural resource specialists would, wherever possible, aid in positioning crew camps, holding lines, spike camps, helispots, drop zones, and other fire suppression-related facilities to avoid damage to cultural resources.
- Archeologists or cultural resource specialists would advise fire management teams of known, significant cultural resources where potential impacts of fire could be reduced or avoided through emergency fuel reduction.
- Wherever possible, archeologists or cultural resource specialists would document significant cultural resources prior to a burn.

Post-Burn Measures

- Archeologists or cultural resource specialists would document the post-fire condition of known cultural resources.
- Where feasible, significant cultural resources would be stabilized to prevent post-fire damage.
- Archeologists or cultural resource specialists would, where necessary, conduct post-burn inventory at areas affected from construction of holding lines, spike camps, and other fire related facilities.
- Archeologists or cultural resource specialists would conduct post-burn inventories in unstable areas and recommend stabilization as noted above.
- Archeologists or cultural resource specialists would conduct inventories and prescribe any necessary resource protection measures in areas proposed for post-burn treatment where cultural resources might be affected.
- Archeologists or cultural resource specialists would perform post-fire monitoring surveys of portions of fires after ground visibility is improved.

Archeological Resources

The impact analysis provides a comparison of the FRID analysis with actions proposed for the management units under each alternative. For areas with more than three missed fire return intervals, fuel accumulation is unnaturally high and fires (prescribed burns and wildland fires) could generate soil and below-soil temperatures that damage archeological materials.

Type and Duration of Impact. A change in the physical attributes of an archeological site that affects the information contained in that site is irreparable and considered adverse and of permanent duration. Adverse impacts to archeological resources can result from manual or mechanical fuels treatment, direct heating during fire, fire response and suppression, post-fire ecological processes, emergency rehabilitation, and fire damage restoration. The intensity of impacts to archeological resources can range from negligible to major, depending on the management actions taken and/or on the intensity of burning. The majority of these impacts are long-term in duration. Appendix Eight contains a list of fire-related effects.

Fire can also have beneficial impacts to archeological resources. Burning duff and forest litter exposes mineral soil not visible during inventories of unburned areas, allowing for greater accuracy in documenting site constituents and boundaries. Burning within a natural fire regime also reduces the threat of high-intensity fire and the need for suppression activities.

Intensity of Impact. The intensity of impact to an archeological resource would depend on the potential of the resource to yield important information, as well as the extent of the physical disturbance and/or degradation. For example, moving earth at an archeological site with low data potential might result in a minor, adverse impact.

- Negligible: Barely perceptible and not measurable, and would usually be confined to archeological sites with low data potential.
- Minor: Perceptible and measurable, and would remain localized and confined to archeological site(s) with low to moderate data potential.
- Moderate: Sufficient to cause a noticeable change, and would generally involve one or more archeological sites with moderate to high data potential.
- Major: Substantial and highly noticeable changes, involving archeological site(s) with high data potential.

Mitigation of Impacts

For archeological resources, mitigation includes site avoidance during fire suppression activities, protection of flammable materials during burns, and reducing heavy fuel loads in a manner that preserves and protects the site. In some situations standard treatments such as complete site documentation (e.g. at some historic dumps) may be appropriate as a way to preserve site information and forego continued site management.

Ethnographic Resources

While developing this plan, the National Park Service consulted with culturally-associated American Indian tribes and groups. Both have expressed strong support for increasing the annual number of acres burned. They also have expressed support for the standard treatments for known ethnographic resources or traditionally used plant species (such as avoiding traditionally used plants or timing the burns to promote culturally-desired characteristics in plants). The National Park Service would continue to consult with culturally associated American Indian tribes about each year's prescribed fire program and on individual fires. This provides American Indian tribes and groups the opportunity to provide additional information or express concerns about ethnographic resources and discuss appropriate treatments.

Type of Impact

Fire-related adverse impacts to ethnographic resources can occur as result of fuels treatment, burning, fire response and suppression, emergency fire rehabilitation, and fire damage restoration. For example, traditionally-used plants can be damaged or destroyed if they are exposed to fire at the wrong point in their annual life cycle. Wooden features can be destroyed if not protected from burning. Most ethnographic resources that are known can be protected from adverse impacts through protection or, in the case of plants that benefit from fire, prescribing appropriate burn times and intensities. Fire was used extensively by American Indians in managing and maintaining some plants for traditional use—continued burning is necessary to maintain the health, vigor, culturally-desirable characteristics, and extent of many traditionally-used plants.

Duration of Impact

- Short-term: Causes a temporary change in important vegetation or temporarily restrict access to an important resource, yet do not disrupt the cultural traditions associated with that resource for a noticeable period.
- Long-term: A change in culturally important vegetation or a cultural feature for a noticeable period. This period would vary by resource type and traditional practitioners. Long-term changes would disrupt cultural traditions associated with the affected resource, but the disruption would not alter traditional activities to the extent that the important cultural traditions associated with the resource are lost.
- Permanent: Impacts to ethnographic resources would involve irreversible changes in important resources such that the ongoing cultural traditions associated with those resources are lost.

Intensity of Impact

The intensity of impacts to an ethnographic resource would depend on the importance of the resource to an ongoing cultural tradition, as well as the extent of physical damage or change.

Cultural Landscape Resources, Including Individually Significant Historic Sites and Structures

Type of Impact

- Adverse: Physical changes to significant characteristics of a resource or its setting, such as removal or burning of historically important vegetation or burning of historic structures.
- Beneficial: Restoration of a natural setting or reduction in heavy fuels adjacent to structures—measures that reduce risk of loss through burning.

Duration of Impact

- Short-term: Activities such as temporary removal of vegetation or other contributing resources, road closures, or prescribed burns, where the impacts are noticeable for a period of from one to five years.
- Long-term: Reversible changes, lasting from five to twenty years, in a significant characteristic of a historic structure or landscape.
- Permanent: Irreversible changes such as complete removal or burning of important vegetation or structures.

Intensity of Impact

- Negligible: Barely perceptible and not measurable; would be confined to small areas or a single contributing element of a larger National Register district.
- Minor: Perceptible and measurable; remain localized and confined to a single contributing element of a larger National Register district.
- Moderate: Sufficient to cause a change in a significant characteristic of an individually significant historic structure; or would generally involve a single or small group of contributing elements in a larger National Register district.

- Major: Substantial and highly noticeable changes in significant characteristics of an individually significant historic structure; or would involve a large group of contributing elements in a National Register district.

Mitigation of Impacts

Mitigation measures for historic structures and cultural landscape resources include measures to avoid impacts, such as removing heavy fuels in and adjacent to cultural landscape features and historic structures; protecting flammable historic structures from burning; and excluding fire from especially sensitive designed historic landscapes.

Social Environment

Recreation

Fire management activities and the potential for closures, restrictions and direct effects were evaluated for their potential to affect visitation and an aggregate of recreational activities in Yosemite National Park.

Type of Impact

- Adverse: Reduce visitor participation, quality of visitor experience, and/or service level.
- Beneficial: Enhance visitor participation, quality of visitor experience and/or service level.

Duration of Impact

- Short-term: Temporary in nature, during the period when a fire management activity would take place.
- Long-term: Permanent effect on the visitor experience.

Intensity of Impact

- Negligible: Imperceptible or undetectable effect upon visitors.
- Minor: Slightly detectable or localized effect on visitors.
- Moderate: Readily apparent localized effects on visitors.
- Major: Substantial, highly noticeable effects and/or effects that would result in major limits on activities.

Scenic Resources

Fire management activities and operations, catastrophic fire, and smoke from fires were evaluated for their potential to affect scenic quality of major scenic values or historically important views, such as in Yosemite Valley, along road corridors, and in Wilderness.

Type of Impact

- Adverse: Degrades visual quality.
- Beneficial: Improves visual quality.

Duration of Impact

- Short-term: Short-lived or temporary (less than five years) occurring primarily during or just after fire management activities (managed wildland fire, prescribed fire, biomass removal, etc.).
- Long-term: Effects are detectable for more than five years after fire treatment.

Intensity of Impact

- Negligible: Imperceptible or undetectable.
- Minor: Slightly detectable or limited to a relatively small area.
- Moderate: Readily apparent.
- Major: Substantial, highly noticeable and/or results in a change of character of the landscape.

Noise

In this analysis, the noises associated with fire management activities and operations were evaluated for their influence on the soundscape. Sound levels for various activities and pieces of equipment were compared to a reference sound level [40 dB(A), see table III.12 and text in Chapter III, Noise].

Type of Impact

- Adverse: Noise levels increase.
- Beneficial: Noise levels decrease.

Duration of Impact

- Short-term: Temporary and associated with transitional types of activities.
- Long-term: Permanent effect on the ambient noise environment.

Intensity of Impact

- Negligible: Imperceptible or undetectable.
- Minor: Slightly detectable near the source, but not expected to have an appreciable effect on ambient noise levels.
- Moderate: Clearly detectable, and could have an appreciable effect on ambient noise levels; moderate effects may include the introduction of a noise into an area with little or no ambient noise.
- Major: Clearly audible against ambient noise levels; or would have a substantial, highly noticeable effect on ambient noise levels.

Local Communities

Alternatives were evaluated for their socioeconomic effects on local communities. Socioeconomic effects include potential direct effects of property loss and potential indirect effects in economic terms, in the event of park closures.

Type of Impact

- Adverse: Degrades or otherwise negatively alters the characteristics of the existing environment, as it relates to local communities, visitor population, regional economies, and concessionaires and contractors.
- Beneficial: Improves on characteristics of the existing social and economic environment, as it relates to local communities, visitor population, regional economies, and concessionaires and contractors.

Duration of Impact

- Short-term: Temporary and typically transitional; associated with implementation of an action.
- Long-term: Permanent impacts on the social and economic environments.

Intensity of Impact

- Negligible: Undetectable and expected to have no discernible effect on the social and economic environment.
- Minor: Slightly detectable and not expected to have an overall effect on the character of the social and economic environment.
- Moderate: Detectable and could have the potential to initiate an increasing influence on the social and economic environment.
- Major: Substantial, highly noticeable influence on the social and economic environments, and could be expected to alter those environments permanently.

Environmental Justice

Alternatives were evaluated for their effects on minority and low-income populations and communities.

Type of Impact

- Adverse: Degrades or otherwise negatively alters the characteristics of the existing environment, as it relates to local communities of minority and low-income populations.
- Beneficial: Improves on the characteristics of the existing social and economic environment, as it relates to local communities of minority and low-income populations.

Duration of Impact

- Short-term: Temporary and typically transitional effects associated with implementation of an action.
- Long-term: Permanent effects on the social and economic environments.

Intensity of Impact

- Negligible: Not detectable and expected to have no discernible effect on the social and economic environment for minority and low-income populations

- Minor: Slightly detectable and expected to have no overall effect on the character of the social and economic environment for minority and low-income populations.
- Moderate: Detectable and could have the potential to initiate an increasing influence on the social and economic environment for minority and low-income populations.
- Major: Substantial, highly noticeable influence on the social and economic environments, and could be expected to alter those environments permanently for minority and low-income populations.

Special Designations

Wild and Scenic Rivers

See Chapter V, Wild and Scenic Rivers.

Wilderness

The impacts of fire management activities and operations on Yosemite Wilderness were evaluated by assessing their effect on both the Wilderness user and the Wilderness setting.

Type of Impact

- Adverse: Degrades Wilderness values or interferes with the public's use and enjoyment of Wilderness
- Beneficial: Improves Wilderness values or enhances the public's use and enjoyment of Wilderness.

Duration of Impact

- Short-term: Occurs in the period concurrent with the implementation of individual actions or leaves evidence of human activity that lasts no more than five years after the action.
- Long-term: Continues after completion of the individual actions and can be expected to persist for longer than five years.

Intensity of Impact

- Negligible: Imperceptible or undetectable.
- Minor: Slightly perceptible and limited to a relatively small area.
- Moderate: Apparent.
- Major: Substantial or highly noticeable.

Energy Consumption

Fuel consumption was estimated for each alternative using the average annual amount of accomplishment for each activity, in acres, and an estimate of equipment fuel consumption, on a per acre basis. Assessments of effects are made using the following.

Type of Impact

- Adverse : Increase in energy consumption.
- Beneficial: Decrease in energy consumption.

Duration of Impact

- Short-term: A change in energy consumption that would last less than five years.
- Long-term: Change in energy consumption that would last five years or more.

Intensity of Impact

- Negligible: Increase or decrease by less than 5% annually.
- Minor: Increase or decrease by 5% to 20% annually.
- Moderate: Increase or decrease by 21% to 50% annually.
- Major: Increase or decrease by more than 50% annually.

Impacts of Fire Supression Activities

The effects of fire suppression activities (e.g., fire line construction, use of retardant, physical damage to cultural resources caused by suppression actions,) are potentially greater in those alternatives which take a relatively longer time to reduce wildland fuels and restore ecosystem structure. As wildland fuels, and wildland fire risk, are reduced, less effort will be required to manage wildland fires. Less intrusive methods will likewise be required to manage more natural, low intensity wildland fires.

Fire management actions such as prescribed fire and managed wildland fire may use handline and other tactical actions similar to those used in fire suppression, but greater opportunities for planning are more conducive to avoiding resource impacts and making strategic decisions that improve management of resources. Emergency fire suppression actions, guided by policies intended to assure that only appropriate impacts are allowed during the course of actions to protect human life and property, are often done under tight deadlines, and impacts do occur. Fire lines can have a direct effect upon ecological processes and ecosystem function. They are often associated with disease centers, exotic plant invasion, and rodent habitat disturbance.

The width of fire lines, for example, are constructed according to a fire's flame lengths and how far it is throwing embers. Fire line placement locations are selected based on opportunities to safely control and suppress a fire, and protect life and property. Fire lines built in response to high intensity wildland fires can be in the order of dozens of feet, compared to one to two feet in the case of lines constructed in support of planned prescribed fire activities. In the construction of fire lines, all flammable plant material, including the top layer of organic soil, is removed. In general, suppression tactics depend on several factors: safety, topography, available resources, fire behavior, and fire suppression goals.

Fire suppression activities undertaken under any of the alternatives will be guided by the procedures described in Appendix 3, Wildland Fire Response, Planning, and Implementation Procedures.

Alternative A – No Action

Biological Environment

Vegetation and Fire Ecology

Potential for Impacts from Catastrophic Fire

Subalpine Forests. Vegetation in this group shows no departure from the normal fire return interval (table 2.1). This indicates that stand structure, composition, and fuel loads are within the natural range of variability and potential for catastrophic fire is low. Since 1930, the largest fire in this vegetation zone was only 773 acres. Fire behavior and fire effects would be expected to closely track historical norms with minimal potential for non-native plant establishment. Thus, the No Action Alternative would not reduce the risk of catastrophic fires and the effect on subalpine forests would be adverse, short-term, and negligible.

Upper Montane Forests. Vegetation in this group would continue to show moderate to high departures from the median fire return intervals (table 2.1). About 25% of the acreages of upper montane forests are within one return interval of normal. Of the red fir forest and montane chaparral, about 75% would continue to have moderate departures (2-3 intervals). About 70% of western white pine/Jeffery pine forest are and would continue to be four or more return intervals from normal. The structure and composition of all upper montane forests would continue to change to include higher densities of small, shade-tolerant species, contributing to the potential for catastrophic fire. Chaparral would be reduced in size and extent. Large areas would be converted to vegetation types that would not have historically occurred in the area. Fuel loads would remain higher than the natural range, also contributing to significantly increased chance of catastrophic fire in these areas. While large, stand-replacing fire occasionally occurred in these areas naturally, the existing trend toward high fuel loading would cause a gradual increase in the size and extent of these types of fires. This would be an adverse effect. The relatively small annual average acreage of managed wildland fire in this alternative would increase the chances of stand-replacing fires and associated encroachment into these sites by non-native plant species. The risk of catastrophic fire under Alternative A on upper montane forests would increase, thus effects would be adverse, long-term, and major.

Lower Montane Forests. About 50% of these forests are within two median fire return intervals of natural due to an active prescribed fire program. At the same time, about 50% of these areas are three or more return intervals from normal and some have extremely high departures from the median fire return interval, consequently the chance of catastrophic fire has significantly increased under the existing program. Under Alternative A, vegetation in this group would continue to show moderate to high departures from the median fire return intervals (table 2.1). Of the ponderosa pine/bear clover forest, 36% has missed 17 median return intervals. Fire exclusion has changed these relatively open forests to forests with dense thickets of shade-tolerant tree species at the higher elevations, and dense shrub at lower elevations. Thus, both structure and composition of ponderosa pine/bear clover forest is significantly outside the natural range of variability. Both ponderosa pine/mixed conifer and ponderosa pine/bear clover are undergoing a vegetative type change—becoming white fir/mixed-conifer forest. Fuel loads are significantly higher than they were historically. While large stand-replacing fires occasionally occurred in these forests; fires burning in existing conditions would have a much greater intensity than under the natural fire regime.

Under this alternative, wildland fire in much of the lower montane forest type would be larger in size and extent than expected under the natural range of variability. Such fires would alter gap distribution and the vegetative mosaic. High-intensity, catastrophic fire would convert large areas to vegetation types that would not have historically occurred in the area and would increase the likelihood for invasion of non-native plant species. The Mariposa Grove of Giant Sequoias occurs in lower montane forest and could be one of the areas converted by catastrophic fire. These effects would be outside the range of natural variability, and adverse. The relatively small annual average acreage treated with prescribed fire would increase the potential of stand-replacing fires, thus the effects of the No Action Alternative on lower montane forests would be adverse, long-term, and major.

Montane Meadow. Vegetation in lower montane meadows shows high departures from the mean fire return interval (table 2.1). Almost 80% of the meadows are four or more return intervals from normal. Hydrologic regimes have been altered in many meadows in Yosemite Valley and intensive ecological restoration is ongoing. However, fire exclusion has significantly increased the potential for catastrophic fires in the forests surrounding these meadows. Under this alternative, severe encroachment by conifers would continue and meadows would continue to contain large amounts of Kentucky bluegrass and other non-native, cool season grasses. Fuel loads would be higher because of the number of years between fires and because of conifer encroachment. The relatively small annual average for acreage treated with prescribed fire in this alternative would increase the chances of having stand replacing fires in the forests surrounding meadows. High-intensity fire would likely have more of an effect upon encroaching conifers than on the montane meadow native and non-native species. The effects of the No Action Alternative on meadows would be adverse, short-term, and minor.

Foothill Woodlands. Vegetation in the foothill woodlands would continue to show low to moderate departures from mean fire return interval (table 2.1). Most of the areas in this vegetation type were burned in the large wildland fires that occurred in and around the park during the 1990s. Cheatgrass and other non-native annual grasses have invaded the foothill woodlands. High-severity fires are normal for this group, and the effects from them are within the natural range of variability, although in many areas native species have been replaced with non-native species favored by and/or facilitating unnatural fire frequencies. The relatively small annual average number of acres that would be treated with prescribed fire under this alternative would increase the chances of catastrophic fires due to the potential of fire to spread from the lower montane forests, as happened during the 1990 A-Rock fire. The effects of Alternative A on foothill woodlands would be adverse, long-term, and minor, due to the gradual shift in dominance from native to non-native species that have unnatural fire regimes.

Fire Management Treatments

The No Action Alternative would utilize managed wildland and prescribed fire and a limited array of site preparation, including fuel reduction, techniques. Site preparation for prescribed burns include fire line construction, hand thinning, and some snagging. Fuels may be piled for burning. Fuel reduction is performed in advance of prescribed burning to reduce the potential for an escaped burn and to reduce impacts to air quality from smoldering material following the prescribed burn. Some material is moved to wood yards and chips have been given away or used in the park or El Portal.

Managed Wildland Fire

Subalpine Forests. Of the subalpine forest, 99% would occur within the Fire Use and Conditional Units. There is no departure from normal fire return interval for this group. The structure, composition, and fuel loading are within the natural range of variability. Fire behavior and fire effects would be expected to closely track historical norms. However, the small annual average number of acres burned with managed wildland fire would limit the beneficial impacts to these areas. Overall, the effect of managed wildland fire on subalpine forest would be beneficial, long-term, and minor.

Upper Montane Forests. Of upper montane forest, 95% would occur in the Fire Use and Conditional Units. Fire behavior and fire effects would be expected to be normal to slightly outside the natural range of variability due to changes in the structure, composition, and fuel loads. It is expected that managed wildland fire would have a beneficial, long-term, major effect in areas that burn. However, under this alternative, the small annual amount of managed wildland fire, on average, would likely result in changes that would significantly increase the chance of catastrophic fire in upper montane forests. This is because a large number of fires would be suppressed in the Conditional Unit, which would lead to increased fuel loads. Many areas in red fir and western white/Jeffery pine forests would move outside the natural range of variability during the life of this plan. The effects of Alternative A in upper montane forests would be adverse, long-term, and moderate to major.

Lower Montane Forests. About 40% of lower montane forests occur in the Fire Use and Conditional Units. Half of that acreage is in the Conditional Unit—where wildland fires are likely to have been suppressed. Because the structure and composition of these forests would continue to be significantly outside the natural range of variability, particularly in the Conditional Unit, fire behavior and fire effects also would be expected to be at or outside the natural range of variability. It is expected that managed wildland fire would have a beneficial, long-term, and major effect in the areas that burn. But, the small annual average of acres treated with managed wildland fire would result in overall increases in the potential for catastrophic fire in this type. Additionally, a large number of fires would be suppressed in the Conditional Unit, leading to increased fuel loads. Many areas of lower montane forest would move outside the natural range of variability during the life of this plan. The effects of Alternative A on lower montane forests would be adverse, long-term, and major.

Meadows. About 60% of dry montane meadows would occur in the Fire Use and Conditional Units. Fuel loads are higher than normal due to the accumulation of grass and woody fuels (small conifers) in the years between fires, which would be greater than under historic conditions. Fire behavior and fire effects would be expected to be slightly to moderately outside the natural range due to these changes. The small number of acres to be burned annually by managed wildland fire would be expected to significantly increase the potential for catastrophic fire in the forests surrounding these meadows, but not in the meadows themselves. The effects of managed wildland fire on meadows, under this alternative, would be beneficial, long-term, and minor to moderate, due to the limited size of burns and lack of appropriate timing and frequency.

Foothill Woodlands. About one quarter of foothill woodlands would occur in the Fire Use and Conditional Units. Most of that acreage would be in the Fire Use Unit where fires are less likely to be suppressed than in the Conditional Unit so most fires in this vegetation group would be managed for resource benefit. High severity or catastrophic fires are now normal in the foothills woodland vegetation types, due in part to the establishment of non-native, annual grasses and forbs encouraged by these fire events. The effects of Alternative A for managed wildland fire on foothill woodlands would be beneficial, long-term, and minor.

Re-ignition clause. The re-ignition clause would not be used under this alternative.

Holding Action and Monitoring Effects (water and retardant drops, helispots, and spike camps). The effects of holding actions and monitoring would be similar for all vegetation types so all vegetation will be grouped for this analysis.

Water and retardant drops release liquids onto burning or unburned areas. Vegetation can be physically damaged from the impact of the liquid, but the areas tend to be small and the effects relatively local. Most fire retardant contains fertilizer type compounds, including ammonia, nitrogen, and phosphorous that can change pristine vegetation, especially in areas low in nitrate/ammonia type nutrients. Added nutrients can lead to a decrease in growth of native vegetation and a proportionate increase in the establishment of non-native species that favor higher nutrient levels. However, the chemical components of retardant only remain for a few months at most, and long-term, chemical alteration of the soil would not occur. Impacts in high elevation, low nitrogen areas would be mitigated if needed by avoiding use of retardant or by using "clear" retardant that minimizes active nutrients within the mix. Physical damage to vegetation can be avoided by requesting that pilots fly aircraft quickly enough to dissipate water and retardant over larger, more linear areas. Overall, the effect of water and retardant drops on vegetation is adverse, short-term, and minor.

Fire monitoring activities would potentially require the development, use, and management of helispots and spike camps, which could disturb vegetation and soils. In forested areas, trees and/or snags would be removed under some situations, to open areas for safe operation of aircraft or to make camps safe for fire personnel. The effects generally are local. Common practice is to use, when available, previously used sites and open areas that require little disturbance. Aircraft skids or wheels, boots, equipment, and camp and base supplies could be contaminated with non-native seed, providing vectors for non-native species that would not otherwise disperse to these sites. Mitigation measures would include: (1) avoiding known populations of special-status species; (2) cleaning vehicles and equipment prior to actions to make them weed-seed free; (3) rehabilitating sites (return to natural grade) as quickly as possible to restore natural drainage and prevent unnatural runoff patterns; and (4) replacing litter and duff, to make these sites less susceptible to invasion by non-native species. Overall, the effects of helispots and spike camps on vegetation would be adverse, short-term, and negligible.

Prescribed Fire

Prescribed burns are carried out for two primary reasons—to restore or maintain vegetation within target conditions and to reduce fuels to protect buildings or achieve other administrative objectives (e.g. maintenance of cultural landscapes or view sheds). At times, the two reasons contradict each other because their effects differ on various components in a burn unit (Kauffman, 1990). For example, unnaturally frequent burns or burns done outside of the natural fire season would favor some species and target others, shifting vegetation away from natural conditions. On the other hand, fires conducted solely to restore fire to the ecosystem or to maintain fire's role may lead to unacceptable fuel loading or species composition. For example, the natural fire regime in ponderosa pine/bear clover favors a continuous cover of bear clover. This highly flammable and fire-adapted species poses threats to buildings. Therefore, unnaturally frequent burns would be conducted to reduce or eliminate bear clover near developed areas.

Subalpine Forests. Less than 1% of subalpine forests occur within prescribed fire units under the No Action Alternative. These forests are within the normal fire return interval and structure, composition, and fuel loading are within the natural range of variability. Fire behavior and fire effects would be expected to closely track the historical norms, if prescribed burns were conducted during the normal fire season. Although effects of burning during the *shoulder season* (outside of the normal fire season) are yet to be studied, the potential of adverse effects exists. The very small acreage involved makes this potential effect local. Overall, the effect of prescribed fire on subalpine forest would be beneficial, short-term, and minor.

Upper Montane Forests. Less than 10% of upper montane forests occur within prescribed fire units under the No Action Alternative. Vegetation in this group shows moderate to high departures from the median fire return intervals (table 2.1). Fire behavior and fire effects would be expected to be normal to slightly outside the natural range of variability due to changes in structure, composition, and fuel loads. First entry burns have been conducted during the shoulder season and while the overall effect of these burns has been beneficial, potential for adverse effects on some plant species exists. For example, spring burning has shown high mortality in mature sugar pines. The small annual average number of acres treated with prescribed fire would allow the potential for catastrophic fire to increase in these areas. The effects of Alternative A on prescribed fire in upper montane forests would be beneficial, long-term, and minor.

Lower Montane Forests. Most of the prescribed burn units in the park occur in lower montane forests, and about 40% of lower montane forests are in prescribed burn units. Under Alternative A, vegetation in this group would continue to show moderate to high departure from median fire return intervals (table 2.1). Prescribed fire could effectively reverse the undesirable increase in dense thickets of shade-tolerant tree species at the higher elevations and shrubs at lower elevations, and could return these forests to relatively open stands. However, the amount of prescribed fire treatment proposed annually is limited. At the current rate of burning, departure from normal return interval is increasing and larger areas are at risk for high-intensity fire. Because the structure and composition of these forests is significantly outside their natural range of variability, fire behavior and fire effects would be expected to be from normal to outside the natural range of variability. First entry burns would often be conducted during the shoulder seasons to aid in control. While the overall effect of these burns would be beneficial, there would be the potential for adverse effects on some plant species. For example, the mortality rate for large sugar pines is often higher during spring burns than in fall burns. The small annual average number of acres burned would not significantly decrease the potential for catastrophic fire in these areas. It would not be possible to realize restoration targets, except in small areas. The effects of continuing the current level of prescribed fire under Alternative A on lower montane forests would be adverse, long-term, and moderate.

Meadows. Less than one third of dry montane meadows occur in prescribed fire units. Vegetation in the dry montane meadows would continue to show high departures from the mean fire return interval (table 2.1). Fuel loads would be higher than normal because of conifer encroachment and the long interval between fires. Fire behavior and effects would be expected to be outside the normal range of variability due to these changes. The small annual average for acres treated with prescribed fire is resulting in a loss of dry montane meadow habitats at a rate greater than what would normally occur. At the current rate of prescribed fire, restoration and maintenance targets would not be met, except on a local basis. Overall, the effects of the No Action Alternative from prescribed fire on meadows would be adverse, long-term, and moderate.

Foothill Woodlands. Less than 20% of foothill woodlands occur in prescribed fire units under the existing program. Vegetation in foothill woodlands would continue to show low to moderate departures from the mean fire return interval (table 2.1). High-severity fires are now normal in these types of vegetation, due to the presence of a mix of native and non-native species. Through the removal of numerous non-native plant species, restoration of the native suite of grasses and forbs within the foothill woodlands would continue. Prescribed fires to reduce non-native species would be conducted outside of the normal fire season for this type, which would potentially have adverse fire effects on some native vegetation. However, if highly invasive non-native species are not removed, the structure, composition, and fuel loads in foothill woodlands would be significantly altered and remain outside the normal range of variability. Overall, the effects of the current level of prescribed fire on foothill woodlands would be adverse, long-term, and minor to moderate.

Site Preparation Associated with Managed Wildland Fire and Prescribed Fire (hand line, snagging, mop-up)

The effects of holding actions and monitoring would be expected to be the same for all vegetation types, so they will be grouped for this analysis. Hand line would disturb surface vegetation and soils, potentially opening micro-sites for invasion by non-native species. Snagging could lead to unnaturally high concentrations of fuels. Mop-up activities would create soil disturbance and open sites that non-native species could invade. The effects of these activities would be generally local, and would rarely have landscape scale implications, unless unmitigated. All of these activities would be mitigated through avoidance and/or rehabilitation measures. Overall, the effect of site preparation on vegetation would be adverse, short-term, and minor.

Fuel Reduction by Hand or Machine

Aggressive Reduction Techniques. These treatments would not be used in Alternative A.

Passive Reduction and Lower Profile Techniques.

Low-Impact Skidding. Would not be used in this alternative.

Hand Cutting. These activities would continue to be used in the Conditional and Suppression Unit, in Special Management Areas, and in the wildland/urban interface. Impacts that would not change by vegetation type include the potential for trampling and burial of sensitive plants and communities (e.g. wetlands); the appearance of cut stumps; and the loss of fuel ladders. Most of these impacts would be mitigated through project planning and coordination with the Resource Management Division. Hand cutting would not occur in subalpine forests, upper montane forests, and meadows in this alternative.

Current prescriptions for hand thinning have been developed for lower montane forests where most of the thinning activity would be done. Cutting small diameter trees in the past has actually increased the smallest time-lag fuels, which are the most flammable (Yosemite Fire Management File Data). Removing small diameter trees amounts to removing some of the ladder fuels which are needed for fire to kill some of the larger trees that have come into the area since fire exclusion. Additionally, because of the small number of acres treated annually with hand thinning, the potential for large, high-severity fires would remain high. Thus, unless prescribed fire is used on hand-thinned fuels, the effects of hand thinning on lower montane forests would be adverse, short-term, and minor. If these fuels are also treated with prescribed fire, under controlled conditions, the effects of hand thinning would be beneficial, long-term, and minor to moderate.

Hand thinning has been used in very small areas in foothill woodlands, all within the El Portal Administrative Site. Thinning would continue to be used for removing small diameter trees and brush, to reduce the fire hazard to structures. Due to the intensive nature of this work, some ground disturbance would take place and there would be a potential for additional non-native species establishment. Mitigation would include minimizing soil disturbance and performing post-treatment surveys for non-native plants and implementation of control measures as needed. Overall, the effects of hand thinning on foothill woodlands would be beneficial, short-term, and negligible.

Pile burning. The effects of pile burning would be essentially the same for all vegetation types, so they will be grouped for this analysis. Piles generally are burned following hand thinning, and would precede the use of prescribed fire. Impacts associated with pile burning would potentially include surface and soil disturbance associated with dragging materials to each pile; the very localized, intense burn effects upon surface fuels, litter and duff, and soil layers; and the long lasting effects upon soil chemistry and structure due to extreme heating over long time periods. Because of these effects, piles would be kept small, to the size of a small car. This would minimize the extent of soil damage. The small size would also allow for the recolonization of sterilized patches by mycorrhizal fungi and other soil organisms. These locations are potential micro-sites for colonization by invasive non-native species. Mitigation would include minimizing soil disturbance and performing post-treatment surveys for non-native plants and implementation of control measures as needed. Overall, the impacts of pile burning on vegetation would be adverse, short-term, and negligible.

Chipping. Chipping would only be used occasionally in this alternative. Chipping cut material and then distributing it over a site could occur where air quality, visitor use, or other management concerns prohibit burning. Such impact, however, would be adverse, short-term, and negligible.

Cumulative Impacts

Vegetation within Yosemite National Park and the El Portal Administrative Site has been affected by a variety of actions, including past fire suppression activities, logging, development, construction of O'Shaughnessy Dam (and the creation of the Hetch Hetchy Reservoir), and agricultural and other activities below the park. The effect of 100 years of fire exclusion cannot be overstated. With the exception of subalpine forests, all other vegetation groups have moderate to high departures from normal fire return intervals. The large areas of moderate and high departure vegetation indicate the high potential for catastrophic wildland fires and the potential for type conversion from one vegetation type to another. The overall effect of these activities on forest structure, composition, and fuel loading has been adverse, long-term, and major.

Other actions expected to occur within Yosemite that would affect vegetation would be implementation of the *Merced Wild and Scenic River Comprehensive Management Plan/EIS* (NPS 2000) and the *Yosemite Valley Plan/SEIS* (2000c). The first identifies a protection zone along the Merced River that will allow for enhanced protection of native plant communities that occur in drainages and areas adjacent to the river. Implementation of the *Yosemite Valley Plan* would substantially increase the human population in the El Portal Administrative Site, which would increase the potential for human caused fires and the potential for catastrophic fire, as well as the introduction, establishment, and spread of non-native plant species. Smaller increases in human population would also occur in Wawona, Hazel Green, and Foresta with similar effect. Mitigation measures identified in the *Yosemite Valley Plan* would reduce the potential level of impact to adverse, long-term, and minor.

Actions taken in Yosemite Valley associated with the *Yosemite Valley Plan* would reduce fragmentation. Meadows and California black oak woodland would be increased. However, due to the small areas treated, the overall effect is negligible to minor when looking at park vegetation as a whole. Overall, the effect would be beneficial, long-term and negligible to minor.

Past, present, and reasonably foreseeable actions include fire management and fuel treatment activities outside the park, many of which would be on national forest lands. These would include A-Rock Reforestation, Aspen Fuels Reduction, Orange Crush Fuels Program, Rogge-Ackerson Fire Reforestation, and the Fire Management Plan for Wilderness in Stanislaus National Forest. These projects would include reductions in the spread of noxious weeds, management of fuels and fire in a manner more in line with current federal wildland fire management policies, and protection of riparian resources. These efforts, if successful, would improve habitat conditions for vegetation by controlling weeds and managing fire as part of the ecosystem. These actions would have net beneficial impacts on vegetation by either reducing the potential for high severity fire or restoring vegetation to more ecologically stable targets.

Overall, the effects of these projects on vegetation would be beneficial, long-term, and minor to moderate. These present and reasonably foreseeable future actions would contribute to reversing the adverse impacts of past actions in the region. These effects, in combination with the impacts of Alternative A, would result in beneficial, long-term, and minor cumulative impacts.

Conclusion

Fire management activities would effect vegetation in generally beneficial ways, through actions that would maintain plant communities within their natural range of variability. Continuing an active managed wildland fire program will keep the subalpine forests in the Fire Use Unit within the normal range of variability. Effects in the Conditional and Suppression Units would be limited by the amount of forests treated annually. Because of the likelihood of increasing the risk of large, high intensity fires that would cause type conversion in foothill woodlands and lower and upper montane forests in the Conditional Unit, this alternative would continue to have a high potential for adverse, long-term, and major effects of the type that resulted from the A-Rock Fire. Because over 62% of the park has departed little from the natural range of variability, overall, these effects would be adverse, long-term, and minor to moderate.

The Mariposa Grove of Giant Sequoias is one of the resources specifically identified in the enabling legislation for Yosemite National Park. If catastrophic fire were to eliminate or severely damage this grove, the impact would be impairment.

Wetlands

Potential for Impacts from Catastrophic Fire

Fires of high intensity or large size could have moderate, adverse impacts on wetlands. However, depending on the specific activities associated with individual fires and considering effects at multiple scales, impact levels could vary from negligible to major. Because of the limited scope of work under Alternative A, there would be little reduction in the potential for catastrophic fire. Large, high-intensity fires could cause ecosystem fragmentation, which could impose unnatural barriers on plant and wildlife movements and affect seed sources, nutrients, and plant distribution patterns in wetland communities. These effects would be magnified for spatially limited or isolated wetlands. Fires that consumed all or the majority of available habitat within an area could have major effects on organisms dependent on that habitat type as well. High-intensity fire could initiate a process of type conversion to a less desirable plant assemblage in a wetland, which could result in short-term alterations in occupation by certain species. These effects could occur at multiple spatial scales and result in long-term impacts to wetland ecosystems.

Some additional adverse ecological impacts would be expected following extreme fire events in wetland communities. Most fires spread through the combustion of organic matter that is in contact with the soil, making fire and soil interactions significant (Agee 1993). Fire creates physical, chemical, and biological changes that may be either beneficial or detrimental to long-term soil productivity. Fire events typically involve a transfer of nitrogen from the litter to both air and soil, a transformation of nitrogen from organic to inorganic forms, and a conversion from nitrogen-consuming to nitrogen-fixing plants (Woodmansee and Wallach 1981). These chemical changes associated with fire may impact water quality and quantity as well.

General observations suggest that fire accelerates erosion rates in areas normally subject to erosion but creates little erosion in areas of normally stable soils (Pyne et al. 1996). Wetlands described here are likely to represent communities with low potential for erosion, however, they may also represent areas of deposition for material eroding from upland sites. In regard to catastrophic fire, the effects of Alternative A on wetlands would continue to be adverse, long-term, and minor, due to potential habitat fragmentation and deposition with drying effects on wetland sites caused by catastrophic fire.

Fire Management Treatments

Managed Wildland Fire

In most burning conditions, low- and moderate-intensity fires would burn near or around wetlands—in dry years fires could burn into wetlands. In the short-term, the loss of isolated or spatially limited wetlands habitat would have adverse effects, but over the long-term, these effects would be beneficial as fire is part of the dynamic disturbance cycle of these landscapes. Effects would thus be beneficial, long-term, and moderate.

Re-ignition clause. Re-ignition of wildland fires is not permitted under this alternative.

Holding Action and Monitoring Effects (water and retardant drops, helispots, and spike camps). Wetland habitats would be avoided to the greatest extent possible during holding actions or fire monitoring. While meadows might be used as temporary helispots, this would only be done at dryer sites. Impacts associated with holding actions on wetlands would be adverse, short-term, and negligible.

Prescribed Fire

Fire management activities would likely result in significant ecological benefits for wetlands throughout the park. Although some of these communities have a history of repeated burning and exhibit strong response mechanisms, it is likely that these events occurred at a lower periodicity and severity than has been documented in the contemporary Sierra Nevada (Skinner 2001).

Fires near wetlands would be ignited when wetlands are moist enough not to sustain fire spread, therefore prescribed fire impacts to wetlands would be minimized. Mechanical pre-treatments would be designed to avoid impacts to designated wetlands. The landscape impacts of these combined treatments would benefit wetlands by reducing the likelihood of catastrophic fires of greater intensity to which wetlands are adapted. Appropriately timed and structured prescribed fire events would help significantly with the control of woody tree invasion, as well as the loss of species diversity and structural complexity (Miller et al. 1998).

Risks associated with prescribed fires would include vegetation type conversion (wetland sites to undesirable vegetation types) and adverse impacts to some wetlands species. Prescribed fire activities would only be implemented in designated wetlands when ecologically defensible objectives were presented for habitat, vegetation response, or soil management. Unit arrangement, firing strategies, and prescription parameters would all be designed to minimize the direct effects of prescribed fire. Under this alternative, benefits of prescribed fire would include burning and possibly cutting small trees to achieve more natural structural conditions for specific habitats and well-timed burning to enhance wetland species. These impacts would be beneficial, typically short-term, and minor to moderate.

Site Preparation Associated with Managed Wildland Fire and Prescribed Fire (hand line, snagging, mop-up)

Site preparation for managed wildland fires and prescribed burns would include the use of wetlands as natural barriers and water sources where water is available. When a wetland area is being used for a boundary, line construction and some snagging would occur in the adjacent uplands. Burns would be allowed to back into and burn around wetlands and meadows or through them if the vegetation were dry enough to carry fire. Wetland habitats would be avoided to the greatest extent possible during implementation of confinement and containment strategies. If the objectives of a prescribed burn were to reduce conifer invasion of meadow, some cutting of already established trees might be performed. Since no actual disturbance to the wetland characteristics would be realized, the impacts would be beneficial, short-term, and minor to moderate.

Fuel Reduction by Hand or Machine

Passive Reduction and Lower Profile Techniques.

Hand Cutting. Hand cutting would not typically occur in wetlands. In some meadows small invading conifers would be cut, in which case the effects would be beneficial, short-term, and minor to moderate.

Pile burning. Piles are sited to avoid wetland areas wherever possible. When fuel reduction work is done on the edge of a meadow wetland, piles might be put on the upland areas adjacent to the wetland, where they would be burned. Some movement of ash particles may subsequently wash into the wetland area resulting in an increase of nutrient levels. The impact of pile burning on wetlands would be beneficial, short-term, and minor to moderate.

Chipping. No wetlands plant material would be chipped under this alternative and chip application would avoid riparian and meadow areas.

Cumulative Impacts

Cumulative effects to wetland and aquatic resources discussed herein are based on analysis of other wetlands activities in the Yosemite region and the potential effects of this alternative. The projects identified below include those projects that have the potential to affect local wetland patterns and processes as well as large-scale or regional wetland patterns and processes.

Aquatic and riparian systems are the most altered and impaired habitats of the Sierra Nevada and, as a small proportion of the landscape, are relatively rare. Wetlands in the Sierra Nevada have been drained since the earliest settlers attempted to improve forage and permit agriculture (Hughes 1934; University of California, Davis 1996e). Development and activity in Yosemite has reduced meadow acreage by 60-65%. Dams, roads, and diversions throughout most of the Sierra have profoundly altered stream-flow patterns and water temperatures. Within the mountains, broad valleys with wide riparian areas were often reservoir sites, and much of the former riparian habitat in the Sierra Nevada is now under water. The extent of the inundation across the range becomes apparent when one realizes that virtually all flatwater on the western slope of the Sierra Nevada below 5,000 feet is artificial (University of California, Davis 1996e). These past actions have had long-term, adverse effects on regional wetland and aquatic habitats.

Regional and park wide planning efforts such as the Sierra Nevada Framework for Conservation and Collaboration (USFS); U.S. Forest Service management plans for adjacent Wilderness; and the Wilderness Management Plan Update (NPS) would provide benefits to the size, integrity, and connectivity of wetlands. Cooperation among land management agencies would increase the opportunity to share common objectives and improve resource protection. These plans also could increase knowledge of resources and recreational use. These plans have the potential to have long-term, moderate, beneficial impacts on wetlands, though the proposed management direction has not been finalized.

Other projects approved or planned for construction that could have beneficial effects on wetlands include campground rehabilitation projects in Tamarack, Yosemite Creek, Bridalveil and Hodgdon Meadows Campgrounds, and the Merced River Eagle Creek Ecological Restoration Project (Yosemite Valley). Erosion control and mitigation from these projects would enhance and strengthen palustrine forest and palustrine scrub/shrub wetlands. The Eagle Creek project would revegetate currently denuded riverbanks that were formerly palustrine forest and palustrine scrub/shrub wetlands. The erosion control and restoration projects would have long-term, localized, beneficial impacts on wetlands.

Regional and park plans that would have positive cumulative impacts on wetlands are tempered by adverse impacts that include an extensive infrastructure that diverts water away from wetlands in Yosemite Valley, continued unnatural widening of the Merced River in the east Valley, the potential direct loss of wetland habitat at the Yosemite View Parcel Land Exchange, and other projects outside of the park.

Considered in combination with these beneficial, long-term, and moderate effects, the cumulative impacts of the Alternative A would be adverse on wetlands because of the potential for large, high-intensity fires, with subsequent short-term changes in nutrients, water quality, and vegetation connectivity. Some of these impacts could be long-term, but most would be short-term and negligible. The potential for beneficial or adverse impacts to wetlands would be greater from projects occurring within the cumulative impact assessment area of the Sierra Nevada bioregion than from this alternative.

Conclusion

The effects of the No Action Alternative would be adverse, short-term, and minor to moderate, and would include the continued alteration of forest types surrounding wetlands and the increased likelihood of fire intensities outside the range of tolerance for wetland species. Although most fire management activities would have little or no impact on wetland resources, this alternative would do little to minimize the adverse effects of large, high-intensity fires, and would result in an increase in fire threat through time. These effects would not represent impairment.

Wildlife

Potential for Impacts from Catastrophic Fire

Under Alternative A, park personnel would follow existing fire management practices. The primary threat to wildlife and their habitat would be intense, stand-replacing fires over large areas of the park, especially at lower elevations. Such fires would greatly change the diversity and abundance of wildlife species in the park, through wide-scale and radical changes in habitat (e.g., Finch et al. 1997). Under this alternative, achieving target conditions, and thus more natural vegetation assemblages, for many habitat types would be unlikely. Therefore, the threat of large, catastrophic fires in much of the park would continue or increase indefinitely. Because of the higher risk of catastrophic fire, impacts from fire suppression actions (e.g., fire line construction, helispots, spike camps) are most likely to occur under Alternative A as well.

The mixed-intensity fires that are typical under the natural fire regime for most forested habitats in the park create habitat *heterogeneity* (assorted patches of vegetation types inter-mixed across the landscape). For example, patches of stand-replacing fire within a larger fire create small gaps and openings in the forest canopy while leaving other areas hardly scorched. These processes sustain a wide diversity of wildlife species and promote ecosystem resilience. Sierra Nevada wildlife species have existed for thousands of years under the natural fire regime. They have developed behavioral and life-history adaptations that allow them to take advantage of the spatial and temporal changes in habitats through fire. Under current conditions of abnormally high fuel loading in many forest vegetation types, however, the large, high-intensity fires that are likely would lead to habitat homogeneity. As a consequence, the forest supports an unnatural assemblage and succession of wildlife species adapted to the altered, nearly uniform, habitat.

The A-Rock and Steamboat fires of 1990 provide examples of the adverse effects of stand-replacement fires. These fires burned in unnatural forest conditions and increased the homogeneity of the landscape. In the Foresta area, the fire burned a ponderosa pine/mixed-conifer forest in which years of fire exclusion had caused high fuel loads. The lightning-fire killed virtually all of the trees and understory vegetation during a dramatic crown run of approximately 3,000 acres. Now, over a decade later, the area is dominated by a shrub community interspersed with numerous large snags. While a shift in species composition and succession is natural after a stand-replacing fire, a 3,000 acre type conversion with no interspersed patches of the former habitat type is not characteristic of the fire regime for this type of forest.

This unnaturally large, homogenous habitat area presents several problems for park wildlife that will extend many years into the future. While the area is favorable to bird species such as lazuli bunting, fox sparrow, and numerous woodpecker species, virtually none of the forest-dependent species, such as black-headed grosbeak, white-breasted nuthatch, and western tanager have returned (NPS 2001c). Two California spotted owl territories were lost as well (Gould and Norton 1993). High-intensity fires create large numbers of snags that are normally of high value to many wildlife species (Lyon et al. 2000). Their value, however, is reduced for some species if the area of snags is too large and surrounding vegetation does not afford other necessities, for example, food and cover. Also, high-intensity fires result in fewer snags several years later as the fire created snags fall and growth of the single-age class forest to a snag-producing age takes many decades (Huff and Smith 2000).

Given the potential impact of unnaturally large, intense fires that are likely under current fuel conditions and the relatively long duration of this risk under Alternative A, the effect from the potential impact to wildlife in regard to catastrophic fire is adverse, long-term, and major.

Fire Management Treatments

Managed Wildland Fire

In Yosemite and in surrounding forests, many mid- to low-elevation forests are overgrown with dense shrubs and young trees because of a history of fire exclusion. At the same time, as explained above, some areas are at high risk of unnatural high-intensity fire events. These conditions affect the abundance and diversity of wildlife species directly by creating unfavorable habitat conditions for some species. For example, dense understory growth may adversely affect habitat quality for California spotted owls and northern goshawks by limiting their access to prey (Weatherspoon et al. 1992, Maurer 2000, respectively). Fires started by lightning strikes and managed in the Fire Use Unit and, under appropriate conditions, in the Conditional Fire Use Unit, are an important tool in working toward target vegetation conditions and, therefore, a return to more natural habitat diversity and structure. This allows a return to a more natural distribution, abundance, and diversity of wildlife species in areas that are currently severely altered by a long history of fire exclusion and at risk of catastrophic fire.

However, the rate of habitat restoration would be limited under this alternative. Over the last 30 years, an average of about 4,000 acres has burned annually; well short of the average 16,000 acres that is believed to have burned naturally each year. Therefore, the conditions of suppression-altered habitat and its effects on wildlife species abundance and diversity and the threat of catastrophic fire to wildlife and habitat are likely to continue indefinitely.

Because this alternative relies heavily on natural ignitions and they are somewhat random events, areas burned may not be those of highest management priority (i.e., high fuel loads from fire exclusion). Also, some areas are likely to burn at higher than natural intensities due to high levels of fuel accumulation, even when fire prescriptions are adhered to. As a result, forest gaps may be larger and consumption of large woody debris that provides habitat may be greater than in natural burning conditions. This may adversely affect species that favor dense, complex forests, such as hermit thrush, northern flying squirrel, and marten. Such impacts, however, must be weighed against the benefit of reduced risk of catastrophic fire that would cause greater detrimental change in wildlife habitat. Effects from Alternative A would be beneficial, long-term, and minor due to reductions in the threat of catastrophic fire, but such benefits would be limited by the relatively small number of acres that would be treated annually.

Re-ignition clause. Would not occur under Alternative A.

Prescribed Fire

The use of prescribed fire provides the greatest potential for focused work to restore wildlife habitat and reduce the threat of catastrophic fire. Areas furthest from the natural fire regime with identified threats to wildlife and habitat, can be targeted for treatment. Fire can be planned to occur under conditions that maximize benefit to resources, including wildlife and habitat, and minimize fire-related impacts to sensitive wildlife resources (e.g., spotted owl nesting sites).

Under this alternative, high levels of fuel loading in some areas may cause prescribed fires to burn at higher than natural intensities, even when fire prescriptions are designed to minimize this event. Creation of forest gaps and consumption of large woody debris may be greater than what would be expected under natural fire conditions in some areas of a burn. Thus, intense burning may adversely affect species that favor dense forest, such as hermit thrush, northern flying squirrel, and marten. Such impacts, however, must be weighed against the benefit of the reduced risk of catastrophic fire. Under Alternative A, such benefits would be minimized by the relatively small number of acres that would be treated with prescribed fire.

In habitats near developed areas, where protection of human-built structures and facilities is a concern, prescribed fire would be used to reduce fuel loads to the lower end of the natural variability. If forests became more open (less understory vegetation) and contained less down wood, the effect on animal species that depend on these features, such as salamanders, small mammals, and ground-nesting birds, would be adverse. However, overall a larger number of species would benefit from restoration of forests to a more natural condition.

Prescribed fires would be started when conditions are favorable for their control. This is often in the spring or fall, which is outside of the dry season when most natural fires occur. This would have an adverse effect on species of wildlife that are adapted to the natural timing of fires. For example, small mammals that hibernate in leaf litter could suffer higher mortality during prescribed fires.

Under Alternative A, impact of prescribed fire on wildlife would be beneficial, long-term, and minor, because this action provides habitat improvement in areas most severely altered by fire suppression and some reduction in the risk of catastrophic fire, but such benefits are limited by the relatively small number of acres that would be treated annually.

Holding Action and Monitoring Effects (water and retardant drops, helispots, and spike camps) and Site Preparation Associated with Managed Wildland Fire and Prescribed Fire (hand line, snagging, mop-up)

Maintaining control of managed wildland fires and prescribed fires would occasionally involve hand line construction, snagging, water drops, and other actions. Such efforts are necessary and likely to be less intense than they would be during fire suppression activity.

Water Drops. Dropping water on fires from helicopter buckets would carry inherent risks to wildlife. Water that is removed from small bodies of water may adversely affect aquatic organisms by depleting their habitat, or causing it to dry up prematurely in the same year. Some aquatic species, such as mountain yellow-legged frogs, have small, isolated populations that could be devastated by removal of water and/or frogs. In addition, Chitrid fungus has recently been identified as a factor in the disappearance of mountain yellow-legged frog populations. Helicopter buckets, mostly through dipping in separate water bodies, would potentially spread this fungus to non-infected populations of frogs. Non-native fish inhabit many park lakes and streams, and bullfrogs are present in several others. Water dipped from such areas could lead to the spread of non-native species to pristine waters. The physical impact of a water drop could adversely affect individual animals. On the positive side, water drops can, in some circumstances, be used instead of hand lines ("wet-lining") to control fire movement. This tactic would result in less impact to soil, forest litter, and vegetation than hand line construction and, therefore, would have less impact on wildlife, both in intensity and duration. Under Alternative A, the impact of water drops on wildlife would be adverse, long-term, and minor based upon possible impacts to aquatic ecosystems, especially in relation to amphibians. Mitigation: Avoid dipping from waters known to contain mountain yellow-legged frogs and bullfrogs; avoid dipping from small bodies of water, spread water when dropping. Water drops will only be done on land to avoid the spread of non-native fishes.

Retardant Use. Some terrestrial wildlife could be affected by retardant drops if they were struck by the chemicals, resulting in injury or contamination. Wildlife could also be disturbed by the low-flying aircraft. Under Alternative A, impact to wildlife from retardant drops is expected to be negligible, adverse, and short-term because of its limited application in the park, and protocols for its use designed to protect aquatic resources. Mitigation: Adhere to established protocols for retardant use; limit use in park.

Helispot Construction. Construction of helispots often results in the felling of trees and snags, which are potential wildlife habitat. Snags are especially important wildlife habitat. In addition, helicopter traffic would likely disturb wildlife, such as nesting raptors. Under Alternative A, impact of helispots on wildlife is expected to be adverse, long-term, and minor, based upon their likely limited use, although their use under this alternative is likely to be higher than under other alternatives, due to the greater chance of suppression activities. Mitigation: Limit helispot construction; site helispots away from sensitive resources; use natural clearings for helispots.

Spike Camps. Fire crews staying in spike camps can have an adverse effect on wildlife by allowing them access to human food. This would lead to individuals becoming conditioned to human foods and cause human-wildlife conflicts. In such cases, animals are often eventually killed to protect human safety. Presence of hand crews in remote areas would introduce an element of disturbance, which could affect sensitive species, such as nesting raptors. Under Alternative A, impact to wildlife from spike camps is expected to be adverse, short-term, and minor. Mitigation: Site spike camps away from sensitive resources. Provide strict control of availability of food to wildlife at camps.

Hand Line. Hand line construction would remove and disturb soil and forest litter, possibly affecting animals such as small mammals, amphibians, invertebrates, and ground-nesting birds. The presence of hand line crews in remote locations could cause direct disturbance of some wildlife species and introduce unnatural food sources (see spike camps above). Impacts could be minimized by on-site avoidance of valuable or sensitive wildlife resources (e.g., raptor nests). This would include sensitive habitats, such as meadows and riparian areas. Removal of forest litter and vegetation can also lead to soil erosion and increased siltation in adjacent lakes and streams. This could have an adverse effect on aquatic species, such as amphibians and invertebrates. Impact of hand line construction in association with managed wildland fire and prescribed fire under Alternative A would be adverse, short-term, and negligible given the present limited use of fire, the use of minimum impact management techniques (MIMT), and fire line rehabilitation. Mitigations: Continued use of MIMT; careful planning of fire line construction to avoid sensitive wildlife resources and habitats, avoidance of unnecessary line construction, and proper storage of food.

Snagging. Snags are probably the most valuable tree-form to wildlife (Brown and Bright 1997). They provide cavities and loose bark for nesting and roosting and food in the form of wood-boring insects. Any holding action that requires the felling of snags to protect human safety and the integrity of the fire line would potentially affect wildlife by reducing the availability of snags to species such as pileated woodpeckers, northern flying squirrel, and several bat species. Felling would likely kill some animals. The number of snags lost would vary, depending upon factors such as the type and age of tree stand, its history of fire and/or disease or insect infestation, and the intensity of the fire. Under Alternative A, snagging associated with holding actions would potentially have moderate, long-term, and adverse impacts because of the relatively small areas that would be affected. Mitigation: Use MIMT and limit snag removal to those snags identified as a clear threat to human safety and fire line integrity.

Mop-up. The churning of soil and forest litter to extinguish residual hot spots along the periphery of a fire would cause some mortality of buried organisms by exposing them to heat and flames. Such impact, however, would be along short sections of the lined perimeter and affect few species. Impact of mop-up would therefore be adverse, short-term, and negligible.

Holding Action Summary: Under Alternative A, actions associated with managing wildland fire would have adverse effects on wildlife, but such effects would be slight and localized. Holding actions would facilitate the use of wildland fire to move forests toward natural conditions, which would provide beneficial, long-term, and minor effects on wildlife. Under Alternative A, these effects would be limited by the relatively small number of acres that would be treated each year.

Fuel Reduction by Hand or Machine

Aggressive Reduction Techniques. These treatments would not be used in Alternative A.

Passive Reduction and Lower Profile Techniques.

Hand Cutting. Hand thinning of understory vegetation, down fuels, and small-diameter trees in the wildland/urban interface would have mixed effects on wildlife and habitat. Hand cutting trees and brush to attain target conditions provides a more natural habitat and helps reduce the threat of catastrophic fire; especially from human-caused ignitions that occur in developed areas. The resulting forest structure, however, tends to be less complex and more homogeneous, because protection of property and safety through fuel reduction is a major consideration in these areas. A few species, such as marten, hermit thrush, and some small rodents may be adversely affected by this reduced complexity, but many more species, such as Cooper's hawk, Hammond's flycatcher, and several bat species, would benefit from a more open forest. At the current rate of treatment (< 25 acres/year), restoration of habitat and mitigation of the risk of catastrophic fire to both wildlife and humans is inhibited.

During hand-thinning operations, wildlife in the area might be affected in two ways. Removal of trees and other vegetation would adversely affect wildlife, such as insects and nesting birds, currently using these habitat features. Secondly, human presence and use of chainsaws and other tools during thinning operations may disturb wildlife, although such disturbance would be short-lived. Impact to wildlife from hand-thinning would be beneficial, long-term, and minor, because habitat affected by fire suppression would be returned to a more natural condition, and threat of catastrophic fire would be reduced in these areas. Mitigation: Identify and avoid sensitive wildlife resources.

Pile Burning. Piling and burning of downed trees and shrubs may have an adverse effect on some wildlife. Some species, such as small rodents and reptiles, may take up residence in burn piles between the time they are stacked and the time they are burned; which can be at least several months. Many of these animals are likely to flee the flames once the piles are ignited, but some may perish.

Under Alternative A, effects on wildlife from hand thinning and piling and burning would be beneficial, long-term, and negligible because improvement of habitat adjacent to developed areas toward target conditions would proceed slowly. The area of habitat affected would be relatively small. Some wildlife species may be adversely affected by emphasis on fuel reduction, but more species are likely to benefit from achievement of target conditions, and reduction in the threat of catastrophic fire, small as it is under this alternative.

Chipping. When removed biomass cannot be burned on site or removed for logistical, administrative, or ecological reasons, it may be chipped and distributed over the site. When chips are spread deeply enough to affect the growth of native plants, wildlife would be affected. Such impacts, however, would be limited to areas adjacent to roads and developed areas, and standard mitigation for chipping calls for chips to be spread as thinly as possible on the site—usually to a depth of not more than 1 inch. The machinery used for chipping and shredding would be loud, which would disturb wildlife, such as nesting birds, in the short-term. Impact to wildlife from chipping would therefore be negligible, adverse, and short-term.

Peregrine Falcon

The peregrine falcon, until recently, was an endangered species that the National Park Service considered a special-status species. It has, however, been removed from the endangered species list after a successful recovery program. The park continues to monitor peregrine falcons in Yosemite as part of its larger wildlife management program. Peregrine falcons occupy a broad range of habitats, but need suitable nesting cliffs, which would not be affected by fire management activities due to the vertical aspect of nesting habitat and its lack of vegetation. Some of the major species that peregrine falcon eat (e.g. cliff dwelling birds, such as white throated swift and violet green swallow), are not likely affected by fire management practices because they forage along cliff faces and in the airspace above the Valley floor. Peregrines tend to adjust to changes in the array of bird species available within a forest type, and thus would find suitable prey in a wide variety of forest conditions. Effects on the peregrine falcon would be adverse, short-term, and negligible. However, the park would continue to monitor the status of the peregrine, and if deleterious effects were detected, related to fire management operations, these operations would be adjusted or refined.

Cumulative Impacts

The past activities within the region that have had the greatest adverse impacts upon wildlife have included development, timber harvest, and fire suppression activities. The present and reasonably foreseeable future projects that would have an effect upon wildlife and habitat would include:

Yosemite Wilderness Management Plan Update: This plan could affect how fires are managed in Wilderness by modifying current minimum tool policies. It is likely, however, that the plan will recognize the value of fire in maintaining Wilderness values, and be compatible with fire management goals. On one hand, impacts from fire line construction, snagging, etc., could be reduced, but, on the other hand, policies that inhibit full and quick implementation of the fire program would potentially delay achievement of target conditions which would be beneficial to wildlife over wide areas of the park. Impact on wildlife is expected to be beneficial, long-term, and moderate.

Yosemite Valley Plan/SEIS (2000): Implementation of the preferred alternative would restore highly-valued habitats in Yosemite Valley and decrease the fragmentation of these habitats. This would help restore wildlife abundance and diversity in Yosemite Valley. The construction of facilities outside of Yosemite Valley would cause localized destruction of forest habitat, but the overall impact is expected to be major, beneficial, and long-term.

Merced Wild and Scenic River Comprehensive Management Plan/EIS (2000): Implementation of the preferred alternative would help protect river-related wildlife habitat and species. This is especially true in Yosemite Valley, where past development has encroached on river habitats. The *Merced River Plan* would provide the framework for reducing present development and limiting future development in these areas, with moderate, beneficial, long-term impacts on wildlife.

Yosemite West Re-zoning: This project would likely lead to an increase in the Yosemite West wildland/urban interface area, requiring intensive management of vegetation and fuels over a wider area. This would have an adverse effect on wildlife because an additional 55 acres would be developed in mixed-conifer habitat near the park boundary. Impact on wildlife is expected to be moderate, adverse, and long-term.

Yosemite West, 31 Acre Bed and Breakfast: Like the above project, this project would have an adverse effect on park wildlife by reducing mixed-conifer habitat near the park boundary. No effect on wildland/urban interface treatment in the park is expected, since the affected property abuts national forest land. Impact on wildlife is expected to be moderate, adverse, and long-term.

Hazel Green Ranch: Potential for development in this area adjacent to the park would affect an area of mixed-conifer and meadow habitat. Impact on wildlife is expected to be adverse, long-term, and minor to moderate, due to likely consideration by the developer for preservation of sensitive habitats. However, plans for the site are uncertain.

Evergreen Lodge Expansion*:* This development would affect an area of mixed-conifer habitat near the park. Effect on wildlife is expected to be adverse, long-term, and minor because of the long-term human occupation of this area.

Rush Creek Guest Lodging and Conference Facilities: This project would affect an area of mixed conifer habitat. Effect on wildlife is expected to be adverse, long-term, and minor.

A-Rock Reforestation (USFS): This project would hasten the return of the area burned in the 1990 fire to a forested habitat of 5,000 acres. This would eventually benefit forest-dependent species such as spotted owls, but techniques used to achieve this condition (burning, mechanical thinning, herbicides), would have an adverse effect on wildlife, such as lazuli bunting, fox sparrow, and mule deer, that have occupied the post-fire, shrub-dominated community. Overall impact is expected to be adverse, long-term, and minor because of the artificial influence on the natural succession of habitats and associated wildlife.

Aspen Fuels Reduction (USFS): This project would enhance habitat quality for spotted owls over a 500 acre area near the park. This would have a beneficial, long-term, and minor impact.

Fire Management Plan for Wilderness (USFS): This plan would provide beneficial, long-term, and moderate impact on wildlife by allowing naturally-ignited fires that stay in prescription to cross boundaries between National Park Service and U.S. Forest Service lands. This could result in wider areas of wildlife habitat benefiting from habitat improvement from fire.

Orange Crush Fuels Program (USFS): This project would manage fuels through prescribed burning. This would have a beneficial, long-term, and minor effect on wildlife by working toward the return of a natural fire cycle for the area, and reduce the chance of catastrophic fire, which could carry into the park.

Rogge-Ackerson Fire Restoration (USFS): This would eventually benefit forest-dependent species such as spotted owls, but techniques used to achieve this condition (burning, tilling, shredding, herbicides), would have an adverse effect on wildlife that have occupied the post-fire, shrub-dominated community, such as lazuli bunting, fox sparrow, and mule deer. Overall impact is expected to be adverse, long-term, and minor because of the artificial influence on the natural succession of habitats and associated wildlife.

Sierra Nevada Forest Plan Amendment (USFS): Implementation of this plan would have a major, beneficial, long-term effect on wildlife by leading to more ecosystem-based management of national forests in the Sierra Nevada.

The impacts of these actions, considered in combination with the impacts of Alternative A, would result in beneficial, long-term, and minor cumulative effects on park wildlife and habitat. This is because past, present, and reasonably foreseeable projects inside and outside the park would beneficially affect large areas of wildlife habitat in the central Sierra Nevada. The Sierra Nevada Forest Plan Amendment would affect virtually all U.S. Forest Service land around the park by more ecosystem-based management. In comparison, projects with adverse impacts involve small areas and/or have minor impacts over larger areas.

Conclusion

Effect of Alternative A on wildlife would be adverse, long-term, and major because of the indefinite continuation of the direct effects of high-fuel loading on habitat structure and quality in some areas and the continued threat of catastrophic fire. High-intensity fire has the potential to cause wide-scale, long-term, changes in park habitats as well as large-scale changes in wildlife abundance and diversity in those areas affected. Impacts from actions to suppress fires would be most intense under this alternative, because of the prolonged period over which undesirable wildland fires are likely to occur. Large, high-intensity fires would potentially affect large areas of wildlife habitat, which would be considered key to the natural integrity of the park. The effect would potentially be that of impairment.

Special-Status Species – Plants

The four California rare plant species grow within the lower montane forest and foothill woodland vegetation zones, where fires frequently occur. These plants occur mainly within the El Portal Administrative Site, although isolated populations of the Yosemite onion are also found within the park. Threats to these species are from suppression-related impacts and establishment of non-native plant species in areas that have been severely burned (Hessl and Spackman 1995). As fire lines are tied into creek bottoms and moist areas, populations occurring in those sites may be affected. These impacts can be mitigated by avoidance of known populations and habitats of these species. Soil and substrate disturbance from line construction and trampling is especially harmful to perennial species—in this case, Yosemite onion, Tompkin's sedge, and Congdon's lewisia.

Non-native plants have become established throughout the lower elevations of Yosemite and are concentrated in areas that receive constant disturbance and/or a constant influx of seed and plant material—e.g. along transportation corridors and drainages (Gerlach et al. 2001). As fires burn they open up habitat that may be taken over by non-native plant species. These plants are more aggressive colonizers, have a phenology different than natives, and may be favored by fire-caused changes in the soil. Fires started in the shoulder seasons for hazard fuel reduction or other management reasons may actually exacerbate this problem, favoring non-native plants over the native suite of species. In addition, these fires may negatively affect the rare plants themselves, which are adapted to fires occurring during the normal fire season—May through October at these elevations. For example, Congdon's woolly-sunflower blooms into May and sometimes into June. Prescribed fires held earlier in the year will destroy mature plants and their potential to produce seed for the following season—thereby harming population size and viability.

Potential for Impacts from Catastrophic Fire

Due to fire exclusion and high fire return interval departures in most areas within the vegetation groups inhabited by these special-status plant species, fires tend to have unnaturally high intensity, with impacts to overstory as well as ground cover vegetation. In drainages (which act as chimneys by concentrating high-intensity fire) these fires cook vegetation and create hydrophobic soils.

Yosemite onion, Tompkin's sedge, and Congdon's lewisia all occur on moist slopes or in drainages, and are at most risk of direct impacts from unnaturally high intensity fires. Congdon's woolly-sunflower is an annual species that is in seed during the fire season. It grows on sparsely vegetated slopes with light fuels so fire intensity is generally within normal limits, and this plant thrives under post-burn conditions when competing plants have been burned off and woolly-sunflower seedlings can become established on very exposed slopes. Level of effect to any of these species would depend on the extent of the event (whether it affected the entire species or an isolated population) and the proximity of the disturbed area to non-native seed sources (whether other species became established within the habitat). Impacts from Alternative A to special-status species in regard to catastrophic fire would be adverse, long-term, and minor to moderate, due to the likelihood of extreme exposure of these sites to the sun and heating (due to loss of overstory cover and shade) following the fire.

Fire Management Treatments

Managed Wildland Fire

Under the No Action Alternative, all of the plant special-status species described in this document occur within either the Conditional or Suppression Units. During fire events, input from a Resource Advisor would continue to be used to minimize or eliminate impacts to these species (see Chapter II, Mitigation under Actions Common to All Alternatives and Appendix 3). Human-caused fires would be suppressed regardless of the potential for ecological benefits, and attempts would be made to protect known populations through direct suppression actions. Lightning fires in areas inhabited by these species would most often be suppressed; the only exception would be within the Conditional Unit where there could be isolated populations of the Yosemite onion. In this unit, lightning fires would be allowed to burn if conditions (including ecological, political, and administrative) permitted. These fires would occur within the natural fire season, when plants would be dormant and resistant to direct fire effects. The departure from natural fire return intervals in these areas would continue to increase over time, with increased potential for catastrophic fire as explained above. Therefore, impacts associated with managed wildland fire to special-status species under this alternative would be adverse, long-term, and moderate, because fire in some areas that would benefit from burning would continue to be suppressed.

Re-ignition clause. Not used under this alternative.

Holding Action and Monitoring Effects (water and retardant drops, helispots and spike camps). Water and retardant drops release liquids onto burning or unburned areas. The physical impact of hundreds of gallons of fluid can cause erosion of soils both from the direct impact and from runoff from the site (due to the nature of decomposed granite soils and sparsely vegetated metamorphic substrates). The woolly-sunflower could be washed from the slope, if soils containing seed for this species are dislodged and carried to lower, possibly less suitable slopes and gullies. Perennial species of onion, sedge, and lewisia, due to their below-ground bulb and root structures, could lose the above-ground portions of individual plants with minimal impact to the perennial portions. However, loss of above-ground biomass could eventually lead to reduced vigor in the season following a fire.

Retardant is high in phosphorous and nitrogen, both of which are generally found in very low concentrations within the habitats for these species. Increased levels of nutrients could increase the potential for the establishment of non-native species. However, the chemical components of retardant only remain for a few months at most, and long-term, chemical alteration of the soil does not occur. Impacts are mitigated through avoiding the use of retardants, or by using "clear" retardants that minimize active nutrients within the mix. Direct impacts would be avoided by asking pilots to keep their aircraft moving so that water and retardant is dissipated over a larger, more linear area. In this way, less soil is disturbed, decreasing the amount of downslope erosion and topsoil lost.

Fire monitoring activities, including the development and management of helispots, spike camps, and fire camps can all lead to ground disturbance. There is an increased potential of spills and soil contamination from aircraft as well as chainsaws and fuel cans in these areas. Aircraft runners, boots, other equipment, and camp and base supplies contaminated with non-native seed, provide vectors for non-native species that otherwise would not have dispersed into these sites. Mitigation measures include avoiding known populations of special-status species, cleaning weed seeds from vehicles and equipment, and rehabilitating sites as quickly as possible (which restores natural drainages, prevents further unnatural runoff; and restores locally gathered litter and duff to the site). Mitigation measures as described in Chapter II would be adhered to. All of the special-status species occur in relatively steep, inaccessible areas that would not serve for staging areas or helispots. Therefore, impacts of these actions taken in conjunction with mitigation measures would be adverse, short-term, and negligible.

Prescribed Fire

Prescribed burns are carried out for two primary reasons—to restore or maintain vegetation within target conditions and to reduce fuels to protect buildings or achieve other administrative objectives (e.g. maintenance of cultural landscapes or view sheds). At times, the two reasons contradict each other because their effects differ on various components in a burn unit (Kauffman, 1990).

In the areas where the park's listed plant species occur, prescribed burns are done for both reasons. Efforts would continue to restore the native suite of grasses and forbs within the foothill pine/live oak/chaparral vegetation type, through the removal of numerous non-native plant species. Other areas adjacent to developments (particularly in the El Portal Administrative Site) would be burned during the shoulder season and at higher frequencies to create a defensible barrier around houses, businesses, and administrative facilities. Depending on the site and the species affected, impacts would vary. Overall, due to the highly limited and isolated habitat of special-status plant species and their overall resilience to fire, these actions would have a minor, adverse, and long-term effect.

Site Preparation Associated with Managed Wildland Fire and Prescribed Fire (hand line, snagging, mop-up)

Preparations for managed wildland fire can significantly disturb vegetated areas. Felling and moving snags can create large accumulations of fuel in sparsely covered areas not normally at risk of fire. Hand line construction could cause ground disturbance across slopes and drainages that might divert run-off and cause a loss of topsoil, thus drying out drainages and impinging on individual plants within a special-status population. Mop-up activities would churn up ash and soil, creating extensive disturbance within the upper soil layers, potentially establishing non-native species due to an increase in interstitial spaces in the soil. Mop-up can also lead directly to the loss of seed and below-ground plant structures by exposing them to heat and flames. All of these actions can negatively affect the park's special-status plant species. As much as possible, efforts would be made to identify known populations of these species during fire planning so that disturbance would not occur. In the event that a population were disturbed, fire rehabilitation (which includes restoring natural topography by replacing soil layers scraped aside and rocks that were moved while building hand lines) would mitigate the impacts. Mop-up would not be allowed within a certain distance of a special-status species plant population so that soils and below-ground plant structures would be left intact and undisturbed. Snags would be felled away from sensitive sites to prevent damage from high-intensity burns. Under this alternative, with these mitigations, impacts would be negligible to adverse, short-term, and minor.

Fuel Reduction by Hand or Machine

Aggressive Reduction Techniques. These treatments would not be used in Alternative A.

Passive Reduction and Lower Profile Techniques.

Hand Cutting. Hand cutting to reduce overall stand density, break up continuous areas of shrubs and trees, and/or remove ladder fuels under this alternative would be focused on removing smaller size classes of tree seedlings and saplings. Thinning prescriptions have been developed for most wildland/urban interface areas of the park, as well as undeveloped portions of Yosemite Valley and Wawona. Prescriptions include species to target, desired density of smaller age classes (so that some seedlings and saplings would remain on the site), and (if applicable) species to be avoided.

In the case of special-status plant species, hand thinning would only affect known populations in the El Portal Administrative Site. All thinning projects would go through review, with Resource Advisors providing input regarding the presence and necessary measures to protect and/or avoid these species. Yosemite onion and Congdon’s lewisia generally are unaffected by thinning due to the locations of their populations. Both Tompkin’s sedge and Congdon’s woolly-sunflower potentially would be affected by thinning activities if ground disturbance such as foot traffic or dragging cut materials were to occur. Therefore, the impact of hand thinning in the No Action Alternative (with mitigations) would be adverse, short-term, and negligible to minor.

Pile burning. Pile burning would generally follow hand thinning and would precede broadcast burning (as site preparation). Impacts associated with pile burning would include surface and soil disturbance associated with dragging materials to each pile; very localized, intense burn effects on surface fuels, litter, and duff; and damage to soil layers (and thus subsurface plant structures such as seeds, roots, bulbs, rhizomes, and mycorrhizal mycelium). Longer-term impacts might include changes in soil chemistry and structure, from extreme, long duration heating. Piles would be kept rather small – about the size of small car – so they would be manageable when burned and so the effects would be localized and unlikely to impact larger, individual plants. The small size would allow re-colonization of sterilized patches by mycorrhizal fungi and other soil organisms.

These activities would have the potential to impact both Tompkin’s sedge and Congdon’s woolly-sunflower because of the location of some populations and individuals of these species. Yosemite onion and Congdon’s lewisia generally would not be impacted by these activities, because of the location of their populations. Efforts would be made to avoid individual plants and populations, by identifying them during planning for the activity. Vegetation is often so thick that resource specialists would be unable to gain access to a burn site to accurately identify isolated individual plants. However, larger populations would be avoided, and piles would be placed in sites that are unlikely to support these species. Therefore, impacts of pile burning on plant special-status species would be negligible to adverse, short-term, and minor.

Chipping. Chipping activities would occur when biomass could not be burned on site or when it would need to remain on site for logistical, administrative, or ecological reasons. Chips can cause localized denudation by burying soils and seed banks and robbing soils of available nutrients during the decomposition process. Chips – due to their high cellulose content and the lack of moisture and nutrients in local soils to facilitate rapid breakdown – should only be applied up to 1 inch deep. However, chips would be spread more thickly in some areas (such as road shoulders in the El Portal Administrative Site) to deter non-native plant species such as yellow star-thistle. Impacts would occur to special-status species if chips were placed on top of populations and/or individuals, or on potential habitat for these species. Careful project planning and notification to resource specialists prior to the start of a project would help avoid covering special-status plants. Due to these mitigations, the impact of chipping on special-status species would be short-term, negligible to minor, and adverse.

Cumulative Impacts

Other actions expected to occur within Yosemite that would affect these special-status species would be implementation of the *Merced Wild and Scenic River Comprehensive Management Plan/EIS* (NPS 2000) and the *Yosemite Valley Plan/SEIS* (2000c). The first identifies a protection zone along the Merced River that will allow for enhanced habitat protection of Tompkin's sedge, some populations of Yosemite onion, and Congdon's lewisia, which occur in drainages and areas adjacent to the river. Implementation of the *Yosemite Valley Plan* would substantially increase the human population in the El Portal Administrative Site, which would increase the potential for impacts (from radiating use and the increased potential for the introduction, establishment, and spread of non-native plant species) to individuals and populations of all of these plant species. Mitigation measures identified in the *Yosemite Valley Plan* reduce the potential level of impact to adverse, long-term, and minor.

Beyond the park and administrative site boundaries, the only projects that would affect these plants, because of their habitat requirements, would be those that occur within the Merced River drainage immediately west of the park. The Sierra Nevada Forest Plan Amendment, which affects both Stanislaus and Sierra National Forests, would have potential effects in areas adjacent to the park. Under this plan, efforts would be made to reduce the spread of noxious weeds, protect riparian resources, and manage fuels and fire similarly to the National Park Service.

Thus, present and reasonably foreseeable projects in the region would potentially improve habitat conditions for these species (by controlling weeds and restoring fire as part of the ecosystem), with resultant long-term, minor, and beneficial impacts. These effects, in combination with the effects of Alternative A, would result in minor, adverse and long-term cumulative impacts.

Conclusion

Overall, the effect of Alternative A would be adverse, long-term, and minor for special-status plant species, primarily because of the potential for habitat modification from high-intensity fire, and because of the effects of some on-site treatments on populations. There would be no impairment from the effects of this alternative.

Special-Status Species – Animals

Sierra Nevada Bighorn Sheep (Ovis canadensis sierrae) - Federal Endangered

This species has an extremely limited distribution in Yosemite; a few individuals occasionally venture into the park near Mount Dana and Gaylor Basin. They come from a reintroduced population that is found primarily on Tioga and Warren Crests, east of the park. Bighorn sheep summer on high, open terrain above treeline, and winter on high, windswept ridges or descend to lower elevations on the east side of the Sierra. Critical habitat requirements include open terrain that has a low chance of concealing predators and steep, rocky escape terrain. Green vegetation around water seeps is important in foraging areas (Moore 1993). Because of the limited distribution in Yosemite, no wildlife habitat relationships (Mayer and Laudenslayer 1988) evaluation was done for this species.

Potential for Impacts from Catastrophic Fire

Bighorns select high elevation, habitats that have sparse tree and shrub cover where fires rarely spread even though lightning strikes are frequent. The natural fire return interval is 200 to 400 years. Catastrophic fire would, therefore, be highly unlikely. The fires that do occur would help open up the landscape, making it more suitable for bighorns. For bighorn sheep, impact of Alternative A in regards to catastrophic fire, would be adverse, long-term, and negligible.

Fire Management Treatments

Managed Wildland Fire

All bighorn habitat in Yosemite is in the Fire Use Unit, where lightning-fires are the primary method of habitat management. Fires would be evaluated and allowed to burn when they would accomplish resource management objectives. The rarity, low intensity, and slow rate of spread of fires make their suppression, and possible re-ignition, unlikely. As such, managed wildland fire would have a negligible, beneficial, long-term effect on bighorn sheep under Alternative A.

Prescribed Fire

Prescribed burns in bighorn sheep habitat would be unlikely since these areas are well within the natural fire return interval of 200 to 400 years. The U.S. Forest Service has recently burned bighorn wintering areas outside the park in order to enhance habitat quality, reduce predator cover, and stimulate forage growth. Yosemite has no wintering habitat. Prescribed fire under Alternative A would therefore, have a negligible, beneficial, long-term effect on bighorn sheep.

Site Preparation Associated with Managed Wildland Fire and Prescribed Fire (hand line, snagging, mop-up)

Because management of wildland and prescribed fires would be unlikely in bighorn habitat, actions to manage such fires would also be unlikely. Any human presence would potentially disturb bighorns and affect their survival and reproduction (Papouchis et al. 2001). Therefore, fire crews in bighorn habitat would have an adverse effect. Helicopters dropping water and retardant would also distress bighorns. The improbability of these actions happening in bighorn habitat, however, limit their expected impact to adverse, short-term, and negligible.

Fuel Reduction by Hand or Machine

Passive Reduction Techniques. Would not occur in bighorn sheep habitat.

Cumulative Impacts

Two regional plans for adjacent U.S. Forest Service land would affect Sierra Nevada bighorn sheep. Implementation of the Sierra Nevada Forest Plan Amendment/FEIS (USFS) would potentially benefit bighorns by protecting resources of value to bighorns. The Management Direction for the Ansel Adams, John Muir, and Dinkey Lakes Wilderness Revised Draft/EIS would have a beneficial effect on bighorns by allowing habitat enhancement of wintering areas through prescribed burning.

The Inyo National Forest has implemented restrictions on dogs within all occupied bighorn habitat. Removal of three mountain lions over the last year from bighorn habitat outside the park has helped reduce predation. The cancellation of two domestic sheep grazing allotments (Bloody Canyon and Alger Lakes) on the Inyo National Forest, and the modification of two others, have helped reduce the threat of disease transmission from domestic sheep to bighorn sheep. These actions are all designed as part of the interagency recovery efforts for this endangered species.

The resulting cumulative impacts from these actions on Sierra Nevada bighorn sheep are major, beneficial, and long-term because they will help the species recover to larger, more stable self-sustaining populations. In combination with the negligible impacts from Alternative A, cumulative impacts would remain major, beneficial, and long-term.

Conclusion

The impact of Alternative A on Sierra Nevada bighorn sheep would be beneficial, long-term, and negligible because of the continued, though rare, influence of fire on their habitat.

Valley Elderberry Longhorn Beetle (*Desmocerus californicus dimorphus*) – Federal Threatened

Distribution of the valley elderberry longhorn beetle in the area administered by Yosemite National Park is restricted to the El Portal Administrative Site. The entire life cycle of the valley elderberry longhorn beetle is connected to the elderberry plant (*Sambucus sp.*). Adverse effects on elderberry plants would therefore, have an adverse effect on this beetle. Current management of vegetation in El Portal follows U.S. Fish and Wildlife Service guidelines for protection of valley elderberry longhorn beetle and their host plants (USFWS 1999).

Potential for Impacts from Catastrophic Fire

Valley elderberry longhorn beetle and elderberry plants have existed under natural fire regimes for thousands of years. Chaparral and oak woodland communities where elderberry plants are found are subject to large, high-intensity fires, which could result in high mortality of valley elderberry longhorn beetle and elderberry plants. Under present conditions, catastrophic fire presents the threat of moderate, adverse, long-term effects on valley elderberry longhorn beetles. Implementation of Alternative A would not reduce these impacts.

Fire Management Treatments

Managed Wildland Fire

The El Portal Administrative Site, where valley elderberry longhorn beetle habitat occurs, is entirely within the Suppression Unit where wildland fires would be suppressed.

Prescribed Fire

Use of prescribed fire would be beneficial to the valley elderberry longhorn beetle by reducing the chance of catastrophic fire in beetle habitat. All elderberry shrubs with evidence of valley elderberry longhorn beetle activity (exit holes) would be protected during prescribed fires by reducing fuels and/or applying water around shrubs. Fires that reach greater than 2-4 feet in height near valley elderberry longhorn beetle-occupied shrubs would be extinguished. Elderberry plants with no evidence of beetle occupation would not be protected during prescribed fire. Valley elderberry longhorn beetle and elderberry plants evolved with fire, and regular burns remove decadent wood and stimulate new growth in the shrubs. Thus, fire is important for maintaining the health of elderberry plants. In valley elderberry longhorn beetle habitat, prescribed fires would be lit when conditions would produce moderate intensity fires. Although shrubs burned in prescribed fires may not have valley elderberry longhorn beetle exit holes, it is possible some beetles may be present, and could be killed. Elderberry shrubs burned in prescribed fires would take several years to generate stems large enough to support the beetle (> 1 inch diameter). Under Alternative A, prescribed fire use in El Portal would be limited. Its effect on the valley elderberry longhorn beetle would, be beneficial, long-term, and negligible, because long-term benefit to elderberry plants through regeneration and reduced fuel loads would offset the unintentional, short-term impacts from beetle mortality. Mitigation would include following U.S. Fish and Wildlife Service guidelines for protection of valley elderberry longhorn beetle and their host plants.

Holding Action and Monitoring Effects (water and retardant drops, helispots, and spike camps) and Site Preparation Associated with Managed Wildland Fire and Prescribed Fire (hand line, snagging, mop-up)

Standard procedures for these activities, in accordance with U.S. Fish and Wildlife Service guidelines, would limit damage to elderberry plants. The following fire management actions are unlikely in valley elderberry longhorn beetle habitat and, therefore, would not affect the species: water and retardant drops, helispot construction, and spike camps. Construction of hand lines before and during prescribed fires and mop-up would not affect the valley elderberry longhorn beetle because elderberry plants would be avoided. Snagging is unlikely in valley elderberry longhorn beetle habitat and, therefore, would not affect the species. Impact of actions taken to manage prescribed fire under Alternative A to the valley elderberry longhorn beetle would be adverse, short-term, and negligible.

Fuel Reduction by Hand or Machine

Passive Reduction and Lower Profile Techniques.

Hand Cutting. Hand cutting to reduce fuels that threaten developed areas in El Portal would not likely adversely affect the valley elderberry longhorn beetle. Standard mitigation requires the mapping of all elderberry plants in a treatment area. All elderberry plants with stems greater than one inch in diameter at ground level would be left. This would protect the plants most likely to be inhabited by valley elderberry longhorn beetles. Hand cutting could affect the recruitment of small plants into the larger, valley elderberry longhorn beetle-suitable size class. However, the reduction of fuels by hand thinning would help reduce the threat of catastrophic fire, which would help protect the valley elderberry longhorn beetle and their host plants. The limited application of this technique in El Portal would limit such benefit. Impact on the valley elderberry longhorn beetle from hand thinning under Alternative A would be beneficial, long-term, and minor.

Pile Burning. Materials removed during hand-thinning operations may be piled on-site and burned. This could have an adverse effect on valley elderberry longhorn beetles if the piles were near enough to elderberry plants to damage them. Standard procedures designed to protect the beetle would limit such effects. Impact on the valley elderberry longhorn beetle from pile burning under Alternative A would be adverse, short-term, and negligible.

Chipping. In some cases, cut materials would be chipped, when logistical, administrative, or ecological reasons made on-site burning unsuitable. If chips were distributed over the treatment site, they would inhibit growth of elderberry plants by “mulching” and removing soil nutrients during decomposition. Current chipping guidelines, however, limit the depth at which chips can be spread on the soil, to minimize these adverse effects. Effect of chipping on the valley elderberry longhorn beetle under Alternative A would be negligible, adverse, and long-term.

Cumulative Impacts

Urbanization in California’s Central Valley and Sierra foothills is a primary factor affecting valley elderberry longhorn beetles and continued human population growth in the Sierra Nevada is likely to result in further destruction of habitat.

Specific foreseeable projects that could adversely affect valley elderberry longhorn beetle populations include the Yosemite View Parcel Land Exchange (NPS); Yosemite Motels expansion; University of California, Merced campus; the City of Merced General Plan; and the Merced River Canyon Trail Acquisition (BLM). Developments likely to affect the valley elderberry longhorn beetle would however, have to comply with U.S. Fish and Wildlife Service mitigation guidelines to protect the beetles.

The Sierra Nevada Forest Plan Amendment/FEIS (USFS) and the *Merced Wild and Scenic River Comprehensive Management Plan/FEIS* (NPS) would help protect valley elderberry longhorn beetles by providing more ecosystem-based management of potential habitat. The valley elderberry longhorn beetle and its habitat are biologic Outstandingly Remarkable Values under the *Merced River Plan* and, therefore, must be protected and enhanced under that plan.

Impacts to valley elderberry longhorn beetle from present and reasonably foreseeable actions would be minor, beneficial, and long-term. In combination with the effects of Alternative A, the cumulative effects would be adverse, long-term, and minor, based on the increased intrusion of human development into valley elderberry longhorn beetle habitat.

Conclusion

The impact of Alternative A on valley elderberry longhorn beetles is expected to be adverse, long-term, and minor due primarily to fire and fuels management techniques and the continued threat of catastrophic fire that may affect the beetles and their host plants.

California Red-Legged Frog (*Rana aurora draytonii*) - Federal Threatened

California red-legged frogs have disappeared from nearly the entire Sierra Nevada, including Yosemite National Park—only two populations are known to exist in the northern Sierra. The most significant cause of this decline is alteration and destruction of habitat from activities such as urban development, dams, sediment from roads and mines, grazing, and timber harvest (USFWS 1996). Pesticide contamination and non-native predators have also been implicated in the frog's demise. Predation by bullfrogs is thought to have caused the disappearance of red-legged frogs from Yosemite, where red-legged frogs were last seen in 1984. Recent surveys have found none (Knapp 2000). Red-legged frog habitat was identified through wildlife habitat relationships analysis (Mayer and Laudenslayer 1988).

Potential for Impacts from Catastrophic Fire

Under the median fire return interval, over 90% of the high-quality habitat has missed more than four intervals. Although red-legged frogs are no longer known to live in Yosemite, catastrophic fire could have an adverse effect on habitat that could be used by the frogs if they were reintroduced. The frog's main habitat, ponds and slow-moving streams with emergent vegetation, is unlikely to burn, but riparian areas that the species uses for foraging and shelter during dry periods could (Jennings and Hayes 1994). Some riparian habitats in the park have extraordinarily high accumulations of fuel, and this, coupled with the chimney effect of drainages, could result in high-intensity fires that would destroy riparian habitat and adversely affect aquatic habitats.

Alternative A would allow these risky conditions to continue indefinitely. Catastrophic fires would possibly affect red-legged frog habitat. No frogs would be directly affected, but the quality of habitat for potential reintroduction of the species to Yosemite would be degraded. Effects on California red-legged frogs from catastrophic fire under Alternative A would be minor (because no frogs are present), adverse, and long-term. Mitigation: Identify potential red-legged frog habitat and reduce fuels in those areas.

Fire Management Treatments

Managed Wildland Fire

Because approximately 84% of high-quality red-legged frog habitat in the park is in the Fire Use Unit, managed wildland fire would the primary method of management in this habitat. Fuel loads and the risk of catastrophic fire could be reduced by allowing natural ignitions to burn within established prescriptions. However, this alternative would limit the number of these fires and re-ignitions of suppressed fires would not occur. Also, accumulations of fuel may cause managed wildland fires to burn at unnaturally high intensity in some areas, which could adversely affect riparian habitats. The impact of managed wildland fire on California red-legged frogs would be beneficial, long-term, and minor.

Prescribed Fire

Prescribed fire, because it is used to restore the natural vegetative structure of park habitats and reduce the risk of catastrophic fire, would benefit the riparian habitat of red-legged frogs. This benefit would be limited by the relatively small area that would be burned annually under Alternative A. At the same time, the threat of catastrophic fire would remain high. Only about 16% of high-quality, red-legged frog habitat is in the Suppression Unit, where prescribed fire would be the primary tool. However, prescribed fires are allowed in only a small part of this unit so benefits would be limited. High levels of fuel loading in some areas may cause prescribed fires to burn at higher than natural intensities, even when fire prescriptions were designed to minimize high-intensity fires. Such adverse effects, however, must be weighed against the overall reduction in the threat of catastrophic fire achieved through prescribed fires. Impact to California red-legged frogs from prescribed burning under Alternative A would be beneficial, long-term, and negligible, due to the small area of high-quality potential habitat that would be affected.

Holding Action and Monitoring Effects (water and retardant drops, helispots, and spike camps) and Site Preparation Associated with Managed Wildland Fire and Prescribed Fire (hand line, snagging, mop-up)

Water drops could have an adverse effect on potential red-legged frog habitat due to the possible introduction and spread of non-native species. The last waters in the park known to contain red-legged frogs are infested with bullfrogs, which were the likely cause for the disappearance of red-legged frogs. Bullfrog tadpoles and adults could be transported to new areas through water drops, further reducing habitat suitable for red-legged frogs. Current protocols prohibit retardant drops within 300 feet of any surface waters. Retardant could diminish water quality, but the effect on red-legged frogs would be negligible, since none are present. Hand line construction and spike camps could affect frog habitat if they were placed in riparian or wetland areas. Current fire management protocols, however, recognize the sensitivity of these areas and procedures are in place to protect riparian areas. Potential impacts would be limited by the relatively small number of acres that would be treated by prescribed and managed wildland fire. Helispots, snagging, and mop-up would be unlikely to have any effect on red-legged frogs because such activities are unlikely to occur in red-legged frog habitat, and no red-legged frogs are known to exist in the park. Impact of prescribed and wildland fire management activities on California red-legged frogs under Alternative A would be adverse, long-term, and negligible, primarily from the threat of the spread of bullfrogs from water drops. This could be mitigated by prohibitions against dipping water from waters known to contain bullfrogs.

Fuel Reduction by Hand or Machine

Passive Reduction and Lower Profile Techniques.

Hand Cutting. Reduction in fuel loading by hand thinning would have a beneficial effect on red-legged frogs by reducing fuel loads and the threat of catastrophic fire. This treatment, however, would be used in very small areas of potential red-legged frog habitat near developed areas. Yosemite Valley, El Portal, Foresta, and Wawona appear to have suitable habitat. Pile burning, after thinning, could have an adverse effect on red-legged frogs if piles were located near occupied habitat (because frogs may shelter in the piles and be killed when they were burned). However, no known populations of red-legged frogs occur in areas likely to be treated with hand thinning. Impact of hand-thinning on red-legged frogs under Alternative A is expected to be beneficial, long-term, and negligible, due to the possible reduction in the threat of catastrophic fire near potential habitat.

Cumulative Impacts

The remaining small, isolated California red-legged frog populations makes them extremely vulnerable to impacts such as non-native species predation and chemicals. Critical habitat has been identified, but human population growth and urbanization is likely to impact potential habitat and affect the chances of red-legged frogs being reestablished into parts of their former range. Protection of critical habitat and compliance with the Draft Recovery Plan would be the best defense against these impacts. In addition, implementation of plans such as the Sierra Nevada Forest Plan Amendment, would help protect red-legged frogs by providing more ecosystem-based management of U.S. Forest Service lands.

Although no California red-legged frogs are known to currently exist in Yosemite, protection of aquatic and riparian habitats in Yosemite Valley called for in the *Merced Wild and Scenic River Comprehensive Management Plan* would be beneficial if reintroduction of the species were to occur. Protection and restoration of aquatic and riparian habitats from implementation of the *Yosemite Valley Plan* would cause minor to moderate beneficial impact on California red-legged frog habitat and would enhance the chances of its successful reintroduction. Overall, the impact of these projects considered in combination with the minor, adverse and long-term effects of Alternative A to California red-legged frogs would result in beneficial, long-term, and minor cumulative effects, due to implementation of land management plans that would protect habitat and species conservation plans that would protect the California red-legged frog.

Conclusion

No known populations exist in Yosemite or El Portal. Impact of Alternative A on potential habitat of California red-legged frogs would be adverse, long-term, and minor, due primarily to the continued threat of catastrophic fire and lack of fuel reduction.

Bald Eagle *(Haliaeetus leucocephalus)* - Federal Threatened

Bald eagles are rare and transient in the Yosemite area, and while they have been seen in many areas of the park, they are most frequently seen near large rivers and lakes. Nesting by bald eagles is not known to occur in the park or El Portal. Fish are the primary prey of bald eagles in these areas, and large trees and snags for perching are important habitat components. Bald eagle habitat was identified through wildlife habitat relationships analysis (Mayer and Laudenslayer 1988).

Potential for Impacts from Catastrophic Fire

Analysis of bald eagle habitat in Yosemite reveals that approximately 66% of high-quality eagle habitat has missed more that four median fire return intervals. This means a substantial portion of the park's bald eagle habitat is at risk from catastrophic fire. The relatively slow pace at which this risk would be reduced under Alternative A, through managed wildland and prescribed fire, means it would continue indefinitely, or grow worse, as areas go unburned. Catastrophic fire would destroy the large trees and snags that are important bald eagle habitat components. Effects of Alternative A regarding catastrophic fire and bald eagles would be moderate, adverse, and long-term.

Fire Management Treatments

Managed Wildland Fire

Approximately half of the high-quality bald eagle habitat in the park is in the Fire Use Unit and would benefit from managed, low-intensity, lightning fires. Fire would help open the forest canopy, making it more navigable by bald eagles. It would also reduce the threat of catastrophic fire, which could destroy the large, old growth trees that are important habitat components. These benefits, however, would be limited by the relatively limited use of wildland fire and the lack of the possibility of re-ignition of suppressed wildland fire under Alternative A. Threat of catastrophic fire in some areas would continue indefinitely. Because of high levels of fuels, managed wildland fires may burn at unnaturally high intensities, which could result in the death of large trees in some areas. This must be weighed against the reduced threat of catastrophic fire that would result from managed wildland fire. Impact of managed wildland fire on bald eagles under Alternative A would be beneficial, long-term, and minor, due to the relative slow rate at which it would be implemented.

Prescribed Fire

Approximately half of the high-quality bald eagle habitat in the park is in the Suppression Unit. This means prescribed fire would be the primary tool for fuel reduction and restoration of natural forest structure in a substantial portion of the park's bald eagle habitat. Habitats in the Suppression Unit are also those that have most severely deviated from the natural fire return interval. Under Alternative A, however, the rate of prescribed fire use would remain relatively low, so the high risk of catastrophic fire would continue indefinitely. The current high levels of fuel accumulation may, in some areas, result in high intensity fires that would result in the death of some large trees. This adverse effect, however, must be weighed against the reduced threat of catastrophic fire over large areas that would result from prescribed fire use. Impact of prescribed fire on bald eagles under Alternative A would be beneficial, long-term, and minor, due to the relatively slow rate at which prescribed fire would be used.

Holding Action and Monitoring Effects (water and retardant drops, helispots, and spike camps) and Site Preparation Associated with Managed Wildland Fire and Prescribed Fire (hand line, snagging, mop-up)

Construction of hand lines could have an adverse effect on bald eagles if large trees or snags were cut in areas used by eagles. This would generally not occur, since the management goals of this plan are to retain old growth forest attributes, and hand lines would avoid, to the greatest extent feasible, these features. Water or retardant drops could have an adverse effect on eagles if a nest were struck or if nesting birds were disturbed by aircraft. However, no eagles currently nest in the park, and any future nests would be identified as a sensitive resource to avoid. Helispots would generally be constructed in open areas away from the tall trees favored by eagles. Snagging would have an adverse effect on eagles if important perching or roosting snags were cut. However, snags would only be cut if they presented a threat to life and safety, were a threat to the control of wildland fire, or represented a hazard to property or park resources. Some snags would be lost in fires, but new snags would be created from fire mortality of trees.

Overall, impact of fire management actions under Alternative A would be adverse, short-term, and negligible, since the relatively low level of application of wildland and prescribed fires in this alternative would limit potential effects.

Fuel Reduction by Hand or Machine

Aggressive Reduction Techniques. These treatments would not be used under Alternative A.

Passive Reduction or Lower Profile Techniques.

Hand Cutting. Hand cutting would have a negligible effect on bald eagles, since it would generally occur near developed areas that bald eagles avoid. Bald eagles are occasionally seen along the Merced River in Yosemite Valley and El Portal, but current management direction to protect riparian areas and other river-related resources would limit adverse effects from hand thinning. Hand thinning would have a negligible, adverse, short-term effect on bald eagles.

Pile Burning. Pile burning would have no effect on bald eagles

Cumulative Impacts

Bald eagles are recovering from a population crash that was caused by habitat destruction and pesticide contamination—they are reoccupying many places in the Sierra Nevada. The construction of numerous reservoirs on Sierra Nevada rivers have created large bodies of water suitable for bald eagles, but they have also interrupted the runs of anadromous fishes that eagles might feed on. Implementation of the Sierra Nevada Forest Plan Amendment/FEIS would benefit bald eagles by preserving old growth forests over broad areas of U.S. Forest Service land surrounding Yosemite. Implementation of the *Merced Wild and Scenic River Comprehensive Management Plan/FEIS* (NPS) would help protect riparian habitats.

The overall cumulative impact on bald eagles, considered in combination with the moderate, adverse, and long-term effects of Alternative A, would be beneficial, long-term, and minor, based on the continuing recovery of the species and implementation of broad-ranging plans that would benefit the species.

Conclusion

Alternative A would have a moderate, adverse, long-term effect on bald eagles, primarily from the continued threat of catastrophic fire, that could destroy the large trees and snags that are important habitat components.

Mountain Yellow-Legged Frog *(Rana muscosa)* - Under Review for Federal Listing

Precipitous declines in mountain yellow-legged frog populations have resulted in their disappearance from between 70% and 90% of their historical range in the Sierra Nevada (Jennings 1996). This includes Yosemite National Park, where mountain yellow-legged frogs have disappeared from over 80% of their former range (Fellers 1997). The most apparent cause for this decline is the introduction of non-native fishes that prey on the frogs and their larvae (Kapp and Matthews 2000). Other possible factors include disease and environmental toxins. Mountain yellow-legged frog habitat was identified through wildlife habitat relationships analysis (Mayer and Laudenslayer 1988).

Potential for Impacts from Catastrophic Fire

Mountain yellow-legged frogs would be little affected by catastrophic fire in Yosemite because the lake, pond, and wetland habitats where mountain yellow-legged frogs are found, are not flammable. Over 90% of mountain yellow-legged frog habitat is within a natural fire regime. Severe fire would potentially result in sediments entering these habitats, but such fires are not likely over most of the frog's range. Impact on mountain yellow-legged frogs under Alternative A would be adverse, short-term, and negligible, primarily due to possible increase in sediments in aquatic habitats resulting from catastrophic fire.

Fire Management Treatments

Managed Wildland Fire

Over 98% of high-quality mountain yellow-legged frog habitat occurs in the Fire Use Unit, mainly in areas that have not suffered from fire exclusion. Managed wildland fire would have little effect on mountain yellow-legged frogs, other than maintaining the natural fire regime. Although use of wildland fire would be limited under Alternative A, some benefit to mountain yellow-legged frogs would be derived from reducing the risk of catastrophic fire in the small part of its habitat that has missed fire return intervals. Impact of managed wildland fire on mountain yellow-legged frogs under Alternative A would be beneficial, long-term, and negligible.

Prescribed Fire

With only 2% of mountain yellow-legged frog habitat occurring in the Fire Suppression Unit, and so little of its habitat in need of burning, prescribed fire would have a negligible effect on the species. Although use of prescribed fire would be limited under Alternative A, some benefit to mountain yellow-legged frogs would be derived from reducing the risk of catastrophic fire in the unit. Impact of prescribed fire on mountain yellow-legged frogs under Alternative A would be beneficial, long-term, and negligible.

Holding Action and Monitoring Effects (water and retardant drops, helispots, and spike camps) and Site Preparation Associated with Managed Wildland Fire and Prescribed Fire (hand line, snagging, mop-up)

Water dipping and water drops could have an adverse effect on mountain yellow-legged frogs in several ways. Non-native fish, which are already present in many park waters, could be transferred into waters containing frogs. Remnant populations of frogs composed of small numbers of individuals could be impacted if frogs or larvae were removed. Finally, infection by a Chytrid fungus has been identified as a possible factor in the decline of mountain yellow-legged frogs. Water buckets could transfer this disease from an infected population of frogs to a healthy population. The limited use of wildland fire and prescribed fire in mountain yellow-legged habitat limits the possibility of these events, and effects would be mitigated by avoiding dipping from waters containing mountain yellow-legged frogs, bullfrogs, or non-native fish (see Appendix 3).

Retardant drops could adversely affect mountain yellow-legged frogs through contamination of their aquatic habitat. Protocols for retardant use in Yosemite restrict its use within 300 feet of water and on bare rock, which limit the chances of the chemicals reaching water. These restrictions, coupled with the low probability of having prescribed and managed wildland fire in mountain yellow-legged frog habitat, would limit impact on the species.

Helispots, spike camps, and hand lines would have limited use in mountain yellow-legged frog habitat—they would be sited away from such sensitive habitats. Overall impact of prescribed and wildland fire management actions on mountain yellow-legged frogs under Alternative A would be adverse, long-term, and negligible, due to the risk to frog populations from water drops. Mitigation: Comply with established protocols to protect resources, identify locations of sensitive resources to avoid impacts, use MIMT.

Fuel Reduction by Hand or Machine

Passive Reduction and Lower Profile Techniques.

Hand Cutting. No populations of mountain yellow-legged frogs are known to occur in areas where hand-cutting would be applied. Therefore, this action, along with pile burning, would have no effect on mountain yellow-legged frogs.

Cumulative Impacts

Two regional plans for adjacent U.S. Forest Service land could affect mountain yellow-legged frogs. The Sierra Nevada Forest Plan Amendment/FEIS and the Management Direction for the Ansel Adams, John Muir, and Dinkey Lakes Wilderness Revised Draft Environmental Impact Statement. The implementation of the former document would prohibit pesticide and herbicide application within 500 feet of known mountain yellow-legged frog sites, remove exotic fish from some sites, and prohibit livestock grazing in breeding sites. These measures would improve conditions for mountain yellow-legged frogs. Implementation of the latter document would reduce recreational impacts on mountain yellow-legged frogs and prohibit grazing in moist environments. In addition, a mountain yellow-legged frog conservation plan for the Sierra Nevada is being written (USFS), and a restoration program is underway in Sequoia and Kings Canyon National Parks (NPS).

Update of Yosemite's *Wilderness Management Plan*, and the *Merced Wild and Scenic River Comprehensive Management Plan* would beneficially affect mountain yellow-legged frogs by helping to reduce current impacts on the species related to human uses of habitat areas.

Fish stocking, acid rain, snowmelt, ultraviolet radiation, disease, and pesticide drift from agricultural areas could all be factors contributing to the decline of mountain yellow-legged frogs, and all are likely to continue.

The resulting impacts of these present and reasonably foreseeable future projects on mountain yellow-legged frogs would be beneficial, long-term, and moderate, because of active efforts to protect and restore the species, and the implementation of land management plans that would provide more ecosystem-based management. In combination with the effects of Alternative A, cumulative impacts would be beneficial, long-term, and moderate.

Conclusion

Impact to mountain yellow-legged frogs from Alternative A would be beneficial, long-term, and negligible due primarily to the return of the natural fire regime to the small area of habitat that has departed from a natural fire return interval.

Yosemite Toad (*Bufo canorus*) - Under Review for Federal Listing

The Yosemite toad is a high-elevation species found in the central Sierra between 8,000 and 10,000 feet. Suitable habitat for breeding includes open wet meadows, ponds, and lake margins, surrounded by lodgepole or whitebark pine forests. The toads find cover in thick meadow grass, low-lying willows, or other vegetation, as well as rodent burrows and damp logs and stones (Sherman and Morton 1984, 1993; Karlstrom 1962). Throughout its range, the Yosemite toad has experienced recent steep population declines and has disappeared from over 50% of historic sites (Jennings 1996). Surveys conducted in the park in 1999 found Yosemite toads in 14 sites, which reflected a modest recovery. Possible causes for the decline of Yosemite toads include livestock grazing, drought, chemical toxins, and increases in UV radiation. Non-native fish may also be a contributing factor. Yosemite toad habitat was identified through wildlife habitat relationships analysis (Mayer and Laudenslayer 1988).

Potential for Impacts from Catastrophic Fire

There is little potential for catastrophic fire affecting Yosemite toads or their habitat. Most of the lodgepole and whitebark pine forests that surround the meadows and pond habitat are within their natural fire regime as is 67% of suitable habitat and 79% of high-quality habitat. This, coupled with the preference of the species for moist habitats, makes it unlikely that catastrophic fire would have an appreciable effect on Yosemite toads. Conceivably, fires adjacent to occupied habitat could have an adverse effect if sedimentation increased, but such effects have not been demonstrated. Regarding effects of catastrophic fire, impact on Yosemite toads under Alternative A would be adverse, short-term, and negligible.

Fire Management Treatments

Managed Wildland Fire

Over 95% of Yosemite toad habitat is in the Fire Use Unit, but over 67% of this habitat has not deviated from median fire return interval. Managed wildland fire would have little effect on Yosemite toads, other than helping to maintain the natural fire regime. Although use of wildland fire would be limited under Alternative A, some benefit to Yosemite toads would be derived from reduction in the risk of catastrophic fire in the small proportion of habitat that has deviated from the natural fire return interval. Impact of managed wildland fire on Yosemite toads under Alternative A would be beneficial, long-term, and negligible.

Prescribed Fire

Only 5% of Yosemite toad habitat is in the Fire Suppression Unit and little of it is in need of burning. Prescribed fire would have a negligible effect on Yosemite toads, other than helping to maintain the natural fire regime. Although use of prescribed fire would be limited under Alternative A, some benefit to Yosemite toads would be derived from reduction in the risk of catastrophic fire in the small proportion of habitat out of natural fire return interval. Impact of prescribed fire on Yosemite toads under Alternative A would be beneficial, long-term, and negligible.

Holding Action and Monitoring Effects (water and retardant drops, helispots, and spike camps) and Site Preparation Associated with Managed Wildland Fire and Prescribed Fire (hand line, snagging, mop-up)

Water drops could have an adverse effect on the Yosemite toad in several ways. Non-native fish could be transferred into waters containing toads. Remnant populations of toads composed of small numbers of individuals could be affected if frogs or larvae were removed, although their usual breeding habitat (shallow wetlands and ponds) is usually too shallow for dipping. Finally, infections of a Chytrid fungus has been identified as a possible factor in the decline of amphibians. Water buckets could transfer this disease from an infected population to a healthy population. The source of such an infection could be mountain yellow-legged frogs that inhabit ponds and lakes that are deep enough to dip water out of. The limited use of wildland fire and prescribed fire in Yosemite toad habitat would limit the possibility of these events, but waters containing Yosemite toads and mountain yellow-legged frogs must be avoided as water sources for water drops.

Retardant drops could adversely affect Yosemite toads through contamination of their aquatic habitat. Protocols for retardant use in Yosemite restrict its use within 300 feet of water and on bare rock, which limits the chances of the chemicals reaching water. Some of the less conspicuous habitat of Yosemite toads (i.e., wet meadows) may be accidentally exposed to retardant. Restrictions, coupled with the low incidence of prescribed and managed wildland fire in Yosemite toad habitat, would limit impact on the species.

Helispots, spike camps, and hand lines would have limited use in Yosemite toad habitat, and would be sited away from such sensitive habitats.

Snagging and mop-up operations would have limited, if any, application in Yosemite toad habitat, and would be unlikely to have any impact on the species.

Overall impact of prescribed and wildland fire management actions on toads under Alternative A would be adverse, long-term, and negligible, due primarily to the risk to remaining populations from water drops and retardant contamination. Mitigation: Identify locations of Yosemite toad and mountain yellow-legged frog populations and avoid these areas when dipping water or making water or retardant drops.

Fuel Reduction by Hand or Machine

Passive Reduction and Lower Profile Techniques.

Hand Cutting. Hand thinning would have no direct effect on Yosemite toads, since it would occur in forest habitats. The reduction of fuels would help prevent catastrophic fire, although such fires would be of little threat to Yosemite toads. Impact of hand cutting on Yosemite toads would be beneficial, long-term, and negligible.

Cumulative Impacts

The Sierra Nevada Forest Plan Amendment/FEIS and the Management Direction for the Ansel Adams, John Muir, and Dinkey Lakes Wilderness Revised Draft Environmental Impact Statement could affect Yosemite toads. The implementation of the former document would prohibit pesticide and herbicide application within 500 feet of known Yosemite toad habitat, remove exotic fish from some sites, and prohibit livestock grazing in breeding sites. These actions would improve conditions for mountain Yosemite toads. Implementation of the latter document would reduce recreational impacts on toads and prohibit grazing in moist environments.

Fish stocking, acid rain and snow, ultraviolet radiation, disease, and pesticide drift from agricultural areas could all be contributing to the decline of mountain yellow-legged frogs—these actions would be likely to continue.

The impacts of present and reasonably foreseeable projects on Yosemite toad would be beneficial, long-term, and moderate, based primarily on active efforts to protect and restore the species, and the implementation of land management plans that would provide more ecosystem-based habitat management. Considered in combination with the impacts of Alternative A, cumulative impacts would be beneficial, long-term, and moderate.

Conclusion

Impact to Yosemite toads from Alternative A would be beneficial, long-term, and negligible due primarily to the return of a natural fire regime to the small area of habitat that has departed from a natural fire return interval.

California Spotted Owl *(Strix occidentalis occidentalis)* - Under Review for Federal Listing

California spotted owls are found throughout the Sierra Nevada, from lower elevation oak and ponderosa pine forests up to 7,600 feet elevation red fir forests. Forested areas with greater that 70% canopy closure are potential spotted owl nesting and roosting while areas with greater than 40% canopy closure provide foraging. Old growth forests provide the best habitat. There are approximately 100 known and probable spotted owl sites in Yosemite National Park

(Weatherspoon et al. 1992). Comparison of the two most recent studies of spotted owls in Yosemite (Gould and Norton 1993; Steger 2000) suggests that the population of spotted owls in the park is relatively stable (Thompson 2000). The number of California spotted owls in the Sierra Nevada has declined steadily, prompting the current review by U.S. Fish and Wildlife Service for possible listing of the species. Likely cause for this decline is habitat destruction and fragmentation from logging and development. Severe wildland fire in mixed-conifer forests may represent the greatest threat to existing spotted owl habitat in Yosemite (Weatherspoon et al. 1992). California spotted owl habitat was identified through wildlife habitat relationships analysis (Mayer and Laudenslayer 1988).

Potential for Impacts from Catastrophic Fire

Under a natural fire regime, much of the spotted owl habitat in the Sierra was subject to frequent, low-intensity fires. Under existing conditions, approximately 49% of high-quality spotted owl habitat has missed over four median fire return intervals. About 54% of high-quality spotted owl habitat occurs in the Suppression Unit, where the greatest threat of catastrophic fire exists. High fuel loadings make it likely that large, stand-replacing fires would occur, which would destroy spotted owl habitat by reducing the canopy closure. In addition, the growth of dense understory vegetation may affect foraging habitat quality. Under Alternative A, the current relatively slow rate of forest fuel accumulations would result in the destruction of spotted owl habitat through catastrophic fires and prolong the degradation of habitat by allowing thick understory vegetation to remain. Impact of to California spotted owls would be adverse, long-term, and major.

Fire Management Treatments

Managed Wildland Fire

With approximately 47% of high-quality California spotted owl habitat occurring in the Fire Use Unit, the use of wildland fire can be an important tool in protecting and improving spotted owl habitat in the park, by helping to maintain the natural fire regime. Spotted owls can coexist with extensive fires of varying intensities within their habitats (Weatherspoon et al. 1992). Such a tool, however, must be carefully applied. Lightning fires are somewhat random events; they give little chance to prepare an area to protect resources and maximize fire benefit. Because of the existing high level of fuel loading in many areas, even fires that are burning within prescription are likely to burn small areas at intensities high enough to have an adverse effect on some spotted owls. This impact, however, must be weighed against the risk of catastrophic fire if an emphasis on fire suppression were to continue in much of the park. In the old growth stands favored by spotted owls, the dense canopies maintain a higher relative humidity, which reduces heating and drying of surface fuels—thus reducing flammability. Adverse effects from wildland fire would be minimized if fuel loads were reduced in and near spotted owl nesting and roosting areas. This could be done by application of spring prescribed fires that would disrupt fuel continuity and reduce the potential for stand-replacing fires (Weatherspoon et al. 1992).

Under Alternative A, use of wildland fire would be limited which would limit benefits to California spotted owls. The threat of catastrophic fire would remain a large threat to the species in some areas. The effect of managed wildland fire on California spotted owls would be beneficial, long-term, and minor, based on the likely mitigation of the threat of catastrophic fire, limited though it would be under this alternative.

Prescribed Fire

Prescribed fire provides the greatest potential for targeted treatment of forest habitats, with a focus on protecting spotted owls and improving their habitat. Fifty-four percent of high-quality spotted owl habitat exists in the Suppression Unit, where prescribed fire would be most heavily used, and where areas have deviated most severely from the natural fire return interval. Adverse impacts on spotted owl territories located prior to ignition of a prescribed fire would be minimized through preparatory burns and mechanical fuel reduction in nesting and roosting habitat to control fire intensity in these immediate areas. Prescribed fire must also take into account other important habitat components, such as large, down, woody debris that provide a substrate for hypogeous fungi, which are an important food source for northern flying squirrels, an important prey of spotted owls (Verner et al. 1992). Fires of an intensity that would reduce the amount of large, woody debris would have an adverse effect on spotted owls.

Currently, no program elements exist for identification of spotted owl locations, or for the management of prescribed fires for the benefit of spotted owls. The use of prescribed fire under Alternative A, would, nonetheless, have a beneficial, long-term, and minor impact on California spotted owls, primarily through reduction in the threat of catastrophic fire in some areas.

Holding Action and Monitoring Effects (water and retardant drops, helispots, and spike camps) and Site Preparation Associated with Managed Wildland Fire and Prescribed Fire (hand line, snagging, mop-up)

Water and retardant drops would have an adverse effect on spotted owls if they occurred over nesting habitat and, especially, nests. Such events have a low probability of occurring, but would be mitigated if nest sites and probable nesting habitat could be avoided. Helispots and spike camps would potentially have an adverse effect on spotted owls if they were located close to nesting or roosting areas and the level of disturbance were high. Hand-line, if constructed through a spotted owl nesting or roosting area, would potentially cause adverse effects from disturbance and habitat alteration, especially if trees were felled. Snags are often used by spotted owls as nest sites (Verner et al. 1992). As such, snagging operations to protect human safety and the integrity of fire lines would potentially have an adverse effect on spotted owls.

Overall, actions taken to manage wildland and prescribed fire would have a minor adverse effect on spotted owls through possible disturbance and habitat alteration in roosting and nesting sites. Such impacts could be mitigated by locating all spotted owl sites and avoiding impacts to them.

Fuel Reduction by Hand or Machine

Passive Reduction and Lower Profile Techniques.

Hand Cutting. Under Alternative A, hand thinning in the vicinity of development and roads could have an adverse effect on spotted owls if canopy closure were reduced enough to degrade. This is especially true where developed areas interface with dense forest that provides roosting and nesting habitat. Under Alternative A, cutting large trees would be limited because techniques would be confined to hand thinning and then piling and burning. In some areas, clearing understory vegetation could, in fact, improve foraging conditions for spotted owls. Under Alternative A, the impact on California spotted owls of hand thinning and burning would be beneficial, long-term, and negligible because of the possible return of treated areas to a more natural forest structure.

Chipping. Chipping has only been used occasionally in this alternative. Chipping cut material and then distributing it over a site could occur where air quality, visitor use, or other management concerns prohibit burning. The equipment used to chip material is extremely loud and, if operated nearby, may disturb spotted owls. Such impact, however, would be adverse, short-term, and negligible.

Cumulative Impacts

Past activities that have impacted spotted owls and their habitat include timber harvest, development and fire suppression activities. Their effects have been moderate to major, adverse and long-term. Present and reasonably foreseeable future projects would include:

Yosemite Valley Plan/SEIS (NPS 2000c): Implementation of the preferred alternative would restore highly-valued habitats in Yosemite Valley and decrease the fragmentation of these habitats. This would help restore foraging habitat for spotted owls in Yosemite Valley. The construction of facilities outside of Yosemite Valley would cause localized destruction of forest habitat, but the overall impact would be negligible to beneficial, long-term, and minor.

Merced Wild and Scenic River Comprehensive Management Plan/EIS (2000a): Implementation of the preferred alternative would help protect river-related wildlife habitat and species. This would be especially true in Yosemite Valley, where past development has encroached on river habitats. The *Merced Wild and Scenic River Comprehensive Management Plan* would provide the framework for reducing present development and limiting future development in these areas, with moderate, beneficial, long-term impacts on spotted owls.

Yosemite West Re-Zoning: This project would likely lead to an increase in the Yosemite West wildland/urban interface, requiring intensive management of vegetation and fuels over a wider area. This would have an adverse effect on spotted owls because an additional 55 acres would be developed in mixed conifer habitat near the park boundary. Impact on spotted owls would be moderate, adverse, and long-term.

Yosemite West, 31 Acre Bed and Breakfast: Like the above project, this project would have an adverse effect on spotted owls in the park, by further reducing mixed conifer habitat near the park boundary. No effect on wildland/urban interface treatment in the park is expected, since the affected property abuts USFS land. Impact on spotted owls would be moderate, adverse, and long-term.

Hazel Green Ranch: Development at this location adjacent to the park would affect an area of mixed conifer and meadow habitat. Impact on spotted owls would be adverse, long-term, and minor, due to likely consideration by the developer for preservation of sensitive habitats.

Evergreen Lodge Expansion: This development would affect an area of mixed conifer habitat near the park. Effect on spotted owls would be adverse, long-term, and minor.

Rush Creek Guest Lodging and Conference Facilities: This project would affect an area of mixed conifer habitat. Effect on spotted owls is expected to be adverse, long-term, and minor.

A-Rock Reforestation (USFS): This project would hasten the return of the area burned in the 1990 fire to a forested habitat of 5,000 acres. This would eventually benefit forest-dependent species such as spotted owls. Overall impact would be beneficial, long-term, and minor.

Aspen Fuels Reduction (USFS): This project would enhance habitat quality for spotted owls over a 500-acre area near the park. This would have beneficial, long-term, and minor effects.

Fire Management Plan for Wilderness (USFS): This plan would provide beneficial, long-term, and moderate impact on spotted owls by allowing naturally-ignited fires that say in prescription to cross boundaries between the park and the national forests. This could result in larger areas of habitat benefiting from fire, resulting in beneficial, long-term, and minor impacts.

Orange Crush Fuels Program (USFS): This project would manage fuels through prescribed burning. This would have a beneficial, long-term, and minor effect on spotted owls by working toward the return of a natural fire cycle for the area, and reduce the chance of catastrophic fire, which could carry into the park.

Rogge-Ackerson Fire Restoration (USFS): This would eventually benefit forest-dependent species such as spotted owls. Overall impact would be beneficial, long-term, and minor.

Sierra Nevada Forest Plan Amendment: Implementation of this plan would have a moderate, beneficial, long-term effect on spotted owls by leading to more ecosystem-based management of National Forests in the Sierra Nevada.

The resulting impacts from present, and reasonably foreseeable future projects on park spotted owls and their habitat would be beneficial, long-term, and minor, because some projects with a beneficial impact would affect large areas of habitat in the central Sierra Nevada. The Sierra Nevada Forest Plan Amendment would affect virtually all national forest land around the park by enabling more ecosystem-based management. Implementation of the *Yosemite Valley Plan* and the *Merced Wild and Scenic River Comprehensive Management Plan* would benefit high-value habitats, primarily in Yosemite Valley. The *Yosemite Fire Management Plan* under Alternative A would, however, have major, adverse, and long-term impacts associated with habitats continuing to be affected by fire suppression and continued risk of catastrophic fire in some areas. Other foreseeable projects with adverse impacts would affect small areas and/or have minor effects over larger areas. Effects in Yosemite would likely offset benefits realized elsewhere, and the cumulative impact would be adverse, long-term, and negligible.

Conclusion

Alternative A would have major, adverse, long-term impact on spotted owls from the prolonged threat of catastrophic fire that would occur at the current, relatively slow rate of treatment of accumulated fuels.

Pacific Fisher *(Martes pennanti)* - Under Review for Federal Listing

Fishers are among the most habitat-specific mammals in North America, living in landscape mosaics of conifer-dominated forest stands, and avoiding open areas that have no overstory or shrub cover (Buskirk and Powell 1994). Late successional mid- to low-elevation coniferous or mixed forests provide the most suitable habitat because they provide abundant potential den sites and prey (Allen 1987). The presence of large deciduous trees, such as oaks, also appears to be important. Forest type, however, is probably not as important to fishers as structural characteristics, such as dense canopies, and large trees, snags, and down logs. Riparian areas are also important (Seglund 1995). Fishers are apparently present in Yosemite in extremely low numbers (Chow unpublished data) and may be extirpated from much of their historical range in Washington, Oregon, and California (Aubry and Raqley 1999, Carroll et al. 1999, Zielinski et al. 1996). Trapping at the end of the 19th century severely reduced the number of fishers, but the reasons for the lack of recovery in the species in the absence of trapping are unclear. Factors may include loss of suitable habitat from logging and fire suppression, fragmentation of habitat, and disturbance and mortality from roads.

Potential for Impacts from Catastrophic Fire

Catastrophic fire has the potential for severely altering fisher habitat by reducing canopy closure and forest floor features that are important components of suitable fisher habitat. In the park, 35%

of all potential fisher habitat, and 32% of high-quality fisher habitat has missed more than four fire return intervals. This indicates that catastrophic fire would potentially have a substantial effect on fishers. Studies, observations, and roadkills of fishers in Yosemite indicate that the highest density of Pacific fishers in the park are found south of Yosemite Valley; especially along the Wawona Road and Glacier Point Road corridors. Much the area along Wawona Road has greater that four missed fire return intervals (map 1-3), making it among the areas highest at risk of catastrophic fire. As such, catastrophic fire in Yosemite has a high potential for adverse impacts on fishers.

Under Alternative A, actions to reduce fuel loading would proceed at a relatively slow pace, resulting in more catastrophic fires in fisher habitat and resultant adverse effects on fishers. Regarding catastrophic fire, the impact of Alternative A on fishers would be adverse, long-term, and major.

Fire Management Treatments

Managed Wildland Fire

Seventy-seven percent of all fisher habitat and 69% of high-quality habitat in the park occurs in the Fire Use Unit. Managed wildland fire, therefore, has the potential for achieving and maintaining reduced fuel loading and natural forest structure, as a benefit to fishers. Existing high levels of fuel loading in some areas, however, indicate that fire intensity may be great in some areas, reducing the large, woody debris, and large snags that are important habitat components. Also, over the short-term, short-term, shrub cover would be reduced. Overall, wildland fire would be beneficial to fishers. However, under Alternative A, wildland fire would be used at a relatively slow rate, and catastrophic fires are likely to occur. Under Alternative A, managed wildland fire would have a beneficial, long-term, and minor effect on fishers.

Prescribed Fire

Because prescribed fires can be targeted on habitats that are at the greatest risk of catastrophic fire, and are the most severely altered by a history of fire suppression, it has the potential for great resource benefit. This is especially true for fishers, because the area of the park believed to support the highest density of this species is in the Suppression Unit, and is among the most severely deviated from a natural fire return interval.

High fuel loading in some areas would potentially result in prescribed fires of high enough intensity to consume large woody debris, which is an important component of fisher habitat. Also, large snags, that are of high value to fishers, would potentially be consumed. Prescribed fires conducted with a concern for fishers should minimize these losses. On balance, reduction in the risk of catastrophic fire would yield the greatest, long-term benefit to fishers, but fire prescriptions should strive to conserve habitat elements that are important to fishers (e.g., large trees, snags, and large woody debris). The benefit of prescribed fire under Alternative A would be limited by the relatively slow rate of its use. Catastrophic fires would likely occur over time. Impact to fisher under Alternative A would be beneficial, long-term, and minor, based upon a modest reduction in the threat of catastrophic fire in some areas.

Holding Action and Monitoring Effects (water and retardant drops, helispots, and spike camps) and Site Preparation Associated with Managed Wildland Fire and Prescribed Fire (hand line, snagging, mop-up)

Water and retardant drops should have no effect on fishers, unless they were struck, which would be highly unlikely. Some short-term disturbance would occur from overflights. Hand line construction could have a localized, adverse effect on fishers through direct disturbance, and alteration of habitat. Such effects, however, would be limited in area and short-term. Helispot and spike camps could have an adverse effect if they were located near a fisher den, but, without knowledge of every den site, this impact would be difficult to avoid. Snagging could have an adverse effect on fishers by removing an important habitat component, because snags are often used as den sites. Snags should only be cut when they present a clear threat to human safety or the integrity of a fire line. Prescribed and wildland fire would create new snags through the killing of trees, but most of these would be relatively small snags, and it would take time for the dead trees to become suitable snags through decay.

In total, actions taken to manage wildland and prescribed fire would a potential to have a minor, adverse, long-term effect on fishers, primarily due to possible reduction in the number of snags.

Fuel Reduction by Hand or Machine

Passive Reduction and Lower Profile Techniques.

Hand Cutting. Reduction in fuel loading and stand density by hand thinning could adversely affect fishers by reducing understory vegetation and habitat complexity. These effects would, however, be balanced against the accompanying reduction of the threat of catastrophic fire from fuel reduction. Hand crews would also cause some short-term disturbance while on site. Hand thinning under Alternative A would be adverse, long-term, and negligible.

Chipping. The noise of chipping machines would cause short-term disturbance near developed areas. Chips spread too thickly could suppress understory vegetation, which could have an adverse effect on fishers, but the areas where this technique would be used are already marginal habitat for fishers due to existing levels of human disturbance and habitat fragmentation. Chipping under Alternative A would have a negligible, adverse, short-term effect on fishers.

Cumulative Impacts

Past and present actions that have affected fishers have included development, timber harvest and fire suppression. Their effects have been major, adverse and long-term. Reasonably foreseeable future actions that would affect fishers would include:

Yosemite Valley Plan/SEIS (2000c): Implementation of the preferred alternative would restore highly-valued habitats in Yosemite Valley and decrease the fragmentation of these habitats. The construction of facilities outside of Yosemite Valley, however, would cause localized destruction of forests, some of which are known fisher habitat. These impacts would be adverse, long-term, and minor.

Merced Wild and Scenic River Comprehensive Management Plan/EIS (2000): Implementation of the preferred alternative would help protect river-related wildlife habitat and species. This is especially true in Yosemite Valley, where past development has encroached on river habitats. The *Merced Wild and Scenic River Comprehensive Management Plan* would provide the framework for reducing present development and limiting future development in these areas, with moderate, beneficial, long-term effects on fishers.

Yosemite West Re-Zoning: This project would likely lead to an increase in the Yosemite West wildland/urban interface area, requiring intensive management of vegetation and fuels over a wider area. This would have an adverse effect on fishers because an additional 55 acres would be developed in mixed conifer habitat near the park boundary, in an area of known fisher occurrence. Impact on fishers is expected to be adverse, long-term, and moderate.

Yosemite West, 31 Acre Bed and Breakfast: Like the above project, this project would have an adverse effect on fishers in the park, by further reducing mixed conifer habitat near the park boundary. No effect on wildland/urban interface treatment in the park is expected, since the affected property abuts U.S Forest Service land. Impact on fishers is expected to be adverse, long-term, and moderate.

Hazel Green Ranch: Development in this area adjacent to the park would affect an area of mixed conifer and meadow habitat. Impact on fishers is expected to be adverse, long-term, and minor, if consideration is give by the developer for preservation of sensitive habitats. However, there is some uncertainty about the future of this property.

Evergreen Lodge Expansion: This development would affect an area of mixed conifer habitat near the park. Effect on fishers is expected to be adverse, long-term, and minor.

Rush Creek Guest Lodging and Conference Facilities: This project would affect an area of mixed conifer habitat. Effect on fishers is expected to be adverse, long-term, and minor.

A-Rock Reforestation (USFS): This project would hasten the return of the area burned in the 1990 fire to a forested habitat in 5,000 acres. This would eventually benefit forest-dependent species such as fishers. Overall impact is expected to be beneficial, long-term, and minor.

Aspen Fuels Reduction (USFS): This project would enhance habitat quality for spotted owls over a 500 acre area near the park. Such improvement is also likely to benefit fishers. This would have a beneficial, long-term, and minor impact.

Fire Management Plan for Wilderness (USFS): This plan would benefit fishers by allowing naturally-ignited fires that stay in prescription to cross boundaries between the park and Forest Service lands. This could result in wider areas of habitat benefiting from habitat improvement from fire, resulting in beneficial, long-term, and minor impacts.

Orange Crush Fuels Program (USFS): This project would manage fuels through prescribed burning. This would have a beneficial, long-term, and minor effect on fishers by working toward the return of a natural fire regime for the area, and reduce the chance of catastrophic fire, which could carry into the park.

Rogge-Ackerson Fire Restoration (USFS): This would eventually benefit forest-dependent species such as fishers. Overall impact is expected to be beneficial, long-term, and minor.

Sierra Nevada Forest Plan Amendment: Implementation of this plan would have a moderate, beneficial, long-term effect on fishers by leading to more ecosystem-based management of National Forests in the Sierra Nevada.

The resulting impacts on Pacific fishers and their habitat would be moderate, beneficial, and long-term, because some foreseeable projects would benefit large areas of habitat in the central Sierra Nevada. The Sierra Nevada Forest Plan Amendment would affect virtually all U.S. Forest Service land around the park by enabling more ecosystem-based management. Implementation of the *Yosemite Valley Plan* and the *Merced Wild and Scenic River Comprehensive Management Plan* would beneficially affect high-value habitats, primarily in Yosemite Valley. The *Yosemite Fire Management Plan* under Alternative A would, however, have adverse impacts associated with habitats continuing to be affected by a history of fire suppression, and the continued risk of catastrophic fire in some areas. Other foreseeable projects with adverse impacts would affect small areas and/or have minor effects over larger areas. Benefits yielded elsewhere would likely be offset by effects of catastrophic fire in Yosemite. Considered in combination with the impacts of Alternative A, the cumulative impact would be beneficial, long-term, negligible.

Conclusion

Overall, Alternative A would have a major, adverse, long-term effect on fishers by allowing the threat of catastrophic fire to continue indefinitely, especially in the southwest part of the park where fisher densities are believed to be highest and fuel loading has reached critical levels.

Great Gray Owl *(Strix nebulosa)* – California Endangered

The Sierra Nevada population of great gray owls marks the most southerly extent of the species in the world, and the center of abundance of this population is in Yosemite National Park. Surveys in Yosemite National Park and adjacent national forests estimate the California population of great gray owls at 100 to 200 birds (Winter 1986). Breeding habitat occurs in pine and fir forests near montane meadows between approximately 2,460 and 7,380 feet in elevation (Winter 1980). In California, nearly all reported great gray owls nests have been in the tops of large-diameter broken snags that are within several hundred feet of a meadow, where most foraging takes place. High snag densities may be critical for nesting habitat, because not all snags form top depressions suitable for nests. Great gray owls descend to elevations as low as 2,000 feet during the winter. The small size of the California population of great gray owls may be due to habitat degradation from logging and grazing.

Potential for Impacts from Catastrophic Fire

Approximately 35% of all great gray owl habitat, and 19% of high-quality great gray owl habitat has missed more than four median fire intervals. This means, overall, catastrophic fire has the potential for substantial effects on the park population of great gray owls. Shading is an important factor in nest site selection and nesting success because here, at the furthest southern extent of the owl's range, overheating of incubating adults and nestlings can occur (Reid 1989). In a catastrophic fire, nesting snags could be destroyed and trees shading any surviving snags could be sparse. Snags would be created in a fire but they may not be suitable without shade, and long-term recruitment of snags would be reduced because there would be fewer living trees.

At lower elevations, on wintering areas, catastrophic fire would have little effect on great gray owls. The A-Rock fire that burned over Foresta in 1990 has had no detectable effect on the use of Big Meadow by wintering great gray owls, and may have actually opened up more foraging habitat.

The threat of catastrophic fire would be greatest under Alternative A, because the rate at which treatment of accumulated fuels and altered habitats would occur is relatively slow. Some areas would continue to deviate further from natural conditions and catastrophic fires would likely occur in time. The impact of Alternative A would be adverse, long-term, and minor, given the relatively small amount of great gray owl habitat that is at risk, the slow rate of treatment would expose more areas to risk of high-intensity fires.

Fire Management Treatments

Managed Wildland Fire

Approximately two-thirds of all great gray owl habitat and 80% of high-quality habitat occurs in the Fire Use Unit. As such, managed wildland fire has potential to affect great gray owl habitat quality, but a majority of the habitat in this unit is at or close to a natural maximum fire return interval, especially in higher-elevation breeding areas. Almost a quarter of all habitat has missed at least one fire return interval.

Lightning fires are somewhat random events and there would be little chance to protect owl habitat. Even fires that are burning within prescription are likely, in places, to burn at intensities high enough to have an adverse effect on some great gray owls, due to the high fuel loading in some areas. Some nesting snags may be consumed. This impact must be weighed against the increased risk of catastrophic fire, if the emphasis on fire suppression were to continue in the Fire Use Unit. Some meadows, especially at lower elevations, are shrinking in size due to conifer encroachment, without fire, this would eventually have an adverse effect on great gray owls.

Benefit to great gray owls of managed wildland fire would be limited by its slow rate of use under Alternative A. Catastrophic fire would continue to be a threat to some areas. The effect of managed wildland fire on great gray owls under Alternative A would be beneficial, long-term, and minor, because of the small acreage of great gray owl habitat that has deviated from the maximum fire return interval and the limited amount of this habitat that would be treated with wildland fire under Alternative A.

Prescribed Fire

Although only about one-third of all great gray owl habitat occurs in the Fire Suppression Unit, these are the areas furthest from the natural fire regime (map 1-3), and, therefore, stand to benefit the most from prescribed fire. In some areas, high levels of fuel may result in high-intensity fires that would potentially consume nesting snags and other habitat components important to great gray owls. These threats, however, should be weighed against the continued risk of catastrophic fire to great gray owls. Under Alternative A, use of prescribed fire would be limited and the risk of catastrophic fire would continue in some areas. Surveys would be conducted to locate and protect active nest sites. Impact of prescribed fire on great gray owls under Alternative A would be beneficial, long-term, and minor, based upon the improvement of habitat and the reduction in the threat of catastrophic fire that would occur.

Holding Action and Monitoring Effects (water and retardant drops, helispots, and spike camps) and Site Preparation Associated with Managed Wildland Fire and Prescribed Fire (hand line, snagging, mop-up)

Water and retardant drops would have an adverse effect on great gray owls if owls or nest sites were struck. The chances of this are small, especially if nest sites can be located prior to the use of water or retardant drops. Helispots and spike camps would have an adverse effect on great gray owls if they were located near nest sites. Such effects, however, would be short-term. Hand lines would adversely affect great gray owls if they were constructed near nest sites, where ongoing human disturbance could affect nesting success. These impacts could be minimized if nest sites could be located prior to line construction. Snagging would have an adverse effect on great gray owls through reduction in the number of snags available for nest sites. Impact would be greater if active nest snags were removed. Mop-up would not have an adverse effect on great gray owls unless it entailed snag removal.

Overall, actions taken to manage wildland and prescribed fires would have a negligible, adverse, long-term effect on great gray owls under Alternative A. This is primarily based upon possible impacts associated with snag removal, although the limited use of wildland and prescribed fire under Alternative A would limit such impacts.

Fuel Reduction by Hand or Machine

Passive Reduction and Lower Profile techniques.

Hand Cutting/Pile Burning. Hand cutting and pile burning would have an adverse effect on great gray owls if it occurred near nesting or hunting areas, where the disturbance caused by hand crews could be disruptive. If thinning also included removal of snags it would have an adverse effect by reducing the density of potential nesting snags. Areas where hand thinning could occur near occupied great gray owl habitat include Crane Flat, Hodgdon Meadow, Wawona Meadow, Foresta, and along Glacier Point Road. Impact of hand thinning on great gray owls under Alternative A would be adverse, short-term, and negligible, based upon potential disturbance of hunting and nesting owls.

Chipping. The noise caused by chipping machinery could adversely affect great gray owls' hunting success. Great gray owls hunt primarily by sound, and chipping machinery could be disruptive, especially near areas where great gray owls are known to occur such as Crane Flat, Hodgdon Meadow, Wawona Meadow, Foresta, and along Glacier Point Road. Chipping under this alternative would be infrequent, thus effects would be adverse, short-term, and minor.

Cumulative Impacts

Past and present actions that have affected great gray owls have included development, timber harvest and fire suppression. Their effects have been major, adverse and long-term. Reasonably foreseeable future actions that would affect great gray owls would include:

Yosemite Valley Plan/SEIS (2000): Implementation of the preferred alternative would restore highly-valued habitats in Yosemite Valley and decrease fragmentation, which could benefit great gray owls, although they are now rare in the Valley. The construction of facilities outside of Yosemite Valley, however, would cause localized destruction of habitat. If parking were constructed at Foresta, this would have an adverse effect on the great gray owls that use Big Meadow for wintering and staging. Such effects would be adverse, long-term, and moderate.

Merced Wild and Scenic River Comprehensive Management Plan/EIS (2000): Implementation of the preferred alternative would help protect river-related wildlife habitat and species. This is especially true in Yosemite Valley, where past development has encroached on river habitats. The *Merced Wild and Scenic River Comprehensive Management Plan* would provide the framework for reducing present development and limiting future development in these areas, with moderate, beneficial, long-term effects on great gray owls.

Hazel Green Ranch: Development in this area adjacent to the park would affect an area of mixed conifer and meadow habitat. Impact on great gray owls is expected to be adverse, long-term, and negligible if consideration is given by a developer to preservation of sensitive habitats. However, there is some uncertainty about the future of this property.

Evergreen Lodge Expansion: This development would affect an area of mixed conifer and meadow habitat near the park. Effect on great gray owls is expected to be adverse, long-term, and minor.

Fire Management Plan for Wilderness (USFS): This plan would benefit great gray owls by allowing naturally-ignited fires that say in prescription to cross agency boundaries. This could result in wider areas of habitat benefiting from fire, resulting in beneficial, long-term, and minor impacts

Orange Crush Fuels Program (USFS): This project would manage fuels through prescribed burning. This would have a beneficial, long-term, and minor effect on great gray owls by working toward the return of a natural fire cycle for the area which would reduce the chance of catastrophic fire that might spread into the park.

Sierra Nevada Forest Plan Amendment: Implementation of this plan would have a moderate, beneficial, long-term effect on great gray owls by leading to more ecosystem-based management of National Forests in the Sierra Nevada.

The effect of reasonably foreseeable projects in combination on park great gray owls and their habitat would be beneficial, long-term, and moderate, because some foreseeable projects with a beneficial impact would affect large areas of habitat in the central Sierra Nevada. The Sierra Nevada Forest Plan Amendment would affect virtually all U.S. Forest Service land around the park by enabling more ecosystem-based management. Implementation of the *Yosemite Valley Plan* and the *Merced Wild and Scenic River Comprehensive Management Plan* would beneficially affect high-value habitats, primarily in Yosemite Valley. The *Yosemite Fire Management Plan* under Alternative A would, however, have adverse impacts associated with habitats continuing to be affected by a history of fire suppression and continued risk of catastrophic fire in some areas. Other foreseeable projects with adverse impacts would affect small areas and/or have minor effects over larger areas. Considered in combination with the effects of Alternative A, cumulative impacts would be beneficial, long-term, and negligible.

Conclusion

The effects of Alternative A on great gray owls would be adverse, long-term, and moderate, based primarily on the threat of catastrophic fire that would continue indefinitely, due to the relatively slow rate of fuels treatment. Actions taken to manage wildland and prescribed fires could adversely affect great gray owls if they reduced snag density or caused disturbance of nesting or hunting owls.

Willow Flycatcher *(Empidonax trailii)* – California Endangered

In the past, willow flycatchers nested in California wherever willow thickets in wetlands, meadows, or riparian areas were found (Grinnell and Miller 1944). In recent decades, breeding populations have disappeared from low elevation habitats in the state. Alteration and destruction of riparian and meadow habitats is thought to be the principal cause for this decline (Remson 1978). Other contributing factors may include nest parasitism by brown-headed cowbirds, disturbance from grazing, and disturbance on wintering grounds. Nest predation is a major cause of nest failure in willow flycatchers in the Sierra Nevada (Morrison et al. 2000). The California population of willow flycatchers is thought to number around 200 pairs.

In Yosemite, willow flycatchers were once widespread; they have declined from a combination of internal and external factors. Recent records of willow flycatchers in the park include Wawona Meadow, Hodgdon Meadow, and Westfall Meadow.

Potential for Impacts from Catastrophic Fire

In the Sierra Nevada, the long-term response of willow flycatchers and their habitat to fire is not known. The natural role and extent of fire in Sierra Nevada meadows is unclear, but it is likely that under drought conditions, historic late summer and autumn fires may have occasionally influenced meadow vegetation. The rate of willow stand mortality in meadows from catastrophic fire is unknown, but re-sprouting and re-growth may take place (Agee 1994). If willows regenerate after a fire, the time between the fire and the re-growth of willows to the point where they could be reoccupied by willow flycatchers is unknown (Paxton et al. 1996).

With all of this uncertainty about the effects of fire on willow flycatchers, we must assume that burning willows reduces nesting habitat and thus has at least a short-term adverse effect on willow flycatchers. Wildland fire in riparian and meadow vegetation is typically low in intensity and frequency, except where concentrations of woody debris cause flare-ups (Skinner and Chang 1996). During a low-intensity burn, willow stands containing a minimal amount of dry wood and high moisture content are generally just singed and recover quickly.

Sixty-percent of all potential willow flycatcher habitat and 60% of high-quality habitat in the park have missed more than four median fire return intervals. This means a large proportion of Yosemite's willow flycatcher habitat is vulnerable to catastrophic fire, although local effects (i.e. meadow moisture levels) would likely influence the specific habitat impact that would most directly affect the flycatchers: the consumption of willows by fire.

Under Alternative A treatment of accumulated fuels would occur at a relatively slow pace, increasing potential for catastrophic fires over time. The impact on willow flycatchers would be adverse, long-term, and moderate, because of the gradual increase in the amount of habitat that has missed fire return intervals. This is moderated by the usually low fire frequency and intensity in meadow habitats.

Fire Management Treatments

Managed Wildland Fire

Only about 26% of potential willow flycatcher habitat and only one known flycatcher site (Westfall Meadow) are located in the Fire Use Unit. Habitat in this unit is at or near the median natural fire return interval. Nonetheless, fire would be used to restore and maintain habitat, and reduce the chance of catastrophic fire.

Low-intensity fires can cause new growth in willows by singeing the stems, which stimulates the plant to produce new sprouts. Over time, the willows become denser. Without low-intensity burns or floods, willows tend to contain more decayed and decadent growth, which increases the chance that they will be consumed in a fire (Fritzke 2001). Wildland fires that are likely to affect meadow habitats known to be occupied by willow flycatchers should be evaluated for potential adverse effects, based on fuel loading in the meadows and willows, and managed to minimize impacts. Surveys would be conducted to locate all willow flycatchers in the park so appropriate fire management actions can be taken.

Under Alternative A, no re-ignitions of suppressed wildland fires would occur. This would limit the amount of area that could be treated with managed wildland fire, thus catastrophic fire would remain a threat in some areas.

Use of wildland fire under Alternative A would result in beneficial, long-term, and negligible impact on willow flycatchers, because the natural fire regime existing in most wildland habitat areas would continue, but due to the limited use of wildland fire, some areas would continue to be threatened by catastrophic fire.

Prescribed Fire

Approximately 74% of all willow flycatcher habitat in the park and 73% of high-quality habitat occurs in the Fire Suppression Unit, and these areas tend to be the ones with the greatest number of missed fire return intervals. Two of the three known active nest sites are located in the Suppression Unit. Prescribed fire would be an important tool for restoring habitat and protecting it from catastrophic fire. Prescribed fires likely to affect meadow habitats known to be occupied by willow flycatchers should be evaluated for potential adverse effects and managed to minimize impacts. Burning at specific sites would not occur during the period of nesting and fledging (May – September), and willows would be protected from intense fires by clearing dead and decadent fuels from around and within willow shrubs. If possible, meadow habitats with recent flycatcher nests would be burned in stages, so not all potential nest shrubs would be damaged at once. Surveys would be conducted to locate willow flycatchers in the park, so appropriate fire management actions can be taken. The rate at which prescribed fire would be applied under

Alternative A would be limited. Degraded habitat and risk of catastrophic fire would continue indefinitely in some areas, with possible adverse effects on willow flycatchers.

Impact of prescribed fire on willow flycatchers under Alternative A would be beneficial, long-term, and minor, because of the modest reduction in the threat of catastrophic fire and regeneration of lightly-burned willows.

Holding Action and Monitoring Effects (water and retardant drops, helispots, and spike camps) and Site Preparation Associated with Managed Wildland Fire and Prescribed Fire (hand line, snagging, mop-up)
Water and retardant drops are unlikely to affect willow flycatchers because the habitat flycatchers occupy is relatively wet, and does not in most years carry fire. Existing procedures for retardant prohibit its use within 300 feet of water and wetlands. Helispots could affect willow flycatchers if they were located near nesting areas, and the amount of helicopter traffic were enough to cause frequent disturbance. Such could be the case at Wawona Meadow, which is commonly used for helicopter operations. Spike camps are prescribed to be established outside of sensitive habitats, such as meadows, and therefore would not have an adverse effect on willow flycatchers. Hand lines would have an adverse effect on willow flycatchers if they were built through meadows, and willows were cut or removed. These habitats, however, usually contain enough moisture that they do not carry fire, making fire lines unnecessary. Also, fire line construction guidelines call for the avoidance of sensitive habitats, such as meadows. Snagging would have no effect on willow flycatchers because snags are not commonly found in meadows, and are not an important habitat component of this species. Mop-up would have an adverse effect on willow flycatchers if it involved the digging or disturbance of willow shrubs, but meadow habitats are very unlikely to harbor hot spots that would need mop-up actions.

Overall, actions taken to manage wildland and prescribed fires would have minor, adverse, short-term effects on willow flycatchers, mostly from potential impacts of conducting helicopter operations out of Wawona Meadow.

Fuel Reduction by Hand or Machine
Passive Reduction Techniques.
Hand Cutting. Hand cutting would have a negligible effect on willow flycatchers because it would not usually occur in meadow habitats where large fuels are sparse and the moist conditions would typically not carry fire.

Chipping. Chipping would occur infrequently and well away from willow flycatcher habitat.

Cumulative Impacts
Past and present actions that have impacted willow flycatcher include development, water projects, grazing, timber harvest. Their effects have been major, adverse, and long-term. Reasonably foreseeable future projects that would affect willow flycatcher would include:

Yosemite Valley Plan/SEIS (2000): Implementation of the preferred alternative would restore highly-valued habitats, including meadows, in Yosemite Valley and decrease the fragmentation of these habitats, which could benefit willow flycatchers, although they are no longer found in Yosemite Valley. Such effects would be beneficial, long-term, and minor to moderate.

Merced Wild and Scenic River Comprehensive Management Plan/EIS (2000): Implementation of the preferred alternative would help protect river-related wildlife habitat and species. This is especially true in Yosemite Valley, where past development has encroached on river habitats. The plan would provide the framework for reducing present development and limiting future development, with moderate, beneficial, long-term effects on willow flycatchers.

Hazel Green Ranch: Development of this area adjacent to the park would affect an area of mixed conifer and meadow habitat. Impact on willow flycatchers is expected to be adverse, long-term, and negligible, if consideration is given by the developer to preservation of sensitive habitats. However, there is uncertainty about the future of this property.

Evergreen Lodge Expansion: This development would affect an area of mixed conifer and meadow habitat near the park. Effect on willow flycatchers is expected to be adverse, long-term, and minor.

Fire Management Plan for Wilderness (USFS): This plan would benefit willow flycatchers by allowing naturally-ignited fires that stay in prescription to cross boundaries into the park. This could result in wider areas of habitat benefiting from habitat improvement from fire, resulting in beneficial, long-term, and minor impacts

Orange Crush Fuels Program (USFS): This project would manage fuels through prescribed burning. This would have a beneficial, long-term, and minor effect on willow flycatchers by working toward the return of a natural fire cycle for the area, and reduce the chance of catastrophic fire, which could spread into the park.

Sierra Nevada Forest Plan Amendment (USFS): Implementation of this plan would have a moderate, beneficial, long-term effect on willow flycatchers by leading to more ecosystem-based management of National Forests in the Sierra Nevada.

Some current and foreseeable projects would benefit large areas of the central Sierra Nevada. The Sierra Nevada Forest Plan Amendment would affect virtually all U.S. Forest Service land around the park by enabling more ecosystem-based management. Implementation of the *Yosemite Valley Plan* and the *Merced Wild and Scenic River Comprehensive Management Plan* would beneficially affect high-value habitats, primarily in Yosemite Valley. In aggregate their effects would be minor, beneficial and long-term. Other foreseeable projects with adverse impacts would affect small areas and/or have minor effects over larger areas. The *Yosemite Fire Management Plan* under Alternative A would, however, adversely impact habitats affected by years of fire suppression by continuing the risk of catastrophic fire in some areas. Considered in combination with the effect of Alternative A, the cumulative impacts would be negligible to minor, beneficial, and long-term.

Conclusion

The impact of Alternative A on willow flycatchers would be adverse, long-term, and minor because of the continued threat of catastrophic fire in some areas, although such fires are likely to affect only a small portion of potential willow flycatcher habitat.

Summary Conclusion, Special-Status Species – Animals

In almost all cases, the greatest threat to special-status species would be catastrophic fire. Under Alternative A the potential of catastrophic fire would continue and increase during the life of the plan. Some effects of catastrophic fire could be considered impairment to special-status species.

Physical Environment

Watersheds, Soils, and Water Quality

Potential for Impacts from Catastrophic Fire

In the Suppression Unit, there are 64,268 acres of the Merced River watershed and 42,313 acres of the Tuolumne River watershed. Another 27,180 acres of the Merced and 32,316 acres of the Tuolumne are within the Conditional Unit. Because of the likelihood of forest fuels accumulating and plant community structure continuing to change, the potential for large, high-severity fires over the life of the plan (assumed 15-year timeframe) is large. Approximately 25% of the Merced River watershed and 19% of the Tuolumne River watershed show moderate to high departures from median fire return intervals. These areas, many of which are lower and upper montane forest, have the greatest potential for catastrophic fire.

High-severity fires in Yosemite are characterized by extensive burned areas that may be continuous from ridgeline to slope bottom and include riparian areas. Water yield and peak flows increase following high severity fire because soil infiltration rates decrease and there is little vegetation to intercept precipitation or organic litter (duff) to slow water runoff. Extensive and continuous areas of hydrophobic soils are created, further decreasing infiltration and increasing water yields.

This alternative would cause an increase in sediment and nutrient yields in the watershed and corresponding increased rates of erosion and sediment deposition in channels. This would affect both water quality and the physical characteristics of channels and their associated aquatic habitats. Channels would not reestablish their pre-fire character until the vegetation re-colonized and stabilized hill slopes and channel banks. However, because of burn severity in the riparian areas, reestablishment of vegetation would take decades or longer. During extreme weather events, debris torrents would potentially scour streams, delaying restoration of the riparian community for even longer. Thus, in regard to catastrophic fire, the effects of Alternative A on soils and watershed conditions in the Suppression Unit would include areas of adverse, potentially long-term, and major change.

Fire Management Treatments

Managed Wildland Fire

Approximately 255,208 acres of the Merced River watershed, and 386,166 acres of the Tuolumne River watershed are within Fire Use or Conditional Units. Vegetation and fuel loading are only slightly altered as most of this area is within two intervals of the natural range of variability. Fire in the duff layers would spread across the watershed under variable conditions so that burn severity would range from light to locally severe. Patches of extremely hydrophobic soils would be created in areas of high fuel loading where soils would be exposed to heating for a longer time and at a higher temperature than where fires burned in lighter fuels. Fire would help keep plant communities within their natural range of variability. The effects would not typically be on a watershed scale; fire would typically burn along ridge tops and upper slopes, with only partial intrusion into slope bottoms and riparian areas. Water yield and peak flows would increase only slightly and within a small range of variability, thus sediment and nutrient yield fluctuations would be short-term. As a result, there would be negligible channel response, and a short-term recovery of riparian systems. Overall, the soils and watershed effects within these areas would be beneficial, short-term, and moderate.

Holding Action and Monitoring Effects (water and retardant drops, helispots, and spike camps). Helispots would be located more than 150 feet away from any river, and generally much further. Because of the relatively small surface area of a helispot, they would typically have little effect upon water quality or other watershed attributes. Spike camps for monitoring and holding crews would have the potential to be larger, especially as crew-size increases, but even so, effects would be generally local. Both helispots and spike camps would contribute to areas of increased compaction and disturbance in the soils. Soil effects of these actions would be adverse, long-term, and negligible to minor. Watershed effects of these actions would be adverse, short-term, and minor.

Retardant and suppressant compounds would not typically move into ground water or into surface water from runoff as they would be used carefully around surface waters because of potential effects upon aquatic organisms. Most fire retardants contain fertilizer type compounds, including ammonia and nitrogen, which can cause changes in pristine terrestrial and aquatic ecosystems, especially those otherwise low in nitrate/ammonia type nutrients. Additionally, ammonia itself can be quite toxic in aquatic habitats. Some retardants contain preservatives that release cyanide. The half-lives for these compounds, in soil, are short. When retardants and suppressants are in use, pilots and engine crews would be directed to avoid dropping retardants within 300 feet of wetlands, streams, and lakes. Potentially adverse and moderate to major effects could be arrested through these wide buffer zones, making the effect of using retardant and suppressant adverse, short-term, and negligible to minor, for both soils and watersheds.

Prescribed Fire

Prescribed fire would typically be used in areas where the fire return interval is three or more fires out of cycle, or to maintain target conditions in areas within the Suppression Unit or along the margins of the Fire Use and Conditional Units. Where fire return intervals are out of cycle, such as around wildland/urban interface areas, fuel accumulations can be well outside their natural range of variability. Due to the controlled nature of prescribed fire, however, in terms of fuel moisture, weather conditions, time of day, spatial pattern of ignition and other factors, prescribed fire would not generally result in high severity fire that would alter watershed conditions. However, the soils would not be subjected to the natural range of variability present with natural fire. Prescribed fire would be used, however, as a means to reduce the severity of fire in these areas, and would limit the potential for catastrophic fire that could burn along the entire vertical gradient in the watershed. Burn blocks would continue to be limited in size. Burns would not be continuous up the vertical gradient of the watershed (meaning from ridge, through mid-slope, and into or through the slope bottom/riparian). Fire in the duff layers would spread under variable conditions, but not with enough severity to cause extensive areas of hydrophobic soil. With the unnaturally high fuel loads, the soils will be exposed to higher temperatures and longer resident times than in the normal range of variability. It should be noted that under this alternative, only 1,442 acres of prescribed burning and approximately 100 acres of wildland/urban interface treatment would occur over an average year. This would contribute to the high potential for catastrophic fire and diminish the landscape-scale effects of burning. The effects of prescribed fire on watershed conditions would be beneficial, long-term, and moderate.

Site Preparation Associated with Managed Wildland Fire and Prescribed Fire (hand line, snagging, mop-up)

These activities would have the potential to increase soil erosion, because vegetation and organic litter would be removed to stop or hold a fire. Erosion would be greatest along stretches of line that run down slope. Soil compaction and disturbance would occur with both hand line and mop-up. Waterbars and check dams would continue to be used as mitigation, to reduce runoff and the resulting erosion. The downed snags would create locally heavy areas of fuels that would affect the temperature and fire residence time on very small scales. Soil and watershed effects would be adverse, short-term, and minor.

Fuel Reduction by Hand or Machine

Aggressive Reduction Techniques. These treatments would not be used in this alternative.

Passive Reduction and Lower Profile Techniques.

Hand Cutting. These activities would continue to be used in the wildland/urban interface, and as needed in the Conditional and Suppression Units and in Special Management Areas. Because of the labor-intensive nature of the work, accomplishments would remain at approximately 100 acres treated per year. Hand cutting activities would lead to soil compaction on a localized scale, but would likely have a negligible effect on duff and topsoil layers, resulting in negligible direct impacts on watershed characteristics, including water yield, peak flows, sediment yield, nutrient yield, and stream system response. However, because of the small numbers of acres treated annually, the potential for large, high severity fires would remain high. Thus, the effects of hand cutting would be beneficial and potentially long-term, but only minor in intensity.

Pile burning. Piles would burn under variable conditions, ranging from light to locally severe, creating small patches of extremely hydrophobic soils. Biological and physical characteristics of these patches would be expected to change. However, because of the small areas, the biological function of these areas would return very quickly. The effects would not be on a watershed scale. Projects would be limited in scale, with boundaries typically associated with only one portion of the slope (top, mid-slope, or bottom). Water yield and peak flows would increase only slightly, and within a small range of variability, thus sediment and nutrient yield would only see short-term fluctuations. As a result, there would be negligible channel response, with short-term effects, if any, in riparian systems. The impact of pile burning on soils would be adverse, short-term, and minor. Overall, the watershed effects within these areas would be beneficial, short-term, and minor to moderate.

Chipping. Chipping would only be used occasionally in this alternative. Chipping cut material and then distributing it over a site could occur where air quality, visitor use, or other management concerns prohibit burning. Such impact, however, would be adverse, short-term, and negligible.

Cumulative Impacts

The Merced and Tuolumne River watersheds have been affected historically by a variety of actions. Past actions have included fire suppression activities that have contributed to fuel build-up and high-severity fires, logging, construction of O'Shaughnessy Dam and the creation of the Hetch Hetchy Reservoir on the Tuolumne, and multiple agricultural and land use activities below the park. Logging and fire exclusion would both be expected to have adverse effects on soils. It should be noted that activities in the upper watersheds have had relatively little effect on water quality, compared to the downstream sources of change.

Present and reasonably foreseeable actions within the watersheds include the Aspen fuels reduction, Orange Crush fuels program, and A-Rock reforestation on the Stanislaus National Forest; similar programs on other national forests; and the various fire, resource, and land management actions that would take place on the national forests in the watershed, as a result of implementing the Sierra Nevada Forest Plan Amendment. Most of these treatments include extensive use of tracked machinery. This will cause soil compaction and alter the biological and physical functions of these areas. While the actions would reduce the potential for high severity fire, the impacts on soils would be adverse, potentially long-term, and minor. These actions would have net beneficial impacts on watershed values through either reducing the potential for high severity fire, or through the reduction of watershed effects through restoration.

When considered in combination with the minor to moderately beneficial impacts of projects on other lands in the upper watersheds, the cumulative impacts from Alternative A would be adverse, long-term, and minor.

Conclusion

In aggregate, actions implemented under this alternative would have adverse, long-term, and moderate effects. This conclusion is based on a combination of beneficial, long-term, moderate to major effects in the Fire Use and Conditional Units, and the potential for areas of adverse, long-term, and major, effects in the Suppression Unit, where large, high-severity fires would likely occur during the life of the plan. The effects of Alternative A on watersheds, soils, and water quality would not typically be considered impairment.

Air Quality

Emissions

Wildland and Prescribed Fire Emissions

Smoke from wildland fires and prescribed fire is a complex mixture of carbon, tars, liquids, and gases. The major pollutants are particulates (PM_{10} and $PM_{2.5}$), volatile organic compounds (VOC), and carbon oxides (CO and CO_2). Nitrogen oxides ($NO_{X)}$ are produced during a fire, but in a relatively small quantities compared to the other pollutants. Table 4.5 summarizes the annual emissions from various fire types that would occur under Alternative A. They are based on emissions that have occurred within the park over the 10-year period 1991 to 2000 (based on park records).

Mechanical Treatments Emissions

Air emissions would be generated by machines used in site preparation and fuel reduction activities. Motorized equipment would include chainsaws, chippers, and haul trucks. Emissions from the operation of this equipment have been estimated based on approximate historical operating hours by park personnel clearing approximately 100 acres per year, estimated horsepower ratings, estimated operating loads, and emission factors (see Methodology, Air Quality). Estimated air emissions are summarized in table 4.6. These emissions would be minor when compared to emissions from prescribed or wildland fire or broadcast burning. Chipping cut material and then distributing it over a site could occur when air quality is a concern. Such impact, however, would be beneficial, short-term, and negligible.

Table VI-5
Average Air Emissions Associated with Various Fire Types in Yosemite National Park—based on ten years of emissions data (1991-2000)

Alternative A—Average Emissions from Existing Program							
Fire Type	**Acres** [d]	**Fire Emissions (tons/yr)** [a]					
		PM_{10}	**$PM_{2.5}$**	**VOC**[b]	**CO**	**NO_x**	**CO_2**
Prescribed Burns[c]	1,495	1,087	917	719	12,945	370	58,557
Managed Wildland Fire[c]	2,152	1,564	1,321	1,034	18,637	532	84,305
Wildfire	5,759	6,920	5,864	3,529	76,930	2,198	387,446
Total	**9,406**	**9,571**	**8,103**	**5,282**	**108,512**	**3,100**	**530,308**

a PM_{10} = Suspended Particulate, $PM_{2.5}$ = Fine Particulate Matter, VOC = volatile organic compounds, CO = Carbon Monoxide, NOx = Nitrogen Oxides, CO_2 = Carbon Dioxide
b VOC (volatile organic compounds) as methane
c Based on composite emission factor for prescribed burning
d Average annual historical fire acres during 1991-2000

Table VI-6
Air Emissions Associated with Mechanical Thinning Activities In Alternative A

Alternative A							
Equipment	**Operating Hours**	**Motorized Equipment Emissions (tons/yr)**[a]					
		PM_{10}	**$PM_{2.5}$**	**VOC**	**CO**	**NO_x**	**CO_2** [b]
Chainsaws	1,400	0.04	0.04	0.74	2.40	0.01	ND
Chippers	267	0.06	0.06	0.02	3.57	0.00	ND
Haul Trucks	192	0.05	0.05	0.09	0.42	0.28	ND
Total		**0.15**	**0.15**	**0.85**	**5.39**	**0.29**	**ND**

a PM10 = Suspended Particulate, PM2.5 = Fine Particulate Matter, VOC = volatile organic compounds as methane, CH4, CO = Carbon Monoxide, NOx = Nitrogen Oxides, CO2 = Carbon Dioxide
b No data

Mitigation Measures

Various management techniques would be used to reduce air emissions produced by prescribed fires and wildland fires. Together with overall priorities, such as firefighter and public safety, prescribed and wildland fire and suppression actions would be conducted so that effects of smoke and other emissions on air quality and visibility would be lessened. Air emissions would be decreased by reducing the area burned, reducing fuel loading (e.g., chipping and hauling away), or managing fuel consumption.

Smoke Communications Strategy

The park also has developed a *Smoke Communication Strategy* (Appendix 4) that provides a blueprint for how to manage future smoke events from prescribed fires, managed wildland fires, suppression actions, and fires occurring outside the park. It provides information on health issues and concerns and, among others, it would be directed to visitors, employees, and residents in affected smoke sensitive areas. The park would also attempt to monitor particulate levels in the park during smoke events. Park air quality technicians would operate air quality monitors that measure particulate levels every hour. These levels are used to compute a 24-hour average that correlates with the Environmental Protection Agency Air Quality Index for particulates.

Agency Coordination

Prior to igniting a prescribed fire, Yosemite National Park must obtain permission through a permit from the appropriate County level Air Quality Management District. The park must also obtain meteorological approval to burn from the California Air Resources Board. It is the responsibility of these permitting agencies to coordinate the numbers of fires burning in one area. As an added measure to mitigate the potential cumulative impacts of prescribed fires, Yosemite fire management staff are members of the Mountain Counties Air Alliance, a Sierra Nevada-wide Fire Management network of National Parks, National Forests, BLM Units, California Department of Forestry, private timber companies, air pollution control districts, and State Parks. The goal of this group is to assure planned ignitions on federal and state lands in the Sierra Nevada do not adversely impact smoke sensitive areas in and around the burn area. The group meets twice a year to discuss issues and register burns for the coming year.

Cumulative Impacts

Other actions in the immediate area and greater San Joaquin Valley would have cumulative impacts when viewed in the context of Alternative A. These include the implementation of the public transportation recommendations included in the *Yosemite Valley Plan* (removal of some roads in the Valley and the implementation of an out-of-Valley shuttle bus system). The net affect of these actions would be to reduce vehicle related air emissions in the Valley and along the corridors leading to the Valley. A regional transit system, the Yosemite Area Regional Transportation Strategy (YARTS), provides some visitors and commuting employees with an alternative to driving into the Valley and would result in overall lower air emissions. A 2-year demonstration of YARTS began in the summer of 2000. The planned improvements for state highway 41 in both the short-term (1999-2000) and long-term (2014) are not likely to increase traffic to the Valley according to Madera County Transportation Commission officials, since the improvements are directed at relieving congestion and not increasing traffic volume.

There are expansion projects in the region that would affect air emissions in the region. These include construction of new housing developments, to accommodate, for example, population growth in the City of Merced which is expected to rise from 62,000 to 133,000 by the year 2015. Other new housing includes the Rio Mesa Area Plan on the east side of Highway 41 in Madera County with a planned 29,000 housing units over 100 years and a University of California Campus just outside Merced that would accommodate 31,500 residents and 31,600 students. There are also new lodging projects planned for the area that would increase guest rooms by about 725. Collectively, these developments would increase vehicles and associated air emissions in the region. The Merced expansion plans represent an approximate 30% increase in the estimated population of Merced County and a corresponding increase in vehicle numbers and related air emissions. Increases in Madera County are expected to be 25 %. An increase in population near the park has the potential to create larger areas of wildland/urban interface that would cause fire issues and smoke concerns and possibly complaints.

The park is surrounded by the Stanislaus, Sierra, Toiyabe, and Inyo National Forests, which experience wildland fires and planned burns. Park and U.S. Forest Service fire management staff would continue to coordinate their planned ignitions to minimize potential impacts on smoke sensitive areas.

Wildland fires that occur in surrounding National Forests are expected to generate smoke emissions similar to those quantified for wildland fires burning within Yosemite National Park. In the event that fires are burning in the park and in surrounding forests simultaneously, the impacts to air quality would have the potential to be extreme. However, in these cases, park and forest staffs would coordinate closely on managing smoke emissions to minimize impacts to smoke sensitive areas. This would include suppressing wildland fire that might otherwise have been managed to achieve ecosystem management goals. Activities in the region have both short-term and long-term effects and would remain adverse.

Conclusion

Generally, Alternative A would continue the practices of recent years, which would not meet the park's natural resources management objective of returning the park to its natural background conditions for air quality. The continuing risk of wildland fires consuming areas of high fuel loadings would have the attendant effect of continuing adverse, long-term, and major impacts on air quality. These effects would not represent impairment.

Cultural Environment

Archeological Resources

Potential for Impacts from Catastrophic Fire

Impacts of catastrophic fire and fire suppression are discussed in several reports (NPS 1991b; DOI 1996; Hull 1991, Keefe et al. 1999). These reports document major, adverse impacts to archeological resources both from fire related activities and from high-impact fire suppression actions. In general, catastrophic fires in the vegetation types found in Yosemite result in soil and below-soil heating that damages archeological materials (see e.g., Andrews and Rothermel 1982; Agee 1973; Sackett and Haase 1992). Significant archeological resources exist in areas that are at risk from catastrophic fire and high-impact fire suppression actions. Therefore, implementation of this alternative has the potential to result in adverse, long-term, and major impacts to archeological resources from catastrophic fire. These impacts would be mitigated to the extent possible (see Methodology, Mitigation of Impacts to the Cultural Environment, above).

Fire Management Treatments

Managed Wildland Fire

Under this alternative, wildland fire would be used in Fire Use and Conditional Units, map 2-12. Approximately 28,878 acres, or 4.5%, of the total 641,375 acres in these units have been inventoried for archeological resources. The 850 sites in the area range in significance from low to exceptional. Based on a comparison of the missed fire return intervals in maps 2.5 and the units, 226,590 acres, or 35%, of these units probably contain significant fuel accumulation (FRID values of three and greater). As noted above, soil and below-soil temperatures can be regulated to thresholds that minimize damage to archeological materials, when vegetation is burned under certain prescriptions. However, in areas where significant fuels have accumulated, it is unlikely that wildland fire can be managed to avoid damage to archeological resources. In these areas, managed wildland fire would have direct and indirect adverse impacts to archeological resources. The intensity of these impacts would depend upon the nature and significance of the resources as well as the intensity of burning and the post-burn landscape condition, but would be potentially adverse, long-term, and minor to moderate. These impacts would be reduced to the extent possible by implementing mitigations (see Methodology, Mitigation Measures).

In areas where the FRID analysis indicates from zero to two missed fire return intervals, it is likely that managed wildland fire could be managed to avoid soil and below-soil temperatures that damage archeological materials. In these areas managed wildland fire would probably not adversely impact archeological resources. However, post-fire survey and fire-effects research would be necessary to verify this assumption. It is likely that minor to moderate, long-term, beneficial impacts would result from maintaining natural fuel loading on archeological sites.

Holding Action and Monitoring Effects (water and retardant drops, helispots, and spike camps). Holding and monitoring actions have the potential to adversely impact archeological resources through soil disruption and compaction. The intensity of these impacts would depend on the nature and significance of the resources as well as the extent of disturbance, but effects would be potentially, adverse, long-term, and minor to moderate. These impacts would be mitigated as much as possible.

Prescribed Fire

Under this alternative, prescribed fire would be used in the Conditional and Suppression Units (map 2-12). Approximately 27,573 acres, or 17% of the total 166,078 acres in these units have been inventoried for archeological resources. Eight hundred and fifty known sites are within this area, ranging in significance from low to high. Based on a comparison of the missed fire return intervals in map 2.5 with the units, 75,351 acres, or 45% of these units contain significant fuel accumulation. As noted above, soil and below-soil temperatures can be regulated to thresholds that minimize damage to archeological materials, when burns are accomplished under certain prescriptions.

Prescribed fires are lit under specific conditions to burn in a certain way. Thus, the potential for prescribed fire to have adverse impacts to archeological resources would be less than catastrophic fire or even managed wildland fire. However, in areas where significant fuels have accumulated (areas that have missed three or more fires) it might not be possible to manage fire so that damage to archeological resources would be avoided. In these areas, prescribed fire would have direct and indirect adverse impacts to archeological resources. The intensity and duration of these impacts would depend upon the nature and significance of the resources as well as the intensity of burning and the post-burn landscape condition. These impacts would be mitigated to the extent feasible by implementing mitigating measures. Maintaining lighter fuel loads on archeological sites would likely result in long-term, beneficial impacts to archeological resources.

In areas where the FRID analysis indicates from zero to two missed fire return intervals, it would be likely that prescribed fire could be managed to avoid soil and below-soil temperatures that damage archeological materials. In these areas, prescribed fire would probably not adversely impact archeological resources. However, post-fire survey and fire-effects research is necessary to verify this assumption. It is likely that minor to moderate, long-term, beneficial impacts would result from maintaining more natural fuel loading on archeological sites.

Site Preparation Associated with Managed Wildland Fire and Prescribed Fire (hand line, snagging, mop-up)

Construction of hand lines, removal of snags, and conducting fire mop-up would cause soil disruption and compaction and can therefore adversely impact archeological resources. These activities can also expose archeological sites. The intensity of these impacts would depend upon the nature and significance of the resources as well as the extent of disturbance. Effects would potentially be adverse, long-term, and minor to moderate. These impacts would be avoided or reduced as much as possible through mitigating measures.

Fuel Reduction by Hand or Machine

Aggressive Reduction Techniques. These treatments would not be used in this alternative.

Passive Reduction and Lower Profile Techniques.

Hand Cutting. Hand cutting would reduce unnatural fuel loads in and around archeological resources, and thereby reduce the potential for intense fires that generate soil and below-soil temperatures that damage archeological materials. Cutting would also reduce root encroachment and make sites more visible, making it easier to record them. Therefore, hand cutting would generally result in minor to moderate, long-term, beneficial impacts to archeological resources.

Pile burning. Pile burning, if conducted on archeological sites, would generate intense, localized soil and below-soil temperatures that would potentially damage archeological materials. Therefore, pile burning on sites would result in adverse impacts to archeological resources. The intensity of impact would depend upon the significance of the resources and the types of materials present, but would be potentially adverse, long-term, and minor to moderate. These impacts would be mitigated by avoiding archeological sites during pile burning.

Chipping. The process of creating chips does not involve ground disturbance, therefore impact on archeological resources would be negligible. There are no study data indicating the impacts of distributing chips on archeological sites. However, in order to mitigate any potential impacts, chips would not be distributed on known archeological sites.

Cumulative Impacts

Archeological resources are subject to damage from development, vandalism, visitor access, and natural processes (including fire). For example, tens of sites in Yosemite are considered at risk from existing facility development. At least 12 past, present, and reasonably foreseeable design and construction projects in Yosemite (consisting of facility redesign, road realignments, and utility and bridge replacements) could disturb additional archeological resources.

Several projects under the control of surrounding state or federal agencies or communities include the construction of resort lodging (e.g., the Hazel Green Ranch development, the Rush Creek Guest Lodging project), improvement of transportation facilities (i.e. Evergreen Road Improvement), management of fuels, or management planning for fire and Wilderness. Even though any or all of these could disturb archeological resources by the extensive grading and ground disturbance required to upgrade facilities in archeologically sensitive areas, the impacts on archeological resources cannot be evaluated until resource inventory and design information is available.

This alternative would contribute to the damage and/or loss of some regional archeological resources through burning and post-burn landscape processes, as well as emergency actions associated with catastrophic fire response. Since the most frequent and intense adverse impacts would usually be associated with catastrophic fire and emergency actions, and this alternative would not significantly reduce the potential for catastrophic fire, there is a greater potential for fire-related impacts to archeological resources. Adverse impacts would be mitigated to the extent possible through measures described above. The adverse impacts associated with other past, present, and reasonably foreseeable future projects would be minor to moderate. Considered in combination with impacts to archeological resources from Alternative A, cumulative impacts would be adverse, long-term, and moderate to major.

Conclusion

Implementation of this alternative could result in adverse, long-term, and major impacts to archeological resources mainly due to the high likelihood of future catastrophic fire. Of all fire management situations and treatments, catastrophic fire and high-impact suppression actions result in the most frequent and severe impacts to archeological resources. Depending upon the intensity of burning, the related soil and below-soil temperature, and the post-burn landscape condition, managed wildland fire and prescribed fire would also result in direct and indirect adverse impacts to archeological resources. These impacts would be mitigated to the extent possible (see Methodology, Mitigation Measures). In the areas where a more natural fire regime could be restored and maintained, and buildup of heavy fuels could be avoided, there would be the potential for long-term, beneficial impacts.

Large, high intensity catastrophic fire would potentially affect archeological districts, which would be considered key to the cultural integrity of the park or to opportunities for enjoyment of the park. The effect would potentially be that of impairment.

Ethnographic Resources

Potential for Impacts from Catastrophic Fire

Significant ethnographic resources exist in areas that are at risk from catastrophic fire and emergency fire suppression actions. Therefore, implementation of this alternative would have the potential to result in major, adverse, and short to long-term impacts to ethnographic resources from catastrophic fire.

These impacts would be reduced to the extent possible using measures described under Methodology (Chapter IV). However, consultation with American Indian tribal leaders, traditional practitioners, and elders is critical to identifying these resources and determining the most appropriate treatment. Such consultation is difficult or impossible to achieve in emergencies, and the potential for damage to or loss of significant resources is greater.

Fire Management Treatments

Managed Wildland Fire

Neither the Fire Use Unit or the Conditional Unit, where wildland fire would be allowed to burn, have been inventoried for ethnographic resources and few data exists regarding traditional use by American Indian people. Therefore, the potential for impacts to ethnographic resources is unknown, but the potential for adverse impacts would be low. Continuing a natural fire regime for ecosystem maintenance would likely result in minor to moderate, long-term, beneficial effects, especially in the areas of the Fire Use and Conditional Units, in which there are fewer missed fires. The park is consulting with all park-associated American Indian tribes and groups in order to determine the potential for impacts and the most appropriate mitigating measures. The park would continue to consult with tribal groups as part of the ongoing government-to-government relationship, and would factor new information into fire management planning as it becomes available.

Holding Action and Monitoring Effects (water and retardant drops, helispots, and spike camps). Holding and monitoring actions would have the potential to adversely impact ethnographic resources, typically traditionally used plants. The intensity and duration of these impacts would depend upon the nature and significance of the resources as well as the extent of disturbance, and would potentially be minor to moderate, adverse, and short- to long-term. These impacts would be avoided or reduced as much as possible, through mitigating measures.

Prescribed Fire

The majority of the prescribed fire units have not been inventoried for ethnographic resources. However, since prescribed fires are planned actions, the potential for adverse impacts would be reduced compared to the potential for adverse impacts through either catastrophic fire or managed wildland fire. Reducing heavy fuel loads and reintroducing fire's natural role in ecosystem maintenance would more likely result in minor to moderate, long-term, beneficial effects upon ethnographic resources. However, since prescribed burns would potentially occur outside of natural fire season, the effects could be adverse. As part of the ongoing government-to-government relationship with American Indian tribes, Yosemite National Park would continue to consult with all park-associated American Indian tribes in order to determine the potential for impacts and the most appropriate mitigating measures. The park would factor new information into fire management planning as it becomes available.

Site Preparation Associated with Managed Wildland Fire and Prescribed Fire (hand line, snagging, mop-up)

Construction of hand lines, removal of snags, and conducting mop-up would impact ethnographic resources. The intensity and duration of these impacts would depend upon the nature and significance of the resources as well as the extent of disturbance. These effects would be potentially minor to moderate, adverse, and short- to long-term. These impacts would be avoided or reduced as much as possible through mitigating measures and through ongoing consultation with park-associated tribal groups.

Fuel Reduction by Hand or Machine

Passive Reduction and Lower Profile Techniques.

Hand Cutting. Hand cutting would have the potential to adversely impact ethnographic resources, mainly through damage to traditionally used plants. The intensity and duration of these impacts would depend upon the nature and significance of the resource as well as the extent of disturbance. These impacts would be avoided by either avoiding traditionally used plants, or only thinning during seasons when this action would promote culturally-desired plant characteristics. In areas where inventory data are not available, plants typically used for traditional purposes would be treated the same as known ethnographic resources. As with other aspects of the fire management program, the park would continue to consult with park-associated tribal groups in order to identify and address concerns regarding ethnographic resources. Thus, minor to moderate, beneficial, and short-term impacts would be achieved where possible and the potential for adverse impacts would be reduced or avoided.

Pile burning. Pile burning could be beneficial if the burning was planned as part of the management of a traditional resource. Otherwise, pile burning could damage plants if burning was unintentional or out of season. Therefore, pile burning would result in adverse impacts to ethnographic resources. The intensity and duration of impact would depend on the significance of the resources and the types of materials present. Effects would be potentially negligible to adverse, short-term, and moderate. These impacts would be mitigated by avoiding unintentional pile burns on, or adjacent to, traditionally used plants.

Chipping. There are no study data showing the impacts of distributing chips on or near ethnographic resources. However, in order to mitigate any potential impacts, chips would not be distributed on known ethnographic resources. The effect would therefore, be negligible.

Cumulative Impacts

Ethnographic resources and their traditional cultural associations have been lost or damaged in Yosemite through disruption of cultural traditions and disenfranchisement through government policies and actions, larger societal trends, and past development, visitor use, and natural events. Ethnographic resources have also been lost because of fire and suppression of fire. Nevertheless, Yosemite retains many sites and resources of significance to local and culturally-affiliated American Indians. Five past, present, or reasonably foreseeable management plans and design/construction projects in Yosemite (e.g., facility redesign, utility replacement, and road realignment) have the potential for effect.

Additional projects under the control of surrounding state and federal agencies or communities include construction or expansion of resort facilities such as Hazel Green Ranch and Rush Creek Resort, improvement of transportation facilities, and reforestation and fuels reduction projects. While any or all of these projects could impact ethnographic resources by damaging gathering sites and historic villages or by restricting access to traditional use places, it is not possible to accurately evaluate the nature of impacts without detailed project information which is not now available. However, the trend for potential resource disturbance by these types of undertakings can be expected to continue.

This alternative would contribute to minor to moderate damage and/or loss of some regional ethnographic resources from burning and post-burn landscape processes, as well as emergency actions associated with catastrophic fire response. Since this alternative would not significantly reduce the potential for catastrophic fire, there would be a greater potential for fire-related impacts to ethnographic resources. Adverse impacts would be mitigated to the extent possible. Considered in combination with the adverse, long-term, and minor to moderate effects of present, and reasonably foreseeable future projects, cumulative effects of implementing Alternative A would be adverse, long-term, and minor to moderate.

Conclusion

Implementation of this alternative would potentially result in adverse, short-term, and minor to moderate impacts to ethnographic resources, mainly due to the increasing likelihood of catastrophic fire. Managed wildland fire and prescribed fire could also result in indirect adverse impacts to ethnographic resources, depending upon the timing and intensity of burning. Effects would be minor to moderate, adverse, and typically short-term. These impacts would be mitigated to the extent possible through standard mitigating measures as well as through ongoing consultation with park-associated American Indian tribal groups.

Large, high intensity catastrophic fire would potentially affect ethnographic resources, which would be considered key to the cultural integrity of the park or to opportunities for enjoyment of the park. The effect would potentially be that of impairment.

Cultural Landscape Resources, Including Individually Significant Historic Structures

Potential for Impacts from Catastrophic Fire

Significant cultural landscape resources exist in areas that are at risk from catastrophic fire and emergency fire suppression actions. Vegetation density has increased in some cultural landscapes, affecting their character; efforts to reverse this trend would not be increased under this alternative. Therefore, implementation of this alternative would have the potential to result in major, adverse and long-term effects upon cultural landscape resources from catastrophic fire. These impacts would be mitigated to the extent possible.

Fire Management Treatments

Managed Wildland Fire

Significant cultural landscape resources exist in areas proposed for managed wildland fire. For the most part, they consist of backcountry cabins, camps, historic trails and roads (and their associated features), and other historic structures. Many historic resources were either constructed with wood or contain features of flammable materials. In areas where heavy fuels have accumulated, it is unlikely wildland fire could be managed at a level necessary to avoid damage to cultural landscape resources unless mitigating measures are implemented either before or early in the wildland fire event. In these areas, managed wildland fire would have direct and indirect adverse impacts to these resources. The intensity and duration of these impacts would depend on the nature and significance of the resources, as well as the intensity of burning and the post-burn landscape condition. Effects would be adverse, long-term, and major, if national register properties were lost during fire. However, fire would also contribute to maintaining cultural landscapes, and impacts would be mitigated to the extent possible.

Where the FRID analysis shows from zero to two missed fire return intervals, it would be likely that wildland fire could be managed to avoid adverse impacts to cultural landscape resources. Maintaining a natural fire regime would likely result in minor to moderate, long-term, beneficial impacts to cultural landscape resources by reducing the potential for high-intensity fires.

Holding Action and Monitoring Effects (water and retardant drops, helispots, and spike camps). Holding and monitoring actions would have little potential to adversely impact cultural landscape resources. The intensity of any such impacts would depend upon the nature and significance of the resources as well as the extent of disturbance, but would be potentially minor to moderate, adverse and long-term. These impacts would be avoided or mitigated as much as possible.

Prescribed Fire

Prescribed fire would be lit under specific conditions in pre-determined areas. Thus, the potential for adverse impacts to cultural landscape resources from prescribed fire would be less than with catastrophic fire or even managed wildland fire. However, in areas where fuels have accumulated (areas of three or more missed fires) it might not be possible to manage fire to avoid damage to cultural landscape resources, unless mitigations were implemented prior to burning. Prescribed fire would have direct and indirect adverse impacts to resources. The intensity and duration of these impacts would depend on the nature and significance of the resources as well as the intensity of burning, but would be potentially negligible to adverse, long-term, and minor. These impacts would be mitigated as much as possible.

In areas where the FRID analysis indicates from zero to two missed fire return intervals, it would be likely that prescribed fire could be managed to avoid impacts to cultural landscape resources. Any potential impacts would be avoided by prescribing a target condition for these areas that would protect and enhance cultural resources. Maintaining a natural fire regime would likely result in beneficial, long-term, and minor to moderate impacts to cultural landscape resources by reducing the potential for high-intensity fires.

Site Preparation Associated with Managed Wildland Fire and Prescribed Fire (hand line, snagging, mop-up)

Construction of hand lines, removal of snags, and conducting fire mop-up would have little potential to adversely impact cultural landscape resources. Any such impacts would be adverse, short-term, and negligible, and would be avoided or reduced through mitigation.

Fuel Reduction by Hand or Machine

Passive Reduction and Lower Profile Techniques.

Hand Cutting. Hand cutting would have the potential to adversely impact cultural landscape resources, mainly through inappropriate vegetation removal in cultural landscape or historic site settings. The intensity of these impacts would depend on the nature and significance of the resource, as well as the extent of disturbance. Potentially moderate, adverse, and long-term impacts would be avoided by prescribing a target condition for these areas that would protect and enhance the cultural resource.

Pile burning. Pile burning would have little or no potential to impact cultural landscape resources. Any potential impacts would be avoided by implementing mitigating measures.

Chipping. Distributing chipped material would result in minor, short-term, adverse impact to cultural landscape resources, if the chips were distributed in places where such materials were not compatible with a historic site or setting. This potential impact would be avoided by prescribing chipped-material distribution in a manner compatible with a cultural landscape or historic setting.

Cumulative Impacts

Historic resources at Yosemite have been lost or damaged through past development of facilities and park infrastructure, visitor use, natural deterioration, and natural events such as floods and fires. Rapidly disappearing structures in the region include homestead cabins, barns, road and trail segments, bridges, mining complexes, railroad and logging facilities, blazes, and campsites. These resources are tangible remains of the area's ranching, grazing, logging, and mining history. However, despite past losses and disturbances, Yosemite contains many significant historic structures and cultural landscape resources.

Five past, present, or reasonably foreseeable design and construction projects within Yosemite would potentially affect historic resources. For example, removal of the Cascades Diversion Dam and Happy Isles Bridge would result in the loss of historic resources. Reconstruction of the Mariposa Grove Road would impact the historic landscape resources at the Mariposa Grove of Giant Sequoias and the South Entrance Station. Several projects under the control of surrounding state and federal agencies or communities involve constructing facilities in the vicinity (e.g., new development at Hazel Green adjacent to the historic Coulterville Road). Any or all of these actions would impact historic resources; however, it is not possible to accurately evaluate the nature of impacts without more detailed, site specific project information which is not now available. The trend for potential disturbance of resources by these types of undertakings can be expected to continue.

This alternative would contribute to the damage and/or loss of cultural landscape resources from burning and post-burn landscape processes, as well as emergency actions associated with catastrophic fire response. Since this alternative would not significantly reduce the potential for catastrophic fire, there would be a greater potential for fire-related impacts to cultural landscape resources. Adverse impacts would be mitigated to the extent possible. The adverse impacts associated with past, present, and reasonably foreseeable future projects would be minor to moderate and long-term. Considered in combination with the impacts to cultural landscape resources from Alternative A, cumulative effects would be adverse, long-term, and moderate to major.

Conclusion

Implementation of this alternative would potentially result in adverse impacts to cultural landscape resources, mainly due to the increasing likelihood of catastrophic fire. Of all fire management situations and treatments, catastrophic fire and associated emergency response would result in the most frequent and severe impacts to cultural landscape resources. Managed wildland fire and prescribed fire would also result in adverse impacts to cultural landscape resources. These impacts would be reduced to the extent possible through mitigation (see page 4-11). Because the potential for catastrophic or other high-intensity fires would remain high, this alternative would result in moderate to major, long-term, and adverse impacts to cultural landscape resources.

Large, high intensity catastrophic fire would potentially affect large areas of the cultural landscape, which would be considered key to the cultural integrity of the park or to opportunities for enjoyment of the park. The effect would potentially be that of impairment.

Section 106 Summary

Under regulations of the Advisory Council on Historic Preservation (36 CFR 800.9) addressing the criteria of effect and adverse effect, implementation of this alternative would have the potential to adversely affect significant historic properties. Archeological sites, ethnographic resources, and cultural landscape resources (including historic sites and structures) would likely be adversely affected by high-intensity fires and emergency response actions associated with catastrophic fire. The number and significance of resources that potentially would be affected cannot be projected since inventory and evaluation data are lacking for much of the park. These impacts would be mitigated to the extent possible by some pre-burn inventory for resources of concern, avoiding known resources when feasible, reducing hazardous fuels at significant resources, documentation and protection of significant resources, post-burn inventory and stabilization, and fire-effects research.

Social Environment

Recreation

Potential for Impacts from Catastrophic Fire

Large catastrophic fires would most likely occur in the Suppression Unit and possibly the Conditional Unit, where fires have been and would continue to be suppressed. The relatively small number of acres treated annually with prescribed fire would contribute to the high potential for large and catastrophic fires in these units. This would be especially true in the wildland/urban interface, in which homes and communities, visitor facilities, and park operations buildings are located, and where the most aggressive suppression activities have historically taken place. Several large, catastrophic fires have occurred in the park since 1990, including the A-Rock fire. The park was closed for several days until the A-Rock fire was controlled—thus visitors were affected by being denied access to the park. Under this alternative, the potential for large, catastrophic fire would continue to increase, likely resulting in future park closures and impacts upon all park visitors. Although closures of limited areas would be possible, many closures potentially would be park-wide, thus affecting all park visitors. During closures, the effects will be adverse, short-term, and major. These events would likely occur during peak visitation periods, and over a limited timeframe.

Fire Management Treatments

Managed Wildland Fire

Managed wildland fire would affect recreation in the Fire Use and Conditional Units, most of which is Wilderness. Mainly Wilderness visitors would be affected as local closures and restrictions would affect some trip itineraries and possibly trip quality for some people. Because of this and perceived risks, managed wildland fire would enhance the Wilderness experience for some users, while it would negatively affect the visit for others. Some visitors would be redirected to other parts of the park during closures. However, because visitation is high during peak periods and because of the trailhead quotas that are in place for park Wilderness, some visitors might not be able to take a Wilderness trip or would not be able to access a preferred area. This would be an adverse, short-term, and major effect on a small proportion of park visitors.

The majority of park visitors affected would be affected only by the smoke from managed wildland fires, and this would typically occur when down slope and down-valley winds carry smoke into the basins, generally during night-time and early morning hours. Those affected would mainly be overnight visitors, which would represent over one-third of the visitors to Yosemite Valley, for example. However, smoke would potentially remain in the area throughout the day, affecting visibility of scenic areas (see Scenic Resources, below). These effects on all park visitors would be potentially adverse, short-term, and moderate. Managed wildland fire would be common during the peak season thus smoke effects would potentially impact a large number of visitors.

Holding Action and Monitoring Effects (water and retardant drops, helispots, and spike camps). Many Wilderness users would be sensitive to these actions, particularly when they are used in Wilderness. Helicopter use can be quite intrusive in Wilderness because of noise, visual aspects, and the need to clear spots for safe landings and operations. The adverse and moderate effects of noise and activity would be short-term, while the fire was staffed and/or monitored.

Prescribed Fire

Prescribed fires would continue to be scheduled and managed in ways that limit their effects on visitors. The amount of prescribed fire activity in the No Action Alternative would be the least among the alternatives (approximately 1200 acres treated per year). Effects on visitor activities, including hiking, nature study, and scenic touring, would generally be limited to small-scale closures and restrictions, although visitors would have to recreate outside of the prescribed fire project boundary. Very few people would be unable to partake in their chosen activity, although some would have to go to another part of the park. Smoke would affect a wider area, and thus more visitors, than closures and restrictions. However, because prescribed fires would be ignited only under certain atmospheric conditions, the effects of concentrated smoke would generally be localized. Effects would be adverse, short-term, and minor.

Site Preparation Associated with Managed Wildland Fire and Prescribed Fire (hand line, snagging, mop-up)

Site preparation would rarely influence visitor movements or activities. If chainsaws were in use, areas would be closed off, but visitors would likely avoid the immediate area or stay at some distance because of noise (see Noise, below). Under this alternative, most site preparation would have only negligible to minor, short-term, and adverse effects.

Fuel Reduction by Hand or Machine

Aggressive Reduction Techniques. These treatments would not be used under Alternative A.

Passive Reduction and Lower Profile Techniques.
Hand Cutting. If chainsaws were in use, areas would be closed off and visitors would likely stay at some distance because of noise levels (see Noise, below). Most hand cutting activities would have negligible to minor, short-term, and adverse effects on recreation. Piles of fuels would have the potential to effect scenic quality, but generally, piles would be placed to limit visibility and other effects.

Pile burning. Effects upon activities would generally be limited to small, local scale closures and site restrictions, with most visitors being able to recreate elsewhere, outside of the prescribed fire boundary. Very few people would be unable to partake in their chosen activity, although some would have to go another part of the park. Smoke would affect more visitors than closures, but because the piles would be burned under atmospheric conditions specified by the counties, the smoke effects would generally be minimized. Effects would be adverse, short-term, and minor.

Cumulative Impacts

Past actions that affect recreation would include the development of visitor use facilities in and around the park. These facilities have provided support to visitors in beneficial and long-term ways. Several reasonably foreseeable projects have the potential to provide increases in visitor services and facilities, including Hazel Green Ranch, Rush Creek Guest Lodging and Conference facilities, Evergreen Lodge Expansion, and others. These projects have the potential to provide long-term, and moderate to major benefits to the visitor seeking these services. The effects of past, present and reasonably foreseeable actions upon recreation have been beneficial, long-term, and major. However, the *Draft Yosemite Fire Management Plan/EIS* does not propose to remove, increase or modify visitor facilities, and its major influence would be that of local effects upon recreational experiences, including hiking, nature study, and scenic touring. These impacts of other projects in the region, in combination with the impacts of this alternative, would result in beneficial, long-term, and major cumulative impacts.

Conclusion

In aggregate, the actions of this alternative would have adverse, short-term, and minor effects on recreation, except during large, catastrophic fire events, when closures and other needed actions would result in major, short-term, and adverse effects. There would be no impairment from the effects of this alternative.

Scenic Resources

Potential for Impacts from Catastrophic Fire

Important scenic views in Yosemite Valley and the giant sequoia groves are also Special Management Areas and have been high priority for receiving fire management treatments over the past 30 years. As a result, these are not areas with the highest potential for catastrophic fire. The areas where there is the greatest potential for catastrophic fire would be in suppression areas along the western boundary. Three of the four entrance roads come into the park through the Suppression Unit, and catastrophic fire in this area in recent years has had major impact on scenic quality. The A-Rock and Steamboat fires burned large stretches along both the Big Oak Flat Road and the South Entrance Road, leaving extensive areas of standing dead trees in an open landscape that was formerly forest. The impact of this fire, on scenic quality along these roads, was adverse, long-term, and major. Under this alternative, the potential for more fires of this size and intensity would remain high. If along major road corridors, or near major scenic vistas, on the margins of or in Special Management Areas, the effects would be adverse, major, and potentially long-term.

Fire Management Treatments

Managed Wildland Fire

Wildland Fires would continue to burn approximately 2,567 acres per year, mostly in Wilderness. To some, the effect of managed wildland fire on scenic resources would be seen as adverse, but extreme fire behavior and effects are not common in these areas, so most Wilderness visitors would be see the effects as beneficial and natural. Fire in plant communities that are within their natural range of variability rarely result in extreme events with major effects on scenic quality. The typical effects of fire include blackened bark, caftans on some trees, opening of the understory, cleaning (through burning) of the litter and duff layer, and the scorching of some trees, resulting in scattered kill and opening of the canopy. It is likely that Wilderness users would see these natural effects as beneficial, long-term, and major on a landscape scale.

Holding Action and Monitoring Effects (water and retardant drops, helispots, and spike camps). These actions have the potential to have short-term effects on scenic resources, in the form of evidence of helispots and spike camps. These effects would be local in scale and probably not encountered by most Wilderness visitors. Effects would be adverse, short-term, and minor.

Prescribed Fire

Prescribed fire can be used as a tool to maintain scenic resources, such as in Yosemite Valley and in the giant sequoia groves, and it can also have effects that would be considered potentially adverse to the visitor who infrequently visits parks and natural areas. Fire would continue to be infrequently prescribed as a tool for maintaining open scenic views. This acreage would only be a portion of the 1,442 acres treated per year on average, and most would be in either Yosemite Valley or in the sequoia groves. Some visitors would see the local effects of burning as adverse, but public acceptance of the prescribed fire program has increased to the point that local effects would not typically be seen as adverse. Effects of prescribed burning on scenic resources would be generally beneficial and long-term, but minor, because of the limited number of acres treated.

Site Preparation Associated with Managed Wildland Fire and Prescribed Fire (hand line, snagging, mop-up)

These actions would be visible to visitors within the immediate area of the work, but would not typically be seen within scenic views, when viewed on a landscape scale. Effects would be adverse, short-term, and minor.

Fuel Reduction by Hand or Machine

Passive Reduction and Lower Profile Techniques.

Hand Cutting. These actions would be visible to visitors within the immediate area, but would not typically be seen within scenic views, when viewed on a landscape scale. Effects would be adverse, short-term, and minor. Hand cutting is not currently used as a tool to restore and maintain open vistas in places like Yosemite Valley.

Pile burning. This activity has two potential effects on scenic resources. First, piles of stacked fuels would be visible, potentially within major scenic views. Second, piles once burned would leave a pattern of burned area that would appear unnatural. Both effects would be adverse, short-term, and minor.

Cumulative Impacts

The effects of past and present actions on scenic resources can be seen in Yosemite Valley, which includes visitor and support facilities. Major viewpoints, like Tunnel View, have no visible intrusions, while visitors, traffic, and facilities can be seen from places like Lower Yosemite Falls. These effects are adverse, long-term, and moderate.

Past, present, and reasonably foreseeable actions include timber harvest, fire management and fuels treatment activities outside the park, many of which are on national forest lands. These would include reasonably foreseeable future projects like A-Rock Reforestation, Aspen Fuels Reduction, Orange Crush Fuels Program, Rogge-Ackerson Fire Reforestation, and the Fire Management Plan for Wilderness in Stanislaus National Forest. These actions would cause effects similar to those from fire management actions in the park. Effects would include burned areas, cut stumps, evidence of holding lines, burned area fire rehabilitation work, and others. Some of these effects potentially would be visible from roads. The effects would be adverse to beneficial, long-term, and minor. Considered in combination with the impact of Alternative A on scenic resources, cumulative impact would remain beneficial, long-term, and minor.

Conclusion

Fire management activities would affect scenic resources in generally beneficial ways, through actions that would maintain open vistas and natural forest structure. Effects in the Suppression Unit would be limited by the amount of annual burning and thinning. Overall, these effects would be beneficial, long-term, and minor. This is because of the likelihood of having large, high intensity, catastrophic fires remains high. This alternative would continue to have a high potential for adverse, long-term, and major effects of the type that resulted from the A-Rock Fire. Yosemite Valley is one of the resources specifically identified in the designating legislation for Yosemite. If catastrophic fire were to cause major intrusions into the Valley or into the Mariposa Grove of Giant Sequoia, the effect would potentially be impairment.

Noise

Potential for Impacts from Catastrophic Fire

During catastrophic fires, large fire organizations would be employed to control the fire, as needed. When this occurs, a larger amount of equipment, including helicopters and fire engines, would be used to accomplish fire control objectives. Complex fire operations can extend their activities over large areas, sometimes tens of thousands of acres. Helicopters and chainsaws in close proximity would be the loudest typical equipment, with sounds as loud as 100 dB. These sounds would be uncomfortably loud if nearby. In terms of relative loudness, these sounds would be 128 times as loud as a lower limit, urban daytime ambient noise level of 40 dB (reference loudness). During suppression actions that are brought about because of large, high severity fires, noise effects would be adverse, short-term, and major.

Fire Management Treatments

Managed Wildland Fire

During managed wildland fire incidents, helicopters would be used as needed for reconnaissance, monitoring, and moving people and supplies. At least one flight per day would normally be flown over fires, many of which would be in Wilderness. As fires grew, the reconnaissance area and flight duration would increase as well. Helicopters 100 feet from a person would be as loud as 100 dB, a sound that would be uncomfortably loud. In relative loudness, this would be 128 times as loud as a urban, daytime ambient noise level of 40 dB (reference loudness). This effect would be adverse, short-term, and major. However, the noise would generally affect only a small number of Wilderness visitors, unless operations occurred near populated areas and Wilderness corridors.

Holding Action and Monitoring Effects (water and retardant drops, helispots, and spike camps). The effects of helicopter use, as in water and retardant drops, would be the same as described under managed wildland fire. In the event of a holding action, chainsaws, water pumps and other equipment would be used. Chainsaws have sound levels of approximately 100 dB, or 128 times as loud as the reference loudness of 40 dB. The effect, especially at close range, would be adverse, short-term, and moderate to major

Prescribed Fire

Prescribed fire operations typically occur within a defined project area but do entail noise. Noise would be generated in many of the 25 days it would take each year on an average to complete projects. Fire engines would commonly be used along roads and, in some cases, along burn boundaries. A diesel truck traveling at 40 miles per hour at 50 feet can have sound levels of 80 dB (16 times as loud as reference loudness). Effects would be adverse, short-term, and moderate.

Site Preparation Associated with Managed Wildland Fire and Prescribed Fire (hand line, snagging, mop-up)

The equipment used in building control lines, snagging, and mop-up during these operations would include chainsaws, water pumps, and other equipment. The effect would be adverse, short-term, and moderate.

Fuel Reduction by Hand or Machine

Passive Reduction and Lower Profile Techniques.

Hand Cutting. Chainsaws would be the major piece of equipment used during these operations, which are generally conducted in defined project areas. The effect would be adverse, short-term, and moderate.

Pile burning. The equipment used during these operations would include engines and water pumps. The effects would be similar to that found under prescribed fire above.

Cumulative Impacts

The noise effects of past and present actions are manifest in the soundscapes in places like Yosemite Valley and along major roadways. Vehicular traffic in these areas typically results in sounds that exceed 60 dB at 50 feet. In some locations in Yosemite Valley, such as along Northside Drive and Southside Drive, about 15 noticeable sound events can occur each hour. These effects would continue to be adverse, long-term, and moderate. Past, present, and reasonably foreseeable actions would include fire management and fuels treatment activities outside the park, many of which are on national forest lands. The types of equipment that would be used would be similar to those used in the national park, including helicopters, chainsaws, and water pumps. The noise effects would be adverse, short-term, and moderate to major. Considered in combination with the noise effects of Alternative A, cumulative effects would remain adverse, short-term, and moderate to major.

Conclusion

Fire management activities would continue to introduce noises that have a short-term, adverse, and moderate to major effects on ambient noise levels, especially in wildland/urban interface areas and during large, catastrophic fire events. In Wilderness, helicopter and chainsaw noises would continue to introduce short-term intrusions, with adverse and major effects.

There would be no impairment of the park's resources or values.

Local Communities

Alternative A, as well as the other alternatives considered, has risks and a degree of uncertainty associated with it. The threat of loss from wildland fires is the most important consideration, even though we cannot predict when and where wildland fires will occur. The risk associated with implementing prescribed fire and fuel treatment activity is lower than the threat of wildland fire, even when one considers potential smoke emissions and escaped prescribed fires. Most of the uncertainty in implementing a successful fire management strategy is associated with doing enough fuels treatment in enough places to influence wildland fire in the intended ways.

Potential for Impacts from Catastrophic Fire

The greatest potential for catastrophic fires would be in the Suppression Unit and along the margins of the Fire Use Unit. Aspen Valley, Hodgdon Meadow, El Portal, Foresta, Wawona, Yosemite Village, and Yosemite West are all within or along the Suppression Unit. Forest conditions around each of these communities are among the most altered from fire suppression in the park. In this alternative, catastrophic fire would continue to have the potential to affect these communities through both direct impact (i.e. property loss and damage from fire) and the indirect effects of closures and other actions (i.e. loss of business and associated economic impacts). The 1990 A-Rock fire, which closed the park for 11 days and burned the majority of the homes and buildings in Foresta, is illustrative of the potential impact of an extreme-behavior, wildland fire.

Potential Direct Effects: Under this alternative, the potential for large, catastrophic fire would remain high in and near Aspen Valley, Hodgdon Meadow, El Portal, Foresta, Wawona, Yosemite Village, and Yosemite West. There would be less than 100 acres of fuel treatment accomplishment per year, split among all the communities. At this level of accomplishment, it would not be possible to accomplish restoration objectives, thus the risk of catastrophic fire would remain high. In the event of a wildland fire exhibiting extreme behavior in these communities, the impact could be great. During the A-Rock Fire in 1990, 70 homes and other buildings and 14 vehicles in Foresta were destroyed by fire; only 18 buildings and five vehicles were left intact. This impact was adverse, long-term, and major. Similar effects would be expected in any of the other communities in the event of an extreme fire event. Potential direct effects from catastrophic fire in wildland/urban interface would include adverse, long-term, and major impacts.

Potential Indirect Effects. Potential Indirect effects would include loss of revenue in both local and regional communities, because of the closures associated with catastrophic fire. This would include loss of business activity in the gateway communities and in the park. Lost would be business at lodging, restaurants, gift shops, and various services in gateway communities and in the park. Because of the potential for catastrophic fire in the Suppression Unit, the likelihood of having fire-related closures during the life of the plan would be high. During and following the Yosemite flood of January 1997 when the park was closed, economic impacts were estimated at an average of about $32 of lost expenditures per visitor, per day of closure. Assuming a worst case scenario of an 11 day total park closure during the peak season month of August, the economic impact would be in excess of $13 million in lost visitor expenditures in the five county area. The estimate of impact, by county is included in table 4.7. Part of these lost expenditures would be losses to county tax receipts. The greatest impact would be in Mariposa County where the loss of motel tax alone could be greater than $200,000 for an 11 day period.

Table VI.7
Estimated Distribution of Impacts upon Visitor Expenditures, by County

Worse case scenario of an 11 Day Total-Park Closure, as a Result of Large, Catastrophic Fire

County	Expenditures
Madera County (11.3% of expenditures)	$ 1,619,519
Mariposa County (56.2% of expenditures)	$ 7,613,028
Merced County (5.2% of expenditures)	$ 745,266
Mono County (18.6% of expenditures)	$ 2,665,757
Tuolumne County (8.7% of expenditures	$ 1,246,886
Total for the five counties	$ 13,890,456

Notes: Based on 37% park overnight stays, 40% local overnight stays, and 23% day use, and $45.5 per day for park overnighters, $28, 32 per day/per person for local overnighters, and $11.02 per day/per person for day users, and using 1997 dollars. Analysis based on information in: Duffield, et al 1997.

Although severe impacts would result under this scenario, a closure of this length would not likely bring about a change in social and economic environments in the five counties. Major effects would likely include short-term job loss (or reductions in hours worked) and reductions in personal income, the impact of which would be highly variable. Overall, a closure of this duration would have adverse, short-term, and moderate effects. (Note that some fire personnel would use hotels and other local services, lessening these potential effects.)

Fire Management Treatments

Managed Wildland Fire

Wildland fires would be managed in the Fire Use Unit to accomplish resource management objectives of restoring fire to ecosystems while protecting a variety of resource values. There would be risk associated with these fires, including possible escape and extreme fire behavior. However, managed wildland fire in plant communities that are within their natural range of variability would rarely present a threat of escape and property damage or loss. The effects of managed wildland fire that would more typically occur would be smoke-related impacts on local and regional communities. Smoke can affect health, visibility, or both. Because particulates in smoke can have health effects, the park would use a communication strategy to inform communities of smoke events (Appendix 4). Second, smoke can affect scenic views and the quality of the visitor experience. It is possible that some visitors would decide not to visit Yosemite because of a fire, but the numbers would not likely be large. The effects of managed wildland fire on communities would be adverse, short-term, and negligible.

Holding Action and Monitoring Effects (water and retardant drops, helispots, and spike camps). Holding actions and monitoring do not typically affect local communities. However, there is always risk associated with fire management actions, and in the event of a failed holding action, the worst case effects would be the same as described under catastrophic fire, above.

Prescribed Fire

Prescribed fire would be one of the tools used to reduce risks associated with fire in and near the wildland/urban interface (Aspen Valley, Hodgdon Meadow, El Portal, Foresta, Wawona, Yosemite Village, Yosemite West, and others). Under this alternative, approximately 1,442 acres would be burned in the park in an average year. Some of this would be to reduce risks in wildland/urban interface areas, but much of the work would be to accomplish restoration objectives and to maintain Special Management Areas, including giant sequoia groves. With the small amount of wildland/urban interface treatment that would be done annually, risk of fire to communities would not be reduced during the life of the plan.

Only about 100 acres or less of thinning would occur in this alternative. Because of this, it is doubtful that prescribed fire would effectively reduce risks in some areas. Prescribed fire in some areas (such as around Yosemite West), when applied under controlled conditions but not in combination with mechanical treatments, would not be effective at restoring forest community structure. The likelihood of being able to suppress all fires in wildland/urban interface areas would decrease further over time as forests continue to accumulate fuel. Considering the impacts of catastrophic fire to wildland/urban interface areas, the effects of prescribed fire would be locally beneficial, but overall, the risk of wildland fire would remain high. The effects of prescribed fire would be beneficial, long-term, and minor to moderate.

Prescribed fire use in wildland/urban interface areas would impact residents through smoke and site closures. During prescribed fire activities, residents and visitors would be affected through localized safety closures and equipment noise. Smoke would effect all down-wind locations in the area but most areas of the park would be unaffected. Some residents would have concerns about the smoke, while others would want the work to move forward, to provide the fire protection and ecosystem restoration benefits. Overall, these effects upon local communities would be adverse, short-term, and minor.

There are risks and uncertainty associated with implementing a successful fire management strategy that includes prescribed fire. The program attempts to do enough fuels treatment in enough places to influence wildland fire in the intended ways. The risks associated with prescribed fire and fuel treatment activity is lower than risks from wildland fire, even when one considers potential smoke emissions and escaped prescribed fires.

Site Preparation Associated with Managed Wildland Fire and Prescribed Fire (hand line, snagging, mop-up)

These actions would not have socio-economic effects upon communities.

Fuel Reduction by Hand or Machine

Passive Reduction and Lower Profile Techniques.

Hand Cutting. Less than 100 acres of thinning would occur in wildland/urban interface areas. Though locally effective, the small number of acres treated would limit the overall effectiveness of reducing the risk of catastrophic fire. It would not be possible to bring wildland/urban interface areas back to within target conditions during the life of the plan, except on a limited, local basis. The potential for large, high-intensity wildland fires would continue to increase. Effects would be beneficial, long-term, and minor.

Pile burning. The effects of pile burning would be similar to prescribed fire effects.

Cumulative Impacts

Many projects, proposed or on-going, in the five county area would affect local communities. These projects include new lodging and visitor service projects, utility and infrastructure projects, and other projects dealing with fire, fuels, and vegetation management. Examples of reasonably foreseeable future projects that could have an effect upon visitation within the local communities include Evergreen Lodge expansion in Tuolumne County, Hazel Green Ranch in Mariposa County, Rush Creek Guest Lodging and Conference Facilities in Tuolumne County, Yosemite West Thirty-One Acre Bed and Breakfast in Mariposa County, and Yosemite Motel's proposed development in Mariposa County. These projects would provide additional facilities for visitors.

The Yosemite Motels project, for example, would add 141 new motel units, creating new hotel tax revenues and potential spending impacts from increased visitation. An additional 141 new lodging units would allow for approximately 98,000 additional visitor overnight stays per year. These additional stays would generate a net gain of approximately 5.3 million dollars per year in total (direct and secondary) visitor spending—a beneficial, long-term, and minor impact on the local economy. If new visitors are attracted to the region by the increase in lodging capacity, visitor-spending growth would be higher and the impact would be greater.

Whereas these projects would potentially bring about increases in visitation and spending growth, closures during periods of catastrophic fire would bring about short-term decreases in both visitation and spending. Considered in combination with the long-term, minor, and beneficial economic impacts of new development in the communities, the impacts of infrequent closures under Alternative A would remain adverse, short-term, and moderate.

Fire management-related projects would include A-Rock Reforestation, Aspen Fuels Reduction, Orange Crush Fuels Program, Rogge-Ackerson Fire Reforestation, the Fire Management Plan for Wilderness in Stanislaus National Forest, and others. These actions would result in effects similar to fire management activities in Yosemite, with the same types of risks. These actions would potentially reduce risks of catastrophic fire and restore resources on and near the boundaries of Yosemite. The long-term, beneficial, and moderate effects of these actions, considered in combination with the impacts of Alternative A, would result in cumulative effects in Yosemite's wildland/urban interface areas that would potentially be adverse, long-term, and moderate to major.

Conclusion

Because the potential for catastrophic fire remains high in this alternative, the risk in Alternative A for direct effects (loss of property during fires) and indirect effects (loss of business during fire-related closures) is highest among the alternatives. This is because the amount of prescribed fire and fuel treatment is not adequate to restore park forests to target conditions, especially in the Suppression Unit. As a result, the overall effect of this alternative is beneficial, long-term, and minor.

Environmental Justice

Yosemite Village, El Portal, and Hodgdon Meadows have high proportions of federal and/or concession employees. Foresta, Wawona, and Yosemite West also have residents who work for these employers, but like Aspen Valley, also have a high proportion of residents who do not work in the park—many have other residences as well. The property values vary between areas.

These communities, like the Sierra Nevada region as a whole, have a larger proportion population of Caucasians than both the state on the whole and the communities just outside the region in the San Joaquin Valley. The proportion of American Indians for the five county region is higher than the statewide population proportion.

Although the average property values vary among these wildland/urban interface areas, fire management activities have not targeted one or more of the wildland/urban interface areas as more important than others. Any differences in activity time and effort are reflective of the complexity of the work required in each area. Prescribed fire and thinning activities have historically been conducted in Aspen Valley, El Portal, Hodgdon Meadows, Foresta, Wawona and Yosemite Valley. In the last 2 years, cooperative, interagency prescribed fire activities have also been conducted Yosemite West. Under this alternative, the work would continue to focus on the most immediate risks associated with each of the wildland/urban interface areas. In that risks in each of the communities would be targeted, the effects upon minority and low-income populations in those communities would be beneficial, long-term, and minor, as are effects described under Local Communities above.

Cumulative Impacts

Cumulative effects would be the same as described under Local Communities above.

Conclusion

Prescribed fire and fuel treatment would be focused on the immediate risks associated with each of the wildland/urban interface areas. The effects upon minority and low-income populations in those communities would be beneficial, long-term, and minor.

Special Designations

Wild and Scenic Rivers

The Wild and Scenic River Act of 1968 requires agencies to protect and enhance the outstandingly remarkable values (ORV) of Wild and Scenic Rivers in Yosemite National Park and the El Portal Administrative Site. Chapter V discusses the potential for achieving this end, in light of the actions proposed in the *Yosemite Fire Management Plan*. Impacts of this alternative on river related attributes are discussed in the representative sections (for example, in watersheds, water quality and soils; plant communities and fire ecology; etc.).

Wilderness

Potential for Impacts from Catastrophic Fire

Catastrophic fire is most likely to occur in the western portion of the park, in areas that are within the Suppression Unit, and along the western margins of the Fire Use and Conditional Unit. Much of this area is not Wilderness, but fires in this area have the potential to spread into Wilderness, and affect Wilderness values. Catastrophic fires like the A-Rock Fire potentially would burn extensive areas, affecting natural resources, and possibly moving them beyond the lower limits of their natural range of variability, for plant composition/diversity, community structure, and fuel loading. The effect of these operations on wildness could be adverse, long-term, and moderate, but the effect of catastrophic fire on naturalness would have the potential to be adverse, long-term, and major.

Fire suppression operations used to control these fires would typically include helicopters, chainsaws, and other equipment. These would be used as determined by a minimum tool analysis documented in the Fire Management Plan. Prescribed fire and wildland fire used for resource benefits would also affect Wilderness values and users, although on a much smaller scale than the effects resulting from suppression operations on catastrophic fire. In the long-term, the increased naturalness of the area due to the restoration and maintenance of a more natural role of fire would be a major benefit.

Fire Management Treatments

Managed Wildland Fire

Wildland fires would continue to burn approximately 2,567 acres per year, mostly in Wilderness. Fire in Yosemite plant communities that are within their natural range of variability would rarely result in extreme events with major effects. The typical effects of fire include blackened bark, catfaces on some trees, opening of the understory, clearing the forest floor, and the scorching of some trees—resulting in scattered kill and opening of the canopy.

As with all alternatives in the EIS for the FMP, helicopters would be used for reconnaissance, monitoring, and movement of people and supplies. Chainsaws would be used during holding actions; these would affect Wilderness character on in the short-term. Holding actions would generally be limited to instances in which fire policy or air quality regulations require such actions.

Holding actions may include water and retardant drops, construction of handline, spike camps, and helispots. Such actions will be guided by the minimum tool and minimum impact management technique philosophies. While the visual effects of the constructed handline are often in remote areas, the rare visitor to these areas have a high expectation of pristine conditions.

It is likely that Wilderness users would see the natural effects of fire as beneficial, long-term, and major on a landscape scale, and the effects of equipment use on the Wilderness experience as adverse, short-term, and minor to moderate.

Re-ignition clause. Re-ignition would not be used on this alternative.

Holding Action and Monitoring Effects (water and retardant drops, helispots, and spike camps). These actions have the potential to have short-term effects on Wilderness quality. These effects would include evidence of helispots and spike camps, and would be generally local in scale and encountered by few visitors to the backcountry. Effects would be adverse, short-term, and minor.

Prescribed Fire

Prescribed fire can be used as a tool to restore Wilderness resources. Approximately 1,442 acres would be treated with prescribed fire each year. Most of this would occur outside of Wilderness, as needed to accomplish other objectives (for wildland/urban interface and Special Management Areas, for example). Targets related to maintenance would be used in most of the Wilderness. Where prescribed fire is needed to achieve restoration targets, the effect would be beneficial, long-term, and moderate to major.

As with all the alternatives in the FMP/EIS, past fire suppression and logging have compromised both the Wilderness and naturalness of the western forests of the Yosemite Wilderness. The beneficial effects of restoring natural conditions and natural fire to an area that is otherwise at risk for unnatural, large scale catastrophic fire are long-term and major. The effects on Wilderness experience are largely the same as for wildland fire used for resource benefits, although the expanded burning season associated with prescribed fire means that the short-term effects, such as smoke, will be present for more of the year.

Site Preparation Associated with Managed Wildland Fire and Prescribed Fire (hand line, snagging, mop-up)

Minimum impact management techniques (MIMT) are used in Wilderness. However, impacts from site preparation would be visible to visitors within the immediate area. This would diminish the Wilderness character of the area, through the evidence of human activities. Other than stumps cut flush with the ground and other visible saw cuts, which would be apparent, most effects would be adverse, short-term, and minor. Debris would be scattered to reduce visual effects in Wilderness, and handlines would be obliterated.

Fuel Reduction by Hand or Machine

Aggressive Reduction Techniques. Would not occur under this alternative.

Passive Reduction Techniques.

Hand Cutting. These actions would be visible to visitors within the immediate area, but would not typically affect views on a landscape scale. Effects would be adverse, short-term, and minor.

Pile burning. This activity would have two potential effects on Wilderness resources. First, piles of stacked fuels would be visible, and would potentially diminish the Wilderness character of the area. Second, piles once burned would leave a patch of burned area that would appear unnatural. Both effects would be adverse, short-term, and minor.

With regard to Wilderness areas within Yosemite, these activities would be limited to the Wilderness area in the Wawona WUI in which prescribed fire is determined to be unsafe to use because of the proximity of private structures. Tools used in this area would be determined via the minimum tool analysis documented in the FMP. It is expected that following the mechanical removal of hazardous fuels, prescribed fire will be used to the extent practical to maintain fuel loads within target conditions.

Cumulative Impacts

Notable ecological manipulation has occurred in the Yosemite Wilderness, resulting in a significant effect on both wildness and naturalness. In addition to Native American burning and historic fire suppression already noted, large areas of the western part of the park, including part of the Wilderness, were logged in the early part of the 20th century. The Civilian Conservation Corps burned much of the slash from this logging, which reduced fuel loads, but species composition and structure were changed considerably.

Other manipulation included 19th century grazing and burning by euro-americans, fish stocking, killing of predators such as the California Grizzly, spraying of insects such as needle-miner moth, and attempted eradication of plant species such as gooseberries and poison oak. Recently, managed wildland fire and prescribed fire have had a significant effect. Ecological changes caused by fire suppression are not realized by most visitors, although the effects of major wildfires are noticed by many visitors.

The effects of past and present recreational actions on Wilderness are seen in trails, bridges, primitive structures, and campsites. These facilities have the potential to diminish the Wilderness quality to some visitors, but most depend on many of these features and tolerate their presence. Overall, their effects are adverse, long-term, and minor.

Past, present, and reasonably foreseeable actions include fire management and fuel treatment activities outside the park, many of which are national forest lands. These would include A-Rock Reforestation, Aspen Fuels Reduction, Orange Crush Fuels Program, Rogge-Ackerson Fire Reforestation, and the Fire Management Plan for Wilderness in Stanislaus National Forest. These actions would result in evidence similar to that left by fire management activities in the park—burned areas, cut stumps, rehabilitated holding lines, burned area rehabilitation work, and others. Some of these impacts would be within Wilderness. The effects would be beneficial, long-term, and moderate to major on Wilderness values.

These effects, considered in combination with the effects of Alternative A, would result in the cumulative effects on Wilderness would be beneficial, long-term, and moderate.

Conclusion

Fire management activities would affect Wilderness character in generally beneficial ways, through actions that would maintain plant communities within their natural range of variability, and thus maintain Wilderness values, especially in the Fire Use and Conditional Units. Effects in the Suppression Unit would be limited by the amount of annual fuel treatment accomplishment. Because of the likelihood of having large, high intensity, catastrophic fires that could spread into Wilderness, this alternative would continue to have a high potential for adverse, long-term, and major effects of the type that resulted from the A-Rock fire. In Wilderness, helicopter and chainsaw noises would continue to introduce short-term, intrusions, with adverse and minor to major effects.

Adverse effects on Wilderness due to the restoration of prescribed and wildland fire are outweighed by the greater benefit of returning ecosystems to a more natural condition. Overall, these effects would be beneficial, long-term, and minor to moderate. Large, high intensity catastrophic fire would effect large areas of Congressionally designated Wilderness, which is key to the natural integrity of the park and to opportunities for enjoyment of the park. This would result in adverse, long-term, major effects. The effect would potentially be that of impairment.

Energy Consumption

The energy consumption associated with fire management activities is difficult to calculate, because of the great number of variables involved, including the size and complexity of projects. Fire management activities, including monitoring managed wildland fire, prescribed fire, and hand thinning are considered in the analysis; emergency fire suppression and administrative activities are not.

Engine fuel is consumed by equipment during managed wildland fire. Aircraft, generally a helicopter, is used to monitor the fire on a daily basis, and to provide reconnaissance to anticipate fire movements. During prescribed fire operations, fuel is consumed by drip torches, engines, water tenders, and chainsaws (the latter during site preparation work). Occasionally, aerial ignition devices are used, which require the use of a helicopter. During these kinds of projects, engine crews, water tenders, ground crews with drip torches, and site preparation are still involved. Estimates of fuel consumption are shown in table 4.8. For this analysis, it was estimated that prescribed fire would burn an average of 1,442 acres per year, generally ignited by drip torch.

Cumulative Impacts

Energy is used in many park operations. For the proposed action for the *Yosemite Valley Plan* alone, projections included an estimated reduction of 1,341,800 gallons of gasoline consumption per year, and an increase of 335,500 gallons of diesel fuel consumption (a total of 549,300 gallons of diesel fuel consumption per year by year 2015). Combined, these values represent a decrease of 1,006,300 gallons of fuel consumption per year. After this reduction, the total level of fuel consumption would be approximately 1,688,300 gallons per year, a moderate, long-term, beneficial impact. The impact of the amount of fuel consumed during fire management activities at Yosemite National Park would be adverse, long-term and negligible. The cumulative effects would remain beneficial, long-term, and moderate.

Conclusion

Energy would be consumed during fire monitoring and reconnaissance, prescribed fire operations, and fuel reduction activity. Typically, more than 9,000 gallons of various fuels would be consumed per year. The effects of the program's energy demand would continue to be adverse, long-term, and negligible.

Table IV-8
Projected Energy Consumption Under Alternative A

Fire Management Treatment	Acres Treated per year	Equipment Used	Treatment Rate or Equipment Use	Fuel Use Rate	Fuel Use
Managed Wildland Fire	2,567 in 19 fires per year	Aircraft (helicopter used in recon flights)	1 hour per recon flight; 96 recon hours per year (3 year average).	60 gallons of fuel per hour	5,760 gallons of fuel
Prescribed Fire [a]	1,442 acres, in 10 prescribed fires.	a) Drip Torches; and [OR Aerial ignition device (ignition balls and helicopter time)]	Approx. 1 acre per hour per torch, 8 acres per day in an 8 hour shift. [OR in aerial ignition, approx. 150 acres per day by aerial ignition; 2 hours flight time per day.]	Approx. 2 gallons per acre burned. [OR approx. one box (1000 balls) per 150 acres, plus 60 gallons of fuel per hour of flight time, plus ground crews.]	2,884 gallons of drip torch fuel [OR 7000 ignition balls, with approx. 840 gallons of aviation fuel; plus approx. 200 gallons drip torch fuel for ground crews.]
		b) engines	2 to 4 engines plus 1 water tender per day (3 on average), for an average of 25 days per year; 12 hour shifts.	8 miles per gallon diesel fuel, at least 50 miles out and back to station per vehicle per day.	469 gallons of diesel fuel.
		c) Chainsaws (used in prep work, on approx. 85 project acres).	Crew of saws can treat 5 acres per day.	2 gallons per day per saw; 10 gallons per crew per day.	170 gallons
		d) Chipper	Crews can treat 5 acres per day	10 gallons per day. (20 days max.)	200 gallons
Hand Cutting	100	Chainsaws	Crew with 5 saws can treat 5 acres per day.	2 gallons per day per saw; 10 gallons per crew per day	200 gallons
Total: 9683 gallons of various fuels					

a Total fuel includes drip torches, chainsaws, and trucks, not aerial ignition technique

Sustainability and Long-Term Management

Relationship of Short-Term Uses and the Maintenance and Enhancement of Long-term Productivity

This alternative would not result in new development, thus it would not take lands out of productivity as natural ecosystems. However, fires would continue to be suppressed, mostly in the Suppression Unit and to a lesser extent in the Conditional Unit. This would allow forest structure to continue to change and fuel load conditions to increase. This would be particularly true in upper and lower montane forests. This would not likely reverse under this alternative, because of the limited amount of prescribed fire project work that would be completed annually (1,442 acres per year, on average). The effects, as described under Vegetation, would include type conversion (change over time to a different vegetation type and fire regime) and other ecosystem effects. Over the long-term, there is great potential for extensive areas to be taken by catastrophic fire into early seral stages, a long-term and adverse effect. Evidence of this potential effect is the impact of the A-Rock Fire.

Irreversible or Irretrievable Commitments of Resources

This Alternative would have the highest potential of large, catastrophic fire. The trend has shown that in Yosemite and surrounding areas high-intensity fires are more frequent than they were in the past. The fire history of the park indicates that, until recently, Yosemite National Park did not sustain fires of the size of the A-Rock. In the 1990's, the park had three large, high-intensity fires: A-Rock, Steamboat, and Rogge-Ackerson.

The effects of the A-Rock Fire were long-term, adverse, and major, and represent, in a relative sense, an irretrievable commitment of resources. Under Alternative A exists the highest potential for having more fires of this intensity, because of the limited amount of fuel treatment and prescribed fire, particularly in the Suppression Unit. Future fires of this size and intensity would likely have irretrievable effects.

The giant sequoia groves would continue to be focus of fuel treatments and prescribed fire, as they have in the past. This has assisted in protecting them, but they have remained at risk, and, allowing surrounding areas to continue to degrade would increase this risk over time. The loss of the Mariposa Grove of Giant Sequoia would be considered an irretrievable loss of resources, and represent impairment, under the definition in National Park Service Management Policies 1.4.5

If burned during catastrophic fire, historic resources would be irreversibly and irretrievably lost since one cannot be reconstructed, only replaced by a similar structure which would lack the significance and integrity of the original.

Effects of managed wildland fire in the Fire Use and Conditional Units upon wildlife and other park values would not generally be considered irreversible or irretrievable, in that their effects would typically be within the natural range of variability for park ecosystems and wildlife habitat, and would be short-term. Habitat would typically become suitable to wildlife relatively quickly.

Under Alternative A, no irreversible and irretrievable commitments of resources would be associated with air quality.

Adverse Impacts that Could Not be Avoided if the Action Were Implemented

As discussed above, it would be likely that the effects of large, high intensity catastrophic fire could not be avoided, considering the amount of prescribed fire and fuel treatment work that would occur under this alternative. Treatments would attempt to restore plant community structure and reduce the risk of catastrophic fire. Implementation of this alternative would reduce the potential for adverse effects, but only in areas receiving treatment. The amount of work proposed would not be enough to restore park ecosystems. The potential for adverse effects would be greatest in upper and lower montane forests.

Generally, Alternative A would continue the practices of recent years, which would not meet the park's natural resources management objective of returning the park to its natural background conditions for air quality. The continuing risk of wildland fires consuming areas of high fuel loadings would have the attendant effect of continuing major, adverse impacts on air quality.

Alternative B – Aggressive Action

Biological Environment

Vegetation and Fire Ecology

Potential for Impacts from Catastrophic Fire

Subalpine Forests. Vegetation in this group shows no departure from the normal fire return interval (table 2.1). This indicates that the stand structure and composition and fuel loads are within the natural range of variability. Potential for catastrophic fire is low. Since 1930, the largest fire in these forests was only 773 acres. Because of the increased capability for managed wildland fires than under the No Action Alternative, under Alternative B the amount of subalpine forest burned could increase. Thus, the effects of Alternative B on subalpine forests would be beneficial, short-term, and minor.

Upper Montane Forests. Vegetation in this group shows moderate to high departures from the median fire return intervals (table 2.1) and only about 25% of them are within one return interval of normal. About 75% of the red fir forest and montane chaparral have moderate departures. Western white pine/Jeffery pine forests show larger departures from normal—about 70% of them have missed four or more fires. The structure and composition of these forests now includes higher densities of small, shade-tolerant species so that fuel loads are higher than the natural range. Chaparral has been reduced in size and extent.

Under natural conditions, large stand replacing fires occasionally burn these forests, however, existing vegetative conditions would cause larger and higher-intensity fires. Under Alternative B, the focus on managed wildland fires could increase the area burned in upper montane forests. It also might increase because of the 36% increase of upper montane forest in prescribed fire units compared with the No Action Alternative. However, less than 20% of this group would be burned through prescribed fire so the potential for catastrophic fire would remain high. In general, the potential to restore areas under this alternative would be greater than under Alternative A, thus a decrease in intensity from major to moderate. The effects of Alternative B on upper montane forests would be adverse, long-term, and moderate.

Lower Montane Forests. Vegetation in this group shows moderate to high departures from the median fire return intervals (table 2.1). About 50% of these forests are within two median fire return intervals of natural due to an active prescribed fire program. At the same time, about 50% of these areas are three or more return intervals from normal and some have extremely high departures from the median fire return interval. Of the ponderosa pine/bear clover forest, 36% has missed 17 median return intervals. Fire exclusion has changed these forests from being relatively open, to forests with understories of dense thickets of shade-tolerant tree species at the higher elevations and dense shrub at lower elevations. The structure and composition is considerably outside the natural range of variability. Ponderosa pine/mixed conifer and ponderosa pine/bear clover are undergoing a vegetative type change to white fir/mixed conifer forest. Fire exclusion has significantly increased fuel loads and the potential of catastrophic fire. While large stand replacing fires have occurred historically, under current conditions fire would have much greater intensity and be larger in size and extent than under the natural fire regime. Fire burning in these conditions would alter gap distribution and the vegetative mosaic as well.

By maximizing managed wildland fire, the number of acres burned in lower montane forests could increase under Alternative B. Additional treatment would come from placing 50% more of the lower montane forest into prescribed fire units, compared with the No Action Alternative. The new prescribed fire units would include about 75% of all lower montane forests, and would significantly increase the number of acres that would be restored. Therefore, the potential for catastrophic fire would remain high initially, but would be significantly reduced over time as prescribed burns and managed wildland fire brought these areas into the range of natural variability. The potential to restore significantly greater amounts of forest would be greater than under Alternative A. The effects of Alternative B on lower montane forests would be beneficial, long-term, and major.

Meadows. Vegetation in the dry montane meadows shows high departures from the mean fire return interval (table 2.1). Almost 80% of the area has missed four or more fires. Many meadows in Yosemite are severely encroached upon by conifers and have significant amounts of Kentucky bluegrass and other non-native, cool season grasses. In Yosemite Valley, the hydrologic regime in meadows have been altered. Fuel loads are higher than natural because of conifer encroachment and the lack of fires. Fire exclusion has significantly increased the potential for catastrophic fires in surrounding forests. Maximizing managed wildland fire in Alternative B would increase the number of acres burned in the park. The new prescribed fire units would include about 50% of all meadows. Compared with the Alternative A, there would be about a 60% increase in meadows put into prescribed fire units, which would increase the number of acres that would be restored. Therefore, the potential for catastrophic fire would remain high initially, but would be reduced as the use of prescribed and managed wildland fire brought these areas into the natural range of variability. The potential to restore larger areas under this alternative would be greater than under Alternative A. Thus, the effect of Alternative B on meadows would be beneficial, long-term, and moderate.

Foothill Woodlands. Vegetation in the foothill woodlands shows low to moderate departures from the mean fire return interval (table 2.1). Most of the areas in this type were burned in several large wildland fires during the 1990s. Cheatgrass and other non-native annual grasses have invaded much of the foothills woodlands. High-severity or catastrophic fire are typical fire behaviors for this group, due to the establishment of non-native species. Compared with the No Action Alternative, maximizing managed wildland fire in Alternative B could increase the acres burned while additional treatment would come from about a 25% increase in the amount of foothill woodlands included in prescribed fire units. The new prescribed fire units would include more than 75% of all foothill woodlands and thus would increase the number of acres restored. Based on the increased area of treatment, and potential restoration of native vegetation cover, the effect of Alternative B on foothill woodlands would be beneficial, long-term, and moderate.

Fire Management Treatments

The Aggressive Action Alternative would focus on managed wildland and prescribed fire while allowing the full array of fuel reduction and site preparation techniques, mainly aggressive reduction techniques, in wildland/urban interface areas and along road and utility corridors.

Managed Wildland Fire

Subalpine Forests. Ninety-nine percent of subalpine forest occurs within the Fire Use Unit. Maximizing managed wildland fire in this alternative would increase the amount of subalpine forests. However, because of the small amount of total acres that would burn in this group, the effects of Alternative B would be the same as under Alternative A—beneficial, long-term, and minor.

Upper Montane Forests. Ninety percent of upper montane forest would be in the Fire Use Unit. This would be 5% less than in the Fire Use and Conditional Units under Alternative A. It is expected that managed wildland fire would have a beneficial, long-term, and major effect in the areas that burn. Maximizing managed wildland fire in this alternative would increase the acres burned when compared with Alternative A. Due to the increase in area treated, the overall effect of Alternative B on managed wildland fire in upper montane forest would be beneficial, long-term, and moderate.

Lower Montane Forests. About 35% of lower montane forests would be in the Fire Use Unit. This would be 5% less than in the Fire Use and Conditional Units under Alternative A. It would be expected that managed wildland fire would have a beneficial, long-term, major effect in the areas that burn. Maximizing managed wildland fire in this alternative would increase the acreage burned compared to the existing program. Compared to Alternative A, the overall effect of managed wildland fire on lower montane forest would be beneficial, long-term, and moderate, due to the increase in area treated.

Meadows. About 60% of dry montane meadows would be in the Fire Use Unit, the same as in Fire Use and Conditional Units under Alternative A. Maximizing managed wildland fire in this alternative would increase the number of acres burned compared to Alternative A. Overall, the effect of managed wildland fire on meadows in Alternative B would the same as under Alternative A—beneficial, long-term, and moderate.

Foothill Woodlands. About one quarter of foothill woodlands would be in the Fire Use Unit, the same as is in Fire Use and Conditional Units under Alternative A. Maximizing managed wildland fire in this alternative would increase the number of acres burned compared to Alternative A. Overall, the effect of managed wildland fire in foothill woodlands under Alternative B would the same as under Alternative A—beneficial, long-term, and minor.

Re-ignition clause. While the effects of re-ignition might differ slightly from one vegetation type to another, the general effects of and concerns for re-ignition are similar, thus, all vegetation groups will be analyzed together. Re-igniting forests during the normal fire season would be expected to have the same effects on vegetation as managed wildland fire. When re-ignition was done in the *shoulder season* (just before or just after the normal fire season, when fuels contain more moisture, temperatures are cooler, etc.), there would be the potential for adverse effects on vegetation although the overall effect of these burns would be expected to be beneficial. The impacts of shoulder season burns are hard to quantify and need more research, but generally speaking, the effects would be the same as described for prescribed fire. To mitigate effects, re-ignitions would be carried out within the target condition for season of burn (table 2.4); this would significantly reduce the potential for adverse effects. The re-ignition clause would significantly increase the number of acres treated and would reduce the potential for catastrophic fires compared to Alternative A. The overall impact of re-ignitions on vegetation would be beneficial, long-term, and moderate to major.

Holding Action and Monitoring Effects (water and retardant drops, helispots, and spike camps). The effects of holding actions and monitoring are expected to be similar for all vegetation types, so the vegetation types will be grouped for this analysis. Due to the increased use of prescribed and managed wildland fire, it is expected that impacts from holding actions and monitoring would affect more areas than under Alternative A. However, the overall effect of water and retardant drops on vegetation would remain the same—adverse, short-term, and minor. The effects of helispots and spike camps on vegetation would also the same as under Alternative A—-adverse, short-term, and negligible.

Prescribed Fire

Prescribed fire would typically be used in restoration of areas where the fire return interval is three or more fires out of cycle, or to maintain target conditions in areas within the Suppression Unit or along the margins of the Fire Use Unit. The total acreage in prescribed fire units would be the same in all action alternatives, but under Alternative B, Aggressive Action, the largest number of acres would be burned annually.

Subalpine Forests. Less than 1% of subalpine forests would be within prescribed fire units in Alternative B. The effect of prescribed fire would be the same as under Alternative A—beneficial, short-term, and minor.

Upper Montane Forests. Less than 20% of upper montane forests would be in prescribed fire units in Alternative B— twice the acreage included in prescribed fire units under Alternative A. The impact of prescribed fire in these forests would be the same as under Alternative A, but the larger area burned would decrease the potential for catastrophic fire, compared with Alternative A. Overall, the impacts of prescribed fire on upper montane forests would be beneficial, long-term, and moderate.

Lower Montane Forests. These forests would be a primary focus of the prescribed fire program. About 75% of the park's lower montane forest would be in prescribed fire units in Alternative B. This would be twice the area in prescribed fire units in Alternative A. The effect of prescribed fire in these forests would be the same as under Alternative A, but the greater number of acres treated would reduce the potential for catastrophic fire. The increase in area burned would increase the benefit compared to Alternative A. Overall, the effect of prescribed fire in lower montane forests, under Alternative B, would be beneficial, long-term, and major.

Meadows. Meadows have the shortest fire return intervals of all vegetation types described for the park. About 50% of the park's dry montane meadows would be in prescribed fire units under Alternative B. This would represent a 60% increase in area to be treated, compared to Alternative A. The effects of prescribed fire would be the same as under Alternative A, but the significant increase in area treated would restore more meadows than under Alternative A. The potential to restore more area under this alternative would be greater than under Alternative A, thus the beneficial effect. Overall, the effect of Alternative B would be beneficial, long-term, and major.

Foothill Woodlands. More than 75% of park's foothill woodland would be in prescribed fire units under this alternative. This is nearly four times more than under Alternative A. The effects of fire would be the same as in the existing program for Alternative B, but overall, under Alternative B the benefits would increase, due to the amount of treatment and shorter time frame for restoration. Effects would be beneficial, long-term, and major.

Site Preparation Associated with Managed Wildland Fire and Prescribed Fire (hand line, snagging, mop-up)

The effects of holding actions and monitoring would be similar for all vegetation types, so they will be grouped for this analysis. Due to the increase in treatment acreage for prescribed fire and managed wildland fire, it would be expected that site preparation work would be more wide spread than under Alternative A. Given the increased amount of site preparation, mitigation measures would be used to the greatest extent possible. Overall, the effect of site preparation on vegetation would be the same as under Alternative A—adverse, short-term, and minor.

Fuel Reduction by Hand or Machine

Effects of Reducing or Removing Biomass from Sites

While the removal of cut trees and shrubs from treated sites can reduce the intensity of future fires, it can have other effects on ecosystems, such as a loss of stored nitrogen and other vital plant nutrients. Table 4.9 presents a comparison of methods used to remove cut trees and shrubs and a qualitative analysis of the movement and availability of nitrogen and other nutrients.

Table IV.9
Qualitative Effects Of Different Methods Of Tree And Shrub Removal In Relation To Nutrient Availability

Methods	Pile/Burn [c]	Pile/Leave [d]	Lop and Scatter	Chip and Broadcast	Chip and Haul Away
Fuel Load [a,f]	Decrease	Increase	Increase	Increase	Decrease
Nutrient Cycling and Return [b]	Increase	Increase	Increase	Increase	Decrease
Fire Behavior [a]	Decrease	Increase	Increase	Decrease	Decrease
Positive Visual Impacts	Increase	Temporary Decrease [d]	Increase	Increase	Increase
Feasibility [e]	Would be determined for each project.				

a van Wagtendonk 1996.

b Graham and Associates 1999.

c Based on the assumption that piles would be burned from November through March in the year following treatment.

d Piles would be visible until the prescribed fire unit is broadcast burned within the following 5 years.

e Includes physical constraints, project cost and time, labor, and other factors.

f Amount of fuel (expressed in tons per acre) available for combustion on the site after treatment.

In Table IV.9, nutrient cycling and return implies the movement and availability through decomposition of nitrogen and other vital plant nutrients. It is an indicator of the amount of nutrients returned to soils in the project site following treatment. Fire behavior denotes the expected fire behavior during a wildland or prescribed fire after mechanical fuel reduction. Positive visual impacts indicate the stand appearance and aesthetic value as perceived by visitors after completion of the project. This often is best described in historical accounts as “natural and park-like.” Feasibility would be evaluated for each project and include labor, physical barriers, and project time and costs. All scenarios assume that a prescribed fire would take place in the unit within 5 years after the fuel treatment.

Aggressive Reduction Techniques

Mechanical Tree and Shrub Removal. These activities would occur primarily around the wildland/urban interface. It would be used in areas where both plant community structure has been altered by years of fire exclusion and communities and developed areas are at risk from catastrophic fire. Less than 1% of the park, or 6,425 acres, lies within the six inner wildland/urban interface boundaries. Approximately 1,285 acres would be treated each year. These activities usually would be followed by prescribed fire (effects discussed above). To restore plant community structure to within its natural range of variability, large machines (i.e feller-bunchers) would be used. Only lower montane forest and meadows would be treated in large enough areas to have more than a local effect. Less than 5% of lower montane forest and less than 20% of meadows would be targeted for this treatment in Alternative B.

Effects of biomass removal would include the increased potential for trampling and burial of sensitive plants and communities (e.g. riparian areas), the appearance of cut stumps, and the loss of fuel ladders (see also table 4.9). All of these impacts would be mitigated through project planning and coordination with resource management staff. Surface and soil disturbance and compaction would also be caused by tracked vehicles and cutting, dragging, or crushing materials (depending on the treatment used). This disturbance would provide potential sites for invasion of non-native species.

Trees up to 20” dbh (diameter breast height) would be removed according to the structural target conditions for density and frequency, by vegetation type (see table 2.3). Removal of trees would alter tree density and canopy cover in the immediate area. However, canopy cover reduction should change fire behavior so that a high-intensity fire would be likely to be slowed and move on the ground rather than to move in the canopy (crown fire). This treatment would not reduce the surface fuel load, which can be greater than half the total down and dead fuel load on a site. In fact, it would actually increase the surface fuel load until the area was broadcast burned. The intensity of fire would be temporarily greater due to this loading of fuels. Overall, the adverse effects of biomass removal by mechanical means would be short-term and minor to moderate. Long-term impacts would be beneficial and negligible to moderate, due to the lower potential for catastrophic fire in treated areas.

Conventional Tree and Shrub Removal. Surface and soil disturbance and compaction would be associated with the use of wheeled and/or tracked vehicles and dragging materials. This would provide potential sites for the invasion of non-native species. Skidding would be used in some locations. Mitigation would include running the equipment over snow or heavy brush and restricting equipment use to certain areas and paths. Overall, the effect of skidding and grappling would be adverse, short- to long-term, and minor to moderate, depending on the intensity of treatment.

Passive Reduction and Lower Profile Techniques

Low-Impact Skidding. This would include the use of draft animals and four wheel, all-terrain vehicles, in combination with fetching arches, to skid trees of approximately 10 to 20” dbh, to reduce locally heavy fuels. In this alternative, the treatment would be used infrequently and only in areas with sensitive resources, as a substitute for other, heavier types of equipment. This would cause limited compaction and scarification of the upper duff and topsoil layers. Mitigation, when needed, could include skidding over snow, frozen soil or a bed of crushed materials, as with heavier equipment. Adverse effects of use would be short-term and negligible to minor. Because of its limited application in this alternative, the benefits of reducing fuels using low-impact methods would be short-term and minor.

Hand Cutting. Hand cutting would be used as needed in the Fire Use Unit and in some parts of the Suppression Unit and Special Management Areas. Because this work is labor-intensive, accomplishments would likely remain at approximately 100 acres treated each year, as in Alternative A. Amount of work would depend on how much was treated by other methods. Overall, the effects of hand cutting on vegetation would be adverse, short-term, and minor—the same as under Alternative A.

Pile Burning. The effects of pile burning would be similar for all vegetation types, so vegetation types will be grouped for this analysis. The impacts of pile burning would be the same as under Alternative A. But, the increase in amount of treatment would affect a larger area. The impacts of pile burning on vegetation would be adverse, short-term, and negligible to minor.

Chipping. Chipping is one method for reducing the overall fuel loads in areas where hand thinning and/or biomass removal (by mechanical means) has occurred. There are several options for reducing or removing biomass from sites. The loss of nitrogen in the ecosystem is the greatest adverse effect of biomass removal. According the *Vegetation Management Plan* (1997), chips should not be applied at depths greater than 3 inches. Since that document was developed, further evidence has indicated that chips, due to their high cellulose content and the lack of moisture and nutrients in local soils to facilitate rapid breakdown, should be applied at depths no greater than 1 inch. Chips can cause localized denudation by burying soils and seed banks, and robbing soils of available nutrients during the decomposition process. Chips would be spread more thickly in some areas (e.g. road shoulders in the El Portal Administrative Site) to manage non-native species such as yellow star-thistle.

Overall, the impacts of chipping on vegetation would depend on whether chips were broadcast or removed from the site. If chips were broadcast, the impacts would be adverse, short-term, and negligible to minor, depending on the area treated. If chips were removed, the impacts on vegetation would be adverse, short-term, and negligible. Careful project planning and coordination with resource management staff would occur prior to project implementation, to select the appropriate treatment.

Girdling. Girdling would not be a part of this alternative.

Helibase Upgrades

Crane Flat: The removal of approximately 7,500 square feet of red fir forest and montane chaparral (primarily green manzanita) and periodic maintenance of trees in the glide path would result in a adverse, long-term, and minor impact to vegetation, due to potential invasion of the cleared site by non-native plant species, loss of topsoil (from wind and water erosion from lack of vegetation and subsequent decline in vigor and cover of existing vegetation.

El Portal: There would be no additional impact to vegetation because the helibase area is already paved or part of the road shoulder.

Wawona: There would be no additional impact to vegetation in Wawona Meadow because there would be no change in the current use of the area by helicopters. There would be a long-term negligible, beneficial impact to the stand of trees adjacent to Wawona Meadow because the parking area would be better defined and parking amongst the trees would lessen. There would be a long-term negligible, beneficial impact to the stand surrounding the driveway as tree removal and trimming would bring the stand closer to target conditions.

Cumulative Impacts

The past, present, and reasonably foreseeable projects effecting vegetation at Yosemite National Park would be the same as discussed under Alternative A. The overall affect of past activities on the structure, composition, and fuel loads have been adverse, long-term, and major. Past and reasonably foreseeable future projects would have a beneficial, long-term, and minor to moderate effect on vegetation. These impacts, in combination with the impacts of Alternative B, would result in beneficial, long-term, and moderate cumulative impacts.

Conclusion

In aggregate the effect of Alternative B would be beneficial, long-term, and moderate to major, based upon a significant increase in the amount of area treated by prescribed fire and managed wildland fire. The period of time required to restore park ecosystems (10 to 15 years) and reduce risks in and restore wildland/urban interface (5 years) would be within the normal range of fire return intervals for all but two vegetation types (ponderosa pine/bear clover forest and dry montane meadows). This would significantly reduce the threat of large, high severity, catastrophic fire in all areas of the park, and would reduce the potential for vegetation type conversion. This would be a beneficial effect, compared with Alternative A. Large, high-severity fires would likely occur during the life of the plan, but the size and extent of the fires would be reduced compared to Alternative A. The potential for catastrophic fire still exists, but the intent of the alternative is to reduce the risk, thus impairment would not result from the implementation of this alternative.

The Mariposa Grove of Giant Sequoias is one of the resources specifically identified in the enabling legislation for Yosemite National Park. If catastrophic fire were to eliminate or severely damage this grove, the impact would be impairment.

Wetlands

Potential for Impacts from Catastrophic Fire

Effective implementation of this alternative would likely result in the greatest amount of change over the shortest time. It would not eliminate the potential for catastrophic fire, but would significantly reduce the likelihood of high-intensity fires that are outside the range of tolerance for wetlands and associated species. This reduction in the potential for large or unusually intense fires would result in beneficial, moderate to major, long-term impacts for park wetlands.

Fire Management Treatments

Managed Wildland Fire

Same as Alternative A—beneficial, long-term, and moderate.

Re-ignition clause. Some managed wildland fires would be suppressed and later (within 3 years) re-ignited within the Fire Use Unit. Wetlands in this unit, particularly meadow types, could be affected. Given ecologically based criteria for re-ignition, adverse effects would be kept at a negligible level and moderate to major ecological benefits may be generated from fires burning at ecologically desirable times.

Holding Action and Monitoring Effects (water and retardant drops, helispot, and spike camps). The effects of holding actions would be negligible in this alternative. Ground-disturbing activities would be kept to a minimum in and around wetlands, but fires would be allowed to burn into and across wetlands where fires are managed for resource benefit. Wetland habitats would be avoided to the greatest extent possible during holding actions and monitoring, and only a minimal amount of line would be constructed in wetland areas—in part because wetlands are often natural barriers. Retardant would not be applied within 300' of wetland areas and water drops would be kept to a minimum. While meadows might be used as temporary helispots, this would only be done at dryer sites. Impacts associated with holding actions on wetlands would be adverse, short-term, and negligible.

Prescribed Fire

The large number of acres treated annually and the distribution of treatments would result in specific impacts to wetlands. In some areas, wetlands would be targeted for treatment, because of the need to control tree encroachment or change species composition. Treatments would provide significant ecological benefit. Although the total number of acres targeted would be well within the normal range of variability for fire regimes within the Yosemite landscape, the distribution of wetlands treated could potentially be un-naturally concentrated. Fragmentation of wetlands and fires burning at compressed intervals rather than at natural fire return intervals could result in adverse, short-term and minor impacts.

Wildland/urban interface areas, such as El Portal and Yosemite West, would likely receive mechanical pretreatment, followed by prescribed fire. Treatments would be implemented with the intention of avoiding impacts to wetlands (see hand cutting, below). Specific impacts of treatments would differ little from the No Action Alternative, but the intensity would be expected to increase because of the increase in the number of acres treated. Overall, the effects of prescribed fire on wetlands in Alternative B would be beneficial, long-term, and minor due to emphasis toward restoration of vegetative structure and function. Short-term adverse impacts would be minimized through mitigation measures of planning and coordination with Resource Management staff.

Site Preparation Associated with Managed Wildland Fire and Prescribed Fire (hand line, snagging, mop-up)

Site preparation for managed wildland fires and prescribed burns would include the use of wetlands as natural barriers and water sources for pumps where water is available. When a wetland area is being used for a boundary, line construction and some snagging might occur in the adjacent uplands. Minimum Impact Management Techniques would be used which can include flattening grasses and sedges, and creating wetlines from which to burn. Burns would be allowed to back into and burn around wetlands and meadows or through them if the vegetation were dry enough to carry fire. Wetland habitats would be avoided to the greatest extent possible during implementation of confinement and containment strategies. If the objectives of a prescribed burn were to reduce conifer invasion of meadow, some established trees might be cut. Since no actual disturbance to the wetland characteristics would be realized, the impacts would be beneficial, minor to moderate, and short-term.

Fuel Reduction by Hand or Machine

Aggressive Reduction Techniques.

Mechanical Tree and Shrub Removal. No biomass removal by mechanical means would occur in wetlands.

Conventional Tree and Shrub Removal. If fallen debris needed to be removed from meadows, attempts to move the material would be done when the water table had dropped and the surface was dry or in winter when snow would protect the meadow surface. Methods used would mitigate the possibility of material digging into the soil surface and causing soil disturbance. Impacts would be adverse, short-term, and negligible.

Passive Reduction and Lower Profile Techniques.

Hand Cutting. In most areas of the park, no hand cutting would be conducted near wetlands. Small conifers along the dry margins and edges of meadows in Yosemite Valley might be cut to reverse conifer encroachment. At the interface of the large meadows some trees might be cut to restore the visibility of meadows from scenic viewpoints and forest trails. These actions would occur in conjunction with restoration burning. Exclusion of fire has allowed an unnaturally dense wall of conifers to grow at the interface between meadow and forest in some areas. Meadow burning has been part of the program for many years and was commonly done by American Indians. Cutting trees to open this “wall” of trees is desirable to the restoration of meadows. Burning would kill additional trees and as areas are restored, burning would be the preferred treatment. The impacts to wetlands associated with hand cutting would be beneficial, short-term, and minor to moderate.

Pile Burning. Piles would be sited to avoid wetland areas wherever possible. When fuel reduction work is done on the edge of a meadow wetland, piles might be put on the upland areas adjacent to the wetland, where they would then be burned. Some movement of ash particles could subsequently wash into the wetland area, resulting in an increase of nutrient levels. The impact of pile burning on wetlands would be beneficial, minor to moderate, and short-term.

Chipping. No chipping would occur in wetlands.

Cumulative Impacts

Cumulative effects to wetland and aquatic resources discussed herein are based on analysis of additional wetlands activities within the Yosemite region and the potential effects of this alternative. The past, present, and reasonably foreseeable projects that might affect local wetland patterns and large-scale or regional wetland patterns would be the same as evaluated in Alternative A. These and park projects would result in both short-term and long-term adverse and beneficial impacts on wetlands in the areas. Overall, impacts would be beneficial, long-term, and moderate effects for reasonably foreseeable future projects. Considered in combination with the impacts of Alternative B cumulative impacts would be beneficial, moderate and long-term, due to the emphasis on restoration of vegetation structure and natural processes through the use of fire.

Conclusion

Current threats to park wetlands are most strongly characterized by the continued, ongoing diversion of water from wetland areas and the potential for catastrophic fire. Reduction of these threats results in clear benefit for a number of ecological communities, including wetlands. The process of returning the park landscape to fuel conditions in which natural fire processes could take place would result in some minor or moderate, adverse impacts to wetlands. The combined treatment acreages represent a significant portion of the landscape and avoiding wetlands would be potentially difficult or impossible. Although the long-term impacts should result in moderate benefits to wetland resources, negligible to moderate adverse impacts may occur over the short-term. Because of the aggressive program to reduce fuels and reduce the threat of catastrophic fire in Alternative B, impacts would be beneficial, moderate, and long-term. The potential for catastrophic fire would still exist, but the intent of the alternative is to reduce the risk, thus there would be no impairment from the effects of this alternative.

Wildlife

Potential for Impacts from Catastrophic Fire

Under Alternative B, catastrophic fire would have the same effects as described under Alternative A. However, the risk of such events would be substantially reduced over the 10 to 15 years proposed for achieving target conditions in areas that exhibit high fuel loads. In the Suppression Unit, areas that deviate four or more intervals would be targeted first for prescribed fire, with 2,520 to 12,872 acres burned per year. The total acreage would depend upon acreage burned in the Fire Use Unit and the environmental conditions, but this alternative proposes ecosystem restoration within 10 to 15 years. As compared to other alternatives, wildlife habitat would most rapidly be returned to a more natural condition. Under Alternative B, rapid reduction of the threat of catastrophic fire and the rapid return of habitats to natural, target conditions would result in beneficial, long-term, major impacts to wildlife and their habitat.

Fire Management Treatments

In Yosemite and in surrounding forests, many mid- to low-elevation forests are overgrown with dense shrubs and young trees because of a history of fire exclusion. Some areas are at high risk of unnatural high-intensity fire events. These conditions affect the abundance and diversity of wildlife species directly by creating unfavorable habitat conditions for some species. For example, dense understory growth may adversely affect habitat quality for California spotted owls and northern goshawks by limiting their access to prey (Weatherspoon et al. 1992, Maurer 2000, respectively). The combination of wildland fire, prescribed burning, and fuel reduction proposed in this alternative would result in increased habitat and species diversity as gaps would be created in continuous forest and the edge along the forest/gap interface recovered with important understory plants that had been crowded out by shade tolerant species. Mitigation: Use MIMT for fire management; identify sensitive wildlife resources to minimize adverse impacts; and apply mitigations identified during consultation with USFWS (see Appendix 9).

Managed Wildland Fire

The goal to restore ecosystems in a 10 to 15 year period under Alternative B means that annual acreage treated with fire would increase, through an increase in managed wildland fire and re-ignition of suppressed fires in the Fire Use Unit. Under the action alternatives, suppressed wildland fires could be re-ignited when conditions are favorable for a burn, up to 3 years after they were suppressed which would increase the number of acres burned on average. Conditions for wildland fires would vary among years, resulting in years with few acres burning and years with many acres burning. In years of more wildland fire activity, large areas of dense forests with fairly homogenous habitat would be changed to a mosaic of diverse habitats, thus the forest would support a larger array of wildlife.

The aggressive action proposed in Alternative B would provide a valuable tool in restoring natural, fire-influenced wildlife habitat. Because natural ignitions are somewhat random events, areas burned may not be those of highest management priority (i.e., high FRID areas). Also, some areas are likely to burn at higher than natural intensities due to high levels of fuel accumulation, even when fire prescriptions and management are designed to minimize these events. As a result, forest gaps, and consumption of large woody debris (which provides habitat diversity), would be greater than under the natural range of variation in some areas of a burn. This could adversely affect species that favor dense, complex forest, such as hermit thrush, northern flying squirrel, and marten. While these effects would be greater under Alternative B than under the other alternatives, such impacts must be weighed against the benefit of reduced risk of catastrophic fire, which would be much more damaging to wildlife and their habitat.

Under Alternative B, impact of managed wildland fire on wildlife would be beneficial, long-term, and major, due to the resulting restoration of wildlife habitats and the relatively rapid rate of reducing the potential for catastrophic fire. Mitigation: Use MIMT for fire management; identify sensitive wildlife resources to minimize adverse impacts; and apply mitigations identified during consultation with USFWS (see Appendix 9).

Re-ignition. Managed wildland fires might be re-started when conditions were favorable for their control. This could be done during summer or could be in the spring or fall, which would be outside the period when most natural fires occur (summer when lightning strikes and dry fuels combine). Igniting fires in the shoulder seasons would have an adverse effect on some species of wildlife that are adapted to the natural timing of fires. For example, small mammals that hibernate in leaf litter could suffer higher mortality. Overall, however, re-ignition would enhance the beneficial effects of wildland fire by increasing the amount of habitat returned to a more natural, fire-influenced structure and composition.

Prescribed Fire

The use of prescribed fire provides the greatest potential to restore wildlife habitat and reduce the threat of catastrophic fire in areas furthest from natural conditions. Fire can also be planned to occur under conditions that maximize benefit to resources, including wildlife and habitat, and minimize fire-related impacts to sensitive wildlife resources (e.g., spotted owl nesting sites).

Under Alternative B, prescribed fire would be used to the greatest extent, especially in the Suppression Unit, which comprises some of the forests most severely altered from fire exclusion. Much of this area is in mid-elevation mixed-conifer forest, which is among the most productive and diverse wildlife habitat in the park. High levels of fuel loading in some areas would cause prescribed fires to burn at higher than natural intensities, even when fire prescriptions and management were designed to minimize this effect. As a result, forest gaps and consumption of large woody debris (which provide habitat diversity) would be greater than typical within the natural range of variation for ecosystems of this type. This could adversely affect species such as hermit thrush, northern flying squirrel, and marten. Such impacts, however, must be weighed against the benefit of reducing the risk of catastrophic fire, which would cause a greater detrimental change in wildlife habitat.

Also, prescribed fires would be started when conditions were favorable for their control. This would often be in the spring or fall, which would be outside the dry season when most natural fires would occur. This could have an adverse effect on some species of wildlife that are adapted to the natural timing of fires. For example, small mammals that hibernate in leaf litter could suffer higher mortality.

In habitats near developed areas, where protection of human-built structures and facilities is a concern, prescribed fire would be used to reduce fuel loads to the lower end of the natural variability. If forests became more open (less understory vegetation) and contained less down wood, the effect on animal species that depend on these features, such as salamanders, small mammals, and ground-nesting birds, would be adverse. However, overall a larger number of species would benefit from restoration of forests to a more natural condition.

Conditions for prescribed fires would vary among years so that little burning occurs in some years, and, when conditions were favorable, many prescribed burns take place. In years of high prescribed fire activity, large areas would likely be affected. Habitat would be no longer suitable to species that favor dense forest structure, but would be more suitable to species that favor open forests and more diverse habitats. Under Alternative B, impact to wildlife would be beneficial, long-term, and major due to the restoration of wildlife habitats and reduction in the potential for catastrophic fire. Mitigation: Use MIMT for fire management, identify sensitive wildlife resources to minimize adverse impacts; and apply mitigations identified during consultation with USFWS (see Appendix 9). Where possible, limit fire size and/or provide burn intensity heterogeneity and maintain wildlife species diversity.

Holding Action and Monitoring Effects (water and retardant drops, helispots, and spike camps) and Site Preparation Associated with Managed Wildland Fire and Prescribed Fire (hand line, snagging, mop-up)

Adverse effects from fire control actions, such as hand lines, spike camps, helispots, and water drops (described under Alternative A) would increase in under Alternative B because of the greater use of managed wildland and prescribed fire and the re-ignition clause.

Water Drops. The types of impacts associated with water drops would be the same as described under Alternative A, but the increased use of wildland fire under this alternative could increase the use of water drops. Impacts to wildlife could therefore, be greater than under Alternative A, but adherence to mitigation measures would limit impacts. Threat of disease transmission, spread of non-native species, and effects on declining amphibians from water drops would still result in minor, adverse, long-term impacts. Mitigation: Avoid dipping from waters known to contain mountain yellow-legged frogs or bullfrogs; avoid dipping from small bodies of water. Water drops will occur over land to prevent spread of non-native fishes

Fire Retardant. The impacts of fire retardant (released by aircraft) would be the same as described under Alternative A, but the larger number of wildland fires under Alternative B could increase its use, but use of standard mitigation measures would limit adverse effects. Impact of retardant drops on wildlife under Alternative B would be adverse, short-term, and minor. Mitigation: Adhere to established protocols for retardant use; limit use in park.

Helispot Construction. The types of impacts associated with helispot construction would be the same as under Alternative A, but the greater use of wildland fire under Alternative B could result in a greater chance of impacts on wildlife, through habitat destruction and direct disturbance. Impact under this alternative would be adverse, long-term, and negligible. Mitigation: Limit helispot construction, place helispots away from sensitive resources, use natural clearings for helispots.

Spike Camps. Under Alternative B, the types of impacts associated with the establishment and use of spike camps would be the same as under Alternative A. The greater use of wildland fire could however, result in more spike camps to manage and monitor fires. Mitigating impacts would result in negligible, adverse, short-term effects on wildlife. Mitigation: place spike camps away from sensitive resources, maintain strict control over the availability of food to wildlife.

Handline. The greater use of wildland and prescribed fire in Alternative B would likely include reduction in the use of hand lines that would be necessary during suppression of catastrophic fires. Impact of hand line construction under Alternative B would be adverse, short-term, and minor. Mitigation: Use MIMT in hand line construction, identify sensitive wildlife resources to minimize adverse impacts, rehabilitate areas.

Snagging. Impacts from snagging under Alternative B would be the same type identified under Alternative A, but like hand line construction, snagging would likely increase under Alternative B, due to increased use of fire. This would have a local, adverse effect on those species using the snags that were removed, such as some bat species and woodpeckers. Prescribed fire, however, would likely generate additional snags that, over the long-term, would benefit these species. In addition, the reduction in the threat of catastrophic fire from use of prescribed fire would provide benefit for a wide range of wildlife species. Under Alternative B, impact on wildlife from snagging would be adverse, short-term, and minor, based upon the greater use, but the relatively small area that is likely to be affected along the periphery of fires. Mitigation: Use MIMT, limit snag removal to those snags identified as a clear threat to human safety and fire line integrity, identify sensitive wildlife resources to minimize adverse impacts.

Mop-up. The impacts to wildlife from mop-up activities under Alternative B would be of the same type identified under Alternative A, but the greater use of prescribed fire under Alternative B would increase such impacts. The small, dispersed areas that would be affected, however, would limit adverse effects. Impact of mop-up under Alternative B would be adverse, short-term, and negligible. Mitigation: Use MIMT and identify sensitive wildlife resources to minimize adverse impacts.

Fuel Reduction by Hand or Machine

Aggressive Reduction Techniques.

Under Alternative B, annual treatment of forests in wildland/urban interface areas and along road and utility corridors would be greatest of all alternatives, primarily through the use of heavy machinery to cut and remove trees and reduce biomass. To provide protection for developed areas, prescriptions for wildland/urban interface areas would thin forest structure to the lower end of the natural range of variability for tree density and fuel loading. This would affect the species composition of wildlife in these areas. For example, species that depend upon habitat complexity on the forest floor and in the understory, such as marten and some small mammals, would be adversely affected. The conditions achieved, however, would benefit a larger number of species by restoring a forest structure that is within the range of natural variability for fire-influenced habitat.

Mechanical Tree and Shrub Removal. Heavy equipment would be used where critical fuel conditions demand immediate, efficient action, and where natural resources can acceptably withstand the impacts associated with this method. The use of tracked vehicles in forest habitat would create ground disturbance that would affect animals that live in the forest litter, such as salamanders, reptiles, and small mammals. Removal of trees and snags to reduce forest density would affect animals using these habitat features, such as bats and nesting birds. This is especially true for snags, which would be valuable to a wide range of species. Also, adjacent habitat would remain unaffected and thus be a source for recolonization. If debris were piled for later burning, some mortality of animals that take up residence in piles, such as reptiles and small mammals, would occur, although most of these animals would likely flee. The noise of heavy machinery would cause some short-term disturbance of wildlife in treatment sites and in adjacent areas.

Biomass removal by feller-bunchers would result in minor, beneficial, long-term impact to wildlife due to the rapid return of forest structure to a more natural, open condition near developed areas, although these areas would be relatively small on a landscape scale, and some adverse, short-term impacts would occur from use of heavy machinery. Mitigation: avoid use of machinery in wet areas, identify and avoid impact to sensitive wildlife resources in treatment areas, and allow snags to stand where possible.

Conventional Tree and Shrub Removal. Under Alternative B, rubber tired or tracked log loaders and grapplers would be used to remove hand-thinned trees and naturally downed trees and fuels. It has the potential for damage through ground disturbance that would affect animals such as salamanders and small mammals. Grappling and skidding would also result in the removal of large logs which provide habitat and structural diversity on the forest floor, with possible adverse effects on wildlife that use these features, such as marten, shrews, and dark-eyed juncos. Use of heavy machinery would cause high noise levels that would disturb local wildlife. Short-term impacts on wildlife from grappling and skidding under Alternative B are expected to be minor and adverse because of the small, disperse areas impacted. However, in the long-term, restoration of park ecosystems would be beneficial to park wildlife.

Passive Reduction and Lower Profile Techniques

Hand Cutting. Same as Alternative A—beneficial, long-term, and minor.

Pile Burning. In some cases, removed material would be piled and burned on-site, although some materials may be removed for later burning or sale. With on-site burning, the impacts would be the same types as described under Alternative A, but would be somewhat greater since areas would be treated more quickly. Some mortality of animals that would take up residence in the piles may occur, although such effects are still expected to be adverse, short-term, and negligible. Mitigation: burn piles as soon as possible to minimize the number of animals living in them.

Chipping and Shredding. Impacts to wildlife would be of the same type as under Alternative A, but the larger acreage treated under Alternative B would result in greater impacts. Such impacts would be limited by use of standard practices such as thinly distributing chips over a site or removal of chips, both of which would limit suppression of plant growth and depletion of soil nutrients from decomposition. Removal of chips, however, would also remove nutrients from the system. The machinery used for chipping and shredding would be loud, which would disturb wildlife, such as nesting birds, in the short-term. Impacts to wildlife from chipping and shredding would be negligible; adverse, and short-term. Mitigation: follow established protocols for limiting the depth of chips distributed on a site.

Girdling. Trees would be girdled to benefit wildlife species that need snags or standing dead trees as a habitat component. Its use would be limited and would be combined with other techniques to reduce fuels to more natural levels. Impact on wildlife, under Alternative B, would be beneficial, long-term, and minor. Mitigation: Allow snags created by girdling to stand.

Peregrine Falcon

Same as Alternative A—adverse, short-term, and negligible.

Helibase Upgrades

Crane Flat: The removal of vegetation would have a long-term, negligible, adverse impact to wildlife due to additional fragmentation or loss of wildlife habitat. The area represents a small area in proportion to the surrounding habitat that would remain unaffected.

El Portal: There would be a long-term, negligible, adverse impact to wildlife due to increased helicopter use in the Railroad Flat area, potentially disrupting wildlife behavior. Disturbances would be infrequent and no habitat would be directly affected.

Wawona: There would be a long-term, negligible, beneficial impact to wildlife from clearing vegetation adjacent to Wawona Meadow, which would increase habitat quality by moving the stand toward structural targets. The meadow is a wintering and staging area for great gray owls, and one of the last places where willow flycatchers are known to nest in the park. Disturbances would be infrequent and no riparian habitat would be directly affected.

Cumulative Impacts

The past, present, and reasonably foreseeable projects that would have the most direct relationship to Alternative B would be the same as listed under Alternative A. The impacts of these actions, considered in combination with the impacts of Alternative B, would result in cumulative effects on park wildlife and habitat that would be beneficial, long-term, and moderate to major. This is because projects with a beneficial impact would affect large areas of habitat in the central Sierra Nevada in ways that would compliment the beneficial effects of the *Yosemite Fire Management Plan*. The Sierra Nevada Forest Plan Amendment would affect virtually all U.S. Forest Service land around the park through ecosystem-based management. In comparison, projects with adverse impacts involve small areas and/or have minor effects over larger areas.

Conclusion

Alternative B would result in major, long-term, beneficial impacts on wildlife and habitat by rapidly restoring a more natural forest structure to areas of the park that have severely deviated from a natural fire regime. The threat of catastrophic fire and its impacts on wildlife and habitat would be greatly and quickly reduced. The potential for catastrophic fire would still exist, but the intent of the alternative is to reduce the risk. Thus, there would be no impairment from the effects of this alternative.

Special-Status Species – Plants

A total of four plant species known to occur in Yosemite National Park and the El Portal Administrative Site have been listed as rare by the state of California. All are at lower elevations in the lower montane and foothills woodlands vegetation zones—mainly near El Portal. Plants and their habitats are listed in table 3.5, see also discussion in Alternative A, Special-Status Species – Plants.

Potential for Impacts from Catastrophic Fire

Increased amounts of mechanical and hand cutting treatments in the El Portal Administrative Site would reduce the potential for catastrophic fire within El Portal and ecological restoration burning would reduce the potential for high-intensity fire beyond the bounds of the El Portal Administrative Site. If a catastrophic fire were to occur, there would be adverse impacts from non-native species encroachment. The probability of non-native species encroachment into sites burned by catastrophic fire would remain high, as in Alternative A, due to the impacts of high-intensity burning on soils and on understory and overstory vegetation. However, under this alternative, the potential for catastrophic fire would be reduced, therefore the amount of non-native species encroachment would likely be less and direct impacts to special-status species plants would be reduced (compared to Alternative A). Regarding catastrophic fire, under Alternative B impacts would be adverse, long-term, and negligible to minor.

Fire Management Treatments

Managed Wildland Fire

Under the Aggressive Action Alternative, all of the plant special-status species described in this document occur within the Suppression Unit, and only isolated populations of Yosemite onion grow in the Fire Use Unit. During fire events, input from a Resource Advisor would continue to be used to minimize or eliminate impacts to these species (see Chapter 2, Mitigation under Actions Common to All Alternatives and Appendix 3). Under Alternative B, the natural fire regime in areas inhabited by these species would quickly approach the natural range in variability over the landscape, and there would be a reduced potential for catastrophic fire events. Therefore, impacts of managed wildland fire on special-status species under this alternative would be beneficial, long-term, and minor, due to return to natural fire return intervals with associated benefits to ecosystem function.

Re-ignition clause. Re-ignition effects on special-status plants would only apply to isolated populations of Yosemite onion within the Fire Use Unit. This species would neither benefit nor be adversely affected by re-ignition due to its isolated locations on sparsely vegetated outcrops. Actions during re-ignition procedures would adhere to mitigation measures and avoid these populations or habitats (see Chapter 2, Mitigations under Actions Common to All Alternatives).

Holding Action and Monitoring Effects (water and retardant drops, helispots, and spike camps). Special-status plant species are in areas that would be only minimally affected by the proposed actions in Alternative B. These actions would have effects similar to Alternative A, despite increased burning and associated activities. Mitigations would be as described in Alternative A. Impacts of these actions taken in conjunction with mitigation measures would be adverse, short-term, and negligible.

Prescribed Fire

Effects would be similar to those described under Alternative A, however, in Alternative B potential effects to special-status species through prescribed burning would increase with the creation of a larger defensible perimeter around developed areas. This is especially true in the El Portal area because many of these plants grow there. Species would be potentially affected by burning in the shoulder seasons and the probability of non-native species encroachment into sites burned out of season would remain high, as in Alternative A. Appropriate mitigation measures would be developed by the park Vegetation Ecologist and Fire Ecologist. Mitigation measures common to all alternatives (Chapter 2) discusses the common practices for dealing with these situations. Park vegetation personnel may recommend that some areas not be burned. Impacts would be adverse, long-term, and minor to moderate.

Site Preparation Associated with Managed Wildland Fire and Prescribed Fire (hand line, snagging, mop-up)

With the mitigations mentioned in Alternative A, impacts would be similar—adverse, short-term, and negligible to minor.

Fuel Reduction by Hand or Machine

Aggressive Reduction Techniques. These techniques would be unlikely to occur in areas inhabited by special-status species. Mitigations to avoid special-status plant species would be employed therefore there would be no effect.

Passive Reduction and Lower Profile Techniques

Low-Impact Skidding. Low-impact skidding would not be done in areas inhabited by special-status plant species therefore there would be no effect.

Hand Cutting. Hand cutting might affect special-status plant species only within the El Portal Administrative Site. Mitigations (as described in Alternative A) would be used to limit impacts. Yosemite onion and Congdon's lewisia would not be affected by these activities, due to the location of populations. Both Tompkin's sedge and Congdon's woolly-sunflower would be potentially affected by increased activities in wildland/urban interface areas, because of greater amounts of ground disturbance (through foot traffic, dragging cut materials, etc.) and subsequent changes in species composition if non-native species were to become established within the rare plant populations. The impact of hand cutting, if mitigated to the extent possible, would be adverse, long-term, and minor.

Pile burning. Pile burning would increase under Alternative B. Increased activity near populations of Tompkin's sedge and Congdon's woolly-sunflower would increase the potential to harm these species. Yosemite onion and Congdon's lewisia would be unaffected by these activities due to the location of populations. The expanded area of intensively managed vegetation surrounding El Portal would increase levels of disturbance in sites that currently receive no management attention. Efforts would continue to be made to avoid individual plants and populations, by identifying their locations during planning. Piles would be placed in areas that would be unlikely to support these species. Therefore, impacts of pile burning on plant special-status species would be minor, adverse, and potentially long-term, due to the larger area of disturbance and increased potential for spread and establishment of non-native plants. Appropriate mitigations as described in Alternative A and Chapter 2 (Mitigation Measures) would be applied prior to execution of each project.

Chipping. Similar to Alternative A, although amounts of activity would increase. By using measures described in Alternative A (planning, avoidance, depth of chips), effects would be mitigated, thus, effects would be adverse, short-term, and negligible to minor.

Girdling. This action would not occur in areas inhabited by special-status plant species, therefore, there would be no effect.

Helibase upgrades

There would be no impact to special-status species because these species do not occur in the project areas of Crane Flat, El Portal, or Wawona.

Cumulative Impacts

Projects generating cumulative impacts that may affect special-status plants would be the same as those identified in Alternative A. Impacts of increased mechanical treatments within known and potential habitats for special-status plant species, as well as actions associated with implementation of the Yosemite Valley Plan in El Portal, would have increased impacts from non-native plant species introduction and alteration of native plant habitat. Overall, these effects, in combination with the effects of Alternative B, would result in adverse, long-term, and minor cumulative impacts.

Conclusion

Implementation of Alternative B, with increased mechanical thinning and removal, increased management of fuels around developed areas and increased burning would have an overall minimal effect on these species, due to their relative isolation, sparsely vegetated habitats, and occurrence beyond areas that would be managed aggressively. The effect of Alternative B would be adverse, long-term, and minor. There would be no impairment of the park's resources or values.

Special-Status Species – Animals

Sierra Nevada Bighorn Sheep (Ovis canadensis sierrae) – Federal Endangered

Potential for Impacts from Catastrophic Fire

Catastrophic fire would be highly unlikely in bighorn sheep habitat. Lightning strikes that do start fires would help open up the landscape, making it more suitable for bighorns.

Fire Management Treatments

Managed Wildland Fire

Although use of wildland fire would greatly increase under Alternative B, its application on bighorn habitat would be limited since these areas are well within the natural fire return interval. Managed wildland fire would have a negligible, beneficial, long-term effect on bighorn sheep.

Prescribed Fire

Prescribed fire would be unlikely to occur in bighorn sheep habitat, thus would have a negligible, beneficial, long-term effect on bighorn sheep.

Holding Action and Monitoring Effects (water and retardant drops, helispots, and spike camps) and Site Preparation Associated with Managed Wildland Fire and Prescribed Fire (hand line, snagging, mop-up)
The improbability of these actions happening in bighorn habitat, however, limit their expected impact to adverse, short-term, and negligible.

Fuel Reduction by Hand or Machine
Fuel reduction treatments would not occur in bighorn sheep habitat.

Cumulative Impacts

The past, present, and reasonably foreseeable projects that could affect bighorn sheep would be the same as identified in Alternative A. Cumulative impacts from these projects, in combination with the impacts of Alternative B, would remain beneficial, long-term, and negligible.

Conclusion

The impact of Alternative B on Sierra Nevada bighorn sheep would be beneficial, long-term, and negligible based primarily on the continued, though rare, influence of fire on their habitat.

Valley Elderberry Longhorn Beetle (*Desmocerus californicus dimorphus*) – Federal Threatened

Distribution of the valley elderberry longhorn beetle in the area administered by Yosemite National Park is restricted to the El Portal Administrative Site. The entire life cycle of the valley elderberry longhorn beetle is connected to the elderberry plant (*Sambucus sp.*). Adverse effects on elderberry plants would therefore have an adverse effect on this beetle. Current management of vegetation in El Portal follows U.S. Fish and Wildlife Service guidelines for protection of valley elderberry longhorn beetle and their host plants (USFWS 1999).

Potential for Impacts from Catastrophic Fire

Under current conditions, accumulations of fuel in some areas of El Portal could lead to catastrophic fires that would have an adverse effect on valley elderberry longhorn beetle and their host plants. Valley elderberry longhorn beetles and elderberry plants have existed under natural fire regimes for thousands of years, and chaparral and oak woodland communities where elderberry plants are found can burn at an extent and intensity that would cause high mortality of both beetle and host plant. Actions taken under Alternative B, with a goal to treat all wildland/urban interface areas within 5 years, would greatly reduce the potential for catastrophic fire in El Portal. Reduction of the threat of catastrophic fire would therefore, be beneficial, long-term, and moderate.

Fire Management Treatments

Managed Wildland Fire
El Portal Administrative Site, where valley elderberry longhorn beetle habitat occurs, is entirely within the Suppression Unit where wildland fires would be suppressed.

Prescribed Fire
Effects of prescribed fire would be similar to those described under Alternative A, but under Alternative B, prescribed fire use in El Portal would greatly increase in order to reach goals for wildland/urban interface areas within 5 years. Its effect on valley elderberry longhorn beetles

would be beneficial, long-term, and moderate by reducing the risk of catastrophic fire and because long-term benefit to elderberry plants through regeneration and reduced fuel loads would offset the unintentional, short-term impacts from beetle mortality. Mitigation would include following USFWS guidelines for protection of valley elderberry longhorn beetle and their host plants (e.g. see Alternative A).

Holding Action and Monitoring Effects (water and retardant drops, helispots, and spike camps) and Site Preparation Associated with Managed Wildland Fire and Prescribed Fire (hand line, snagging, mop-up)
With the greatly increased use of wildland and prescribed fires under Alternative B, the amount (but not the type) of impacts associated with management of these fires would likely increase, compared to Alternative A. The following fire management actions would be unlikely to occur in valley elderberry longhorn beetle habitat and, therefore, would not affect the species: water and retardant drops, helispot construction, spike camps, and snagging.

Impact on valley elderberry longhorn beetles of actions taken to manage prescribed fire under Alternative B would be adverse, short-term, and negligible, based upon their increased use, and therefore, greater chance of inadvertent effects. Impacts would be limited by the application of mitigation measures in accordance with USFWS guidelines.

Fuel Reduction by Hand or Machine
Aggressive Reduction Techniques.

Mechanical Tree and Shrub Removal. Heavy machinery, such as feller-bunchers would be used to achieve target conditions near developed areas. This aggressive approach would result in a more open forest structure, with removal of some trees in the 15-20" dbh size range. Compliance with U.S. Fish and Wildlife Service guidelines would minimize damage to elderberry plants, but some damage could occur. However, there would be a reduction in the threat of catastrophic fire, which would in the long-term, help protect valley elderberry longhorn beetles and their host plants. Impact of heavy machinery on valley elderberry longhorn beetles under Alternative B would be adverse, short-term, and minor. In the planning area, host plants for the valley elderberry longhorn beetle only occur in El Portal area where minimal mechanical use would be anticipated.

Conventional Tree and Shrub Removal. After cutting, downed trees in some areas would be removed with skidders and grapplers. This could have an adverse effect on valley elderberry longhorn beetles if elderberry plants were damaged or destroyed. However, mapping of elderberry plants in the treatment areas and adherence to park protocols and U.S. Fish and Wildlife guidelines would avoid all but accidental damage. Impact to valley elderberry longhorn beetles from skidding and grappling would be adverse, long-term, and negligible.

Passive Reduction and Lower Profile Techniques.
Hand Cutting. Hand cutting to reduce fuels that threaten developed areas in El Portal would not likely adversely affect the valley elderberry longhorn beetle. Standard mitigation requires the mapping of all elderberry plants in a treatment area. All elderberry plants with stems greater than 1-inch diameter at ground level would be left. This would protect the plants most likely to be inhabited by valley elderberry longhorn beetles. Hand cutting could affect the recruitment of small plants into the larger, valley elderberry longhorn beetle-suitable size class. The reduction in fuels by hand cutting, in combination with other treatments, would help reduce the threat of

catastrophic fire, which would help protect valley elderberry longhorn beetles and their host plants. Impact on valley elderberry longhorn beetles from hand cutting under Alternative B would be beneficial, long-term, and moderate.

Pile Burning. Cut trees and brush would, in some cases, be piled and burned. Impact to valley elderberry longhorn beetles and their host plants would occur if materials were piled and burned too closely to elderberry plants. Park protocols and U.S. Fish and Wildlife guidelines would however, minimize the chance of damage. Impact of pile burning on valley elderberry longhorn beetles under Alternative B would be adverse, short-term, and negligible.

Chipping. In some cases, when logistical, administrative, or ecological reasons made on-site burning unsuitable, cut materials would be chipped. Effects would be the same as described in Alternative A—adverse, long-term, and negligible.

Girdling. Girdling of trees would be used to reduce stand density in some areas. This technique would eventually reduce fuel loading in some areas, but is unlikely to have much effect on valley elderberry longhorn beetles. Impact of this technique on valley elderberry longhorn beetles would be beneficial, long-term, and negligible.

Cumulative Impacts

Specific past present and reasonably foreseeable projects that could adversely affect valley elderberry longhorn beetles near the El Portal Administrative Site would be the same as described under Alternative A. Impacts to valley elderberry longhorn beetle from present and reasonably foreseeable actions would be beneficial, long-term, and minor. Considered in combination with the effects of Alternative B, cumulative impacts to valley elderberry longhorn beetle would be beneficial, long-term, and minor.

Conclusion

Impact of Alternative B on valley elderberry longhorn beetles is expected to be beneficial, long-term, and minor due primarily to the reduction in the threat of catastrophic fire, through an intensive program of prescribed fire and thinning.

California Red-Legged Frog (*Rana aurora draytonii*) - Federal Threatened

California red-legged frogs have nearly disappeared from the Sierra Nevada—only two populations are known to exist in the northern extent. Recent surveys have found none in Yosemite (Knapp 2000) although habitat does exist. Red-legged frog habitat was identified through wildlife habitat relationships analysis (Mayer and Laudenslayer 1988).

Potential for Impacts from Catastrophic Fire

Under the median fire return interval, approximately 92% of the high-quality habitat has missed more than four fires. Most effects of catastrophic fire would be similar to under Alternative A, but actions under Alternative B would reduce fuel accumulations in 10 to 15 years and reduce the risk of catastrophic fire. The effect on red-legged frog habitat from catastrophic fire would be reduced, compared to Alternative A. Impacts would be beneficial, long-term, and negligible. Mitigation: Identify potential red-legged frog habitat and focus fuel-reduction efforts on those areas.

Fire Management Treatments

Managed Wildland Fire

Managed wildland fire would be the primary method for managing high-quality red-legged frog habitat, because approximately 84% of it is in the Fire Use Unit. Fuel loads and the risk of catastrophic fire would be reduced by allowing natural ignitions to burn under strict management protocols. Because target conditions would be achieved in a 10 to 15 year period under Alternative B, the use of wildland fire would increase, through managing some lightning fires and re-igniting some suppressed fires. Decisions about whether lightning fires would be managed or suppressed would be based upon the same decision elements as in Alternative A. However, under Alternative B, suppressed wildland fires could be re-ignited when conditions were favorable for a burn (up to 3 years after they were suppressed). Under the aggressive action proposed in Alternative B, this would be a valuable tool in restoring natural, fire-influenced wildlife habitat. This would have a beneficial effect on red-legged frog habitat by quickly reducing the threat of catastrophic fire.

Re-ignited fires would be started when conditions were favorable for their control. This would generally be in spring or fall, which is outside the period when most natural fires occur (summer when lightning strikes and dry fuels combine). Burning in the shoulder seasons could have an adverse effect on frogs hibernating in riparian areas that would be burned. However, no California red-legged frogs are known to exist in Yosemite. Under Alternative B, managed wildland fire would have a minor, beneficial, long-term impact on California red-legged frog habitat by helping to restore the natural structure and fuel loading in riparian areas, and quickly reducing the threat of catastrophic fire.

Prescribed Fire

Prescribed fires would be started in the shoulder seasons, when conditions were favorable for their control. This would have an adverse effect on red-legged frogs hibernating in riparian areas when they were burned. However, no red-legged frogs are known to exist in the park. Most effects of prescribed fire would be similar to those under Alternative A, but the greater amount of burning would reduce the potential for catastrophic fire. Impact to California red-legged frog habitat from prescribed burning under Alternative B would be beneficial, long-term, and minor, because of the relatively rapid treatment of habitats that have severely deviated from their natural fire return interval. However, the area of high-quality red-legged frog habitat that would be affected would be relatively small.

Holding Action and Monitoring Effects (water and retardant drops, helispots, and spike camps) and Site Preparation Associated with Managed Wildland Fire and Prescribed Fire (hand line, snagging, mop-up)

With the greatly increased use of prescribed and wildland fires under Alternative B, the effects from actions used to manage these fires would also increase. Most effects would be similar to those described in Alternative A, but amount of effect would increase. Mitigations would be the same as in Alternative A. Impact of prescribed and wildland fire management actions on California red-legged frogs under Alternative B would be adverse, long-term, and minor, primarily from the threat of the bullfrog spread because of water drops. This could be mitigated by prohibitions against dipping water from waters known to contain bullfrogs.

Fuel Reduction by Hand or Machine

Aggressive Reduction Techniques.

Mechanical Tree and Shrub Removal. Under Alternative B, the use of feller-bunchers and other heavy machinery would be the primary method for achieving target conditions in wildland/urban interface and other areas associated with development and roads. Such equipment would cause considerable ground disturbance, but would be unlikely to affect red-legged frog habitat, because it would not be used in wet environments. If red-legged frogs were present, use of heavy equipment in riparian areas would have an adverse effect on frogs sheltering under shrubs and leaf litter. However, no red-legged frogs are known to occur in the park so impact to red-legged frogs from mechanical thinning with heavy machinery would be beneficial, negligible, short-term, due to the reduction in unnaturally high levels of forest fuels.

Conventional Tree and Shrub Removal. Under Alternative B, cut and down materials would be removed from some treatment sites using grappling and skidding equipment. Disturbance of soil and forest litter would occur, which could affect red-legged frogs sheltering in riparian areas. Impact, however, would be negligible, because no red-legged frogs are known to inhabit the park. The habitat would benefit from the reduction in fuel loading facilitated by skidding and grappling. Impact of grappling and skidding on red-legged frogs under Alternative B would be beneficial, long-term, and negligible.

Passive Reduction and Lower Profile Techniques.
Hand Cutting. Site-specific effects would be similar to those under Alternative A. Impact of hand cutting, in combination with other treatments, on red-legged frogs under Alternative B would be beneficial, long-term, and minor, due to the possible reduction in the threat of catastrophic fire near potential habitat.

Chipping. The distribution of chips in riparian areas could suppress vegetation, but current park guidelines would reduce this risk, resulting in negligible impacts.

Cumulative Impacts

The past, present, and reasonably foreseeable projects that would have a potential to affect red-legged frog would be the same as evaluated in Alternative A. Beneficial impacts from present and reasonably foreseeable projects in combination with effects of Alternative B would result in beneficial, long-term, and minor cumulative impacts, due to implementation of land management plans that would protect habitat and species conservation plans that would protect the species.

Conclusion

Impact of Alternative B on California red-legged frogs would be beneficial, long-term, and minor, due primarily to a rapid reduction in the threat of catastrophic fire through use of prescribed and wildland fire.

Bald Eagle *(Haliaeetus leucocephalus)* - Federal Threatened

Bald eagles are rare and transient in the Yosemite area, and while they have been seen in many areas of the park, they are most frequently seen near large rivers and lakes. Fish are the primary prey of bald eagles, and large trees and snags for perching are important habitat components. Nesting by bald eagles is not known to occur in the park or El Portal. Bald eagle habitat was identified through wildlife habitat relationships analysis (Mayer and Laudenslayer 1988).

Potential for Impacts from Catastrophic Fire

Approximately 66% of high-quality eagle habitat has missed more than four fires. This means a substantial portion of the park's bald eagle habitat is at risk of catastrophic fire. Under Alternative

B, treatment of these severely deviated areas would proceed at a relatively rapid pace through the use of wildland and prescribed fire, with a goal of achieving target conditions within 10 to 15 years. This would help protect the large trees and snags that are important bald eagle habitat components. Impact of the reduction of the threat of catastrophic fire on bald eagles under Alternative B would be beneficial, long-term, and moderate.

Fire Management Treatments

Managed Wildland Fire

Approximately half of the high-quality bald eagle habitat in the park would be in the Fire Use Unit and would benefit from low-intensity, lightning fires that are allowed to burn. Fire would open up the forest, making it more navigable by bald eagles. It would reduce the threat of catastrophic fire, which could destroy the large, old growth trees and snags that are important habitat components to bald eagles. Under Alternative B, the increased use of wildland fire and the use of re-ignitions of suppressed wildland fires (up to 3 years afterward) would greatly increase the amount of habitat burned. Reaching target conditions in 10 to 15 years would quickly reduce the potential for catastrophic fire. Because of high levels of fuels in some areas, managed wildland fires could burn at unnaturally high intensities, which could cause the death of some large trees. This adverse effect, however, must be weighed against the reduced threat of catastrophic fire. Impact of managed wildland fire on bald eagles under Alternative B would be beneficial, long-term, and major, due to the relatively rapid rate at which the threat of catastrophic fire would be reduced.

Prescribed Fire

Approximately half of the high-quality bald eagle habitat in the park would be in the Suppression Unit. This means prescribed fire would be the primary tool for fuel reduction and restoration of natural forest structure in a substantial portion of the park's bald eagle habitat. Habitat in the Suppression Unit would also include that most severely deviated from the natural fire regime. Under Alternative B, the liberal use of prescribed fire would quickly restore natural forest structure and reduce the threat of catastrophic fire. The current high levels of fuel accumulation could cause high intensity fires that would kill some of the larger trees. This adverse effect, however, must be weighed against the reduced threat of catastrophic fire over large areas that would result from prescribed fire use. Impact of prescribed fire on bald eagles under Alternative B would be beneficial, long-term, and major, due to the relatively rapid rate at which the threat of catastrophic fire would be reduced and the natural forest structure restored.

Holding Action and Monitoring Effects (water and retardant drops, helispots, and spike camps) and Site Preparation Associated with Managed Wildland Fire and Prescribed Fire (hand line, snagging, mop-up)

Because wildland and prescribed fire use would increase greatly under Alternative B, impacts associated with management of these fires would also increase over Alternative A. Construction of hand lines would have an adverse effect on bald eagles if large trees or snags were cut in areas used by eagles. This would generally not occur, since the management goals of this plan would be to retain old growth forest attributes, and hand lines would avoid these features to the greatest extent feasible. Water or retardant drops would have an adverse effect on eagles if a nest were struck or if nesting birds were disturbed by aircraft. However, no eagles currently nest in the park, and any future nests would be identified as a sensitive resource to avoid. Helispots would generally be constructed in open areas away from the tall trees favored by eagles. Snagging would have an adverse effect on eagles if important perching or roosting snags were cut, but snags would only be cut if they represented a threat to life and safety, were a threat to control of a wildland fire, or presented a hazard to property or park resources. Some snags would be lost in fires, but new snags would be created from fire mortality. Overall, impact of fire management actions under Alternative B would be adverse, short-term, and minor, primarily from actions affecting snags.

Fuel Reduction by Hand or Machine

Aggressive Reduction Techniques.

Mechanical Tree and Shrub Removal. Heavy machinery, such as feller-bunchers, would be used for forest thinning in wildland/urban interface and other special treatment areas. This could have an adverse effect on bald eagles if large, old-growth trees were removed, but prescriptions would only allow the removal of trees no greater than 20” in diameter. This would have localized adverse effects on bald eagles in Yosemite Valley, since trees of this size may be the largest ones in some areas, although bald eagles are very rare in the Valley. Neither pile burning in association with these operations nor chipping would affect eagles. Thinning by use of heavy machinery under Alternative B would have a negligible, adverse, long-term impact on bald eagles.

Conventional Tree and Shrub Removal. Skidding and grappling would be used to remove cut material for wildland/urban interface and other Special Management Areas. Such operations would generally cause a considerable amount of ground disturbance, but such impacts would not adversely affect bald eagles. The eagles, however, would benefit from the reduced risk of catastrophic fire from the removal of fuels. Impacts of skidding and grappling on bald eagles under Alternative B would be beneficial, long-term, and negligible.

Passive Reduction and Lower Profile Techniques.

Hand Cutting. Same as Alternative A—negligible, adverse, short-term.

Girdling. Girdling of trees, which would occur under Alternative B, could be used as a treatment to create more snags for use by bald eagles, although eagles are seldom seen in the treatment areas. Effects would be beneficial, long-term, and negligible.

Cumulative Impacts

Past, present, and reasonably foreseeable projects that could affect bald eagles would be the same as under Alternative A with beneficial, long-term, and minor impacts, based upon the continuing recovery of the species and implementation of broad-ranging plans that would further benefit the species. Considered in combination with the effects of Alternative B, cumulative impacts would be beneficial, long-term, and moderate.

Conclusion

Alternative B would have a moderate, beneficial, long-term effect on bald eagles, primarily from a rapid reduction in the threat of catastrophic fire that exists over much of their habitat.

Mountain Yellow-Legged Frog *(Rana muscosa)* - Under Review for Federal Listing

The USFWS has determined that listing of this species is warranted but precluded. Mountain yellow-legged frog habitat was identified through wildlife habitat relationships analysis (Mayer and Laudenslayer 1988).

Potential for Impacts from Catastrophic Fire

Conditions would be the same as in Alternative A. Effects would be beneficial, short-term, and negligible, due to the gradual reduction in the risk of catastrophic fire.

Fire Management Treatments

Managed Wildland Fire

Over 98% of high-quality mountain yellow-legged frog habitat would occur in the Fire Use Unit, but over 90% of this habitat has not deviated from its natural fire regime. Managed wildland fire would have little effect on mountain yellow-legged frogs, other than maintaining the natural fire regime. Managed wildland fire would increase greatly under Alternative B. Some benefit to mountain yellow-legged frogs would be derived from reduction in the risk of catastrophic fire in the small proportion of the habitat that has been altered from fire suppression. Impact of managed wildland fire on mountain yellow-legged frogs under Alternative B would be beneficial, long-term, and minor.

Prescribed Fire

Use of prescribed fire would increase greatly under Alternative B, but with only 2% of mountain yellow-legged frog habitat occurring in the Fire Suppression Unit, and so little of its habitat in need of burning, prescribed fire would have a minor effect on the species. Some benefit to mountain yellow-legged frogs would be derived from reduction in the risk of catastrophic fire in the small proportion of habitat out of its natural fire return interval. Impact of prescribed fire on mountain yellow-legged frogs under Alternative B would be beneficial, long-term, and minor.

Holding Action and Monitoring Effects (water and retardant drops, helispots, and spike camps) and Site Preparation Associated with Managed Wildland Fire and Prescribed Fire (hand line, snagging, mop-up)

Because use of wildland and prescribed fire would increase greatly under Alternative B, impacts from actions taken to manage these fires would also increase. Effects from water dipping and water drops would likely increase under Alternative B, but would be mitigated by avoiding dipping from waters containing mountain yellow-legged frogs, bullfrogs, or non-native fish. Likewise, helispots, spike camps, and hand lines would be sited away from mountain yellow-legged frog habitat. Overall impact of prescribed and wildland fire management actions on mountain yellow-legged frogs under Alternative B would be adverse, long-term, and minor, due primarily to the risks associated with water drops. Mitigation: Comply with established protocols to protect resources; identify locations of sensitive resources to avoid impacts; use MIMT.

Fuel Reduction by Hand or Machine

Aggressive Reduction Techniques.

Mechanical Tree and Shrub Removal. This treatment would not be used in or near any mountain yellow-legged frog habitat.

Conventional Tree and Shrub Removal. These techniques would cause considerable ground disturbance, but would be unlikely to affect mountain yellow-legged frogs because they would not be used in wetland areas. Impact to mountain yellow-legged frogs from skidding and grappling under Alternative B would be adverse, short-term, and negligible.

Passive Reduction and Lower Profile Techniques.

Hand Cutting. No populations of mountain yellow-legged frogs are known to occur in areas where hand-cutting would be applied. Therefore, this action, along with pile burning, would have no effect on mountain yellow-legged frogs.

Cumulative Impacts

Past, present, and reasonably foreseeable projects that would affect yellow-legged frog habitat would be the same as in Alternative A. Impacts from these projects would be beneficial, long-term, and moderate, based primarily on active efforts to protect and restore the species, and the implementation of land management plans that would provide more ecosystem-based management of habitats. In combination with the effects of Alternative B, cumulative impacts would remain beneficial, long-term, and moderate.

Conclusion

Impact to mountain yellow-legged frogs from Alternative B would be beneficial, long-term, and minor, due primarily to the return of a natural fire regime to the small area of habitat that has departed from a natural fire return interval.

Yosemite Toad (*Bufo canorus*) - Under Review for Federal Listing

The USFWS has determined that listing of this species is warranted but precluded. Yosemite toad habitat was identified through wildlife habitat relationships analysis (Mayer and Laudenslayer 1988).

Potential for Impacts from Catastrophic Fire

Catastrophic fire has a low potential for impact on Yosemite toads. The majority of lodgepole and whitebark pine forests that surround the meadows and pond habitats have not seriously diverged from a natural fire return interval. Over 67% of suitable Yosemite toad habitat and 79% of high-quality habitat are within one median fire return interval. This, coupled with the preference of the species for moist habitats, makes it unlikely that catastrophic fire would have an appreciable effect on Yosemite toads. Conceivably, fires adjacent to occupied habitat would have an adverse effect if sedimentation increased, but such effects have not been demonstrated. Impact of the reduction in risk of catastrophic fire on Yosemite toads under Alternative B would be beneficial, short-term, and negligible.

Fire Management Treatments

Managed Wildland Fire

Use of wildland fire would increase greatly under Alternative B. Over 95% of Yosemite toad habitat occurs in the Fire Use Unit, but over 67% of this habitat is within one median fire return interval. Managed wildland fire would have a minor effect on Yosemite toads and would help maintain the natural fire regime. Yosemite toads would benefit from reduction in the risk of catastrophic fire in the proportion of habitat that has deviated from the natural fire regime. Impact of managed wildland fire on Yosemite toads under Alternative B would be beneficial, long-term, and minor.

Prescribed Fire

Same as Alternative A—beneficial, long-term, and negligible.

Holding Action and Monitoring Effects (water and retardant drops, helispots, and spike camps) and Site Preparation Associated with Managed Wildland Fire and Prescribed Fire (hand line, snagging, mop-up)

Because use of wildland and prescribed fire would increase greatly under Alternative B, impacts associated with management of these fires would be expected to increase, but the types of effects would be the same as described in Alternative A. Overall impact of prescribed and wildland fire management actions on toads under Alternative B would be adverse, long-term, and minor, due primarily to the risk to remaining populations from water drops and retardant contamination. Mitigation: Identify locations of Yosemite toad populations and avoid involvement of these areas in water and retardant drops.

Fuel Reduction by Hand or Machine

Aggressive Reduction Techniques

Mechanical Tree and Shrub Removal. The use of heavy machinery, such as feller-bunchers would not affect Yosemite toads because the equipment would not be used in wet habitats, and no known Yosemite toad populations occur in hand or machine treatment areas.

Conventional Tree and Shrub Removal. Skidding and grappling techniques would not be used in the remote areas where Yosemite toads occur. Impact would be adverse, short-term, and negligible.

Passive Reduction and Lower Profile Techniques

Hand Cutting. Same as Alternative A—beneficial, long-term, and negligible.

Cumulative Impacts

Past, present, and reasonably foreseeable projects would be the same as described in Alternative A. Impacts on the Yosemite toad would be beneficial, long-term, and moderate, based primarily on active efforts to protect and restore the species, and the implementation of land management plans that would provide more ecosystem-based habitat management. Considered in combination with the impacts of Alternative B, cumulative impacts would be beneficial, long-term, and moderate.

Conclusion

Impact to the Yosemite toad from Alternative B would be beneficial, long-term, and minor, due primarily to the return of a natural fire regime to habitat that has departed from a natural fire regime, although the wet habitats of Yosemite toads would unlikely be directly affected.

California Spotted Owl (Strix occidentalis occidentalis)

California spotted owls are found throughout the Sierra Nevada, from lower elevation oak and ponderosa pine forests up to 7,600 feet elevation red fir forests. There are approximately 100 known and probable spotted owl sites in Yosemite National Park. While spotted owls can coexist with extensive fires of varying intensities within their habitats, severe wildland fire in mixed-conifer forests may represent the greatest threat to existing spotted owl habitat in Yosemite (Weatherspoon et al. 1992). California spotted owl habitat was identified through wildlife habitat relationships analysis (Mayer and Laudenslayer 1988).

Potential for Impacts from Catastrophic Fire

Under a natural fire regime, much of the spotted owl habitat in the Sierra was subject to frequent, low-intensity fires. Under current conditions, approximately 49% of high-quality spotted owl habitat has missed over four fires under the median fire return interval departure criteria. About 54% of high-quality spotted owl habitat would occur in the Fire Suppression Unit, where the greatest threat of catastrophic fire would exist from severely high fuel loads. Without treatment, these conditions would likely result in large stand-replacing fires, which would destroy spotted owl habitat by reducing the canopy closure that defines good habitat. In addition, the growth of dense understory vegetation could affect habitat quality by making foraging by spotted owls more difficult. Under Alternative B, these conditions would be rapidly reduced through prescribed and managed wildland fire. Impact of the reduction of risks of catastrophic fire on California spotted owls under Alternative B would be beneficial, long-term, and major.

Fire Management Treatments

Managed Wildland Fire

Effects would be similar to those described in Alternative A, except under Alternative B managed wildland fire would greatly increase. Adverse effects from wildland fire could be minimized through reduction of fuel loading in known nesting and roosting areas through the use of spring prescribed fires, which would disrupt fuel continuity and reduce the chance of stand-replacing fires in these areas (Weatherspoon et al., 1992). The impact of managed wildland fire on California spotted owls would be beneficial, long-term, and major, based on lessening the threat of catastrophic fires, over a 10 to 15 year period.

Prescribed Fire

Effects would be similar to those described in Alternative A. The use of prescribed fire under Alternative B would have major, beneficial, long-term impact on California spotted owls, primarily through the reduction of the threat of catastrophic fire and the restoration of a more natural forest structure. Reduction of fuels in spotted owl roosting and nesting habitat through low-intensity burns or mechanical thinning at appropriate times of the year would minimize adverse impacts.

Holding Action and Monitoring Effects (water and retardant drops, helispots, and spike camps) and Site Preparation Associated with Managed Wildland Fire and Prescribed Fire (hand line, snagging, mop-up)

Same effects as Alternative A. Overall, actions taken to manage wildland and prescribed fire under Alternative B would have a minor, adverse, long-term effect on spotted owls through possible disturbance and habitat alteration in roosting and nesting sites. Adverse effects could be mitigated by locating all spotted owl sites in a treatment area and avoiding impacts to them.

Fuel Reduction by Hand or Machine

Aggressive Reduction Techniques.

Mechanical Tree and Shrub Removal. Under Alternative B, forests in wildland/urban interface areas would be thinned and biomass would be reduced with the use of heavy machinery, such as feller-bunchers. To provide protection for developed areas, wildland/urban interface areas would be thinned to the lower end of the range of natural variability (as described in Chapter 2, table 2.3). This would result in the removal of many secondary canopy trees up to 20” in diameter, and removal of some snags. The reduction in canopy cover and number of snags would affect the quality of these areas to spotted owls. Knowing and avoiding spotted owl roosting and nesting sites in treatment areas would allow impacts to be minimized resulting in adverse, long-term, and minor impacts.

Conventional Tree and Shrub Removal. The use of skidding and grappling to remove cut and down fuels in wildland/urban interface and other Special Management Areas would help reduce fuel loading and the risk of catastrophic fire. The clearing of understory vegetation would also create more favorable foraging conditions for spotted owls. Adverse effects on spotted owls would occur if many large, downed logs were removed from the forest, because this could result in a decrease in northern flying squirrel, an important prey item of spotted owls. Impact of biomass removal on spotted owls under Alternative B would be adverse, long-term, and minor, through localized effects on forest habitats.

Passive Reduction and Lower Profile Techniques.
Hand Cutting. Under Alternative B, hand cutting near developments and roads would have an adverse effect on spotted owls if canopy closure were reduced enough to affect its quality to spotted owls. This is especially true for roosting and nesting sites, which require a high degree of canopy closure, and where developed areas interface with dense forest. Adverse impacts could be avoided through determining whether spotted owls were present in the treatment area. The clearing of understory vegetation would improve foraging conditions for spotted owls. Impact of hand cutting and burning on California spotted owls under Alternative B would be beneficial, long-term, and minor, based upon possible return of treated areas to a more natural forest structure.

Chipping. The equipment used to chip material would be extremely loud and would disturb nearby spotted owls. Such impact, however, would be adverse, short-term, and negligible.

Girdling. Girdling of trees as a thinning technique would create snag habitat for spotted owls, an effect that would be beneficial, long-term, and moderate to major. An adverse effect would occur if the snags were removed while the owls are using them.

Cumulative Impacts

Past, present, and reasonably foreseeable projects would be the same as described in Alternative A. Effects of reasonably foreseeable projects would be beneficial, long-term, and moderate. Considered in combination with the effects of Alternative B, cumulative impacts would be beneficial, long-term, and moderate to major.

Conclusion

Alternative B would have major, beneficial, long-term impact on spotted owls, from a rapid reduction in the threat of catastrophic fire and restoration of natural forest structure through wildland and prescribed fire. Fuels management in known spotted owl roosting and nesting habitat would minimize adverse impacts.

Pacific Fisher *(Martes pennanti)* - Under Review for Federal Listing

Pacific fisher habitat was identified through wildlife habitat relationships analysis (Mayer and Laudenslayer 1988).

Potential for Impacts from Catastrophic Fire

Catastrophic fire has the potential for severely altering fisher habitat by reducing canopy closure and forest floor features that are important components of suitable fisher habitat. Thirty-five percent of all potential fisher habitat and 32% of high-quality fisher habitat has missed more than four fires. This indicates that catastrophic fire could have a substantial effect on fishers. Studies, observations, and roadkills of fishers in Yosemite indicate that the highest density of fishers is found south of Yosemite Valley; especially along the Wawona Road and Glacier Point Road corridors. Much of the area along Wawona Road has missed more than four fire return intervals (map 2-5), making it among the areas at highest risk of catastrophic fire. As such, catastrophic fire in Yosemite has a high potential for adverse impacts on fishers. Under Alternative B, through increased use of managed wildland and prescribed fire fuel loading would be rapidly reduced, thereby restoring natural forest structure, and maintaining a natural fire regime. The effect of Alternative B to fishers would be beneficial, long-term, and major, because of the reduced potential for catastrophic fire.

Fire Management Treatments

Managed Wildland Fire

The area treated with fire would greatly increase under Alternative B, through the increase in managed wildland fires and the re-ignition of suppressed fires in the Fire Use Unit. Seventy-seven percent of all fisher habitat and 69% of high-quality habitat in the park would occur in the Fire Use Unit. Managed wildland fire, therefore, would have the potential for achieving and maintaining reduced fuel loading and natural forest structure, as a benefit to fishers. Current high levels of fuel loading in some areas, however, indicate that fire intensity would be great in some areas, reducing the large, woody debris, and large snags that are important habitat components. Also, over the short-term, shrub cover would be reduced. Overall, wildland fire would be beneficial to fishers. Under Alternative B, managed wildland fire would have a major, beneficial, long-term effect on fishers.

Prescribed Fire

Use of prescribed fire would greatly increase under Alternative B. Because prescribed fires could be used to target habitats that have been most severely altered by a history of fire suppression and are at the greatest risk of catastrophic fire, Alternative B would have the potential to yield great resource benefit. This would be especially true for fishers, because the area of the park believed to support the highest density of this species is in the Fire Suppression Unit, which is among the most severely deviated from a natural fire regime.

High fuel loading in some areas could result in prescribed fires of high enough intensity to consume large woody debris, which is an important component of fisher habitat. Also, large snags, which are of high value to fishers, would be consumed. Prescribed fires conducted with a concern for fishers would minimize these losses. While reduction in the risk of catastrophic fire would yield the greatest, long-term benefit to fishers, fire prescriptions should strive to conserve habitat elements that are important to fishers (e.g., large trees, snags, and large woody debris). Impact of prescribed fire on fishers under Alternative B would be beneficial, long-term, and major, based on a rapid reduction in the threat of catastrophic fire and ecosystem restoration. Care, however, must be taken to preserve habitat features that are important to fishers.

Holding Action and Monitoring Effects (water and retardant drops, helispots, and spike camps) and Site Preparation Associated with Managed Wildland Fire and Prescribed Fire (hand line, snagging, mop-up)

Same as Alternative A—adverse, long-term, and minor effect on fishers, primarily from possible reduction in the number of snags.

Fuel Reduction by Hand or Machine

Aggressive Reduction Techniques.

Mechanical Tree and Shrub Removal. Under Alternative B, some forests in wildland/urban interface areas would be treated using heavy machinery to thin forests and reduce biomass. To provide protection for developed areas, prescriptions for wildland/urban interface areas would produce forest habitat at the lower end of the natural range of variability (in the target values for tree density and fuel loading). This could have an adverse effect on fisher habitat in these areas by reducing habitat complexity, and by removing key habitat features, such as snags and large down woody debris. Heavy equipment would also cause short-term impact associated with noise and disturbance. Biomass removal under Alternative B would have a minor, adverse, long-term effect on fishers.

Conventional Tree and Shrub Removal. The use of skidding and grappling machinery to remove large, woody debris would have an adverse effect on fishers by reducing habitat complexity; especially from the loss of large, down trees. There would also be a reduction in the threat of catastrophic fire from the resulting fuel reduction. Impacts would be adverse, long-term, and negligible.

Passive Reduction and Lower Profile Techniques.

Hand Cutting. Same as Alternative A—adverse, long-term, and negligible.

Chipping. The noise of chipping machines would cause short-term disturbance near developed areas. Chips spread too thickly would suppress understory vegetation, which would adversely effect fishers, but the areas where this technique would be used are already marginal habitat due to existing levels of human disturbance and habitat fragmentation. Impacts would be adverse, short-term, and negligible.

Cumulative Impacts

Past, present, and reasonably foreseeable projects would be the same as in Alternative A. Effects of reasonably foreseeable projects would be beneficial, long-term, and moderate. Alternative B would reduce the potential for catastrophic fire, thus, considered in combination with the impacts of Alternative B, the cumulative impact would be beneficial, long-term, and moderate to major.

Conclusion

Overall, Alternative B would have a major, beneficial, long-term effect on fishers by quickly reducing the threat of catastrophic fire and restoring natural forest structure through the use of wildland and prescribed fires, especially in the southwest part of the park where fisher densities are believed to be highest and where fuel loading has reached critical levels. Fuel-reduction actions, however, must take into account preservation of habitat features, such as snags and large down woody debris, which are important to fishers.

Great Gray Owl *(Strix nebulosa)* – California Endangered

Great gray owl habitat was identified through wildlife habitat relationships analysis (Mayer and Laudenslayer 1988).

Potential for Impacts from Catastrophic Fire

Approximately 35% of all great gray owl habitat and 19% of high-quality great gray owl habitat has missed more than four fires, under the median analysis. This means, overall, catastrophic fire has the potential for substantial effects on the park population of great gray owls. Shading of nest sites is an important factor affecting nest site selection and nesting success because here, at the furthest southern extent of the species range, overheating of incubating adults and nestlings can occur (Reid 1989). In a catastrophic fire, nesting snags would be lost, and trees shading surviving snags would be sparse. More snags would be created in a fire, but they would not be suitable without shade, and with few living trees, long-term recruitment of snags would be reduced.

At lower elevations, on wintering areas, catastrophic fire would have little effect on great gray owls. The A-Rock fire that burned over Foresta in 1990 has had no detectable effect on the use of Big Meadow by wintering great gray owls, and may have actually opened up more foraging habitat (Thompson, personal observation). The rapid treatment of accumulated fuels under Alternative B through prescribed and wildland fires would greatly reduce the threat of catastrophic fire. The impact of Alternative B would be beneficial, long-term, and moderate, given the substantial portion of great gray owl habitat over which there is a threat of catastrophic fire.

Fire Management Treatments

Managed Wildland Fire

Effects would be similar to those in Alternative A, except under Alternative B managed wildland fire would be greatly increased. Resource protection measures in great gray habitat should take into account preservation of habitat features that are important to the owls. Considerations regarding adverse effects, however, must be weighed against the risk of catastrophic fire, to prevent an emphasis on fire suppression in the Fire Use Unit. The effect of managed wildland fire on great gray owls under Alternative B would be beneficial, long-term, and major, based upon the large amount of great gray owl habitat that has large departures from the median fire return interval and the rapid treatment of this habitat that would occur.

Prescribed Fire

Under Alternative B, use of prescribed fire would greatly increase and would concentrate on areas that have most severely deviated from the natural fire cycle. Impact of prescribed fire on great gray owls under Alternative B would be beneficial, long-term, and major, based upon the improvement of habitat, and the reduction in the threat of catastrophic fire that would occur. Prescriptions for fires in great gray owl habitat would take into consideration the preservation of large, old snags that are important to the owls.

Holding Action and Monitoring Effects (water and retardant drops, helispots, and spike camps) and Site Preparation Associated with Managed Wildland Fire and Prescribed Fire (hand line, snagging, mop-up)

Effects would be similar to those in Alternative A, but the number of treatment acres would be greater. Overall, actions taken to manage wildland and prescribed fires would have a minor, adverse, long-term effect on great gray owls under Alternative B. This is primarily based upon possible impacts associated with snag removal, which would be strictly limited in great gray owl habitat.

Fuel Reduction by Hand or Machine

Aggressive Reduction Techniques.

Mechanical Tree and Shrub Removal. Under Alternative B, heavy machinery would be used to thin forests and reduce biomass in wildland/urban interface areas. To provide protection for developed areas, prescriptions for wildland/urban interface areas would produce forest habitat at the lower end of the range of natural variability (for target values for tree density and fuel loading).

This could have an adverse effect on great gray owls in these areas by reducing the density of snags and nest-shading trees. Heavy equipment would also cause short-term impact associated with noise and disturbance. Before such treatments were used in an area, the occurrence of great gray owls would be determined, and steps taken to preserve important habitat features and minimize disturbance. The potential for adverse effects on great gray owls would be most likely at Crane Flat, Hodgdon Meadow, Wawona Meadow, and along the Glacier Point Road, where the species is known to occur. Impact to great gray owls from thinning by heavy machinery would be adverse, short-term, and minor.

Conventional Tree and Shrub Removal. The use of skidding and grappling equipment to reduce fuel loading would have an adverse effect on great gray owls if it were to occur in nesting and foraging habitat, where disturbance could cause reproductive failure. Before such operations were undertaken in potential great gray owl habitat, it would be necessary to determine if the owls are present. Impact to great gray owls from thinning by heavy machinery would be adverse, short-term, and minor if actions were taken into account for protection of the owls.

Passive Reduction and Lower Profile Techniques.
Hand Cutting. Effects would be similar to those in Alternative A, but would be in combination with other biomass removal activities. Impact of hand cutting on great gray owls under Alternative B would be adverse, long-term, and minor, based upon potential disturbance of hunting and nesting owls, and reduction in snag density.

Chipping. Same as Alternative A—adverse, short-term, and minor.

Girdling. Girdling would be used as a tool for maintaining snag density, resulting in minor to beneficial, long-term, and moderate impacts.

Cumulative Impacts

Past, present, and reasonably foreseeable projects that would affect great gray owls would be the same as in Alternative A. The effects of reasonably foreseeable projects would be beneficial, long-term, and moderate. Considered in combination with the effects of Alternative B, cumulative impacts would be moderate, beneficial and long-term.

Conclusion

The impact of Alternative B on great gray owls would be beneficial, long-term, and moderate, based primarily on a rapid reduction in the threat of catastrophic fire. Actions taken to manage wildland and prescribed fires, and mechanically manage fuels would have locally adverse effects on great gray owls if they reduced snag density or caused disturbance of nesting or hunting owls.

Willow Flycatcher *(Empidonax trailii)* – California Endangered

Willow flycatcher habitat was identified through wildlife habitat relationships analysis (Mayer and Laudenslayer 1988).

Potential for Impacts from Catastrophic Fire

Sixty percent of all potential willow flycatcher habitat and 60% of high-quality habitat in the park has missed more than four fires. This means a large proportion of Yosemite's willow flycatcher habitat is vulnerable to catastrophic fire, although local conditions (i.e., moisture in meadows) would have the greatest influence on the potential for fire to affect specific habitat components – willow and their consumption by fire – that most directly affect the flycatchers.

The risk of catastrophic fire would be rapidly reduced under Alternative B through the widespread use of wildland and prescribed fires thus the impact of Alternative B would be beneficial, long-term, and minor, based on the amount of habitat that is outside of the natural fire regime, but moderated by the inherent low fire frequency and intensity associated with meadow habitats.

Fire Management Treatments

Managed Wildland Fire

Effects would be similar to those in Alternative A, except that more acres would be treated. Use of wildland fire under Alternative B would result in minor, beneficial, long-term impact on willow flycatchers because managed wildland fire would reduce the threat of catastrophic fire. Alternative B would return fire to its role in maintenance of willow habitat as well. Fires that occur in habitat occupied by willow flycatchers would cause possibly adverse effects, because of accumulated fuels. In meadows known to be occupied by willow flycatchers, protection measures would be taken to protect individual nests and local habitat. The amount of decayed and decadent grown of willows in the immediate area would be reduced because of the regeneration of lightly-burned willows Other mitigation measures would include timing re-ignitions to occur outside of the nesting season. .

Prescribed Fire

Effects would be similar to those in Alternative A, but the amount of prescribed fire would be greater. Prescribed fire would help restore habitat and protect it from catastrophic fire, and would be liberally applied under Alternative B. Impact of prescribed fire on willow flycatchers would be beneficial, long-term, and moderate, based upon the reduction in the threat of catastrophic fire that would occur, and regeneration of lightly-burned willows. Prescribed fires likely to affect meadow habitats known to be occupied by willow flycatchers should be evaluated for potential adverse effects and managed to minimize impacts. Burning at specific sites would not occur during the period of nesting and fledging (May – September), and willows would be protected from intense fires by clearing dead and decadent fuels from around and within willow shrubs. If possible, meadow habitats with recent flycatcher nests would be burned in stages, so not all potential nest shrubs would be damaged at once. Surveys would be conducted to locate willow flycatchers in the park, so appropriate fire management actions can be taken.

Holding Action and Monitoring Effects (water and retardant drops, helispots, and spike camps) and Site Preparation Associated with Managed Wildland Fire and Prescribed Fire (hand line, snagging, mop-up) Same as Alternative A—minor adverse, short-term effect on willow flycatchers, mostly from potential impacts of conducting helicopter operations out of Wawona Meadow.

Fuel Reduction by Hand or Machine

Aggressive Reduction Techniques

Mechanical Tree and Shrub Removal. Under Alternative B, use of heavy machinery to thin forests and reduce biomass in wildland/urban interface areas would be greatest. To provide protection for developed areas, prescriptions for wildland/urban interface areas would produce forest habitat at the higher end of the range of natural variability (for target values for tree density and fuel loading). Biomass removal, however, would not affect willow flycatcher habitat, since fuels in these areas do not need thinning. Equipment noise might cause some disturbance. Impact of biomass removal on willow flycatchers under Alternative B would be adverse, short-term, and negligible.

Conventional Tree and Shrub Removal. The use of skidding and grappling to reduce fuel loads adjacent to developed areas would have little effect on willow flycatchers because the meadow habitats the flycatchers use would not be subject to this treatment. Impacts would be adverse, short-term, and negligible.

Passive Reduction and Lower Profile Techniques

Hand Cutting. Same as Alternative A—negligible effect on willow flycatchers, because these operations would not usually occur in meadow habitats, where large fuels are already sparse, and the moist conditions would typically not carry fire.

Chipping. Chipping would occur, but well away from willow flycatcher habitat.

Cumulative Impacts

Past, present, and reasonably foreseeable projects would be the same as in Alternative A. In aggregate the effects of reasonably foreseeable future actions would be minor, beneficial and long-term. Other foreseeable projects with adverse impacts would affect small areas and/or have minor effects over larger areas. The *Yosemite Fire Management Plan* under Alternative B would affect habitats changed by years of fire exclusion by reducing the risk of catastrophic fire in some areas. Considered in combination with the effect of Alternative B, the cumulative impacts would be beneficial, long-term, and minor.

Conclusion

The impact of Alternative B on willow flycatchers would be beneficial, long-term, and moderate based primarily on rapid reduction of the threat of catastrophic fire through use of wildland and prescribed fires. These techniques, however, must be carefully applied to avoid adverse impacts on the few remaining willow flycatchers remaining in Yosemite.

Summary Conclusion, Special-Status Species – Animals

The greatest threat to special-status species would be catastrophic fire. This alternative would reduce the potential of catastrophic fire, compared to Alternative A. Special measures, as identified, would be used to mitigate impacts. There would be no impairment from the effects of this alternative. See Appendix 9 for mitigation developed in consultation with USFWS.

Physical Environment

Alternative B would have the greatest amount of annual prescribed fire and wildland/urban interface treatment among the alternatives, consequently this alternative will provide the quickest path toward accomplishing ecosystem restoration and fuel reduction objectives in many areas of the park and El Portal.

Watersheds, Soils, and Water Quality

In the action alternatives, the majority of the park (621,059 acres) would be in the Fire Use Unit where natural processes would be at the core of the fire management program. Approximately

25% of the Merced River watershed and 19% of the Tuolumne River watershed show moderate to high departures from median fire return intervals. These are the areas with the greatest potential for catastrophic fire and thus the areas where ecosystem restoration and fuel reduction treatment may be needed to restore the natural fire regime and provide protection to people and developed areas. The Suppression Unit would comprise 76,664 acres of the Merced River watershed and 51,379 of the Tuolumne River watershed. Prescribed fire units, some of which are in the Fire Use Unit, would include 77,154 acres in the Merced River watershed and 79,094 acres in the Tuolumne River watershed.

Potential for Impacts from Catastrophic Fire

Because of aggressive actions that would be used in the burn units to reduce fuels, there is the potential for creating strategically located burns to break up the continuity of fuels and vegetation along the vertical gradients within the watersheds. These burned areas would not eliminate the potential for high-severity fires in the watershed, but they would reduce the potential for large fires burning all along the vertical gradient (from ridge, down through mid-slope and bottom-slope/riparian) over large areas of a watershed. This in turn would reduce the potential for large, high-severity fires during the life of the plan.

Areas of hydrophobic soils would exist, but with breaks in the vertical gradient, smaller increases in water yield and peak flows would result, compared to Alternative A. Likewise, the increase in sediment and nutrient yields would be less than in Alternative A, because of the smaller amounts of intrusion by fire into the lower slopes of the watershed. Fire intrusion would create less stable banks and channel margins, but the effects would be localized, and less than under Alternative A, with less severe stream channel response and a quicker recovery of riparian vegetation which would stabilize the stream system. This would benefit water quality. The potential would continue to exist for high-severity fires with adverse, moderate, and potentially long-term effects but the overall effects of Alternative B on soil and watershed conditions in regards to catastrophic fire would be beneficial, long-term, and moderate.

Fire Management Treatments

Managed Wildland Fire

Approximately 243,811 acres of the Merced River watershed, and 377,099 acres of the Tuolumne River watershed would be within the Fire Use Unit. Burn units would make up 21,261 acres in the Merced River watershed and 27,650 acres in the Tuolumne River watershed. Most of the vegetation in this area is within its natural range of variability or has only missed one fire. Fire in the duff layers would continue as it has, to spread within the watershed under variable conditions, ranging from generally light to locally severe, creating only small patches of extremely hydrophobic soils. In areas of high fuel loading, soils would be exposed to longer resident time and higher temperature than would occur within the natural range of variability. Fire would also keep plant communities within their natural range of variability. The effects would not typically be on a watershed-wide scale; fire would typically burn along ridge tops and upper slopes, with only partial intrusion into slope bottoms and riparian areas. Water yield and peak flows would increase only slightly, over a short-term, and within a small range of variability, thus sediment and nutrient yield would generally only see short-term fluctuations. As a result, there would be negligible channel widening, with short-term recovery of riparian systems. Overall, the soil and watershed effects within these areas would be beneficial, short-term, and moderate, as in Alternative A.

Re-ignition clause. The effects under the re-ignition clause would be the same as effects described under managed wildland fire.

Holding Action and Monitoring Effects (water and retardant drops, helispots and spike camps). Helispots would be located more than 150 feet away from any river, and generally much further away. Because of the relatively small surface area of a helispot, they would typically have little effect upon water quality or other watershed attributes. Spike camps for monitoring and holding crews would have the potential to be larger under Alternative B, however, effects of camps would be generally local. These actions would be potentially more widespread due to the increase in managed wildland fire, but impacts to soils and watersheds would be the same as under Alternative A, adverse, short-term, and minor.

Retardant and suppressant compounds would not typically move into ground water or into surface water from runoff. They would be used carefully around surface waters because of potential effects upon aquatic organisms. When retardants and suppressants are in use, pilots and engine crews would be directed to avoid dropping retardants within 300 feet of wetlands, streams, and lakes. Most fire retardants contain fertilizer type compounds, including ammonia and nitrogen that can cause changes in pristine terrestrial and aquatic ecosystems, especially those otherwise low in nitrate/ammonia type nutrients. Additionally, ammonia itself can be quite toxic in aquatic habitats. Some retardants have contained preservatives that release cyanide. Impacts to soils and watersheds would be the same as under Alternative A, making the effect of using retardant and suppressant adverse, short-term, and negligible to minor.

Prescribed Fire

Prescribed fire would typically be used in areas with unnaturally high fuel buildup and in Special Management Areas. The total acreage in prescribed fire units is 77,153 acres in the Merced River watershed and 79,094 acres in the Tuolumne River watershed. This alternative would result in a more aggressive program of prescribed fire use (2,520 to 12,872 acres burned per year), but this would also accompany similarly aggressive actions to restore plant community structure through mechanical thinning and hand thinning (both are discussed below). Due to the controlled conditions of prescribed fire (fuel moisture, weather conditions, time of day, spatial pattern of ignition and other factors), the effects of projects on a local scale would be similar to those under Alternative A. However, because of the greater number of acres being treated through prescribed fire, Alternative B would reduce the potential for large, high-severity fires on a watershed scale. Burns would reduce the continuity of fuels on the vertical gradient in more areas throughout the watershed, compared to that of Alternative A. Fire in the duff layers would spread under variable conditions, but not with enough severity to cause extensive areas of hydrophobic soil. Consequently, wildland fire would have less of an affect on water yield, peak flows, sediment yield, and nutrient yield in this alternative than under Alternative A. Because of these treatments, the effects of prescribed fire on watershed conditions would be beneficial, long-term, and major.

Site Preparation Associated with Managed Wildland Fire and Prescribed Fire (hand line, snagging, mop-up)

These activities would have the potential to increase soil erosion, because vegetation and organic litter would be removed in order to stop or hold a fire. Erosion would be greatest along hand line that follows steep gradients. Soil compaction and disturbance would occur with both hand line and mop-up. Waterbars and check dams would continue to be used as mitigation, to reduce runoff and erosion. The downed snags would make locally heavy areas of fuel and would affect water temperature and residence time on very small scales. These actions would be potentially more widespread than under Alternative A, due to the increased use of prescribed fire. Impacts to soils and watersheds would be the same—adverse, short-term, and minor.

Fuel Reduction by Hand or Machine

Aggressive Reduction Techniques.

Mechanical Tree and Shrub Removal. These activities would likely occur primarily around the wildland/urban interface, in areas where plant community structure has been altered because of the absence of fire. Of the approximately 1,285 acres of wildland/urban interface treated per year in this alternative, about half is slated for mechanical thinning. These activities generally would be followed by prescribed fire, as discussed above. The extensive use of tracked machinery in small areas would cause soil compaction and alter the biological and physical functions. Second entries into WUI areas, to remove trees up to 20 inches in diameter if prescribed fire has failed to achieve desired results, could result in long-term compaction, unless mitigations are effectively utilized. Mitigation would include running the machinery only over snow, frozen soil, or a bed of crushed vegetation. While aggressive reduction techniques would reduce the potential for high-severity fire, the impacts on soils would be adverse, long-term, and minor. Mitigation, including limiting activities within 150 feet of a stream to less than five percent of the total area, should buffer the effects of ground disturbance on the aquatic community. In combination with the prescribed burn program, the effects of mechanical treatment, in terms of reducing the potential for watershed impacts (on water yield, peak flow, sediment yield, nutrient yield and stream system response) of large, high-severity fire over the long-term, would be beneficial and major

Conventional Tree and Shrub Removal. Skidding would be used in parts of the wildland/urban interface. The extensive use of tracked or rubber tired machinery in small areas would cause soil compaction and alter the biological and physical functions of these areas. Second entries into WUI areas, to remove trees up to 20 inches in diameter if prescribed fire has failed to achieve desired results, could result in long-term compaction, unless mitigations are effectively utilized. Mitigation would include running the machinery only over snow, frozen soil, or a bed of crushed vegetation. These activities and equipment-use combinations could disrupt the duff and topsoil layers, causing erosion and increasing sediment and nutrient yield, as well as affecting water quality. However, treatment areas would not combine ridges, mid-slopes, and bottom-slopes, thereby mitigating the impact to adverse, short-term, and minor for watersheds. The impacts on soil would be adverse, long-term, and minor to moderate.

Passive Reduction and Lower Profile Techniques.

Low-Impact Skidding. This would include the use of draft animals and four wheel, all-terrain vehicles, in combination with fetching arches, to skid trees of approximately 10-20" dbh. Skidding with this technique would be infrequently used as a substitute for other, heavier types of equipment in some sites with sensitive resources. This technique would cause limited compaction and scarification of the upper duff and topsoil layers and would have only negligible effects on topsoil and duff layers. The most significant effect from dragging one end of a tree might be a skid trench less than a foot wide and a few inches deep; this impact could be lessened by using fetching arches or skidding over snow, frozen soil, or a bed of crushed vegetation. Second entries into WUI areas, to remove trees up to 20 inches in diameter if prescribed fire has failed to achieve desired results, could result in long-term compaction, unless mitigations are effectively utilized. Because of the limited use of this technique in this alternative, in most locations scarification could be raked out with hand tools, which would retard soil erosion and limit the effect upon sediment and nutrient yield in the watershed. Treatment areas would be small and would not occur in ridge, mid-slope, and bottom-slope combinations, thus effects of use would be adverse, short-term, and negligible for watersheds and soils.

Hand Cutting. These activities would be used in the Fire Use Unit and in some areas of the Suppression Unit and Special Management Areas. Because the work is labor-intensive, about 100 acres would be treated per year, although the amount would depend on how much was treated by other methods. Hand cutting activities would likely lead to soil compaction in small areas, but would have a negligible effect on duff and topsoil layers, resulting in negligible direct impacts upon watershed characteristics, including water yield, peak flows, sediment yield, nutrient yield, and stream system response. However, because of the small number of acres treated annually, the potential for large, high severity fires would remain high. Thus, the effects of hand thinning would be beneficial and potentially long-term and minor.

Pile burning. Piles would burn under variable conditions, ranging from light to locally severe, creating only patches of extremely hydrophobic soils. These patches would be expected to have altered biological and physical characteristics. Because of the small size of the areas, the biological function would return very quickly. The impact of pile burning on soils would be adverse, short-term, and minor. Overall, the watershed effects within these areas would be beneficial, short-term, and minor to moderate. The effects would not be on a watershed-wide scale; projects would be limited in scale, with boundaries typically associated with only one portion of the slope (top, mid-slope, or bottom). Water yield and peak flows would increase only slightly, and within a small range of variability, thus sediment and nutrient yield would only see short-term fluctuations. As a result, there would be negligible channel response, with short-term effects, if any, in riparian systems. Compared to Alternative A, due to the increase in area treated, the impact of pile burning on soils would be adverse, short-term, and minor to moderate. Overall, the watershed effects within these areas would be beneficial, short-term, and minor to moderate.

Chipping. Chipping would be used to reduce fuels, promote nutrient cycling, and achieve air quality objectives. Fire in chipped fuels would be generally light to moderate in intensity and would be used in project areas with boundaries that would not be of watershed or landscape scale. Effects of chipping in this alternative would be beneficial, short-term, and minor or moderate. Chips would be applied up to 1” deep. This mitigation would make the effects of chipping on soils adverse, short-term, and negligible to minor.

Girdling. The intensive nature of the work necessary to complete this action would lead to soil compaction and disturbance in small areas. Girdling would have an adverse, short-term, and negligible to minor effect on soils, watersheds, and water quality.

Cumulative Impacts

The past, present and reasonably foreseeable projects effecting the Merced and Tuolumne River watersheds would be the same as discussed under Alternative A. While the actions would reduce the potential for high severity fire, the impact on soils would be adverse. These actions would have net beneficial impacts on watershed values through either reducing the potential for high severity fire, or through reduction of watershed effects caused by restoration activities.

When considered in combination with the minor to moderately beneficial impacts of projects on lands administered by other agencies in the upper Tuolumne and Merced watersheds, the cumulative impacts of Alternative B would be beneficial, long-term, and moderate to major.

Conclusion

The actions of this alternative would have beneficial, long-term, and major impacts to watersheds, soils, and water quality. This is based upon a combination of beneficial, long-term, moderate to major impacts in Fire Use Units and the potential for areas of beneficial, long-term, and major impacts in Suppression Units. High-severity fires would likely occur during the life of the plan, but the treatments proposed would reduce the size and effects upon soils and watersheds, including the potential for adverse effects upon water yield, peak flow, nutrient yield, sediment yield, and stream system response. The potential for catastrophic fire would still exist, but the intent of the alternative would be to reduce the risk, thus there would be no impairment from the effects of this alternative.

Air Quality

Emissions

Wildland and Prescribed Fire Emissions

Air emissions associated with the amount of burning under Alternative B were estimated using the FOFEM model (see Methodology for an explanation). The results are summarized and compared to air emission levels under the current program (Alternative A) in table 4.10a. Separate estimates were made for each year from 2003 to 2009 to analyze the trends in impacts over the years. The emissions shown represent the worst-case scenario; it was assumed that all acres are being burned for the first time. In the event that a prescribed fire unit is burned more than once in the 7-year period, the emissions from that unit would be reduced by approximately 33%. Table 4.9 provides an example of the magnitude of this type of emission reduction.

Prescribed Fire Emissions Summary

To compare the estimated emissions from the various alternatives, the emissions from prescribed burns were averaged for the modeled 7-year period. These data are provided in table IV.10b.

Table IV-10a
Projected Air Emissions Associated with Various Fire Types in Yosemite National Park Under Alternative B (Alternative A emissions for comparison).

Alternative A (1991-2000 average)							
Fire Type	Acres	Fire Emissions (tons/yr) [a]					
		PM_{10}	$PM_{2.5}$	VOC	CO	NO_X	CO_2
Prescribed Burns [b]	1,495	1,087	6,551	719	12,945	370	58,557
Managed Wildland Fire [b]	2,152	1,564	9,432	1,034	18,637	532	84,305

Wildfire	5,759	6,920	5,864	3,529	76,930	2,198	387,446
Total	**9,406**	**9,571**	**8,103**	**5,282**	**108,512**	**3,100**	**530,308**

a PM_{10} = Suspended Particulate, $PM_{2.5}$ = Fine Particulate Matter, VOC = volatile organic compounds (as methane), CO = Carbon Monoxide, NOx = Nitrogen Oxides, CO_2 = Carbon Dioxide

b Based on composite emission factor for prescribed burning

Alternative B – 2003

Fire Type	Acres	Fire Emissions (tons/yr) [a]					
		PM_{10}	$PM_{2.5}$	VOC	CO	NO_X	CO_2
Prescribed Burns [b]	10,584	8,507	7,209	4,352	95,052	2,716	450,156
Managed Wildland Fire[b]	3,165	2,301	1,943	1,522	27,417	783	124,020
Wildfire	5,759	6,920	5,864	3,529	76,930	2,198	387,446
Total	**19,508**	**17,728**	**15,016**	**9,403**	**199,399**	**5,697**	**961,622**

Alternative B – 2004

Fire Type	Acres	Fire Emissions (tons/yr) [a]					
		PM_{10}	$PM_{2.5}$	VOC	CO	NO_X	CO_2
Prescribed Burns [b]	13,418	9,000	7,628	4,613	100,904	2,883	456,880
Managed Wildland Fire[b]	3,165	2,301	1,943	1,522	27,417	783	124,020
Wildfire	5,759	6,920	5,864	3,529	76,930	2,198	387,446
Total	**22,342**	**18,221**	**15,435**	**9,664**	**205,251**	**5,864**	**968,346**

Alternative B – 2005

Fire Type	Acres	Fire Emissions (tons/yr) [a]					
		PM_{10}	$PM_{2.5}$	VOC	CO	NO_X	CO_2
Prescribed Burns [b]	16,117	17,136	14,442	12,641	210,683	6,020	926,813
Managed Wildland Fire[b]	3,165	2,301	1,943	1,522	27,417	783	124,020
Wildfire	5,759	6,920	5,864	3,529	76,930	2,198	387,446
Total	**25,041**	**26,357**	**22,249**	**17,692**	**315,030**	**9,001**	**1,438,279**

Alternative B – 2006

Fire Type	Acres	Fire Emissions (tons/yr) [a]					
		PM_{10}	$PM_{2.5}$	VOC	CO	NO_X	CO_2
Prescribed Burns [b]	9,577	6,378	5,406	3,268	71,477	2,042	325,656
Managed Wildland Fire[b]	3,165	2,301	1,943	1,522	27,417	783	124,020
Wildfire	5,759	6,920	5,864	3,529	76,930	2,198	387,446
Total	**18,501**	**15,599**	**13,213**	**8,319**	**175,824**	**5,023**	**837,122**

Alternative B – 2007

Fire Type	Acres	Fire Emissions (tons/yr)[a]					
		PM_{10}	$PM_{2.5}$	VOC	CO	NO_X	CO_2
Prescribed Burns[b]	11,059	8,810	7,466	4,505	98,376	2,811	469,254
Managed Wildland Fire[b]	3,165	2,301	1,943	1,522	27,417	783	124,020
Wildfire	5,759	6,920	5,864	3,529	76,930	2,198	387,446
Total	**19,983**	**18,031**	**15,273**	**9,556**	**202,723**	**5,792**	**980,720**

Alternative B – 2008

Fire Type	Acres	Fire Emissions (tons/yr)[a]					
		PM_{10}	$PM_{2.5}$	VOC	CO	NO_X	CO_2
Prescribed Burns[b]	18,562	10,016	8,487	5,127	112,104	3,203	518,805
Managed Wildland Fire[b]	3,165	2,301	1,943	1,522	27,417	783	124,020
Wildfire	5,759	6,920	5,864	3,529	76,930	2,198	387,446
Total	**27,486**	**19,237**	**16,294**	**10,178**	**216,451**	**6,184**	**1,030,271**

Alternative B – 2009

Fire Type	Acres	Fire Emissions (tons/yr)[a]					
		PM_{10}	$PM_{2.5}$	VOC	CO	NO_X	CO_2
Prescribed Burns[b]	11,743	10,798	9,088	8,608	135,467	3,870	620,111
Managed Wildland Fire[b]	3,165	2,301	1,943	1,522	27,417	783	124,020
Wildfire	5,759	6,920	5,864	3,529	76,930	2,198	387,446
Total	**20,667**	**20,019**	**16,895**	**13,659**	**239,814**	**6,851**	**1,131,577**

a PM_{10} = Suspended Particulate, $PM_{2.5}$ = Fine Particulate Matter, VOC = volatile organic compounds (as methane), CO = Carbon Monoxide, NOx = Nitrogen Oxides, CO_2 = Carbon Dioxide

b Based on composite emission factor for prescribed burning

Table IV-10b
Average Prescribed Fire Estimated Emissions by Alternative for 2003 – 2009

Alternative B						
	Acres Burned	Emissions (tons/year) [a]				
		PM_{10}	$PM_{2.5}$	VOC	CO	CO_2
Historical Average (Alt A)	1,495	1,087	917	719	12,945	58,557
Alternative B Average	13,009	10,092	8,532	6,159	117,723	538,239
Potential Increase in Alt. B	**11,514**	**9,005**	**7,615**	**5,440**	**104,778**	**479,682**

a PM_{10} = Suspended Particulate, $PM_{2.5}$ = Fine Particulate Matter, VOC = volatile organic compounds, CO = Carbon Monoxide, CO_2 = Carbon Dioxide

Mechanical Thinning Emissions

Air emissions would be generated by machinery used in site preparation and fuel reduction activities. Motorized equipment used for cutting and removing fuels would include chainsaws, chippers, feller/bunchers, skidders, and haul trucks. Emissions from the operation of this machinery have been figured based on estimated operating hours of this equipment by park personnel clearing an average of 1,533 acres per year, which is more than fifteen times the number of acres cleared historically. Estimated air emissions are summarized in table 4.11 (for emissions factors, etc., see Methodology, Air Quality). *The Final Yosemite Fire Management Plan/EIS* would result in a smaller size of trees thinned in WUI than was considered in *the Draft Yosemite Fire Management Plan/EIS*. Actual operating hours would potentially be less, but because of the possibility of second entry, the analysis in the Draft was retained as a worst-case analysis. These emissions would be minor when compared to fire emissions and, as forests were restored, would decrease.

Table IV-11
Air Emissions Associated with Mechanical Thinning Activities

Alternative B							
Equipment	Operating Hours	Motorized Equipment Emissions (tons/yr) [a]					
		PM_{10}	$PM_{2.5}$	VOC	CO	NO_X	CO_2 [b]
Chainsaws	15,834	0.40	0.40	8.36	27.12	0.10	ND
Chippers	3,016	0.64	0.64	0.27	40.31	0.02	ND
Feller-bunchers	362	0.10	0.10	0.17	0.79	0.53	ND
Skidders	362	0.10	0.10	0.17	0.79	0.53	ND
Haul Trucks	1,086	0.31	0.31	0.51	2.38	1.60	ND
Total Emissions (tons/yr)		**1.56**	**1.56**	**9.49**	**71.39**	**2.79**	**ND**

a PM_{10} = Suspended Particulate, $PM_{2.5}$ = Fine Particulate Matter, VOC = volatile organic compounds (as methane), CO = Carbon Monoxide, NOx = Nitrogen Oxides, CO_2 = Carbon Dioxide
b No data

Mitigation of Air Emissions

There is a management commitment to use available measures to mitigate the adverse effects of smoke and other air emissions on air quality and visibility associated with prescribed fire and managed wildland fire. Along with firefighter and public safety and other priorities, prescribed fire, wildland fire, and suppression actions would be managed to minimize unacceptable air quality and smoke impacts. Air emissions would be reduced almost exclusively by reducing the area burned, reducing fuel loads, or reducing fuel consumption (the amount of each log or tree that is consumed by fire). Suppressing wildland fires only delays the generation of smoke emissions—it does not reduce or eliminate them. Removal of trees and woody debris leaves less to burn—it reduces the volume of forest fuel and thus emissions.

Methods to reduce emissions by reducing the area burned include mechanical treatments, chemical treatments, and concentration burning. Mechanical treatment would include removal of standing or downed trees and onsite chipping or crushing of woody material or brush. However, it would be labor intensive and require access to the site. In addition, it would potentially interfere with land management objectives, if the treatment would cause undue soil disturbance or compaction, stimulate invasion by non-native plant species, impair water quality, or remove material needed for nutrient cycling or small animal habitat. Chemical treatments would be effective in reducing or removing live vegetation and/or species from a site, however, these treatments have their own set of potentially adverse effects. They would not be allowed in Yosemite without additional compliance. Concentration burning involves burning part of a larger area slated for treatment. Although this would decrease the total area burned, the smaller area burned would represent a high fuel loading with associated higher emissions.

Techniques to reduce fuel loading would include mechanical fuel removal, burning more frequently, and scheduling burns prior to the appearance of new fuels. Mechanical fuel removal would be the same as described above, but a prescribed fire would follow it. Frequent, low intensity fires can prevent unwanted vegetation from becoming established on the forest floor. This technique would have positive land management effects since it would result in fire regimes that more closely mimic natural fire frequencies. Burning before new fuels appear would also reduce fuel loading. Examples include burning before vegetation drops its leaves in the fall and burning before brushy or herbaceous fuel greens up.

Emission reductions could also be achieved when significant amounts of fuel were at or above the moisture of extinction and therefore unavailable for combustion. Long-term emission reductions, rather than the postponement of emissions generation, would be achieved only if the fuels that were left behind could be expected to decompose or otherwise be sequestered by the time the area was broadcast burned.

Increasing combustion efficiency or shifting the majority of combustion away from the smoldering phase and into the more efficient flaming phase would reduce emissions, except, NO_x, which is produced in greater quantities at higher temperatures. Methods to accomplish this would include pile or windrow burning, rapid mop-up, and shortened fire duration. Pile or windrow burning would generate more heat and burn more efficiently. It would be effective for forest fuel types rather than brush type fuels. However, it could have negative effects on soils and water quality since high temperature extremes can cause soil sterilization. A portable incinerator with air curtain destructor could be used to incinerate brush, slash, and debris. Local on site effects could be reduced by establishing pits for the air curtain in each of the six WUI communities, or using an air curtain with container attachment. Site selection and compliance for the pit/incinerator location will be completed separately for each location (rather than through this document).

The measures discussed above are intended to be actions to minimize or avoid impacts on sensitive receptors that are identified in Chapter 3, Affected Environment. Additional measures that would be adopted could include the avoidance of conducting burns during heavy visitor use periods and the coordination with other regional agencies that also conduct burns and regulatory authorities.

Smoke Communications Strategy

The park also has developed a *Smoke Communication Strategy* (Appendix 4) that provides a blueprint for how to manage future smoke events from prescribed fires, managed wildland fires, suppression actions, and fires occurring outside the park. It provides information on health issues and concerns and, among others, it would be directed to visitors, employees, and residents in affected smoke sensitive areas. The park would also attempt to monitor particulate levels in the park during smoke events. Park air quality technicians would operate air quality monitors that measure particulate levels every hour. These levels are used to compute a 24-hour average that correlates with the Environmental Protection Agency Air Quality Index for particulates.

Agency Coordination

Prior to igniting a prescribed fire, Yosemite National Park must obtain permission through a permit from the appropriate County level Air Quality Management District. The park must also obtain meteorological approval to burn from the California Air Resources Board. It is the responsibility of these permitting agencies to coordinate the numbers of fires burning in one area. As an added measure to mitigate the potential cumulative impacts of prescribed fires, Yosemite fire management staff are members of the Mountain Counties Air Alliance, a Sierra Nevada-wide Fire Management network of National Parks, National Forests, BLM Units, California Department of Forestry, private timber companies, air pollution control districts, and State Parks. The goal of this group is to assure planned ignitions on federal and state lands in the Sierra Nevada do not adversely impact smoke sensitive areas in and around the burn area. The group meets twice a year to discuss issues and register burns for the coming year.

Cumulative Impacts

Past, present, and reasonably foreseeable projects that would have a cumulative impact for Alternative B would be the same as those discussed in Alternative A. The cumulative impacts of Alternative B, considered in combination with the moderate, adverse impact resulting from present and reasonably foreseeable future projects in the region, would be adverse, short-term, and major.

Conclusion

These data indicate that Alternative B would result in greater emissions relative to the No Action Alternative. In particular, Alternative B would generate the largest quantity of emissions among all the alternatives. The intensity of the impact of Alternative B relative to Alternative A would be adverse, short-term, and major, since the increases would be well above 50 percent greater than Alternative A. The effects of the fire management program would not represent an impairment of the park's resources or values.

Cultural Environment

Archeological Resources

Potential for Impacts from Catastrophic Fire

Compared with Alternative A, this alternative would reduce to the greatest extent the potential for catastrophic fire and its impacts. This would result in beneficial, short- and long-term, major impacts to archeological resources.

Fire Management Treatments

Managed Wildland Fire

Under all action alternatives, 621,059 acres would be in the Fire Use Unit. Burning would consist mainly of managed wildland fire but some prescribed fire would take place. Of the total area, 48,912 acres (or 8%) would be designated as prescribed burn units, which could be burned either under managed wildland fire (natural ignition) or prescribed burns (management-ignited fires). Potential impacts resulting from managed wildland fire under this alternative would be similar to those described under Alternative A, however the potential for adverse impacts would be greater due to the increased acreage targeted for treatment. Overall, it is likely that minor to moderate, long-term, beneficial impacts would result from maintaining natural fuel loading on archeological sites. Adverse impacts would be mitigated (see Mitigation of Impacts, 4-12).

Re-ignition clause. The potential for impacts from re-igniting a managed wildland fire would be identical to those described for managed wildland fire.

Holding Action and Monitoring Effects (water and retardant drops, helispots, and spike camps). Same as Alternative A—adverse, long-term, and minor to moderate.

Prescribed Fire

Under all action alternatives 48,912 acres in the Fire Use Unit and 107,040 acres in the Suppression Unit would be slated for prescribed burning over the life of the plan. This alternative would treat the maximum acreage per year (2,520 to 12,872 acres), focusing on areas of greater than three missed fire return intervals. Impacts resulting from prescribed fire under this alternative would be similar to those described under Alternative A. The potential for adverse impacts would be greater, due to the increased acreage targeted for treatment, but the potential for benefits would also be greater. Moderate, long-term, beneficial impacts would result from maintaining natural fuel loading on and near archeological sites. Adverse impacts would be mitigated to the degree possible.

Site Preparation Associated with Managed Wildland Fire and Prescribed Fire (hand line, snagging, mop-up)

Same as Alternative A—adverse, long-term, and minor to moderate.

Fuel Reduction by Hand or Machine

Aggressive Reduction Techniques.

Mechanical Tree and Shrub Removal. Heavy equipment would be used under this alternative to cut, and either pile or crush, large amounts of vegetation, primarily in wildland/urban interface areas. Areas would be surveyed for archeological resources prior to any treatment. However, because thick vegetation covers many archeological sites, it would be likely that some archeological resources would be missed during inventory. Therefore, all known resources would be avoided during heavy equipment use and piling, but archeological resources obscured by vegetation could be adversely impacted. Second entries into WUI areas, to remove trees up to 20 inches in diameter if prescribed fire has failed to achieve desired results, could result in additional site disturbance or long-term soil compaction, unless mitigations are effectively utilized. Post-treatment inventory would document and stabilize any sites inadvertently disrupted. The intensity of impact would depend upon the nature and significance of the archaeological resource as well as the extent of soil disturbance. Impacts would be potentially adverse, long-term, and moderate to major and would be mitigated to the extent possible. Archeological monitoring would be used to reduce the potential for these impacts.

Conventional Tree and Shrub Removal. Skidding and grappling would be used under both Alternative B and D in the Suppression Unit to remove dead and downed trees. The large machinery and tree skidding would cause soil disturbance and compaction. This could adversely impact archeological sites; the intensity of impact would depend upon the nature and significance of the archeological resource as well as the degree of soil disturbance. These impacts would be mitigated to the extent possible. All areas slated for this treatment would be inventoried for archeological resources prior to heavy equipment use, and known resources would be avoided. However, large amounts of dead and downed trees would obscure some archeological resources, increasing the potential for adverse, long-term, and moderate to major impacts. Archeological monitoring would be used to reduce the potential for these impacts. Second entries into WUI areas, to remove trees up to 20 inches in diameter if prescribed fire has failed to achieve desired results, could result in additional site disturbance or long-term soil compaction, unless mitigations are effectively utilized.

Passive Reduction and Lower Profile Techniques.
Hand Cutting. Same as Alternative A—beneficial, long-term, and minor.

Pile burning. Same as Alternative A—adverse, long-term, and minor to moderate.

Chipping. Same as Alternative A—negligible.

Girdling. Girdling would create standing dead trees or snags. The adverse impacts associated with girdling would include soil disturbance through tree falls and use of heavy equipment, however, impacts to cultural resources would be rare and unlikely. Effects upon archeological sites would negligible, and would be reduced or mitigated.

Helibase Upgrades

Crane Flat: The Crane Flat Lookout is listed in the National Register of Historic Places and therefore is considered a significant cultural resource. There are no archeological sites or ethnographic resources in the project area. Since the project work in the vicinity of the historic structure would only involve creating an additional landing area and would use compatible materials, the project would not impact the historic structure or its setting. The proposed heli-rappel training tower would be constructed in a location that would not impact the historic structure or its setting. Therefore, these helibase improvements would have no impact on the historic Crane Flat Lookout.

El Portal: There are no historic structures, archeological sites, or ethnographic resources in the project area, hence, there would be no impacts to cultural resources.

Wawona: There is one archeological site of unknown data potential in the project area, and portions of the split-rail fence are considered historic. The project would not disturb the fence, therefore there would be no impact to historic structures or cultural landscape resources. The project would entail some grading and perimeter delimiting, which would disrupt soils and artifacts, potentially resulting in a long-term, adverse impact to the archeological site. This impact would be mitigated through archeological testing and, as necessary, data recovery, in accordance with the park's archeological research design. Testing and recovery would reduce the intensity of the adverse impact to minor or negligible. Since information about ethnographic resources for this area is lacking, the park would consult with park-associated American Indian tribes as part of site-specific planning. If previously unknown ethnographic resources were identified, the park would further consult with these tribes and make every effort to avoid or reduce impacts to these resources as part of final project design.

Cumulative Impacts

The cumulative impacts that would result from implementation of this alternative, in conjunction with other past, present, and reasonably foreseeable future actions, would be the same as Alternative A. Implementation of this alternative would significantly reduce the potential for catastrophic fire and associated emergency response actions. The adverse impacts associated with other present, and reasonably foreseeable future projects would be minor to moderate. Considered in combination with the impacts to archeological resources from Alternative B, cumulative impacts would be beneficial, long-term, and minor.

Conclusion

Implementation of this alternative could result in adverse impacts to archeological resources mostly due to the potential for high-intensity fires in areas that are three or more fires away from their natural fire return intervals and the use of heavy equipment to reduce fuel loads. Effects in these areas would be adverse, long-term, and major. These impacts would be mitigated or avoided. However, this alternative would reduce to the greatest extent, compared with Alternative A, the potential for catastrophic fire and its impacts. Of all fire management situations and treatments, catastrophic fire and emergency response actions would result in the most frequent and severe impacts to archeological resources. Overall, the effect of this alternative would be beneficial, moderate, and long-term. The potential for catastrophic fire would still exist, but the intent of the alternative is to reduce the risk, thus there would be no impairment from the effects of this alternative.

Ethnographic Resources

Potential for Impacts from Catastrophic Fire

Compared with Alternative A, this alternative would reduce to the greatest extent the potential for catastrophic fire and its impacts. This would result in beneficial, short- and long-term, moderate impacts to ethnographic resources.

Fire Management Treatments

Managed Wildland Fire

Potential impacts resulting from managed wildland fire under this alternative would be similar to those described under Alternative A, however the potential for adverse impacts would be greater due to the increased acreage targeted for treatment. Still, it is likely that minor to moderate, long-term, beneficial impacts would result from maintaining natural fuel load and plant community conditions near ethnographic resources. Adverse impacts would be mitigated.

Re-ignition clause. The potential for impacts from re-igniting a controlled wildland fire would be identical to those described for managed wildland fire.

Holding Action and Monitoring Effects (water and retardant drops, helispots, and spike camps). Same as Alternative A—adverse, short-term, and minor to moderate.

Prescribed Fire

This alternative treats the maximum acreage per year, focusing on areas of greater than three missed fire return intervals. Impacts resulting from prescribed fire under this alternative would be similar to those described under Alternative A. Due to the increased acreage targeted for treatment the potential for adverse impacts would be greater, but so would the potential for benefits. Moderate, long-term, beneficial impacts would result from maintaining natural fuel loads and plant community structure near ethnographic resources. Adverse impacts would be mitigated to the degree possible.

Site Preparation Associated with Managed Wildland Fire and Prescribed Fire (hand line, snagging, mop-up)

Same as Alternative A—potentially adverse, long-term, and minor to moderate.

Fuel Reduction by Hand or Machine

Aggressive Reduction Techniques.

Mechanical Tree and Shrub Removal. Heavy equipment would be used in Alternative B and D to cut, and either pile or crush, large amounts of vegetation, primarily in wildland/urban interface areas. Potential adverse impacts would include disturbance or destruction of traditionally used plants. Second entries into WUI areas, to remove trees up to 20 inches in diameter if prescribed fire has failed to achieve desired results, would potentially result in site disturbance or long-term soil compaction, unless mitigation are effectively utilized. The intensity and duration of these impacts would depend upon the nature and significance of the resource as well as the extent of disturbance, but all known resources would be avoided during heavy equipment use and piling. Effects would be potentially adverse, long-term, and moderate to major, but impacts would be mitigated or avoided. Long-term beneficial impacts would include restoration of more natural vegetation patterns. These effects would be minor to moderate, and short- to long-term. The National Park Service would continue to consult with park-associated tribal groups to identify areas of concern and implement the most appropriate mitigation measures.

Conventional Tree and Shrub Removal. Heavy equipment and tree skidding would cause soil disturbance and compaction. These activities have the potential to adversely impact ethnographic resources. The intensity of impact would depend upon the nature and significance of the resource as well as the degree of disturbance. Second entries could have additional effects, including soil compaction if not mitigated. Effects would be potentially adverse, long-term, and moderate to major, but these potential impacts would be mitigated to the extent possible by continued work to identify areas of concern prior to implementing projects.

Passive Reduction and Lower Profile Techniques.
Hand Cutting. Same as Alternative A—beneficial, short-term, and minor to moderate.

Pile burning. Same as Alternative A—negligible to moderate, adverse and short-term, but these impacts would be mitigated by avoiding traditionally used plants.

Chipping. Same as Alternative A—negligible.

Girdling. Girdling would create standing dead trees, or snags. The potential adverse impacts associated with girdling could include impacts to traditionally used plants through use of heavy equipment, though these effects would be rare and unlikely. These impacts would be avoided or mitigated.

Cumulative Impacts

The cumulative impacts that would result from implementation of this alternative, in conjunction with other past, present, and reasonably foreseeable future actions, would be the same as Alternative A, except that implementation of this alternative would significantly reduce the potential for catastrophic fire and associated emergency response actions. Considered in combination with the minor to moderate, adverse effects of present, and reasonably foreseeable projects, the cumulative effects of Alternative B, would be adverse, long-term and minor to negligible.

Conclusion

Implementation of this alternative would result in beneficial, long-term, and moderate effects to ethnographic resources. The potential for adverse, long-term, and major impacts would remain, due to the potential for high-intensity fires in areas of three or more missed fire return intervals and the use of heavy equipment to reduce heavy fuel loads. These impacts would be mitigated or avoided to the extent possible. This alternative would reduce to the greatest extent, compared with Alternative A, the potential for catastrophic fire and its impacts. Of all fire management situations and treatments, catastrophic fire and emergency response actions would result in the most frequent and severe impacts to ethnographic resources. The potential for catastrophic fire would still exist, but the intent of the alternative would be to reduce the risk, thus there would be no impairment from the effects of this alternative.

Cultural Landscape Resources, Including Individually Significant Historic Structures

Potential for Impacts from Catastrophic Fire

Compared with Alternative A, No Action, this alternative would reduce to the greatest extent the potential for catastrophic fire and its impacts. This would result in beneficial , short- and long-term, major impacts to cultural landscape resources.

Fire Management Treatments

Managed Wildland Fire

Potential impacts resulting from managed wildland fire under this alternative would be similar to those described under Alternative A, however the potential for adverse impacts would be greater due to the increased acreage targeted for treatment. Still, it is likely that minor to moderate, long-term, beneficial impacts would result from maintaining natural fuel load and plant community conditions in cultural landscapes. Adverse impacts would be mitigated to the degree possible.

Re-ignition clause. The potential for impacts from re-igniting a controlled wildland fire would be identical to those described for managed wildland fire.

Holding Action and Monitoring Effects (water and retardant drops, helispots, and spike camps). Same as Alternative A—potentially adverse, long-term, and minor to moderate. These impacts would be avoided or mitigated.

Prescribed Fire

Impacts resulting from prescribed fire under this alternative would be similar to those described under Alternative A. Due to the increased acreage targeted for treatment, the potential for adverse impacts would be greater, but so would the potential for benefits. Moderate, long-term, beneficial impacts would result from maintaining natural fuel loads and plant community structure in cultural landscapes. Adverse impacts would be mitigated to the degree possible.

Site Preparation Associated with Managed Wildland Fire and Prescribed Fire (hand line, snagging, mop-up)

Same as Alternative A—adverse, short-term, and negligible impacts, which would be avoided or mitigated.

Fuel Reduction by Hand or Machine

Aggressive Reduction Techniques.

Mechanical Tree and Shrub Removal. Heavy equipment would be used to cut, and either pile or crush, large amounts of vegetation, primarily in wildland/urban interface areas. This alternative maximizes use of heavy equipment to restore target vegetation conditions. Wildland/urban interface areas (and all other areas proposed for this treatment) would be surveyed for cultural resources prior to any treatment, but because vegetation grows thickly over some cultural resources, it would be possible that some resources (such as small-scale features) would be missed during inventory. Target conditions would be established with consideration of known cultural landscape resources. All known features would be avoided during heavy equipment use and piling but this treatment could cause adverse impacts to resources obscured by vegetation. Post-treatment inventory would be used to document and stabilize any resources inadvertently impacted. The intensity of impact would depend on the nature and significance of the resource as well as the extent of disturbance. Potential impacts would be adverse, long-term, and moderate to major.

Conventional Tree and Shrub Removal. Heavy equipment and tree skidding would cause soil disturbance and compaction, which has the potential to adversely impact cultural landscape resources similar to the biomass removal described above. The intensity of impact would depend upon the nature and significance of the resource as well as the degree of disturbance, but would be potentially adverse, long-term, and moderate to major. These potential impacts would be mitigated or avoided to the extent possible.

Passive Reduction and Lower Profile Techniques.
Hand Cutting. Same as Alternative A—adverse, long-term, and moderate impacts would be avoided by prescribing a target condition for these areas that would protect and enhance the cultural resource.

Pile burning. Same as Alternative A—negligible.

Chipping. Same as Alternative A—adverse, short-term, and minor.

Girdling. Girdling creates standing dead trees, or snags. This treatment would be used primarily after prescribed burns. The potential adverse impacts associated with girdling would include removal of trees at historic sites or cultural landscapes, and disruption of features through tree falls and use of heavy equipment. These impacts would be avoided by not girdling trees at historic sites or cultural landscapes.

Cumulative Impacts

Past, present, and reasonably foreseeable projects in the area would be the same as under Alternative A. Implementation of this alternative would significantly reduce the potential for catastrophic fire and associated emergency response actions. The adverse impacts associated with present and reasonably foreseeable future projects would be minor to moderate and long-term. Considered in combination with the impacts to cultural landscape resources from Alternative B, cumulative impacts would be beneficial, long-term, and minor.

Conclusion

Implementation of this alternative would result in beneficial, long-term, and moderate effects on cultural landscape resources. Implementation would also potentially result in adverse impacts due to the potential for high-intensity fires in remaining areas of three or more missed fire return intervals and the use of heavy equipment to reduce heavy fuel loads. These adverse effects of equipment use would be mitigated or avoided to the extent possible. However, this alternative would reduce to the greatest extent, compared with Alternative A, the potential for catastrophic fire and its impacts. Of all fire management situations and treatments, catastrophic fire and emergency response actions would result in the most frequent and severe impacts to cultural landscape resources. The potential for catastrophic fire would still exists, but the intent of the alternative would be to reduce the risk, thus there would be no impairment from the effects of this alternative.

Section 106 Summary

Under regulations of the Advisory Council on Historic Preservation (36 CFR 800.9) addressing the criteria of effect and adverse effect, implementation of this alternative would have the potential to adversely affect significant historic properties. Archeological sites, ethnographic resources, and cultural landscape resources (including historic sites and structures) would likely be adversely affected by high-intensity fires and emergency response actions associated with catastrophic fire. The number and significance of resources that could be affected cannot be projected since inventory and evaluation data are lacking for broad tracts of land within Yosemite and El Portal. These impacts would be mitigated to the extent possible through some pre-burn inventory for resources of concern, avoidance of known resources when feasible, reduction of hazardous fuels at significant cultural resource sites, continued documentation and protection of significant resources, post-burn inventory and stabilization, and research on the effects of fire on cultural resources.

Social Environment

Recreation

Potential for Impacts from Catastrophic Fire

Large catastrophic fires are most likely to occur in the Suppression Unit, where fires have been and will continue to be suppressed, contributing to fuel buildup and changes in plant community structure. The large increase in the number of acres burned annually with prescribed fire would help reduce the potential for large and catastrophic fires in this unit. Fuel reduction in the wildland/urban interface, where communities, visitor facilities, and park operations buildings are located, and where the most aggressive suppression activities have historically taken place, would also reduce the threat of catastrophic fire. The potential for large, catastrophic fires like the A-Rock Fire, would be reduced under this Alternative. Consequently, this alternative would greatly reduce the potential for fire-related, park-wide closures, although, during fires, closures in areas of the park would continue. During these closures, the effects will be adverse, short-term, and minor, affecting only the visitors within or wishing to enter that portion of the park. These effects would be less than under Alternative A, but closures and restrictions would still be likely since the fire season and the peak visitation period overlap.

Fire Management Treatments

Managed Wildland Fire

Managed wildland fire would impact recreation in the Fire Use Unit only. Primarily Wilderness users would be affected, but some visitors would be redirected to other parts of the park during closures. Local closures and restrictions could cause changes in trip itineraries and could negatively affect trip quality for these visitors—as it would under Alternative A. Managed wildland fire would enhance the Wilderness experience for some visitors, while it would negatively affect the visit for others, through perceived risk and smoke. However, because of high visitation levels during fire season and trailhead quotas for Wilderness, some visitors would not be able to take a Wilderness trip, thus there would be an adverse, short-term, and major effect on a small proportion of park visitors.

The majority of park visitors would be affected only by the smoke from managed wildland fires, and this would typically occur when down slope and down-valley winds carried smoke into the basins, generally during nighttime and early morning hours. The visitors affected by this would mainly be the overnight campers and lodging users, especially those in Yosemite Valley, which would represent over one third of the visitors to Yosemite Valley. However, smoke could remain in the area all through the day, reducing visibility, especially at scenic vistas (see Scenic Resources). These effects on all park visitors would be potentially adverse, short-term, and moderate, similar to that of Alternative A. In some years, managed wildland fire would be common during the peak season, thus smoke effects would impact a large number of visitors.

Re-ignition clause. Because re-ignitions would be scheduled, the effects upon Wilderness users could be minimized through the permit process. Some individuals and parties would not be able to go into preferred areas if closures were put in place, but this would generally be determined when the permit was issued. Effects would be adverse, short-term, and minor.

Holding Action and Monitoring Effects (water and retardant drops, helispots, and spike camps). Many Wilderness users would be sensitive to these intrusions into Wilderness. Helicopters are loud and need clear landing spots for safe landings and operations. The adverse and moderate effects of noise and activity would be short-term, during the period when the fire was actively managed and/or monitored. Few people would be directly affected, but for those who were, the impacts would be adverse, short-term, and minor.

Prescribed Fire

Prescribed fires would continue to be scheduled and managed in ways that limit their effects upon visitors. However, the amount of prescribed fire and related activities in this alternative would be highest among the alternatives. Effects upon recreational activities, including hiking, nature study, and scenic touring, would generally be limited to small, local scale closures and site restrictions, with most visitors being able to recreate elsewhere, outside of the prescribed fire boundaries. Very few people would be unable to partake in their chosen activity, although some would have to relocate. Because of the large number of acres treated annually, the potential for adverse effects would increase compared to Alternative A. Smoke would affect more visitors than would closures and restrictions. However, because prescribed fires would be ignited only under certain atmospheric conditions, smoke concentrations would generally affect the area immediately near the fire. Effects would be adverse, short-term, and minor.

Site Preparation Associated with Managed Wildland Fire and Prescribed Fire (hand line, snagging, mop-up)

Site preparation would rarely influence visitor movements or activities. If chainsaws were in use, areas would be closed off, but visitors would likely avoid the immediate area or stay at some distance because of noise (see Noise, below). Under this alternative, most site preparation would have only negligible to minor, short-term, and adverse effects.

Fuel Reduction by Hand or Machine

Aggressive Reduction Techniques.

Mechanical Tree and Shrub Removal. Biomass removal would affect visitors through safety closures and equipment noise, in the Suppression Unit and non-Wilderness portions of the Fire Use Unit only. Visitors would be able to partake in activities, including hiking, nature study, and scenic touring, in other, nearby locations, with limited or no restrictions. Some visitors would have concerns about equipment use in the park, while others would understand the rationale for its use and would be supportive. Overall, the effects upon recreation would be adverse, short-term, and minor.

Conventional Tree and Shrub Removal. Same effects as described under Mechanical Tree and Shrub Removal above.

Passive Reduction and Lower Profile Techniques.
Low-Impact Skidding. Draft animals and four-wheel, all terrain vehicles, in combination with fetching arches would be used to skid trees of approximately 10-20” dbh, but only in areas with sensitive resources as a substitute for other, heavier types of equipment, such as skidders and grapplers. Low-impact skidding would infrequently affect visitors through safety closures and equipment noise in small, contained areas while work was going on. Visitors would be able to partake in their chosen activity, including hiking, nature study, and scenic touring, in nearby areas. Some visitors would have concerns about equipment noise and use in the park, but probably less so than with heavier equipment; other people would understand the rationale for its use and would be supportive. Overall, the effects of low-impact skidding upon recreation, due to limited use, would be adverse, short-term, and negligible.

Hand Cutting. If chainsaws were in use, areas would be closed off and visitors would likely stay at some distance because of noise levels (see Noise, below). Piles of fuels would have the potential to effect scenic quality, but generally, piles would be placed away from areas of high visitor use. Because hand-thinning activities are labor intensive they would not be used extensively in any alternative. Effects would be negligible to minor, short-term, and adverse.

Pile burning. Effects on human activities would generally be limited to small, local scale closures and site restrictions. Most visitors would be able to recreate elsewhere, outside of the prescribed fire unit. Very few people would be unable to partake in their chosen activity, although some would have to relocate. Smoke from burning piles would affect more visitors than would restrictions, but because the piles would be burned under atmospheric conditions specified by the local air quality districts, the smoke effects would generally be localized. Effects would be adverse, short-term, and minor.

Chipping. Chipping would affect visitors through small, localized safety closures that would not limit visitors in their activities. Noise from the chipper would be the greater effect upon visitors (see Noise, above). Some would move to another location to avoid the noise. Effects would be adverse, short-term, and moderate to major.

Girdling. Girdling work would be conducted in a manner and at a time when it would have no effect upon visitors. The evidence of the work would affect some visitors, especially if they did not understand the reason for its use (dead, standing trees benefit wildlife). Overall, effects would be negligible, short-term, and adverse to beneficial, depending upon the acceptance level from the individual visitor.

Cumulative Impacts

Past actions that affect recreation would include the development of visitor use facilities in and around Yosemite National Park. These facilities have provided support to the visitor in beneficial and long-term ways. Several reasonably foreseeable projects have the potential to provide increases in visitor services and facilities, including Hazel Green Ranch, Rush Creek Guest Lodging and Conference facilities, Evergreen Lodge Expansion, and others. These projects have the potential to provide long-term and moderate to major benefits to visitors seeking these services. The effects of present and reasonably foreseeable actions upon recreation would be beneficial, long-term, and major. However, this plan does not propose to remove, increase or modify visitor facilities. Its major influence would be that of local, short-term effects upon the recreational experiences, including hiking, sightseeing by car, and other activities. The impacts of other projects in the region, in combination with the impacts of this alternative, would result in beneficial, long-term, and major cumulative impacts.

Conclusion

More acres would be treated in this alternative than in the No Action Alternative. However, the actions of this alternative would have adverse, short-term, and minor effects upon recreation. The potential for large, catastrophic fire events would decrease, reducing with it the potential for closures. Effects of catastrophic fire on recreation would likely drop to moderate, short-term, and adverse. The potential for catastrophic fire would still exist, but the intent of the alternative is to reduce the risk, thus there would be no impairment from the effects of this alternative.

Scenic Resources

Potential for Impacts from Catastrophic Fire

Important scenic areas like Yosemite Valley and the giant sequoia groves have been high priorities for prescribed fire over the past 30 years. As a result, these are not areas with the highest potential for catastrophic fire. The areas where there is the greatest potential for catastrophic fire would be in the Suppression Unit along the western boundary. The potential for having large, high intensity catastrophic fire in area would be greatly reduced under this alternative, because of the large amount of treatment area that would help to keep wildland fires from reaching the size and having the effects of fires like the A-Rock Fire. Under this alternative, the potential for fires of this size and intensity would decrease. The impacts of Alternative B in regard to catastrophic fire would be beneficial, long-term, and minor to moderate, due to the reduction of risk catastrophic fire and its adverse effects on scenic resources.

Fire Management Treatments

Managed Wildland Fire

Wildland fires would burn the largest number of acres of all the alternative. Most wildland fires would be in Wilderness. To some, the effect of managed wildland fire on scenic resources would be seen as adverse, but to most Wilderness visitors the effects would be seen as acceptable, beneficial, and natural. Fire in forests that are within their natural range of variability rarely exhibit extreme fire behavior that can have major effects on scenic quality. The typical effects of fire would include blackened bark, catfaces on some trees, the opening of the understory, cleaning of the forest floor (burning the litter and duff layer), and the scorching of some trees. The overall effect is scattered kill and opening of the canopy. It is likely that Wilderness users would see these natural effects as beneficial, long-term, and major on a landscape scale.

Re-ignition clause. Re-ignition effects would be similar to those described under managed wildland fire.

Holding Action and Monitoring Effects (water and retardant drops, helispots, and spike camps). These actions would potentially have short-term effects on scenic resources, in the form of evidence of helispots and spike camps. These effects would generally be local in scale and probably not encountered by most visitors. Effects would be adverse, short-term, and minor.

Prescribed Fire

Under this alternative, prescribed fire would be used to maintain scenic resources in places like Yosemite Valley and in the giant sequoia groves. Some project plans would include objectives for restoring open scenic areas or maintain scenic vistas. This acreage would only be a portion of the total acres per year treated on average, but the actions would clear scenic views of meadows and open up stands of trees that have obscured vistas over the past century and a half. Prescribed fire would also cause effects that would be considered adverse to some front country visitors, so education efforts would be needed to explain objectives and the role of fire in natural systems. However, public acceptance of the prescribed fire program has increased to the point that local impacts would not be seen as adverse by most visitors. Effects of prescribed burning on scenic resources would be generally beneficial and long-term, but moderate to major.

Site Preparation Associated with Managed Wildland Fire and Prescribed Fire (hand line, snagging, mop-up)

These actions would be visible to visitors within the immediate area, but would not typically be seen within scenic views, when viewed on a landscape scale. Effects would be greater than under Alternative A, due to the larger number of treated acres under this alternative. Effects would remain adverse, short-term, and minor.

Fuel Reduction by Hand or Machine

Aggressive Reduction Techniques.

Mechanical Tree and Shrub Remova*l*. An average of 1,285 acres of wildland/urban interface would be treated per year. The activity would have at least two potential effects. First, cutting vegetation and removing it would have adverse effects from cut stumps, fuel piles, vehicle tracks, and soil disturbance. Some evidence of activity (e.g., stumps, machine cuts) would be potentially long-term, unless additional actions (use of tub grinders, for example) were taken. However, clean-up activities following a project (raking out vehicle tracks and soil disturbance) would mitigate effects so they would be short-term, minor, and adverse. Second, biomass removal would restore forest stands to a target condition (when applied in combination with prescribed fire) that would be within the natural range of variability for the system. This would have the positive effect of opening up views and improving scenic quality on a landscape scale. This effect would be beneficial, long-term, and potentially major, yielding benefits that would not occur under Alternative A.

Conventional Tree and Shrub Removal. The effects of skidding/grappling would include on-the-ground effects, such as vehicle tracks and soil disturbance. With mitigation, such as clean-up activities at the end of the project (raking out vehicle tracks and soil disturbance), most of these effects would be short-term, minor, and adverse.

Passive Reduction and Lower Profile Techniques.

Low-Impact Skidding. Under Alternative B, this technique would be used to a limited extent in the wildland/urban interface and along road corridors. Paths and scarification caused by horses, ATVs, or fetching arches and dragging trees would be raked out in most areas. Impacts from skidding trees would be mitigated by the use of fetching arches or by skidding over snow, frozen ground, or crushed vegetation. Most areas would be broadcast burned after fuel reduction was finished, lessening the visual impact of skidding. Considering the limited application of this technique in this alternative, and the use of mitigation at the end of the project, most of these effects would be adverse, short-term, and negligible.

Hand Cutting. These actions would be visible to visitors within the immediate area, but would not typically be seen on a landscape scale. On the ground, visual effects would be adverse, short-term, and minor, but would contribute to beneficial, long-term, and major effects through the restoration of open scenic views.

Pile burning. This activity would have two potential effects on scenic resources. First, piles of stacked fuels would be visible, and potentially within major scenic views. Second, piles once burned would leave a pattern of burned area that would not appear natural. As in Alternative A, both effects would be adverse, short-term, and minor, but the amount and distribution of work would increase substantially under this alternative.

Chipping. Chipping would result in local area effects that would be limited to evidence of activity, through concentrations of wood chips left behind. Chipping would not be a major feature on a landscape/scenic view scale. These effects would be adverse, short-term, and negligible.

Girdling. Girdling would cause local effects that would rarely be noticed within a scenic resource. Effects would be adverse, long-term, and negligible.

Cumulative Impacts

The effects of past and present actions on scenic resources are obvious in locations like Yosemite Valley, which includes visitor and support facilities. Major viewpoints, like Tunnel View, have no visual intrusions, while visitors, traffic and facilities can be seen in others. These effects are adverse, long-term, and moderate.

Past, present, and reasonably foreseeable actions include fire management and fuels treatment activities outside the park, many of which would be National Forest administered lands. These would include A-Rock Reforestation, Aspen Fuels Reduction, Orange Crush Fuels Program, Rogge-Ackerson Fire Reforestation, and the Fire Management Plan for Wilderness in Stanislaus National Forest. These actions would result in effects similar to those in the park that result from fire management actions, including burned areas, cut stumps, evidence of holding lines, burned area fire rehabilitation work, and others. Some of these effects would be potentially visible from highways entering the park, if passersby knew where to look for them. Overall, the effects of present and reasonably foreseeable projects would be adverse to beneficial, long-term, and minor. Considered in combination with the impact of Alternative B on scenic resources, cumulative impact would be beneficial, long-term, and major.

Conclusion

Fire management activities would affect scenic resources in generally beneficial ways, because they would contribute to restoring and maintaining open vistas and natural forest structure. The effects in the Suppression Unit would be substantially greater in this alternative, compared to Alternative A, due to the larger amount of annual prescribed fire and biomass reduction. Overall, these effects would be beneficial, long-term, and major, especially if projects in some areas (Yosemite Valley, for example) included objectives related to the restoration and maintenance of open vistas. Under this alternative, there would be a smaller likelihood of having large, high intensity, catastrophic fires with effects like the A-Rock Fire. The potential for catastrophic fire would still exist, but the intent of the alternative would be to reduce risk, thus there would be no impairment from the effects of this alternative.

Noise

Potential for Impacts from Catastrophic Fire

Under this alternative, the potential for large, high-intensity fire would decrease compared to Alternative A, due to the amount of fuel treatment and prescribed fire, especially in the Suppression Unit. With the diminishing potential for large-scale fires, the likelihood and frequency of having to deploy large-scale fire suppression efforts would also diminish, thereby reducing the size and duration of fire operations. When large fire organizations were needed, the noise effects would be similar to under Alternative A, except the duration of operations would likely be shorter. Due to the reduction in risk of catastrophic fire and resultant reduction in duration and extent of noise events, the impact would be beneficial, long-term, and moderate.

Fire Management Treatments

Managed Wildland Fire

During managed wildland fire incidents, helicopters typically would be used periodically for reconnaissance and for moving people and equipment. At least one flight per day would normally be flown over fires, many of which would be in Wilderness. As fires grow, the reconnaissance area and flight duration would increase. Helicopters at 100 feet distance would be as loud as 100 dB, a sound that would be uncomfortably loud. In relative loudness, this would be 128 times as loud as a lower limit, urban daytime ambient noise level of 40 dB (reference loudness, table 3.12). This effect would be adverse, short-term, and major. However, the noise would generally affect only a small number of Wilderness visitors, unless operations occurred near front country areas and major Wilderness corridors.

Re-ignition clause. The effects would be the same as under managed wildland fire.

Holding Action and Monitoring Effects (water and retardant drops, helispots, and spike camps). The effects of helicopter use, as used in water and retardant drops, would be the same as described under managed wildland fire. In the event of a holding action, chainsaws, water pumps, and other equipment would be in use. Chainsaws at close proximity would have sound levels of approximately 100 dB, or 128 times as loud as the reference loudness of 40 dB. The effect, especially at close range, would be adverse, short-term, and moderate to major

Prescribed Fire

Prescribed fire operations typically occur within a defined project area. Between 2,520 and 12,872 acres would be treated in an average year. This amount of acreage would take 75 or more of days of project time, compared to approximately 25 days under Alternative A. Fire engines would commonly be in use along roads and in some cases along burn boundaries. A diesel truck traveling at 40 miles per hour at 50 feet can have sound levels of 80 dB, or 16 times as loud as reference loudness. These effects would be adverse, short-term, and moderate.

Site Preparation Associated with Managed Wildland Fire and Prescribed Fire (hand line, snagging, mop-up)

The equipment used in building control lines, snagging, and mop-up during these operations would be chainsaws, water pumps, and other equipment. Chainsaws at close proximity would have sound levels of approximately 100 dB, or 128 times as loud as the reference loudness of 40 dB. The effect would be adverse, short-term, and moderate.

Fuel Reduction by Hand or Machine

Aggressive Reduction Techniques.

Mechanical Tree and Shrub Removal. During biomass removal operations equipment of various types would be used. Most of the project areas would be in burn units near wildland/urban interface. In an average year, approximately 1,285 acres would be treated, which would take approximately 45 days of work. Some of the equipment used would have noise levels similar to levels of bulldozers, which have noises that are approximately 85 dB at 50 feet. This sound level would be considered loud and would be over 16 times as loud as reference noise levels. The effects would be adverse, short-term, and moderate to major. Possible mitigations would result from scheduling work during winter months when visitation was at the low end of the spectrum.

Conventional Tree and Shrub Removal. These effects would be the similar to those under Mechanical Tree and Shrub Removal.

Passive Reduction and Lower Profile Techniques.

Low-Impact Skidding. This technique would be infrequently used and only as a substitute for heavy machinery in sensitive areas. This would include the use of draft animals and four wheel, all-terrain vehicles, in combination with fetching arches to skid trees of 10-20" dbh. ATVs, which have motorcycle-type engines, would potentially be very loud. Noise levels can be as high as 90 dB at 25 feet—32 times as loud as reference noise levels [although ATVs may have engine sizes and mufflers that could reduce this noise output considerably, motorcycle noise levels (see table 3.12, in Chapter 3) are considered as the basis for comparison]. Distance from the noise source, in heavily wooded areas, would diminish the noise considerably, but close up the effects would be clearly audible. In this alternative, this technique would be used very little, thus the impact of skidding using ATVs would be adverse, short-term, and moderate to major.

Hand Cutting. Chainsaws would be the major piece of equipment used for hand cutting, which would generally be conducted in defined project areas. The effect would be adverse, short-term, and moderate.

Pile burning. The equipment used during these operations would include engines and water pumps. The effects would be similar to that found under prescribed fire above.

Chipping. A pneumatic chipper, at one meter distance can be as loud as 115 dB, which is uncomfortably loud, and over 128 times as loud as reference loudness. This equipment would typically be used in the Suppression Unit and Special Management Areas, particularly in wildland/urban interface areas. Chippers would be used on a defined project basis, over a short time period. The effects of use would be adverse, short-term, and major.

Girdling. If chainsaws were used in these operations, the effects would be the same as under Hand Cutting above, except girdling would be used on a limited basis, thus noise effects would be limited and very short-term.

Cumulative Impacts

The noise effects of past and present actions are manifest in the soundscapes found in places as Yosemite Valley and along major roadways. Vehicular traffic in these areas typically results in sounds that exceed 60 dB at 50 feet. In Yosemite Valley, some locations, such as along Northside

Drive and Southside Drive, about 15 major (noticeable) sound events per hour can occur. These effects would continue to be adverse, long-term, and moderate.

Past, present, and reasonably foreseeable actions include fire management and fuels treatment activities outside the park, many of which are on U.S. National Forest Service administered lands. The types of equipment that would be used would be similar to those used in the park, including helicopters, chainsaws, and water pumps. The noise effects from present and reasonably foreseeable projects would be adverse, short-term, and moderate to major. Considered in combination with the noise effects of Alternative B, cumulative effects would remain adverse, short-term, and major.

Conclusion

Fire management activities would have the potential to introduce noises that have a short-term, adverse, and major effect on ambient noise levels, especially near wildland/urban interface areas and during large, catastrophic fire events. The noise events would be similar to those found under Alternative A, but the number of events and the duration of fuel treatment operations would be substantially greater than under Alternative A. In Wilderness, helicopter and chainsaw noises would continue to introduce short-term intrusions, with adverse and major effects, the same as under Alternative A. There would be no impairment of the park's resources or values.

Local Communities

Potential for Impacts from Catastrophic Fire

The greatest potential for catastrophic fires would be in the Suppression Unit and along the margins of the Fire Use Unit. Because this alternative proposes an aggressive program for prescribed fire and fuel reduction in and near the wildland/urban interface, the risk of catastrophic fire spreading into the wildland/urban interface would be much lower than under Alternative A. Risk near communities and developments in Aspen Valley, Hodgdon Meadow, El Portal, Foresta, Wawona, Yosemite Valley, and Yosemite West would greatly decrease by reducing fuels and restoring ecosystems in the surrounding terrain. In this alternative, catastrophic fire would continue to be a risk, but fire in treated areas would typically show acceptable behavior, making it easier to protect wildland/urban interface areas. Potential effects of catastrophic fire would be lower in terms of both direct impacts (property loss and damage from fire reaching communities), and the indirect impacts of closures and other actions (loss of business and its economic effect), thus the effect of Alternative B would be beneficial, long-term, and moderate.

Potential Direct Effects of Catastrophic Fire. Under this alternative, the risk of catastrophic fire would remain, but, through time, fire behavior would become less severe, because of the amount of annual prescribed fire and wildland/urban interface treatment. There would be between 2,520 and 12,872 acres treated per year with prescribed and managed wildland fire and another 1,533 acres of fuel reduction in the wildland/urban interface. At this level of accomplishment, it would be possible to achieve restoration objectives and the size and impact of unwanted wildland fires would lessen considerably. Any direct effects in wildland/urban interface that would occur because of catastrophic fire would likely be adverse, long-term, and major, but the potential of these effects occurring would be greatly reduced under this alternative.

Potential Indirect Effects of Catastrophic Fire. The potential for large, catastrophic fires would still exist under this alternative, but the potential for indirect effects, in the form of revenue loss due to park closures, would be lower. Adverse economic impacts on the five county area would thus be lessened. It would be difficult to estimate the duration of any possible closures under this alternative, but closures most likely would be fewer and, when they occurred, shorter, because fire behavior in treated areas would generally be more manageable. Economic impacts on a per visitor basis would be the same (estimated at an average of about $32 of lost expenditures per visitor, per day of closure), but closures would likely be of shorter term. A fire like the A-Rock, had it encountered areas where fuels had been reduced (either through prescribed burns or biomass removal), would have possibly been less difficult to control, and it would likely have been possible to contain in a shorter period of time. Thus, the potential economic effects of a closure would be adverse, short-term, and minor—less than under Alternative A, No Action.

It should be noted that total park closures have been rare in the history of Yosemite, but several have occurred in recent years. Also, actual fire conditions (i.e., when and where a fire would occur) would dictate the values at risk, the measures needed to assure public safety, the extent of closure needed to assure public safety, and thus any resulting economic impacts. Actual fire events are very difficult to foresee; but closures under this alternative would likely have adverse, short-term, and minor effects, compared to Alternative A.

Fire Management Treatments

Managed Wildland Fire

Managed wildland fire would accomplish resource management objectives of restoring fire to ecosystems in the Fire Use Unit, as in Alternative A. There would be risk associated with fires of this type, including possible fire escape and extreme fire behavior. However, managed wildland fires burning in plant communities that are within their natural range of variability rarely escape and cause property damage or loss. Additionally, by modeling fire behavior, holding actions can be put in place long before a fire approached any community.

Managed wildland fire more typically affects visitors because under certain fire and atmospheric conditions, a large amount of smoke is generated and funneled into well-populated areas. Smoke-related impacts on local and regional communities can be put into two categories—those that might affect health and those that might affect visibility of scenic resources. Particulates in smoke can adversely affect health, thus, the park would implement a Smoke Communication Strategy (Appendix 4) to inform communities and visitors of smoke events. Second, smoke or smoke combined with air moisture can affect scenic views and the quality of the visitor experience. Since closures due to fire are generally small and short-term, the effects would generally be experiential (see Recreation). It is possible that some visitors would decide not to visit Yosemite because of fire in the park, but the number of these visitors would not likely be large. As in Alternative A, No Action, the effects of managed wildland fire on communities would be adverse, short-term, and negligible.

Re-ignition clause. Effects would be the same as under managed wildland fire.

Holding Action and Monitoring Effects (water and retardant drops, helispots, and spike camps). Holding actions and monitoring do not typically have effects upon local communities. However, there would be risk associated with applying fire management actions, and in the event of a failed holding action, the worst case effects would be the same as described under Potential for Impacts from Catastrophic Fire, above.

Prescribed Fire

Prescribed fire would be one tool used to reduce risks associated with fire in and near wildland/urban interface (Aspen Valley, Hodgdon Meadow, El Portal, Foresta, Wawona, Yosemite Valley, Yosemite West, and others). Under this alternative, between 2,520 and 12,872 acres would be burned per year, and much of this would be in combination with an average 1,285 acres of wildland/urban interface work (thinning and fuel reduction) per year. This work would accomplish objectives for restoring plant community structure and reducing risks around wildland/urban interface areas. With the amount of wildland/urban interface treatment that would be done annually, it would be likely that risks would be greatly reduced during the life of the plan. The potential for the type of high-intensity, destructive fire that burned in Foresta in 1990 approaching wildland/urban interface areas would be greatly reduced as a result of this alternative. Prescribed fire under this alternative would have beneficial, long-term, and major effects.

Prescribed fire in wildland/urban interface areas would impact residents through smoke and site closures. During prescribed fire activities, residents and visitors would be affected through localized safety closures and equipment noise. Smoke would affect all ‘down-wind’ and ‘in-basin’ locations in the area. Some residents would have concerns about the smoke, while others would want the work to move forward, to provide the fire protection and ecosystem restoration benefits. This latter group would be supportive. Overall, these effects upon local communities would be adverse, short-term, and minor.

There is risk and uncertainty associated with implementing a successful fire management strategy that includes prescribed fire. One intent of the program is to reduce enough fuels in enough places to lessen the risk of catastrophic wildland fire. Even when one considers potential smoke emissions and escaped prescribed fires, the risk associated with prescribed fire and mechanical fuel reduction is still lower than the threat of wildland fire, especially in areas where fuel loads are unnaturally high.

Site Preparation Associated with Managed Wildland Fire and Prescribed Fire (hand line, snagging, mop-up)

These actions would have negligible socio-economic effects upon communities.

Fuel Reduction by Hand or Machine

Aggressive Reduction Techniques.

Mechanical Tree and Shrub Removal. Biomass removal operations, primarily in the wildland/urban interface areas (Hodgdon Meadow, El Portal, Foresta, Wawona, Yosemite Valley, Yosemite West), would reduce fuels in approximately 1,285 acres per year. This is a major increase in fuels reduction work compared to Alternative A, and would greatly reduce risks of catastrophic fire and loss of property in the communities in and adjacent to the park. The effect for local communities would be beneficial, long-term, and moderate to major.

Equipment use would occur adjacent to and within wildland/urban interface areas. When equipment is in use, residents and visitors would be affected through local safety closures and equipment noise. Some residents would have concerns about equipment use in the park, while others would want the work to move forward, to provide the fire protection and ecosystem restoration benefits. This latter group would be supportive. These effects upon local communities would be adverse, short-term, and minor.

Cost recovery, through wood sales and other economic considerations, was recommended during public scoping as a way to increase annual accomplishment toward target conditions. At present, the National Park Service does not have an authority for the reinvestment of receipts from biomass removal-related wood sales. Yosemite's designating legislation (Title 16, USC Sec. 54) allows the sale and removal of matured or dead or down timber as needed for the protection of the park, but all proceeds go to General Services Administration for deposit into the General Treasury, as miscellaneous receipts. Although the National Park Service could use available mechanisms in contracts to reduce certain costs related to biomass removal, it would not be able to return proceeds to the park to support additional project work of this type. If the National Park Service had a new authority to allow it to enter cost recovery contracts, this alternative would provide more marketable logs per year than under Alternative A. Partnering with private enterprise could greatly reduce agency costs, but the National Park Service would not likely recover all costs under current or expected market conditions. This effect on local communities would be beneficial, long-term, and probably minor. However, the authority for cost recovery does not exist at present.

Conventional Tree and Shrub Removal. The benefits of skidding/grappling would be associated with biomass removal, the effects of which would reduce risks in wildland/urban interface areas, a beneficial, long-term, and moderate to major impact.

Passive Reduction and Lower Profile Techniques.

Low-Impact Skidding. This alternative has the shortest period for completing fuel reduction projects (5 years for wildland/urban interface work), and low-impact skidding would be used only on a limited basis, thus it would make only a minor contribution in accomplishing these objectives. Effects of low-impact skidding on local communities would be beneficial, long-term, and negligible.

Hand Cutting. Less than 100 acres of hand cutting would likely occur in wildland/urban interface areas. However, because of the amount of biomass removal through mechanical means under this alternative, overall risk in communities would lessen. As a result, hand thinning would contribute to an overall reduction in risk, but its contribution would be similar to that of Alternative A—beneficial, long-term, and minor.

Pile burning. The socio-economic effects of pile burning would be similar to the effects described under Prescribed Fire.

Chipping. Chipping would have beneficial, short-term, and minor socio-economic effects, primarily through rental payments to equipment providers or through wood chip sales.

Girdling. Girdling work would have no socio-economic effect upon local communities.

Cumulative Impacts

As in Alternative A, there are many projects in the five county area that would have a diversity of effects upon local communities. These projects include: Lodging and service projects: utility and infrastructure projects; and other projects of the type described in the proposed action, e.g., projects dealing with fire, fuels, and vegetation management.

Examples of reasonably foreseeable future projects that could have an effect upon visitation within the local communities include: Evergreen Lodge Expansion in Tuolumne County, Hazel Green Ranch in Mariposa County, Rush Creek Guest Lodging and Conference Facilities in Tuolumne County, Yosemite West Thirty-One Acre Bed and Breakfast in Mariposa County, and Yosemite Motel's proposed development in Mariposa County. The Yosemite Motels project, for example, would add 141 new motel units, creating new hotel tax revenues and potential spending impacts from increased visitation. An additional 141 new lodging units would allow for approximately 98,000 additional visitor overnight stays per year. These additional stays would generate a net gain of approximately 5.3 million per year in total (direct and secondary) visitor spending, a long-term, minor, beneficial impact on the local economy.

If new visitors are attracted to the region by the increase in lodging capacity, visitor-spending growth would be higher and the impact would be greater. Whereas these projects could bring about increases in visitation and spending growth, closures during periods of catastrophic fire would bring about short-term decreases in both visitation and spending. Considered in combination with the long-term, minor, and beneficial economic impacts of new development in the communities, the impacts of infrequent closures under Alternative B would remain adverse, short-term, and moderate. However, the frequency of their occurrence would be much less.

Fire management-related projects would include A-Rock Reforestation, Aspen Fuels Reduction, Orange Crush Fuels Program, Rogge-Ackerson Fire Reforestation, the Fire Management Plan for Wilderness in Stanislaus National Forest, and others. These actions would result in effects similar to fire management activities in the park, with the same types of risks. These actions could reduce risks of catastrophic fire and restore resources on and near park boundaries. The long-term, beneficial, and moderate effects of these actions, considered with the impacts of Alternative B, would result in cumulative effects in Yosemite's wildland/urban interface areas that would potentially be beneficial, long-term, and moderate to major.

Conclusion

Because the risks associated with large, catastrophic fires would be greatly reduced in this alternative, direct effects (loss of property during fires) and indirect effects (loss of business during fire-related closures) would be greatly reduced compared to Alternative A. This would be because prescribed fire and mechanical thinning would restore plant community conditions in wildland/urban interface to within the range of target conditions, quickly reducing the risk of catastrophic loss. The potential for fire-related closures and other effects would also be lower. As a result, the overall affect of this alternative on local communities would be beneficial, long-term, and moderate to major.

Environmental Justice

Under this alternative, fire management activities would continue to be directed toward reducing risks in all wildland/urban interface areas in the park, including El Portal, Hodgdon Meadow, Foresta, Wawona, Yosemite West, and Yosemite Valley. Cooperative, interagency prescribed fire activities would also be continued at Yosemite West. Any differences in activity time and effort would be reflective of the complexity of the work required in some areas.

Compared to Alternative A, under Alternative B the greater amount of prescribed burning and fuel treatment would provide greater benefits for each community. Risks associated with each of the wildland/urban interface areas would be lower. In that risks in each of the communities would be targeted, the effects upon minority and low-income populations in those communities would be beneficial, long-term, and moderate to major, the same as effects described under Local Communities above.

Cumulative Impacts

Cumulative effects upon minority and low income populations, as represented in the wildland/urban interface areas, would be the same as described under Local Communities above, beneficial, long-term, and moderate to major.

Conclusion

Prescribed fire and fuel treatment would be focused upon the most immediate risks associated with each of the wildland/urban interface areas. The effects upon minority and low income populations in those communities would be beneficial, long-term, and moderate to major.

Special Designations

Wild and Scenic Rivers

The Wild and Scenic River Act of 1968 requires agencies to protect and enhance the outstandingly remarkable values (ORV) of Wild and Scenic Rivers in Yosemite National Park and the El Portal Administrative Site. Chapter 5 discusses the potential for achieving this end, in light of the actions proposed in the *Yosemite Fire Management Plan*. Impacts of this alternative on river related attributes are discussed in the representative sections (for example, in watersheds, water quality and soils; plant communities and fire ecology; etc.).

Wilderness

All wildland fire management activities within areas being managed as designated Wilderness inside the boundaries of Yosemite National Park will adhere to “minimum tool” requirements of the 1964 Wilderness Act (16 USC 1 1 21). About 704,624 acres or 94% of the park is designated Wilderness. Most of this is in the Fire Use Unit where allowing natural processes of fire to occur is a major goal of Yosemite’s fire management program. Some areas of Wilderness, however, are in the Suppression Unit because years of fire exclusion have created fuel accumulations that would burn at unnaturally high-intensities. These areas would be restored before being considered for inclusion in the Fire Use Unit. Some areas, because of their proximity to populated areas, buildings, roads and utility lines, or historical resources, would never be included in the Fire Use Unit.

Potential for Impacts from Catastrophic Fire

Catastrophic fire would be most likely to occur in the western portion of the park, in areas that are within the Suppression Unit, and along the western margin of the Fire Use Unit. Much of this area is designated Wilderness. The potential for catastrophic fires would be much less than under Alternative A, because of the amount of prescribed fire and various fuel treatment that would be employed. This alternative would have the greatest amount of annual restoration, and thus would result in the lowest potential for large, high-severity fire. Treatments would attempt to restore plant communities to within their natural range of variability, for plant community structure and fuel loading. Fire suppression operations used to control these fires would typically include helicopters, chainsaws, and other motorized equipment, which would be used only after application of the minimum tool test. Their use would have an effect upon Wilderness users and Wilderness values. The effect of these operations on Wilderness would be adverse, short-term, and moderate to major, but the effect of catastrophic fire on the Wilderness landscape would be greatly diminished compared to Alternative A, thus the impact of Alternative B, in regard to catastrophic fire would be beneficial, long-term, and moderate.

Fire Management Treatments

Managed Wildland Fire

Wildland fires could burn well over the 16,000 acre average in any one year, mostly in designated Wilderness. As in Alternative A, the effect of managed wildland fire on Wilderness values would be seen as adverse, but to most Wilderness visitors the effects would be seen as acceptable, beneficial, and natural. Fire in Yosemite plant communities that are within their natural range of variability would rarely result in extreme fire events with major post-fire effects. The typical effects of fire would include blackened bark, catfaces on some trees, a more open understory, reduced litter and duff layer, and the scorching of some trees, resulting in scattered kill and opening of the canopy. Helicopters would be used for reconnaissance and chainsaws would be used during holding actions; these would affect the Wilderness character on a short-term basis. It is likely that Wilderness users would see the natural effects of fire as beneficial, long-term, and major on a landscape scale, and the effects of equipment use on the Wilderness experience as adverse, short-term, and moderate to major.

Re-ignition clause. The effects of re-ignition on Wilderness would be similar to those under wildland fire, except that visitors knowing the source of ignition could have concerns about artificial processes used to accomplish resource management objectives. Evidence of ignition would not likely be apparent. The effects of any evidence at all would be adverse, short-term, and negligible, but the project would net beneficial, long-term, and moderate to major results to other Wilderness and natural values.

Holding Action and Monitoring Effects (water and retardant drops, helispots and spike camps). These actions have the potential to have short-term effects on Wilderness quality. These effects would include hand-constructed fire lines and evidence of helispots and spike camps. These would be generally local in scale and encountered by few visitors in the Fire Use Unit. Effects would be adverse, short-term, and minor.

Prescribed Fire

Prescribed fire would be used as a tool to restore and maintain Wilderness. Between 2,520 and 12,872 acres would be treated with prescribed fire per year, as needed to accomplish restoration and, near communities, fuel reduction objectives. Most of the prescribed fire units would be within the Suppression Unit, although 48,912 acres in 11 prescribed fire units would be in the Fire Use Unit, mainly along the margin of the Fire Use Unit. Where prescribed burning, or a combination of cutting and then burning, would be needed to achieve restoration targets, the effect would be beneficial, long-term, and moderate to major.

Site Preparation Associated with Managed Wildland Fire and Prescribed Fire (hand line, snagging, mop-up)

These actions would be visible to visitors within the immediate area, and would diminish the Wilderness character of the area through evidence of human use. Other than cut stumps and other visible saw cuts, which would be apparent, most effects would be adverse, short-term, and minor. Slash and debris would be scattered to reduce visual effects in Wilderness.

Fuel Reduction by Hand or Machine

Aggressive Reduction Techniques.

Mechanical Tree and Shrub Removal. Would not be used in Wilderness under this alternative.

Conventional Tree and Shrub Removal. Skidding/Grappling would not occur in Wilderness under this alternative.

Passive Reduction and Lower Profile Techniques.

Low-Impact Skidding. The most significant effect of low-impact skidding, from dragging one end of the tree, would be a visible skid trench typically less than a foot wide and a few inches deep. However, because of the limited use of this technique in Wilderness, in most locations this scarification could be raked out with hand tools. Raking would limit the amount of soil erosion and reduce visible marks, thereby limiting adverse effects. Many areas would be burned after skidding activities took place. Considering the limited application of this technique in designated Wilderness, effects would be adverse, short-term, and negligible. This would be done only in the Wilderness part of the Wawona WUI.

Hand Cutting. These actions would be visible to visitors within the immediate area, but would not typically be seen over expansive areas as effects on views of a landscape scale. Effects would be adverse, short-term, and minor.

Pile burning. This activity would have two potential effects on scenic resources. First, piles of stacked fuels would be visible, and could diminish the Wilderness character of the area through the evidence of human use. Second, piles once burned would leave a pattern of burned area that would not appear natural. Both effects would be adverse, short-term, and minor.

Chipping. Chipping would result in local area effects that would be primarily limited to the evidence of activity, through the concentrations of wood chips left behind in the project area. However, the chipper is a loud piece of equipment that would impact Wilderness character on those occasions when it was used. The minimum tool test would be used to indicate whether a chipper was the appropriate tool for accomplishing project objectives. When used, these effects would be adverse, short-term, and moderate to major.

Girdling. This treatment would rarely be used in Wilderness. When it was, girdling would result in very localized effects that would rarely be noticed. Effects would be adverse, long-term, and negligible

Cumulative Impacts

The effects of past and present actions on Wilderness are manifest in the trails, bridges, primitive structures and constructs of man. These facilities have the potential to diminish the Wilderness quality to some visitors, but most depend on many of these features and are tolerant of their presence. Overall, their effects are adverse, long-term, and minor.

Past, present, and reasonably foreseeable actions include fire management and fuels treatment activities outside the park, many of which are national forest lands. These would include A-Rock Reforestation, Aspen Fuels Reduction, Orange Crush Fuels Program, Rogge-Ackerson Fire Reforestation, and the Fire Management Plan for Wilderness in Stanislaus National Forest. These actions would result in effects similar to those in the park that result from fire management actions, including burned areas, cut stumps, evidence of holding lines, burned area fire rehabilitation work, and others. Some of these effects would be within Wilderness. The effects would be beneficial, long-term, and moderate to major on Wilderness values. These effects, considered in combination with the effects of Alternative B, would result in the cumulative impacts on Wilderness would remain beneficial, long-term, and moderate to major.

Conclusion

Fire management activities would affect Wilderness resources in generally beneficial ways, through actions that would restore or maintain plant communities within their natural range of variability, and thus maintain Wilderness values. Amount of ecosystem restoration and fuel reduction in the Suppression Unit would be greater than under Alternative A, which would reduce the potential of having large, high-intensity fires in Wilderness. Helicopter and chainsaw noises would continue to introduce short-term intrusions, with adverse and major effects in Wilderness, the same as under Alternative A. Overall, the effect of Alternative B would be beneficial, long-term, and moderate to major. There would be no impairment from the effects of this alternative.

Energy Consumption

The energy consumption associated with fire management activities is difficult to calculate, because of the great number of variables involved, including the size and complexity of projects. Fire management activities, including monitoring of managed wildland fire, prescribed fire, and hand thinning are considered in the analysis; fire suppression and administrative activities are not.

The same fire management activities considered under Alternative A would be used in this alternative. In addition, biomass removal and chipping would be included in the treatment mix. The number of acres that would be treated, and related energy that would be consumed is estimated in table 4.12 below.

Cumulative Effects

Energy is used in many park operations. For the proposed action for the Yosemite Valley Plan alone, projections included an estimated reduction of 1,341,800 gallons of gasoline consumption per year, and an increase of 335,500 gallons of diesel fuel consumption (for a total of 549,300 gallons per year by 2015), a decrease of 1,006,300 gallons to a total of 1,688,300 gallons of fuel, and a moderate, long-term, beneficial impact. The impact of the amount of fuel consumed during fire management activities in this alternative, over 250,000 gallons of fuel per year, would be adverse, long-term, and major, compared to Alternative A. The cumulative effects would remain beneficial, long-term, and moderate.

Conclusion

Energy would be consumed during fire monitoring and reconnaissance, prescribed fire operations, and fuel reduction activity. Typically more than 250,000 gallons of various fuels per year would be consumed, compared to over 7,000 gallons under Alternative A. The effects of the fire management program's energy demand would be adverse, long-term, and major, compared to Alternative A, No Action. Equipment use during biomass removal operations would be the greatest new source of fuel consumption.

Table IV-12
Projected Energy Consumption Under Alternative B

Fire Management Treatment	Acres Treated per year	Equipment Used	Treatment Rate or Equipment Use	Fuel Use Rate	Fuel Use
Managed Wildland Fire	16,000	Aircraft (recon, transport and water drops)	2 hour per recon flight; est. 180 recon hours per year.	60 gallons of fuel per hour	10,800 gallons of fuel
Prescribed Fire [a]	7,696 (2,520-12,872 per year)	a) Drip Torches [OR in aerial ignition, ignition balls and helicopter]	Approx. 1 acre per hour per torch, 8 acres per day in an 8 hour shift. [Approx. 150 acres per day by aerial ignition; 2 hours flight time per day.]	Approx. 2 gallons per acre burned. [OR approx. one box (1,000 balls) per 150 acres, plus 60 gallons of fuel per hour of flight time, plus ground crews.]	15,392 gallons of drip torch fuel [OR 51,300 ignition balls, and 6,156 gallons of aviation fuel; plus 1,000 gallons drip torch fuel for ground crews.]
		b) Engines	3 to 6 engines/ plus 1 to 2 water tenders per day (5 on average), for an average of 60 project days per year; 12 hour shifts.	8 miles per gallon diesel fuel, at least 50 miles out and back to station per vehicle per day.	1,875 gallons
		c) Chainsaws for site prep.	Approx. 460 acres of prep work. (3 acres site prep/50 acres burn)	2 gallons per day per saw; 10 gallons per crew per day	920 gallons
Hand Cutting	100	Chainsaws	Crew with 5 saws can treat 5 acres per day.	2 gallons per day per saw; 10 gallons per crew per day	200 gallons
Biomass Removal	1,533	Tracked vehicle	20 acres per day	72 gallons per acre, median (16 to 128 gal/acre, depending on terrain and workload).	110,376 gallons
Skidding/ Grappling	1,533	Grapple	8 to 30 acres per day, for 1,131 acres	72 gallons per acre, median (16 to 128 gal/acre, depending on terrain and workload	110,376 gallons
Chipping	300	Chipper	5 acres per day	10 gallons per work day.	600 gallons
Total: 250,339 gallons of various fuels					

a Total fuel includes drip torches, chainsaws, and trucks, not aerial ignition techniques

Sustainability and Long-Term Management

Relationship of Short-Term Uses and the Maintenance and Enhancement of Long-term Productivity

Alternative B would not result in new development (the only development proposed would be expansion of one helibase), thus it would not take lands out of productivity as natural ecosystems. However, fires would continue to have a potential effect upon ecosystem integrity, particularly in the Suppression Unit. This alternative would include the greatest amount of prescribed burning and fuel treatment of all the alternatives. Therefore, it would have the greatest potential to restore forest structure and decrease fuel loads. This would greatly reduce the potential for large, high-intensity fires. Actions would be most influential in upper and lower montane vegetation types, which are furthest away from a natural fire regime. Actions would likely reverse the trend for vegetation type conversion (change over time to a different vegetation type and fire regime) and reduce the potential of returning large areas of the park to early seral stages of ecosystem development, as happened during the A-Rock Fire.

Biomass removal, prescribed burning, and other treatments would not degrade long-term productivity because restoration target conditions would be based upon the natural range of variability for park ecosystems.

Irreversible or Irretrievable Commitments of Resources

Implementation of Alternative B would decrease the threat of large, catastrophic fires more than the other alternatives. The amount of prescribed fire and fuel treatment, particularly in the Suppression Unit and in wildland/urban interface areas, would likely restore target conditions in such a timeframe as to reduce, to the greatest extent, the potential for irreversible or irretrievable loss of resources, except in the earliest years of program implementation. Fire of the magnitude and effect of A-Rock Fire would still be a possibility but the course of action in Alternative B, compared to Alternative A, would not represent an irreversible or irretrievable commitment of resources.

The three giant sequoia groves in Yosemite National Park have been the focus of past fuel treatments and prescribed fire activity. This alternative would assist in protecting them. The increase in prescribed fire and fuel treatment activity in this alternative would reduce the potential for large, high-intensity fires along the margins of these areas and would reduce the risk over time of losing a sequoia grove. The loss of the Mariposa Grove of Giant Sequoia would be considered an irretrievable loss of resources, and impairment, under the definition in National Park Service Management Policies 1.4.5, but the potential for this would be lowest in this alternative.

Historic resources in Yosemite Valley, Wawona, and in other wildland/urban interface areas, if burned during catastrophic fire, would be irreversibly and irretrievably lost. However, the potential for such a loss is lowest under this alternative.

As in Alternative A, No Action, the effects of managed wildland fire upon wildlife and other park values would generally not be considered irreversible or irretrievable, in that effects would typically be within the natural range of variability for park ecosystems and wildlife habitat, and adverse effects would be short-term. Habitat would typically become suitable to wildlife shortly after a fire.

Under this alternative, no appreciable irreversible or irretrievable commitments of resources would be associated with air quality.

Adverse Impacts that Could Not be Avoided if the Action Were Implemented

The potential for catastrophic fire would exist, but would be less than under Alternative A, and the lowest among the action alternatives. This is because of the large amount of prescribed fire and fuel treatment work proposed under this alternative. Treatments would attempt to restore plant community structure and reduce the risk of catastrophic fire. This would reduce the potential for adverse effects from both unwanted wildland fire and fire exclusion. Thus, the potential for adverse effects is lowest in this alternative.

Biomass removal and other fuel treatments would not be considered adverse in that target conditions would be based on the natural range of variability for those systems. The adverse effects of treatments would be short-term, while beneficial effects, such as ecosystem restoration, would be long-term.

Under this alternative, there would be short-term, unavoidable, adverse impacts to air quality due to the increase in prescribed burning in areas where fuel loads are high from decades of fire exclusion. As park forests are restored to their natural vegetative state and natural fire regime, fuel loads will be lighter and thus, less smoke will be produced when forests burn. The need to burn in the park's forests through prescribed and managed wildland fire will never go away, however, adverse impacts on air quality would decrease over the long-term as forests fuels are reduced.

Alternative C – Passive Action

Biological Environment

Vegetation and Fire Ecology

Potential for Impacts from Catastrophic Fire

Among the action alternatives, Alternative C proposes carrying out the least amount of prescribed fire and wildland/urban interface treatment each year. Thus, it would take the longest time to restore ecosystems (25 years) and wildland/urban interface (10 years). This implies that the risk for catastrophic fire would remain high for longer than under the other action alternatives, but not as long as under the current program, as described in the Alternative A, No Action.

The impacts would be the same as the Alternative B, Aggressive Action, except in lower montane forest. In all action alternatives, these forests would have the largest acreage targeted for prescribed fire. The relatively short fire return intervals found in lower montane forests, combined with existing moderate to high departure from normal fire return interval and the length of time it will take to restore the fire regime under this alternative, creates the conditions for increases in the departure from the natural fire regime during most of the restoration period. The potential for catastrophic wildland fire would not decline until near the end of the 25-year period. Mariposa Grove of Giant Sequoias occurs in lower montane forest and could be one of the areas converted by catastrophic fire. Overall, the impact of Alternative C would be beneficial, long-term, and minor to moderate, due to the reduction in the risk of catastrophic fire. This is still improved over the adverse impacts that would occur under Alternative A.

Fire Management Treatments

Treatments utilized in Alternative C include managed wildland fire, prescribed fire, and fuel reduction treatments comprised of a combination of passive reduction and lower fuel profile treatments (table 2-6, Chapter II). None of the aggressive treatment strategies (i.e., feller-bunchers, tractors, or skidders for moving cut fuels from burn units) would be used. Low-impact skidding techniques would be widely used in this alternative in areas where burning or burning without prior fuel reduction is needed to protect life and property and/or resource values. Livestock and all terrain vehicles (ATVs) would be used to remove dead and down and freshly cut trees. Because of the limitations of these techniques, few large downed trees would be removed and few large trees would be cut and removed. The inability to remove large, dead and down trees would require burning them on site which could create prescribed burns of higher intensity than desired. By leaving too many large, standing trees it would not be possible to restore areas to the lower end of vegetative structure targets which are desired in the wildland/urban interface—especially near communities most at risk from unwanted wildland fire. This could mean again that prescribed fires would burn at a higher intensity than desired.

Managed Wildland Fire

Impacts would be the same for each vegetation zone as under Alternative B.

Re-ignition clause. Same as under Alternative B— beneficial, long-term, and moderate to major.

Holding Action and Monitoring Effects (water and retardant drops, helispots, and spike camps). Same as under Alternative B—adverse, short-term, and negligible to minor.

Prescribed Fire

Prescribed fire would typically be used in restoration of areas where the fire return interval is three or more fires out of cycle, or to maintain target conditions in areas within the Suppression Unit or along the margins of the Fire Use Unit. The total acreage in prescribed fire units would be the same as in Alternative B, Aggressive Action, but the number of acres burned annually would be less.

Subalpine Forests. In all alternatives, less than 1% of subalpine forests would be in prescribed fire units. The impacts of prescribed fire would be expected to be the same as under Alternative A — beneficial, short-term, and minor.

Upper Montane Forests. Less than 20% of upper montane forests would be in prescribed fire units in Alternative C. However, it is twice the acreage as is in prescribed units under Alternative A. The impact of prescribed fire in these forests would be expected to be the same as under Alternative A. But the large acreage would decrease the chance of catastrophic fire, compared to Alternative A. Due to the longer fire return intervals in this vegetation group, the longer time frame for restoration would have a negligible effect. Impacts of prescribed fire on upper montane forests would be the same as under Alternative B, Aggressive Action—beneficial, long-term, and moderate.

Lower Montane Forests. These forests would be a primary focus of the prescribed fire program. The acreage to be restored would be the same as in Alternative B, but fewer acres would be treated per year. The relatively short fire return intervals, combined with the present moderate to high departure from normal fire return interval, would mean that during most of the restoration period, these forests would continue to increase in departure from normal fire regime. Compared to Alternative A, this alternative would increase the area restored and reduce the potential for catastrophic fire. However, potential for catastrophic wildland fire would not decrease until near the end of the 25-year period. The impact of prescribed burns in these forests would be expected to be the same as under Alternative A. Under this alternative, the effect of prescribed fire on lower montane forests would be beneficial, long-term, and minor to moderate. This would be an increase in intensity, compared to Alternative A, because of the increase in area treated.

Meadows. Meadows have the shortest fire return intervals of all vegetation types described for the park. Short fire return intervals found in this group, combined with their moderate to high departure from normal fire return interval, would suggest that during most of the restoration period, the meadows would continue to increase in departure from normal fire return intervals. The acreage to be restored would remain the same as in Alternative B, Aggressive Action, but fewer acres would be treated per year. The potential for catastrophic wildland fire would not decrease until near the end of the 25-year period. The effects of prescribed fire would be expected to be the same as under Alternative A. Overall, the effect of Passive Action would be beneficial, long-term, and minor to moderate. The increase in acreage and the amount of time used to achieve restoration objectives would have benefits that would last longer and cause substantial change in community structure, composition, or fuels, compared to Alternative A.

Foothill Woodlands. More than 75% of foothill woodlands would occur in prescribed fire units under Passive Action, the same amount as under Alternative B, Aggressive Action. This would be nearly four times the acreage in prescribed fire units as under Alternative A. Fire effects would be expected to be the same as under Alternative A. Overall, the effects of Passive Action would be the same as under Aggressive Action because fire return intervals in this group are long enough that the longer time frame in this alternative would have no appreciable effect. The impacts of prescribed fire in foothill woodlands would be beneficial, long-term, and major. The increase in benefit intensity, compared to Alternative A, would be due to the increase in the amount of work and the time frame for achieving restoration.

Site Preparation Associated with Managed Wildland Fire and Prescribed Fire (hand line, snagging, mop-up)

Impacts would be the same as under Alternative A—adverse, short-term, and minor.

Fuel Reduction by Hand or Machine

Effects of Reducing or Removing Biomass from Sites

While the removal of cut trees and shrubs from treated sites can reduce the intensity of future fires, it can have other effects on ecosystems, such as a loss of nitrogen and other vital plant nutrients. Table *IV*-9 under Alternative B presents a comparison of methods used to remove cut trees and shrubs and a qualitative analysis of the movement and availability of nitrogen and other nutrients.

Aggressive Reduction Techniques. These treatments would not be used in this alternative.

Passive Reduction and Lower Profile Techniques.

Low-Impact Skidding. In Alternative C, this technique would be relied upon as the principle means of skidding in areas where it was necessary to remove trees to reduce fuel loads. The total area is estimated to be half of the approximately 6,425 acres of the inner wildland/urban interface and in some places along road and utility corridors. This treatment would include the use of draft animals and four wheel, all-terrain vehicles (ATVs), in combination with fetching arches, to skid dead and down and freshly cut trees of approximately 10 - 20” dbh. Low-impact skidding would cause localized compaction and scarification of the upper duff and topsoil layers. Knobby tires and the feet of draft animals would have negligible to minor local effects on topsoil and duff layers. The most significant effect would result from dragging one end of the tree which could create a skid trench less than a foot wide and a few inches deep. Soil disturbance could create potential sites for invasion of non-native species. Because this treatment would be widely used in this alternative, impacts would be visually apparent, but not so great as to result in changes in species composition or invasion of non-native plant species, if site rehabilitation is not completed and monitored. With rehabilitation and follow-up monitoring and removal of non-natives, effects would be minor. Other mitigation, when needed, could include skidding over snow, frozen soil, or a bed of crushed vegetation. Many areas would be burned subsequent to fuel reduction. Most projects would be extensive enough that adverse effects could be potentially greater than localized, thus effects would be adverse, minor to moderate, and short-term. However, because of the inability of this equipment to haul large trees, it would be difficult to achieve the levels of fuel reduction needed to return some areas to target condition (conservative, and repeated burning techniques would be needed to achieve objectives).

Hand Cutting. Types of effects would be the same as under Alternative A, but this activity would be the predominant one for restoring plant community structure in areas that were unsafe to burn.

This work is labor intensive, which would limit the amount of work that could be accomplished annually, compared to other alternatives that utilize a full range of machinery for reducing plant growth. In the wildland/urban interface, only around 766 acres would be treated annually. This would lengthen the time needed to accomplish wildland/urban interface restoration and risk reduction compared to other action alternatives, but this would still be more restoration than would occur under Alternative A. Work would focus on removing small diameter trees and ladder fuels with resultant decreased risk of catastrophic fire and stand-replacing events. Thus, unless hand-thinned fuels are broadcast burned after thinning, the effects of hand thinning on lower montane forests would be adverse, short-term, and minor. If these fuels are also burned, under controlled conditions the effects of hand thinning would be beneficial, long-term, and minor to moderate.

Pile Burning. Same as under Aggressive Action—adverse, short-term, and negligible to minor.

Chipping. Same as under Aggressive Action.

Girdling. The impact of girdling, to kill individual trees and create wildlife habitat, would be adverse, short-term, and negligible to minor.

Helibase Upgrades

Upgrades would be made in helibases at Crane Flat, El Portal, and Wawona. Effects for each of these would be the same as in Alternative B.

Cumulative Impacts

The past, present, and reasonably foreseeable projects effecting vegetation at Yosemite National Park would be the same as discussed under Alternative A. The overall effects of past activities on vegetative structure and composition and on fuel loads have been adverse, long-term, and major. Present and reasonably foreseeable future projects would have a beneficial, long-term, and minor to moderate effect on vegetation.

The actions of Alternative C would have beneficial, long-term, and minor to major effects in aggregate. When considered in combination with the minor to moderately beneficial impacts of projects on other lands in the area, the cumulative impacts would be beneficial, long-term, and minor to moderate.

Conclusion

Taken together, the impacts of Passive Action would have beneficial, long-term, and minor to major effects on vegetation. This is based on the increase in area treated using prescribed fire and managed wildland fire. The intensity will change from minor to major over the life of the plan as more acres are treated and moved into the maintenance category. By using the estimates of the time required to restore park ecosystems (25 years) and to reduce risks in and restore wildland/urban interface (10 years), the time frame for restoration would be within the normal range of fire return intervals for all but five vegetation types. At the end of the restoration period there would be a significant reduction in the threat of large, high-intensity wildland fires in all areas of the park. This would reduce the potential for vegetation type conversion. This would change effects from adverse to beneficial, compared with Alternative A. Large, high-severity fires would likely occur during the life of the plan, but the size and extent of the fires would be reduced when compared with Alternative A.

The Mariposa Grove of Giant Sequoias is one of the resources specifically identified in the enabling legislation for Yosemite National Park. If catastrophic fire were to eliminate or severely damage this grove, the impact would be impairment.

Wetlands

Potential for Impacts from Catastrophic Fire

Alternative C would result in a decreased risk of catastrophic fire over a 25-year period. The likelihood of fires of high intensity and/or large size would be reduced with corresponding beneficial impacts on park wetlands. Depending on the specifics associated with individual events and considering effects at multiple scales, impact levels would vary from negligible to moderate, which is an improvement over Alternative A.

Fire Management Treatments

Managed Wildland Fire

Same as Alternative A—beneficial, long-term, and moderate effects.

Re-ignition clause. Same as Alternative B.

Holding Action and Monitoring Effects (water and retardant drops, helispots, and spike camps). Same as Alternative B—adverse, short-term, and negligible.

Prescribed Fire

Under this alternative, limited amounts of prescribed fire would be proposed in and around wetlands. Direct benefits would include desired structural conditions for specific habitats and well-timed prescribed fire to enhance wetlands species. These impacts would be considered beneficial. In the absence of a need for fire, through changes in the prescribed fire boundary or firing patterns, wetlands would be excluded from prescribed fire units to avoid adverse impacts. Thus, impacts would be beneficial, minor to moderate, and typically short-term.

Wildland/urban interface areas, such as El Portal and Yosemite West, would likely receive mechanical pretreatment, followed by prescribed fire. Treatments would be implemented with the intention of avoiding impacts to wetlands (see hand cutting, below). Specific impacts of treatments would differ little from the No Action Alternative, but the intensity would be expected to increase because of the increase in the number of acres treated. Therefore, the effects of prescribed fire on wetlands in Alternative C would be beneficial, long-tern, and minor to moderate.

Site Preparation Associated with Managed Wildland Fire and Prescribed Fire (hand line, snagging, mop-up)

Same as Alternative B, although with smaller annual impacts.

Fuel Reduction by Hand or Machine

Aggressive Reduction Techniques. Would not be used under this alternative.

Passive Reduction and Lower Profile Techniques.
Low-Impact Skidding. If for some reason fallen debris needed to be removed from meadows, attempts to move the material would be done when the water table had dropped and the surface was dry or in winter when snow would protect the meadow surface. Methods used would mitigate the possibility of material digging into the soil surface and causing soil disturbance. Impacts would be adverse, short-term, and negligible.

Hand Cutting. Same as Alternative B—minor to moderate, beneficial, and short-term

Pile Burning. Same as Alternative B—beneficial, minor to moderate, and short-term.

Chipping. No chipping of wetland vegetation will take place under this alternative.

Girdling. No girdling of wetland vegetation would take place under this alternative.

Cumulative Impacts

Cumulative effects to wetland and aquatic resources discussed herein are based on analysis of additional wetlands activities within the Yosemite region and the potential effects of this alternative. The past, present, and reasonably foreseeable projects that would potentially affect local wetland patterns and large-scale or regional wetland patterns would be the same as evaluated in Alternative A.

Present and reasonably foreseeable future projects within and outside of the park would result in both short-term and long-term impacts on wetlands in the area. Overall, effects would be beneficial, long-term, and moderate for reasonably foreseeable future projects. Considered in combination with the impacts of Alternative C, cumulative impacts would be beneficial, long-term, and minor to moderate, due to the emphasis on restoration of vegetative structure and processes through fire and the long time-frame proposed to accomplish the work.

Conclusion

Alternative C would have some impact on wetland resources, including reducing the potential for catastrophic wildland fire and its effects. Overall, these effects would be beneficial, long-term, and minor to moderate, with minor to moderate ecological benefits for park wetlands. There would be no impairment from the effects of this alternative.

Wildlife

Potential for Impacts from Catastrophic Fire

Under Alternative C, catastrophic fire would have similar effects as described under Alternative A, however the risk would decrease over time. Forests that have deviated from the median fire return interval by four or more intervals would be gradually brought into more natural conditions over 25 years, more time than in the other action alternatives. Areas most outside of the natural fire regime would be restored first. This alternative proposes , about 1,260 to 6,436 acres of restoration burning per year. Alternative C would also rely upon natural ignitions to achieve target conditions in the Fire Use Unit. Some areas would likely miss more fires, potentially becoming more at risk from the impacts of high-intensity fire. Even though stand-replacement fires would likely occur over the life of the plan, risk of catastrophic fire would be gradually reduced over the proposed 25-

year period. Because catastrophic fire and its adverse effects on wildlife and wildlife habitat would be reduced, compared to Alternative A effects would be beneficial, long-term, and moderate for wildlife and their habitats.

Fire Management Treatments

In Yosemite and in surrounding forests, many mid- to low-elevation forests are overgrown with dense shrubs and young trees because of a history of fire exclusion. At the same time, as explained above, some areas are at high risk of unnatural high-intensity fire events. These conditions affect the abundance and diversity of wildlife species directly by creating unfavorable habitat conditions for some species. For example, dense understory growth may adversely affect habitat quality for California spotted owls and northern goshawks by limiting their access to prey (Weatherspoon et al. 1992, Maurer 2000, respectively). The combination of fire and fuel reduction proposed in this alternative would result in increased habitat and species diversity as gaps would be created in continuous forest and the edge along the forest/gap interface recovered with important understory plants that had been crowded out by shade tolerant species. Use MIMT for fire management; identify sensitive wildlife resources to minimize adverse impacts; and apply mitigations identified during consultation with USFWS (see Appendix 9).

Managed Wildland Fire

Because ecosystem restoration would occur over a period of 25 years in Alternative C, the acreage burned by managed wildland fire would increase only gradually. Actions in the Fire Use Unit and effects of managed wildland fire would be similar to Alternative B, however they would occur over a longer time. Overall, the effects would be beneficial, long-term, and moderate, due to the restoration of wildlife habitats and reduction in the threat of catastrophic fire over a 25-year period. Mitigation: Use MIMT and identify sensitive wildlife resources to minimize adverse impacts.

Re-ignition. Effects would be the same as under Alternative B.

Prescribed Fire

This alternative proposes an increase in prescribed fire over the No Action Alternative. However, when compared to the other action alternatives, this alternative proposes the smallest annual amount of prescribed fire. Effects are similar to those in Alternative B. Impact to wildlife from prescribed burning would be beneficial, long-term, and moderate due to gradual burning schedule over 25 years to restore fire to wildlife habitat and reduce the threat of catastrophic fire. Mitigation: Use MIMT for fire management; identify sensitive wildlife resources to minimize adverse impacts; and apply mitigations identified during consultation with USFWS (see Appendix 9). Where possible, limit fire size and/or provide burn intensity heterogeneity to maintain wildlife species diversity.

Holding Action and Monitoring Effects (water and retardant drops, helispots, and spike camps) and Site Preparation Associated with Managed Wildland Fire and Prescribed Fire (hand line, snagging, mop-up)

Actions such as hand line construction, snagging, and water drops would be employed before and during prescribed fire and during management of wildland fires. Effects and concerns would be those described in Alternative A. Some adverse effects on wildlife would occur from these actions because of the increased use of prescribed fire under this alternative. These impacts, however, would be offset by the long-term benefits of fires on ecosystems by reducing the threat of catastrophic fire and restoring a more natural forest structure. Impacts would be similar to Alternative B—adverse, short-term, and minor.

Fuel Reduction by Hand or Machine

Passive Reduction and Lower Profile Techniques.

Low-Impact Skidding. Trees in wildland/urban interface areas and along road and utility corridors under Alternative C would be removed with the use of horses or ATVs and fetching arches. These techniques would be used extensively in this alternative to move smaller sized material (10-20"dbh) from areas where thickets of sub-canopy trees required thinning. It is expected that all the areas in wildland/urban interface and along road and utility corridors could see limited amounts of this treatment. This work would be limited in scope; it would occur over 10 years in less then 1% of the park area (an average of 766 acres per year).

Because horses and ATVs cannot handle large trees, trees larger than approximately 20" dbh would not be removed and would have to be felled prior to broadcast burning. Some drag trails would be created from the smaller diameter material, but the use of fetching arches would reduce the impacts of logs being mechanically skidded across the ground. Drag trails and other disturbance would be raked out following the work and most areas would be broadcast burned as well. Few tire and track scars would be evident and the effects on small mammals and reptiles associated with the forest floor would be minor. Impacts associated with these techniques as the forest was brought closer to natural stand structure would be beneficial, long-term, and minor as the areas would be maintained using prescribed fire. Mitigations: areas proposed for thinning and removal of vegetation using these techniques would be inventoried for the presence of sensitive species that could be affected by proposed project work.

Hand Cutting. Hand thinning of understory vegetation, down fuels, and small-diameter trees in the wildland/urban interface would have mixed effects on wildlife and habitat. Hand cutting trees and brush to attain target conditions provides a more natural habitat and helps reduce the threat of catastrophic fire; especially from human-caused ignitions that occur in developed areas. The resulting forest structure, however, tends to be less complex and more homogeneous, because protection of property and safety through fuel reduction is a major consideration in these areas. A few species, such as marten, hermit thrush, and some small rodents may be adversely affected by this reduced complexity, but many more species, such as Cooper's hawk, Hammond's flycatcher, and several bat species, would benefit from a more open forest. During hand-thinning operations, wildlife in the area might be affected in two ways. Removal of trees and other vegetation would adversely affect wildlife, such as insects and nesting birds, currently using these habitat features. Secondly, human presence and use of chainsaws and other tools during thinning operations may disturb wildlife, although such disturbance would be short-lived.

Trees and other vegetation in wildland/urban interface areas and along road and utility corridors under Alternative C would be hand cut with chainsaws. This would limit the amount of work (size of area and number of trees) that could be accomplished annually. Achievement of target habitat conditions in these areas would take longer than with the other action alternatives. Such management would have different effects on wildlife. On one hand, delay in achieving target conditions would allow altered habitat conditions to continue, and the threat of high-intensity fire in those areas would remain. On the other hand, retention of more trees would benefit species that prefer denser forest conditions, such as spotted owls. Impacts on wildlife would be beneficial, long-term, and minor through eventual return of these small areas to a more natural habitat structure and composition. Mitigation: Avoid damage to sensitive habitat types, such as wetlands; identify and avoid sensitive wildlife resources; and apply mitigations identified during consultation with USFWS (see Appendix 9).

Pile Burning. Under Alternative C, in some areas removed material would be piled and burned on-site, while in other areas materials would be removed for later burning or sale. With on-site burning, the impacts would be the same types as described under Alternative A, but may be somewhat greater since areas would be treated more quickly. Some mortality of animals that would take up residence in the piles may occur, although such effects are still expected to be adverse, short-term, and negligible. Mitigation: burn piles as soon as possible to minimize the number of animals living in them.

Chipping. Same as Alternative B—negligible; adverse, and short-term. Mitigation: Follow established protocols for limiting the depth of chips distributed on a site.

Girdling. Under Alternative C, trees would be girdled to reduce forest density, create snags, and prepare areas for prescribed fire. Girdling trees in Wilderness or away from roads and developed areas would be beneficial to wildlife by creating snag habitat, and facilitating the return of a more natural forest habitat structure. If, however, the snags were eventually felled and removed, wildlife such as bats and woodpeckers that had taken up residence would be adversely affected. This impact would occur if snags created by girdling were removed to reduce fuel loading, or were determined to be hazard trees near roads or developed areas. Impact on wildlife from girdling would be beneficial, long-term, and minor, because of the creation of snag habitat and its use in creating a more natural, fire-influenced habitat structure.

Peregrine Falcon

Same as Alternative A—adverse, short-term, and negligible.

Helibase Upgrades

Same as Alternative B.

Cumulative Impacts

The past, present, and reasonably foreseeable projects that would have the most direct relationship to Alternative C would be the same as listed under Alternative A. The impacts of these actions, considered in combination with the impacts of Alternative C, would result in cumulative effects on park wildlife and habitat that would be beneficial, long-term, and minor to moderate. This is because beneficial projects would impact large areas of habitat in the central Sierra Nevada in ways that would compliment the beneficial effects of the *Yosemite Fire Management Plan*. The Sierra Nevada Forest Plan Amendment would affect virtually all U.S. Forest Service land around the park because of its focus on more ecosystem-based management. In comparison, projects with adverse impacts involve small areas and/or have minor effects over larger areas.

Conclusion

Alternative C would result in moderate, beneficial, long-term impacts on wildlife and habitat through eventual restoration of park habitats to a more natural, fire-influenced condition that would support a more natural abundance, diversity, and distribution of species. Threat of catastrophic fire, and its adverse effects on wildlife, would be reduced, compared to Alternative A, although the period of time over which this alternative would be implemented (25 years) would still lead to unwanted wildland fires. The intent of the alternative is to reduce the risk of catastrophic fire, thus there would be no impairment from the effects of this alternative.

Special-Status Species - Plants

Potential for Impacts from Catastrophic Fire

Wildland/urban interface treatments around the El Portal area would reduce the potential for catastrophic fire conditions within the wildland/urban interface and prescribed fire would reduce the potential for these events beyond the bounds of the administrative site. Regardless of treatment methods, if a catastrophic fire were to occur, there would be adverse impacts from non-native species encroachment. The probability of non-native species encroachment into sites burned by catastrophic fire would remain high, as in Alternative A, due to the impacts of high-intensity burning on soils and on understory and overstory vegetation. However, under this alternative, the potential for catastrophic fire would be reduced, therefore the amount of non-native species encroachment would likely be less. Therefore, in regards to catastrophic fire, impacts to special-status species from implementation of Alternative C beneficial, long-term, and negligible to minor.

Fire Management Treatments

Managed Wildland Fire

Under Alternative C, all of the plant special-status species described in this document would occur within the Suppression Unit, and only isolated populations of Yosemite onion would occur in the Fire Use Unit. During fire events, input from a Resource Advisor would continue to be used to minimize or eliminate impacts to these species (see Chapter II, Mitigation under Actions Common to All Alternatives and Appendix 3). The departure from natural fire return intervals in areas inhabited by these species would more slowly approach the natural range in variability over the landscape, compared to Alternative B. Therefore, impacts of managed wildland fire on special-status species would be the same as for Alternative B—beneficial, long-term, and minor, due to return to natural fire return intervals with associated benefits to ecosystem function.

Re-ignition clause. Same as Alternative B—negligible effect.

Holding Action and Monitoring Effects (water and retardant drops, helispots, and spike camps). Despite increased implementation of burning and operational activities, effects would be the same as in Alternative A. These special-status species are in areas that would be minimally affected by the proposed actions in Alternative C. Mitigations would be as described in Alternative A (see also Chapter II, Mitigation Measures, Natural Resources). Impacts of these actions taken in conjunction with mitigation measures would be adverse, short-term, and negligible.

Prescribed Fire

Under this Alternative, potential effects to special-status plants through prescribed burning would increase slightly over Alternative A because of the gradual creation of a larger defensible space and perimeter around El Portal. Species would be potentially affected by burning in the shoulder seasons and the probability of non-native species encroachment into sites burned out of season would remain high, as in Alternative A. Appropriate mitigation measures would be developed by the park Vegetation Ecologist and Fire Ecologist. Mitigation Measures Common to All Alternatives (Chapter II) discusses the common practices for dealing with these situations. Resource Advisors may recommend that some areas not be burned. However, the more gradual approach in this alternative would allow for improved coordination of mitigation measures to avoid individuals and populations, which would reduce long-term effects to these species. Therefore, impacts would be negligible to minor, adverse, and long-term, the same as in Alternative A.

Site Preparation Associated with Managed Wildland Fire and Prescribed Fire (hand line, snagging, mop-up)

Same as Alternative A—negligible to adverse, short-term, and minor.

Fuel Reduction by Hand or Machine

Passive Reduction and Lower Profile Techniques.

Low-Impact Skidding Low-impact skidding would not be done in areas inhabited by special-status species, therefore there would be no effect.

Hand Cutting. Same as Alternative B. In the case of special-status species, hand cutting actions would continue to only affect special-status species within the El Portal Administrative site. Mitigations used would be the same as described in Alternative A, with the same effects. Yosemite onion and Congdon's lewisia would not be impacted by these activities due to their locations. Both Tompkin's sedge and Congdon's woolly-sunflower would potentially have increased levels of impact under this alternative due to wildland/urban interface treatments, and the increased potential for ground disturbance (through foot traffic, dragging cut materials) and subsequent changes in species composition if non-native species became established within rare plant populations. Therefore, the impact of hand cutting would be minor, adverse, and long-term.

Pile burning. These activities would increase, compared to Alternative A. Effects would be the same as in Alternative B, minor, adverse, and potentially long-term due to the larger area of disturbance and increased potential for spread and establishment of non-native plant species. Appropriate mitigations as described in Alternative A and Chapter II (Mitigation Measures) would be applied prior to execution of each project.

Chipping. Same as Alternative B—short-term, negligible to minor, and adverse, as a result of using mitigation related to depth of piles.

Girdling. This action would not occur in the areas inhabited by special-status species, therefore there would be no effect.

Helibase Upgrades

Same as Alternative B

Cumulative Impacts

Past, present, and reasonably foreseeable projects that might affect special-status plants would be the same at identified in Alternative A. Projects within known and potential habitats for plant special-status species, as well as actions associated with implementation of the Yosemite Valley Plan in El Portal, would have increased impacts from non-native plant species introduction and alteration of native plant habitat. Overall, these effects, in combination with the effects of Alternative C, would result in negligible to minor, adverse and long-term cumulative impacts.

Conclusion

Implementation of Alternative C, with increased manual thinning and removal (as compared to Alternative A), increased management of fuels around developed areas and increased burning would have an overall minimal effect on these species due to their relative isolation, sparsely vegetated habitats, and occurrence beyond areas that would be managed aggressively. The impacts of Alternative C would have a negligible to minor, adverse, and long-term impact to special-status species. The intent of the alternative is to reduce the risk of catastrophic fire, thus there would be no impairment from the effects of this alternative.

Special-Status Species – Animals

Sierra Nevada Bighorn Sheep *(Ovis canadensis sierrae)* - Federal Endangered

Potential for Impacts from Catastrophic Fire

Same as Alternative A—negligible, beneficial, and long-term.

Fire Management Treatments

Managed Wildland Fire

The impact of managed wildland fire would be the same as under Alternative A. Although use of wildland fire would greatly increase under Alternative C, its application on bighorn habitat would be limited since these areas are well within the natural fire return interval.

Prescribed Fire

The impact of prescribed fire on bighorn sheep under Alternative C would be the same as under Alternative A—negligible, beneficial, and long-term.

Holding Action and Monitoring Effects (water and retardant drops, helispots, and spike camps) and Site Preparation Associated with Managed Wildland Fire and Prescribed Fire (hand line, snagging, mop-up)

Impact of actions taken to manage wildland and prescribed fire under Alternative C would be the same under Alternative A—adverse, short-term, and negligible.

Fuel Reduction by Hand or Machine

Passive Reduction Techniques Would not occur in bighorn sheep habitat.

Cumulative Impacts

Past, present and reasonably foreseeable future projects would be the same as considered in Alternative A. The resulting cumulative impacts from these actions on Sierra Nevada bighorn sheep are beneficial, long-term, and major because they will help the species recover to larger, more stable self-sustaining populations. Impacts of these projects in combination with the impacts of Alternative C would result in beneficial, long-term, and major cumulative impacts.

Conclusion

The impact of Alternative C on Sierra Nevada bighorn sheep would be negligible, beneficial, and long-term based primarily on the continued, though rare, influence of fire on their habitat.

Valley Elderberry Longhorn Beetle (*Desmocerus californicus dimorphus*) – Federal Threatened

Distribution of the valley elderberry longhorn beetle in the area administered by Yosemite National Park is restricted to the El Portal Administrative Site. The entire life cycle of the valley elderberry longhorn beetle is connected to the elderberry plant (*Sambucus sp.*). Adverse effects on elderberry plants would therefore have an adverse effect on this beetle. Current management of vegetation in El Portal follows U.S. Fish and Wildlife Service guidelines for protection of valley elderberry longhorn beetle and their host plants (USFWS 1999).

Potential for Impacts from Catastrophic Fire

Similar to Alternative B. Actions taken under Alternative C, with a goal to treat wildland/urban interface areas within 10 years, would reduce the chance of catastrophic fire in El Portal, although some unwanted fires would be likely to occur in that span of time. Impact of Alternative C would, therefore be beneficial, long-term, and minor to moderate, due to the gradual reduction in the threat of catastrophic fire.

Fire Management Treatments

Managed Wildland Fire

The El Portal Administrative Site where valley elderberry longhorn beetle habitat occurs is entirely within the Suppression Unit where wildland fires would be suppressed.

Prescribed Fire

Effects of prescribed fire, when used, would be similar to under Alternative A, but under Alternative C, prescribed fire use in El Portal would be greater. The goal would be to achieve target conditions in wildland/urban interface areas within 10 years through hand thinning and prescribed fire. The effect of prescribed fire on valley elderberry longhorn beetle would be beneficial, long-term, and minor through the reduction in the potential for catastrophic fire and because long-term benefit to elderberry plants through regeneration and reduced fuel loads would offset the unintentional, short-term impacts from beetle mortality. Mitigation would include following U.S. Fish and Wildlife Service guidelines for protection of valley elderberry longhorn beetle and their host plants (e.g., see Alternative A).

Holding Action and Monitoring Effects (water and retardant drops, helispots, and spike camps) and Site Preparation Associated with Managed Wildland Fire and Prescribed Fire (hand line, snagging, mop-up)

With the increased use of wildland and prescribed fires under Alternative C, impacts associated with management of these fires would likely increase, compared to Alternative A, No Action. Effects of Alternative C would be the same as Alternative B—adverse, short-term, and negligible, based upon their increased use, and therefore, greater chance of inadvertent impacts, and the application of mitigation measures in accordance with USFWS guidelines.

Fuel Reduction by Hand or Machine
Passive Reduction and Lower Profile Techniques.
Low-Impact Skidding. Would not be used in valley elderberry longhorn beetle habitat.

Hand Cutting. Effects and mitigation would be as in Alternative B. Overall, the reduction in fuels by hand cutting would help reduce the threat of catastrophic fire, which would help protect valley elderberry longhorn beetle and their host plants. Impact on valley elderberry longhorn beetle from hand cutting under Alternative C would be expected to be beneficial, long-term, and moderate.

Pile Burning. Same as Alternative A—adverse, short-term, and negligible.

Chipping. In some cases, cut materials would be chipped, when logistical, administrative, or ecological reasons make on-site burning unsuitable. Effects would be the same as described in Alternative A—negligible, adverse, and long-term.

Girdling. Effects of girdling of trees would be the same as in Alternative B—negligible, beneficial and long-term.

Cumulative Impacts

Specific foreseeable projects that could adversely affect valley elderberry longhorn beetle near Yosemite National Park would be the same as described under Alternative A. Impacts to valley elderberry longhorn beetle from present and reasonably foreseeable actions would be beneficial, long-term, and minor. Considered in combination with the effects of Alternative C, cumulative impacts would be beneficial, long-term, and minor.

Conclusion

Impact of Alternative C on valley elderberry longhorn beetles is expected to be beneficial, long-term, and minor, due primarily to the reduction in the threat of catastrophic fire, through a program of prescribed fire and mechanical fuels management in the El Portal area.

California Red-Legged Frog (*Rana aurora draytonii*) - Federal Threatened

California red-legged frogs have disappeared from nearly the entire Sierra Nevada, including Yosemite National Park—only two populations are known to exist in the northern Sierra. The most significant cause of this decline is alteration and destruction of habitat from activities such as urban development, dams, sediment from roads and mines, grazing, and timber harvest Red-legged frog habitat was identified through wildlife habitat relationships analysis (Mayer and Laudenslayer 1988).

Potential for Impacts from Catastrophic Fire

Under the median fire return interval, approximately 92% of the high-quality habitat has missed more than four intervals. Most effects of catastrophic fire would be similar to those under Alternative A. Alternative C would reduce fuel accumulations and reduce the risk of catastrophic fire, with the goal of reaching target conditions within 25 years. The effect on red-legged frog habitat would be minor, beneficial, and long–term. While no frogs are present in the park, potential habitat could be adversely affected by catastrophic fire. These effects could be mitigated by identification of potential red-legged frog habitat and fuel-reduction efforts in those areas.

Fire Management Treatments

Managed Wildland Fire

Effects would be similar to Alternative B. This would have a beneficial effect on red-legged frog habitat by eventually reducing the threat of catastrophic fire, although some unwanted fires would likely occur over the 25-year span of implementation. Under Alternative C, effects of managed wildland fire would be similar to Alternative B—beneficial, long-term, and minor. California red-legged frog habitat would benefit from the restoration of the natural structure and fuel loading in riparian areas, and reducing the threat of catastrophic fire.

Prescribed Fire

Similar to Alternative B—beneficial, long-term, and minor.

Holding Action and Monitoring Effects (water and retardant drops, helispots, and spike camps) and Site Preparation Associated with Managed Wildland Fire and Prescribed Fire (hand line, snagging, mop-up)

Effects would be the same as Alternative B—minor, adverse, and long-term. Mitigations would be the same as under Alternative A.

Fuel Reduction by Hand or Machine

Passive Reduction and Lower Profile Techniques.

Low-Impact Skidding. These techniques would not be used in red-legged frog habitat.

Hand Cutting. Same as Alternative B—beneficial, long-term, and minor.

Chipping. Same as Alternative B—negligible impacts.

Cumulative Impacts

The past, present, and reasonably foreseeable projects that would have a potential effect on red-legged frogs would be the same as in Alternative A. Beneficial impacts from present and reasonably foreseeable projects in combination with effects of Alternative C would result in beneficial, long-term, and minor cumulative impacts, due to implementation of land management plans that would protect habitat and species conservation plans that would protect the species.

Conclusion

Impact of Alternative C on California red-legged frogs would be beneficial, long-term, and minor, due primarily to a reduction in the threat of catastrophic fire through use of prescribed and wildland fires and hand cutting.

Bald Eagle *(Haliaeetus leucocephalus)* - Federal Threatened

Bald eagles are rare and transient in the Yosemite area, and while they have been seen in many areas of the park, they are most frequently seen near large rivers and lakes. Nesting by bald eagles is not known to occur in the park or El Portal. Bald eagle habitat was identified through wildlife habitat relationships analysis (Mayer and Laudenslayer 1988).

Potential for Impacts from Catastrophic Fire

The impact of Alternative C would be beneficial, long-term, and minor to moderate, due to the gradual reduction in the threat of catastrophic fire.

Fire Management Treatments

Managed Wildland Fire

Similar to Alternative A, except under Alternative C, an increase in managed wildland fires and the use of re-ignitions of suppressed wildland fires, up to 3 years after, would increase the amount of habitat treated with fire, with target conditions reached within 25 years. This would reduce the threat of catastrophic fire, compared to Alternative A. Impact of managed wildland fire on bald eagles under Alternative C would be beneficial, long-term, and moderate, due to the rate at which the threat of catastrophic fire would be reduced.

Prescribed Fire

Effects would be similar to Alternative B, except there would be less use of prescribed fire, and a higher risk of catastrophic fire, so the impact of prescribed fire on bald eagles under Alternative C would be beneficial, long-term, and moderate.

Holding Action and Monitoring Effects (water and retardant drops, helispots, and spike camps) and Site Preparation Associated with Managed Wildland Fire and Prescribed Fire (hand line, snagging, mop-up)

Same as Alternative B—adverse, short-term, and minor, primarily from actions that may remove snags.

Fuel Reduction by Hand or Machine

Passive Reduction and Lower Profile Techniques.

Low-Impact Skidding. These techniques would be used extensively in this alternative to move smaller sized material (10-20"dbh) from areas where thickets of sub-canopy trees required thinning. It is expected that all the areas in the wildland/urban interface and along road and utility corridors would see limited amounts of this treatment and those listed below. Disturbance could be mitigated through inventories of treatment areas for the presence of sensitive species that could be adversely affected by proposed project work. These techniques are generally quieter and less intrusive than techniques described under Aggressive Reduction, which is proposed under Alternative B and D. Impacts associated with these techniques are beneficial, short- to long-term, and minor, if areas continue to be maintained with prescribed fire following initial thinning treatments.

Hand Cutting. Same as Alternative B—negligible, adverse, short-term.

Girdling. Same as Alternative B—negligible, beneficial, and long-term.

Cumulative Impacts

Past, present, and reasonably foreseeable projects would be the same as under Alternative A. Impacts from present and reasonably foreseeable projects would be beneficial, long-term, and minor, based upon the continuing recovery of the species and implementation of broad-ranging plans that would further benefit the species long-term. Consider in combination with the effects of Alternative C, cumulative effect would be beneficial, long-term, and minor

Conclusion

Alternative C would have a minor, beneficial, long-term effect on bald eagles, primarily from a reduction in the threat of catastrophic fire, compared to Alternative A.

Mountain Yellow-Legged Frog *(Rana muscosa)* - Under Review for Federal Listing

Potential for Impacts from Catastrophic Fire

Conditions would be the same as in Alternative A. Effects would be beneficial, short-term, and negligible, due to the gradual reduction in the risk of catastrophic fire.

Fire Management Treatments

Managed Wildland Fire
Same as Alternative B—beneficial, long-term, and minor.

Prescribed Fire
Same as Alternative B—beneficial, long-term, and minor.

Holding Action and Monitoring Effects (water and retardant drops, helispots, and spike camps) and Site Preparation Associated with Managed Wildland Fire and Prescribed Fire (hand line, snagging, mop-up)
Same as Alternative B—minor, adverse, and long-term, due primarily to the risk to remaining populations from water drops. Mitigation: Comply with established protocols to protect resources; identify locations of sensitive resources to avoid impacts; use MIMT.

Fuel Reduction by Hand or Machine
Passive Reduction and Lower Profile Techniques.
Low-Impact Skidding. These techniques would not be used in mountain yellow-legged frog habitat.

Hand Cutting. Same as Alternative A—no effect on mountain yellow-legged frogs.

Cumulative Impacts

Past, present, and reasonably foreseeable projects would be the same as in Alternative A. Effects would be beneficial, long-term, and moderate, based primarily on active efforts to protect and restore the species, and the implementation of land management plans that would provide more ecosystem-based management of habitats. In combination with the effects of Alternative C, cumulative impacts would remain beneficial, long-term, and moderate.

Conclusion

Impact to mountain yellow-legged frogs from Alternative C would be beneficial, long-term, and minor due primarily to the return of a natural fire regime to the small area of habitat that has departed from a natural fire return interval.

Yosemite Toad (*Bufo canorus*) - Under Review for Federal Listing

Potential for Impacts from Catastrophic Fire

Same as Alternative B—beneficial, short-term, and negligible effect.

Fire Management Treatments

Managed Wildland Fire
Same as Alternative B—beneficial, long-term, and minor.

Prescribed Fire
Same as Alternative A—negligible, beneficial, and long-term.

Holding Action and Monitoring Effects (water and retardant drops, helispots, and spike camps) and Site Preparation Associated with Managed Wildland Fire and Prescribed Fire (hand line, snagging, mop-up)
Overall impact of prescribed and wildland fire management actions on toads under Alternative C would be the same as in Alternative B—minor, adverse, and long-term, due primarily to the risk to remaining populations from water drops and retardant contamination. Mitigation: Identify locations of Yosemite toad and mountain yellow-legged frog populations and avoid these areas during water and retardant drops.

Fuel Reduction by Hand or Machine
Passive Reduction and Lower Profile Techniques.
Low-Impact Skidding. This techniques would not be used in Yosemite toad habitat.

Hand Cutting. Same as Alternative A—negligible, beneficial, and long-term.

Cumulative Impacts

Past, present, and reasonably foreseeable projects would be the same as under Alternative A. Impacts to Yosemite toad would be beneficial, long-term, and moderate, based primarily on active efforts to protect and restore the species, and the implementation of land management plans that would provide more ecosystem-based habitat management. Considered in combination with the impacts of Alternative C, cumulative impacts would be moderate, beneficial and long-term.

Conclusion

Impact to Yosemite toads from Alternative C would be beneficial, long-term, and minor due primarily to the return of a natural fire regime to the area of habitat that has departed from a natural fire return interval, although the wet habitats of Yosemite toads are unlikely to be directly affected.

California Spotted Owl (Strix occidentalis occidentalis)

California spotted owls are found throughout the Sierra Nevada, from lower elevation oak and ponderosa pine forests up to 7,600 feet elevation red fir forests. There are approximately 100 known and probable spotted owl sites in Yosemite National Park. While spotted owls can coexist with extensive fires of varying intensities within their habitats, severe wildland fire in mixed-conifer forests may represent the greatest threat to existing spotted owl habitat in Yosemite (Weatherspoon et al. 1992). California spotted owl habitat was identified through wildlife habitat relationships analysis (Mayer and Laudenslayer 1988).

Potential for Impacts from Catastrophic Fire

Types of effects would be the same as in Alternative B. Under Alternative C, the goal is to reach target conditions within 25 years and over that span of time, some catastrophic fires would likely occur. However, impact of Alternative C would be moderate, beneficial, and long-term, due to the reduced threat of catastrophic fire.

Fire Management Treatments

Managed Wildland Fire

Effects would be similar to those described in Alternative A, except under Alternative C, managed wildland fire would increase.. Adverse effects from wildland fire could be minimized through reduction of fuel loading in known nesting and roosting areas through the use of spring prescribed fires, which would disrupt fuel continuity and reduce the chance of stand-replacing fires in these areas (Weatherspoon et al. 1992). The impact of managed wildland fire on California spotted owls would be beneficial, long-term, and moderate, based upon the mitigation of the threat of catastrophic fire. However, over a 25-year period, some catastrophic fires would likely occur.

Prescribed Fire

Effects would be similar to those described in Alternative A. The use of prescribed fire under Alternative C would have moderate, beneficial, long-term impact on California spotted owls, primarily through the reduction in the threat of catastrophic fire and the restoration of a more natural forest structure over a 25-year period. Reduction of fuels in spotted owl roosting and nesting habitat through low-intensity burns or mechanical thinning at appropriate times of the year would minimize adverse impacts.

Holding Action and Monitoring Effects (water and retardant drops, helispots, and spike camps) and Site Preparation Associated with Managed Wildland Fire and Prescribed Fire (hand line, snagging, mop-up)

Same as Alternative A. Overall, actions taken to manage wildland and prescribed fire under Alternative C would have a minor, adverse and long-term effects on spotted owls through possible disturbance and habitat alteration in roosting and nesting sites. Such impacts would be mitigated by locating all spotted owl sites in a treatment area and avoiding impacts to them.

Fuel Reduction by Hand or Machine

Passive Reduction and Lower Profile Techniques

Low-Impact Skidding. ATVs, horses, and fetching arches would be used to remove standing and dead and down trees to reduce fuel loading and the risk of high-intensity fire. It is expected that about half of the acreage in wildland/urban interface and many areas along road and utility corridors would see limited amounts of this treatment. Areas proposed for these techniques represent less than 1% of the park. These techniques would be used extensively in this alternative to move smaller sized material (10-20”dbh) from areas where thickets of sub-canopy trees required thinning. Most sites would be broadcast burned after fuel reduction treatments Clearing understory vegetation would provide favorable foraging conditions for spotted owls. Impact of low-impact skidding on spotted owls under Alternative C would be adverse, long-term, and negligible.

Hand Cutting. Similar to Alternative A, except the amount of area treated would be much greater. Clearing understory vegetation would provide more favorable foraging conditions for spotted owls. Adverse effects on spotted owls would occur if many large, down logs were removed from the forest, because this would result in a decrease in northern flying squirrel, and important prey of spotted owls. Impact of hand cutting and burning on California spotted owls under Alternative C would be beneficial, long-term, and moderate, based on possible return of treated areas to a more natural forest structure.

Chipping. Same as Alternative B—adverse, short-term, and negligible.

Girdling. Same as Alternative B—major, beneficial, and long-term.

Cumulative Impacts

Past, present, and reasonably foreseeable projects would be the same as described in Alternative A. Effects on spotted owls would be beneficial, long-term, and moderate. Considered in combination with the effects of Alternative C, cumulative impacts would be beneficial, long-term, and moderate.

Conclusion

Alternative C would have moderate, beneficial, long-term impact on spotted owls from a reduction in the threat of catastrophic fire and restoration of natural fire structure through use of wildland and prescribed fire. Care, however, would have to be taken with fuels management in spotted owl roosting and nesting habitat to minimize adverse impacts. This would require extensive knowledge of the distribution of spotted owls in the park.

Pacific Fisher *(Martes pennanti)* - Under Review for Federal Listing

Potential for Impacts from Catastrophic Fire

Similar to Alternative B, except under Alternative C this dangerous situation would be reduced through the application of wildland and prescribed fire to reduce critical fuel loading, restore natural forest structure, and maintain a natural fire regime. Some high-intensity fires would likely occur over the 25-year implementation of Alternative C. Impact of Alternative C on the threat of catastrophic fire would therefore, be major, beneficial, and long-term.

Fire Management Treatments

Managed Wildland Fire

Under Alternative C, effects would be similar to Alternative B, but with potentially fewer acres of managed wildland fire, which would have a moderate, beneficial, long-term effect on fishers.

Prescribed Fire

Use of prescribed fire would increase under Alternative C, with effects similar to Alternative B, but fewer acres would be treated. Impact of prescribed fire on fishers under Alternative C would be beneficial, long-term, and moderate, based upon a reduction in the threat of catastrophic fire, and restoration of a more natural forest structure, although it would occur over a relatively long period (25 years). Care would be taken to preserve habitat features that are important to fishers.

Holding Action and Monitoring Effects (water and retardant drops, helispots, and spike camps) and Site Preparation Associated with Managed Wildland Fire and Prescribed Fire (hand line, snagging, mop-up)

Same as Alternative A. In total, actions taken to manage wildland and prescribed fire would have a minor, adverse, long-term effect on fishers, primarily from possible reduction in the number of snags.

Fuel Reduction by Hand or Machine

Passive Reduction and Lower Profile Techniques.

Low-Impact Skidding. In this alternative, these techniques would be used to reduce fuels in the wildland/urban interface areas and along road and utility corridors. The removal of woody debris would have an adverse effect on fishers by reducing habitat complexity; especially from the loss of down trees. However, because of the limitations of ATVs and livestock to remove large trees, the largest (greater than 20” dbh) trees would be left. The removal of fuel would reduce the threat of high-intensity fire that would also decrease habitat complexity for fishers. Thinned areas would be maintained in an open forest condition through prescribed burning. Given that the areas where this technique would be used would not exceed 1% of the park, and that such areas are in and around developed areas, the impacts from this treatment it would be negligible, adverse, and long-term.

Hand Cutting. Same as Alternative A— adverse, long-term, and negligible.

Chipping. Same effects as Alternative B—adverse, short-term, and negligible.

Cumulative Impacts

Past, present, and reasonably foreseeable projects would be the same as in Alternative A. Impacts of reasonably foreseeable actions would be moderate, beneficial and long-term. Alternative C would reduce the potential for catastrophic fire in Pacific fisher habitat, compared to Alternative A. Considered in combination with the moderate, beneficial and long-term impacts of Alternative C, the cumulative impact would be moderate, beneficial and long-term.

Conclusion

Overall, Alternative C would have a moderate, beneficial, long-term effect on fishers by reducing the threat of catastrophic fire and restoring natural forest structure through the use of wildland and prescribed fires, especially in the southwest part of the park where fisher densities are believed to be highest, and fuel loading has reached critical levels. Fuel-reduction actions, however, must take into account preservation of habitat features, such as snags and large down woody debris, which are important to fishers.

Great Gray Owl *(Strix nebulosa)* – California Endangered

Potential for Impacts from Catastrophic Fire

Effects would be similar to those described in Alternative B, except the reduction in accumulated fuels under Alternative C through prescribed and wildland fires would reduce the threat of catastrophic fire over a 25-year period. Given the substantial portion of great gray owl habitat over which there is a threat of catastrophic fire, the impact of Alternative C to great gray owls would be beneficial, long-term, and moderate.

Fire Management Treatments

Managed Wildland Fire

Effects would be similar to those in Alternative A, except under Alternative C managed wildland fire would increase in the Fire Use Unit. The effect of managed wildland fire on great gray owls under Alternative C would be beneficial, long-term, and moderate, based upon the large amount of great gray owl habitat that has deviated from natural conditions due to fire suppression, and the treatment of this habitat that would occur.

Prescribed Fire

Effects would be similar to those described in Alternative B. Under Alternative C, use of prescribed fire would concentrate on areas that have most severely deviated from the natural fire cycle, and over a 25-year restoration period. Impact of prescribed fire on great gray owls under Alternative C would be beneficial, long-term, and moderate, based upon the amount of habitat improvement, and the reduction in the threat of catastrophic fire that would occur over a 25-year period. Prescriptions for fires in great gray owl habitat must take into consideration the preservation of habitat features that are important to the owls.

Holding Action and Monitoring Effects (water and retardant drops, helispots, and spike camps) and Site Preparation Associated with Managed Wildland Fire and Prescribed Fire (hand line, snagging, mop-up)
Same as Alternative B. Overall, actions taken to manage wildland and prescribed fires would have a minor, adverse, long-term effect on great gray owls under Alternative C. This is primarily based upon possible impacts associated with snag removal, which should be strictly limited in great gray owl habitat.

Fuel Reduction by Hand or Machine
Passive Reduction and Lower Profile Techniques.
Low-Impact Skidding. The use of low-impact skidding using ATVs, horses and fetching arches to reduce fuel loading would have an adverse effect on great gray owls if it were to occur in nesting and foraging habitat, where disturbance could cause reproductive failure. Before such operations were undertaken in potential great gray owl habitat, it would be determined if the owls were present. Snag removal in nesting and foraging areas would have an adverse impact as well. As the areas for this proposal are limited to wildland/urban interface areas and road and utility corridors, the overall impact would be minor. The potential for adverse effects on great gray owls would be most likely at Crane Flat, Hodgdon Meadow, Wawona Meadow, and along the Glacier Point Road, where the species is known to occur. The impacts from low-impact skidding would be adverse, short-term, and minor.

Hand Cutting. Effects would be similar to those in Alternative A, but would be in combination with fuel reduction using passive techniques. Impact of hand cutting on great gray owls under Alternative C would be minor, adverse, and long-term, based upon potential disturbance of hunting and nesting owls, and reduction in snag density.

Chipping. Same as Alternative A—adverse, short-term, and minor.

Girdling. Girdling would be used as a tool for maintaining snag density and creating wildlife habitat. Effects would be beneficial, long-term, and minor to moderate.

Cumulative Impacts

Past, present, and reasonably foreseeable projects that would affect great gray owls would be the same as in Alternative A. The effects of reasonably foreseeable projects would be beneficial, long-term, and moderate. Considered in combination with the effects of Alternative C, cumulative impacts would be beneficial, long-term, and minor to moderate.

Conclusion

The impact of Alternative C on great gray owls would be beneficial, long-term, and minor, based primarily on a reduction in the threat of catastrophic fire over a 25-year period. Wildland and prescribed fires and their management and mechanical reduction of fuels would have localized adverse effects on great gray owls, if snag density were reduced or nesting or hunting owls disturbed.

Willow Flycatcher *(Empidonax trailii)* – California Endangered

Potential for Impacts from Catastrophic Fire

As in Alternative B, the risk of catastrophic fire would be reduced under Alternative C, through wildland and prescribed fires. Impact on willow flycatchers under Alternative C would be beneficial, long-term, and minor, based upon the inherent low fire frequency and intensity associated with meadow habitats and the reduced threat from catastrophic fire.

Fire Management Treatments

Managed Wildland Fire

Effects would be similar to those in Alternative B. Use of wildland fire under Alternative C would result in minor, beneficial, long-term impact on willow flycatchers, from reduction in the threat of catastrophic fire, and the return of fire to its role in maintenance of willow habitat. Actions taken to manage fires in habitat occupied by willow flycatchers, should take into account the possible adverse effects associated with fuel accumulation; steps would be taken to mitigate these effects.

Prescribed Fire

Effects would be similar to those in Alternative A. The impact of Alternative C would be beneficial, long-term, and minor, based upon the reduction in the threat of catastrophic fire that would occur, and regeneration of lightly burned willows. Prescribed fires likely to affect meadow habitats known to be occupied by willow flycatchers should be evaluated for potential adverse effects and managed to minimize impacts. Burning at specific sites would not occur during the period of nesting and fledging (May – September), and willows would be protected from intense fires by clearing dead and decadent fuels from around and within willow shrubs. If possible, meadow habitats with recent flycatcher nests would be burned in stages, so not all potential nest shrubs would be damaged at once. Surveys would be conducted to locate willow flycatchers in the park, so appropriate fire management actions can be taken.

Holding Action and Monitoring Effects (water and retardant drops, helispots, and spike camps) and Site Preparation Associated with Managed Wildland Fire and Prescribed Fire (hand line, snagging, mop-up)

As in Alternative A, the actions taken to manage wildland and prescribed fires would have a minor, adverse, short-term effect on willow flycatchers. This would mainly be due to potential impacts from conducting helicopter operations out of Wawona meadow.

Fuel Reduction by Hand or Machine

Passive Reduction and Lower Profile Techniques.

Low-Impact Skidding Would not be used in willow flycatcher habitat.

Hand Cutting. Same as Alternative A, hand cutting would have a negligible effect on willow flycatchers, because these operations would not usually occur in meadow habitats, where large fuels are already sparse, and the moist conditions would typically not carry fire.

Chipping. Would not occur in willow flycatcher habitat.

Cumulative Impacts

Past, present, and reasonable foreseeable projects would be the same as in Alternative A. In aggregate the effects of reasonably foreseeable future actions would be minor, beneficial and long-term. Other foreseeable projects with adverse impacts would affect small areas and/or have minor effects over larger areas. The *Yosemite Fire Management Plan* under Alternative C would affect habitats changed by years of fire exclusion by reducing the risk of catastrophic fire in some areas. Considered in combination with the effect of Alternative C, the cumulative impacts would be beneficial, long-term, and minor to moderate.

Conclusion

The impact of Alternative C on willow flycatchers would be beneficial, long-term, and moderate based primarily upon reduction of the threat of catastrophic fire in some habitats through use of wildland and prescribed fires. These techniques, however, must be carefully applied to avoid adverse impacts on the few willow flycatchers remaining in Yosemite.

Summary Conclusion, Special-Status Species – Animals

In almost all cases, the greatest threat to special-status species would be through catastrophic fire. This alternative would reduce the potential of catastrophic fire, compared to Alternative A. Mitigations and special measures, as identified, would be applied to limit impacts. There would be no impairment from the effects of this alternative. See Appendix 9 for mitigation developed in consultation with USFWS.

Physical Environment

Watersheds, Soils, and Water Quality

Among the action alternatives, Alternative C proposes the least amount of prescribed fire and wildland/urban interface treatment, meaning it will take longer to accomplish ecosystem restoration and fuel reduction objectives. Because of the limited amount of work proposed fewer actions would directly impact watersheds, soils, and water quality, however, threats from unwanted fire to watersheds would be greater. The treatment acreage would be greater than under Alternative A, but the least among the action alternatives.

Potential for Impacts from Catastrophic Fire

In all action alternatives, 76,664 acres of the Merced River watershed and 51,379 acres of the Tuolumne River watershed would be within the Suppression Unit. Prescribed fire units in the Suppression Unit would include approximately 55,892 acres in the Merced River watershed and 51,444 acres in the Tuolumne River watershed. Approximately 25% of the Merced River watershed and 19% of the Tuolumne River watershed show moderate to high departures, when using the median FRID analysis; these are the areas with the greatest potential for catastrophic fire. However, because this alternative (of all the action alternatives) would use the longest period to restore ecosystems (25 years) and wildland/urban interface (10 years), it would retain the highest potential for large, high severity fire during the life of the plan (assumed 15-year time frame).

Areas of hydrophobic soils would exist, but because fire would be less likely to burn throughout the vertical gradient, the increase in water yield and peak flows would be less, compared to Alternative A, but the most among the action alternatives. The increase in sediment and nutrient yields would also be less than in Alternative A, because of the smaller amounts of intrusion by fire into the lower slopes of watersheds. Catastrophic fire could make banks and channel margins less stable, but the effects would be localized, and lessen as more of each watershed were restored. The size of the areas adversely affected would be less than under Alternative A ; in particular, stream channel response would be less while recovery of riparian vegetation and stabilization of stream systems would be faster. However, benefits would be mainly realized toward the end of the restoration period. The potential for having large, high-severity fires with adverse, potentially long-term, and moderate effects on soils and watersheds would be less than under Alternative A, but would remain high until near the end of the 25-year restoration period. The effects of Alternative C on water quality and watershed conditions in regards to catastrophic fire would be beneficial, long-term, and minor to moderate.

Fire Management Treatments

Managed Wildland Fire

Same as Alternative B—beneficial, moderate, and short-term.

Re-ignition clause. Same as Alternative B—beneficial, moderate, and short-term.

Holding Action and Monitoring Effects (water and retardant drops, helispots and spike camps). Same as Alternative B—adverse, minor, and short-term.

Prescribed Fire

Prescribed fire would typically be used in areas where the fire return interval is three or more fires out of cycle, or to maintain target conditions in areas within the Suppression Unit or along the margins of the Fire Use Unit. The total acreage in prescribed fire units would be the same as in Alternative B, but this alternative proposes the least aggressive prescribed fire program (1,260 to 6,436 acres burned per year). Due to the controlled nature of prescribed fire, in terms of fuel moisture, weather conditions, time of day, spatial pattern of ignition, and other factors, the small scale effects of actions under this alternative would be similar to that of Alternative A. On a watershed scale, compared to Alternative A, because of the greater number of acres being treated through prescribed fire, this alternative would reduce the potential for large, high-severity fires. Carefully placed prescribed burns would reduce the continuity of fuels on the vertical gradient in more areas throughout the watershed, compared to that of Alternative A, but benefits would not be fully realized until the end of the restoration period (25 years). Fire in the duff layers would spread under variable conditions, but not with enough severity to cause extensive areas of hydrophobic soil. Post-fire water yield, peak flows, sediment yield, and nutrient yield would gradually return to more natural conditions (decrease) through the life of the plan. The effects of prescribed burning on soil and watershed conditions would be beneficial, long-term, and major, but until the restoration work is completed, the potential would remain high for large, high-intensity wildland fires.

Site Preparation Associated with Managed Wildland Fire and Prescribed Fire (hand line, snagging, mop-up)

Same as Alternative B—adverse, minor, and short-term.

Fuel Reduction by Hand or Machine

Aggressive Reduction Techniques. Would not occur under Alternative C.

Passive Reduction and Lower Profile Techniques.

Low-Impact Skidding. This would include the use of draft animals and four wheel, all-terrain vehicles (ATVs), in combination with fetching arches, to skid trees approximately 10 to 20 inches in diameter. This technique would be used in the wildland/urban interface and along road and utility corridors and would be relied upon as the principle means of skidding. It would not be feasible to move trees larger than approximately 20" dbh and because only 766 acres are proposed for fuel reduction treatment annually, impacts would be less than under Alternatives B or D. Where logs were skidded, these techniques would cause compaction and scarification of the upper duff and topsoil layers. No tracked vehicles would be used and the knobby tires of ATVs and the feet of draft animals would have only negligible effects on topsoil and duff layers. The most significant effect would be from dragging one end of the tree which could cause a skid trench less than a foot wide and a few inches deep in most locations, although it could be deeper in paths used repeatedly. The use of fetching arches would mitigate this impact. In most locations, scarification could be raked out with hand tools, which would retard soil erosion and thus limit the effect upon sediment and nutrient yield in the watershed. Waterbars might be needed along paths that get repeated use. Other mitigation, when needed, could include the use of fetching arches or skidding over snow, frozen soil, or a bed of crushed vegetation. Second entries into WUI areas, to remove trees up to 20 inches in diameter if prescribed fire has failed to achieve desired results, could result in long-term compaction, unless mitigation are effectively utilized. Projects could be extensive enough that effects could be greater than localized, nevertheless they would not typically occur on ridge, mid-slope, and bottom-slope combinations, thus effects would be adverse, short-term, and minor for watersheds and soils.

Hand Cutting. Local effects would be similar to those in Alternative A, but because this class of treatments would be used to perform most of the 766 acres of plant reduction work, its effects would be greater than under other alternatives. However, the labor intensive nature of the work would limit the amount of annual accomplishment. Effects would be beneficial and potentially long-term, and moderate.

Pile burning. Same as Alternative B—beneficial, short-term, and minor to moderate.

Chipping. Same as Alternative B—adverse, short-term, and negligible to minor.

Girdling. Same as Alternative B—adverse, short-term, and negligible to minor effect.

Cumulative Impacts

The past, present, and reasonably foreseeable projects effecting the Merced and Tuolumne River watersheds would be the same as discussed under Alternative A. While the actions would reduce the potential for high severity fire, the impacts on soil would be adverse, long-term, and minor. These actions would have net beneficial impacts on watershed values through either reducing the potential for high severity fire, or through reduction of watershed effects caused by restoration activities.

When considered in combination with the minor to moderately beneficial impacts of projects on other lands in the upper watersheds, the cumulative impacts of Alternative C would be beneficial, long-term, and moderate.

Conclusion

In aggregate, the actions of this alternative would have beneficial, long-term, and moderate effects to watersheds, soils, and water quality. This is based upon a combination of beneficial, long-term, moderate to major effects in Fire Use Units, as in Alternative A, and the potential for areas of beneficial, long-term, and moderate effects in Suppression Units, due to the timeframe required for restoration compared to Alternative A. Large, high-severity fires would likely occur during the life of the plan, but the treatments proposed would reduce their effects upon soils and watersheds, including the potential for adverse effects upon water yield, peak flow, nutrient yield, sediment yield and stream system response. The intent of the alternative is to reduce the risk of catastrophic fire, thus there would be no impairment from the effects of this alternative.

Air Quality

Emissions

Wildland and Prescribed Fire Emissions

Air emissions associated with the amount of burning under Alternative C were estimated using the FOFEM model. The results are summarized and compared to Alternative A in table IV-13. Separate estimates were made for each year from 2003 to 2009 to analyze the trends in impacts over the years. The emissions shown represent the worst-case scenario; it was assumed that all acres are being burned for the first time. In the event that a prescribed fire unit is burned more than once in the 7-year period, the emissions from that unit would be reduced by approximately 33%. Table IV-13 provides an example of the magnitude of this type of emission reduction.

Prescribed Fire Summary

To compare the estimated emissions from the various alternatives, the emissions from prescribed burns were averaged for the 7-year period that was modeled, and these data are provided in table IV-14.

Table IV-13
Projected Air Emissions Associated with Various Fire Types in Yosemite National Park Under Alternative C (Alternative A emissions for comparison)

Alternative A (1991-2000 average)							
Fire Type	Acres	Fire Emissions (tons/yr) [a]					
		PM_{10}	$PM_{2.5}$	VOC	CO	NO_X	CO_2
Prescribed Burns [b]	1,495	1,087	917	719	12,945	370	58,557
Managed Wildland Fire [b]	2,152	1,564	1,321	1,034	18,637	532	84,305
Wildfire	5,759	6,920	5,864	3,529	76,930	2,198	387,446
Total	**9,406**	**9,571**	**8,103**	**5,282**	**108,512**	**3,100**	**530,308**

a PM_{10} = Suspended Particulate, $PM_{2.5}$ = Fine Particulate Matter, VOC = volatile organic compounds (methane), CO = Carbon Monoxide, NOx = Nitrogen Oxides, CO_2 = Carbon Dioxide

b Based on composite emission factor for prescribed burning

Alternative C – 2003							
		Fire Emissions (tons/yr) [a]					
Fire Type	Acres	PM_{10}	$PM_{2.5}$	VOC	CO	NO_X	CO_2
Prescribed Burns [b]	2,547	2,088	1,769	1,070	23,383	668	107,259
Managed Wildland Fire [b]	9,583	6,967	5,883	4,607	83,002	2,371	375,457
Wildfire	5,759	6,920	5,864	3,529	76,930	2,198	387,446
Total	**17,889**	**15,975**	**13,516**	**9,206**	**183,315**	**5,237**	**870,162**

Alternative C – 2004							
		Fire Emissions (tons/yr) [a]					
Fire Type	Acres	PM_{10}	$PM_{2.5}$	VOC	CO	NO_X	CO_2
Prescribed Burns [b]	2,106	1,877	1,591	961	21,005	600	107,259
Managed Wildland Fire [b]	9,583	6,967	5,883	4,607	83,002	2,371	375,457
Wildfire	5,759	6,920	5,864	3,529	76,930	2,198	387,446
Total	**17,448**	**15,764**	**13,338**	**9,097**	**180,937**	**5,169**	**870,162**

Alternative C – 2005							
		Fire Emissions (tons/yr) [a]					
Fire Type	Acres	PM_{10}	$PM_{2.5}$	VOC	CO	NO_X	CO_2
Prescribed Burns [b]	3,712	4,267	3,618	2,190	47,610	1,360	222,126
Managed Wildland Fire [b]	9,583	6,967	5,883	4,607	83,002	2,371	375,457
Wildfire	5,759	6,920	5,864	3,529	76,930	2,198	387,446
Total	**19,054**	**18,154**	**15,365**	**10,326**	**207,542**	**5,929**	**985,029**

Alternative C – 2006							
		Fire Emissions (tons/yr) [a]					
Fire Type	Acres	PM_{10}	$PM_{2.5}$	VOC [b]	CO	NO_X	CO_2
Prescribed Burns [c]	2,132	1,435	1,218	741	15,958	456	72,843
Managed Wildland Fire [c]	9,583	6,967	5,883	4,607	83,002	2,371	375,457
Wildfire	5,759	6,920	5,864	3,529	76,930	2,198	387,446
Total	**17,474**	**15,322**	**12,965**	**8,877**	**175,890**	**5,025**	**835,746**

Alternative C – 2007							
Fire Type	Acres	Fire Emissions (tons/yr) [a]					
		PM_{10}	$PM_{2.5}$	VOC [b]	CO	NO_X	CO_2
Prescribed Burns[c]	1,576	779	660	399	8,729	249	40,043
Managed Wildland Fire[c]	9,583	6,967	5,883	4,607	83,002	2,371	375,457
Wildfire	5,759	6,920	5,864	3,529	76,930	2,198	387,446
Total	**16,918**	**14,666**	**12,407**	**8,535**	**168,661**	**4,818**	**802,946**
Alternative C – 2008							
Fire Type	Acres	Fire Emissions (tons/yr) [a]					
		PM_{10}	$PM_{2.5}$	VOC[b]	CO	NO_X	CO_2
Prescribed Burns[c]	1,958	1,195	1,013	612	13,398	383	60,652
Managed Wildland Fire[c]	9,583	6,967	5,883	4,607	83,002	2,371	375,457
Wildfire	5,759	6,920	5,864	3,529	76,930	2,198	387,446
Total	**17,300**	**15,082**	**12,760**	**8,748**	**173,330**	**4,952**	**823,555**
Alternative C – 2009							
Fire Type	Acres	Fire Emissions (tons/yr) [a]					
		PM_{10}	$PM_{2.5}$	VOC [b]	CO	NO_X	CO_2
Prescribed Burns[c]	1,534	829	703	423	9,245	264	45,001
Managed Wildland Fire[c]	9,583	6,967	5,883	4,607	83,002	2,371	375,457
Wildfire	5,759	6,920	5,864	3,529	76,930	2,198	387,446
Total	**16,876**	**14,716**	**12,450**	**8,559**	**169,177**	**4,833**	**807,904**

a PM_{10} = Suspended Particulate, $PM_{2.5}$ = Fine Particulate Matter, VOC = volatile organic compounds (as methane), CO = Carbon Monoxide, NOx = Nitrogen Oxides, CO_2 = Carbon Dioxide

c Based on composite emission factor for prescribed burning

Table IV-14
Average Prescribed Burn Estimated Emissions for Alternative C for the years 2003 – 2009

Alternative C						
	Acres Burned	Emissions (tons/year) [a]				
		PM_{10}	$PM_{2.5}$	VOC	CO	CO_2
Historical Average (Alt. A)	1,495	1,087	917	719	12,945	58,557
Alternative C Average	2,224	1,782	1,510	914	19,904	92,211
Potential Increase in Alt. C	**729**	**695**	**593**	**195**	**6,959**	**33,654**

a PM_{10} = Suspended Particulate, $PM_{2.5}$ = Fine Particulate Matter, VOC = volatile organic compounds, CO = Carbon Monoxide, CO_2 = Carbon Dioxide

Mechanical Thinning Emissions

Air emissions would be generated by chainsaws, chippers, skidders, ATVs, and haul trucks used in site preparation and fuel reduction activities. Emissions from the operation of these machines have been figured by estimating the hours of this equipment needed to clear an average of 766 acres per year, which would be more than seven times the number of acres cut historically. Estimated air emissions are summarized in table IV-15. The *Final Yosemite Fire Management Plan/EIS* would result in a smaller size of trees thinned in WUI than was considered in the *Draft Yosemite Fire Management Plan/EIS.* Actual operating hours would potentially be less, but because of the possibility of second entry, the analysis in the Draft was retained as a worst-case analysis. Emissions from machinery would be minor compared to fire emissions.

Table IV-15
Alternative C Projected Air Emissions Associated with Mechanical Thinning

Alternative C							
Equipment	**Operating Hours**	**Motorized Equipment Emissions (tons/yr)** [a]					
		PM_{10}	**$PM_{2.5}$**	**VOC**	**CO**	**NO_x**	**CO_2** [b]
Chainsaws	7,910	0.20	0.20	4.18	13.55	0.05	ND
Chippers	1,507	0.32	0.32	0.14	20.14	0.01	ND
Haul Trucks	543	0.16	0.16	0.26	1.19	0.80	ND
ATV Skidders	225	0.0	0.0	0.04	3.44	0.03	ND
Total		**0.68**	**0.68**	**4.62**	**38.12**	**0.89**	**ND**

a PM_{10} = Suspended Particulate, $PM_{2.5}$ = Fine Particulate Matter, VOC = volatile organic compounds as methane, CO = Carbon Monoxide, NOx = Nitrogen Oxides, CO_2 = Carbon Dioxide
b No data

Mitigation Measures

Under Alternative C, mitigation measures, including the use of the *Smoke Communications Strategy*, would be the same as those for Alternative B.

Agency Coordination

Agency coordination for Alternative C would be the same as for Alternative B.

Cumulative Impacts

Past, present, and reasonably foreseeable projects in the region that might have a cumulative impact under Alternative C would be the same as those for Alternative A. The cumulative impact of Alternative C, considered in combination with the moderate, adverse impact resulting from present and reasonably foreseeable future projects in the region, would be adverse, short-term, and major.

Conclusion

Alternative C would generate a smaller quantity of emissions among all the alternatives, except for Alternative A. The intensity of the impact of Alternative C relative to Alternative A would be adverse, short-term, and major since the increases would be slightly above 50% of Alternative A for all emissions except VOC. The impact on VOC emissions would be moderate.

The effects of the fire management program would not represent an impairment of the park's resources or values.

Cultural Environment

Archeological Resources

Potential for Impacts from Catastrophic Fire

Compared with Alternative A, No Action, this alternative would reduce slightly the potential for catastrophic fire and its impacts. This would probably result in beneficial, short- and long-term minor impacts to archeological resources.

Fire Management Treatments

Managed Wildland Fire

Under all action alternatives 621,059 acres would be in the Fire Use Unit. Burning would consist mainly of managed wildland fire but some prescribed fire would take place. Of this figure, 48,912 acres (or 8%) would be designated as prescribed burn units, which could be burned either under managed wildland fire (natural ignition) or prescribed burns (management-ignited fires). Acres burned and effects would be similar to that of Alternative B. It is likely that minor to moderate, long-term, beneficial impacts would result from maintaining natural fuel loading on archeological sites. Adverse impacts would be reduced to the degree possible through mitigating measures (described under Methodology).

Re-ignition clause. The potential for impacts occurring from re-igniting a controlled wildland fire would be identical to those described for managed wildland fire.

Holding Action and Monitoring Effects (water and retardant drops, helispots, and spike camps). The potential for impacts occurring from holding and monitoring actions would be identical to those described under Alternative A, potentially minor to moderate, adverse, and long-term.

Prescribed Fire

Under all action alternatives, 48,912 acres in the Fire Use Unit and 107,040 acres in the Suppression Unit would be slated for prescribed burning over the life of the plan. Of the action alternatives, this alternative would treat the smallest annual average acreage, from 1,260 to 6,436 acres per year. Actions would focus on areas of greater than three missed fire return intervals (using the median FRID analysis). Impacts resulting from prescribed fire under this alternative would be similar to those described under Alternative A, minor to moderate, long-term, and beneficial, as a result of maintaining more natural fuel loading on archeological sites. However, the potential for adverse impacts is somewhat greater due to the increased acreage targeted for treatment. These impacts would be reduced to the degree possible through mitigating measures (described under Methodology).

Site Preparation Associated with Managed Wildland Fire and Prescribed Fire (hand line, snagging, mop-up)

The potential for impacts associated with site preparation is identical to that described for Alternative A, minor to moderate, adverse and long-term. These impacts would be avoided or reduced as much as possible through mitigating measures.

Fuel Reduction by Hand or Machine

Aggressive Reduction Techniques. Would not occur under Alternative C.

Passive Reduction and Lower Profile Techniques.
Low-Impact Skidding Low-impact skidding and yarding could cause soil disruption and compaction, if trees and logs are dragged (rather than lifted) into natural openings or landing areas. However, the extent of soil disruption associated with these techniques would be much less than the disturbance associated with mechanized and conventional tree and shrub removal. Areas would be surveyed for archeological resources prior to any treatment. However, because thick vegetation covers many archeological sites, it would be likely that some archeological resources would be missed during inventory. Therefore, all known resources would be avoided during yarding, but archeological resources obscured by vegetation could be adversely impacted. Post treatment inventory would document and stabilize any sites inadvertently disrupted. The intensity of impact would depend upon the nature and significance of the archeological resource as well as the extent of soil disturbance. Impacts would be potentially adverse, long-term, and moderate to major and would be mitigated to the extent possible. Archeological monitoring would be used to reduce the potential for these impacts. Second entries into WUI areas, to remove trees up to 20 inches in diameter if prescribed fire has failed to achieve desired results, would potentially result in site disturbance or long-term soil compaction, unless mitigation are effectively utilized.

Hand Cutting. The potential for impacts associated with hand thinning would be greatest in this alternative because of the degree to which it is relied upon. Approximately 766 acres per year would be treated. Effects would be similar to those under Alternative A, but the increased amount of treatment would result in moderate to major, long-term, beneficial impacts to archeological resources.

Pile burning. The potential for impacts associated with pile burning is identical to that described for Alternative A—potentially minor to moderate, adverse and long-term.

Chipping. Same as under Alternative A—negligible.

Girdling. Same as Alternative B—negligible.

Helibase Upgrades

Same as Alternative B

Cumulative Impacts

The cumulative impacts that would result from implementation of this alternative, in conjunction with other past, present, and reasonably foreseeable future actions, would be the same as Alternative A. Implementation of this alternative would minimally reduce the potential for catastrophic fire and associated emergency response actions. The adverse impacts associated with other past, present, and reasonably foreseeable future projects would be minor to moderate. Considered in combination with the impacts to archeological resources from Alternative C, cumulative impacts would be beneficial, long-term, and minor.

Therefore the cumulative impacts would be minor, beneficial and long-term.

Conclusion

Implementation of this alternative could result in adverse impacts to archeological resources mostly due to the increasing potential for high-intensity fires in areas of three or more missed fire return intervals and the use of equipment to reduce heavy fuel loads. These impacts would be reduced or avoided to the extent possible through standard mitigating measures. Compared with Alternative A, this alternative minimally reduces the potential for catastrophic fire and its impacts. Of all fire management situations and treatments, catastrophic fire and emergency response actions result in the most frequent and severe impacts to archeological resources. Overall, the effect of this alternative would be beneficial, minor to moderate, and long-term. The intent of the alternative is to reduce the risk of catastrophic fire, thus there would be no impairment from the effects of this alternative.

Ethnographic Resources

Potential for Impacts from Catastrophic Fire

Compared with Alternative A, No Action, this alternative would reduce the potential for catastrophic fire and its impacts. Compared to Alternatives B and D, this reduction would be minimal. The reduction in impacts from catastrophic fire would result in beneficial, short- and long-term, minor impacts to ethnographic resources.

Fire Management Treatments

Managed Wildland Fire

Effects would be the same as Alternative B. Minor to moderate, long-term, beneficial impacts would result from maintaining natural fuel load and plant community conditions near ethnographic resources. Adverse impacts would be reduced to the degree possible through the mitigations described under Methodology.

Re-ignition clause. The potential for impacts occurring as a result of re-igniting a controlled wildland fire would be identical to those described for managed wildland fire in Alternative B.

Holding Action and Monitoring Effects (water and retardant drops, helispots and spike camps). The impacts occurring as a result of holding and monitoring actions would be identical to those described under Alternative A. Impacts would be potentially minor to moderate, adverse and short- to long-term. These impacts would be avoided or reduced as much as possible through standard mitigations described under Methodology.

Prescribed Fire

Impacts resulting from prescribed fire under this alternative would be similar to those described under Alternative A. Impacts would be minor to moderate, long-term, and beneficial, as a result of maintaining more natural fuel loading on ethnographic resources. However, the potential for adverse impacts is greater due to the increased acreage targeted for treatment. These impacts would be reduced to the degree possible through mitigating measures.

Site Preparation Associated with Managed Wildland Fire and Prescribed Fire (hand line, snagging, mop-up)

The impacts associated with site preparation are identical to those described for Alternative A. Impacts would be potentially minor to moderate, adverse, and short- to long-term. These impacts would be avoided or reduced as much as possible through mitigating measures and through ongoing consultation with park-associated tribal groups.

Fuel Reduction by Hand or Machine

Passive Reduction and Lower Profile Techniques.

Low-Impact Skidding. Low-impact skidding could cause soil disruption and compaction, and disruption of understory species. Areas proposed for treatment would be surveyed for cultural landscape resources prior to any treatment, but because vegetation grows thickly over some cultural resources, it would be possible that some resources (such as small-scale features) would be missed during inventory. Target conditions would be established with consideration of known cultural landscape resources. All known features would be avoided during these treatments but activities have the potential to adversely impact cultural landscape resources obscured by vegetation. Post-treatment inventory would be used to document and stabilize any resources inadvertently impacted. The intensity of impact would depend on the nature and significance of the resource as well as the extent of disturbance. Potential impacts would be moderate, long-term, and adverse.

Hand Cutting. The potential for impacts associated with hand cutting would be similar to that described for Alternative A, but there would be much more reliance on these treatments than under any of the other alternatives. Effects upon ethnographically important plants would be potentially moderate to major, adverse and short-term, but these effects would be precluded through avoidance and other mitigation measures.

Pile burning. The potential for impacts associated with pile burning is identical to that described for Alternative A, negligible to moderate, adverse and short-term. These impacts would be mitigated by avoiding traditionally used plants, and pile burning could actually be beneficial for some plants if done to maintain important plant characteristics.

Chipping. The potential impacts associated with chipping would be identical to those described under Alternative A, negligible.

Girdling. Same as Alternative B, negligible.

Cumulative Impacts

The cumulative impacts that would result from implementation of this alternative, in conjunction with other past, present, and reasonably foreseeable future actions, would be the same as Alternative A except that implementation of this alternative would minimally reduce the potential for catastrophic fire and associated emergency response actions. Considered in conjunction with the minor to moderate, adverse, and long-term effects of present, and reasonably foreseeable projects, and the effects of Alternative C, the cumulative effects upon ethnographic resources would be beneficial, long-term, and minor.

Conclusion

Implementation of this alternative would result in minor to moderate, beneficial and long-term effects upon ethnographic resources, but the potential for major, adverse and long-term impacts would remain, due to the potential for high-intensity fires in areas of three or more missed fire return intervals and the use of equipment to reduce heavy fuel loads. These impacts would be reduced or avoided to the extent possible through use of mitigating measures (described under Methodology). Compared with Alternative A, implementation of this alternative would reduce the potential for catastrophic fire and its impacts. Of all fire management situations and treatments, catastrophic fire and emergency response actions generally result in the most frequent and severe impacts to ethnographic resources. The intent of the alternative is to reduce the risk of catastrophic fire, thus there would be no impairment from the effects of this alternative.

Cultural Landscape Resources, Including Individually Significant Historic Structures

Potential for Impacts from Catastrophic Fire

Compared with Alternative A, No Action, this alternative would reduce to a minimal extent the potential for catastrophic fire and its impacts. This would result in beneficial, short- and long-term, minor impacts to cultural landscape resources.

Fire Management Treatments

Managed Wildland Fire

Same as Alternative B, minor to moderate, long-term, beneficial impacts would result from maintaining natural fuel load and plant community conditions in cultural landscapes. Adverse impacts would be reduced to the degree possible through the mitigating measures described above.

Re-ignition clause. The potential for impacts occurring as a result of re-igniting a controlled wildland fire would be identical to those described for managed wildland fire.

Holding Action and Monitoring Effects (water and retardant drops, helispots and spike camps). The potential for impacts occurring as a result of holding and monitoring actions would be identical to those described under Alternative A, potentially minor to moderate, adverse and long-term. These impacts would be avoided or reduced as much as possible through mitigating measures (described under Methodology, Cultural Resources).

Prescribed Fire

Impacts resulting from prescribed fire under this alternative would be similar to those described under Alternative A, potentially negligible to minor, adverse, and long-term. However the potential for adverse impacts would be somewhat greater due to the increased acreage targeted for treatment. These impacts would be reduced to the degree possible through mitigating measures.

Site Preparation Associated with Managed Wildland Fire and Prescribed Fire (hand line, snagging, mop-up)

The potential for impacts associated with site preparation is identical to that described for Alternative A, negligible, adverse and short-term, and would be avoided or reduced as much as possible through mitigating measures.

Fuel Reduction by Hand or Machine

Passive Reduction and Lower Profile Techniques.

Low-Impact Skidding Low-impact skidding could cause soil disruption and compaction, and disruption of understory species. Areas proposed for treatment would be surveyed for cultural landscape resources prior to any treatment, but because vegetation grows thickly over some cultural resources, it would be possible that some resources (such as small-scale features) would be missed during inventory. Target conditions would be established with consideration of known cultural landscape resources. All known features would be avoided during these treatments but activities have the potential to adversely impact cultural landscape resources obscured by vegetation. Post-treatment inventory would be used to document and stabilize any resources inadvertently impacted. The intensity of impact would depend on the nature and significance of the resource as well as the extent of disturbance. Potential impacts would be moderate, adverse, and long-term.

Limb Removal. Limb removal involves cutting lower limbs from six to 16 feet above the ground to remove ladder fuels. This action has the potential to change the visual setting in cultural landscape or historic structures settings. Areas proposed for treatment would be surveyed for cultural landscape resources. Target conditions would be developed in consultation with cultural resources specialists, thus avoiding any potential adverse impacts.

Skidding/Grappling. Effects would be the same as Alternative B—potentially adverse, long-term, and moderate to major. These potential impacts would be reduced through avoidance, and, to the extent possible, through mitigating measures.

Hand Cutting. The potential for impacts associated with hand cutting would be identical to that described for Alternative A—potentially moderate, adverse, and long-term. Impacts would be avoided by prescribing a target condition for these areas that would protect and enhance the cultural resource.

Pile burning. The potential for impacts associated with pile burning would be identical to that described for Alternative A. Little or no potential to impact cultural landscape resources. Any potential impacts would be avoided by implementing mitigating measures.

Chipping. The potential impacts associated with chipping would be identical to those described under Alternative A—negligible.

Girdling. Same as Alternative B.

Cumulative Impacts

The cumulative impacts that would result from implementation of this alternative, in conjunction with other past, present, and reasonably foreseeable future actions, would be the same as Alternative A except that implementation of this alternative would minimally reduce the potential for catastrophic fire and associated emergency response actions. The adverse impacts associated with present and reasonably foreseeable future projects would be minor to moderate and long-term. Considered in combination with the impacts to cultural landscape resources from Alternative C, cumulative effects would be beneficial, long-term, and minor.

Conclusion

Implementation of this alternative would result in minor, beneficial and long-term effects upon cultural landscape resources. Implementation would also potentially result in adverse impacts due to the potential for high-intensity fires in remaining areas of three or more missed fire return intervals and the use of equipment to reduce heavy fuel loads. These adverse effects of equipment use would be reduced or avoided to the extent possible through mitigating measures described under Methodology. Compared with Alternative A, implementation of this alternative would minimally reduce the potential for catastrophic fire and its impacts. Of all fire management situations and treatments, catastrophic fire and emergency response actions result in the most frequent and severe impacts to cultural landscape resources. The intent of the alternative is to reduce the risk of catastrophic fire, thus there would be no impairment from the effects of this alternative.

Section 106 Summary

Under regulations of the Advisory Council on Historic Preservation (36 CFR 800.9) addressing the criteria of effect and adverse effect, implementation of this alternative would have the potential to adversely affect significant historic properties. Archeological sites, ethnographic resources, and cultural landscape resources (including historic sites and structures) would likely be adversely affected by high-intensity fires and emergency response actions associated with catastrophic fire. The number and significance of resources that could be affected cannot be projected since inventory and evaluation data are lacking for broad tracts of lands. These impacts would be mitigated to the extent possible by some pre-burn inventory for resources of concern, avoiding known resources when feasible, reducing hazardous fuels at significant resources, documentation and protection of significant resources, post-burn inventory and stabilization, and fire-effects research.

Social Environment

Recreation

Potential for Impacts from Catastrophic Fire

Large catastrophic fires are most likely to occur in the Suppression Unit, where fire has been excluded, causing unnatural fuel buildup and changes in plant community structure. The moderate increase in the number of acres burned annually with prescribed fire would help reduce the potential for large and catastrophic fires in this unit. Fuel reduction in the wildland/urban interface, where communities, visitor facilities, and park operations buildings are located, and where the most aggressive suppression activities have historically taken place, would also reduce the threat of catastrophic fire. The potential for large, catastrophic fires like the A-Rock Fire, would be reduced under this alternative. Consequently, this alternative would reduce the potential for fire-related, park-wide closures, although, during fires, closures in areas of the park would continue. During these closures, the effects will be adverse, short-term, and minor, affecting only the visitors within or wishing to enter that portion of the park. These effects would be less than under Alternative A, but closures and restrictions would still be likely since the fire season and the peak visitation period overlap.

Fire Management Treatments

Among the action alternatives, this alternative would have the least amount of prescribed fire and wildland/urban interface treatment. However, the treatment acreages would still be greater than under Alternative A, resulting in effects upon recreation that would be similar to that of Alternative B, except in the case of the following treatment:

Fuel Reduction by Hand or Machine

Aggressive Reduction Techniques. Would not occur under Alternative C.

Passive Reduction and Lower Profile Techniques.

Low-Impact Skidding. Use of draft animals and four-wheel, all terrain vehicles, in combination with fetching arches would be used to skid trees approximately 10 to 20 inches in diameter. Low-impact skidding would infrequently affect visitors through small, contained, safety closures and equipment noise while work was going on. These techniques would be used only in the wildland/urban interface and along road corridors (Suppression Unit and non-Wilderness portions of the Fire Use Unit), which might include trailhead areas. Visitors would generally be able to partake in their chosen activity, including hiking, nature study, and scenic touring, in a nearby area. Some visitors would have concerns about equipment noise and use in the park; other people would understand the rationale for its use and would be supportive. Overall, the effects of low-impact skidding upon recreation, due to the limited amount of use, would be adverse, short-term, and negligible.

Cumulative Impacts

As in Alternative B, the impacts of other projects in the region, in combination with the adverse, short-term, and minor impacts of this alternative, would result in beneficial, long-term, and major cumulative impacts upon recreation.

Conclusion

The effects of this alternative upon recreation would be adverse, short-term and minor. The potential for large, catastrophic fire events and its likely effect upon recreation would be similar to but less than under Alternative A. There would be no impairment from the effects of this alternative.

Scenic Resources

The effects of this alternative on scenic resources would be similar to that of Alternative B, except in the following areas:

Potential for Impacts from Catastrophic Fire

The potential for catastrophic fire would remain similar to that of Alternative A for most of the life of the plan. If a fire the size of the A-Rock Fire were to occur, the effect on scenic quality would be adverse, long-term, and major. Under this alternative, the potential for more fires of this size and intensity would remain high until near the end of the planning period (25 years). Along major road corridors, near major scenic vistas, or on the margins of or in Special Management Areas, the effects of this alternative, regarding catastrophic fire would be beneficial, minor, and long-term.

Fire Management Treatments

Prescribed Fire

Prescribed fire operations would typically occur within a defined project area. Between 1,260 and 6,436 acres would be treated in an average year, compared to 1,442 acres per year under Alternative A. Effects of prescribed burning on scenic resources would be generally beneficial, long-term, and moderate to major, based on the amount of annual accomplishment.

Site Preparation Associated with Managed Wildland Fire and Prescribed Fire (hand line, snagging, mop-up)

Passive Reduction and Lower Profile Techniques

Low-Impact Skidding. Under Alternative C, this technique would be used in the wildland/urban interface and along road corridors to remove some cut trees up to 20" dbh. Paths and scarification caused by horses, ATVs, or fetching arches and dragging trees would be raked out in most areas. Impacts from skidding trees would be lessened by the use of fetching arches or by skidding over snow, frozen ground, or crushed vegetation. Most areas would be prescribed burned after fuel reduction was finished, lessening the visual impact of skidding. Considering the use of mitigation, especially burning, at the end of each project, most of these effects would be short-term, minor to moderate, and adverse.

Hand Cutting. These actions would be visible to visitors within the immediate area, but would not typically be seen on a landscape scale. On the ground, visual effects would be adverse, short-term, and minor, but would contribute to beneficial, long-term, and major effects through the restoration of open scenic views.

Pile burning. This activity would have two potential effects on scenic resources. First, piles of stacked fuels would be visible—potentially within major scenic views. Second, piles once burned would leave a patch of burned area that would not appear natural. As in Alternative A, both effects would be adverse, short-term, and minor.

Chipping. Chipping would result in small areas with evidence of activity, through concentrations of wood chips left behind. Chipping would not be a major feature on the scale of a landscape or scenic view. These effects would be adverse, short-term, and negligible.

Girdling. Girdling would cause local effects that would rarely be noticed within a scenic resource. Effects would be adverse, long-term, and negligible.

Cumulative Impacts

Past, present, and reasonable foreseeable projects affecting scenic resources would be the same as under Alternative A. The effects of present and reasonably foreseeable projects would be adverse to beneficial, long-term, and minor. Considered in combination with the beneficial, long-term and moderate impact of Alternative C on scenic resources, cumulative impacts would be beneficial, long-term, and moderate.

Conclusion

Fire management activities would affect scenic resources in generally beneficial ways, through actions that would contribute to restoring and maintaining open vistas and natural forest structure.

The beneficial effects within the Suppression Unit would be greater in this alternative than under Alternative A, because there would be more annual accomplishment in prescribed fire and plant growth removal. Overall, these effects would be beneficial, long-term and moderate. However, the potential for large, high intensity, catastrophic fires with effects as major as the A-Rock Fire would be only slightly less than under Alternative A. The intent of the alternative is to reduce the risk of catastrophic fire, thus there would be no impairment from the effects of this alternative.

Noise

The noise effects of this alternative would be similar to that of Alternative B, except in the following areas:

Potential for Impacts from Catastrophic Fire

The potential for catastrophic fire would remain similar to that of Alternative A, for most of the life of the plan. Thus, the dependence upon large fire organizations and their equipment would be similar but would go down over 25 years as the threat of catastrophic fire were reduced. Because of a reduction in the threat of catastrophic fire, effects would be beneficial, long-term, and negligible.

Fire Management Treatments

Prescribed Fire

Prescribed fire operations would typically occur within a defined project area. Between 1,260 to 6,436 acres per year would be treated in an average year. This amount of acreage would take approximately 40 to 50 days of project time, compared to approximately 25 days under Alternative A. Fire engines would commonly be in use along roads and in some cases along burn boundaries. A diesel truck traveling at 40 miles per hour at 50 feet can have sound levels of 80 dB, or 16 times as loud as reference loudness. These effects would be adverse, short-term and moderate.

Fuel Reduction by Hand or Machine

Passive Reduction and Lower Profile Techniques.

Low-Impact Skidding. The use of draft animals would have negligible effect in terms of noise, but ATVs, which have motorcycle-type engines, and would potentially be very loud, with noise levels of approximately 90 dB at 25 feet—32 times as loud as reference noise levels [although ATVs are operated at lower RPMs than motorcycles and may have engine sizes and mufflers that could reduce this noise output considerably, motorcycle noise levels (see table III-12, in Chapter III) are considered as the basis for comparison]. Low-impact skidding could be used for several weeks at a time, over entire project areas. Distance from the noise source, in heavily wooded areas, would lessen the noise considerably, but nearby the effects would be clearly audible. The impacts of low-impact skidding, using ATVs would be adverse, short-term, and major.

Hand Cutting. Chainsaws would be the major piece of equipment used for hand cutting, which would generally be conducted in defined project areas. The effect would be adverse, short-term, and moderate.

Pile burning. The equipment used during these operations would include engines and water pumps. The effects would be similar to that found under prescribed fire above.

Chipping. A pneumatic chipper, at one meter distance can be as loud as 115 dB, which is uncomfortably loud, and over 128 times as loud as reference loudness. This equipment would typically be used in the Suppression Unit and Special Management Areas, particularly in wildland/urban interface areas. Chippers would be used on a defined project basis, over a short time period. The effects of use would be adverse, short-term, and major.

Girdling. If chainsaws were used in these operations, the effects would be the same as under Hand Cutting above, except girdling would be used on a limited basis, thus noise effects would be limited and very short-term.

Cumulative Impacts

Past, present and reasonable foreseeable projects affecting scenic resources would be the same as under Alternative A. Considered in combination with the adverse, short-term, and major impact of Alternative C on noise, cumulative effect would remain adverse, short-term, and major.

Conclusion

Fire management activities would have the potential to introduce noises that have a short-term, adverse and major effect on ambient noise levels, especially near wildland/urban interface areas and during large, catastrophic fire events. The noise events would be similar but more than would occur under Alternative A. Large fire organization events, as needed for catastrophic fire would be similar to those under Alternative A. In Wilderness, helicopter and chainsaw noises would continue to introduce short-term intrusions, with adverse and major effects, the same as under Alternative A. There would be no impairment of the park's resources or values.

Local Communities

This alternative would have the least amount of prescribed fire and wildland/urban interface treatment, per year, among the action alternatives. The treatment acreage would be greater than under Alternative A, resulting in adverse effects and risk levels for local communities that would be less than under Alternative A, No Action. However, the level of risk from the effects of catastrophic fire would remain high and would be the greatest among the action alternatives. The amount of annual accomplishment for wildland/urban interface work would meet objectives for protecting these areas within approximately 10 years, but the ecosystem restoration work would require much longer, approximately 25 years, meaning the potential for large, high intensity catastrophic fire would remain high for much of the implementation period. Even with the wildland/urban interface work completed, large fires could potentially run through the area and put wildland/urban interface areas at risk, despite efforts to hold the fires and protect communities.

Potential for Impacts from Catastrophic Fire

These effects would be similar to Alternative B, except that risks for local communities would be more slowly abated by the schedule for wildland/urban interface treatment, which would reduce fuels in forests around communities and developed areas within 10 years. Thus, effects of Alternative C on the potential impacts from catastrophic fire would be beneficial, long-term, and negligible to minor.

Fire Management Treatments

Managed Wildland Fire

The effects under this alternative would be similar to Alternative B—adverse, short-term, and negligible.

Re-ignition clause. The effects of this alternative would be the same as under managed wildland fire—adverse, short-term, and negligible.

Holding Action and Monitoring Effects (water and retardant drops, helispots and spike camps). ***The effects under this alternative would be similar to Alternative B.***

Prescribed Fire

Prescribed fire operations typically occur within a defined project area. Between 1,260 and 6,436 acres would be restored in an average year, compared to 1,285 acres per year under Alternative A, thus reducing the risks associated with catastrophic fire, compared to Alternative A. However, with this amount of annual work, it would still require up to 25 years to accomplish ecosystem restoration objectives, meaning that the risks associated with catastrophic fire would remain through much of this period. Effects of prescribed burning on local communities would be beneficial and long-term, but moderate. Other effects would be similar to under Alternative B.

Other effects of prescribed fire would be similar to those under Alternatives A and B.

Site Preparation Associated with Managed Wildland Fire and Prescribed Fire (hand line, snagging, mop-up)

The effects under this alternative would be similar to Alternatives A.

Fuel Reduction by Hand or Machine

Passive Reduction and Lower Profile Techniques.

Low-Impact Skidding. Low-impact skidding would affect local communities through its relationship to the duration required to complete fuel reduction in communities and ecological restoration work around community perimeters. Under this alternative, low-impact skidding would be the major tool for skidding trees to quickly reduce fuels near homes, businesses, and other buildings. This alternative requires the longest period for completing these projects (10 years for wildland/urban interface work), in part because of the time required to do this work, considering the range of tools and equipment available. Skidding using these techniques would be beneficial, but more time-consuming, thus risks to communities would remain high for a longer time. Effects of low-impact skidding on local communities would be beneficial, long-term, and moderate to major.

Hand Cutting. There would be approximately 766 acres of plant and fuel reduction work competed in wildland/urban interface areas per year. This would accomplish wildland/urban interface objectives for protection and ecosystem restoration in approximately 10 years, reducing risks near communities compared to Alternative A. Although catastrophic fire potential would remain great, the opportunity to protect these communities would be improved compared to Alternative A. The effects of biomass removal would be beneficial, long-term and moderate to major.

Pile burning. The effects under this alternative would be similar to Alternatives B— adverse, short-term and minor.

Chipping. The effects of this alternative would be similar to Alternative B—minor, short-term and beneficial.

Girdling. The effects under this alternative would be similar to Alternatives B—negligible.

Cumulative Impacts

As in Alternative A, there would be a diversity of projects in the five county area that would have a diversity of effects upon local communities. These projects include: Lodging and service projects: utility and infrastructure projects; and other projects of the type described in the proposed action, e.g., projects dealing with fire, fuels and vegetation management matters.

The long-term, beneficial, and moderate effects of these actions, considered with the impacts of Alternative C, would result in cumulative effects in Yosemite's wildland/urban interface areas that would potentially be beneficial, long-term, and moderate.

Conclusion

The risks associated with large, catastrophic fires would be reduced in this alternative, compared to Alternative A. The risk in Alternative C for direct effects (loss of property during fires) and indirect effects (loss of business during fire-related closures) would be reduced compared to Alternative A, but would remain the highest among the action alternatives. This is because of a smaller amount of annual prescribed fire and mechanical thinning accomplishment to restore plant communities in wildland/urban interface areas and elsewhere in the Suppression Unit. The potential for fire-related closures and other effects would also be only slightly lower than under Alternative A. As a result, the overall affect of this alternative on local communities would be beneficial, long-term and moderate.

Environmental Justice

Under this alternative, fire management activities would continue to be directed toward reducing risks in all of the wildland/urban interface areas in the park, including El Portal, Hodgdon Meadow, Foresta, Wawona, and Yosemite Valley. Cooperative, interagency prescribed fire activities would be continued at Yosemite West. Any differences in activity time and effort would continue to be reflective of the complexity of the work required in some areas.

Because of the greater amount of prescribed burning and fuel treatment, compared to Alternative A, the benefits for each community would be greater. The amount of prescribed fire and fuel treatment would be less than under other action alternatives. Nevertheless, the risks in each of the wildland/urban interface areas would be less than under Alternative A. In that risks in each of the communities would be targeted, the effects upon minority and low-income populations in those communities would be beneficial, long-term and moderate, the same as effects described under Local Communities, above.

Cumulative Impacts

Cumulative effects upon minority and low income populations, as represented in the wildland/urban interface areas, would be the same as described under Local Communities, above.

Conclusion

Prescribed fire and fuel treatment would be focused upon the immediate risks associated with each of the wildland/urban interface areas. The effects upon minority and low income populations in those communities would be beneficial, long-term, and moderate.

Special Designations

Wild and Scenic Rivers

The Wild and Scenic River Act of 1968 requires agencies to protect and enhance the outstandingly remarkable values (ORV) of Wild and Scenic Rivers in Yosemite National Park and the El Portal Administrative Site. Chapter V discusses the potential for achieving this end, in light of the actions proposed in the *Yosemite Fire Management Plan*. Impacts of this alternative on river related attributes are discussed in the representative sections (for example, in watersheds, water quality and soils; plant communities and fire ecology; etc.).

Wilderness

All wildland fire management activities within areas being managed as designated Wilderness inside the boundaries of Yosemite National Park will adhere to "minimum tool" requirements of the 1964 Wilderness Act (16 USC 1 1 21). About 704,624 acres or 94% of the park is designated Wilderness. Most of this is in the Fire Use Unit where allowing natural processes of fire to occur is a major goal of Yosemite's fire management program. Some areas of Wilderness, however, are in the Suppression Unit because years of fire exclusion have created fuel accumulations that would burn at unnaturally high-intensities. These areas would be restored before being considered for inclusion in the Fire Use Unit. Some areas, because of their proximity to populated areas, buildings, roads and utility lines, or historical resources, would never be included in the Fire Use Unit.

The effects of Alternative C on Wilderness values would be similar to Alternative B, except in the following areas:

Potential for Impacts from Catastrophic Fire

Potential for impacts from catastrophic fire would be remain similar to under Alternative A, No Action, during the life of the plan. Although there would be more fuel treatment than under Alternative A, the amount of annual accomplishment toward restoration goals would likely result in effects that would be similar until toward the end of the planning period when the threat of catastrophic fire would be reduced.

Fire Management Treatments

Prescribed Fire

Prescribed fire would be used as a tool to restore and maintain park ecosystems, especially in areas altered from years of fire exclusion. Some of this area includes Wilderness. Alternative C proposes to burn from 1,260 to 6,436 acres per year with prescribed fire. Much of this would be to accomplish objectives related to wildland/urban interface and Special Management Areas. Where prescribed burning is needed to achieve restoration targets, the effect would be beneficial, long-term and moderate to major. However, the greatest effect upon Wilderness values would be in reducing the potential for large, high-intensity fires spreading under extreme fire conditions into large areas, including Wilderness.

Fuel Reduction by Hand or Machine

Passive Reduction and Lower Profile Techniques.

Low-Impact Skidding. If trees needed to be removed from Wilderness, draft animals would be used to skid trees. The most significant effect of low-impact skidding, from dragging one end of the tree, would be a visible skid trench typically less than a foot wide and a few inches deep. However, because of the limited use of this technique in Wilderness, in most locations this scarification could be raked out with hand tools. Raking would limit the amount of soil erosion and reduce visible marks, thereby limiting adverse effects in Wilderness. Many areas would be burned after skidding activities took place. Considering the limited application of this technique in Wilderness, and the use of mitigation at the end of the project, effects would be adverse, negligible, and short-term.

Cumulative Impacts

The effects of past and present actions on Wilderness are manifest in the trails, bridges, primitive structures, and constructs of man. These facilities have the potential to diminish the Wilderness quality to some visitors, but most depend on many of these features and are tolerant of their presence. Overall, their effects are adverse, long-term, and minor.

Past, present, and reasonably foreseeable actions include fire management and fuels treatment activities outside the park, many of which are national forest lands. These would include A-Rock Reforestation, Aspen Fuels Reduction, Orange Crush Fuels Program, Rogge-Ackerson Fire Reforestation, and the Fire Management Plan for Wilderness in Stanislaus National Forest. These actions would result in effects similar to those in the national park that result from fire management actions, including burned areas, cut stumps, evidence of holding lines, burned area fire rehabilitation work, and others. Some of these effects would be within Wilderness. The effects would be beneficial, long-term and moderate to major on Wilderness values.

These effects, considered in combination with the beneficial, long-term and minor to moderate effects of Alternative C, would result in the cumulative effects on Wilderness would remain beneficial, long-term, and minor to moderate.

Conclusion

Fire management activities would affect Wilderness resources in generally beneficial ways, through actions that would maintain plant communities within their natural range of variability, and thus maintain Wilderness values, and especially in the Fire Use Unit. Effects in the Suppression Unit would be greater than under Alternative A, due to the greater amount of annual accomplishment in fuels treatment and prescribed fire. However, the potential of having large, high intensity, catastrophic fires that could spread their effects into Wilderness would remain fairly high during the life of the plan. That would mean the possibility of having fires of the magnitude of the A-Rock Fire. In Wilderness, helicopter and chainsaw noises would continue to introduce short-term intrusions, with adverse and major effects, the same as under Alternative A.

Overall, the effect of Alternative C would be beneficial, long-term and minor to moderate. There would be no impairment from the effects of this alternative.

Energy Consumption

The energy consumption associated with fire management activities is difficult to calculate, because of the great number of variables involved, including the size and complexity of projects. Fire management activities, including monitoring of managed wildland fire, prescribed fire and hand thinning are considered in the analysis; emergency fire suppression and administrative activities are not.

The same fire management activities considered under Alternative A are used in this alternative. In addition, passive reduction techniques such as skidding with ATVs and chipping would be included into the treatment mix. The number of acres that would be treated, and related energy that would be consumed is estimated in table IV-16 below.

Cumulative Impacts

Energy is used in many park operations. For the proposed action for the Yosemite Valley Plan alone, projections included an estimated reduction of 1,341,800 gallons of gasoline consumption per year, and an increase of 335,500 gallons of diesel fuel consumption (for a total of 549,300 gallons per year by 2015), a decrease of 1,006,300 gallons to a total of 1,688,300 gallons of fuel, and a moderate, long-term beneficial impact. The impact of the amount of fuel consumed during fire management activities in this alternative, about 22,088 gallons of fuel per year, would be adverse, long-term, and minor, compared to Alternative A. The cumulative effects would remain beneficial, long-term, and moderate.

Conclusion

Energy would be consumed during fire monitoring and reconnaissance, prescribed fire operations, and fuel reduction activity. Typically, more than 22,000 gallons of various fuels per year would be consumed, compared to over 9,000 gallons under Alternative A. The effects of the fire management program’s energy demand would be adverse, long-term, and minor, compared to Alternative A, No Action.

Table IV-16
Projected Energy Consumption Under Alternative C

Fire Management Treatment	Acres Treated per year	Equipment Used	Treatment Rate or Equipment Use	Fuel Use Rate	Fuel Use
Managed Wildland Fire	16,000	Aircraft (recon, transport and water drops)	2 hour per recon flight; est. 180 recon hours per year.	60 gallons of fuel per hour	10,800 gallons of fuel
Prescribed Fire[a]	3,848 (1,260 - 6,436)	a) Drip Torches	Approx. 1 acre per hour per torch, 8 acres per day in an 8 hour shift. [OR in aerial ignition, approx. 150 acres per day by aerial ignition; 2 hours flight time per day]	Approx. 2 gallons per acre burned. [OR approx. one box (1,000 balls) per 150 acres, plus 60 gallons of fuel per hour of flight time, plus ground crews]	7,696 gallons of drip torch fuel [OR 25,600 ignition balls, with approx. 3,072 gallons of aviation fuel; plus approx. 500 gallons drip torch fuel for ground crews]
		b) Engines	2 to 4 engines/ plus 1 to 2 water tenders per day (4 on average), for an average of 40 project days per year; 12 hour shifts	8 miles per gallon diesel fuel, at least 50 miles out and back to station per vehicle per day	1,000 gallons
		c) Chainsaws for site prep.	Crew with 5 saws can treat 5 acres per day, for approx. 230 acres	2 gallons per day per saw; 10 gallons per crew per day	460 gallons
Hand Cutting	766	Chainsaws	Crew with 5 saws can treat 5 acres per day	2 gallons per day per saw; 10 gallons per crew per day	1,532 gallons
ATV Skidders		All Terrain Vehicles	225 hours per year	28 days, at 10 gallows of fuel consumption per day	280 gallons
Chipping	300	Chipper	5 acres per day	10 gallons per day	600 gallons
Total: 22,368 gallons of various fuels					

a Total fuel includes drip torches, chainsaws, and trucks, not aerial ignition techniques

Sustainability and Long-Term Management

Relationship of Short-Term Uses and the Maintenance and Enhancement of Long-term Productivity

Alternative C would not result in new development (the only development proposed would be expansion of one helibase), thus it would not take lands out of productivity as natural ecosystems. However, fires would continue to be suppressed, mostly in the Suppression Unit and to a smaller extent in the Fire Use Unit. This would allow forest structure to continue to change and fuel loads to increase throughout most of the planning period. This would be particularly true in upper and lower montane vegetation groups, in the Suppression Unit, and in the wildland/urban interface. Conditions would not likely be reversed in this alternative until the end of the planning period. Those areas that are burned would be restored to target conditions. The effects on vegetation are described under Vegetation for this alternative. Over the long-term, there would be the potential for high-intensity fires burning extensive areas and changing vegetation into early seral stages such as happened in the A-Rock Fire. This would be a long-term and adverse effect.

Irreversible or Irretrievable Commitments of Resources

Implementation of Alternative C would be similar to Alternative A in terms of the potential of large, catastrophic fires. The trend has shown that in Yosemite National Park large, high-intensity fires are becoming more frequent than in the past. The fire history of the park indicates that in past decades Yosemite did not have fires of the size of the A-Rock. In the 1990's, the park had three large fires: A-Rock, Steamboat, and Ackerson.

The effects of the A-Rock Fire were long-term, adverse, and major, and represent, in a relative sense, an irretrievable commitment of resources. Future fires of this size and intensity also would have irretrievable effects. Because of the limited amount of fuel reduction and prescribed fire, under Alternative C the situation would remain much the same until near the end of the planning period, 25 years.

The three giant sequoia groves in Yosemite National Park have been the focus of past fuel treatments and prescribed fire in Yosemite's fire management program. These actions have helped to protect them, yet they continue to be at risk. The gradual amount of fuel reduction and prescribed fire in Alternative C would allow surrounding areas to continue to degrade for much of the planning period. Thus, implementation of Alternative C would increase this level of risk over time. The loss of the Mariposa Grove of Giant Sequoias would be considered an irretrievable loss of resources, and impairment, under the definition in National Park Service Management Policies 1.4.5

The risk to historic resources in Yosemite Valley, Wawona, and in other wildland/urban interface areas would be slightly less than under Alternative A, No Action, because of biomass removal in the wildland/urban interface. If burned during catastrophic fire, historic resources would be irreversibly and irretrievably lost since one cannot be reconstructed, only replaced by a similar structure which would lack the significance and integrity of the original.

Effects of managed wildland fire upon wildlife and other park values would generally not be considered irreversible or irretrievable, in that their effects would typically be within the natural range of variability for park ecosystems and wildlife habitat, and would be short-term. Habitat would typically become suitable to wildlife shortly after a fire.

Under this alternative, no appreciable irreversible or irretrievable commitments of resources would be associated with air quality.

Adverse Impacts that Could Not be Avoided if the Action Were Implemented

As in Alternative A, it is likely that the effects of large, catastrophic fires could not be avoided, considering the limited amount of prescribed fire and fuel reduction that would occur under this alternative. The effects would include vegetation type conversion and return of large areas to earlier seral stages following catastrophic fire. The potential for this would be greatest in upper and lower montane forests.

Plant and fuel reduction and other fuel treatments would not be considered adverse in that target conditions would be based on the natural range of variability for those systems. The adverse effects of treatments would be short-term while beneficial effects, such as ecosystem restoration, would be long-term.

Under this alternative, there would be short-term, unavoidable, adverse impacts to air quality due to the increase in prescribed burning in areas where fuel loads are high from decades of fire exclusion. As park forests are restored to their natural vegetative state and natural fire regime, fuel loads will be lighter and thus, less smoke will be produced when forests burn. The need to burn in the park's forests through prescribed and managed wildland fire will never go away, however, adverse impacts on air quality would decrease over the long-term as forests fuels are reduced.

Alternative D – Multiple Action

Biological Environment

Vegetation and Fire Ecology

Potential for Impacts from Catastrophic Fire

Among the action alternatives, this alternative would accomplish more fuel reduction than the passive action alternative and less then the aggressive alternative. This Multiple Action Alternative proposes moderate increases in the use of prescribed fire and managed wildland fire and use of all of the fire and fuel reduction techniques described (Chapter II, table II-6) to accomplish wildland/urban interface work. It would restore ecosystems in 15 to 20 years and provide protection for the wildland/urban interface in 6 to 8 years. This longer time frame indicates that the risk for catastrophic fire would remain high for longer than under the Aggressive Action Alternative, but not as long as under the No Action or Passive Action Alternative.

The impacts would be the same as the Alternative B, except in lower montane forests. In all action alternatives these forests would have the largest acreage targeted for prescribed fire. The relatively short fire return intervals found in lower montane forests, combined with existing moderate to high departure from normal fire return interval and the length of time it will take to restore the fire regime under this alternative, creates the conditions for increases in the departure from the natural fire regime during most of the restoration period. The time frame for restoration is within the range of the fire return intervals for all but three vegetation types: ponderosa pine/mixed conifer, ponderosa pine/bear clover forests, and dry montane meadows. These areas would need to be specifically targeted for treatments. If not, the FRID would continue to increase and the potential for catastrophic fire and type conversion would remain high. The potential for catastrophic wildland fire would only decrease in direct proportion to the amount of burning in these three vegetation types. Overall, the impact would be beneficial, long-term, and minor to moderate, which is an improvement over the adverse effects of Alternative A.

Fire Management Treatments

The Multiple-Action Alternative would utilize managed wildland and prescribed fire and, in some areas, the full array of site preparation and fuel reduction techniques described in Chapter II. For each area, the preferred treatment would cause the least impact while allowing the objectives (safety, level of protection, time, target conditions) of the area's implementation plan to be met. Within the wildland/urban interface areas and along road and utility corridors mechanical tree removal equipment would be used, however, if the objectives could be met using another, less invasive technique, that technique would be seriously considered.

Managed Wildland Fire

Impacts to each vegetation group would be the same as under Alternative B. Maximum use of managed wildland fire to maintain vegetation in its appropriate fire regime would be a major goal in the Fire Use Unit.

Re-ignition clause. Same as under Alternative B—beneficial, long-term, and moderate to major.

Holding Action and Monitoring Effects (water and retardant drops, helispots, and spike camps). Same as under Alternative B—adverse, short-term, and negligible to minor.

Prescribed Fire

Prescribed fire would typically be used in the restoration of areas where the fire return interval is three or more fires out of cycle, or to maintain target conditions in areas within the Suppression Unit or similar areas of the Fire Use Unit. The total acreage in prescribed fire units would be the same as in Alternative B, Aggressive Action, but the number of acres burned annually would be less, but still more than under Alternative A or C.

Subalpine Forests. In all alternatives, less than 1% of subalpine forests would be in prescribed fire units. The impacts of prescribed fire would be expected to be the same as under Alternative A—beneficial, short-term, and minor.

Upper Montane Forests. Less than 20% of upper montane forests would be in prescribed fire units in Alternative D. However, it is twice the acreage as is in prescribed units under Alternative A. The impact of prescribed fire in these forests would be expected to be the same as under Alternative A, although the larger acreage would decrease the chance of catastrophic fire. Due to the longer fire return intervals in this vegetation group, the longer time frame for restoration would have a negligible effect. Impacts of prescribed fire on upper montane forests would be the same as under Alternative B—beneficial, long-term, and moderate.

Lower Montane Forests. These forests are a primary focus of the prescribed fire program. The acreage to be restored would remain the same as in Alternative B, but fewer acres would be treated per year. The relatively short fire return intervals, combined with the present moderate to high departure from normal fire return interval, would mean that during most of the restoration period, these forests would continue to increase in departure from normal fire regime. The potential for catastrophic wildland fire would decrease in proportion to the amount and location of work performed in these lower montane forests. It would be enhanced by strategic placement of the first few years of prescribed burning. By providing breaks in the canopy and reduced surface fuels in the right areas, additional protection would be provided for forests and developed areas, especially against spread of high-intensity fire. The impact of prescribed burns in these forests would be expected to be the same as under Alternative A, No Action. Under this alternative, the effect of prescribed fire on lower montane forests would be beneficial, long-term, and minor to moderate. Because of the increase in area treated, this would be an increase in intensity, compared to Alternative A.

Meadows. Meadows have the shortest fire return intervals of all vegetation types described for the park. Short fire return intervals found in this group, combined with their moderate to high departure from normal fire return interval, would suggest that during most of the restoration period, the meadows would continue to increase in departure from normal fire return intervals. Many of the meadows are included in the multi-year plan and more would be treated with maximum use of managed wildland fire. The acreage to be restored would remain the same as in Alternative B, Aggressive Action, but fewer acres would be treated per year. The effects of prescribed fire would be expected to be the same as under Alternative A. Overall, the effect of Multiple Action would be beneficial, long-term, and minor to moderate. The increase in acreage and the amount of time used to achieve restoration objectives would have benefits that would last longer and cause substantial change in community structure, composition, or fuels, compared to Alternative A.

Foothill Woodlands. More than 75% of foothill woodlands would occur in prescribed fire units under Passive Action, the same amount as under Alternative B, Aggressive Action. This would be nearly four times the acreage in prescribed fire units as under Alternative A. Fire effects would be expected to be the same as under Alternative A. Overall, the effects of Multiple Action would be the same as under Aggressive Action. The impacts of prescribed fire in foothill woodlands would be beneficial, long-term, and major. The increase in benefit intensity, compared to Alternative A, would be due to the increase in the amount of work and the time frame for achieving restoration.

Site Preparation Associated with Managed Wildland Fire and Prescribed Fire (hand line, snagging, mop-up)

Impacts would be the same as under Alternative A—adverse, short-term, and minor.

Fuel Reduction by Hand or Machine

Effects of Reducing or Removing Biomass from Sites

While the removal of cut trees and shrubs from treated sites can reduce the intensity of future fires, it can have other effects on ecosystems, such as a loss of nitrogen and other vital plant nutrients. Table IV-9 under Alternative B presents a comparison of methods used to remove cut trees and shrubs and a qualitative analysis of the movement and availability of nitrogen and other nutrients.

Aggressive Reduction Techniques

Mechanical Tree and Shrub Removal. These activities would occur primarily around the inner wildland/urban interface where plant community structure has been altered by years of fire exclusion and communities are at risk from catastrophic fire. Less than 1% of the park or 6,425 acres is within inner wildland/urban interface boundaries, of this approximately 1,100 acres would be treated with various fuel reduction techniques each year. These activities usually would be followed by prescribed fire (effects discussed above). To restore plant community structure to within its natural range of variability, mechanical means would be used. Only lower montane forest and meadows would be treated in large enough areas to have more than a local effect. Less than 5% of lower montane forest and less than 20% of meadows would be targeted for this treatment in Alternative D.

Effects of biomass removal would include the potential for trampling and burial of sensitive plants, disturbing sensitive ecosystems (e.g. riparian areas), the appearance of cut stumps, and the loss of fuel ladders (see also table IV-9). All of these impacts would be mitigated through project planning and coordination with resource management staff. Surface and soil disturbance and compaction would also be caused by tracked vehicles and cutting, dragging, or crushing materials (depending on the treatment used). This disturbance would provide potential sites for invasion of non-native species.

Trees up to 20” dbh (diameter breast height) in the six inner WUI areas would be removed mechanically according to the structural target conditions for density and frequency, by vegetation type (see table 2.3). This would alter tree density and canopy cover in the areas of treatment. Canopy cover reduction should change fire behavior so that a fire would be more likely to move on the ground rather than to move in the canopy (crown fire). This treatment would not reduce the surface fuel load, which can be greater than half the total down and dead fuel load on a site. In fact, it would actually increase the surface fuel load until the area was broadcast burned, which would normally follow within two years. The intensity of fires would be greater due to this loading of fuels. Overall, the adverse effects of biomass removal by mechanical means would be short-term and minor to moderate. Long-term impacts would be beneficial and negligible to moderate, due to the lower potential for catastrophic fire in treated areas.

Conventional Tree and Shrub Removal. Under the Multiple Action alternative, skidders and grapplers would be used in the six inner WUI areas. Surface and soil disturbance and compaction would be associated with the use of wheeled and/or tracked vehicles and dragging materials. This would provide potential sites for the invasion of non-native species. Skidding would be used in some locations. Mitigation would include running the equipment over snow and restricting equipment use to certain areas and paths. Overall, the effect of skidding and grappling would be adverse, short to long-term, and minor to moderate, depending on the intensity of treatment.

Passive Reduction and Lower Profile Techniques.

Low-Impact Skidding. In Alternative D, this treatment would be used where it would be effective in restoring target conditions, such as in areas in the inner wildland/urban interface needing carefully managed fuel reduction treatment because of populations of non-native, noxious weed species. This technique would also be used where this equipment would be successful in removing downed trees. Draft animals and four wheel, all-terrain vehicles would be used, in combination with fetching arches, to skid trees of approximately 10 to 20" dbh. This treatment would cause localized compaction and scarification of the upper duff and topsoil layers, less than would occur with tracked vehicles; knobby tires and the feet of draft animals would have negligible to minor local effects on topsoil and duff layers. The most significant effect would be from dragging one end of the tree. Skid paths would create potential sites for invasion of non-native species, however fetching arches would mitigate soil disturbance. The extent of skidding would be apparent, but not so great as to result in changes in plant community structure. Species composition might be affected, through invasion of non-natives, if site rehabilitation is not completed and monitored. With rehabilitation and follow up monitoring or removal of non-natives, effects should be minor. Other mitigation, when needed, could include skidding over snow, frozen soil, or a bed of crushed vegetation, as with heavier equipment. Many areas would be burned subsequent to fuel reduction. Most projects would be relatively extensive, thus effects of use would be adverse, minor, and short-term. Note that when used in combination with heavier equipment, it should be possible to use this treatment to achieve restoration target conditions.

Hand Cutting. Types of effects would be the same as under Alternative A, but this activity would not be the predominant ones for restoring plant community structure in this alternative. This work is labor intensive, which would limit the amount of cutting that could be accomplished each year. In the inner wildland/urban interface, fuels would be reduced on about 1,100 acres annually. Hand-cutting work would focus on removing small diameter trees and ladder fuels which would help to reduce the risk of high-intensity fire and stand-replacing events. Combining machine thinning with hand cutting would lengthen the time needed to restore wildland/urban interface areas and reduce risks compared to Alternative B, but this would still be more restoration than would occur under Alternatives A or C. Thus, unless hand-thinned areas are also burned, the effects of hand thinning on lower montane forests would be adverse, short-term, and minor. If thinned areas are also broadcast burned under controlled conditions, the effects of hand thinning would be beneficial, long-term, and minor to moderate.

Pile Burning. Same as under Aggressive Action—adverse, short-term, and negligible to minor.

Chipping. Effects would be similar to those described under Alternative B. Overall, the impacts of chipping on vegetation would depend on whether chips were broadcast or removed from the site. If chips were broadcast, the impacts would be adverse, short-term, and negligible to minor, depending on the area treated. If chips were removed, the impacts on vegetation would be adverse, short-term, and negligible. Careful project planning and coordination with resource management staff would occur prior to project implementation, to select the appropriate treatment.

Girdling. The impact of girdling, to kill individual trees and create wildlife habitat, would be adverse, short-term, and negligible to minor.

Helibase Upgrades

Same as Alternative B

Cumulative Impacts

The past, present, and reasonably foreseeable projects effecting vegetation at Yosemite National Park would be the same as discussed under Alternative A. The overall effect of past activities on vegetative structure and composition and on fuel loads have been adverse, long-term, and major. Present and reasonably foreseeable future projects would have a beneficial, long-term, and minor to moderate effect on vegetation. When considered in combination with the minor to moderately beneficial impacts of projects on other lands in the area, the cumulative impacts of Alternative D would be beneficial, long-term, and moderate.

Conclusion

The effects of this alternative would be similar to Alternative B, Aggressive Action, but would include aspects of the approach taken under Alternative C, Passive Action. In aggregate, the actions of Multiple Action would have beneficial, long-term and moderate to major effects. The time required to restore park ecosystems (15 to 20 years) and to reduce risks to the six inner wildland/urban interface communities would be longer (6 to 8 years) than in Aggressive Action. The time frame for restoration is with in the normal range of fire return intervals for all but three vegetation types (ponderosa pine/mixed-conifer forest, ponderosa pine/bear clover forest, and dry montane meadows). This will significantly reduce the threat of large, high-intensity wildfire in all areas of the park over time. This would reduce the potential for type conversion of vegetation outside of the natural range of variability. Effects would revert from adverse to beneficial, compared with Alternative A. Large, high-severity fires would likely occur during the life of the plan, but the size and extent of the fires would be reduced when compared with Alternative A. There would be no impairment from the effects of this alternative.

The Mariposa Grove of Giant Sequoias is one of the resources specifically identified in the enabling legislation for Yosemite National Park. If catastrophic fire were to eliminate or severely damage this grove, the impact would be impairment.

Wetlands

Potential for Impacts from Catastrophic Fire

Alternative D would likely result in significant amounts of change over a moderate period of time. Effective implementation of this alternative would not eliminate the potential for catastrophic fire, but would significantly reduce the likelihood of fire events outside the range of tolerance for wetlands and associated species. This reduction in the potential for large or unusually intense fires would result in moderate to major ecological benefits for park wetlands. Use MIMT for fire management; identify sensitive wildlife resources to minimize adverse impacts; and apply mitigations identified during consultation with USFWS (see Appendix 9).

Fire Management Treatments

Managed Wildland Fire

Same as Alternative A, No Action—beneficial, long-term, and moderate.

Re-ignition clause. Same as Alternative B.

Holding Action and Monitoring Effects (water and retardant drops, helispots, and spike camps). Same as Alternative B—adverse, short-term, and negligible.

Prescribed Fire

Alternative D proposes a moderate to large amount of prescribed fire annually. Selected units would target wetlands for treatment, given concerns of tree invasion or changes in species composition (Yosemite Valley, for example). These treatments would provide significant ecological benefit. Although specific fire return intervals for Sierra Nevada wetlands are not well defined, the amount of prescribed fire acreage proposed in this alternative would not likely generate adverse impacts. Short-term fragmentation would be possible, but long-term benefits would also result.

Wildland/urban interface areas, such as El Portal and Yosemite West, would likely receive mechanical pretreatment, followed by prescribed fire. Treatments would be implemented with the intention of avoiding impacts to wetlands (see hand cutting, below). Specific impacts of treatments would differ little from the No Action Alternative, but the intensity would be expected to increase because of the increase in the number of acres treated.

Site Preparation Associated with Managed Wildland Fire and Prescribed Fire (hand line, snagging, mop-up)

Same as Alternative B—beneficial, minor to moderate, and short-term.

Fuel Reduction by Hand or Machine

Aggressive Reduction Techniques. These techniques would not occur in wetlands.

Passive Reduction and Lower Profile Techniques.
Low-Impact Skidding. These techniques would possibly be used in wetland areas. If for some reason fallen debris needed removal from meadows, attempts to move the material would be done when the water table had dropped and the surface was dry enough to support the use of a fetching

arch. This method would mitigate the possibility of material digging into the soil surface and causing soil disturbance. Impacts would be beneficial, short-term, and negligible.

Hand Cutting. Same as Alternative B—short-term, and minor to moderate.

Pile burning. Same as Alternative B—beneficial, short-term, and minor to moderate.

Cumulative Impacts

Cumulative effects to wetland and aquatic resources are based on analysis of additional wetlands activities within the Yosemite region and the potential effects of this alternative. The past, present, and reasonably foreseeable projects that would potentially effect local wetland patterns and large-scale or regional wetland patterns would be the same as evaluated in Alternative A.

These and park projects would result in both short-term and long-term adverse and beneficial impacts on wetlands in the areas. Overall, these beneficial, long-term, and moderate effects for reasonably foreseeable future projects, considered in combination with the beneficial, moderate to major and long-term impacts of Alternative D would result in beneficial, moderate and long-term cumulative impacts, due to the emphasis on restoration of vegetation structure and processes through fire and the moderately aggressive approach.

Conclusion

Alternative D would have little or no adverse impacts on wetland resources. This moderately aggressive approach would likely generate moderate to major, long-term, and beneficial ecological benefits from the reduction of catastrophic fire threat. The multi-strategy approach would also provide additional options for wetlands avoidance. There would be no impairment from the effects of this alternative.

Wildlife

Potential for Impacts from Catastrophic Fire

Under Alternative D, catastrophic fire would have the same effects as described under Alternative A, but the risk of such events would be substantially reduced, because of the 15 to 20 year goal for achieving target conditions in areas that have deviated from the median fire return interval by three or more intervals. Areas that deviate three or more intervals would be targeted for prescribed burning first, with 1,817 to 9,194 acres burned per year, depending upon the number of natural ignitions in the Fire Use Unit and the prevailing conditions that would allow prescribed or managed wildland fire. As a result, wildlife habitat would quickly be returned to a more natural condition, and the risk of catastrophic fire, and its adverse effects on wildlife, would be greatly reduced over a relatively short period of time. Because of this, implementation of Alternative D would result in beneficial, long-term, and major impact to wildlife and their habitat.

Fire Management Treatments

In Yosemite and in surrounding forests, many mid- to low-elevation forests are overgrown with dense shrubs and young trees because of a history of fire exclusion. At the same time, as explained above, some areas are at high risk of unnatural high-intensity fire events. These conditions affect the abundance and diversity of wildlife species directly by creating unfavorable habitat conditions for some species. For example, dense understory growth may adversely affect habitat quality for California spotted owls and northern goshawks by limiting their access to prey (Weatherspoon et al. 1992, Maurer 2000, respectively). The combination of fire and fuel reduction proposed in this alternative would result in increased habitat and species diversity as gaps would be created in continuous forest and the edge along the forest/gap interface recovered with important understory plants that had been crowded out by shade tolerant species.

Managed Wildland Fire

Under Alternative D, the average annual number of acres burned by managed wildland fire would increase over current burning rates, in order to reach target conditions in 15 to 20 years. Under Alternative D, managed wildland fire would be a valuable tool in restoring natural, fire-influenced wildlife habitat. Conditions for wildland fires would vary among years, with little burning occurring in some years, and much burning occurring in others, in order to reach management goals. In years of high wildland fire activity, large areas of habitat would likely be affected, changing their suitability for species favored under the altered forest conditions created by a history of fire suppression.

Because natural ignitions are somewhat random events, areas burned would not be those of highest management priority (i.e., furthest from the natural fire regime). Also, some areas would likely burn at higher than natural intensities due to current levels of fuel accumulation, even when prescriptions were designed to minimize these effects. As a result, forest gaps and consumption of large woody debris (which provides habitat diversity), would be greater than typically found within the natural range of variation for an area. Potentially this would adversely affect species that favor dense forests, such as hermit thrush, northern flying squirrel, and marten. These effects would be greater under Alternative D, compared to Alternative A. Such impacts, however, must be weighed against the benefit of reduced risk of catastrophic fire that would cause much greater detriment to the park's wildlife habitat. Under Alternative D, impact to wildlife of managed wildland fire would be beneficial, long-term, and major due to the restoration of wildlife habitats and reduction in the threat of catastrophic fire. Mitigation: Use MIMT for fire management; identify sensitive wildlife resources to minimize adverse impacts.

Re-ignition. Effects would be the same as under Alternative B.

Prescribed Fire

The use of prescribed fire provides the greatest potential for focused work to restore wildlife habitat and reduce the threat of catastrophic fire. Areas furthest from the natural fire regime with identified threats to wildlife and habitat, can be targeted for treatment. Fire can be planned to occur under conditions that maximize benefit to resources, including wildlife and habitat, and minimize fire-related impacts to sensitive wildlife resources (e.g., spotted owl nesting sites).

Under Alternative D, prescribed fire would be used mainly in the Suppression Unit where forests are furthest from the natural fire regime. Much of this area is in mid-elevation mixed conifer habitat, which is among the most productive and diverse wildlife habitat in the park. High levels of fuel loading would cause some prescribed fires to burn at higher than natural intensities, even when fire prescriptions were designed to minimize these effects. As a result, forest gaps and consumption of large woody debris (which provide habitat diversity) would be greater than might occur under the natural range of variability. This would adversely affect species such as hermit thrush, northern flying squirrel, and marten. Such impacts, however, must be weighed against the benefit of reduced risk of catastrophic fire, which would be of much greater detriment to wildlife habitat. As described in Alternative B, burning in the shoulder season would have an adverse effect on some species of wildlife that are adapted to the natural timing of fires.

In habitats near developed areas, where protection of human-built structures and facilities is a concern, prescribed fire would be used to reduce fuel loads to the lower end of the natural variability. If forests became more open (less understory vegetation) and contained less down wood, the effect on animal species that depend on these features, such as salamanders, small mammals, and ground-nesting birds, would be adverse. However, overall a larger number of species would benefit from restoration of forests to a more natural condition.

Conditions for prescribed fires would vary among years so that little burning occurs in some years, and, when conditions were favorable, many prescribed burns take place. In years favorable to prescribed fire activity, large areas would likely be affected. Habitat would be no longer suitable to species that favor dense forest structure but would be more suitable to species that favor open forests and more diverse habitat. Under Alternative D, impact of prescribed fire on wildlife would be beneficial, long-term, and major due to the restoration of wildlife habitats and reduction in the threat of catastrophic fire. Mitigation: Use MIMT for fire management; identify sensitive wildlife resources to minimize adverse impacts; where possible, limit fire size and/or burn intensity heterogeneity and maintain wildlife species diversity.

Holding Action and Monitoring Effects (water and retardant drops, helispots, and spike camps) and Site Preparation Associated with Managed Wildland Fire and Prescribed Fire (hand line, snagging, mop-up)

Actions such as hand line construction, snagging, and water drops would be employed before and during prescribed fire and during management of wildland fires. Effects, concerns, and mitigations would be those described in Alternative A. Some adverse effects on wildlife would occur from these actions because of the increased use of prescribed fire under this alternative. These impacts, however, would be offset by the long-term benefits of fires on ecosystems. Impacts would be similar to Alternative B—adverse, short-term, and minor.

Water Drops: The types of impacts associated with water drops would be the same as described under Alternative A, but the increased use of wildland fire under this alternative could increase the need for water drops. Impacts to wildlife could therefore, be greater than under Alternative A. Adherence to mitigation measures would limit impacts. Actions would result in minor, adverse, long-term impacts. Mitigation: Avoid dipping from waters known to contain mountain yellow-legged frogs; avoid dipping from shallow bodies of water.

Helispot Construction: The types of impacts associated with helispot construction would be the same as under Alternative A, but the greater use of managed wildland fire under Alternative D could result in a greater chance of impacts on wildlife through habitat destruction and direct disturbance. Impact under this alternative would be adverse, long-term, and negligible. Mitigation: Limit helispot construction; site helispots away from sensitive resources; use natural clearings for helispots.

Spike Camps: Under Alternative D, the types of impacts associated with the establishment and use of spike camps would be the same as under Alternative A. The greater use of wildland fire, however, could result in more spike camps to manage and monitor fires. Use of standard mitigation measures would result in negligible, adverse, short-term impacts to wildlife. Mitigation: site spike camps away from sensitive resources; maintain strict control over the availability of food to wildlife at camps.

Hand Lines. Impact from hand line construction under Alternative D would have the same types of impacts as under Alternative A, but given the greater use of prescribed fire the level of such impacts would likely be higher. Such impacts would have to be weighed against the reduction in the risk of high-intensity fire that would be achieved under Alternative D. This includes a likely reduction in the use of hand lines that would be necessary during suppression of unwanted wildland fires. Impact of hand line construction under Alternative D would be adverse, short-term, and minor. Impacts would be mitigated by use of MIMT, identification and avoidance of sensitive wildlife resources, and rehabilitation of areas disturbed by hand lines.

Snagging. Impacts from would be of the same type as in Alternative A. Because of the increase amount of prescribed fire, snagging would likely increase under Alternative D. This could have a local, adverse impact on species (i.e., bats and woodpeckers) that rely on snags. Prescribed fire, however, is likely to generate additional snags that in time would benefit snag reliant species. In addition, the reduction in threat from catastrophic fire from prescribed fire, would benefit a wide range of wildlife species. Impact would be adverse, minor, and short-term, due to the increased number of snags that would be cut but the relatively small area that is likely to be affected. Impacts would be mitigated through use of MIMT, limiting the removal of snags to those identified as a clear threat to human safety and fire line integrity, identifying and avoiding sensitive wildlife resources to the extent possible.

Mop-up. The impacts associated with mop-up are expected to be similar to those described in Alternative A although the greater use of prescribed fire would increase the areas of impact. The small, disperse areas that are likely to be affected would limit adverse impacts to wildlife. Impacts would be adverse, negligible, and short-term and would be mitigated by use of MIMT and identification and avoidance of sensitive wildlife resources to the extent possible.

Fuel Reduction by Hand or Machine

Fuel reduction under Alternative D, Multiple Action, would be a combination of techniques described in Alternatives B and C to achieve target habitat conditions in areas near the wildland/urban interface, roads, and utility corridors. It is proposed for less than 1% of the park. The aggressive actions of Alternative B, using heavy machinery would be used in close proximity to development, whereas, the more passive methods of Alternative C would be used further from these areas. Treatment acres in wildland/urban interface areas would be approximately 1,095 acres per year for 6 to 8 years.

To provide protection for developed areas, prescriptions for wildland/urban interface areas close to development would produce forest habitat at the higher end of the natural range of variability (for target values for tree density and fuel loading). This would affect the species composition of wildlife in these areas. For example, species that depend upon habitat complexity on the forest floor and in the understory, such as marten and some small mammals, would be adversely affected. The conditions achieved, however, would, benefit a larger number of species by restoring a forest structure that is within the range of natural variability for fire-influenced habitat. Farther out from development, reliance primarily on hand thinning and other passive reduction techniques would maintain denser forest structure favorable to other species.

Aggressive Reduction Techniques

Effects of mechanical and conventional tree and shrub removal would be similar to that described in Alternative B, although aggressive reduction would be used in fewer areas.

Mechanical Tree and Shrub Removal. Heavy equipment would be used where critical fuel conditions demand immediate, efficient action, and where natural resources can acceptably withstand the impacts associated with this method. Feller-bunchers, and other tracked or wheeled vehicles in forest habitat would create ground disturbance that would affect animals that live in the forest litter, such as salamanders, reptiles, and small mammals. Adjacent habitat would remain unaffected, allowing recolonization. The noise of heavy machinery would cause some short-term disturbance of wildlife in treatment sites, and in adjacent areas.

Under Alternative D, biomass removal by feller-bunchers would result in minor, beneficial, long-term impact to wildlife due to the rapid return of forest structure to a more natural, open condition in the vicinity of developed areas. These areas would be relatively small on a landscape scale, and some adverse, short-term impacts would occur from use of heavy machinery. Mitigation: avoid use of machinery in wet areas, or during times of year when the forest floor is moist; identify sensitive wildlife resources in treatment areas and avoid impact to them; allow snag retention where possible.

Conventional Tree and Shrub Removal. Same as Alternative B—adverse, short-term, and minor. Mitigation: Avoid sensitive habitats, such as wetlands; identify and avoid sensitive wildlife resources.

Passive Reduction and Lower Profile Techniques.

Low-Impact Skidding. Low-impact skidding would be used to reduce fuels in wildland/urban interface areas and road corridors that would be less tolerant of heavy machinery use. Low-impact techniques cause less ground disturbance than is associated with use of heavier equipment described above. Under Alternative D, low-impact methods would be used in areas where there are wildlife concerns yet it is deemed beneficial to remove trees. Fewer large trees would be removed and those trees already on the ground would be partially or completely consumed when subsequent prescribed burns were conducted. Some drag paths would be created by low-impact skidding, but the use of fetching arches would reduce the impacts of logs being mechanically skidded across the ground. Drag trails and other disturbance would be raked out following the work. Few tire and track scars would be evident and the effects on small mammals and reptiles associated with the forest floor would be minor. Given the limited scope of area that will be treated, the impacts associated with these techniques, as the forest was brought closer to natural stand structure, would be beneficial, long-term, and minor.

Hand Cutting. Thinning of trees and other vegetation in wildland/urban interface areas and along road and utility corridors under Alternative D would be accomplished through a variety of methods, including hand cutting. This would allow the application of hand cutting in areas where damage to the forest floor associated with use of tracked or wheeled equipment is determined to be unacceptable. This would delay achievement of target habitat conditions in some areas, and limit the number of large trees removed. Such management would have different effects on wildlife. On one hand, delay in achieving target conditions would allow altered habitat conditions to continue and extend the threat of high-intensity fire in those areas. On the other, retention of more large trees in treatment areas would keep these areas more in the middle-range of target conditions, and benefit species that prefer denser forest conditions, such as spotted owls.

Under Alternative D, the types of impacts to wildlife associated with hand cutting would be the same type as would occur under Alternative A. Because of the use of heavy machinery in some areas it would be used to a limited extent. Impact to wildlife from hand cutting would be beneficial, long-term, and minor, because habitat affected by fire suppression would be returned to a more natural condition, and threat of catastrophic fire would be reduced in these areas. Mitigation: Identify and avoid sensitive wildlife resources.

Pile Burning Same as Alternative B—adverse, short-term, and negligible. Mitigation: burn piles as soon as possible to minimize the number of animals living in them.

Chipping. Same as Alternative B—negligible; adverse, and short-term. Mitigation: Follow established protocols for limiting the depth of chips distributed on a site.

Girdling. Same as Alternative B—beneficial, long-term, and minor.

Peregrine Falcon

Same as Alternative A—adverse, short-term, and negligible

Helibase Upgrades

Same as Alternative B.

Cumulative Impacts

The past, present, and reasonably foreseeable projects that would have the most direct relationship to Alternative D, would be the same as listed under Alternative A. The impacts of these actions, considered in combination with the impacts of Alternative D, would result in cumulative effects on park wildlife and habitat that would be beneficial, long-term, and minor. This is because beneficial projects would affect large areas of habitat in the central Sierra Nevada in ways that would compliment the beneficial effects of the *Yosemite Fire Management Plan*. The Sierra Nevada Forest Plan Amendment would affect virtually all U.S. Forest Service land around the park by more ecosystem-based management. In comparison, projects with adverse impacts involve small areas and/or have minor effects over larger areas.

Conclusion

Alternative D would result in major, long-term, beneficial impacts to wildlife and habitat by rapidly restoring a more natural forest structure to areas of the park that have severely deviated from a natural fire return interval. The threat of catastrophic fire and its impacts on wildlife and habitat would be greatly and quickly reduced under this alternative. Use of a full range of fuel-reduction techniques would allow flexibility in achieving habitat restoration goals while minimizing adverse impacts. There would be no impairment from the effects of this alternative.

Special-Status Species – Plants

The four California rare plant species grow within the lower montane forest and foothill woodland vegetation zones, where fires frequently occur. These plants grow within the El Portal Administrative Site, although isolated populations of the Yosemite onion have been found within the park. Threats to these species are from suppression-related impacts and the establishment of non-native plant species in areas that have been severely burned (Hessl and Spackman 1995). As fire lines are tied into creek bottoms and moist areas, populations occurring in those sites may be affected. These impacts can be mitigated by avoidance of known populations and habitats of these species. Soil and substrate disturbance from line construction and trampling is especially harmful to perennial species—in this case Yosemite onion, Tompkin's sedge, and Congdon's lewisia.

Non-native plants have become established throughout the lower elevations of Yosemite and are concentrated in areas that receive constant disturbance and/or a constant influx of seed and plant material—e.g. along transportation corridors and drainages (Gerlach et al. 2001). As fires burn they open up habitat that may be taken over by non-native plant species. These plants are aggressive colonizers, have a phenology different than natives, and may be favored by fire-caused changes in the soil. Fires started in the shoulder seasons for hazard fuel reduction or other management reasons may actually exacerbate this problem, favoring non-native plants over the native suite of species. In addition, these fires may negatively affect the rare plants themselves, which are adapted to fires occurring during the normal fire season—May through October at these elevations. For example, Congdon's woolly-sunflower blooms into May and sometimes into June. Prescribed fires held earlier in the year will destroy mature plants and their potential to produce seed for the following season—thereby harming population size and viability. See Appendix 9 for mitigation developed in consultation with USFWS.

Potential for Impacts from Catastrophic Fire

Wildland/urban interface fuel reduction treatments around the El Portal Administrative Site would reduce the potential for high-intensity fire in areas where the California rare plants exist, and burning for ecological restoration would reduce the potential for high-intensity fire beyond the bounds of the administrative site. The probability of encroachment of exotic species into areas burned by catastrophic fires would be high under any of the alternatives because of the impacts on soils and understory and overstory vegetation caused by high-intensity burning. Regardless of treatment methods, if a catastrophic fire were to occur, there would be adverse impacts from non-native species encroachment. The probability of non-native species encroachment into sites burned by catastrophic fire would remain high, as in Alternative A, due to the impacts of high-intensity burning on soils and on understory and overstory vegetation. However, under this alternative, the potential for catastrophic fire would be reduced, therefore the amount of non-native species encroachment would likely be less. Compared to Alternative A, the impacts to special-status plant species would be adverse, long-term, and negligible to minor.

Fire Management Treatments

Managed Wildland Fire

Under the Multiple Action Alternative, all of the plant special-status species described in this document would occur within the Suppression Unit, and only isolated populations of Yosemite onion would occur in the Fire Use Unit. During fire events, input from a Resource Advisor would continue to be used to minimize or eliminate impacts to these species (see Chapter II, Mitigation and Appendix 3). The departure from natural fire return intervals in areas inhabited by these species would quickly approach the natural range in variability over the landscape, and there would be a reduced potential for catastrophic fire events (with associated impacts – see above). Therefore, impacts associated with managed wildland fire to special-status species under this alternative would be the same as for Alternative B—beneficial, long-term, and minor.

Re-ignition clause. Re-ignition effects on special-status plants would only apply to isolated populations of Yosemite onion within the Fire Use Unit. This species neither would benefit nor be adversely affected by re-ignition, due to its isolated locations on sparsely vegetated outcrops. Actions during re-ignition procedures would adhere to mitigation measures and avoid these populations or habitats (see Chapter II, Mitigation Measures).

Holding Action and Monitoring Effects (water and retardant drops, helispots, and spike camps). These special-status species are in areas that would be minimally affected by the proposed actions. These actions would have effects similar to Alternative A, despite increased burning and associated activities. Mitigations would be as described in Alternative A (see also Chapter II, Mitigation Measures). Impacts of these actions taken in conjunction with mitigation measures would be adverse, short-term, and negligible.

Prescribed Fire

Under the Multiple Action alternative, potential effects to special-status species through prescribed burning would increase with the creation of a larger defensible perimeter around development areas (specifically El Portal). Species would be potentially affected by burning in the shoulder seasons and the probability of non-native species encroachment into sites burned out of season would remain high, as in Alternative A. Appropriate mitigation measures would be developed by the park Vegetation Ecologist and Fire Ecologist. Mitigation Measures Common to All Alternatives (Chapter II) discusses the common practices for dealing with these situations. Park vegetation personnel may recommend that some areas not be burned. Impacts would be adverse, long-term, and minor to moderate.

Site Preparation Associated with Managed Wildland Fire and Prescribed Fire (hand line, snagging, mop-up)

Same as Alternative A—adverse, short-term, and negligible to minor.

Fuel Reduction by Hand or Machine

Aggressive Reduction Techniques.

Mechanical Tree and Shrub Removal. Feller-buncher activities would not occur in the areas inhabited by special-status species, therefore there would be no effect.

Conventional Tree and Shrub Removal. Skidding and grappling activities would not occur in the areas inhabited by special-status species, therefore there would be no effect.

Passive Reduction and Lower Profile Techniques.

Low-Impact Skidding. Would not occur in areas inhabited by special-status plant species.

Hand Cutting. Hand cutting actions would be likely to affect special-status plant species only within the El Portal Administrative Site. Mitigations would remain the same as under the existing program. Yosemite onion and Congdon's lewisia would not be impacted by these activities due to their locations. Both Tompkin's sedge and Congdon's woolly-sunflower would potentially have increased levels of impact under this alternative, due to treatments in wildland/urban interface with greater amounts of ground disturbance (through foot traffic, dragging cut materials) and subsequent changes in species composition if non-native species became established within rare plant populations. Therefore, the impact of hand cutting (with mitigations) would be adverse, long-term, and minor.

Pile burning. More pile burning would occur under this alternative than under Alternative A, thereby increasing the potential to affect both Tompkin's sedge and Congdon's woolly-sunflower, due to the location of some populations and individuals of these species. Yosemite onion and Congdon's lewisia would not be impacted by these activities due to their locations. The expanded area of intensively managed vegetation surrounding El Portal would result in increased levels of disturbance in sites that currently receive no management attention. Efforts would continue to be made to avoid individual plants and populations during planning for the activity, and piles would continue to be placed in sites that would be unlikely to support these species. Therefore, impacts of pile burning on plant special-status species under this alternative would be minor, adverse, and potentially long-term due to the larger area of disturbance and increased potential for spread and establishment of non-native plant species. Appropriate mitigations as described in Alternative A and Chapter II (Mitigation Measures) would be applied prior to execution of each project.

Chipping. Same as Alternative B—adverse, short-term, and negligible to minor.

Girdling. This action would not occur in the areas inhabited by special-status species, therefore there would be no effect.

Helibase Upgrades

Same as Alternative B.

Cumulative Impacts

Projects generating cumulative effects that would affect special-status plants would be the same at identified in Alternative A. Impacts of increased mechanical treatments within known and potential habitats for plant special-status species, as well as actions associated with implementation of the *Yosemite Valley Plan* in El Portal, would have increased impacts from non-native plant species introduction and alteration of native plant habitat. Overall, these effects, in combination with the effects of Alternative D, would result in adverse, long-term, and minor cumulative impacts.

Conclusion

Implementation of Alternative D, with increased mechanical thinning and removal, increased management of fuels around developed areas and increased burning would have an overall minimal effect on these species, due to their relative isolation, sparsely vegetated habitats, and occurrence beyond areas that would be managed aggressively. The effect of Alternative D would be adverse, long-term, and minor. There would be no impairment of the park's resources or values.

Special-Status Species – Animals

See Appendix 9 for mitigation developed in consultation with USFWS.

Sierra Nevada Bighorn Sheep *(Ovis canadensis sierrae)* - Federal Endangered

Potential for Impacts from Catastrophic Fire

Same as Alternative A, No Action—beneficial, long-term, and negligible.

Fire Management Treatments

Managed Wildland Fire
Although use of wildland fire would greatly increase under Alternative D, its application on bighorn habitat would be limited since these areas are well within the natural fire return interval. The impact would be the same as under Alternative A—beneficial, long-term, and negligible.

Prescribed Fire
Prescribed fire in bighorn sheep habitat would be unlikely as explained under Alternative A. The impact would be the same as under Alternative A—beneficial, long-term, and negligible.

Site Preparation Associated with Managed Wildland Fire and Prescribed Fire (hand line, snagging, mop-up)
Same as under Alternative A—adverse, short-term, and negligible.

Fuel Reduction by Hand or Machine
Aggressive Reduction Techniques. These activities not occur in bighorn sheep habitat.

Passive Reduction Techniques. These activities would not occur in bighorn sheep habitat.

Cumulative Impacts

Past, present and reasonably foreseeable future projects would be the same as considered in Alternative A. Impacts from present and reasonably foreseeable actions, considered in combination with the impacts of Alternative D would result in beneficial, long-term, and negligible cumulative impacts.

Conclusion

The impact of Alternative D on Sierra Nevada bighorn sheep would be beneficial, long-term, and negligible based primarily on the continued, though rare, influence of fire on their habitat.

Valley Elderberry Longhorn Beetle (*Desmocerus californicus dimorphus*) – Federal Threatened

Distribution of the valley elderberry longhorn beetle in the area administered by Yosemite National Park is restricted to the El Portal Administrative Site. The entire life cycle of the valley elderberry longhorn beetle is connected to the elderberry plant (*Sambucus sp.*). Adverse effects on elderberry plants would therefore have an adverse effect on this beetle. Current management of vegetation in El Portal follows U.S. Fish and Wildlife Service guidelines for protection of valley elderberry longhorn beetle and their host plants (USFWS 1999). See Appendix 9 for mitigation developed in consultation with USFWS.

Potential for Impacts from Catastrophic Fire

In the chaparral and oak woodland communities where elderberry plants are found, accumulations of fuel in some areas of El Portal could lead to high-intensity fires that would have an adverse effect on valley elderberry longhorn beetles and their host plants. Valley elderberry longhorn beetles and elderberry plants have existed under natural fire regimes for thousands of years, but fires of large extent and high intensity may result in high mortality of valley elderberry longhorn beetles and elderberry plants. Actions taken under Alternative D with a goal to treat wildland/urban interface areas within 6 to 8 years through mechanical fuel reduction and prescribed fire would greatly reduce the chance of catastrophic fire in El Portal. Impact of catastrophic fire would, therefore be beneficial, long-term, and moderate.

Fire Management Treatments

Managed Wildland Fire

Would not occur in valley elderberry longhorn beetle habitat. El Portal Administrative Site, where valley elderberry longhorn beetle habitat occurs, is entirely within the Suppression Unit.

Prescribed Fire

Effects of prescribed fire use, when used, would be similar to Alternative A, but under Alternative D prescribed fire use in El Portal would be greater, with a goal of achieving target conditions in all wildland/urban interface areas within 6 to 8 years. Its effect on the valley elderberry longhorn beetle would therefore be beneficial, long-term, and moderate through the reduction in the chance of catastrophic fire and because long-term benefit to elderberry plants through regeneration and reduced fuel loads would offset the unintentional, short-term impacts from beetle mortality. Mitigation: Follow U.S. Fish and Wildlife Service guidelines for protection of valley elderberry longhorn beetle and their host plants (e.g. see Alternative A).

Holding Action and Monitoring Effects (water and retardant drops, helispots, and spike camps) and Site Preparation Associated with Managed Wildland Fire and Prescribed Fire (hand line, snagging, mop-up)

With the greatly increased use of prescribed fires in areas of valley elderberry longhorn beetle under Alternative D, impacts associated with management of these fires is likely to increase, compared to Alternative A, No Action. Effects of Alternative D would be the same as under Alternative B—adverse, short-term, and negligible, based upon their increased use, and therefore, greater chance of inadvertent impacts, and the application of mitigation measures in accordance with U.S. Fish and Wildlife guidelines.

Fuel Reduction by Hand or Machine

Aggressive Reduction Techniques.

Mechanical Tree and Shrub Removal. Heavy machinery, such as feller-bunchers would be used to achieve target conditions near developed areas but would not be used in areas inhabited by valley elderberry longhorn beetles. Effects would be the same as under Alternative B—adverse, short-term, and minor.

Conventional Tree and Shrub Removal. After plant and fuel removal and reduction, cut and already down materials would be removed through skidding and grappling. Skidding would not be used in areas inhabited by valley elderberry longhorn beetles. Effects would be the same as in Alternative B—adverse, long-term, and negligible.

Passive Reduction and Lower Profile Techniques

Low-Impact Skidding. Would not be used in valley elderberry longhorn beetle habitat.

Hand Cutting. Effects and mitigation would be as in Alternative B. Overall, the reduction in fuels by hand cutting would help reduce the threat of catastrophic fire, which would help protect valley elderberry longhorn beetles and their host plants. Impact on valley elderberry longhorn beetles would be expected to be beneficial, long-term, and moderate.

Pile Burning. Cut materials would, in some cases, be piled and burned. Effects would be the same as described in Alternative B—adverse, short-term, and negligible.

Chipping. In some cases, cut materials would be chipped, when logistical, administrative, or ecological reasons made on-site burning unsuitable. Effects would be the same as described in Alternative B—adverse, long-term, and negligible.

Girdling. Effects of girdling trees would be the same as under Alternative B—beneficial, long-term, and negligible.

Cumulative Impacts

Specific past, present, and reasonably foreseeable projects that could adversely affect valley elderberry longhorn beetles in the vicinity of Yosemite National Park would be the same as in Alternative A. Impacts to valley elderberry longhorn beetle from present and reasonably foreseeable actions would be beneficial, long-term, and minor. Considered in combination with the effects of Alternative D, the cumulative impacts to valley elderberry longhorn beetle would be beneficial, long-term, and minor.

Conclusion

Impact of Alternative D on valley elderberry longhorn beetles would be expected to be beneficial, long-term, and minor due primarily to the reduction in the threat of catastrophic fire through an intensive program of prescribed fire and mechanical fuels management. See Appendix 9 for mitigation developed in consultation with USFWS.

California Red-Legged Frog (*Rana aurora draytonii*) - Federal Threatened

California red-legged frogs have disappeared from nearly the entire Sierra Nevada, including Yosemite National Park—only two populations are known to exist in the northern Sierra. The most significant cause of this decline is alteration and destruction of habitat from activities such as urban development, dams, sediment from roads and mines, grazing, and timber harvest. Pesticide contamination and non-native predators have also been implicated in the frog's demise. Predation by bullfrogs is thought to have caused the disappearance of red-legged frogs from Yosemite, where red-legged frogs were last seen in 1984. Recent surveys have found none (Knapp 2000). Red-legged frog habitat was identified through wildlife habitat relationships analysis (Mayer and Laudenslayer 1988).

Potential for Impacts from Catastrophic Fire

Same as Alternative B—beneficial, long-term, and negligible.

Fire Management Treatments

Managed Wildland Fire

Effects would be similar to those under Alternative B. Under Alternative D, managed wildland fire would have a minor, beneficial, long-term impact on California red-legged frog habitat by helping to restore the natural structure and fuel loading in riparian areas, and quickly reducing the threat of catastrophic fire.

Prescribed Fire
Same as Alternative B—beneficial, long-term, and minor.

Holding Action and Monitoring Effects (water and retardant drops, helispots, and spike camps) and Site Preparation Associated with Managed Wildland Fire and Prescribed Fire (hand line, snagging, mop-up)
Same as Alternative B—adverse, long-term, and minor. Mitigations would be the same as under Alternative A.

Fuel Reduction by Hand or Machine
Aggressive Reduction Techniques
Mechanical Tree and Shrub Removal. Under Alternative D, the use of feller bunchers and other heavy machinery would be used for achieving target conditions in inner wildland/urban interface areas through forest thinning. The effects on red-legged frog would be the same as described in Alternative B, beneficial, long-term, and negligible.

Conventional Tree and Shrub Removal. . Under Alternative D, cut and down materials would be removed from some treatment sites through the use of grappling and skidding equipment. Impact, however, would be negligible, because no red-legged frogs are known to occur in the park. The habitat would benefit from the reduction in fuel loading and restoration of a more natural forest structure. Impact of grappling and skidding on red-legged frogs under Alternative B would be beneficial, long-term, and negligible.

Passive Reduction and Lower Profile Techniques.
Low-Impact Skidding. Would not be used in red-legged frog habitat.

Hand Cutting. Same as Alternative B—beneficial, long-term, and minor.

Chipping. Same as Alternative B—negligible impacts.

Cumulative Impacts
The past, present, and reasonably foreseeable projects that would have a potential effect on red-legged frogs would be the same as in Alternative A. Beneficial impacts from present and reasonably foreseeable projects in combination with effects of Alternative D would result in beneficial, long-term, and minor cumulative impacts, due to implementation of land management plans that would protect habitat and species conservation plans that would protect the species.

Conclusion
Impact of Alternative D on California red-legged frogs would be beneficial, long-term, and minor, due primarily to a rapid reduction in the threat of catastrophic fire through liberal use of prescribed and wildland fires.

Bald Eagle *(Haliaeetus leucocephalus)* - Federal Threatened

Bald eagles are rare and transient in the Yosemite area, and while they have been seen in many areas of the park, they are most frequently seen near large rivers and lakes. Nesting by bald eagles is not known to occur in the park or El Portal. Fish are the primary prey of bald eagles in these areas, and large trees and snags for perching are important habitat components. Bald eagle habitat was identified through wildlife habitat relationships analysis (Mayer and Laudenslayer 1988).

Potential for Impacts from Catastrophic Fire

Impact of Alternative D would be similar to Alternative B—beneficial, long-term, and moderate.

Fire Management Treatments

Managed Wildland Fire

Similar effects as under Alternative B. Impact of managed wildland fire on bald eagles under Alternative D would be beneficial, long-term, and major, due to the relatively rapid rate at which the threat of catastrophic fire would be reduced.

Prescribed Fire

Same as Alternative B—beneficial, long-term, and major, due to the relatively rapid rate at which the threat of catastrophic fire would be reduced, and natural forest structure restored.

Holding Action and Monitoring Effects (water and retardant drops, helispots, and spike camps) and Site Preparation Associated with Managed Wildland Fire and Prescribed Fire (hand line, snagging, mop-up)

Same as Alternative B—adverse, short-term, and minor, primarily from actions that would potentially affect snags.

Fuel Reduction by Hand or Machine

Aggressive Reduction Techniques

Mechanical Tree and Shrub Removal. Use of tracked tree cutting machinery, such as feller-bunchers would be the method used for forest thinning in wildland/urban interface areas. Use of this technique would be restricted to areas of extreme stem density where no other tool was economically feasible. The effects would be the same as in Alternative B—negligible, adverse, long–term.

Conventional Tree and Shrub Removal. Impact of skidding and grappling on bald eagles under Alternative D would be the same as under Alternative B—beneficial, long-term, and negligible.

Passive Reduction and Lower Profile Techniques

Low-Impact Skidding. Effects from low-impact skidding would be similar to Alternative C but the techniques would be used to a smaller extent in Alternative D. Mitigations would be the same as well. These techniques are generally quieter, less intrusive then techniques described under Aggressive Reduction, above. Impacts associated with these techniques are minor, beneficial, and short- to long-term, if areas continue to be maintained with prescribed fire following initial thinning treatments.

Hand Cutting. Same as Alternative B—negligible, adverse, short-term.

Girdling. Same as Alternative B—negligible, beneficial and long-term.

Cumulative Impacts

Past, present, and reasonably foreseeable projects would be the same as under Alternative A. Impacts from these projects would be beneficial, long-term, and minor, based upon the continuing recovery of the species, and implementation of broad-ranging plans that would further benefit bald eagles. Considered in combination with the effects of Alternative D, cumulative impacts would be beneficial, long-term, and moderate.

Conclusion

Alternative D would have a moderate, beneficial, long-term effect on bald eagles, primarily from a rapid reduction in the threat of catastrophic fire that exists over much of their habitat.

Mountain Yellow-Legged Frog *(Rana muscosa)* - Under Review for Federal Listing

Potential for Impacts from Catastrophic Fire

Conditions would be the same as in Alternative A. Effects would be beneficial, short-term, and negligible, due to the gradual reduction in the risk of catastrophic fire.

Fire Management Treatments

Managed Wildland Fire
Same as Alternative B—beneficial, long-term, and minor.

Prescribed Fire
Same as Alternative B—beneficial, long-term, and minor.

Holding Action and Monitoring Effects (water and retardant drops, helispots, and spike camps) and Site Preparation Associated with Managed Wildland Fire and Prescribed Fire (hand line, snagging, mop-up)
Same as Alternative A—adverse, long-term, and minor, due primarily to the risk to remaining populations from water drops. Effects from water dipping and drops would be mitigated by avoiding dipping from waters containing mountain yellow-legged frogs or non-native fish and complying with established protocols to protect resources, identifying locations of sensitive resources to avoid impacts, and use of MIMT.

Fuel Reduction by Hand or Machine
Aggressive Reduction Techniques.
Mechanical Tree and Shrub Removal. Impacts would be adverse, short-term, and negligible but these techniques would not be used near mountain yellow-legged frog habitat.

Conventional Tree and Shrub Removal. These techniques would cause considerable ground disturbance, but would be unlikely to affect mountain yellow-legged frogs because they would not be used in wetland areas. Impact to mountain yellow-legged frogs from skidding and grappling under Alternative D would be adverse, short-term, and negligible.

Passive Reduction and Lower Profile Treatment.
Low-Impact Skidding. Would not be used in mountain yellow-legged frog habitat.

Hand Cutting. Same as Alternative A—no effect on mountain yellow-legged frogs.

Cumulative Impacts

Past, present, and reasonably foreseeable projects would be the same as in Alternative A. Impacts from these projects would be beneficial, long-term, and moderate, based primarily on active efforts to protect and restore the species, and the implementation of land management plans that would provide more ecosystem-based management of habitats. In combination with the effects of Alternative D, cumulative impacts would remain moderate, beneficial and long-term.

Conclusion

Impact to mountain yellow-legged frogs from Alternative D would be beneficial, long-term, and minor, due primarily to the return of a natural fire regime to the small area of habitat that has departed from a natural fire return interval.

Yosemite Toad (*Bufo canorus*) - Under Review for Federal Listing

Potential for Impacts from Catastrophic Fire

Same as Alternative B—beneficial, short-term, and negligible effects.

Fire Management Treatments

Managed Wildland Fire

Same as Alternative B—beneficial, long-term, and minor.

Prescribed Fire

Same as Alternative A—beneficial, long-term, and negligible.

Holding Action and Monitoring Effects (water and retardant drops, helispots, and spike camps) and Site Preparation Associated with Managed Wildland Fire and Prescribed Fire (hand line, snagging, mop-up)

Overall impact of prescribed and wildland fire management actions on toads under Alternative D would be the same as in Alternative B—adverse, long-term, and minor, due primarily to the risk to remaining populations from water drops and retardant contamination. Mitigation: Identify locations of Yosemite toad and mountain yellow-legged frog populations and avoid involvement of these areas in water and retardant drops.

Fuel Reduction by Hand or Machine

Aggressive Reduction Techniques. These techniques would not be used in Yosemite toad habitat.

Passive Reduction and Lower Profile Techniques.
Low-Impact Skidding. Would not be used in toad habitat.

Hand Cutting. Same as Alternative A—beneficial, long-term, and negligible.

Cumulative Impacts

Past, present, and reasonably foreseeable projects would be the same as under Alternative A. Impacts on Yosemite toad from these projects would be beneficial, long-term, and moderate, based primarily on active efforts to protect and restore the species, and the implementation of land management plans that would provide more ecosystem-based habitat management. Considered in combination with the impacts of Alternative D, cumulative impacts would be beneficial, long-term, and moderate.

Conclusion

Impact to Yosemite toads from Alternative D would be beneficial, long-term, and minor due primarily to the return of a natural fire regime to the area of habitat that has departed from a natural fire return interval, although the wet habitats of Yosemite toads would be unlikely to be directly affected.

California Spotted Owl (Strix occidentalis occidentalis)

California spotted owls are found throughout the Sierra Nevada, from lower elevation oak and ponderosa pine forests up to 7,600 feet elevation red fir forests. There are approximately 100 known and probable spotted owl sites in Yosemite National Park. While spotted owls can coexist with extensive fires of varying intensities within their habitats, severe wildland fire in mixed-conifer forests may represent the greatest threat to existing spotted owl habitat in Yosemite (Weatherspoon et al. 1992). California spotted owl habitat was identified through wildlife habitat relationships analysis (Mayer and Laudenslayer 1988).

Potential for Impacts from Catastrophic Fire

Effects would be similar to those described under Alternative B. Under Alternative D, these conditions would be rapidly reduced through prescribed and managed wildland fire, with a goal of reaching target conditions within 15 to 20 years. Effects of Alternative D in regards to catastrophic fire and California spotted owls would be beneficial, long-term, and moderate.

Fire Management Treatments

Managed Wildland Fire

Effects would be similar to those described in Alternative A, except under Alternative D, managed wildland fire would increase. Adverse effects from wildland fire could be minimized through reduction of fuel loading in known spotted owl nesting and roosting areas through the use of spring prescribed fires, which would disrupt fuel continuity and reduce the chance of stand-replacing fires in these areas (Weatherspoon et al. 1992).

The impact of managed wildland fire on California spotted owls under Alternative D would be beneficial, long-term, and moderate to major, based upon the mitigation of the threat of catastrophic fire, primarily through the use of managed wildland fire, over a 15 – 20-year period.

Prescribed Fire

The use of prescribed fire under Alternative D would be the same as in Alternative B, and would have moderate to major, beneficial, long-term impact on California spotted owls, primarily through the reduction in the threat of catastrophic fire and the restoration of a more natural forest structure over a 15 – 20-year period. Reduction of fuels in spotted owl roosting and nesting habitat through low-intensity burns or mechanical thinning at appropriate times of the year would minimize adverse impacts.

Holding Action and Monitoring Effects (water and retardant drops, helispots, and spike camps) and Site Preparation Associated with Managed Wildland Fire and Prescribed Fire (hand line, snagging, mop-up)

Same as Alternative A. Overall, actions taken to manage wildland and prescribed fire under Alternative D would have a minor, adverse, long-term effect on spotted owls through possible disturbance and habitat alteration in roosting and nesting sites. Such impacts would be mitigated by locating all spotted owl sites in a treatment area and avoiding impacts to them.

Fuel Reduction by Hand or Machine
Aggressive Reduction Techniques
Mechanical Tree and Shrub Removal. Under Alternative D, forests in wildland/urban interface areas and along road and utility corridors would be thinned and biomass would be reduced. The reduction in canopy cover and number of snags would affect the quality of these areas to spotted owls but these effects are small areas in relation to the park landscape. Effects of biomass removal on spotted owls under Alternative D would be the same as in Alternative B, with adverse, long-term, and minor impacts.

Conventional Tree and Shrub Removal. This technique utilizes tracked and rubber tired equipment to remove fresh cut and down and dead material from inner wildland/urban interface areas. Adverse effects on spotted owls would occur if many large, downed logs were removed from the forest, because this could result in a decrease in northern flying squirrel, an important prey of spotted owls. This is offset by the small area that work is performed and the benefits that result from reducing the risk of high intensity fire in developed areas. The impacts are minor, adverse and long-term.

Passive Reduction and Lower Profile Techniques.
Hand Cutting. Same as Alternative B. Impact of hand Cutting and burning on California spotted owls under Alternative D would be beneficial, long-term, and minor, based upon possible return of treated areas to a more natural forest structure.

Chipping. Same as Alternative B, the equipment used to chip material is extremely loud, and would potentially cause disturbance of any nearby spotted owls. Such impact, however, would be adverse, short-term, and negligible.

Girdling. Same as Alternative B, adverse effect if the snags were removed while the owls are using them.

Cumulative Impacts

Past, present, and reasonably foreseeable projects would be the same as described in Alternative A. Impacts from present and reasonably foreseeable projects would be beneficial, long-term, and moderate. Considered in combination with the effects of Alternative D, cumulative impacts would be beneficial, long-term, and moderate to major.

Conclusion

Alternative D would have moderate to major, beneficial, long-term impact on spotted owls from a rapid reduction in the threat of catastrophic fire and restoration of natural fire structure through liberal use of wildland and prescribed fire. Care, however, would have to be taken with fuels management in spotted owl roosting and nesting habitat to minimize adverse impacts. This would require extensive knowledge of the occurrence of spotted owls in the park.

Pacific Fisher *(Martes pennanti)* - Under Review for Federal Listing

Potential for Impacts from Catastrophic Fire

As in Alternative B, under Alternative D the potential for high-intensity fire would be reduced through the liberal application of managed wildland and prescribed fire to reduce critical fuel loading, restore natural forest structure over a 15 – 20-year period, and maintain a natural fire regime. Impact of Alternative D from the threat or effects of catastrophic fire would be beneficial, long-term, and major.

Fire Management Treatments

Managed Wildland Fire

Effects would be similar to Alternative B. Under Alternative D, managed wildland fire would have a moderate to moderate to major, beneficial, long-term effect on fishers.

Prescribed Fire

Use of prescribed fire would greatly increase under Alternative D, with effects similar to Alternative B, but fewer acres would be treated. Impact of prescribed fire on fishers under Alternative D would be beneficial, long-term, and moderate to major, based upon a rapid reduction in the threat of catastrophic fire, and restoration of a more natural forest structure. Care, however, must be taken to preserve habitat features that are important to fishers.

Holding Action and Monitoring Effects (water and retardant drops, helispots, and spike camps) and Site Preparation Associated with Managed Wildland Fire and Prescribed Fire (hand line, snagging, mop-up)

Same as Alternative A. In total, actions taken to manage wildland and prescribed fire under Alternative D would have a minor, adverse, long-term effect on fishers, primarily from possible reduction in the number of snags.

Fuel Reduction by Hand or Machine

Aggressive Reduction Techniques.

Mechanical Tree and Shrub Removal. Same effects as in Alternative B. Biomass removal under Alternative D would have adverse, long-term, and minor effects on fishers.

Conventional Tree and Shrub Removal. The use of skidding and grappling machinery to remove large, woody debris would have an adverse effect on fishers by reducing habitat complexity; especially from the loss of large, down trees. There would also be a reduction in the threat of catastrophic fire from the resulting fuel reduction. Because the areas where this treatment is proposed in not suitable habitat due to human development the impacts would be adverse, long-term, and negligible.

Passive Reduction and Lower Profile techniques.

Low-Impact Skidding. These techniques are generally quieter, less intrusive then techniques described under Aggressive Reduction. Impacts would be similar to Alternative C yet these techniques would be used less often in this alternative. Impacts to fishers associated with these techniques are minor, beneficial, and short- to long-term, if areas continue to be maintained with prescribed fire following initial thinning treatments.

Hand Cutting. Same as Alternative A—adverse, long-term, and negligible.

Cumulative Impacts

Past, present, and reasonably foreseeable projects would be the same as in Alternative A. Impacts of reasonably foreseeable actions would be, beneficial, long-term, and moderate for Pacific fishers. Considered in combination with the impacts of Alternative D, the cumulative impact would be moderate to beneficial, long-term, and major.

Conclusion

Overall, Alternative D would have a moderate to major, beneficial, long-term effect on Pacific fishers by reducing the threat of catastrophic fire and restoring natural forest structure through the use of wildland and prescribed fires, especially in the southwest part of the park where fisher densities are believed to be highest, and fuel loading has reached critical levels. Fuel-reduction actions, however, would take into account preservation of habitat features that are important to fishers, such as snags and large down woody debris.

Great Gray Owl *(Strix nebulosa)* – California Endangered

Potential for Impacts from Catastrophic Fire

Effects would be similar to those in Alternative B. Through the use of prescribed and wildland fires, the treatment of accumulated fuels under Alternative D would reduce the threat of catastrophic fire over a 15 – 20-year period. The impact of Alternative D would be beneficial, long-term, and moderate, given the substantial portion of great gray owl habitat over which threat of catastrophic fire would be reduced.

Fire Management Treatments

Managed Wildland Fire

Effects would be similar to those in Alternative A, except under Alternative D managed wildland fire would be greatly increase. The effect of managed wildland fire on great gray owls under Alternative D would be beneficial, long-term, and moderate to major, based upon the amount of managed wildland fire that would occur, the large amount of great gray owl habitat that has deviated from the median fire return interval, and the treatment of this habitat that would occur.

Prescribed Fire

Effects would be similar to those described in Alternative B. Under Alternative D, use of prescribed fire would be substantial, and concentrate on areas that have most severely deviated from the natural fire cycle. Impact of prescribed fire on great gray owls under Alternative D would be beneficial, long-term, and moderate to major, based upon the improvement of habitat, and the reduction in the threat of catastrophic fire that would occur. Prescriptions for fires in great gray owl habitat must take into consideration the preservation of large, old snags that are important to the owls.

Holding Action and Monitoring Effects (water and retardant drops, helispots, and spike camps) and Site Preparation Associated with Managed Wildland Fire and Prescribed Fire (hand line, snagging, mop-up)

Same as in Alternative B. Overall, actions taken to manage wildland and prescribed fires would have a minor, adverse, long-term effect on great gray owls under Alternative D. This is primarily based upon possible impacts associated with snag removal, which would be mitigated to protect the owls through avoidance of snags used by great gray owls the extent possible.

Fuel Reduction by Hand or Machine

Aggressive Reduction Techniques

Mechanical Tree and Shrub Removal. The effects would be similar to those described under Alternative B although these techniques would be used less. Impacts would be adverse, short-term, and minor and would be mitigated to the extent possible through avoidance of great gray owl habitat, especially nesting snags.

Conventional Tree and Shrub Removal. The use of skidding and grappling equipment to reduce fuel loading would have an adverse effect on great gray owls if it were to occur in nesting and foraging habitat, where disturbance could cause reproductive failure. Before such operations were undertaken in potential great gray owl habitat, it would be necessary to determine if the owls are present. The potential for adverse effects on great gray owls would be most likely at Crane Flat, Hodgdon Meadow, Wawona Meadow, and along Glacier Point Road, where the species is known to occur. Given that these activities occur in relatively small areas in relation to great gray owl habitat, they would be somewhat minor. Impact to great gray owls from thinning by heavy machinery would be adverse, short-term, and minor if inhabited areas were avoided.

Passive Reduction and Lower Profile Techniques

Low-Impact Skidding. Effects would be similar to those described in Alternative C but in Alternative D the techniques would be used in conjunction with large machinery. As the areas for this proposal are limited to wildland/urban interface areas and road and utility corridors, the overall impact would be minor. The impacts from low-impact skidding would be adverse, short-term, and minor.

Hand Cutting. Effects would be similar to those in Alternative A, but would be in combination with other biomass removal activities. Impact of hand thinning on great gray owls under Alternative D would be adverse, long-term, and minor, based upon potential disturbance of hunting and nesting owls, and reduction in snag density.

Chipping. Same as Alternative A—adverse, short-term, and minor.

Girdling. Girdling would be used as a tool for maintaining snag density resulting in, beneficial, long-term, and minor to moderate impacts.

Cumulative Impacts

Past, present, and reasonably foreseeable projects that would affect great gray owls would be the same as in Alternative A. The effects of present and reasonably foreseeable projects would be beneficial, long-term, and moderate. Considered in combination with the effects of Alternative D, cumulative impacts would be beneficial, long-term, and moderate.

Conclusion

The impact of Alternative D on great gray owls would be beneficial, long-term, and moderate, based primarily on a reduction in the threat of catastrophic fire. Actions taken to manage wildland and prescribed fires, and mechanically manage fuels would have localized adverse effects on great gray owls if they reduced snag density or caused disturbance of nesting or hunting owls.

Willow Flycatcher *(Empidonax trailii)* – California Endangered

Potential for Impacts from Catastrophic Fire

Impacts would be similar to Alternative B. The risk of catastrophic fire would be reduced under Alternative D through the widespread use of wildland and prescribed fires over a 15 – 20-year period. Impact of Alternative D from the threat or effects of catastrophic fire would be beneficial, long-term, and minor, because of the inherent low fire frequency and intensity associated with meadow habitats.

Fire Management Treatments

Managed Wildland Fire

Same as Alternative B—minor, beneficial, long-term impact on willow flycatchers from reduction in the threat of catastrophic fire, and the return of fire to its role in maintenance of willow habitat. Fires that occur in habitat occupied by willow flycatchers would be managed to consider possible adverse effects associated with accumulation of fuels; steps would be taken to mitigate these effects. In meadows known to be occupied by willow flycatchers, protection measures will be taken to protect individual nests and local habitat, while also reducing the amount of decayed and decadent grown of willows in the immediate area. Re-ignitions would be timed to occur outside of nesting season.

Prescribed Fire

Effects would be similar to those of Alternative A, but the amount of prescribed fire activity would be greater. Impact of prescribed fire on willow flycatchers under Alternative D would be beneficial, long-term, and minor to moderate, due to the reduction in the threat of catastrophic fire and the regeneration of lightly singed or burned willows following prescribed burning. Prescribed fires likely to affect meadow habitats known to be occupied by willow flycatchers should be evaluated for potential adverse effects and managed to minimize impacts. Burning at specific sites would not occur during the period of nesting and fledging (May – September), and willows would be protected from intense fires by clearing dead and decadent fuels from around and within willow shrubs. If possible, meadow habitats with recent flycatcher nests would be burned in stages, so not all potential nest shrubs would be damaged at once. Surveys would be conducted to locate willow flycatchers in the park, so appropriate fire management actions can be taken.

Holding Action and Monitoring Effects (water and retardant drops, helispots, and spike camps) and Site Preparation Associated with Managed Wildland Fire and Prescribed Fire (hand line, snagging, mop-up)

Same as Alternative A—adverse, minor, and short-term effect on willow flycatchers, mostly from potential impacts of conducting helicopter operations out of Wawona Meadow.

Fuel Reduction by Hand or Machine

Aggressive Reduction Techniques

Mechanical Tree and Shrub Removal. Same as Alternative B—adverse, short-term, and negligible.

Conventional Tree and Shrub Removal. Effects would be similar to Alternative B. Impact of on willow flycatchers under Alternative C would be adverse, short-term, and negligible

Passive Reduction and Lower Profile Techniques

Low-Impact Skidding. Would not be used in willow flycatcher habitat.

Hand Cutting. Same as Alternative A. Hand thinning would have a negligible effect on willow flycatchers, because these operations would not usually occur in meadow habitats, where large fuels are already sparse, and the moist conditions would typically not carry fire.

Chipping. Chipping would occur, but well away from willow flycatcher habitat.

Cumulative Impacts

Past, present, and reasonably foreseeable projects would be the same as in Alternative A. In aggregate the effects of reasonably foreseeable future actions would be minor, beneficial and long-term. Other foreseeable projects with adverse impacts would affect small areas and/or have minor effects over larger areas. The *Yosemite Fire Management Plan* under Alternative D would affect habitats influenced by years of fire suppression by reducing the risk of catastrophic fire in some areas. Considered in combination with the effects of Alternative D, the cumulative impacts would be beneficial, long-term, and minor.

Considered in combination with these effects, the impact of Alternative D would remain beneficial, long-term, and minor.

Conclusion

The impact of Alternative D on willow flycatchers would be beneficial, long-term, and moderate based primarily upon rapid reduction of the threat of catastrophic fire in some habitats through use of wildland and prescribed fires. These techniques, however, must be carefully applied to avoid adverse impacts on the few remaining willow flycatchers remaining in Yosemite.

Summary Conclusion, Special-Status Species – Animals

In almost all cases, the greatest threat to special-status species would be through catastrophic fire. This alternative would reduce the potential of catastrophic fire, compared to Alternative A. Mitigations and special measures, as identified, would be applied to limit impacts. There would be no impairment from the effects of this alternative. See Appendix 9 for mitigation developed in consultation with USFWS.

Physical Environment

Watersheds, Soils, and Water Quality

In the action alternatives, the majority of the park (621,059 acres) would be in the Fire Use Unit where natural processes would be at the core of the fire management program. Approximately 25% of the Merced River watershed and 19% of the Tuolumne River watershed show moderate to high departures from median fire return intervals. These are the areas with the greatest potential for catastrophic fire and thus the areas where ecosystem restoration and fuel reduction treatment may be needed to restore the natural fire regime and provide protection to people and developed areas. The Suppression Unit would comprise 76,664 acres of the Merced River watershed and 51,379 of the Tuolumne River watershed. Prescribed fire units, some of which are in the Fire Use Unit, would include 77,154 acres in the Merced River watershed and 79,094 acres in the Tuolumne River watershed.

Potential for Impacts from Catastrophic Fire

Because of aggressive actions that would be used in the burn units to reduce fuels, there is the potential for creating strategically located burns to break up the continuity of fuels and vegetation along the vertical gradients within the watersheds. These burned areas would not eliminate the potential for high-severity fires in the watershed, but they would reduce the potential for large fires burning from ridges, down through mid-slopes, and into bottom-slopes and riparian areas over large areas of a watershed. This strategy would reduce the potential for large, high-severity fires during the life of the plan.

Areas of hydrophobic soils would likely be created from unwanted fire, but with breaks in the vertical gradient, smaller increases in water yield and peak flows would result, compared to Alternative A. Likewise, the increase in sediment and nutrient yields would be less than in Alternative A, because of the smaller amounts of intrusion by fire into the lower slopes of the watershed. Fire intrusion could destabilize banks and channel margins, but the effects would be localized and less than under Alternative A. Stream channel response would not be as severe either and a quick recovery of riparian vegetation would stabilize stream systems. This would benefit water quality. The potential would continue to exist for high-severity fires with adverse, moderate, and potentially long-term effects, however, the overall effects of Alternative D on soil and watershed conditions in regards to catastrophic fire would be beneficial, long-term, and moderate.

Fire Management Treatments

Managed Wildland Fire

Fire in the duff layers would continue to spread within watersheds under variable conditions, ranging from generally light to locally severe, creating small patches of extremely hydrophobic soils. In areas of high fuel loading, soils would be exposed to longer resident time and higher temperature than would occur within the natural range of variability. Fire effects would not typically be on a watershed-wide scale as fire would typically burn along ridge tops and upper slopes, with only partial intrusion into slope bottoms and riparian areas. Water yield and peak flows would increase only slightly, over the short-term, and within a small range of variability, thus sediment and nutrient yield would generally only see short-term fluctuations. As a result, there would be negligible channel widening, with short-term recovery of riparian systems. Overall, the soil and watershed effects would be beneficial, short-term, and moderate, as in Alternative A.

Re-ignition clause. The effects under the re-ignition clause would be the same as described under managed wildland fire.

Holding Action and Monitoring Effects (water and retardant drops, helispots, and spike camps). Same as Alternative B—adverse, short-term, and negligible to minor.

Prescribed Fire

Prescribed fire would typically be used in areas that have missed three or more fires and in Special Management Areas. The total acreage in prescribed fire units is 77,154 acres in the Merced River watershed and 79,094 acres in the Tuolumne River watershed. This alternative would result in a more aggressive program of prescribed fire use (1,817 to 9,194 acres burned per year), but this would also accompany similarly aggressive actions to restore plant community structure through mechanical and hand thinning. Due to the controlled conditions of prescribed fire (fuel moisture, weather conditions, time of day, spatial pattern of ignition, and other factors), small scale effects of projects would be similar to those under Alternative A. However, because of the greater number of acres being treated through prescribed fire, Alternative D would reduce the potential for large, high-severity fires on a watershed scale. Burns would reduce the continuity of fuels on the vertical gradient in more areas throughout the watershed, compared to that of Alternative A. Fire in the duff layers would spread under variable conditions, but not with enough severity to cause extensive areas of hydrophobic soil. Consequently, wildland fire would have less of an effect on water yield, peak flows, sediment yield, and nutrient yield in this alternative than under Alternative A. Because of these treatments, the effects of prescribed fire on watershed conditions would be beneficial, long-term, and major.

Site Preparation Associated with Managed Wildland Fire and Prescribed Fire (hand line, snagging, mop-up)

These activities would have the potential to increase soil erosion, because vegetation and organic litter would be removed in order to stop or hold a fire. Erosion would be greatest along hand line that follows steep gradients. Both hand line and mop-up would cause some soil compaction and disturbance. Waterbars and check dams would be used to mitigate runoff and erosion. Downed snags would make locally heavy areas of fuel and would affect water temperature and residence time on very small scales. These actions potentially would be more widespread than under Alternative A, due to the increased use of prescribed fire. Impacts to soils and watersheds would be the same as in Alternative A—adverse, short-term, and minor.

Fuel Reduction by Hand or Machine

Aggressive Reduction Techniques.

Mechanical Tree and Shrub Removal. These activities would occur primarily around the inner wildland/urban interface, in areas where plant community structure has been altered because of the absence of fire. Of the approximately 1,100 acres of wildland/urban interface treated per year in this alternative, about half is slated for mechanical thinning. These activities generally would be followed by prescribed fire, as discussed above. The extensive use of tracked machinery in small areas would cause soil compaction. Second entries into WUI areas, to remove trees up to 20 inches in diameter if prescribed fire has failed to achieve desired results, could result in long-term compaction, unless mitigations are effectively utilized. Mitigation would include running the machinery over snow, frozen soil, or a bed of crushed vegetation. While aggressive reduction techniques would reduce the potential for high-severity fire, the impacts on soils would be adverse, long-term, and minor. Limiting activities within 150 feet of a stream to less than 5% of the total area should buffer the effects of ground disturbance on the aquatic community. In combination with the prescribed burn program, the effects of mechanical treatment, in terms of reducing the potential for watershed impacts (on water yield, peak flow, sediment yield, nutrient yield and stream system response) of large, high-severity fire over the long-term, would be beneficial and major

Conventional Tree and Shrub Removal. Skidding would be used in parts of the wildland/urban interface. The extensive use of tracked or rubber tired machinery in small areas would cause soil compaction. Second entries into WUI areas, to remove trees up to 20 inches in diameter if prescribed fire has failed to achieve desired results, could result in long-term compaction, unless mitigations are effectively utilized. Mitigation would include running the machinery over snow, frozen soil, or a bed of crushed vegetation. These activities and equipment-use combinations could disrupt the duff and topsoil layers, causing erosion and increasing sediment and nutrient yield, as well as affecting water quality. However, treatment areas would not combine ridges, mid-slopes, and bottom-slopes, thus these mitigating effects to adverse, short-term, and minor for watersheds. The impacts on soil would be adverse, long-term, and minor to moderate.

Passive Reduction and Lower Profile Techniques.

Low-Impact Skidding. This would include the use of draft animals and four wheel, all-terrain vehicles, in combination with fetching arches, to skid trees of approximately 10-20”dbh. In Alternative D, this technique would be used on a limited basis, in sensitive areas where use of heavy equipment was deemed inappropriate. Knobby tires and the feet of draft animals would have only negligible local effects on topsoil and duff layers. The most significant effect, from dragging one end of the tree, would be a skid trench typically less than a foot wide and a few inches deep. In most locations, this scarification could be raked out with hand tools, to limit the amount of soil erosion, and thus limit the effect upon sediment and nutrient yield in the watershed. Waterbars would be built if needed. Other mitigation, when needed, could include running the machinery over snow, frozen soil, or a bed of crushed vegetation. Second entries into WUI areas, to remove trees up to 20 inches in diameter if prescribed fire has failed to achieve desired results, could result in long-term compaction, unless mitigations are effectively utilized. Some projects would be extensive enough that effects might be potentially greater than localized, but they would not typically occur on ridge, mid-slope, and bottom-slope combinations, thus effects of use would be adverse, short-term and minor for watersheds and soils.

Hand Cutting. These activities would be used in the Fire Use Unit and in some areas of the Suppression Unit and Special Management Areas. Because the work is labor-intensive, about 100 acres would be treated per year, although the amount would depend on how much was treated by other methods. Hand cutting activities would likely lead to soil compaction in small areas, but would have a negligible effect on duff and topsoil layers, resulting in negligible direct impacts upon watershed characteristics, including water yield, peak flows, sediment yield, nutrient yield, and stream system response. However, because of the small number of acres treated annually, the potential for large, high severity fires would remain high. Thus, the effects of hand thinning would be beneficial and potentially long-term, and minor.

Pile burning. Piles would burn under variable conditions, ranging from light to locally severe, creating only patches of extremely hydrophobic soils. These patches would be expected to have altered biological and physical characteristics. Because of the small size of the areas, the biological function would return very quickly. The impact of pile burning on soils would be adverse, short-term, and minor. Overall, the watershed effects within these areas would be beneficial, short-term, and minor to moderate. The effects would not be on a watershed-wide scale; projects would be limited in scale, with boundaries typically associated with only one portion of the slope (top, mid-slope, or bottom). Water yield and peak flows would increase only slightly, and within a small range of variability, thus sediment and nutrient yield would only see short-term fluctuations. As a result, there would be negligible channel response, with short-term effects, if any, in riparian systems. Compared to Alternative A, due to the increase in area treated, the impact of pile burning on soils would be adverse, short-term, and minor to moderate. Overall, the watershed effects within these areas would be beneficial, short-term, and minor to moderate.

Chipping. Chipping would be used to reduce fuels, promote nutrient cycling, and achieve air quality objectives. Fire in chipped fuels would be generally light to moderate in intensity and would be used in project areas with boundaries that would not be of watershed or landscape scale. Effects of chipping in this alternative would be beneficial, short-term, and minor or moderate. Chips would be applied up to 1” deep. This mitigation would make the effects of chipping on soils adverse, short-term, and negligible to minor.

Girdling. The intensive nature of the work necessary to complete this action would lead to soil compaction and disturbance in small areas. Girdling would have an adverse, short-term, and negligible to minor effect on soils, watersheds, and water quality.

Cumulative Impacts

The past, present and reasonably foreseeable projects effecting the Merced and Tuolumne River watersheds would be the same as discussed under Alternative A. While the actions would reduce the potential for high severity fire, the impact on soils would be adverse. These actions would have net beneficial impacts on watershed values through either reducing the potential for high severity fire, or through reduction of watershed effects caused by restoration activities.

The cumulative effects of Alternative D, when considered in combination with the minor to moderately beneficial impacts of projects on lands administered by other agencies in the upper Tuolumne and Merced watersheds, would be beneficial, long-term, and moderate to major.

Conclusion

When looked at as a group, the actions of Alternative D would have beneficial, long-term, and major effects to watersheds, soils, and water quality. This is based upon a combination of beneficial, long-term, moderate to major impacts in Fire Use Units and the potential for areas of beneficial, long-term, and major impacts in Suppression Units. High-severity fires would likely occur during the life of the plan, but the treatments proposed would reduce the size and effects upon soils and watersheds, including the potential for adverse effects upon water yield, peak flow, nutrient yield, sediment yield, and stream system response. The potential for catastrophic fire would still exist, but the intent of the alternative would be to reduce the risk, thus there would be no impairment from the effects of Alternative D.

Air Quality

Emissions

Wildland and Prescribed Fire Emissions

Air emissions associated with the projected burning actions for Alternative D were estimated using the FOFEM model (see Methodology above). The results are summarized and compared to Alternative A in table IV-17. Separate estimates were made for the years 2003 to 2009 to analyze the trends in impacts over the years.

Prescribed Fire Summary. To compare the estimated emissions from the various alternatives, the emissions from prescribed burns were averaged for the 7-year period that was modeled, and these data are provided in table IV-18.

Table IV-17
Projected Air Emissions Associated with Various Fire Types in Yosemite National Park Under Alternative D (Alternative A emissions for comparison)

Alternative A (1991-2000 average)							
Fire Type	Acres	Fire Emissions (tons/yr) [a]					
		PM_{10}	$PM_{2.5}$	VOC	CO	NO_X	CO_2
Prescribed Burns [b]	1,495	1,087	917	719	12,945	370	58,557
Managed Wildland Fire [b]	2,152	1,564	1,321	1,034	18,637	532	84,305
Wildfire	5,759	6,920	5,864	3,529	76,930	2,198	387,446
Total	9,406	9,571	8,103	5,282	108,512	3,100	530,308

a PM_{10} = Suspended Particulate, $PM_{2.5}$ = Fine Particulate Matter, VOC = volatile organic compounds, CO = Carbon Monoxide, NOx = Nitrogen Oxides, CO_2 = Carbon Dioxide

b Based on composite emission factor for prescribed burning

Alternative D – 2003							
Fire Type	Acres	Fire Emissions (tons/yr) [a]					
		PM_{10}	$PM_{2.5}$	VOC	CO	NO_X	CO_2
Prescribed Burns [b]	9,835	7,143	6,053	3,656	79,876	2,282	373,988
Managed Wildland Fire [b]	6,832	4,967	4,194	3,285	59,180	1,691	267,698
Wildfire	5,759	6,920	5,864	3,529	76,930	2,198	387,446
Total	**22,426**	**19,030**	**16,111**	**10,470**	**215,986**	**6,171**	**1,029,132**

Alternative D – 2004							
Fire Type	Acres	Fire Emissions (tons/yr) [a]					
		PM_{10}	$PM_{2.5}$	VOC	CO	NO_X	CO_2
Prescribed Burns [b]	5,721	5,672	4,807	2,907	63,563	1,816	289,659
Managed Wildland Fire [b]	6,832	4,967	4,194	3,285	59,180	1,691	267,698
Wildfire	5,759	6,920	5,864	3,529	76,930	2,198	387,446
Total	**18,312**	**17,559**	**14,865**	**9,721**	**199,673**	**5,705**	**944,803**

Alternative D – 2005							
Fire Type	Acres	Fire Emissions (tons/yr) [a]					
		PM_{10}	$PM_{2.5}$	VOC	CO	NO_X	CO_2
Prescribed Burns [b]	9,366	11,797	9,996	6,030	131,669	3,762	631,073
Managed Wildland Fire [b]	6,832	4,967	4,194	3,285	59,180	1,691	267,698
Wildfire	5,759	6,920	5,864	3,529	76,930	2,198	387,446
Total	**21,957**	**23,684**	**20,054**	**12,844**	**267,779**	**7,651**	**1,286,217**

Alternative D – 2006							
Fire Type	Acres	Fire Emissions (tons/yr) [a]					
		PM_{10}	$PM_{2.5}$	VOC	CO	NO_X	CO_2
Prescribed Burns [b]	4,974	4,364	3,698	2,236	48,888	1,397	223,484
Managed Wildland Fire [b]	6,832	4,967	4,194	3,285	59,180	1,691	267,698
Wildfire	5,759	6,920	5,864	3,529	76,930	2,198	387,446
Total	**17,565**	**16,251**	**13,756**	**9,050**	**184,998**	**5,286**	**878,628**

Alternative D – 2007							
Fire Type	Acres	Fire Emissions (tons/yr) [a]					
		PM_{10}	$PM_{2.5}$	VOC	CO	NO_X	CO_2
Prescribed Burns [b]	9,653	6,470	5,483	3,308	72,221	2,063	346,492
Managed Wildland Fire [b]	6,832	4,967	4,194	3,285	59,180	1,691	267,698
Wildfire	5,759	6,920	5,864	3,529	76,930	2,198	387,446
Total	**22,244**	**18,357**	**15,541**	**10,122**	**208,331**	**5,952**	**1,001,636**

Alternative D – 2008							
Fire Type	Acres	Fire Emissions (tons/yr) [a]					
		PM_{10}	$PM_{2.5}$	VOC	CO	NO_X	CO_2
Prescribed Burns [b]	17,045	7,748	6,566	3,969	86.805	2,480	396,896
Managed Wildland Fire [b]	6,832	4,967	4,194	3,285	59,180	1,691	267,698
Wildfire	5,759	6,920	5,864	3,529	76,930	2,198	387,446
Total	**29,636**	**19,635**	**16,624**	**10,783**	**222,915**	**6,369**	**1,052,040**

Alternative D – 2009							
Fire Type	Acres	Fire Emissions (tons/yr)[a]					
		PM_{10}	$PM_{2.5}$	VOC	CO	NO_X	CO_2
Prescribed Burns [b]	11,743	10,889	9,165	8,655	136,485	3,900	625,037
Managed Wildland Fire [b]	6,832	4,967	4,194	3,285	59,180	1,691	267,698
Wildfire	5,759	6,920	5,864	3,529	76,930	2,198	387,446
Total	**24,334**	**22,776**	**19,223**	**15,469**	**272,595**	**7,789**	**1,280,181**

a PM_{10} = Suspended Particulate, $PM_{2.5}$ = Fine Particulate Matter, VOC = volatile organic compounds (as methane), CO = Carbon Monoxide, NOx = Nitrogen Oxides, CO_2 = Carbon Dioxide
b Based on composite emission factor for prescribed burning

Table IV-18
Average Prescribed Burn Estimated Emissions for Alternative D for the years 2003 – 2009

Alternative D						
	Acres Burned	Emissions (tons/year) [a]				
		PM_{10}	$PM_{2.5}$	VOC	CO	CO_2
Historical Average	1,495	1,087	917	719	12,945	58,557
Alternative D Average	9,762	7,726	6,538	4,394	88,501	412,376
Potential Increase in Alternative D	**8,267**	**6,639**	**5,621**	**3,675**	**75,556**	**353,819**

a PM_{10} = Suspended Particulate, $PM_{2.5}$ = Fine Particulate Matter, VOC = volatile organic compounds, CO = Carbon Monoxide, NOx = Nitrogen Oxides, CO_2 = Carbon Dioxide

Mechanical Thinning Emissions

Air emissions would be generated by motorized equipment used to reduce fuels and restore ecosystems. Equipment would include chainsaws, chippers, feller/bunchers, skidders, ATVs, and haul trucks. Emissions from the operation of these machines have been figured based on estimated operating hours by park personnel clearing an average of 1,100 acres per year, which is about ten times the existing annual average for machine use. The *Final Yosemite Fire Management Plan/EIS* would result in a smaller tree size thinned in WUI than was considered in the *Draft Yosemite Fire Management Plan/EIS*. Actual operating hours would potentially be less, but because of the possibility of second entry, the analysis in the Draft was retained as a worst-case analysis.

Estimated air emissions are summarized in table IV-19. Emissions from machines would be minor compared to fire emissions.

Table IV-19
Air Emissions Associated with Mechanical Thinning Activities

Alternative D							
Equipment	**Operating Hours**	**Motorized Equipment Emissions (tons/yr)** [a]					
		PM_{10}	**$PM_{2.5}$**	**VOC**	**CO**	**NO_x**	**CO_2** [b]
Chainsaws	11,312	0.29	0.29	5.97	19.37	0.07	ND
Chippers	2,155	0.46	0.46	0.20	28.80	0.02	ND
Feller-Bunchers	259	0.07	0.07	0.12	0.57	0.38	ND
Skidders	259	0.07	0.07	0.12	0.57	0.38	ND
Haul Trucks	777	0.22	0.22	0.37	1.70	1.14	ND
ATV Skidders	150	0.0	0.0	0.03	2.29	0.02	ND
Total		**1.11**	**1.11**	**6.81**	**53.30**	**2.01**	**ND**

a PM_{10} = Suspended Particulate, $PM_{2.5}$ = Fine Particulate Matter, VOC = volatile organic compounds as methane, CO = Carbon Monoxide, NOx = Nitrogen Oxides, CO_2 = Carbon Dioxide
b No data

Mitigation Measures

Under Alternative D, mitigation measures, including use of the *Smoke Communications Strategy*, would be the same as those for Alternative B.

Agency Coordination

Agency coordination for Alternative D would be the same as Alternative B.

Cumulative Impacts

Past, present, and reasonably foreseeable projects in the area that might impact air quality would be the same as those for Alternative A. The cumulative impacts of Alternative D, considered with the moderate, adverse impact resulting from present and reasonably foreseeable future projects in the region, would be major, adverse, and short-term.

Conclusion

These data indicate that Alternative D would result in greater emissions relative to the No Action Alternative. In particular, Alternative D would generate greater quantities of emissions than Alternatives A and C, but less than Alternative B. The intensity of the impact of Alternative D relative to Alternative A would be major, adverse, and short-term, since the increases would be well above 50 percent of Alternative A. The effects of the fire management program would not represent an impairment of the park's resources or values.

Cultural Environment

Archeological Resources

Potential for Impacts from Catastrophic Fire

Compared with Alternative A, No Action, this alternative would reduce to a moderate extent the potential for catastrophic fire and its impacts. This would result in beneficial, short- and long-term, moderate impacts to archeological resources.

Fire Management Treatments

Managed Wildland Fire

Under all action alternatives 621,059 acres would be in the Fire Use Unit. Managed wildland fire would be the main focus of this unit although 48,912 acres (or 8%) would be designated as prescribed fire units. These could be burned either under managed wildland fire (natural ignition) or prescribed burns (management-ignited fires). Acres burned and effects would be similar to that of Alternative B. It is likely that minor to moderate, long-term, beneficial impacts would result from maintaining natural fuel loading on archeological sites. Adverse impacts would be reduced to the degree possible through mitigating measures (described under Methodology).

Re-ignition clause. The potential for impacts occurring as a result of re-igniting a controlled wildland fire would be identical to those described for managed wildland fire.

Holding Action and Monitoring Effects (water and retardant drops, helispots, and spike camps). The potential for impacts occurring as a result of holding and monitoring actions would be identical to those described under Alternative A, minor to moderate, adverse and long-term.

Prescribed Fire

Under all action alternatives 48,912 acres in the Fire Use Unit and 107,336 acres in the Suppression Unit would be slated for prescribed burning. This alternative would treat from 1,817 to 9,194 acres, compared to 1,442 acres per year under Alternative A. Projects would focus on areas of greater than three missed fire return intervals. Local effects resulting from prescribed fire under this alternative would be similar to those described under Alternative A, however the potential for adverse impacts is greater due to the increased acreage targeted for treatment, but so would the potential for benefits. Moderate, long-term, beneficial impacts would result from maintaining natural fuel loading on archeological sites. Adverse impacts would be reduced to the degree possible through mitigating measures (as described under Methodology).

Site Preparation Associated with Managed Wildland Fire and Prescribed Fire (hand line, snagging, mop-up)

The potential for impacts associated with site preparation is identical to that described for Alternative A—minor to moderate, adverse and long-term.

Fuel Reduction by Hand or Machine

Aggressive Reduction Techniques.

Mechanical Tree and Shrub Removal. Heavy equipment would be used under Alternatives B and D to cut, and either pile or crush, vegetation, in the inner wildland/urban interface areas. This alternative relies to a moderate extent on use of heavy equipment to restore target vegetation conditions. Wildland/urban interface areas (and all other areas proposed for this treatment) would be surveyed for archeological resources prior to any treatment, but because heavy and ground-obscuring vegetation would reduce the visibility of archeological sites, it is likely that some resources would be missed during inventory. All known resources would be avoided during heavy equipment use and piling but this treatment would adversely impact archeological resources obscured by vegetation. Post-treatment inventory would be used to document and stabilize any sites inadvertently impacted. Second entries into WUI areas, to remove trees up to 20 inches in diameter if prescribed fire has failed to achieve desired results, would potentially result in site disturbance or long-term soil compaction, unless mitigations are effectively utilized. The intensity of impact would depend upon the nature and significance of the resource as well as the extent of soil disruption, but would be potentially moderate to major, adverse and long-term; mitigation (see Methodology) would be used.

Conventional Tree and Shrub Removal. Same as Alternative B, potentially moderate to major, adverse, and long-term impacts. Archeological monitoring would be used to reduce the potential for these impacts.

Passive Reduction and Lower Profile Techniques.

Low-Impact Skidding. Impacts would be similar to Alternative C although this technique would be used to a smaller extent.

Hand Cutting. The potential for impacts associated with hand thinning is identical to that described for Alternative A—beneficial, long-term, and minor.

Pile burning. The potential for impacts associated with pile burning is identical to that described for Alternative A—minor to moderate, adverse, and long-term.

Chipping. The potential impacts associated with chipping would be identical to those described under Alternative A—negligible.

Girdling. Same as Alternative B—negligible.

Helibase Upgrades

Same as Alternative B.

Cumulative Impacts

The cumulative impacts that would result from implementation of this alternative, in conjunction with other past, present, and past, present, and reasonably foreseeable future actions, would be the same as Alternative A. Implementation of this alternative would moderately reduce the potential for catastrophic fire and associated emergency response actions. The adverse impacts associated with other present, and reasonably foreseeable future projects would be minor to moderate. Considered in combination with the impacts to archeological resources from Alternative D, cumulative impacts would be beneficial, long-term, and minor.

Therefore the cumulative impact would be minor, beneficial and long-term.

Conclusion

Implementation of this alternative would result in adverse impacts to archeological resources mostly due to the increased potential for high-intensity fires in areas of three or more missed fire return intervals and the use of heavy equipment to reduce heavy fuel loads. These impacts would be reduced or avoided to the extent possible through use of mitigating measures (described under Methodology). Compared with Alternative A, implementation of this alternative would reduce to a moderate extent the potential for catastrophic fire and its impacts. Of all fire management situations and treatments, catastrophic fire and emergency response actions result in the most frequent and severe impacts to archeological resources. Overall, the effect of this alternative would be beneficial, moderate and long-term. The intent of the alternative would be to reduce the risk of catastrophic fire, thus there would be no impairment from the effects of this alternative.

Ethnographic Resources

Potential for Impacts from Catastrophic Fire

Compared with Alternative A, No Action, this alternative would reduce to a moderate extent the potential for catastrophic fire and its impacts. This would result in beneficial, short- and long-term, moderate impacts to ethnographic resources.

Fire Management Treatments

Managed Wildland Fire

Potential impacts resulting from managed wildland fire under this alternative are similar to those described under Alternative A, however the potential for adverse impacts is greater due to the increased acreage targeted for treatment. Overall, it is likely that minor to moderate, long-term, beneficial impacts would result from maintaining natural fuel load and plant community conditions near ethnographic resources. Adverse impacts would be reduced to the degree possible through the mitigating measures (described under Methodology).

Re-ignition clause. The potential for impacts occurring as a result of re-igniting a controlled wildland fire would be identical to those described for managed wildland fire.

Holding Action and Monitoring Effects (water and retardant drops, helispots, and spike camps). The potential for impacts occurring as a result of holding and monitoring actions would be identical to those described under Alternative A, potentially minor to moderate, adverse and short to long-term. These impacts would be avoided or reduced as much as possible through mitigating measures.

Prescribed Fire

Impacts resulting from prescribed fire under this alternative are similar to those described under Alternative A. The potential for adverse impacts would be greater, due to the increased acreage targeted for treatment, but so would the potential for benefits. Moderate, long-term, beneficial impacts would result from maintaining natural fuel load and plant community conditions near ethnographic resources. Adverse impacts would be reduced to the degree possible through mitigating measures (described under Methodology).

Site Preparation Associated with Managed Wildland Fire and Prescribed Fire (hand line, snagging, mop-up)

The impact associated with site preparation would be identical to that described for Alternative A, potentially minor to moderate, adverse and long-term.

Fuel Reduction by Hand or Machine

Aggressive Reduction Techniques.

Mechanical Tree and Shrub Removal. Same as Alternative B, Effects would be potentially moderate to major, adverse and long-term, but avoidance and mitigation (see Methodology) would be used. Long-term beneficial impacts would include restoration of more natural vegetation patterning. These effects would be minor to moderate, and short to long-term. The NPS would continue to consult with park-associated tribal groups to identify concerns and implement the most appropriate mitigating measures.

Conventional Tree and Shrub Removal. Same as Alternative B, potentially moderate to major, adverse and long-term, but these potential impacts would be reduced to the extent possible through mitigating measures.

Passive Reduction and Lower Profile Techniques.

Low-Impact Skidding. Effects would be similar to Alternative C although the techniques would be used to a smaller extent.

Hand Cutting. The impact associated with hand cutting would be identical to that described for Alternative A—potentially beneficial, short-term, and minor to moderate.

Pile burning. The impact associated with pile burning would be identical to that described for Alternative A—negligible to moderate, adverse, and short-term, but these impacts would be mitigated by avoiding traditionally used plants.

Chipping. The potential impacts associated with chipping would be identical to those described under Alternative A—negligible.

Girdling. Same as Alternative B—negligible.

Cumulative Impacts

The cumulative impacts that would result from implementation of this alternative, in conjunction with other past, present, and reasonably foreseeable future actions, would be the same as Alternative A except that implementation of this alternative would moderately reduce the potential for catastrophic fire and associated emergency response actions. Considered in conjunction with the minor to moderate, adverse, and long-term effects of present and reasonably foreseeable projects, and the effects of Alternative D, the cumulative effects upon ethnographic resources would be beneficial, long-term, and minor to moderate.

Conclusion

Implementation of this alternative would result in beneficial, long-term, and moderate effects upon ethnographic resources, but the potential for major, adverse and long-term impacts would remain, due to the potential for high-intensity fires in areas of three or more missed fire return intervals and the use of heavy equipment to reduce heavy fuel loads. These impacts would be reduced or avoided to the extent possible through use of mitigating measures (described under Methodology). However this alternative would reduce, compared with Alternative A, the potential for catastrophic fire and its impacts. Of all fire management situations and treatments, catastrophic fire and emergency response actions would result in the most frequent and severe impacts to ethnographic resources. The potential for catastrophic fire would still exist, but the intent of the alternative would be to reduce the risk, thus there would be no impairment from the effects of this alternative.

Cultural Landscape Resources, Including Individually Significant Historic Structures

Potential for Impacts from Catastrophic Fire

Compared with Alternative A, No Action, this alternative would reduce to a moderate extent the potential for catastrophic fire and its impacts. This would result in beneficial, short- and long-term, moderate impacts to cultural landscape resources.

Fire Management Treatments

Managed Wildland Fire

Same as Alternative B, minor to moderate, long-term, beneficial impacts would result from maintaining natural fuel load and plant community conditions in cultural landscapes. Adverse impacts would be reduced to the degree possible through the mitigating measures described above.

Re-ignition clause. The potential for impacts occurring as a result of re-igniting a controlled wildland fire would be identical to those described for managed wildland fire.

Holding Action and Monitoring Effects (water and retardant drops, helispots, and spike camps). The potential for impacts occurring as a result of holding and monitoring actions would be identical to those described under Alternative A, potentially minor to moderate, adverse and long-term. These impacts would be avoided or reduced as much as possible through mitigating measures (described under Methodolgy, Cultural Resources).

Prescribed Fire

Impacts resulting from prescribed fire under this alternative are similar to those described under Alternative A, however the potential for adverse impacts is greater due to the increased acreage targeted for treatment. Moderate, long-term, beneficial impacts would result from maintaining natural fuel load and plant community conditions in cultural landscapes. Adverse impacts would be reduced to the degree possible through mitigating measures (described under Methodology).

Site Preparation Associated with Managed Wildland Fire and Prescribed Fire (hand line, snagging, mop-up)

The potential for impacts associated with site preparation is identical to that described for Alternative A, negligible, adverse and short-term. Effects would be avoided or reduced through mitigating measures.

Fuel Reduction by Hand or Machine

Aggressive Reduction Techniques

Mechanical Tree and Shrub Removal. Same as Alternative B. The effects would be moderate to major, adverse and long-term if the work is not guided by cultural resource management specialists.

Conventional Tree and Shrub Removal. Same as Alternative B, potentially moderate to major, adverse and long-term. These potential impacts would be reduced through avoidance, and, to the extent possible, through mitigating measures.

Passive Reduction and Lower Profile Techniques

Low-Impact Skidding. The impacts from these techniques would be the same as in Alternative C but in this alternative, the technique would be used in fewer areas. Potential impacts would be minor, long term, and adverse.

Hand Cutting. The potential for impacts associated with hand thinning is identical to that described for Alternative A. Potentially moderate, adverse and long-term impacts would be avoided by prescribing a target condition for these areas that would protect and enhance the cultural resource.

Pile burning. The potential for impacts associated with pile burning is identical to that described for Alternative A—negligible.

Chipping. The potential impacts associated with chipping would be identical to those described under Alternative A—minor, short-term, and adverse.

Girdling. Same as Alternative B—negligible. The potential adverse impacts associated with girdling would include removal of contributing elements (trees) of historic sites or cultural landscapes, and disruption of features through tree falls and use of heavy equipment. These impacts would be avoided by precluding their use, where necessary, and as determined through application of mitigating measures (described under Methodology).

Cumulative Impacts

The cumulative impacts that would result from implementation of this alternative, in conjunction with other past, present, and reasonably foreseeable future actions, would be the same as under Alternative A, Implementation of this alternative would significantly reduce the potential for catastrophic fire and associated emergency response actions. The adverse impacts associated with present and reasonably foreseeable future projects would be minor to moderate and long-term. Considered in combination with the impacts to cultural landscape resources from Alternative D, cumulative effects would be beneficial, long-term, and minor.

Conclusion

Implementation of this alternative would result in moderate, beneficial and long-term effects upon cultural landscape resources. This would be mostly due to the increased potential for high-intensity fires in areas of three or more missed fire return intervals and the use of heavy equipment to reduce heavy fuel loads. These impacts would be reduced or avoided to the extent possible through use of mitigating measures (described under Methodology). Compared with Alternative

A, implementation of this alternative moderately reduces the potential for catastrophic fire and its impacts. Of all fire management situations and treatments, catastrophic fire and emergency response actions result in the most frequent and severe impacts to cultural landscape resources. The intent of the alternative is to reduce the risk of catastrophic fire, thus there would be no impairment from the effects of this alternative.

Section 106 Summary

Under regulations of the Advisory Council on Historic Preservation (36 CFR 800.9) addressing the criteria of effect and adverse effect, implementation of this alternative would have the potential to adversely affect significant historic properties. Archeological sites, ethnographic resources, and cultural landscape resources (including historic sites and structures) would likely be adversely affected by high-intensity fires and emergency response actions associated with catastrophic fire. The number and significance of resources that would be affected cannot be projected since inventory and evaluation data are lacking for broad tracts of lands. These impacts would be mitigated to the extent possible by some pre-burn inventory for resources of concern and by avoiding known resources when feasible, reducing hazardous fuels at significant resources, documentation and protection of significant resources, post-burn inventory and stabilization, and fire-effects research.

Social Environment

Recreation

Potential for Impacts from Catastrophic Fire

Large catastrophic fires are most likely to occur in the Suppression Unit, where fires have been and will continue to be suppressed, contributing to fuel buildup and changes in plant community structure. The moderate increase in the number of acres burned annually with prescribed fire would help reduce the potential for large and catastrophic fires in this unit. Fuel reduction in the wildland/urban interface, where communities, visitor facilities, and park operations buildings are located, and where the most aggressive suppression activities have historically taken place, would also reduce the threat of catastrophic fire. The potential for large, catastrophic fires like the A-Rock Fire, would be reduced under this alternative. Consequently, this alternative would reduce the potential for fire-related park-wide closures, although, during fires, closures in areas of the park would continue. During these closures, the effects will be adverse, short-term, and minor, affecting only the visitors within or wishing to enter that portion of the park. These effects would be less than under Alternative A, but closures and restrictions would still be likely since the fire season and the peak visitation period overlap.

Fire Management Treatments

This alternative would be mid-range in terms of the amount of prescribed fire and wildland/urban interface treatment among the action alternatives. However, the treatment acreages would be greater than under Alternative A. The effects upon recreation would be similar to that of Alternative B, except in the case of the following treatment:

Fuel Reduction by Hand or Machine

Aggressive Reduction Techniques

Effects of equipment use would occur in Suppression Unit in the six inner wildland/urban interface areas, with equipment not being extensively used except where less impacting methods proved unsuccessful. Biomass removal would affect visitors through localized safety closures and equipment noise. Visitors would however, be able to partake in their activity, including hiking, nature study and scenic touring, in another, nearby location, with limited or no restrictions. Some visitors would have concerns about equipment use in the park, while others would understand the rationale for its use and would be supportive. Work would be performed during periods of low visitation whenever possible. Overall, the effects upon recreation would be adverse, short-term, and minor.

Passive Reduction and Lower Profile Techniques.

Low-Impact Skidding. Draft animals and four-wheel, all terrain vehicles, in combination with fetching arches, would be used to skid trees approximately 10 to 20 inches in diameter. Low-impact skidding would be used to a limited extent only in the wildland/urban interface and along road corridors. Low-impact skidding would require safety closures in the immediate area of work. Closures and noise would affect visitors, who would, however, be able to partake in their activity, including hiking, nature study and scenic touring, in nearby areas. Some visitors would have concerns about equipment use in the park, but probably less so than with heavier equipment; other people would understand the rationale for its use and would be supportive. Overall, the effects of low-impact skidding upon recreation, due to the amount of use in this alternative, would be adverse, short-term, and minor to moderate.

Cumulative Impacts

As in Alternative B, the impacts of other projects in the region, in combination with the adverse, short-term, and minor impacts of this alternative, would result in beneficial , long-term, and major cumulative impacts upon recreation.

Conclusion

The effects of this alternative upon recreation would be adverse, short-term and minor. The potential for large, catastrophic fire events and its likely effect upon recreation would be the same as in Alternative B. There would be no impairment from the effects of this alternative.

Scenic Resources

Summary

The effects of Alternative D on scenic resources would be similar to that of Alternative B.

Cumulative Impacts

Past, present, and reasonably foreseeable projects would be the same as described in Alternative A. The effects would be adverse to beneficial, long-term, and minor. Considered in combination with the impact of Alternative D on scenic resources, cumulative impact would remain beneficial, long-term, and major.

Conclusion

Fire management activities would affect scenic resources in generally beneficial ways, through actions that would contribute to restoring and maintaining open vistas and natural forest structure. The effects in the Suppression Unit would be substantially greater in this alternative, compared to Alternative A, due to the larger amount of annual accomplishment in prescribed fire and biomass treatment. Overall, these effects would be beneficial, long-term, and major, especially if projects in some areas (Yosemite Valley, for example) included objectives related to the restoration and maintenance of open vistas. Under this alternative, there would be a smaller likelihood of having large, high intensity, catastrophic fires with effects like the A-Rock Fire, than under Alternative A. There would be no impairment from the effects of this alternative.

Noise

Potential for Impacts from Catastrophic Fire

Under this alternative, the potential for large, high-intensity fire would decrease compared to Alternative A, due to the amount of fuel treatment and prescribed fire, especially in the Suppression Unit. With the diminishing potential for large-scale fires, the likelihood and frequency of having to deploy large-scale fire suppression efforts would also diminish, thereby reducing the size and duration of fire operations. When large fire organizations were needed, the noise effects would be similar to under Alternative A, except the duration of operations would likely be shorter. Under Alternative D the threat of catastrophic fire would diminish, therefore the effect would be beneficial, long-term, and moderate.

Fire Management Treatments

The noise impacts during wildland and prescribed fire and other fire management activities under Alternative D would be similar to that of Alternative B.

Cumulative Impacts

Past, present, and reasonably foreseeable projects would be the same as described in Alternative A. Cumulative effects under Alternative D would be the same as under Alternative B—adverse, short-term, and major.

Conclusion

Fire management activities would have the potential to introduce noises that have a short-term, adverse, and major effect on ambient noise levels near wildland/urban interface areas. The noise events would be similar to that found under Alternative A, but the number of events and the duration of operations would be substantially greater. Over time, noise associated with large, catastrophic fire events would be less than under Alternative A. In Wilderness, helicopter and chainsaw noises would continue to introduce short-term intrusions, with adverse and major effects, the same as under Alternative A. There would be no impairment from the effects of this alternative.

Local Communities

This alternative would have an intermediate amount of prescribed fire and wildland/urban interface treatment per year. An average of 1,095 acres of wildland/urban interface would be treated by prescribed fire and mechanical fuel reduction. This would be greater than under Alternative A, reducing the effects upon and risk levels for local communities. If ecosystem restoration objectives were met within 15 years, the level of risk from the effects of catastrophic fire would be similar to that of Alternative B. The amount of annual accomplishment would meet objectives for protecting wildland/urban interface areas within 6 to 8 years, greatly improving the opportunity to protect communities in and near the park from fire.

Potential for Impacts from Catastrophic Fire

These effects would be similar to Alternative B. Any direct effects in wildland/urban interface that would occur because of catastrophic fire would still likely be adverse, long-term, and major. Potential indirect economic effects of a closure would be adverse, short-term and minor, less than under a scenario similar to the A-Rock fire under Alternative A. However, the potential of these effects occurring would be greatly reduced under this alternative thus a beneficial, long-term, and moderate effect.

Fire Management Treatments

Managed Wildland Fire

The effects under this alternative would be similar to Alternative A—adverse, short-term, and negligible.

Re-ignition clause. The effects of this alternative would be similar to Alternative B—adverse, short-term, and negligible.

Holding Action and Monitoring Effects (water and retardant drops, helispots and spike camps). The effects under this alternative would be similar to Alternative B—negligible.

Prescribed Fire

Between 1,817 and 9,194 acres would be restored through prescribed burning in an average year, compared to 1,442 acres per year under Alternative A. Effects of prescribed burning on local communities would be beneficial, long-term, and major. Other effects of prescribed fire would be similar to those under Alternative B.

Site Preparation Associated with Managed Wildland Fire and Prescribed Fire (hand line, snagging, mop-up)

The effects under this alternative would be similar to Alternative A—negligible.

Fuel Reduction by Hand or Machine

Aggressive Reduction Techniques.

Mechanical Tree and Shrub Removal. Using large machinery and other techniques, approximately 1,100 acres per year of fuel reduction work would be completed in the six inner wildland/urban interface areas. This would accomplish wildland/urban interface objectives for protection and ecosystem restoration in 6 to 8 years, reducing risks near communities compared to Alternative A. Although potential for large fires would remain, the opportunity to protect these communities would be improved compared to Alternative A. The effects of biomass removal would be beneficial, long-term, and major. The effects of equipment use on local communities would be similar to Alternative B.

Conventional Tree and Shrub Removal. The effects of this alternative would be similar to Alternative B—beneficial, long-term, and moderate to major.

Passive Reduction and Lower Profile Techniques.
Low-Impact Skidding. Under this alternative, use of low-impact skidding would be emphasized where it would be most efficient and effective (in areas with large concentrations of smaller trees, that could be easily removed with this technology). Wildland/urban interface treatment and ecological restoration work near local communities would be completed in about 6 to 8 years, and would reduce risks and potential for catastrophic fire. Effects of low-impact skidding on local communities would be beneficial, long-term, and moderate to major.

Hand Cutting. The effects under this alternative would be similar to Alternative A—beneficial, long-term, and minor.

Pile burning, chipping, and girdling. The effects under this alternative would be similar to Alternative B—beneficial, long-term, and major.

Cumulative Impacts

As in Alternative A, a variety of projects in the five county area would have diverse effects upon local communities. These projects include: Lodging and service projects: utility and infrastructure projects; and other projects of the type described in the proposed action, e.g., projects dealing with fire, fuels and vegetation management matters. The same reasonable foreseeable projects evaluated in Alternative A would apply under Alternative D.

The long-term, beneficial, and moderate effects of these actions, considered with the impacts of Alternative D, would result in cumulative effects in Yosemite's six wildland/urban interface areas that would be beneficial, long-term, and moderate to major.

Conclusion

The risks associated with large, catastrophic fires would be reduced in this alternative, compared to Alternative A. The risk in Alternative D for direct effects (loss of property during fires) and indirect effects (loss of business during fire-related closures) would be greatly reduced compared to Alternative A, and would be intermediate among the action alternatives. This is because of the amount of annual prescribed fire and mechanical thinning accomplishment. The potential for fire-related closures and other effects would also be lower than under Alternative A. As a result, the overall affect of this alternative on local communities would be beneficial, long-term and moderate to major.

Environmental Justice

Under this alternative, fire management activities would continue to be directed toward reducing risks in all of the wildland/urban interface areas in the park. Because of the greater amount of prescribed burning and fuel treatment, compared to Alternative A, the benefits for each community would be greater under Alternative D. Effects would be less than but similar to Alternative B. The risks in each of the wildland/urban interface areas would be lower compared the existing program. In that risks in each of the communities would be targeted, the effects upon minority and low-income populations in those communities would be beneficial, long-term and moderate to major, the same as effects described under Local Communities above.

Cumulative Impacts

Cumulative effects upon minority and low income populations, as represented in the wildland/urban interface areas, would be the same as described under Local Communities above.

Conclusion

Prescribed fire and fuel treatment would be focused upon the most immediate risks associated with each of the wildland/urban interface areas. The effects upon minority and low income populations in those communities would be beneficial, long-term and moderate to major.

Special Designations

Wild and Scenic Rivers

The Wild and Scenic River Act of 1968 requires agencies to protect and enhance the outstandingly remarkable values (ORV) of Wild and Scenic Rivers in Yosemite National Park and the El Portal Administrative Site. Chapter V discusses the potential for achieving this end, in light of the actions proposed in the *Yosemite Fire Management Plan*. Impacts of this alternative on river related attributes are discussed in the representative sections (for example, in watersheds, water quality and soils; plant communities and fire ecology; etc.).

Wilderness

All wildland fire management activities within designated Wilderness inside the boundaries of Yosemite National Park will adhere to "minimum tool" requirements of the 1964 Wilderness Act (16 USC 1 1 21). About 704,624 acres or 94% of the park is designated Wilderness. Most of this is in the Fire Use Unit where allowing natural processes of fire to occur has been part of Yosemite's fire management program since 1972. Some areas of Wilderness, however, are in the Suppression Unit because years of fire exclusion have created fuel accumulations that would burn at unnaturally high-intensities were wildland fire to occur. These areas would be restored before being considered for inclusion in the Fire Use Unit. Some areas, because of their proximity to populated areas, buildings, roads and utility lines, or historical resources, would never be included in the Fire Use Unit.

Summary

The effects on Wilderness of actions under Alternative D would be similar to Alternative B.

Cumulative Impacts

Past, present and reasonably foreseeable future projects would be the same as those listed in Alternative A. These effects, considered in combination with the effects of Alternative D, would result in beneficial, long-term, and moderate to major cumulative impacts.

Conclusion

Fire management activities would affect Wilderness resources in generally beneficial ways, through actions that would maintain plant communities within their natural range of variability, and thus maintain Wilderness values, especially in the Fire Use Unit. Benefits in the Suppression Unit would be greater than under Alternative A, due to the large amount of fuel reduction and prescribed fire, which would reduce the potential for large, high-intensity fires. In Wilderness, helicopter and chainsaw noises would continue to introduce short-term intrusions, with adverse and major effects, the same as under Alternative A. Overall, the effect of Alternative D would be beneficial, long-term, and moderate to major. There would be no impairment from the effects of this alternative.

Energy Consumption

The energy consumption associated with fire management activities is difficult to calculate, because of the great number of variables involved, including the size and complexity of projects. Fire management activities, including monitoring of managed wildland fire, prescribed fire and hand thinning, are considered in the analysis; fire suppression and administrative activities are not. The treatments listed in table 2.6 would be used in Alternative D. The number of acres that would be treated, and related energy that would be consumed, is estimated in table IV-20 below.

Cumulative Impacts

For the *Yosemite Valley Plan* alone, projections included an estimated reduction of 1,341,800 gallons of gasoline consumption per year, and an increase of 335,500 gallons of diesel fuel consumption (for a total of 549,300 gallons per year by 2015), a decrease of 1,006,300 gallons to a total of 1,688,300 gallons of fuel, and a moderate, long-term, beneficial impact. Combined with Alternative D, the cumulative effects would be beneficial, long-term, and moderate.

Conclusion

Energy would be consumed during fire monitoring and reconnaissance, prescribed fire operations, and fuel reduction activity. Typically more than 147,000 gallons of various fuels per year would be consumed, compared to over 9,000 gallons under Alternative A. The effects of the fire management program's energy demand would be adverse, long-term, and major, compared to Alternative A, No Action. Equipment use during biomass removal operations would be the greatest new source of fuel consumption.

Table IV-20
Projected Energy Consumption Under Alternative D

Fire Management Treatment	Acres Treated per year	Equipment Used	Treatment Rate or Equipment Use	Fuel Use Rate	Fuel Use
Managed Wildland Fire	16,000	Aircraft (recon, water drops, transport)	2 hour per recon flight; est. 180 recon hours per year.	60 gallons of fuel per hour	10,800 gallons of fuel
Prescribed Fire[a]	5,505 (1,817 to 9,194)	a) Drip Torches [OR in aerial ignition, ignition balls and helicopter]	Approx. 1 acre per hour per torch, 8 acres per day in an 8 hour shift. [OR in aerial ignition, approx. 150 acres per day by aerial ignition; 2 hours flight time per day.]	Approx. 2 gallons per acre burned. [OR approx. one box (1000 balls) per 150 acres, plus 60 gallons of fuel per hour of flight time, plus ground crews.]	11,010 gallons of drip torch fuel [OR 36,700 ignition balls,. 4,440 gallons of aviation fuel; plus 250 gallons drip torch fuel for ground crews.]
		b) Engines	3 to 6 engines/ plus 1 to 2 water tenders per day (5 on average), an average of 50 project days per year; 12 hour shifts.	8 miles per gallon diesel fuel, at least 50 miles out and back to station per vehicle per day.	1,562 gallons
		c) Chainsaws for site prep.	Crew with 5 saws can treat 5 acres per day, for approx. 330 acres.	2 gallons per day per saw; 10 gallons per crew per day	660 gallons
Hand Cutting	300	Chainsaws	Crew with 5 saws can treat 5 acres per day.	2 gallons per day per saw; 10 gallons per crew per day	600 gallons
Biomass Removal	600	Tracked vehicle	20 acres per day	72 gallons per acre, median (16 to 128 gal/acre, depending on terrain and workload).	43,200 gallons
Skidding/ Grappling	1,095	Grappler	8 to 30 acres per day, for 1131 acres	72 gallons per acre, median (16 to 128 gal/acre, depending on terrain and workload	78,840 gallons
ATV Skidders		All Terrain Vehicle	150 hours per year	19 days at 10 gallons fuel per day	190 gallons
Chipping	300	Chipper	5 acres per day	Approx.10 gallons per work day.	600 gallons
Total: 147,462 gallons of various fuels					

a Total fuel includes drip torches, chainsaws, and vehicles, not aerial ignition techniques.

Sustainability and Long-Term Management

Relationship of Short-Term Uses and the Maintenance and Enhancement of Long-term Productivity

Alternative D would not result in new development, thus it would not take lands out of productivity as natural ecosystems. However, fires would continue to effect ecosystem integrity, particularly in the Suppression Unit. Compared to Alternative A, this alternative would include an amount of prescribed burning and fuel reduction that would reduce significantly unnatural changes in forest structure and increases in fuel load conditions. This would greatly reduce the potential for large, catastrophic fires. Actions would be most influential in upper and lower montane areas. Actions would likely reverse trends toward vegetation type conversion (change over time to a different vegetation type and fire regime) and reduce the potential of returning large areas of the park to early seral stages of ecosystem development, as happened during the A-Rock Fire.

Use of biomass removal, prescribed burning, and other treatments would not degrade long-term productivity, because restoration of target conditions would be based upon the natural range of variability for park ecosystems.

Irreversible or Irretrievable Commitments of Resources

Implementation of Alternative D would reduce the potential of large, catastrophic fire, compared to Alternative A. The amount of prescribed fire and fuel treatment, particularly in the Suppression Unit and in the wildland/urban interface, would likely restore target conditions in such a timeframe as to reduce the potential for irreversible or irretrievable loss of resources, except in the early years of program implementation. Fire of the magnitude and effect of A-Rock Fire would still be a possibility but the course of action in Alternative D, compared to Alternative A, would not be likely to sustain an irreversible or irretrievable commitment of resources.

The three giant sequoia groves in Yosemite have been the focus of past fuel treatments and prescribed fire. These actions have and will assist in protecting them. The increase in prescribed fire in this alternative would reduce the potential for large, high-intensity fires along the margins of these areas, which, over time, would reduce the risk of losing a sequoia grove. The loss of the Mariposa Grove of Giant Sequoias would be considered an irretrievable loss of resources, and impairment, under the definition in National Park Service Management Policies 1.4.5, but the potential for this is reduced in this alternative.

Historic resources in Yosemite Valley, Wawona, and in other areas, if burned during catastrophic fire, would be irreversibly and irretrievably lost. However, the potential for such a loss is reduced under this alternative.

As in Alternative A, No Action, the effects of managed wildland fire upon wildlife and other park values would generally not be considered irreversible or irretrievable, in that their effects would typically be within the natural range of variability for park ecosystems and wildlife habitat. Adverse effects generally would be short-term while beneficial effects would be long-term. Habitat would typically become suitable to wildlife shortly after a fire.

Under this alternative, no appreciable irreversible or irretrievable commitments of resources would be associated with air quality.

Adverse Impacts that Could Not be Avoided if the Action were Implemented

The potential for large, high-intensity fires would be less than under Alternative A. This would be because of the large amount of prescribed fire and fuel reduction work that would occur under this alternative. Treatments would attempt to restore plant community structure and reduce the risk of catastrophic fire. This would reduce the potential for adverse effects from both unwanted wildland fire and fire exclusion.

Biomass removal and other fuel treatments would not be considered adverse in that target conditions would be based on the natural range of variability for those systems. The adverse effects of treatments would be short-term while beneficial effects, such as ecosystem restoration, would be long-term.

Under this alternative, there would be short-term, unavoidable, adverse impacts to air quality due to the increase in prescribed burning in areas where fuel loads are high from decades of fire exclusion. As park forests are restored to their natural vegetative state and natural fire regime, fuel loads will be lighter and thus less smoke will be produced when forests burn. The need to burn in the park's forests through prescribed and managed wildland fire will never go away, however, adverse impacts on air quality would decrease over the long-term as forests fuels are reduced.

Chapter V: Wild and Scenic Rivers

Introduction

In the 1960s, the United States came to recognize that the nation's rivers were being dredged, dammed, diverted, and degraded at an alarming rate. In response, Congress established the Wild and Scenic Rivers Act in October 1968. A Wild and Scenic River is one that has been identified as having distinctively unique or "outstandingly remarkable values" that set it apart from all other rivers, making it worthy of special protection. The goal of designating a river as Wild and Scenic is to preserve its free-flowing character and unique qualities.

The U.S. Congress designated the Tuolumne River a Wild and Scenic River in 1984, and in 1987, the Merced River was designated. These rivers were set aside so that "they and their immediate environments shall be protected for the benefit and enjoyment of present and future generations" (16 USC 1271). This designation gives the Tuolumne and Merced Rivers special protection under the Wild and Scenic Rivers Act and requires the managing agencies to prepare a comprehensive management plan for each river and its immediate environment.

A study of Tuolumne River eligibility under the Wild and Scenic Rivers Act was completed in October 1979. This study recommended segment classifications and inventoried the presence of Outstandingly Remarkable Values (ORVs), by segment. A plan for the Tuolumne River has not been completed.

After reaching a Record of Decision on the Final Environmental Impact Statement, the National Park Service released the *Merced Wild and Scenic River Comprehensive Management Plan* (referred to hereafter as the Merced River Plan) in February 2001, which outlines how the Merced Wild and Scenic River corridor will be managed. The Merced River Plan applies seven management elements to prescribe desired future conditions, typical visitor activities and experiences, and park facilities and management activities that occur in the river corridor. The management elements include boundaries, classifications, Outstandingly Remarkable Values, the Wild and Scenic River Act Section 7 determination process, the River Protection Overlay, management zoning, and the Visitor Experience and Resource Protection framework.

The National Park Service uses the management elements of the Merced River Plan as a set of decision-making criteria with which to evaluate management projects in the Merced River corridor, such as the *Yosemite Fire Management Plan*. This chapter evaluates the consistency of the preferred alternative with the management elements of the Merced River Plan for the Merced River (NPS 2000b) and explains the relationship between the *Yosemite Fire Management Plan* and the Tuolumne River's future comprehensive management plan. Since a comprehensive management plan has not been completed for the Tuolumne Wild and Scenic River, there are no changes to fire management activities in the Tuolumne River corridor. The analysis is limited to existing conditions and treatments and compliance with the Wild and Scenic Rivers Act.

This chapter includes the following sections:

1) The Merced Wild and Scenic River

a. Methodology used for evaluating the consistency of the preferred alternative action with the *Merced Wild and Scenic River Comprehensive Management Plan* management elements

b. Analysis of the consistency of the preferred alternative with the *Merced Wild and Scenic River Comprehensive Management Plan* management elements

2) Fire management in the Tuolumne River.

The Merced Wild and Scenic River

Methodology

This assessment is based on the management elements developed in the *Merced Wild and Scenic River Comprehensive Management Plan*. For the purposes of this analysis of potential effects on Outstandingly Remarkable Values, the Preferred Alternative is compared to the No Action Alternative (see Chapter 2, Alternatives). The focus of the analysis is on long-term effects (e.g., effects that would last ten years or more or would be permanent). Short-term effects are not addressed in this analysis unless they are of sufficient magnitude (having a substantial, highly noticeable influence) to warrant consideration.

The Preferred Alternative has been assessed with regard to (1) protection and enhancement of ORVs; (2) compatibility with classifications; (3) consistency with the River Protection Overlay; and (4) consistency with management zoning. This Wild and Scenic Rivers Act analysis has been triggered because the proposed project is within Wild and Scenic River boundaries or could affect ORVs outside the boundaries. The Wild and Scenic Rivers Act Section 7 determination process would be applied to any actions that would occur within the bed and banks of a Wild and Scenic River as a result of the *Yosemite Fire Management Plan*.

Protection and Enhancement of Outstandingly Remarkable Values

Pursuant to Section 10(a) of the Wild and Scenic Rivers Act, the Act shall be administered to protect and enhance ORVs within the Wild and Scenic River corridor boundary. Uses that are consistent with this provision and that do not substantially interfere with public enjoyment and use of these values should not be limited (16 USC 1281[a]). ORVs located outside the Wild and Scenic River corridor boundary must also be protected (NPS 2000b).

According to the Wild and Scenic Rivers Act, ORVs must be protected and enhanced. Analysis of ORVs is focused on the whole, rather than site-specific or localized effects. Exceptions to the guideline include site-specific activities that could have substantial effects on ORVs, such as degradation of habitat of a river-related special-status species (a biological ORV) that is endemic to that location. For the *Yosemite Fire Management Plan*, ORVs for the Merced River are evaluated based on effects to such values within all segments of the river.

In terms of evaluating potential effects to ORVs, actions that could degrade ORVs include actions with effects that would be discernable throughout the majority of the river segment, or would be of sufficient magnitude to affect adjacent segments. For the purposes of this analysis, the following assumptions for each Outstandingly Remarkable Value were made:

Scientific The analysis considers whether the preferred alternative would affect the integrity of the Merced Wild and Scenic River as a scientific resource, or would degrade the river's value for research.

Scenic The analysis considers the specific features that are listed in the scenic ORV, and potential effects to views are analyzed from the perspective of a person situated on the riverbank or on the river.

Geologic Processes/Conditions The analysis gives primary consideration to designated processes, and evidence of those processes (e.g., U-shaped valley, hanging valleys, evidence of glaciations, etc.), that have been responsible for creating the river's geologic landscape. Effects related to natural meandering of the Merced River are addressed in the hydrologic processes ORV.

Recreation The analysis considers whether opportunities to experience a spectrum of river-related recreational activities would be affected.

Biological The analysis focuses on effects to riparian areas, wetlands, low-elevation meadows, and other riverine areas that provide rich habitat for a diversity of river-related species.

Cultural The analysis considers effects to river-related cultural resources, including archeological sites, which provide evidence of thousands of years of human occupation, and continuing traditional use today. The analysis also considers effects on nationally significant historic resources, such as designed landscapes and developed areas, historic buildings, and circulation systems (trails, roads, and bridges) that provide visitor access to the sublime views of natural features that are culturally valuable.

Hydrologic Processes Consideration is primarily given to designated processes such as river meandering, world-renowned waterfalls, an active flood regime, oxbows, and fluvial processes. Effects to wetlands are addressed in the biological ORV.

It is possible for ORVs to be in conflict with each other, or for an action to have beneficial impacts with regard to one ORV and adverse impacts with regard to other ORVs. The *Merced Wild and Scenic River Comprehensive Management Plan* recognizes this possibility. It states:

> Actions must protect all Outstandingly Remarkable Values, regardless of where they are located. When Outstandingly Remarkable Values lie within the boundary of the Wild and Scenic River, the value must be protected and enhanced. When values are in conflict with each other, the net effect to Outstandingly Remarkable Values must be beneficial. (p. 32)

The Wild and Scenic Rivers Act stipulates that agencies are given discretion to manage a river system with "varying degrees of intensity for its protection and development, based on the special attributes of the area." For example, there may be conflicts between protecting cultural resources and hydrologic processes, as is the case with a historic bridge that constricts the flow of the river. In this analysis, ORVs were evaluated separately for Wilderness segments and non-Wilderness segments due to the different methods employed by the preferred alternative for each.

Compatibility with Classifications

The actions in the *Yosemite Fire Management Plan* were assessed for its compatibility with the Wild and Scenic Rivers classifications.

Consistency with the River Protection Overlay

The *Yosemite Fire Management Plan* was assessed for its consistency with the River Protection Overlay prescriptions

Consistency with Management Zoning

The *Yosemite Fire Management Plan* was assessed for its consistency with the *Merced River Plan* management zoning and corresponding zoning prescriptions. The *Yosemite Fire Management Plan* encompasses all management zones

Wild and Scenic Rivers Act Section 7 Determination Process.

Pursuant to the Wild and Scenic Rivers Act, the National Park Service must carry out a Section 7 determination on all proposed water resources projects[1]. The fire management program is not a water resources project. The proposed helibase at El Portal would not be located within the bed and banks of the river, and thus would not be considered a water resources project subject to Section 7 determination.

Analysis of Consistency

Outstandingly Remarkable Values

The preferred alternative would restore fire to park ecosystems and management of hazardous levels of vegetative fuels. The proposed alternative would use prescribed and managed wildland fire throughout the park as well as mechanical methods to reduce forest fuels in developed areas at a rate needed for ecosystem maintenance and restoration. The effects of the preferred alternative are summarized below and discussed in further detail in the following tables.

The conditions achieved by the preferred alternative would protect and enhance the scientific ORV by maintaining or returning the various vegetation types to their natural range of variability and reduce the threat of large, high intensity wildland fire.

Fire management activities would affect scenic resources in generally beneficial ways, through actions that would contribute to restoring and maintaining open vistas and natural forest structure.

The preferred alternative would have no effect on the geologic processes/conditions ORV.

---

[1] Water Resources Projects: Any dam, water conduit, reservoir, powerhouse, transmission line, or other project works under the Federal Power Act, or other construction of developments that would affect the free-flowing characteristics of a wild and scenic or congressionally authorized study river. In addition to projects licensed by the Federal Energy Regulatory Commission, water resources projects may also include: dams; water diversion projects; fisheries habitat and watershed restoration/enhancement projects; bridges and other roadway construction/reconstruction projects; bank stabilization projects; channelization projects; levee construction; recreation facilities such as boat ramps and fishing piers; and, activities that require a 404 permit from the U.S. Army Corps of Engineers.

With the potential for large, catastrophic fires, reduced under the preferred alternative, the likelihood of park closures and impacts upon all park visitors would be reduced. The preferred alternative would greatly reduce the potential for fire-related park closures. While local closures and restrictions could cause changes in trip itineraries the spectrum of recreational opportunities would not be diminished. The restoration and maintenance of open vistas and natural forest structure and a lower probability of large, high intensity, catastrophic fires would protect and enhance the recreation ORV.

By reducing the threat of catastrophic fire and restoring and maintaining the natural fire regime, the biological ORV would be improved protecting and enhancing river related wildlife, habitat and special status-species.

Restoring the natural fire regime to culturally important areas will enhance the historic value that may have been degraded by previous fire suppression activities. Overall, the effect of the preferred alternative would protect and enhance the cultural ORV by reducing the risk of catastrophic fire through the treatments in the preferred alternative.

The preferred alternative would produce long-term protection and enhancement to the hydrologic process ORV. This is based upon a combination of beneficial, long-term, moderate to major impacts in Fire Use Unit. Large, high-severity fires would likely occur during the life of the plan, but the treatments proposed would reduce their effects upon soils and watersheds. The potential for catastrophic fire would still exist, but the intent of the alternative would be to reduce the risk, thus protecting the excellent water quality.

The preferred alternative would have no effect on river gradient drops, natural conditions, such as glacial remnants or the numerous cascades.

Table V-1
Effects of the Preferred alternative on ORVs in the Wilderness Segments of the Merced Wild and Scenic River Corridor

Outstandingly Remarkable Value	Effects of the Preferred alternative
Scientific – The entire river corridor constitutes a highly significant scientific resource because the river watershed is largely within designated Wilderness in Yosemite National Park. Scientific ORVs relate to the Merced River's value for research. This ORV applies to all the Merced River segments.	The conditions achieved by the preferred alternative would protect and enhance the scientific ORV by maintaining or returning the various vegetation types to their natural range of variability and reduce the threat of large, high intensity wildfire. The preferred alternative could have a beneficial effect on the Scientific ORV.
Scenic – This segment includes views from the river and its banks of the glaciated river canyon, exposed bedrock riverbed, of unique river features, including large pothole pools within slick rock cascades, old growth forest, and meadows. This segment includes views from the river and its banks of Merced Lake and Washburn Lake, the Bunnell Cascades, the confluence of tributaries, a large concentration of granite domes, and the Clark and Cathedral Ranges.	Fire management activities would affect scenic resources in generally beneficial ways, through actions that would contribute to restoring and maintaining open vistas and natural forest structure. Under the preferred alternative, there would be a lower probability of large, high intensity, catastrophic fires with effects to the Scenic ORV as major as the A-Rock Fire, than under No Action. Although air emissions (smoke) will be greater than under No Action and consequently affect the scenic ORV, the impact will be short term and the actions would overall enhance the Scenic ORV over the long term.
Geologic Processes/Conditions – The Wilderness segments traverse a U-shaped, glacially carved canyon separated by cascades and soda springs below Washburn Lake, glaciated valleys in the high country and V-shaped canyons above Wawona. Moraine meadows and soda springs above Gravelly Ford are also unique, river-related geologic features.	The preferred alternative would have no effect on the geologic processes/conditions ORV. Fire management activities would not affect the classic U-shaped valley, V-shaped canyons, or evidence of glaciation.
Recreation – The Wilderness segments provide outstanding opportunities for solitude along the river, with primitive and unconfined recreation. There is a spectrum of levels of recreational use. River-related recreational opportunities include day hiking, backpacking, horseback riding and packing, camping, and enjoyment of natural river sounds. Untrailed tributaries provide enhanced opportunities for solitude.	With the potential for large, catastrophic fires like the A-Rock Fire, reduced under the preferred alternative, the likelihood of park closures and impacts upon all park visitors would be reduced. The preferred alternative would greatly reduce the potential for fire-related park closures, although, during fires, closures in areas of the park would continue. During these closures, only the visitors within or wishing to enter that portion of the park would be affected. Some visitors would be redirected to other parts of the park during closures. While local closures and restrictions could cause changes in trip itineraries the spectrum of recreational opportunities would not be diminished. The restoration and maintenance of open vistas and natural forest structure and a lower probability of large, high intensity, catastrophic fires would protect and enhance the Recreation ORV in the Wilderness segments.
Biological – The Wilderness segments include a nearly full range of intact Sierran riverine environments, high quality riparian, meadow, and aquatic habitats (such as the meadow at Washburn Lake), and special-status species such as mountain yellow-legged frog and Yosemite Toad.	The preferred alternative would likely produce conditions that would protect and enhance the Biological ORV through the reduction of catastrophic fire threat. The multi strategy approach would also provide additional options for wetlands avoidance. By reducing the threat of catastrophic fire and restoring and maintaining the natural fire regime, wildlife habitat would be improved protecting and enhancing river related wildlife and special status-species.
Cultural –The Wilderness segments include portions of a prehistoric trans-Sierra route in use for thousands of years and many prehistoric sites. There are many historic resources such as homestead sites, trails, river crossings, High Sierra Camp sites, structures and reflects historic stock use and cavalry activities.	Implementation of the preferred alternative would reduce to a moderate extent the potential for catastrophic fire and its impacts. Of all fire management situations and treatments, catastrophic fire and emergency response actions result in the most frequent and severe impacts to archeological resources. Overall, the effect of the preferred alternative would protect the Cultural ORV by reducing the risk of catastrophic fire.

Outstandingly Remarkable Value	Effects of the Preferred alternative
Hydrologic Processes – The Wilderness segments are characterized by a free-flowing river and excellent water quality. The river gradient drops from 13,000 to 6,000 feet in elevation. There are examples of natural conditions, including glacial remnants, a logjam in Little Yosemite Valley that is hundreds of years old, and numerous cascades.	The preferred alternative would produce long-term protection and enhancement. This is based upon a combination of beneficial, long-term, moderate to major impacts in fire management units. Large, high-severity fires would likely occur during the life of the plan, but the treatments proposed would reduce their effects upon soils and watersheds, including the potential for adverse effects upon peak flow and sediment yield. Restoration of natural forest structure over time would produce positive effects regarding water yield, nutrient yield and stream system response. The potential for catastrophic fire would still exist, but the intent of the alternative would be to reduce the risk, thus protecting the excellent water quality and the Hydrologic Process ORV. The preferred alternative would have no effect on river gradient drops, natural conditions, such as glacial remnants or the numerous cascades.

Table V-2
Effects of the Preferred alternative on ORVs in the Non-Wilderness Segments of the Merced Wild and Scenic River Corridor

Outstandingly Remarkable Value	Effects of the Preferred Alternative
Scientific – The entire river corridor constitutes a highly significant scientific resource because the river watershed is largely within designated Wilderness in Yosemite National Park. Scientific ORVs relate to the Merced River's value for research. This ORV applies to all the Merced River segments.	The conditions achieved by the preferred alternative would protect and enhance the scientific ORV by maintaining or returning the various vegetation types to their natural range of variability and reduce the threat of large, high intensity wildfire. The preferred alternative could have a beneficial effect on the Scientific ORV.
Scenic – These segments provide magnificent views from the river and its banks of waterfalls (Nevada, Vernal, Illilouette, Yosemite, Sentinel, Ribbon, Bridalveil, Silver Strand, Wildcat, and Tamarack Creek Fall), rock cliffs (Half Dome, North Dome/Washington Column, Glacier Point, Yosemite Point/Lost Arrow Spire, Sentinel Rock, Three Brothers, Cathedral Rock, El Capitan, the Rostrum, Elephant Rock and Wawona Dome), meadows (Stoneman, Ahwahnee, Cook's, Sentinel, Leidig, El Capitan, and Bridalveil) the Cascades, spectacular rapids among giant boulders and continual white-water cascades in the deep and narrow river canyon in a untrailed, undisturbed environment below Wawona. There is a scenic interface of river, rock, meadow, and forest throughout the segments.	Fire management activities would affect scenic resources in generally beneficial ways, through actions that would contribute to restoring and maintaining open vistas and natural forest structure. Under the preferred alternative, there would be a lower probability of large, high intensity, catastrophic fires with effects to the Scenic ORV as major as the A-Rock Fire, than under No Action. Although air emissions (smoke) will be greater than under No Action and consequently affect the scenic ORV, the impact will be short term and the actions would overall enhance the Scenic ORV over the long term.
Geologic Processes/Conditions – These segments contains a classic, glaciated, U-shaped valley, providing important examples of a mature meandering river; hanging valleys such as Yosemite and Bridalveil Creeks; and evidence of glaciation (e.g., moraines below El Capitan and Bridalveil Meadows). Dramatic transition from the U-shaped, glaciated Yosemite Valley to the V-shaped river gorge with a continuous steep gradient and a transition from igneous to metasedimentary rocks (metasedimentary rocks are among the oldest in the Sierra Nevada).	The preferred alternative would have no effect on the geologic processes/conditions ORV. It would not affect the classic U-shaped valley, hanging valleys, or evidence of glaciation, mature meandering river, transition from the U-shaped to the V-shaped river gorge or transition from igneous to metasedimentary rocks.
Recreation – These segments offer opportunities to experience a spectrum of river-related recreational activities, from nature study and sightseeing to hiking. Yosemite Valley is one of the premier outdoor recreation areas in the world. Other segments provide a range of river-related recreational opportunities, in particular white-water rafting and kayaking (class III to V), fishing, outstanding opportunities for river-related solitude, enjoyment of natural river sounds, and primitive and unconfined recreation in an untrailed, undisturbed environment.	With the preferred alternative's reduction in the potential for large, catastrophic fire, the likelihood of park closures and impacts on park visitors would be reduced. The preferred alternative would greatly reduce the potential for fire-related park closures, although, during fires, closures in areas of the park would continue. During these closures, only the visitors within or wishing to enter that portion of the park would be affected. Some visitors would be redirected to other parts of the park during closures. While local closures and restrictions could cause changes in trip itineraries the spectrum of recreational opportunities would not be diminished. The restoration and maintenance of open vistas and natural forest structure and a lower probability of catastrophic fires would protect and enhance the Recreation ORV in non-Wilderness segments.
Biological – Riparian areas and low-elevation meadows are the most productive communities in Yosemite Valley. The high-quality, vast riparian, wetland, and other riverine areas provide rich habitat for a diversity of river-related species, including special-status species, neotropical migrant songbirds, and numerous bat species. Other segments are characterized by diverse riparian areas and associated special-status species that are largely intact and almost entirely undisturbed by humans, riverine habitats such as riparian woodlands and associated federal and state special-status species, including Tompkin's sedge, Willow flycatcher and Valley elderberry longhorn beetle and its critical habitat (elderberry shrub).	The preferred alternative would likely produce conditions that would protect and enhance the Biological ORV through the reduction of catastrophic fire threat. The preferred alternative also would somewhat improve riparian, wetland, and other riverine areas that provide rich habitat for a diversity of river-related species, including special status species. The multi strategy approach would also provide additional options for wetlands avoidance. By reducing the threat of catastrophic fire and restoring and maintaining the natural fire regime, wildlife habitat would be improved protecting and enhancing river related wildlife and special status-species.

Outstandingly Remarkable Value	Effects of the Preferred Alternative
Cultural – The Yosemite Valley segment contains evidence of thousands of years of human occupation, reflected in the large number of archeological sites and continuing traditional use today. Nationally significant historic resources are found here, such as designed landscapes and developed areas, historic buildings, and circulation systems (trails, roads, and bridges) that provide visitor access to the sublime views of natural features that are culturally valuable. Other segments contain cultural resources, including prehistoric sites and historic sites, some of the oldest archeological sites in the Yosemite area as well as many historic Indian villages and traditional gathering places. River-related historic resources include structures related to early tourism and industrial development such as those relating to historic engineering projects and early Army and National Park Service administration, and homesteading.	Implementation of the preferred alternative would reduce to a moderate extent the potential for catastrophic fire and its impacts. Of all fire management situations and treatments, catastrophic fire and emergency response actions result in the most frequent and severe impacts to archeological resources. Restoring the natural fire regime to culturally important areas will enhance the historic value that may have been degraded by previous fire suppression activities. Overall, the effect of the preferred alternative would protect and enhance the Cultural ORV by reducing the risk of catastrophic fire through the treatments in the preferred alternative.
Hydrologic Processes – These segments are characterized by a meandering river, world-renowned waterfalls, an active flood regime, oxbows, unique wetlands, and fluvial processes, exceptionally steep gradients, continuous rapids, excellent water quality, and continual white-water cascades.	The preferred alternative would produce long-term protection and enhancement. This is based upon a combination of beneficial, long-term, moderate to major impacts in fire management units. Large, high-severity fires would likely occur during the life of the plan, but the treatments proposed would reduce their effects upon soils and watersheds, including the potential for adverse effects upon peak flow and sediment yield. Restoration of natural forest structure over time would produce positive effects regarding water yield, nutrient yield, and stream system response. The potential for catastrophic fire would still exist, but the intent of the alternative would be to reduce the risk, thus protecting the excellent water quality and the Hydrologic Process ORV. The preferred alternative would have no effect on the numerous cascades, steep gradients, or continuous white-water rapids.

Relationship to the Merced Wild and Scenic River Boundary

Elements of the preferred alternative would occur within the Merced Wild and Scenic River Boundary and in all segments of the corridor.

Classifications

The preferred alternative would not change the classifications in any segment of the Merced River and is compatible with all classifications.

River Protection Overlay

Since one of the purposes of the River Protection Overlay is to protect and restore hydrologic processes and biotic habitats within the river corridor, the restoration and maintenance of the natural fire regime in the preferred alternative would be consistent with the River Protection Overlay.

The new Helibase in El Portal would be located within the River Protection Overlay. Based upon the River Protection Overlay prescriptions, essential facilities are allowed within it. The El Portal Helibase would be located on Foresta Road between the Merced River and the El Portal Sewage Treatment Facility. It would provide a safe and essential need for this community. The proposed improvements will better provide for public and pilot safety. Presently, lack of a suitable location often results in the use of Highway 140 or the schoolyard at the El Portal Elementary School. Both of these sites have serious safety risks associated with landing helicopters due to power lines and exposure to residents and the public.

Improvements consist of installing one gate to restrict traffic and use of the existing road. The existing road apron would be widened and additional asphalt would be laid to widen the road where the two 50'x 50' helipads would be installed. An asphalt spill abatement berm along the grouted rip-rap bank on the riverside of the road would be installed as well. This action would be consistent with the River Protection Overlay prescriptions which state when site-specific prescribed fire plans are done for wildland/urban interface areas those actions would also comply with River Protection Overlay prescriptions where applicable.

Management Zoning

The Preferred Alternative of the Final Yosemite Fire Management Plan/EIS encompasses and includes actions in all management zones. The restoration and maintenance of the natural fire regime in the Preferred Alternative would be consistent with all zoning on the Merced River.

The new Helibase in El Portal would be located in the Park Operations and Administration zone. The purpose of the Developed zones is to direct high-impact activities and facilities to areas better able to withstand heavy use and/or already developed locations in order to further protect and enhance ORVs in other parts of the corridor. The facilities allowed for in the Developed Zones, such as operational facilities like the Helibase, are necessary to properly accommodate park visitors, many of whom are coming to experience the scenic, recreational, and other ORVs of the Merced Wild and Scenic River. Neither the Helibase at Crane Flat or Wawona are located within the boundaries of the Merced Wild and Scenic River and are thus not subject to its management zoning.

Fire Management in the Tuolumne River Corridor

Compared to the 1990 *Yosemite Fire Management Plan*, the *Yosemite Fire Management Plan/Environmental Impact Statement* prescribes no changes to the fire management program along the Tuolumne Wild and Scenic River corridor, or within the watershed upstream or upslope of segments designated under the Wild and Scenic Rivers Act (map 5-1).

At this time, a management plan for the portions of the Tuolumne Wild and Scenic River which flows within Yosemite National Park has not been finalized and boundaries and specific ORVs have not been defined. The *Final Environmental Impact Statement and Study Report, Tuolumne Wild and Scenic River*, was completed in October 1979 (henceforth the Tuolumne Final Study). The Final Study looked at the segments of the river administered by Yosemite National Park and Stanislaus National Forest and identified nine ORVs for the river. Four study segments of the river fall within Yosemite National Park. The ORVs and the study segments flowing within Yosemite are shown in table 5.3.

Table V-3
Tuolumne River Outstandingly Remarkable Values (Final Study 1979)

Outstandingly Remarkable Values	Segment 1: Dana Fork, source to Tuolumne Meadows	Segment 2: Lyell Fork, source to Tuolumne Meadows	Segment 3: Tuolumne Meadows to Hetch Hetchy (max. pool)	Segment 5: O'Shaughnessy Dam to Early Intake
Scenic	Yes	Yes	Yes	Yes
Recreation	Yes	Yes	Yes	Yes
Geologic	Yes	Yes	Yes	Yes
Fishery	No	No	Yes	No
Wildlife	Yes	Yes	Yes	Yes
Historic/Cultural	Yes	Yes	Yes	Yes
Whitewater Boating	No	No	No	No
Scientific/Educational	Yes	Yes	Yes	Yes
Wilderness Characteristics	No	Yes	Yes	No

* Segment 4 was Hetch Hetchy Reservoir, which was not included in the Wild and Scenic River legislation.

The 1979 Final Study also recommended boundaries as ¼ mile either side of the ordinary high-water mark, which would total 320 acres per mile, the maximum allowed under the Wild and Scenic Rivers Act. The Tuolumne River is very different than the Merced River n that the only development existing along the designated sections of the river is at Tuolumne Meadows, which is a historic staging area for recreation and a trailhead, and just below the O'Shaughnessey Dam. Additionally, much of the Dana Fork runs next to Tioga Road. The segment of river that is impounded from O'Shaughnessey Dam to the high-water mark of the reservoir did not qualify for designation under the Wild and Scenic Rivers Act.

In the absence of an approved Tuolumne Wild and Scenic River comprehensive management plan, there are no changes to current management proposed in the Tuolumne River corridor and the parts of the watershed upstream and upslope of the designated river segments. Existing management that was approved in the 1987 *Fire Management Plan* and revised in the approved 1990 *Yosemite Fire Management Plan* designates the entire area above Hetch Hetchy Reservoir as part of the Fire Use Unit (using terminology consistent with revised National Park Service fire management policy and guidelines). Exceptions are Pate Valley and Tuolumne Meadows (both of which are discussed below). These two areas, because of values that require protection from wildland fire were designated as fire suppression areas in the 1990 plan.

Fire Management and the Tuolumne Wild and Scenic River

The most recent fire management plan for Yosemite was completed in 1990, in response to changes made to National Park Service fire management programs following the Yellowstone fires of 1988; before that the *Final Yosemite Fire Management Plan* had been most recently revised in 1987. Although a number of changes in zoning and fire management treatments are proposed in this (2002) revision of the *Yosemite Fire Management Plan*, none are proposed for areas along the Tuolumne Wild and Scenic River. Because of the lack of a completed Tuolumne River comprehensive management plan, the *Yosemite Fire Management Plan/Environmental Impact Statement* proposes no changes to zoning or treatments that would affect the Tuolumne Wild and Scenic River corridor or the portions of the watershed upstream or upslope of designated segments of the Tuolumne Wild and Scenic River in Yosemite National Park. Fire management in this watershed would remain status quo (as described in the 1990 *Yosemite Fire Management Plan*) until a comprehensive management plan for the river is completed.

Maintaining the present strategy is not only suitable but it better protects ORVs than if the park were to revert to “suppression only” which would be required, by policy, for areas without a fire management plan. The current management strategy works well until a comprehensive management plan for the Tuolumne Wild and Scenic River is completed that could make provisions for change that might be necessary to further protect and enhance ORVs. Although the action alternatives include a number of changes to fire and fuel management programs, these are mainly additional types of treatments that will help protect the wildland/urban interface, especially in high population areas like Wawona and Yosemite Valley. No changes in wildland/urban interface treatment are needed in the Tuolumne Meadows area because this area has not been greatly altered by past fire suppression activities (in stark contrast to lower elevation wildland/urban interface areas of Wawona, Crane Flat, and Yosemite Valley, for example).

There will be no changes in treatments within the Tuolumne Wild and Scenic River watershed (map 5-1). Tuolumne Meadows and the areas below O’Shaughnessy Dam would continue to be in the Suppression Unit, and no change in treatments from those done under the 1990 plan is proposed there. Analysis shows that much of this area is within the natural range of variability.

An examination of the Maximum Fire Return Interval Departure Map (map 2-5) helps to illustrate this point. Most of the Tuolumne River watershed is shown as having missed no fires (i.e., zero fire return interval departure), while the areas with the greatest departure are clustered along the west and southwest boundaries, between the South Entrance and Crane Flat (mostly in the Merced River watershed). Much of the Tuolumne watershed is high elevation country where forests are broken up by many rock outcroppings. Plant communities are characterized by long fire return intervals so they do not experience fire as often as low elevation forests to the west. The low-elevation area within the Tuolumne watershed, below O’Shaughnessy Dam, was burned in 1996 and is in a semi-restored condition at this time. In general, fire management staff believes that the current treatments used along the Tuolumne Wild and Scenic River corridor are effectively restoring and maintaining these areas.

Clarifications of Zoning in the 1990 Plan and the Proposed Revision

Tuolumne Meadows Suppression Unit. In the 1990 *Fire Management Plan/Environmental Assessment*, the Tuolumne Meadows Suppression Zone originally identified was loosely delineated on maps and never clearly described within the text. Managers have had to make case-by-case decisions relating to fire in this area and often the factors that most influenced the decision related to: time of year, potential fire behavior, and location of the ignition. In this revision of the *Yosemite Fire Management Plan*, the boundary for the area of Tuolumne Meadow that is in the Suppression Unit is clearly defined. It follows the Wilderness boundary. The final plan will include a narrative description of the entire Suppression Unit so that management direction is unambiguous. Thus, the identification of the Suppression Unit around Tuolumne Meadow has been redefined to eliminate uncertainties.

Pate Valley. The 1990 *Yosemite Fire Management Plan* shows Pate Valley in the Suppression Zone as a Prescribed Burn Block, because of cultural resources and traditional cultural values in the area. Through collaboration with American Indian tribes, it was decided to treat parts of this area with prescribed fire in 1993 and 1994 to reduce the risk of damage to cultural resources. Following consultation with American Indian tribes in 1999, a managed wildland fire was allowed into Pate Valley in accordance with the 1990 Plan, which states:

> "…. prescribed burn units are designated within the suppression zone [Zone III] and Zone II (conditional zone). In these units, fires will be ignited by management under specified weather, fuel moisture, and fire behavior parameters to restore fuel loadings and forest structure within the natural range of variability. Once this is accomplished most of these units will be incorporated within the year-round prescribed natural fire management Zone I."

Prior to starting this revision to the *Yosemite Fire Management Plan*, Pate Valley was already being managed as part of the prescribed natural fire zone (equivalent to the Fire Use Unit in this revision) consistent with the provisions of the 1990 plan, as was an area near Merced Lake High Sierra Camp. This revision of the *Yosemite Fire Management Plan* shows Pate Valley as being in the Fire Use Unit as well, but continuing to be a Prescribed Fire Unit so that periodic maintenance of vegetation around the high value areas can be completed. Consultation with American Indian tribes has become a standard procedure for all prescribed burning in Yosemite and managed wildland fires where cultural concerns exist.

Changes in Unit Designations that would not affect the Tuolumne Wild and Scenic River Corridor in Yosemite

The south shore of Hetch Hetchy Reservoir was in the Conditional Zone in the 1990 plan. In accordance with the new national policy, only two units, a Fire Use and a Suppression Unit, are proposed for the revised plan. The area south of Hetch Hetchy Reservoir would be divided between these two units. Hetch Hetchy Reservoir was ineligible for inclusion in the Wild and Scenic River system, and these effects do not represent a program change with respect to the Tuolumne Wild and Scenic River. These changes are not in the immediate watershed of the main fork of the river but are in the immediate watershed of the Middle Fork, which was not part of the designation. These changes are a result of policy changes, which call for the use of an *appropriate management response* for all fires. Continued establishment of fire management units is still directed under policy but adoption of the appropriate management response strategy makes the use of a conditional zone irrelevant as fire may be either managed or suppressed within the fire use unit. Within the Suppression Unit, fire must be suppressed.

Mid-elevation wildland/urban interface areas in the Suppression Unit, including Hodgdon Meadows and areas along the Crane Flat Road have been adversely affected by past fire suppression activities. Fuels in these areas need to be reduced by hand or machine as described in the action alternatives (table 2.6). These areas also are within the portions of the watershed drained by the Middle Fork and South Fork of the Tuolumne River, which enter the Tuolumne River downstream of the park boundary. The potential effects of these changes will be evaluated in terms of the ORVs identified by the U.S. Forest Service in its management plan for the segments of the Tuolumne Wild and Scenic River under their jurisdiction. The Middle Fork and South Fork were not included in the 1979 Final Study for the Tuolumne Wild and Scenic River.

Effects of Yosemite Fire Management on the Tuolumne Wild and Scenic River Segments Managed by Stanislaus National Forest (USFS)

The Tuolumne Wild and Scenic River, downstream of Yosemite National Park, could be potentially affected by fire management activities in the watersheds of the Middle and South Forks of the Tuolumne. Big Oak Flat and Hodgdon Meadows are in the South Fork watershed and the Suppression Unit. White Wolf is in the Middle Fork and is in a small piece of the Suppression Unit, completely surrounded by Fire Use Unit. Big Oak Flat Road and Tioga Road move through both the South and Middle Fork watersheds. Wildland/urban interface treatments are proposed for Big Oak Flat, Hodgdon Meadow, and White Wolf.

Stanislaus National Forest was consulted to assess the potential for protecting and enhancing ORVs along the segments of the Tuolumne River downstream of the South Fork/Main Stem confluence, which the U.S. Forest Service manages. Downstream of the confluence, the Tuolumne River segments are: 'Scenic,' in the Lumsden Bridge area; and 'Wild,' along the fifteen mile segment downstream to Lake Don Pedro. Both of these segments were evaluated as parts of Segment 7 in the Tuolumne Final Study, which documented the presence of scenic, recreation, geologic, fishery, wildlife, historic/cultural, white water boating and scientific/educational ORVs.

The following assessments were completed after consulting with Stanislaus National Forest:

Scenic Fire management activities along the South and Middle Forks of the Tuolumne, inside Yosemite National Park, would not affect the potential to preserve and enhance the scenic ORVs along this segment.

Recreation It is unlikely that activities in the park would affect the range of recreational uses downstream of the confluence with the mainstem Tuolumne. It is unlikely that there would be noticeable effects. Although catastrophic fire has the potential to cause a pulse of sediment that could affect stream system responses in the downstream portions of the watershed (potentially affecting navigable channels, camping beaches, put ins and takeouts), the preferred alternative is intended to return the vegetation of the upper watersheds to its natural range of variability. This would work to maintain rather than disrupt these attributes, thus protecting and enhancing the recreation ORV.

Geologic The major geologic values in these segments are the steep-walled V-shaped canyons, and the metasedimentary rocks of the Calaveras formation. The proposed fire management actions would not affect the potential to protect and enhance these ORVs.

Fishery The lower segments of the Tuolumne support a high quality trout fishery. Fire, if catastrophic, can increase sediment and nutrient loading, which can negatively affect a trout fishery. However, the purpose of the fire management actions is to return the vegetation of the upper parts of the South and Middle Fork watersheds to within its natural range of variability. Typical fires would exhibit variable fire intensities throughout a watershed. Additionally, a typical fire would burn only portions of a watershed, or portions of a slope, thereby limiting the potential for increases in sediment and nutrient loading. It was noted during the consultation that 150,000 acres of the Tuolumne River watershed have burned in recent years [the Ackerson Fire in 1996 (in the upper Tuolumne) and the Stanislaus Complex Fire in 1987 (in the lower Tuolumne watershed)]. No deleterious effects upon the fishery were identified after either fire. This is the nature of the Tuolumne River watershed, which burns regularly. There would be no likely affect on potential to protect and enhance the ORV.

Wildlife Deer use the Tuolumne River canyon to travel between Yosemite National Park and Stanislaus National Forest. Wildland fire and the actions to restore the system to within its natural range of variability would protect and enhance deer habitat. Red-legged frog now has critical habitat along the main stem of the Tuolumne River below 5,000 ft. elevation; this does not include the South and Middle Forks. The U.S. Forest Service is protecting critical habitat along the main stem by protecting riparian habitat and managing activities at river crossings. Stream system responses along downstream segments could be altered by catastrophic fire in upper portions of the watershed, but the proposed actions are intended to return these areas to within their natural range of variability. This would reduce the potential for adverse effects upon peak flow and sediment yield, producing positive effects regarding water yield, nutrient yield, and stream system response. Thus, riparian areas would be protected. This ORV would be protected and enhanced by the fire management actions.

Historic/Cultural The actions would have similar effects on cultural and historic resources as those outlined in Chapter 4.

White Water Boating Fire management actions in Yosemite National Park would not effect the quality of white water boating, with the possible exception of an increase in water yield, as a result of bringing the system back to within its natural range of variability. This would be a benefit to this ORV. Some loss of scenic resources may occur during periods of smoke from wildland and prescribed fires.

Scientific/Educational Fire management actions would have little or no negative effect on the scientific/educational ORV. The restoration and maintenance of more natural ecosystems due to wildland fire use and prescribed fire will increase the scientific and educational ORV.

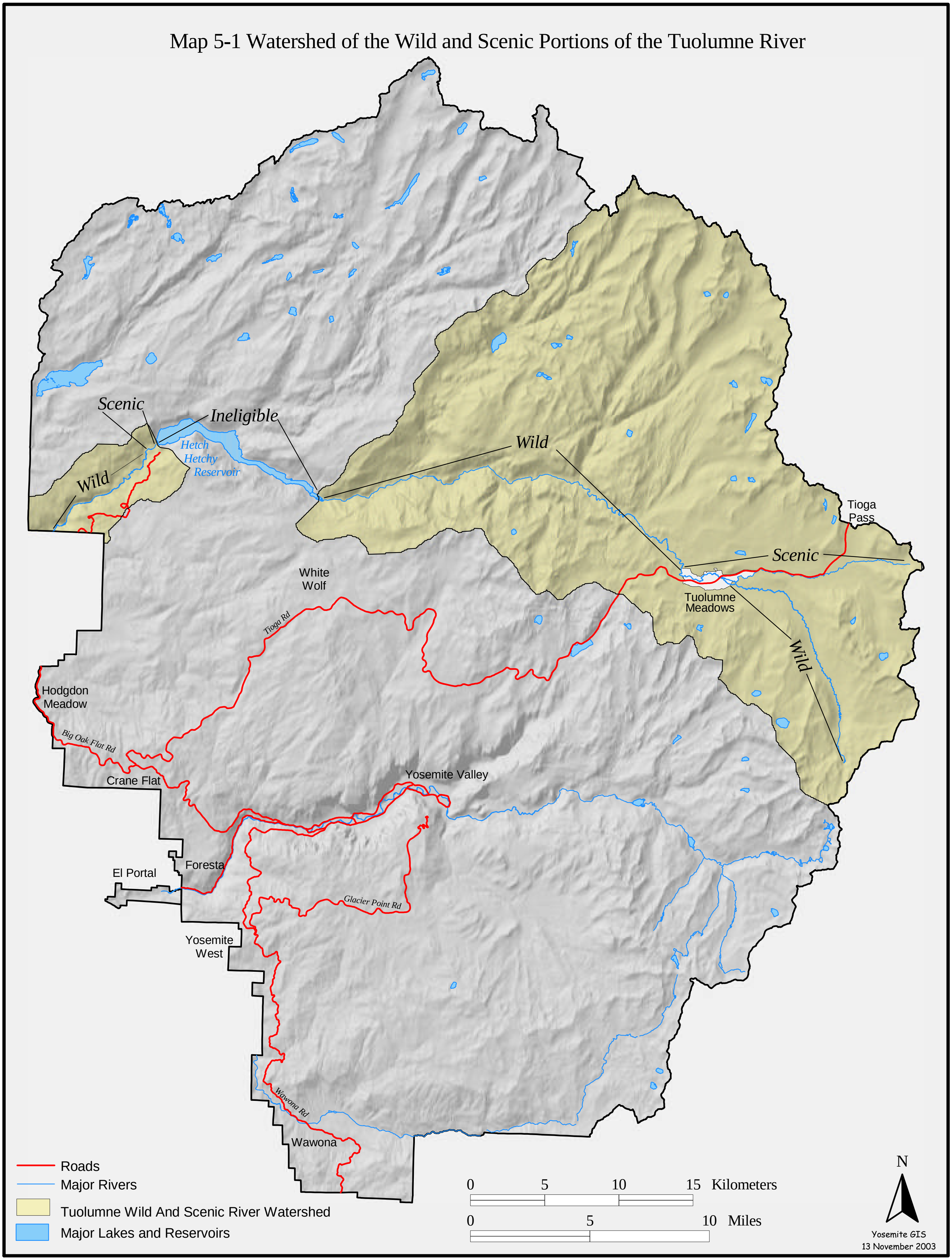
Management of Tuolumne Wild and Scenic River by Yosemite National Park

Despite the fact that the National Park Service has not fulfilled the requirement to complete a comprehensive management plan for the Tuolumne Wild and Scenic River, the National Park Service is continuing to manage the Tuolumne River, as part of carrying out the agency's mission. The National Park Service is already managing Yosemite National Park, including the Yosemite's designated Wilderness. The *Yosemite Wilderness Management Plan* addresses management of all of the Tuolumne River in Yosemite National Park, except Tuolumne Meadows, as specified in a Federal Register notice in September 1986.

Because legislation for the Tuolumne Wild and Scenic River does not specify that the agency do otherwise (see the Wild and Scenic Rivers Act), when a management plan for the Tuolumne River is completed, the protection of ORVs under that plan will be consistent with National Park Service efforts to protect Yosemite National Park and Yosemite Wilderness values. The agency will continue to protect these values, which were and are the foundations under which the 1990 *Yosemite Fire Management Plan* and its predecessors were developed.

National Park Service policy requires that, in the absence of a fire management plan, all fires be suppressed. The impacts of fire suppression activities and a program reversal that would result in ecosystem degradation because of fire suppression activities, would be inconsistent with managing, preserving, and enhancing the resources and values of Yosemite National Park, Yosemite Wilderness, and the Tuolumne Wild and Scenic River.

In the future, any proposed changes to the fire management program in and along the Tuolumne Wild and Scenic River, for whatever reason, would only be considered once a plan for the Tuolumne Wild and Scenic River has been completed. The plan would consider ways in which wildland fire can further enhance and protect ORVs. Until that time the fire management strategies identified in the1990 Fire Management Plan would remain in effect for the Tuolumne Wild and Scenic River watershed (map 5-1).



Map 5-1 Watershed of the Wild and Scenic Portions of the Tuolumne River
Scenic
Ineligible
Hetch
Hetchy
Reservoir
Wild
Wild
Tioga
Pass
Scenic
Tuolumne
Meadows
Wild
White
Wolf
Tioga Rd
Hodgdon
Meadow
Big Oak Flat Rd
Crane Flat
Yosemite Valley
Foresta
El Portal
Glacier Point Rd
Yosemite
West
Wawona Rd
Wawona
Roads
Major Rivers
Tuolumne Wild And Scenic River Watershed
Major Lakes and Reservoirs
0 5 10 15 Kilometers
0 5 10 Miles
N
Yosemite GIS
13 November 2003

Chapter VI: Consultation and Coordination

Introduction

This chapter describes the history of public involvement leading up to and during development of the *Final Yosemite Fire Management Plan/EIS*. Public participation in the planning process helps to ensure that the National Park Service fully understands and considers the public's interest. Through public involvement, the National Park Service shared information about the planning process, issues, and proposed actions. In turn, the planning teams were informed if the concerns and values of those groups and individuals who participated in the process. Also as part of the public involvement and in compliance with laws and regulations, management agencies and other public constituencies were consulted. Chapter 6 describes these consultations and their results. With the help of the public's involvement, the National Park Service is able to make better informed decisions and improved plans.

Public and agency participation throughout the planning process allowed the planning team to:

- Analyze and incorporate comments from previous planning efforts
- Collect scoping comments to help define the range of issues to be addressed
- Provide opportunities for the public to obtain the knowledge necessary to make informed comments
- Collect public, American Indian, and agency comments on the *Final Yosemite Fire Management Plan/EIS*
- Consult with other management agencies
- Produce the best possible plan

Public and agency participation in the planning process will not end with the *Final Yosemite Fire Management Plan/EIS,* but will continue throughout the implementation phases of the plan.

Public Scoping

Public scoping is part of the National Environmental Policy Act process (40 CFR 1501.7) for preparing an environmental impact statement. Scoping helps determine the range of issues and opportunities to be used in developing the alternatives and their attributes, and for assessing their environmental effects. The process used during public scoping, and in additional consultation and coordination for the *Draft Yosemite Fire Management Plan/Environmental Impact Statement* is described below.

In November 1998, the National Park Service issued new directions for wildland fire management in national parks. In early 1999, the Fire Management Office at Yosemite National Park sent a letter to individuals, organizations, and agency and government offices on the park's planning activity mailing list. This letter invited recipients to assist in identifying fire management issues and opportunities. There were 26 letters, faxes, and emails received during this scoping period. The described 41 separate concerns.

In January 2001, following the fire season of 2000 during which many homes and structures across the country were destroyed, a *Report to the President* was prepared and a new Federal Wildland Fire Management Policy was released. The new policy was a revision and update of the December 1995 Final Report of the Federal Wildland Fire Management Policy and Program Review. This document was accepted by the Secretaries of Interior and Agriculture. It endorsed the older policy and strengthened the principles, policies, and recommendations of the 1995 report. A National Fire Plan was also introduced and approved. This national plan directed the National Park Service to expedite the removal of hazardous fuels from wildland/urban interface areas to provide immediate protection of natural and cultural resources, physical property, and facilities, both federal and private.

As a result of the national direction and the issues raised by the Yosemite public during scoping in 1999, a Notice of Intent to prepare an environmental impact statement (EIS) was prepared and published in the Federal Register on March 20, 2001. Letters were again sent to individuals, organizations, and government representatives. The Notice of Intent invited the public to help identify fire management issues and concerns, a suitable range of alternatives and appropriate mitigating measures, and the nature and extent of potential environmental impacts to be addressed in the EIS. Comments were received through April 30, 2001. An open house was also held on April 10, 2001, in Yosemite Valley.

During the public scoping period, 93 letters, faxes, and emails describing 68 separate concerns were received. These concerns are listed under ***Issues and Concerns Used to Develop the Alternatives,*** in ***Chapter 1, Purpose and Need.***

Public Comment Period

The *Draft Yosemite Fire Management Plan/Environmental Impact Statement* was mailed to over 800 interested federal, state, local, and Indian tribal agencies and members of the public on May 10, 2002; it was also posted on the park website. A Notice of Availability for the Draft EIS was published in the Federal Register on June 18, 2002 (Vol. 67, No 117, page 41444). On June 28, the Environmental Protection Agency published their announcement of environmental impact statements officially filed (Federal Register/Vol. 67, No. 125, page 43597), and established the end of the public comment period as August 27, 2002. A press release concerning the comment period's opening and closing was widely distributed on July 1, 2003.

In order to facilitate public review and comment on the *Draft Yosemite Fire Management Plan/EIS,* public open house meetings were held in July 2002, in Oakhurst, Mariposa, Sonora, and Mammoth Lakes, and on three occasions (in June, July and August) in Yosemite Valley; field trips were scheduled to coincide with the Yosemite Valley open houses. At the beginning of the public comment period, and prior to each open house, the National Park Service advertised that comments would be received through August 27, 2002. This advertising included press releases and notification on the Yosemite National Park web site. For open houses, topical information sheets were prepared and handed out to the public.

The National Park Service received 143 written comment letters by mail, email, fax, and at public meetings. All comment letters were read and analyzed by members of the Fire Management Planning Team. These letters contained 753 discreet comments, which were grouped into 202 concerns. Responses to comments are found in Appendix 12. All comments letters are preserved in the administrative record.

Approximately 46 people attended the public open house meetings in Mammoth Lakes, Mariposa, Oakhurst, Sonora, and Yosemite Valley during the public comment period. Another 10 people participated in Fire Management Plan-related field trips that were conducted for the public.

Organizations and Agencies Consulted

March 15, 2001. Meeting with representatives of the American Indian Council of Mariposa County (Southern Sierra Miwok) at the Mariposa Library. Discussed issues and concerns, including traditional cultural areas, gathering areas, archeological resources, fire suppression activities, fire crew development, the Federal Wildland Fire Management Policy, and the development of the *Yosemite Fire Management Plan*.

March 26 to April 10, 2001. During a two-week period prior to the public scoping session in Yosemite Valley, telephonic contacts were made to representatives of environmental organizations, including the Wilderness Society, National Parks and Conservation Association, Natural Resources Defense Council, Central Sierra Environmental Resource Center, and the Sierra Club. The Director of the Mariposa County Planning Department and the Mariposa County Supervisors with responsibility for effected communities (considered as wildland/urban interface under the plan) were also contacted. The planning process and various fire management treatments for accomplishing resource management objectives were discussed.

April 5, 2001. Park representatives met with North Fork Mono Rancheria in a general consultation meeting. Discussion included the fire management plan as well as the specific actions for calendar year 2001 burns and thinning projects.

April 7, 2001. Meeting with Wawona Town Planning Advisory Committee, at the Wawona Community Center. Eleven people attended. Information was provided on the Yosemite Fire Management Plan scoping meeting, the Wildland/Urban Interface Initiative, the National Fire Plan, and Wawona-specific fire management options. The group expressed concerns about fire protection, structural fire capabilities, and the need to remove some of the trees in Wawona for fire protection. The group was supportive of proactive fire management projects.

April 18, 2001. Meeting with El Portal Town Planning Advisory Committee to share information on the fire management plan revision, the Wildland/Urban Interface Initiative, the National Fire Plan, and El Portal-specific fire management options. Nine people attended. The group articulated concerns about fire protection and smoke and were supportive of proactive fire management projects. The group also expressed concerns about non-native plant invasion due to fire management activities and some concern for Yosemite West and a cohesive plan with the U.S. Forest Service.

April 25, 2001. Correspondence sent by park to all associated American Indian groups, concerning projects at Yosemite National Park, including the fire management plan, and informing them of National Park Service interest in seeking consultation.

April 28, 2001. Meeting with Wawona Area Property Owners Association, at the Wawona Community Center. Over 30 people attended. Information was shared on the Yosemite Fire Management Plan revision, the Wildland/Urban Interface Initiative, the National Fire Plan, and Wawona-specific fire management options. The group articulated concerns about fire protection. They were supportive of fire management projects and of housing fire personnel and offices in Wawona. Discussion also included fire history and a possible missing fire record from the 1950's. They also brought up the need for another road bridge across the Merced River, on the east end of town (beyond the scope of the fire management plan).

April, 28,2001. Meeting with Foresta Association, at the Eisenstein Home. A presentation was given on the development of the fire management plan. Issues discussed included placement of a fire crew, the wildland/urban interface, and various fuel treatments including mechanical and hand thinning, fuel breaks, and the A-Rock Fire.

May 1, 2001. Meeting of the California Central Province Fire Management Officers (Stanislaus, Sierra, Sequoia, and Inyo National Forests; Bakersfield Bureau of Land Management District; Sequoia National Park; and Yosemite National Park). Held at Sierra National Forest Supervisor's Office, in Clovis, CA. Yosemite Fire Management Officer met and explained the process for developing the *Yosemite Fire Management Plan*.

April 23, 2001. Letter to Mariposa County Air Pollution Control Officer, requesting response from the county as to its information needs regarding smoke management planning, data, mitigations, and other actions, with respect to Yosemite fire management activities. Response received.

April 23, 2001. Letter to Tuolumne County Air Pollution Control Officer, requesting response from the county as to its information needs regarding smoke management planning, data, mitigations, and other actions, with respect to Yosemite fire management activities. Response received dated April 27, 2001.

June 4 to June 11, 2001. Consultation meetings with American Indian Council of Mariposa County (Southern Sierra Miwok) (6/4) and North Fork Mono Rancheria (6/11). Telephone consultation with Mono Lake Indian Community (6/5). Written response from Bridgeport Indian Colony. Tuolumne Rancheria informed the National Park Service that Bill Leonard of American Indian Council of Mariposa County will take the lead for them as well. Discussion included *Yosemite Fire Management Plan* as well as the specific actions for calendar year 2001 burns and thinning projects.

July 9, 2001. Phone conversation with Samuel Elizondo, Environmental Specialist for Picayune Rancheria, Chukchansi Tribe. Discussed items on the project list/agenda from the 3/15/2001 meeting with American Indian Council of Mariposa County.

July 16 and 17, 2001. In separate meetings, park representatives met with the Bishop Paiute Tribe and Mono Lake Indian Community to discuss park projects. On July 16, park staff consulted with the Bridgeport Indian Colony. At all three consultation meetings the *Yosemite Fire Management Plan* was discussed as was the 2001 burn activities in Yosemite National Park.

July 19, 2001. Interagency Smoke Council (IASC) at Point Reyes, CA. Park and regional staff presented information on the air quality analysis being used in the *Draft Yosemite Fire Management Plan/EIS*. Attending were representatives from federal, state, and private agencies conducting burns in California, as well as California Air Resources Board personnel and several Air Pollution

Control Districts (including San Joaquin Unified Air District). The presentation consisted of a fire history of Yosemite, discussion of tentative draft alternatives and potential emissions, a representative map of Smoke Sensitive Areas, and a solicitation of input when the *Draft Yosemite Fire Management Plan/EIS* becomes available.

August 11, 2001. Park representative met with the Sierra Nevada Alliance (of environmental organizations), at Yosemite National Park. Visited sites within the park, discussed past projects, and discussed concepts, including fire return interval departure analysis (FRID), passive and aggressive mechanical means for restoring forest stands, catastrophic fire, and air quality impacts.

October 18, 2001. Park representatives met with the Interagency Smoke Council to discuss changes to and implementation of burning regulations as they pertain to wildland fire. A presentation was given related to the Yosemite fire management program and the air quality analyses completed to prepare the *Draft Yosemite Fire Management Plan/EIS*. There was discussion of the Hoover Fire (of 2001), and the public information activities used to mitigate effects.

During the Comment Period for the Draft Yosemite Fire Management Plan/Environmental Impact Statement (in addition to public open houses/meetings):

August 9, 2002. Park representatives met with the Yosemite Concession Services employees, and presented information on the *Draft Fire Management Plan/ Environmental Impact Statement* and answered questions.

August 10, 2002. Park representatives met with the Wawona Town Planning Advisory Committee, and presented information on the *Draft Fire Management Plan/ Environmental Impact Statement*, wildland/urban interface and air quality, and answered questions.

August 12, 2002. Park representatives met with the El Portal Town Planning Advisory Committee, and presented information on the *Draft Fire Management Plan/Environmental Impact Statement,* wildland/urban interface and air quality, and answered questions.

August 16, 2002. Park representatives met with Tuolumne County Alliance for Resources and Environment (TuCARE), and presented information on the *Draft Fire Management Plan/Environmental Impact Statement,* wildland/urban interface and air quality, and answered questions.

August 19, 2002. Park representatives met with the Yosemite West Town Planning Advisory Committee, and presented information on the *Draft Fire Management Plan/Environmental Impact Statement,* wildland/urban interface and air quality, and answered questions.

August 21, 2002. Park representatives met with members of the public at the Yosemite Valley Open House, and presented information and answered questions about the *Draft Fire Management Plan/Environmental Impact Statement*, and answered questions. A member of Senator Diane Feinstein's staff attended.

Coordination

California State Historic Preservation Officer. The National Park Service conducted consultation with the California State Historic Preservation Officer and the Advisory Council on Historic Preservation. This consultation was done according to the National Park Service's 1999 Programmatic Agreement for compliance with Section 106 of the National Historic Preservation Act. It included letters dated May 16, 2001 to the California State Historic Preservation Officer and the Advisory Council on Historic Preservation, advising them that the National Park Service was undertaking preparation of a new fire management plan and draft environmental impact statement. In May 2001, a copy of the *Draft Yosemite Fire Management Plan/EIS* was forwarded to the California Office of Historic Preservation. A letter dated February 28, 2003 was sent to the California State Historic Preservation Officer, requesting their review and comment, and offering to provide a briefing on modifications being considered as a result of public comment. On March 13, 2003, an informational copy of the *Draft Yosemite Fire Management Plan/EIS* was provided to the Advisory Council on Historic Preservation. Copies of letters requesting comments appear in Appendix 7; no responses were received.

U.S. Fish and Wildlife Service. The Endangered Species Act of 1973, as amended (16 USC 531 et seq.) requires all federal agencies to consult with the U.S. Fish and Wildlife Service to ensure that any action authorized, funded, or carried out by the agency does not jeopardize the continued existence of listed species or critical habitat. The National Park Service contacted U.S. Fish and Wildlife Service representatives on March 5, 2001. After initial consultation, the U.S. Fish and Wildlife Service recommended to the National Park Service that a Biological Assessment be prepared for the *Draft Yosemite Fire Management Plan/EIS*. A Biological Assessment on the *Draft Yosemite Fire Management Plan/EIS* was submitted to the U.S. Fish and Wildlife Service on September 20, 2001 and was found in Appendix 11. The National Park Service requested that formal consultation be initiated with the U.S. Fish and Wildlife Service.

On November 19, 2002, planning team members and other staff met with U.S. Fish and Wildlife Service representatives to discuss the *Final Yosemite Fire Management Plan/EIS* and the issuance of a Biological Opinion. In February, 2003, additional information related to Valley Elderberry Longhorn Beetle was submitted by letter to the U.S. Fish and Wildlife Service. On May 14, 2003, Park staff provided additional information related to mitigation measures common to all action alternatives, including for wetlands, vegetation, wildlife conservation for special status species, including Mountain yellow-legged frog, Yosemite toad, California spotted owl, and Pacific fisher, and terms and conditions for listed species, including Valley Elderberry Longhorn Beetle. On July 29, 2003, the U.S. Fish and Wildlife Service mailed to the National Park Service its Formal Endangered Species Consultation on the Yosemite Fire Management Plan, Yosemite National Park, California (see Appendix 9).

U.S. Geological Survey. The expertise of the U.S. Geological Survey was used to evaluate fire ecology and fire return interval departures for Yosemite National Park. This information is included in the plan as part of the technical basis for the development of the alternatives. U.S. Geological Survey scientists were consulted again while analyzing issues raised by the public during the public comment period. U.S. Geological Survey scientists provided technical information that was added to Affected Environment, Chapter 3, and used to modify the alternatives and analysis in response to public comments.

National Park Service Water Resources Division. Executive Orders 11988, Floodplain Management, and 11990, Protection of Wetlands, direct federal agencies to enhance floodplain and wetland values, to avoid development in wetlands and floodplains whenever there is a practicable alternative, and to avoid impacts associated with the occupancy or modification of floodplains or wetlands to the extent possible. In consultation with the National Park Service Water Resources Division, it was concluded that Statements of Finding for floodplains and wetlands would not be needed for the *Draft Yosemite Fire Management Plan/EIS*.

Agencies and Organizations that Received Copies of the Final Yosemite Fire Management Plan/EIS

Federal Agencies and Members of Congress

Advisory Council on Historic Preservation
Bureau of Reclamation, Sacramento Office
Dept. of Defense, Army Corps of Engineers
Stanislaus National Forest, Groveland Ranger District
Humboldt-Toiyabe National Forest
Inyo National Forest, Lee Vining Ranger District
Sierra National Forest, Minarets Ranger District
National Park Service
NPS- Air Resources Div
NPS- Denver Service Center
NPS Pacific West Region
NPS- Pacific Great Basin Support Office
NPS- Water Resources Div
Pacific Southwest Forest & Range Exp Station
United States Attorney's Office
Representative George Radanovich, US Congress
Senator Barbara Boxer, US Congress
Representative John T. Doolittle, US Congress
Representative George Miller, UC Congress
US Dept of Justice
US DOI, Bureau of Land Management, CA State Office, Folsom
US Environmental Protection Agency, Region IX
US Fish & Wildlife Service, Sacramento Regional Office
US Geological Survey, Menlo Park
USDA Natural Resource Conservation Service
USDOI Library
US Post Office, Yosemite National Park

State and Local Agencies

CA Dept of Fish & Game
CA Dept of Parks and Recreation
CA Native American Heritage Comm
CA State Clearinghouse
CA State Department of Justice
CA DOJ - Attorney General
CA State Resources Agency
CA State Senate
CA Air Resources Board
Caltrans
Council of Fresno County Governments
Office of Assemblyman Dave Cogdill
Eastern Madera Cnty Chamber of Commerce
El Portal Town Planning Adv Committee
Fish Camp Advisory Council
Fresno Cnty Board of Supervisors
Fresno Cnty Planning & Resource Mgmt
Groveland Community Services District
Madera County Planning Director
Madera County Board of Supervisors
Mariposa County Air Pollution Control District
Mariposa County Board of Supervisors
Mariposa County Planning Department
Mariposa County Sheriff
Mariposa County Unified School District
Mono County Board of Supervisors
Mono County Planning Dept
San Joaquin Air Pollution Control District
Stanislaus Council of Government
Stanislaus Cnty Env Review Committee
State Water Resources Control Board
Tuolumne County Air Pollution Control District
Tuolumne County Board of Supervisors
Tuolumne County Community Development
Tuolumne County Planning Commission
Tuolumne County Sheriff
Wawona Town Plan Advisory Comm

Indian Tribes

American Indian Council of Mariposa
CA Native American Heritage Comm
Madera County Chuckchansi Tribal Govt
Madera County North Fork Mono Indian Museum
Mono County Bridgeport Paiute Indian Colony
Mono County Mono Lake Indian Community
North Fork Rancheria
Tuolumne County Tuolumne Mewuk Tribal Cncl

Organizations

Acton - Agua Dulce Trails Council
American Alpine Club
American Hiking Society
American River Club
American Whitewater
Ansel Adams Gallery
Antelope Valley Press
Associated Press
Backcountry Horsemen of California
Biophilia Society
Bishop Chamber of Commerce
CA Trout Inc, Sierra Nevada Office
California Preservation Foundation
California Wilderness Coalition
Central Sierra Env Research Center
California Native Plant Society - Sequoia Chapter
Conservation Study Institute
CSU Stanislaus
Delaware North Corporation
Earth First! - Santa Cruz
Earth Island Institute
Earthjustice Legal Defense Fund
El Portal Homeowners Assn
El Portal Market
Environment & Natural Resources
Environment Now
Environmental Defense Fund
Fish Camp Property Owners Assn
Foothill Resources
Foresta Preservation Association
Fresno Chamber of Commerce
Friends of the Earth
Friends of the River/American Rivers
Friends of Yosemite Valley
Heritage Trails
Hetch Hetchy Water & Power
Highway 120 Association
Mammoth Lakes Chamber of Commerce
Mariposa Gazette
Mariposa Horse Association
Mariposa Tribune
Merced Irrigation District
Merced Sun Star
Mountain Light Photography
National Trust for Historic Preservation
Native Habitats
Natural Resources Council
Natural Resources Defense Council
Northcoast Environmental Center
National Parks Conserv Assn, National Office
Planning & Conservation League
Royal Robbins Inc
Save-the-Redwoods League
Saving Yosemite
Scotty's B&B/Cabin Rentals
SEIU Local 535
Sequoia Alliance
Sierra Club
Sierra Club Condor Group
Sierra Club Loma Prieta Chapter
Sierra Club Merced Group
Sierra Club National Office
Sierra Club Range of Light-Toiyabe Chapter
Sierra Club Tuolumne Group
Sierra Club Yosemite Committee
Sierra Star
Sonora Union Democrat
Soroptomist International of Groveland
The Access Fund
The Fresno Bee
The Modesto Bee
The Redwoods in Yosemite
The Trust for Public Land
Theroux Environmental
Tioga Lodge
TNC Weed Program
Wawona Area Property Owner’s Association
Wild Earth Advocates
Wild Wilderness
Wilderness Society
Wilderness Watch
Wildlands Center for Preventing Roads
YA Board of Trustees
Yosemite Area Audubon
Yosemite Association
Yosemite Bug Hostel
Yosemite Campers Association
Yosemite Campers Coalition
Yosemite Concession Services
Yosemite Fund
Yosemite Guides
Yosemite Institute
Yosemite Mobilization Committee
Yosemite Motels
Yosemite Mountaineering School
Yosemite Partners GMP

Yosemite Pines
Yosemite Restoration Trust
Yosemite Sierra Visitors Bureau
Yosemite Valley School
Yosemite West Group
Yosemite West Home Owners

Libraries

Alameda County Public Library
Bassett Memorial Library
Contra Costa County Library
Columbia College Library
CSU Fresno, Henry Madden Library
Fresno Flats Historical Library, SHSA
Los Angeles City Public Library
Marin County Public Library
Mariposa County Public Library
Oakhurst Public Library
Sacramento County Public Library
Salazar Library, Sonoma State U
San Bernardino Cnty Public Library
San Francisco City Public Library
San Jose City Public Library
Santa Cruz County Library
Stanford University Green Library
Stanislaus County Library
UC Berkeley Bancroft Library
UC Davis Shields Library
UCLA Maps & Govt Information Library
UCLA Young Research Library
Univ of CA Library Tech Services
Yosemite Research Library

The complete list of individuals sent the *Final* and *Draft Yosemite Fire Management Plan/ Environmental Impact Statement* is available from Yosemite National Park planning office.

Chapter VII: List of Preparers

Name	Responsibility	Education	Years Experience
National Park Service - Yosemite			
Michael J. Tollefson	Superintendent	B.A. Business	31 NPS
Kevin Cann	Deputy Superintendent Operations	2 years undergraduate studies	25 NPS
Tom Nichols	Fire Management Officer Project Manager	B. S. Chemistry/Earth Science M.S. Ecology	26 NPS
Ed Duncan	Former Project Manager, Fire Management Officer Draft FMP/EIS	B. S. Wildlife Management Minors in Biology and Range Mgmt	12 NPS 14 BLM
Jerry Mitchell	Chief GMP Implementation NEPA Coordinator – FMP Purpose & Need, Watersheds, Water Quality, Social Environment, E-J, Public Involvement, Wilderness, Energy Consumption	M. S, Biology B. S. Wildlife Biology	23 NPS 5 other
David A. Mihalic	Former Superintendent	M. S. Recreation Administration B. S. Parks and Recreation Resources	26 NPS 6 other
Kara Paintner	Fire Ecologist, Vegetation AE, Vegetation EC, Target Conditions, Appendix 9 Monitoring Plan, Soils AE, Soils EC, Resource Objectives	Doctorate work in Vegetation Ecology M. A. Biology B. S. Botany	4 NPS 7 university research
Lisa Acree	Section 7 Consultation Biological Assessment, Park and Regional Setting, Wilderness AE, Geology, Climate	B. A. Environmental Studies	11 NPS 6 other
Anne Ashe	Public Comment Reports, Typist, Admin Record	3 years undergraduate studies	10 NPS
Dan Buckley	Public Safety, Mitigations, Wildland Fire Management Situation, Control Problems, Land Use, Special Management Areas, Appendix 3	B. A. Journalism Minors in Anthropology and Biology A.S. Biological Science	22 NPS 3 CDF 1 USFS
Mark Butler	NEPA Coordination - YOSE	M.A. Public Administration B.S. Soil and Water Science Minor - Environmental Toxicology	19 NPS 2 other
Gary Colliver	Public Comment Advisor	M.A. Interdisciplinary Studies (Human Ecology/Geography) B.A. Biology	15 NPS 18 Other
Marie Denn	Ecologist	M. S. Environmental Sciences & Mgmt B. S. Zoology	7 NPS
Ann Dolmage	Address Lists, Letter logging, Comment Coding	B.S. Forestry	4 NPS
Andy Fristensky	Communication Team – FMP Scoping Meeting Presentation, Communication Strategy	B. S. Natural Resources Planning and Interpretation	7 NPS
Sue Fritzke	Vegetation, Special Status Species, Wetlands Review, Target Conditions	M. S. Physical Geography and Plant Ecology B. A. Environmental Studies and Geography	18 NPS
Linn Gassaway	Cultural Resources AE, Target Conditions, Appendix 8	B. A. Anthropology	4 NPS 5 other
Russell Galipeau	Chief of Resource	B. S. Forest Resource Conservation	21 NPS

Name	Responsibility	Education	Years Experience
	Management, Liaison, Advisor		
Linda Kerr	NEPA Advisor, Vegetation Review, Administrative Review		
Laura Kirn	Cultural Resources AE, Cultural Resources EC	B. S. Anthropology	17 NPS
Mary Kline	Interpretation Liaison, Public Information and Education	B.S. Recreation Management	22 NPS
Alan Kunz	Address Lists, Letter logging, Comment Coding	B. A. English	2 NPS
Paul Laymon	Wild and Scenic Rivers	2 years undergraduate studies	20 NPS 7 other
Brian Mattos	Forester –Yosemite Administrative Review	Registered Professional Forester Licensed Timber Operator B. S. Forest Resources Management	20 NPS USFS, CDF, and industry
Joe Meyer	GIS Fire Return Interval Analysis for Alts and EC's	1 year graduate work B.S. Information and Computer Science	12 NPS 2 other
Brenda Ostrom	Scheduling, Project Management	M. T. Aeronautical Technology B. S. Geography	2 NPS 9 other
Kristina Rylands	Park Editor-in-Chief, Cover Production and Design	Graduate Work in Education B. A. English/Natural History	3 NPS 14 other
Rick Smith	Chief of Interpretation, Liaison, Communications, Advisor	B. S. Park Management	26 NPS
Steve Thompson	Wildlife EC, Special Status Species	M. S. Ecology B. S. Biological Sciences	11 NPS 10 other gov't
Kent Van Wagtendonk	GIS Graphics	M. S. Geographic Information Systems B. A. Geography	2 NPS 1 USFS
Wendy Vittands	Compliance Specialist	B. S. Environmental Science	4 NPS 2 other
Katy Warner	Air Quality	B. A. Environmental Studies	12 NPS
National Park Service – Pacific West Regional Office			
Tom Nichols (transferred to Yosemite Park FMO, 2002)	Admin Review Project Manager	M. S. Ecology B. S. Chemistry/Earth Science	24 NPS
Judy Rocchio	Air Quality COTR	M. S. Air Resources B. S. Geology	8 NPS 3 USFS
Robin Wills	Wetlands	M. S. Forest Ecology B. S. Forest Science	1 NPS 10 The Nature Conservancy 5 USFS
National Park Service – Denver Service Center			
Aaron Worstall	Air Quality Monitoring	B.S. Chemical Engineering	3 NPS 4 EPA
U. S. Geological Survey/Western Ecological Research Center/Yosemite Field Station			
Les Chow	Wildlife Habitat Analysis	M. S. Wildland Resources Sciences (Wildlife Biology) B. S. Conservation and Resource Studies	6 USGS 14 NPS
Jan van Wagtendonk	Vegetation, Fire Return Interval Analysis	Ph.D. Wildland Resources Science (Fire Ecology) M. S. Range Management B. S. Forest Management	6 USGS 22 NOS 9 other gov't
EA Engineering Science and Technology, Inc.			
Daniel L. Raley, PE	Air Quality	M. S. Mechanical Engineering B. E. S. Engineering Mechanics	27

Appendix 1: Bibliography

AeroVironment, Inc.

1973 Air Quality and Noise Levels in Yosemite Valley. Prepared for VTN Consolidated, Inc. In *Yosemite National Park: Collection and Analysis of Quantitative Transportation Data, data volume*. On file at Yosemite National Park.

Agee, J. K.

1973 Prescribed Fire Effects on Physical and Hydrologic Properties of Mixed-Conifer Forest Floor and Soil. In *University of California, Water Resources Center, Contribution Report No. 143*. Davis, CA. University of California.

1993 Fire Ecology of Pacific Northwest Forest. Washington, D.C.: Island Press.

Allen, A.W.

1987 The relationship between habitat and furbearers. Pages 164-179 in: M. Novak, J. A. Baker, M.E. Obbard, and B. Mallock, eds. Wild Furbearer Management and Conservation in North America. Ontario Ministry of Natural Resources, Canada. 1150 pp.

Anderson, M.K.

1988 *Southern Sierra Miwok Plant Resource Use and Management of the Yosemite Region: A Study of the Biological and Cultural Bases for Plant Gathering, Field Horticulture, and Anthropogenic Impacts on Sierra Vegetation.* Unpublished Ph.D. dissertation. Berkeley: University of California, Department of Wildland Resource Science.

1993 *Fire Ecology of Pacific Northwest Forest*. Washington D. C.: Island Press.

1993a *Indian Fire -Based Management in the Sequoia-Mixed Conifer Forests of the Central and Southern Sierra Nevada*. Submitted to National Park Service, Yosemite National Park.

Anderson, M. K. and M. J. Moratto

1996 Native American Land-Use Practices and Ecological Impacts, In *Sierra Nevada Ecosystem Project: Final report to Congress, Vol. II, Assessments and Scientific Basis for Management Options*. Davis: University of California, Centers for Water and Wildland Resources.

Andrews, P. L. and R. C. Rothermel

1982 *Charts for Interpreting Wildland Behavior Characteristics*. General Technical Report INT-131, USDA Forest Service, Intermountain Forest and Range Experiment Station, Ogden, UT.

Aubry, K. and C. Raley

1999 Ecological characteristics of fishers in southwestern Oregon. USFS Pacific Northwest Research Station. Olympia, WA. 7 pp.

Bahro, B.

1993 “California Spotted Owl Habitat Area ED-79: An Assessment of Existing Fuels and Alternative Fuel Treatments.” Unpublished Tech. Rep. VI. USDA Forest Service, El Dorado National Forest, Placerville Ranger District, Placerville, CA.

Bennett, P. S. and M. Kunzmann
1985 *Effects of Heating on Artifacts: A Brief Report of Work Conducted at Western Archaeological Center, Tucson*. On file, National Park Service Co-operative Studies, University of Arizona, Tucson and Western Archeological & Conservation Center, Tucson.

Bibby, B.
1994 *An Ethnographic Evaluation of Yosemite Valley: The Native American Cultural Landscape*. M.S. on file, Yosemite National Park.

Bond, W.J. and B. W. van Wilgen.
1996 *Fire and Plants*. Chapman and Hall.

Bonnickson, T. M. and E.C. Stone
1982 "Reconstruction of a Presettlement Giant-sequoia Mixed Conifer Forest Community Using the Aggregation Approach." *Ecology* 64(3): 1134-1148.

Buskirk, S. W., and R. A. Powell
1994 Habitat ecology of fishers and American martens. Pages 283-296 in S. W. Buskirk, A. S. Harestad, M. G. Raphael, and R. A. Powell, editors. Martens, sables, and fishers: biology and conservation. Comstock Publishing Associates, Cornell University Press, Ithaca, New York, USA.

Brown, T. K., and L. Bright
1997 Wildlife habitat preservation and enrichment during and after fires. In *Proceedings, 1st conference on fire effects on rare and endangered species and habitats*; 1995 Nov. 13-16; Coeur d'Alene, ID. Greenlee, J. M. ed. Fairfield, WA: International Association of Wildland Fire: 65-68.

Bunnell, C. H.
1890 Yosemite Valley Commissioner's Report. Unpublished.

BRW
2000 Yosemite Valley Transportation Analysis/Transit Plan, Environmental Consequences, Valley Circulation Tables. August.

California Department of Water Resources (CDWR)
2001 California Data Exchange Center on the worldwide web at http://cdec.water.ca.gov/

Canadien Centre for Occupational Health and Safety
n.d. http://www.ccohs.ca/oshanswers/phys_agents/noise_measurement.html

Caprio, A.C., C. Conover, M. Keifer, and P. Lineback
1997 *Fire Management and GIS: A Framework for Identifying and Prioritizing Fire Planning Needs*. Presented at Fire in California Ecosystems: Integrating Ecology Preventions and Management. San Diego, California.

Caprio, A.C., and D.M. Graber
2000 "Returning Fire to the Mountains: Can We Successfully Restore the Ecological Role of Pre-Euroamerican Fire Regimes to the Sierra Nevada?" pp 233-241. In *Proceedings: Wilderness Science in a Time of Change-- Vol. 5 Wilderness Ecosystems, Threats, and Management*, Cole, D. N.; McCool, S. F.; Borrie, W. T.; O'Loughlin, J. (comps). 1999 May 23-27; Missoula, MT. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. Proceedings RMRS-P-15-VOL-5.

Caprio, A.C., and P. Lineback
1997 *Pre-twentieth Century Fire History of Sequoia and Kings Canyon National Park: A Review and Evaluation of Our Knowledge*. Presented at "Fire in California Ecosystems: Integrating Ecology Preventions and Management." San Diego, California.

Caprio, A. C., and T. W. Swetnam
1993 "Fire History and Fire Climatolology in the Southern and Central Sierra Nevada." In the *Progress report 1992/1993 to the National Park Service*. *Global Change Program, Southern and Central Sierra Nevada Biogeographical Area*. University of Arizona, Laboratory of Tree-Ring Research, Tucson, AZ. 14 pp.

1995 "Historic Fire Regimes Along an Elevational Gradient on the West Slope of the Sierra Nevada, California." In *Proceedings of the Symposium on fire in Wilderness and Park Management*. pp. 173-179. Brown, J. K., R. W. Mutch, C. W, Spoon, and R. H. Wakimoto (tech. Eds.). USDA Forest Service. Gen. Tech. Rep. INT-GTR 320. 283 pp.

Carroll, C., R. Noss, and P.C. Paquet
1999 Carnivores as focal species fore conservation planning in the Rocky Mountain region. Ecological Applications.

Chorover, J., P.M. Vitousek, D.A. Everson, A.E. Esperanza, and D. Turner
1994 "Solution Chemistry Profiles of Mixed-Conifer Forests Before and After Fire." *Biogeochemistry,* 26:115-144.

Clark, G.
1894 Letter to Board of Commissioners of Yosemite Valley and Mariposa Big Tree Grove. August 30, 1894.

Clow, D.W., M.A. Mast, and D.H. Campbell
1996 "Controls on Surface Water Chemistry in the Upper Merced River Basin, Yosemite National Park, California." *Hydrological Processes*, 10:727-746.

Commissioners to Manage the Yosemite Valley and the Mariposa Big Tree Grove
1867 *Report of the Commissioners to Manage the Yosemite Valley and the Mariposa Big Tree Grove*. D.W. Gelwicks State Printer.

1880 *Report of the Commissioners to Manage the Yosemite Valley and the Mariposa Big Tree Grove, 1880*. J. D. Young. Sacramento: State Printing.

1882 *Biennial Report of the Commissioners to Manage the Yosemite Valley and the Mariposa Big Tree Grove, so extended as to include all transactions of the Commission from April 19, 1880 to December 18, 1882*. J. D. Young. Sacramento: State Printing.

Davis, F. W., E.A. Keller, A. Parikh, and J. Florsheim
1998 "Recovery of the Chaparral Riparian Zone after Wildfire." In *the Proceedings of the California Riparian Systems Conference*. Gen. Tech. Rep. PSW-110.

DeBano, L.F., D.G, Neary, and P.F. Ffolliott.
1998 *Fire's Effects on Ecosystems*. New York: John Wiley & Sons.

Dornbush and Company, Inc.
1999 *Socioeconomic Report to the National Park Service, Yosemite National Park, California*. Prepared for the National Park Service. (Also includes data provided by Micro Implant Group, 1996, Input-Output system B IMPLAN.)

Drost, C. A., and G. M. Fellers
1994 *Decline of frog species in the Yosemite section of the Sierra Nevada*. Tech. Rep. No. NPS/WRUC/NRTR-94-02. National Park Service Western Region Cooperative Studies Unit, University of California, Davis, iii+54 pp.

1996 *Collapse of a Regional Frog Fauna in the Yosemite Area of the California Sierra Nevada, USA*. Conservation Biology (April): Vol. 10, No. 2.

Duffield, J., C. Neher, J. Boyer, and J. Cary.
1997 *Economic Assessment of the Highwater 97A Incident*, Yosemite National Park CA.

Eininger, S.
1990 *Long Mesa Fire 1989, Archaeological Survey and Post-fire Assessment*. On file, Research and Cultural Resources Management Division, Mesa Verde National Park, Mesa Verde and Western Archeological & Conservation Center, Tucson, AZ.

Environmental Protection Agency (EPA)
1999 Regional Haze Regulations, Final Ruling.

Ernst, E. F.
1961 Forest Encroachment on the Meadows of Yosemite Valley. Unpublished. Yosemite National Park, CA.

Federal Interagency Committee on Noise (FICN)
1992 Federal Agency Review of Selected Airport Noise. *Issues*.

Fellers, G. M.
1997 "Aquatic Amphibian Surveys - Yosemite National Park" Biological Resources Division, U.S. Geological Survey. Point Reyes National Seashore. Point Reyes, California.

Finch, D. M., J. L. Ganey, W. Yong, R. T. Kimball, R. Sallabanks
1997 Effects and interactions of fire, logging, and grazing. In *Songbird ecology in southwestern ponderosa pine forests: a literature review*. W. M. Block, D. M. Finch, tech eds. Gen. Tech. Rept. RM-GTR-292. Fort Collins, CO; U.S. Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station. 103-136.

Franklin, J.F. and J. Fites-Kaufmann
1996 Assessment of Late-Successional Forests of the Sierra Nevada. In *Sierra Nevada Ecosystem Project: Final report to Congress, vol. II, Assessments and scientific basis for management options*. Davis: University of California, Centers for Water and Wildland Resources.

Gerlach, J.D., Jr., P.E. Moore, D.M. Rubin, B. Johnson, G. Roy, P. Whitmarsh, D.M. Graber, and J.E. Keeley

2001 *Exotic species threat assessment and management prioritization for Sequoia-Kings Canyon and Yosemite National Parks*. Final Report submitted to the NPS. 117 pp.

Gibbons, F. P., and H. F. Heady
1964 "The Influence of Man on the Vegetation of Yosemite Valley." In the *California Agricultural Experiment Station Manual* 36: 44 pp.

Gould, G. I. and K. M. Norton
1993 *Spotted owl distribution and abundance in Yosemite National Park, 1988-89*. California Department of Fish and Game, Nongame Bird and Mammal Section. Technical Report 1993-3.

Graham, R.T., A.E. Harvey, T.B. Jain, and J. R. Tonn
1999 *The effects of Thinning and Similar Stand Treatments on Fire Behavior in Western Forests*. Gen. Tech. Report. PNW-GTR-463. Portland, OR:USDA, Forest Service, Pacific Northwest Research Station. 27pp.

Gramann, J. H.
1992 *Expenditures by Auto Travelers Visiting Yosemite National Park*. Department of Recreation, Park and Tourism Sciences, Department of Rural Sociology, Texas Agricultural Experiment Station, Texas A&M University.

1993 *Visitors, Alternative futures, and Recreational Displacement at Yosemite National Park*. Department of Recreation, Park and Tourism Sciences, Department of Rural Sociology, Texas Agricultural Experiment Station, Texas A&M University.

Gregory, S.V., F.J. Swanson, W.A. Mckee, and K.W. Cummins
1991 "An Ecosystem Perspective of Riparian Zones." *Bioscience*, 41:540-551.

Grinnel, J. and A.H. Miller
1944 The Distribution of the Birds of California. Cooper Ornithological Club. Pacific Coast Avifauna Number 27. 807 pp.

Haase S. M. and S. S. Sackett
1998 "Effects of Prescribed Fire in Giant Sequoia-Mixed Conifer Stands in Sequoia and Kings Canyon National Parks." In *Fire in Ecosystem Management: Shifting the Paradigm,* edited by L. A. Brennan and T.L. Pruden, pp 236-243. Tall Timbers Research, Inc. Tallahassee, FL. 459pp.

Hamilton S.J., S.F. McDonald, M.P. Gaikowski and K.J. Buhl
1996 "Toxicity of Fire Retardant Chemicals to Aquatic Organisms: progress report." In *Ramsey GS, comp.* From Proceedings on International Wildland Fire Foam Symposium and Workshop; 1994 May 3-5; Thunder Bay, Ontario. Chalk River, Ontario: Petawawa National Forestry Institute. pp 132-144.

Harvey, H.T., Howard S. Shellhammer, and Ronald Stecker
1977 Giant Sequoia Ecology; Fire and Reproduction. USDI National Park Service Report, Washington, D.C. Contract No. 8550-4-0578

Harvey, H.T., H.S. Shellhammer, and R. E. Stecker
1980 Giant Sequoia Ecology. Fire and Reproduction. Scientific Monograph Series No. 12, USDOI, NPS, Washington, D.C.

Hessl, A. and S. Spackman.
1995 "Effects of Fire on Threatened and Endangered Plants: An Annotated Bibliography." Information and Technology Report 2, August 1995. USDI, National Biological Service, Washington, D.C.

Huber, N. K.
1989 *The Geologic Story of Yosemite National Park.* Yosemite Association/U.S. Geological Survey Bulletin 1595.

Huff, M. H., and J. K. Smith
2000 Chapter 5: Fire effects on animal communities. In *Wildland fire in ecosystems: effects of fire on fauna*. Smith, J. K. Smith, eds. RMRS-GTR-42, vol 1. Ogden UT: U.S. Dept. of Agriculture, Forest Service, RMRS: pp. 35-42.

Hughes, J.E.
1934 *Erosion Control Progress Report*. Plumas National Forest, Milford Ranger District. Quincy, CA: U.S. Forest Service.

Hull, K. L.
1991 *Archaeological Survey and Post-Fire Surface Evaluations of the Foresta, Big Meadow, and McCauley Meadow Areas, Yosemite National Park, California*. Yosemite Research Center Publications in Anthropology No. 11, USDOI National Park Service, Yosemite National Park.

Hull, K. L., and M. S. Kelly
1995 *Report of Archeological Survey of the Yosemite Valley Archeological District*. Yosemite Research Center Publications in Anthropology No. 15, USDOI National Park Service, Yosemite National Park

Hull, K. L., and M. J. Moratto
1999 *Archeological Synthesis and Research Design, Yosemite National Park, California*. Yosemite Research Center Publications in Anthropology No. 21, USDOI National Park Service, Yosemite.

Interagency Federal Wildland Fire Policy Review Working Group
2001 *Review and Update of the 1995 Federal Wildland Fire Management Policy*. Boise, ID: National Interagency Fire Center.

Jackson, R. J.
1997 *Prescribed Fire and the Protection of Heritage Resources, A Heritage Resource Management Module*. Prepared for the USDA Forest Service, Pacific Southwest Region, National Forests of the Sierra Nevada.

Jennings, M.R.
1996 Status of Amphibians. In *Sierra Nevada Ecosystem Project: Final Report to Congress, Vol. II, Assessments and scientific basis for management options*. Pp. 921-944. Univ. Calif. Centers for Water and Wildland Resources, Davis.

Karlstrom, E.L.
1962 *The toad genus Bufo in the Sierra Nevada of California*. Univ. Calif., Publications in Zoology 62(1): 1-104.

Kattelmann, R.
1996 "Hydrology and Water Resources." In *Sierra Nevada Ecosystem Project: Final Report to Congress, Volume II, Assessments and Scientific Basis for Management Options*, pp. 855-920. Davis, CA: University of California Centers for Water and Wildland Resources.

Kauffman, J. B.

1990 Ecological Relationships of Vegetation and Fire in Pacific Northwest Forests. In *Natural and Prescribed Fire in Pacific Northwest Forests*. pp 38-52. Edited by J.D. Walstad, S.R. Radosevich, and D.V. Sandberg. Corvallis, OR. Oregon State University Press.

Kaufmann, M.R., R.T. Graham, D.A. Boyce Jr., W.H. Moir, L. Perry, R.T. Reynolds, R.L. Bassett, P.Mehlhop, C.B. Edminster, W.M. Block, and P.S. Corn.

1994 *An Ecological Basis for Ecosystem Management*. General Technical Report RM-GTR-246. Fort Collins, CO:USDA, Forest Service, Rocky Mountain Forest and Range Experiment Station. 22p.

Keefe, T. M., B. M. Kahl, and S. T. Montague

1999 *The Ackerson Post-Fire Archeological Project, Yosemite National Park, California,* Vol. 1 draft. Yosemite Research Center, Yosemite National Park. On file, Archaeology Office, Yosemite National Park, California, and Western Archeological & Conservation Center, Tucson.

Keifer, M. B.

1991 "Age Structure and Fire Disturbance in Southern Sierra Nevada Subalpine Forests." Unpublished Masters Thesis. University of Arizona, Tucson, AZ. 111 pp.

Kilgore, B. M.

1978 "Fire in ecosystem distribution and structure: western forests and scrublands." In *Proceedings of the conference: fire regimes and ecosystem properties; 1978 December 11-15; Honolulu, HI.* Technical coordinators: H. A. Mooney, T. M. Bonnicksen, N. L. Christensen, J. E. Lotan, W. A. Reiners, pp 58-89. GTR WO-26. Washington, DC: U.S. Department of Agriculture, Forest Service.

Kilgore, B.M. and D. Taylor

1979 "Fire History of a Sequoia Mixed Conifer Forest." *Ecology*. 60:129-142.

Kirn, L.

1999 Cultural Resources and Fire Management Planning. Presentation at Yosemite Fire Management Planning Meetings, January 19-21, 1999, Yosemite National Park.

Kleinfelder, Inc.

1998 *Wetlands Delineation Report Campground Redevelopment Project, Yosemite National Park, California*. Kleinfelder Job #21-5102-02-A01.

Knapp, R.

2000 Personal Communication.

Kapp, R.A. and K.R. Mathews

2000 *Non-native fish introductions and the decline of the mountain yellow-legged frog (Rana muscosa) from within protected areas*. Conservation Biology 14(2): April, 2000.

Leopold, A.S., S.A. Cain, C.M. Cottam, I.N. Gabrielson, and T.L. Kimbal

1963 "Wildlife Management in the National Parks." In *Trans-America Wildlife National Resources Conference*. 28:1-18.

Lyon, L. J., M. H. Huff, E. S. Telfer, D. S. Schreiner, and J. K. Smith.
2000 Chapter 4: Fire effects on animal populations. In *Wildland fire in ecosystems: effects of fire on fauna*. J. K. Smith, ed. RMRS-GTR-42, vol. 1. Ogden UT: USDA Forest Service, RMRS: pp. 25-34.

Mariposa Gazette, et al.
2001 *In Harm's Way*. Safety Guide for Residents of the Sierra.

Maurer, J.R.
2000 *Nesting habitat and prey relations of the Northern Goshawk in Yosemite National Park*. M.S. Thesis. University of California, Davis. 97 pp.

Mayer, K.E. and W.F. Laudenslayer, Jr., eds.
1988 *A Guide to the Wildlife Habitats of California*. Calif. Dept. of Forestry and Fire Protection. Sacramento, CA. 166 pages.

McClaran, M. P., and J. W. Bartolome
1989 "Fire-related Recruitment in Stagnant *Quercus douglasii* Populations." *Canadian Journal of Forest Resources*. 19: 580-585.

McDonald, S.F., S. J. Hamilton, K. J. Buhl and J. F. Heisinger.
1996 "Acute toxicity of fire control chemicals to *Daphnia magna* (Straus) and *Selenastrum capricornutum* (Printz)." *Ecotoxicology and Environmental Safety*. 33: 62-72.

McGurk, B. and D. Fong
1995 "Equivalent Roaded Area as a Measurement of Cumulative Effect of Logging." *Environmental Management* 19(4):609-621.

Milestone, James F.
1978 *The Influence of Modern Man on the Stream System of Yosemite Valley*. M.A. Thesis, San Francisco State University.

Miller, R., J. Rose, T. Svejcar, J. Bates and K. Paintner
1998 "Western Juniper Woodlands: 100 Years of Succession." In *Proceedings: ecology and management of pinyon-juniper communities within the Interior West*, *1997 September 15-18*, *Provo, UT*. Monsen, S. B; Stevens, R., comps. 1999. Proc. RMRS-P-9. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.

Mitsch, W., and J. G. Gosselink
1986 *Wetlands*. New York: Van Nostrand Reinhold.

Moore, P.E.
1993 *Forage site characteristics of reintroduced mountain sheep in the Sierra Nevada, California*. Tech. Rep. NPS/WRUC/NRTR-93/07. Cooperative Park Studies Unit, University of California, Davis. 92 pp.

Morrison, J.L., H.L. Bombay, J.W. Cain, and D.E. Taylor
2000 *Annual report and preliminary demographic analysis for willow flycatcher monitoring in the central Sierra Nevada*, in partial fulfillment of contracts RFQ-17-00-30 and RFQ-17-00-31 between Calif. State Univ., Sacramento, and USDA Forest Service, Tahoe National Forest.

Muir, John
1938 *John of the Mountains: The Unpublished Journals of John Muir*, edited by L.M. Wolfe. Boston: Houghton Mifflin.

Mundy, W. J. and K. L. Hull
1988 *The 1984 and 1985 Yosemite Valley Archeological Testing Projects*. Yosemite Research Center Publications in Anthropology, No. 5. National Park Service, Yosemite National Park.

Napton, K. L.
1978 *Archeological Overview of Yosemite National Park*. USDOI National Park Service, Western Archeological and Conservation Center, Tucson.

National Institute for Occupational Health and Safety.
2001 http://www.cdc.gov/niosh/noise/noisepg.html

National Park Service, U.S. Department of the Interior (NPS)
1977 *High Lakes Survey 1977. Status of Fish Populations in 102 Planted Lakes* by Steve Botti.

1980 *General Management Plan/Final Environmental Impact Statement, Yosemite National Park.*

1986 *Yosemite Wilderness Management Plan*

1987 *Yosemite, The Park and Its Resources: A History of the Discovery, Management, and Physical Development of Yosemite National Park, California* by Linda W. Greene. 3 vols.

1988 *Wilderness Historic Resource Survey, 1988 Season Report* by Jim B. Snyder. Ms. on file, Yosemite Research Library, Yosemite National Park, California.

1989 *Sequoia National Park Fire Management Plan*

1989b *Yosemite Wilderness Management Plan,* Yosemite National Park.

1990 *Fire Management Plan,* Yosemite National Park, March 1990 revision.

1990b *Wilderness Historic Resource Survey, 1989 Season Report* by Jim B. Snyder. Ms. on file, Yosemite Research Library, Yosemite National Park, California.

1991 *Analysis of Bank Erosion on the Merced River, Yosemite Valley, Yosemite National Park* by M. Madej, W. Weaver and D. Hagans. USDOI, Redwood National Park, Arcata, California.

1991b *Yosemite Fires, 1990.*

1992 *Concession Services Plan/Supplemental Environmental Impact Statement, Yosemite National Park.*

1992a Western Region Fire Monitoring Handbook. National Park Service Publication.

1993 *Aircraft Overflight Sound Level Study, Yosemite National Park*, August.

1993b Preliminary findings, High Country Ethnohistory Study, by C. Bates and M. Lee. In *Field Work Summary, 1993 White Wolf/Tuolumne Meadows Testing Project.*

1993c Resource Management Plan, Yosemite National Park

1994a Water Resources Division and Servicewide Inventory and Monitoring Program. *Baseline Water Quality Data Inventory and Analysis*, Yosemite National Park. Technical Report, NPS/NRWRD/NRTR-94-03, September.

1994b *Report on Effects of Aircraft Overflights on the National Park System* September.1994

1994c *Yosemite Valley Cultural Landscape Report, Yosemite National Park, California, Volumes 1 and 2*. Prepared by Land and Community Associates.

1994d *The Plant Communities of Yosemite Valley – A Map and Descriptive Key* by Lisa Acree. Technical Report NPS/WRUC/NRTR-94-10. Davis, CA: CNPSU/NPS.

1997 *Channel Changes in the Merced River Following the January 1997 Flood* by Mary Ann Madej, Vicki Ozaki, Carrie Jones and Gregory Gibbs. National Park Service report.

1997a *Vegetation Management Plan,* Yosemite National Park.

1998 *Director's Order (DO) 18: Wildland Fire Management*

1998a *Director's Order (DO) 28: Cultural Resource Management Guidelines.*

1998b *Evaluation of Historical Significance and Integrity of the Cultural Resources in El Portal Administrative Site, Yosemite National Park, California: Determination of Eligibility for Listing in the National Register of Historic Places.* Prepared by Harlan Unrau.

1998c *List of Classified Structures*. USDOI National Park Service, Pacific West Regional Office, San Francisco

1998d Yosemite National Park Monthly Public Use Reports, Form 10-157

1998e Procedural Manual #77.1: Wetland Protection, Technical Report NPS/NRWRD/NRTR-98-203.

1998f Director's Order (DO): Park Planning

1999 Yosemite Fire Management Planning Meetings, January 19-21, 1999.

1999b National Park Service Reference Manual 18: Wildland Fire Management (RM-18). February 16, 1999.

1999c Programmatic Agreement Among the National Park Service at Yosemite, the California State Historic Preservation Officer, and the Advisory Council on Historic Preservation Regarding Planning, Design, Construction, Operations and Maintenance, Yosemite National Park, California.

1999d *Draft Director's Order # 12, Conservation Planning, Environmental Impact Analysis, and Decision Making* (DO-12).

2000a *Draft Merced Wild and Scenic River Comprehensive Management Plan/Environmental Impact Statement*.

2000b *Merced Wild and Scenic River Comprehensive Management Plan/Final Environmental Impact Statement (FEIS)*.

2000c *Final Yosemite Valley Plan/Supplemental Environmental Impact Statement (SEIS)*.

2000d *Cultural Landscapes Automated Information Management System*. USDOI National Park Service, Seattle Support Office, Seattle.

2000e *Retardant Issue Summary*. Prepared for Interior Agencies.

2001a *National Register of Historic Places Nomination Form: Yosemite Valley Cultural Landscape Historic District.* Prepared by Ethan Carr and Cathy Gilbert.

2001b *Archeological Sites Management Information System.* USDOI National Park Service, Western Archeological and Conservation Center, Tucson.

2001c Steve Thompson, Wildlife Biologist, personal communication.

n.d.a *Wilderness Historic Resources Survey Reports 1990-1995* by Jim Snyder. Ms. on file, Yosemite Research Library, Yosemite National Park, California.

n.d.b *Wetland Protection.* National Park Service Director's Order #77-1.

n.d c *"Story of Fire"* newspaper, Sequoia and Kings Canyon National Park

Nelson\Nygaard Consulting Associates

1998a *Yosemite Area Regional Transportation Strategy, Draft Working Paper #3-2: Summer Data Collection, September*.

1998b *Yosemite Area Regional Transportation Strategy, Draft Working Paper #3.3: Year Round Data Collection Summary Report, November*.

Newland, J.A. and T.H. DeLuca.

2000 "Influence of Fire on Native Nitrogen-fixing Plants and Soil Nitrogen Status in Ponderosa Pine – Douglas-fir Forests in Western Montana." *Can. J. For. Res.* 30:274-282.

Papouchis, C. M., F. J. Singer, and W. B. Sloan.

2001 *Responses of desert bighorn sheep to increased human recreation.* Journal of Wildlife Management, July, 2001. 65 (N3): pp. 573-582

Picha, P. R., S. A. Ahler, R. D. Sayler, and R. W. Seabloom

1991 "Effects of Prairie Fire on Selected Artifact Classes." *Archaeology in Montana* 32(2): 15-28.

Poulton, B. C. and S. E. Finger

1996 "Effects of Fire Suppressant Foams on a Prairie Wetland Ecosystem: a Study of a North Dakota Prairie Wetland Community." In *Ramsey GS, comp*. From the Proceedings of the International Wildland Fire Foam Symposium and Workshop, 1994 May 3-5. Thunder Bay, Ontario. Chalk River, Ontario: Petawawa National Forestry Institute, 1996. pp 145-151.

Pyne, S.J., P.L. Andrews, R.D. Laven.
1996 *Introduction to Wildland Fire*. John Wiley and Sons, Inc.

Raven, P.H., and D. I. Axelrod.
1979 "Origin and Relationships of the California Flora." *University of California Publications of Botany*. Vol 72. 134 pp.

Reid, M.E.
1989 The predator-prey relationships of the Great Gray Owl in Yosemite National Park. Technical Report No. 35. Cooperative National Park Studies Unit, University of California, Davis

Remson, J.V. Jr.
1978 Bird species of special concern in California. California Department of Fish and Game, Wildlife Management Branch Admin. Rept. No. 78-1. 54 pp.

Rundel, P. W.
1972 "Habitat Restriction in Giant Sequoia: the Environmental Control of Grove Boundaries." *American Midland Naturalist*. 87(1) pp81-99.

Rundel, P. W., and S.B. Stuner
1998 "Native Plant Diversity in Riparian Communities of the Santa Monica Mountains, California." *Madrono*, 45(2), 93-100.

Ryan K. and A. T. Jones.
1999 *Fire Effects to Cultural Resources*. Ms. on file, National Park Service, Western Archeological & Conservation Center, Tucson.

Sackett, S. S. and S. M. Haase
1992 "Measuring Soil and Tree Temperatures During Prescribed Fires With Thermocouple Probes." USDA, Forest Service, Gen. Tech. Rep. PSW-GTR-131. Pacific Southwest Research Station, Albany, California.

Sackett, St. S., S. M. Haase, and G. M. Burke
1992 "Soil Temperatures Related to Prescribed Burning in Ponderosa Pine Stands in Yosemite Valley that Include California Black Oak." Presented at the *Symposium on Ecology and Management of Oak and Associated Woodlands: Perspectives in the Southwestern United States and Northern Mexico*. April 27-30. Sierra Vista, AZ.

Sawyer, J. O., and T. Keeler-Wolf
1995 A manual of California vegetation. California Native Plant Society. Sacramento, California.

Seglund, A.E.
1995 The use of resting sites by the Pacific fisher. M.S. thesis. Humboldt State University, Arcata, CA. 66 pp.

Serena, M.
1981 The status and distribution of the Willow Flycatcher (*Empidonax trailii*) in selected portions of the Sierra Nevada. California Department of Fish and Game, Wildlife Management Branch. Admin. Rept. No. 82-5.

Sherman, C. K., and M. L. Morton.
1984 *The Toad That Stays on its Toes*. Natural History (March). pp. 73-78.

1993 *Population declines of the Yosemite toad in the eastern Sierra Nevada of California*. J. Herpetology. 27:186-198.

Shevok, J. R.
1996 "Status of Rare and Endemic Plants." In *Sierra Nevada Ecosystem Project, Final Report to Congress, Vol. II: Assessments and Scientific Basis for Management Options*. Davis, CA. University of California.

Skinner, C. N. and C. Chang
1996 "Fire regimes, Past and Present. In *Sierra Nevada Ecosystem Project, Final Report to Congress, Vol. II, chap. 38*. Davis, CA. University of California. Wildland Resources Center Report 37. 1528 pp.

Stephens, S. L.
Personal communication. "Fire Regimes, Past and Present." Skinner, C. N., and C. Chang. In *Sierra Nevada Ecosystem Project, Final Report to Congress, Vol. II, chap. 38*. Davis, CA. University of California. Wildland Resources Center Report 37. 1528 pp.

Stephens, S. L.
1997 Fire history of a mixed conifer-oak-pine forest in the foothills of the Sierra Nevada, El Dorado County, California. Pp 191-198 *in Proceedings of a Symposium on Oak Woodlands: Ecology, Management, and Urban Interface Issues*. N.K. Pillsbury, J. Verner, and W. D.Tieje, tech coordinators. General Technical Report GTR-PSW-160. Albany, California: U.S. Department of Agriculture-Forest Service.

Stephenson, Nate
2003 Draft Advisory E, submitted by Nate Stephenson for consideration by the Scientific Advisory Board, Sequoia National Monument, March 11, 2003. Files, Sequoia and Kings Canyon National Parks, Three Rivers, CA 9pp.

Steiger, F.W.
Final Report: Survey for California spotted owls, Strix occidentalis occidentalis, in areas that may be affected by the Yosemite Valley Plan. Interagency Agreement No. 1A8800-00-014. Unpublished report to the National Park Service. 14 pp.

Summerfelt, Paul
2003 The Wildland/Urban Interface: What's Really at Risk. Fire Management Today, volume 23 (1), pp 4-7.

Swetnam, T. W., R. Touchan, C. H. Basian, A. C. Caprio, and P. M. Brown.
1991 "Giant Sequoia Fire History in the Mariposa Grove, Yosemite National Park." pp 249-258. In *Yosemite Centennial Symposium Proceedings, Natural Areas and Yosemite: Prospects for the Future*. The Yosemite Fund, San Francisco, CA. 667 pp.

Taylor A. H., and C. N. Skinner.
1998 "Fire history and Landscape Dynamics in a Late-success ional Reserve, Klamath Mountains, California, USA." *Forest Ecology and Management*. 111: 285-301.

Traylor, D., L. Hubbell, N. Wood, and B. Fiedler
1989 *The La Mesa Fire Study: An Investigation of Fire and Fire Suppression Impact on Cultural Resources in Bandelier National Monument*. Southwest Cultural Resources Center Professional Paper No. 28. National Park Service, Division of Anthropology, Branch of Cultural Resources Management, Santa Fe.

U.S. Department of Agriculture (USDA)

First Order Fire Effects Model: FOFEM 4.0, Users Guide. By E.D Reinhardt, E.R Kearne, & J.K. Brown. General Technical Report INT-GTR-344. p 32. Department of Interior (DOI)

U.S. Department of Interior (USDI)

1996 Ackerson Complex Burned Area Emergency Rehabilitation (BAER) Plan. BAER team, September, 27, 1996

U.S. Environmental Protection Agency (EPA)

1996 *Compilation of Air pollutant Emission Factors, AP-42, Fifth Edition, Volume I: Stationary Point and Area Sources, Chapter 13 Miscellaneous Sources, Wildfires and Prescribed Burning*. October 1996.

1999 Regional Haze Regulations, Final Ruling

U.S. Fish and Wildlife Service (USFWS), U.S. Department of the Interior (USDOI)

1979 *Classification of Wetlands and Deepwater Habitats of the United States*. By L.M. Cowardin, V. Carter, F.R. Govet and E.T. LaRoe. FWS/OBS-79/31.

1995 *Draft National Wetland Inventory Maps: Yosemite National Park*.

1999 *Conservation Guidelines for the Valley Elderberry Longhorn Beetle*. Sacramento Fish and Wildlife Office. Sacramento, CA.

2000 D*raft Recovery Plan for the California Red-legged Frog (Rana aurora draytonii)*. Sacramento Fish and Wildlife Office. Sacramento. CA.

U.S. Forest Service (USFS), U.S. Department of Agriculture (USDA)

1996 *Managing Roads for Wet Meadow Ecosystem Recovery*. By William D. Zeedyk. FHWA-FLP-96-016. Albuquerque, NM: USDA, U.S. Forest Service, Southwestern Region.

2000 *Wildland Fire in Ecosystems and Effects of Fire on Fauna*.Edited by J.K. Smith RMRS-GTR-42-vol. 1. 2000. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 83pp.

2000b *Understory Biomass Reduction Methods and Equipment*. By K. Windell & S. Bradshaw, USDA Forest Service 7E72P55, April 2000, Missoula Technology & Development Center (406-329-3978).

2001 *Sierra Nevada Forest Plan Amendment/ Final EIS*. "Sierra Nevada Framework" Final EIS. Record of Decision

2001b *Health Hazards of Smoke: Spring 2001*. US Forest Service.

n.d. Ansel Adams, John Muir and Dinkey Lakes Wilderness Revised Draft Environmental Impact Statement.

U.S. Geological Survey (USGS), U.S. Department of the Interior

1989 *Assessment of Hydraulic Changes Associated with Removal of Cascade Dam, Merced River, Yosemite Valley, California* by J.C. Blodgett. USGS Open File Report 88-733.

Topographical maps. El Portal, El Capitan, Half Dome, Merced Peak, Mount Lyell, Tenaya Lake, Buckingham Mountain, Wawona, Mariposa Grove.

1998 1998 California Hydrologic Data Report- Merced River at Happy Isles Bridge, near Yosemite, CA

1999 USGS California NWIS-W Data Retrieval network. Historical information for the "Merced R A Pohono Bridge Nr Yosemite Ca" gauging station. http://waterdata.usgs.gov/nwisw/CA/statnum=11266500.

University of California at Davis (U.C. Davis)

1996a *Sierra Nevada Ecosystem Project, Final Report to Congress – Vol. I: Assessment Summaries and Management Strategies.* Davis, CA: University of California.

1996b *Sierra Nevada Ecosystem Project, Final Report to Congress – Sierra Nevada Ecosystem Project, Final Report to Congress, Vol. II: Assessments and Scientific Basis for Management Options.* Davis, CA: University of California.

1996c *Sierra Nevada Ecosystem Project, Final Report to Congress - Vol. III: Assessments, Commissioned Reports, and Background Information.* . Davis, CA: University of California.

1996d *Sierra Nevada Ecosystem Project, Final Report to Congress – Addendum.* Davis, CA: University of California.

1996e *Summary of the Sierra Nevada Ecosystem Project Report.* Davis, CA: University of California.

van Wagtendonk, J. W.

1974 *Refined burning prescriptions for Yosemite National Park.* USDOI, National Park Service Occasional Paper 2. 21 p.

1991 "Spatial Analysis of Lightning Strikes in Yosemite National Park." In *Proceedings of the 11th Conference of Fire and Forest Meteorology.* 11:605-611.

1994 "Spatial Patterns of Lightning Strikes and Fires in Yosemite National Park." In *Proceedings of the 12th Conference of Fire and Forest Meteorology*. 12:223-231.

1996 "Use of a Deterministic Fire Growth Model to Test Fuel Treatments"- In *Sierra Nevada Ecosystem Project: Final report to Congress, Vol. II, chap. 43*. Davis, CA: University of California Centers for Water and Wildland Resources

2000 Personal communication. Research Scientist, U.S. Geological Survey, Yosemite National Park, California.

van Wagtendonk, J.W., K. van Wagtendonk, J. Meyer, K. J. Paintner

2002 George Wright Forum Vol. 19(1), pp 19-39. George Wright Society.

van Wagtendonk, J. W., J. M. Benedict, and W. M. Sydoriak

1998 "Fuel Bed Characteristics of Sierra Nevada Conifers." *Western Journal for Applied Forestry*. 13(3): 73-84.

van Wagtendonk, J. W., and S. J. Botti

1984 "Modeling Behavior of Prescribed Fires in Yosemite National Park." *Journal of Forestry* 82(8): 479-484.

Verner, J., K. McKelvey, B. Noon, R. Gutierrez, G. Gould, and T. Beck.
1992 The California spotted owl: technical assessment of its current status. Gen. Tech. Rep. PSW-GTR-133. USDA Forest Service, Pacific Southwest Research Station, Albany, CA 285 pp.

Verner, J. and L.V. Ritter.
1983 "Current Status of the Brown-headed Cowbird in the Sierra National Forest" *Auk* 100: 355-368

Weatherspoon, C. Phillip, S.J. Husari, and J.W. van Wagtendonk.
1992 Fire and Fuels Management in Relation to Owl Habitat in Forests of the Sierra Nevada and Southern California. Pages 247-260 In T*he Calif. Spotted Owl: A technical assessment of its current status.* Coordinated by J. Verner, K. McKelvey, B. Noon, R. Gutierrez, G. Gould, and T. Beck. Gen. Tech Rep. PSW-GTR-133. USDA Forest Service, Pacific Southwest Research Station. Albany, CA 94701-0245

Weaver, H.
1974 "Effects of Fire on Temperate Forests: Western United States." In *Fire and Ecosystems,* edited by T.T. Kozlowski and C.E. Ahlgren, pp. 279-319. New York, NY: Academic Press

Winter, J.
1980 The status and distribution of the Great Gray Owl in California. California Department of Fish and Game. Final Report, Project W-65-R-2.

1986 Status, distribution, and ecology of the Great Gray Owl (Strix nebulosa) in California. Masters thesis. San Francisco State University.

Wickstrom, C., and K. Roper
1987 *Issues Concerning Native American Use of Fire: A Literature Review*. Yosemite Research Center Publications in Anthropology, No. 6. USDOI, National Park Service, Yosemite National Park.

Williams, M.R. and J.M. Melack.
1997 "Effects of Prescribed Burning and Drought on the Solute Chemistry of Mixed-Conifer Forest Streams of the Sierra Nevada, California." *Biogeochemstry* 39:225-252.

Williamson, R.L., R. Simonsen, D. Spoto, T. Taylor, and G. Olson
1996a *Yosemite National Park: Upper Merced River Sanitary Survey.* Prepared for the National Park Service by the Department of Civil Engineering and Applied Mechanics, San Jose State University.

Wohlgemuth, P.M., J.L. Beyers, and S.G. Conard.
1999 "Postfire Hillslope Erosion in Southern California Chaparral: A Case Study of Prescribed Fire as a Sediment Management Tool." In *Proceedings of the Symposium on Fire Economics, Planning, and Policy: Bottom Lines. USDA Forest Service General Technical Report PSW-GTR-173*, 332 pgs, pp. 269-276. Albany, California: Pacific Southwest Research Station, Forest Service, US Department of Agriculture.

Woodmansee, R.G. and L.S. Wallach.
1981 "Effects of Fire Regimes on Biogeochemical Cycles." pp. 421-444. In *Proceedings of the Conference, fire regimes and ecosystem properties.* H.A. Mooney and others (tech coordinators.) Gen. Tech. Rep. WO-26.

Zielinski, W.J., T.E. Kucera, and R.H. Barrett.
1996 Current distribution of the fisher, *Martes pennanti*, in California. Calif. Fish and Game 81(3): 104-112.

Zimmerman, G.T. and D.L. Bunnell.
1998 Wildland and Prescribed Fire Management Policy: Implementation Procedures and Reference Guide. National Interagency Fire Center, Boise, ID 82p.

Zinke, P. and E. Alexander
1963 *The Soil and Vegetation of Yosemite Valley*. Unpublished manuscript, Yosemite Research Library.

Appendix 2: Fire Management Glossary

Active Crown Fire When the main surface fire and the fire burning in the crowns are moving together across the fire front.

Adaptive Management A type of natural resource management that implies making decisions as part of an on-going process. Monitoring the results of actions will provide a flow of information that may indicate the need to change a course of action. Scientific findings and the needs of society may also indicate the need to adapt resource management to new information.

Alluvial Pertaining to processes or materials associated with transportation or deposition by running water.

Appropriate Management Response The response to a wildland fire is based on an evaluation of risks to firefighter and public safety, the circumstances under which the fire occurs, including weather and fuel conditions, natural and cultural resource management objectives, protection priorities, and values to be protected. The evaluation must also include an analysis of the context of the specific fire within the overall local, geographic area, or national wildland fire situation.

Aquatic Growing or living in or frequenting water; taking place in or on water.

Aquatic Ecosystem A stream channel, lake or estuary bed, the water itself, and the biotic (living) communities that occur therein.

Aspect The direction a slope faces. For example, a hillside facing east has an eastern aspect.

Biological Diversity (Biodiversity) The number and abundance of species found within a common environment. This includes the variety of genes, species, ecosystems, and the ecological processes that connect everything in a common environment.

Biomass 1. Wood products that may or may not be used commercially

2. The total weight of all living organisms in a biological community.

Biota The plant and animal life of a particular region.

Biotic Potential Factors that influence the ability of an animal to utilize its environment, including: reproductive rates, dispersal ability, habitat and life requisite specificity, and adaptability. Combine, these factors assign biotic potential of the animal.

Blue Oak Woodlands An ecosystem dominated by blue oak, valley oak, interior live oak (tree form), or Oregon white oak.

Bole Trunk of a tree.

Boundary Areas margins of different jurisdictions or fire management strategies, such as the perimeter of Yosemite National Park, or the transition between wilderness and non-wilderness areas.

Buffer Used in the context of GIS; a buffer is a zone of a specified distance around a feature.

Burned Area Rehabilitation The full range of post-fire activities to rehabilitate and restore fire damaged lands, including protection of public health and safety.

California Wildlife Habitat Relationships (CWHR) A system of classifying vegetation in relation to its function as wildlife habitat. Tree-dominated habitat is classified according to tree size and canopy closure.

Canopy The part of any stand of trees represented by the tree crowns. It usually refers to the uppermost layer of foliage, but it can be used to describe lower layers in a multi-storied forest.

CASPO (California Spotted Owl Sierran Province Interim Guidelines) A specific set of management guidelines introduced in 1993 that protects California spotted owl populations. The guidelines prescribe silvicultural practices for retaining specific levels of large trees.

Collaboration Managers, scientists and citizens working together to plan, implement and monitor land management activities. The intention is to engage people who have information, knowledge, expertise and an interest in the health of natural ecosystems and nearby communities.

Control Burn See Prescribed Fire or Burn.

Cooperators Federal, state, and local agencies and Indian tribes that participate in planning and conducting fire management projects and activities.

Core WUI Area of wildland urban interface delineated by structures and streets adjacent to them.

Critical Habitat Areas designated for the survival and recovery of state or federally listed threatened or endangered species.

Cryptogamic Soil Crusts (Microbiotic Soil Crusts) Arid and semi-arid soil surface communities consisting of green algae, cyanobacteria, diatoms, non-lichenized fungi, lichens, bryophytes, bacteria, protozoans in various combinations. They stabilize soil surfaces, concentrate certain mineral and organic nutrients, alter water infiltration while consistently reducing sedimentation, and facilitating seed germination and seedling establishment.

Defensible Fuels Profile Zone (DFPZ) See Fuelbreak.

Defensible Space Area around structures needed to provide firefighters safe distance to work as wildland fire approaches

Degradation Reduction in quality.

1. The process whereby the water quality and chemical, physical or biological integrity of a water body is decreased.
2. Habitat quality can be changed by certain management activities. If the quality is reduced then habitat degradation has occurred.

DEIS (Draft Environmental Impact Statement) A working document that is released to governmental agencies and the general public for review and comment.

Designated Areas A mapped area with an identified Desired Condition and specific management direction to move toward the Desired Condition.

Desired Future Conditions (Target Conditions) Land or resource conditions that are expected to result if goals and objectives are fully achieved.

Duff A layer of decomposing organic matter beneath fresh needles and leaves

Early Forest Succession The biotic (or life) community that develops immediately following the removal or destruction of vegetation in an area. For example, grasses may be the first plants to grow in an area that was burned.

Ecology The interrelationships of living things to one another and to their environment, or the study of these interrelationships.

Ecosystem An arrangement of living and non-living things and the forces that move them. Living things include plants and animals. Non-living parts of ecosystems may be rocks and minerals. Weather and wildland fire are two of the forces that act within ecosystems.

Ecotone A zone of intergradations between ecological communities.

Ecosystem Sustainability the capacity to maintain ecosystem health, productivity, diversity, and overall integrity, in the long run, in the context of human activity and use.

Endangered Species Those plant or animal species that are in danger of extinction throughout all or a significant portion of their range. Endangered species are identified by the Secretary of the Interior in accordance with the Endangered Species Act of 1973.

Endemic An organism that evolved in and is restricted to a particular locality. The Yosemite Toad found only in the Sierra Nevada region is an example.

Ephemeral Stream Streams that flow only as the direct result of rainfall or snowmelt. They have no permanent flow.

Escarpment A long, more or less continuous cliff or relatively steep slope produced by erosion or by faulting.

Fauna The animal life of an area.

Fine Fuels Fuels that ignite readily and are consumed rapidly by fire (e.g., cured grass, fallen leaves, needles, small twigs less than ¼ inch diameter, also referred to as 1-hour fuels).

Fire Extent The size of the area that burned.

Fire Frequency A general term referring to the recurrence of fire in a given area over time.

Fire Hazard A fuel complex, defined by volume, type, condition, arrangement, and location, that determines the degree of ignition and of resistance to control. For example, the moisture content of the fuel will influence the ability of the fuel to catch and sustain fire (degree of ignition) and how difficult it will be to control or extinguish the fire (degree of control).

Fire Intensity A physical measure of the flames, in British Thermal Units per foot per second (BTU/ft/sec). This information can be generated using BEHAVE, a fire behavior prediction computer model. Related to flame length.

Fire Management Activities Include fire planning, fire management strategies, tactics, and alternatives, prevention; preparedness, education, and addresses the role of mitigation, post-fire rehabilitation, fuels reduction, and restoration activities in fire management.

Fire Management Plan (FMP) A strategic plan that defines a program to manage wildland fires based on an area's approved land management plan. Fire Management Plans must address a full range of fire management activities that support ecosystem sustainability, values to be protected, protection of firefighter and public safety, public health and environmental issues, and must be consistent with resource management objectives and activities of the area.

Fire Regime The combination of fire frequency, predictability, intensity, seasonality, and extent characteristic of fire in an ecosystem.

Fire Return Interval Expressed as a range of years or as the arithmetic average (mean fire return interval) of all fire intervals in a given area over a given time period.

Fire Return Interval Departure Number of missed fire cycles due to fire suppression

Fire Risk See wildland fire risk.

Fire Severity A measure of fuel consumption and effect on vegetation caused by fires of different intensity and/or season. Severity is divided into three categories: low, moderate, and high. Levels of severity of any wildland fire are distributed unevenly across the landscape. The variability and pattern of fire severity can be critical for establishing some species and for the formation of gaps.

Flora The plant life of an area.

Floristics The study of a particular association of plants or plant communities.

Focal Species A species of concern.

Fuel Hazard A fuel complex defined by kind, arrangement, volume, condition, and location that forms a special threat of ignition and resistance to control.

Fuelbreak A system of linear or mosaic patch treatments of forest or shrub vegetation designed and treated to reduce fire spread, intensity, and create barriers to fire spread.

Fuel load The amount of combustible material (dead plants and trees, litter, and duff) that is found in an area.

Fuels Plants and woody vegetation, both living and dead, that are capable of burning.

Fuels Management The planned manipulation and/or reduction of living and dead forest fuels for forest management and other land use objectives.

Fuels Treatment The treatment of fuels that left untreated, would otherwise interfere with effective fire management or control. For example, prescribed fire can reduce the amount of fuels that accumulate on the forest floor.

Fuelwood Wood cut into short lengths for burning in a fireplace, woodstove or fire pit.

Full Range of fire management See Fire Management Activities

Geographic Area Coordination Center (GACC) Interagency regional operational centers for fire resource coordination and mobilization.

Geographic Information Systems (GIS) A computer system capable of storing, manipulating, analyzing, and displaying geographic information.

Habitat The area where a plant or animal lives and grows under natural conditions.

Hazard Reduction In fuels management: the planned treatment or manipulation of naturally growing vegetation or any other flammable material for the purpose of reducing the rate of spread and the output of heat energy from any wildland fire occurring in the treated area.

Hazard Reduction Prescription These are the specific parameters used to describe the conditions such as specific width, patch size and shape, species composition, diameter distributions, canopy cover, surface fuel mosaic, fire behavior, and location. They are determined at the site-specific project level based on topography, access, vegetation, risk of ignition, and potential fire behavior (this includes weather and wind).

Indigenous (Species) Any species of plant or animals native to a given land or water area by natural occurrence.

Initial Attack The aggressive response to a wildland fire based on values to be protected, benefits of response, and reasonable cost of response.

Inner WUI Wildland Urban interface area defined as the core WUI community plus a ¼ mile wide zone around it. The zone may be narrower, depending on topography and the presence of natural barriers to fire spread.

Interdisciplinary Team A diverse group of professional resource specialists who analyze the effects of Alternatives on natural and other resources. Through interaction, participants bring different points of view and a broader range of expertise.

Interagency Coordination, collaboration, communication among cooperating agencies.

Intermittent Stream A stream that flows only at certain times of the year when it receives water from streams or from some surface, such as melting snow.

Landscape A large land area composed of interacting ecosystems that are repeated due to factors such as geology, soils, climate, and human impacts.

Late Forest Succession The stage of forest succession in which most of the trees are mature or overmature.

Lithology The physical and/or chemical character of a rock or geologic layer generally observed in the field with a low powered lens or the naked eye.

Long-Term Risk A wildland fire risk to be experienced within the next 50 to 100 years.

Management Action Any activity undertaken as part of the administration of the national park.

Managed Wildland Fire A natural (lightning) ignited fire that is managed to meet resource benefits.

Maximum manageable area (MMA) The maximum size a wildland fire allowed to burn for resource benefits may become. It defines the planned project area for the fire; the actual fire may be much smaller than the MMA

Mechanical fuel reduction The removal or rearrangement of wildland fuels with equipment, which may include chain saws, wheeled or tracked vehicles, and chipping.

Meadow Tracks of moist low lying and usually level grasslands. Generally, the water table is just below the surface of the soil and the most abundant vegetation is usually favored by wet but not constantly flooded soil.

Mesic 1. Moderately moist climates or environments.

2. Vegetation: generally refers to vegetation found in moist environments.
3. Soils: refers specifically to soils with mean annual temperatures of 8 to 15 degrees centigrade.

Montane Hardwood Forests For the purposes of this DEIS, it refers to vegetation communities dominated by California black oak or canyon live oak,

Mosaic Areas with a variety of plant communities over a landscape. For example, areas with trees and areas without trees occurring over a landscape.

National Park A tract of land declared public property by a national government so as to be preserved and protected for recreational, scenic, ecological or cultural purposes.

Natural Resource A feature of the natural environment that is of value in serving human needs.

Natural Succession The natural replacement, in time, of one plant community with another. Conditions of the prior plant community (or successional stage) create conditions that are favorable for the establishment of the next stage.

Noxious Weeds Aggressive, non-native plant species that have been introduced. They can be difficult to manage, poisonous, toxic, parasitic, or carrier of insects or disease. Examples of park noxious weeds would be yellow star thistle, spotted knapweed, bull thistle and Himalayan Blackberry.

Old Forest (Old Growth) Areas that contain large, old trees relative to the species-specific, environmentally-constrained growth capacity of the site.

Oligotrophic A water body (usually a lake) that is characterized by having a low concentration of nutrients and low productivity.

Outer WUI Wildland urban interface area defined as the zone from the outside edge of the Inner WUI area extending to no more than 1 ½ miles from the core WUI community.

Owl and Goshawk PACs See Protected Activity Centers.

Paleoecological The study of ancient or prehistoric ecosystems.

Passive Crown Fire An intense surface fire that torches occasional individual trees or small groups of trees, during this condition the surface fire is moving faster than the occasional torching of trees. Any spotting is usually short range less than ¼ mile and supports the surface fire spread.

Patch An area of vegetation, similar in structure and composition.

Perennial Stream A stream that typically has running water on a year-round basis.

Prescribed Fire or Burn Any fire ignited by management actions to meet specific objectives. Prescribed fires are conducted in accordance with prescribed fire plans.

Prescribed Fire Plan A plan for each prescribed fire. Plans are documents prepared by qualified personnel, approved by the agency administrator, and include criteria for the conditions under which the fire will be conducted (a prescription).

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

Protected Activity Centers (PACs) Designated areas that are afforded protection to specific species by restricting certain management activities. For example, California spotted owl PACs protect owl habitat and breeding areas by restricting timber harvest.

Public Involvement The use of appropriate procedures to inform the public, obtain early and continuing public participation, and consider the views of interested parties in planning and decision-making.

Remote Sensing Acquiring information about a geographic feature without contacting it physically. Methods include aerial photography and satellite imaging.

Resilience The ability of an ecosystem to maintain diversity, integrity, and ecological processes following a disturbance.

Riparian Area The area along a watercourse or around a lake or pond.

Riparian Ecosystem The ecosystem around or next to water areas that support unique vegetation and animal communities as a result of the influence of water.

ROD (Record of Decision) An official document in which a deciding official states the alternative that will be implemented from a prepared EIS.

Satellite Image A picture of the earth taken from a satellite in orbit around the earth.

Sensitive Species Plant or animal species which are susceptible to habitat changes or impacts from activities.

Seral Stage The stage of succession of a plant or animal community that is transitional. If left alone, the seral stage will give way to another plant or animal community that represents a further stage of succession.

Short-Term Risk A wildland fire risk to be experienced within the next 10 to 15 years. For example, prescribed burns can disturb habitat in the short-term, but in the long-term the fire resiliency of the habitat may be improved.

Snag A standing dead tree. Snags are important as habitat for a variety of wildlife species and their prey.

Spatial Analysis See Spatial Data.

Spatial Data A GIS contains spatial data. The spatial data represents geographic features associated with real-world locations.

Special Management Area An area with unique issues or features that need to be highlighted within the fire management program, such as giant sequoia groves and administrative boundary areas of Yosemite National Park.

Species A class of individuals having common attributes and designated by a common name; a category of biological classification ranking immediately below the genus or subgenus; comprising related organisms or populations potentially capable of interbreeding.

Stand A group of trees that occupies a specific area and is similar in species, age, and condition.

Standards and Guidelines The primary instructions for land managers. Standards address mandatory actions, while guidelines are recommended actions necessary to a land management decision.

Stand Replacement Fire A fire that burns with sufficient intensity to kill the majority of living vegetation over a given area (grass and brush fires are stand replacement fires for that vegetation type, in forest vegetation types when 75- 80% of the stand is killed by fire are also considered stand replacement fires).

Strategically Placed Area Treatments (SPLATS) See Fuelbreak.

Target Conditions A range of conditions describing vegetation characteristics which existed prior to the onset of the influence of Euro-Americans.

Threatened Species Those plant or animal species likely to become endangered throughout all or a specific portion of their range within the foreseeable future as designated by the U.S. Fish and Wildlife Service under the Endangered Species Act of 1973.

Treatment Area The site-specific location of a resource improvement activity.

Understory The trees and woody shrubs growing beneath branches and foliage formed collectively by the upper portions of adjacent trees.

Vegetation Management Activities designed primarily to promote the health of forest vegetation for multiple-use purposes.

Values To Be Protected Include property, structures, physical improvements, natural and cultural resources, community infrastructure, and economic, environmental, and social values.

Visual Quality The visual resources; terrain, geological features, or vegetation.

Watershed The entire region drained by a waterway, lake, or reservoir. More specifically, a watershed is an area of land above a given point on a stream that contributes water to the streamflow at that point.

Wilderness An area of land designated by Congress to be managed according to the Wilderness Act of 1964.

Wildland An area in which development is essentially non-existent, except for roads, railroads, powerlines, and similar transportation facilities

Wildland Fire Any non-structural fire that occurs on wildlands that is not a prescribed fire.

Wildland Fire Implementation Plan (WFIP) A progressively developed assessment and operational management plan that documents the analysis and selection of strategies and describes the appropriate management response for a wildland fire being managed for resource benefits. A full WFIP consists of three stages. Different levels of completion may occur for differing management strategies (i.e., fires managed for resource benefits will have two-three stages of the WFIP completed while some fires that receive a suppression response may only have a portion of Stage I completed).

Wildland Fire Risk The probability of a fire occurring.

Wildland Fire Threat The potential fire behavior and related fire effects (rate of spread, fire intensity, tree mortality, structure loss, etc.) due to the interactions of fuels, weather, and topography.

Wildland Fire Use See Managed Wildland Fire

Wildland Urban Interface Defined as the line, area, or zone where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuels.

Xeric A soil moisture regime common to Mediterranean climates that have moist cool winters and warm dry summers. A limited amount of water is present but does not occur at optimum periods for plant growth.

Acronyms and Abbreviations

AAR	After Action Review
AMR	Appropriate Management Response
APCD	Air Pollution Control District
AQMD	Air Quality Management District
BAER	Burned Area Emergency Rehabilitation
BLM	Bureau of Land Management
BMP	Best Management Practice
btu	British Thermal Unit
CAA	Clean Air Act

CARB	California Air Resources Board
CDFG	California Department of Fish and Game
CEQ	Council on Environmental Quality
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
CFR	Code of Federal Regulations
cfs	cubic feet per second
CO	carbon monoxide
COE	U.S. Army Corps of Engineers
dB	decibel(s)
dBA	decibels on the "A" weighted scale
DEIS	draft Environmental Impact Statement
DOE	U.S. Department of Energy
DO	Director's Order
DOI	U.S. Department of the Interior
EA	Environmental Assessment
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
EMFAC	Emission Factor
EPA	U.S. Environmental Protection Agency
FESA	Federal Endangered Species Act
FEMA	Federal Emergency Management Agency
FICN	Federal Interagency Committee on Noise
ft/sec	feet per second
FMU	Fire Management Unit
FONSI	finding of no significant impact
FRID	Fire Return Interval Departure
GACC	Geographic Area Coordination Center
gal.	gallons
GIS	geographic information system
GMP	General Management Plan
gpd	gallons per day
GSA	Government Services Administration
HVR	highly valued resources or high value resource
ID	Interdisciplinary team
IAP	Incident Action Plan
ICS	Incident Command System
JHA	Job Hazard Analysis

IMPROVE	Interagency Monitoring of Protected Visual Environments
kWh	kilowatt hour
MCAPCD	Mariposa County Air Pollution Control District
g/m3	micrograms/cubic meter
MIMT	Minimum Impact Management Techniques
MIST	Minimum Impact Suppression Techniques
MMA	Maximum Manageable Area
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
mph	miles per hour
NA	not applicable
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NO2	nitrogen dioxide
NOx	nitrogen oxide
NPS	National Park Service
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NWCG	National Wildfire Coordinating Group
NWI	National Wetlands Inventory
O3	ozone
ORV	Outstandingly Remarkable Values
PA	Programmatic Agreement
PL	Public Law
PM	particulate matter, when used as PM10 or PM2.5
PPE	Personal Protective Equipment
ppm	parts per million
PSD	Prevention of Significant Deterioration
PT	total particulate
ROD	Record of Decision
RPO	River Protection Overlay
RTE	rare, threatened, and endangered
RWQCB	Regional Water Quality Control Board
RXB2-t	Burn Boss Type 2 Trainee
SACS	Shared Application Computer System
SDA	Seventh Day Adventists
SHPO	State Historic Preservation Office (or Officer)

SIP	State Implementation Plan
SNEP	Sierra Nevada Ecosystem Project
SO2	sulfur dioxide
SOF	Statement of Findings
SWRCB	State Water Resources Control Board
TES	threatened and endangered species
TOG	total organic gases
TPAC	Town Planning Advisory Council
USC	U.S. Code
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
UTM	Universal Transverse Mercator
VELB	Valley elderberry longhorn beetle
VERP	Visitor Experience and Resource Protection (framework)
VOC	volatile organic compound
WFSA	Wildland Fire Situation Analysis
WFIP	Wildland Fire Implementation Plan
WPOA	Wawona Property Owners Association
WUI	Wildland/urban interface
YA	Yosemite Association
YI	Yosemite Institute
YCS	Yosemite Concession Services Corporation

Appendix 3: Wildland and Fire Response, Planning, and Implementation Procedures

Specific procedures that the Branch of Fire Management follows regarding response, planning, and implementation of wildland fire projects in Yosemite National Park are variable. In an effort to preserve and protect the cultural and natural resources of the park, the following procedures are adhered to when executing the Appropriate Management Response to a wildland fire. The determination of how an agency will respond to a wildland fire will include an evaluation of such factors as risks to the safety and health of firefighters and the public, weather, fuel conditions, threats, and values to be protected.

One of the most important values to be protected is Wilderness; 95% of Yosemite National Park is designated Wilderness. The policy of the National Park Service (DO41) states that "Wilderness values must be adequately represented during all fire planning processes…Wilderness managers will assist in the selection of and implementation of appropriate responses to Wilderness fires." All fire management operations will consider Wilderness as a value to be protected during their planning and implementation.

These constraints and the corresponding procedures are normally applied. In the event that an Incident Management Team is requested to suppress a wildland fire or a Fire Use Team is requested to manage a wildland fire, a delegation of authority will be prepared and signed by the park Superintendent. The delegation of authority will specify the Lead Resource Advisor and be accompanied by a list of constraints containing, but not limited to, the elements listed below. It would normally contain additional site-specific constraints that apply to the geographic area of the fire as well. The following procedures will also apply for actions not involving a management team.

Wildland Fire Operational Response Procedures

- Normally, a Resource Advisor(s) will be requested for any incident where outside crews are ordered. All fire locations are normally reported to the fire archaeologist as well.
- The Resource Advisor will identify all special-status species and their associated habitats, and will work with the line archaeologist to convey avoidance strategies to fireline crews.
- No heavy equipment is allowed for fireline construction without prior approval, in writing, by the Superintendent.
- No water bucket dipping is allowed in certain lakes determined to be significant habitat for wildlife. During drought conditions this constraint may be applied to other lakes as well so that they do not completely dry up. Lakes to be used for dipping will be determined by the Resource Advisor, incident by incident.
- Fire Retardant is not allowed within 300 feet of any water source. Fire retardant can permanently stain rock surfaces and is used with discretion when being applied near the

significant granite features, domes, and walls in the park. This discretion takes into account the location of the fire, the risk associated with the incident, and wind direction, which can cause the retardant to drift onto a rock face. This is particularly important near culturally significant features and scenic landscapes and any retardant on major features should be washed off using water bucket drops as soon as possible.

- A line qualified archaeologist will be assigned to all fires where organized crews are constructing fireline and will at their option check all work done on all fires.
- Only handtools will be used to construct fireline in the Yosemite Wilderness. Chainsaws are permitted; helicopters are permitted so long as excessive erosion from bucket work is avoided, especially if Type-I helicopters are used.
- Natural barriers will be used, to the greatest extent possible, to avoid fireline construction. All line construction will be kept to the minimum line standard required to do the job. Blacklining and burning out natural features will be used to maximum advantage when preparing fireline.
- Natural openings and clearings will be used whenever possible for helicopter landing zones, and in movement of crews. Landing zones should be constructed only when other alternatives are not possible, or safety concerns dictate and should be concurred with by the Resource Advisor.
- Resource protection measures will be implemented at spike camp locations. These will include proper food storage for wildlife protection, historic and prehistoric site survey and protection, and Wilderness sanitation measures.
- Fireline construction in and around riparian habitat will be done in a manner to least impact the values associated with these important habitat areas. No fireline construction will be done in meadows. Fireline construction that ties into or crosses streams will be done at points where the majority of line impacts upland vegetation rather then riparian vegetation.
- All wildland fire management activities within the boundaries of Yosemite National Park will adhere to Minimum Impact Management Techniques (MIMT; formerly known as “MIST”). MIMT requires that tactics are commensurate with the fire behavior, and do not require compromising firefighter and public safety.
- All wildland fire management activities within areas being managed as Wilderness inside the boundaries of Yosemite National Park will adhere to “minimum tool” requirements of the 1964 Wilderness Act (16 USC 1 1 21). Any question over the minimum tool qualification will be discussed by the Fire Management Committee and decided upon by the park Superintendent.
- Mitigation measures described in the Biological Opinion (Appendix Nine) issued by the U.S. Fish and Wildlife Service will be followed

Wildland Fire Planning Procedures

- All wildland fires occurring within Yosemite National Park will be managed under an Appropriate Management Response (AMR) strategy. AMR is defined as “ the response to a wildland fire is based on an evaluation of risks to firefighter and public safety, the circumstances under which the fire occurs, including weather and fuel conditions, natural and cultural resource management objectives, protection priorities, and values to be protected. The evaluation must also include an analysis of the context of the specific fire within the overall local, geographic area, or national wildland fire situation.” (2001 Federal Fire Policy;

Appendix B Glossary). Appropriate Management Response allows for a full range of management actions, from full control through aggressive and costly suppression techniques, to a confine or contain strategy using existing barriers, predicted weather, or minimal suppression activities.

- All proposed fire management activity project plans not covered by the Yosemite Fire Management Plan/Environmental Impact Statement will undergo appropriate National Environmental Policy Act planning processes, either as a Categorical Exclusion, an Environmental Assessment, or an Environmental Impact Statement, depending on the significance of impacts.
- An internal and external technical review will be conducted before prescribed fire plans are submitted to the park Superintendent for approval. Signature lines indicating an internal review has been completed will be part of the cover page of each plan. Review and signature will be required from the Project Planner, Fire Management Officer, Chief Ranger, Chief of Resource Management, Research Scientist, and Fire Ecologist. External technical reviewers can be from another National Park Service unit, an adjacent cooperating agency, or a private contractor. External technical review will include a signature and comment page. Prescribed fires to be conducted in Wilderness will also be reviewed by the Wilderness Manager.
- A Fire Management Committee will provide oversight and direction to the Fire Management Program. Membership of the Fire Management Committee will be comprised of the Park Superintendent, Deputy Park Superintendent(s), Chief Ranger, Chief of Resource Management, Research Scientist, Fire Management Officer, Wilderness Manager, and Prescribed Fire Manager. The committee will meet each spring to perform an annual review of the Yosemite Fire Management Plan and approve any changes needed in the operational sections of the plan.
- A Prescribed Fire sub-group will work under the purview of the Fire Management Committee. This group will be comprised of the Prescribed Fire Managers staff and representatives of the Resource Management Division and Wilderness Manager. This group will be the interdisciplinary (ID) team that develops the operational prescribed fire plans and hazard fuel plans assuring that critical resource concerns are protected or mitigating measures are developed. This group will determine whether further consultation with USFWS or the SHPO is warranted.
- Fire, especially from natural ignitions on lands being managed as Wilderness, would be allowed to achieve resource management objectives to the fullest extent possible. It is recognized that extenuating circumstances (air quality concerns, cumulative impacts, visitor safety, aesthetics, national fire situation, seasonality, etc) will require some potentially beneficial fires to be suppressed. In this event, any suppressed fires that are candidates for managed wildland fire may be re-ignited when conditions that triggered the suppression action have abated or been mitigated.
- All decisions to engage in any actions permissible under the alternatives will be based on the best available science. The Fire Management Officer, Fire Ecologist, and Chief of Resource Management will be responsible for input on all fire management activities that affect the park's resources.
- Standard mitigations will be utilized in project planning (see Mitigation Measures).

National Park Service Implementation Procedures

Procedures and direction for implementation of fire management programs in the National Park Service is contained in Directors Order 18, and Reference Manual 18. This is a NPS policy and must be adhered to by all parks, and the most current version can be viewed on the NPS Firenet Site at: http://www.nps.gov/fire/index.htm, under Wildland Fire. Chapter 9 specifically deals with Wildland Fire Use and Suppression. Within the NPS policy are directions that allow the NPS to implement the National Fire Policy. The National Fire Policy is developed by representative members of all the wildland fire agencies and endorsed by the Secretaries of Interior, Agriculture, Energy, Defense, and Commerce; the Administrator of the Environmental Protection Agency (EPA); and the Director of the Federal Emergency Management Agency (FEMA).

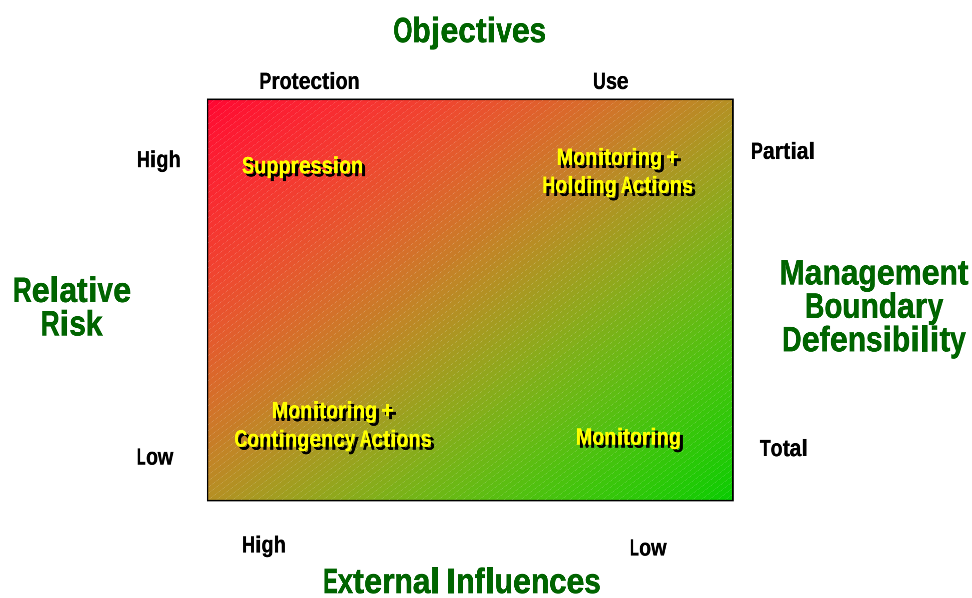
Policies are extremely dynamic, and seem to be in a constant state of change. The National Fire Policy was changed in 1989, 1995 and most recently 2001, followed by subsequent changes in each agency's policy. It is the intent of the final plan to provide for these changes through amendment to the text of the Yosemite Wildland Fire Management Plan as changes occur. These changes would not constitute the need for additional compliance or a complete rewrite of the Yosemite Fire Management Plan.

Wildland Fire Suppression Implementation

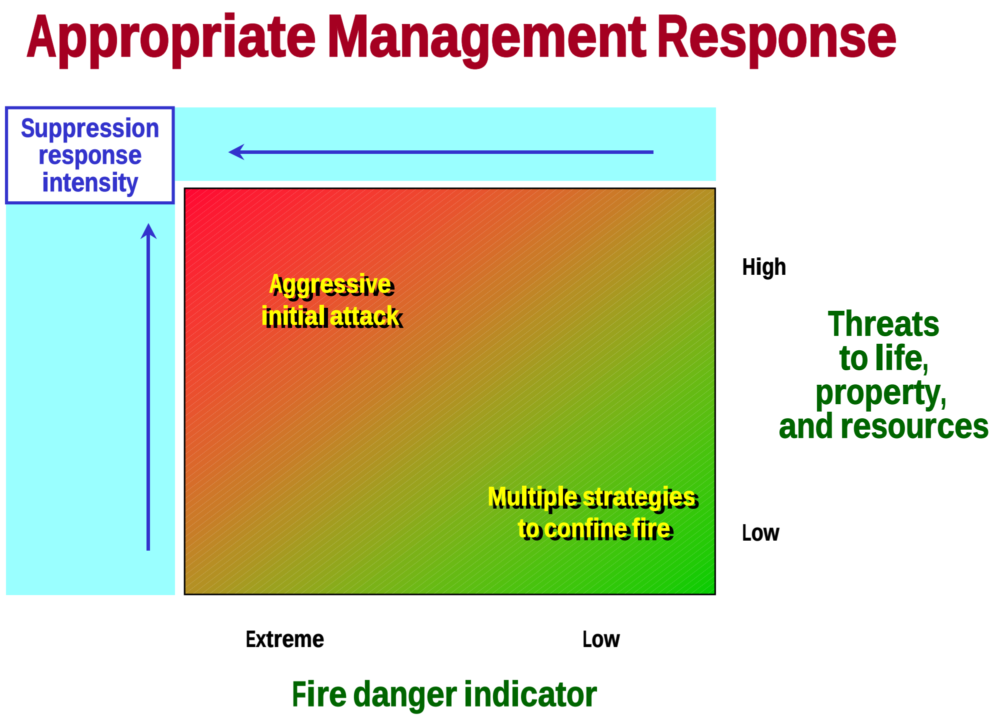
Appropriate Management Response

Suppression of wildland fires that are in fire management units where suppression is the required response would provide first for firefighter and public safety. The Appropriate Management Response concept as defined in the 2001 Federal Fire Policy was utilized in establishing Fire Management Units in Yosemite. There are areas in the Suppression Unit where safety, accessibility, and cost will result in a response that is as aggressive as practical. This would be pertinent to time of year, and proximity to the boundary between the FMU's. The attached chart shows the AMR concept and by crossing lines from top to bottom and side to side an indication of response is identified.

Appropriate Management Response



As Resources (engines, crews, aircraft) are assigned at the time of detection, an Incident Commander is assigned and additional resources are ordered and deployed as needed. At times when multiple ignitions take place, from lightning or other causes, prioritization takes place based on immediate threats to life, property and natural and cultural resources. Resources are deployed based on these priorities, which means that some ignitions may not receive an immediate initial attack if resources are not immediately available. The following chart displays how prioritization of ignitions can be tempered using the Appropriate Management Response when dealing with time of year and threats.



Additional resources (firefighting equipment, firefighters) are ordered through the national mobilization process that recognizes the *closest resources* concept. This allows a resource order to be filled from the closest available source, saving time and getting the resource quickly. Mobilization is done through agreements, operating plans, and mobilization guides that are developed before the wildland fire season and agreed to by participating federal and state agencies and local fire departments.

Wildland Fire Situation Analysis

If initial attack on a wildland fire is unsuccessful a Wildland Fire Situation Analysis (WFSA) is prepared. The WFSA is a decision making process in which the agency administrator (Superintendent) describes the situation, establishes objectives and constraints for the management of the fire, compares multiple strategic wildland fire management alternatives, evaluates the expected effects of the alternatives, selects the preferred alternative, and documents the decision. A Fire Complexity Analysis is completed concurrently to assist in making critical decisions concerning resource commitment and the need for or against using an Incident Management Team. The WFSA is approved by the Superintendent and is validated daily until the fire is controlled.

Burned Area Emergency Rehabilitation (BAER) Implementation

On April 27, 1998, the Department of the Interior approved new policies for Burned Area Emergency Rehabilitation (BAER). The new policies resulted from a 1½ year long effort by an interdepartmental team to revise BAER policies in support of current fire and resource management practices. These policies supersede and expand upon the interim policies contained in the draft Department of the Interior BAER Handbook, and establish consistent BAER guidelines among the NPS, BLM, BIA, USFWS, and the USFS. The new policies are a major step forward because they allow parks to expand the use of BAER funding to mitigate a broad range of threats to natural and cultural resources critical to our mission and protection mandates. Since BAER projects can have a major impact on many aspects of park management, the successful implementation of these policies requires a coordinated interdisciplinary effort among natural and cultural resource managers, fire managers, and visitor services.

Specific guidelines for filing BAER requests and for understanding what BAER funding can be used for are outlined within each agencies policy documents. For the National Park Service this is Chapter 12 of NPS Reference Manual 18.

Prescribed Fire Implementation

Prescribed Fire Planning

The Prescribed Fire Plan is the site-specific implementation document that defines the strategic purpose, goals, and objectives for a prescribed fire project. It also provides guidance for developing the Incident Action Plans (IAP) that defines tactical activities for each operational period needed to execute the prescribed fire project. A prescribed fire plan is required for each prescribed fire project. All prescribed fire plans must be reviewed and recommended by a burn boss qualified at or above the complexity level of the project. The plan receives further review by the interdisciplinary team composed of the Prescribed Fire Managers staff and representatives of the Resource Management Division.

While the National Park Service has no specific position designated as a prescribed fire planner it is recognized that a burn boss must possess the skill and technical knowledge to perform this function. The minimum qualifications for the principal person preparing the plan are that the person (1) is a burn boss trainee (RXB2-t), (2) is knowledgeable about the local area, and (3) possesses skills necessary to write the plan. The park Superintendent has final authority to approve the prescribed fire plan and shall ensure the plan receives sufficient oversight, guidance, and support. As part of the responsibility for approval of the prescribed fire plan, the Superintendent is responsible for ensuring that the prescribed fire plan is closely linked to and consistent with the fire management plan and agency direction and policy. The burn boss has the responsibility to make the on-site, operational, "go/no-go" decision and approval authority for the Incident Action Plan. The burn boss ensures that all prescription elements are met before, during, and after the burn. Deviations from the approved plan, which cause an escape, injury, property damage or other consequence, may result in personal liability. Any amendment that presents major changes to the outcome, size, fire effects, or potential impacts on the management organization of the burn shall go through the same review, approval, and notification process as the original plan. The burn boss can approve amendments addressing minor changes to specific implementation actions, defined in the Incident Action Plan (IAP), on the day of the burn.

The prescribed fire planning process is explained in detail in Chapter 10 of NPS Reference Manual 18 and requires the completion of the following steps:

Technical Review: The technical review is REQUIRED to help ensure that a prescribed fire plan is written in a manner that the stated goals and objectives can be safely and successfully achieved when properly implemented.

1) Seasonal Severity: Effects of long-term drought are a component of the prescribed fire planning process and shall be factored into the prescription of each prescribed fire. When preparing the prescribed fire plan, consideration shall be given to long-term drought effects and climatological probabilities for weather events important to the success of the prescribed fire. When and where available national, geographic area, and specific long-term assessments will be evaluated. Consideration should be given to using long-range fire assessment teams, research, and agency meteorologists to support climatological assessments.
2) Collaborative Planning and Review: During the planning process all National Park Service units should solicit comments from all cooperating agencies and adjacent landowners, and attempt to incorporate those comments into the prescribed fire plan. However, mandatory approval from these agencies and landowners should not be required because it would curtail meaningful progress in accomplishing fuels management objectives.
3) Prescribed Fire Plan Contents: A standard prescribed fire plan form has been developed for use in the National Park Service. However, due to the variety of information required by an individual park unit the plan may be supplemented with additional content provided the minimum elements listed in the standard form are addressed. Each plan shall include as a minimum, the following elements:
    a) Signature Page: The approved prescribed fire plan constitutes a delegation of authority to burn. No one has the authority to burn without an approved plan or in a manner not in compliance with the approved plan. Actions taken in compliance with the approved prescribed fire plan will be fully supported. Personnel will be held accountable for actions taken that are not in compliance with elements of the approved plan regarding execution in a safe and cost-effective manner.
    b) Executive Summary: A brief discussion describing the purpose and justification of the project, connection with the overall management of the unit, and description of how it implements the fire management plan.
    c) Description of Prescribed Fire Area:
        i) General Area Description (narrative)
        ii) Location (County, Legal, Lat/Long and/or UTM, Fire Management Zone)
        iii) Geographic Attributes (Project Size, Elevation Range, Slope Range, Aspect Range)
        iv) Description of Project Boundaries (Define geographic, natural and human features to be used as the project boundary.)
        v) Vegetation Types: Describe the structure and composition of the vegetation type(s) within the project area, the percent of the area composed of this type and the fuel model that corresponds to it. Include plant community class, as available.
        vi) Fuels Characteristics: Describe fuels as applicable by fuel type. Describe:
            1. Fuel type, natural or activity; Fuel Loadings by size class, live and dead, and total;
            2. Fuel bed depth;
            3. Arrangement; and
            4. Discussion of past environmental effects on the land and how they have impacted the fuel characteristics as appropriate.

vii) Vicinity Maps – attached as appendices

viii) Project Maps – attached as appendices (include vegetation/fuel maps)

d) Goals and Objectives: Include purpose and goals of the prescribed fire, as stated in park management and supporting management plans (i.e. Resource Management Plan, Cultural Landscape Plan, Endangered Species Recovery Plan, etc.) Specific objectives of the prescribed fire and protection objectives shall be stated in quantifiable and measurable terms.

e) Risk Management: The process of identifying and controlling hazards to protect resources and property. This includes implementing a risk management process, which is an analysis of proposed actions, the environment (fuels, topography, weather, etc.) where the project takes place, assessment of hazards, potential consequences, and mitigation to reduce risk (several worksheets are included in RM-18 Chapter 10). The mitigations described are then addressed in the later sections of the prescribed fire plan dealing with project complexity, organization, pre-burn considerations, ignition and holding actions, public and firefighter safety, and monitoring. A Job Hazard Analysis is part of this procedure and helps to integrate acceptable safety and health principles into the operation.

f) Project Complexity: A prescribed fire complexity rating shall be completed as part of each prescribed fire plan following the process in RM-18 Chapter 10. This process determines the level of organizational structure and support needed to implement the project based on operational, logistical, safety and management needs. The complexity value breakpoints for requiring a Prescribed Fire Burn Boss Type 1 shall be 4 or more Complexity Values rated "High" OR 2 or more of the Primary Factor Complexity Values rated "High" OR when deemed appropriate by the Superintendent or unit Fire Management Officer.

g) Organization: List required project organization to complete all phases of the project execution. The prescribed fire organization should be developed based on the objectives, risk assessment and project complexity. Specify minimum number and type of resources needed. Consider long duration, day/night, and multi-operational period projects where exchange of resources will need to occur.

h) Cost: Estimated total costs for all phases of the project.

i) Scheduling: Include proposed ignition date, projected duration. Note any dates when project may not be conducted.

j) Preburn Considerations: List key on and offsite preburn activities and special precautions and regulations including responsibilities and timeframes. Specify on-site: line to be built, snags to be felled or protected, equipment to be pre-positioned, special features to be protected, warning signs to be placed, weather recording and monitoring needs, etc. Specify off-site: burn permits, notifications, media releases, closures, etc. Notifications will show whom we want to contact, who was contacted, who made the contact and when the contact was made. Specify special precautions and regulations: air quality, endangered species, cultural clearances, etc.

k) Prescription: A prescribed fire prescription contains key weather and fire behavior parameters needed to achieve desired results. Identify ranges of acceptable prescription parameters to obtain desired fire behavior and effects. General prescriptions for burning in Yosemite National Park were developed through research in the mid 1970's and refined with correction factors in 1984. See tables A-3.1, 2, and 3.

l) Ignition and Holding Actions: Identify methods, roles and responsibilities, coordination and special considerations needed. Attach modeling outputs or worksheets (i.e. Fireline Handbook, BEHAVE, etc.) to justify minimum holding resources required. An Incident Action Plan (IAP) is developed for each operational period that defines tactical activities and assignments.

   i) Test Fire: The test fire is intended to evaluate fire behavior characteristics that are necessary to meet the prescribed fire plan objectives. A test fire is completed prior to making the decision to execute the project. It shall be ignited at a location within the prescribed fire area that is representative of the site and in an area that can be easily controlled if fire behavior is unacceptable.

   ii) Firing and Ignition: Describe ignition operations including firing techniques and patterns. (attach a map where applicable.) Firing and ignition patterns should address potential changes to weather, topography and fuels. Specific firing and ignition tactics will be documented in the IAP showing necessary resources, safety considerations, equipment, and supplies. These tactics shall be further clarified in the briefing.

   iii) Holding Actions: Operations to safely maintain the prescribed fire within prescription, within project boundaries and control all slopovers and spot fires within a predetermined time and size. Consider long duration, day/night, multi-operational period projects where exchange of resources will need to occur.

   iv) Critical Holding Areas: Identify those areas where there is a higher likelihood of holding problems along the boundary or outside the burn unit (anticipated locations of numerous spot fires and/or slopovers, changes in fuel type, high value resource near the project boundary, etc.).

   v) Divide the Project Area into subunits such as Branches, Divisions, and Groups, based upon complexity, size, assignments, access, topography, etc. Clearly delineate these on the project map using Incident Command System (ICS) symbols.

   vi) Mop-up Operations: Identify proposed actions to secure and patrol project area until the prescribed fire is declared out.

m) Wildland Fire Transition Plan: Identify actions and notifications needed when the prescribed fire exceeds project boundaries and cannot be controlled within one burning period using on-site holding resources. All further actions will be determined through a new strategy developed in the Wildland Fire Situation Analysis (WFSA) process. Identify who the initial incident commander will be and what notifications will be needed.

n) Protection of Sensitive Features: Identify treatment and mitigations needed to protect cultural sites, threatened and endangered species, or other sensitive features. Include compliance with all applicable NEPA and NHPA requirements.

o) Public and Firefighter Safety: Describe public and personnel safety and emergency procedures. Identify safety hazards in and outside the project area, measures taken to reduce or mitigate those hazards, and Emergency Medical Service personnel assigned. The IAP should address communications, medical plan, and incident safety analysis.

p) Smoke Management: Describe how the project will comply with County, State, Tribal, and Federal air quality regulations. Include modeling outputs and mitigation measures to reduce potential impacts of smoke production and smoke related safety and health issues, if required.

q) Interagency Coordination and Public Information: Identify actions, timelines and responsibilities for interagency and intra-agency pre-burn coordination and public involvement.

   i) Media Releases and Public Notice Postings.

   ii) Notifications: List of appropriate individuals, agencies and the public to receive notifications.

r) Monitoring: Describe how the following two elements will be met:

   i) Fire Behavior Monitoring: Specify how monitoring of prescription elements will take place pre-ignition and during the burn, including weather, smoke/air quality, and fire behavior observations. Specify on-site weather, smoke, and fire behavior observations required during all phases of the project. Include procedures and responsibilities for acquiring weather and smoke forecasts. May reference park Fire Monitoring Plan, or recommended standards for Level 1 and/or Level 2 fire monitoring guidelines in the NPS Fire Monitoring Handbook.

   ii) Fire Effects Monitoring: Specify how long and short-term fire effects (vegetation and fuels) monitoring will take place pre-burn and post-burn to evaluate if project objectives have been met. May reference park Fire Monitoring Plan, or recommended standards for Level 3 and/or Level 4 fire monitoring guidelines in the NPS Fire Monitoring Handbook. If plots exist on the unit, include a map of plot locations. Chapter 11 contains an outline for completing a Fire Monitoring Plan.

s) Post Fire Rehabilitation: Describe any necessary rehabilitation of disturbances that will be undertaken resulting from management activities of the project. These typically include fireline restoration, minor fence repairs and other mitigation actions that are pre-identified in the prescribed fire plan.

t) Post Fire Reports: Identify who, what, and when various reports associated with this project will be completed.

u) Appendices: Items to be attached to the prescribed fire plan:

   i) Reviewer Comments - Provides a space for each reviewer to document comments pertaining to the development of the prescribed fire plan.

v) Technical Reviewer Checklist and Comments

   i) Maps

   i) Prescribed Fire Complexity Rating Worksheet

   ii) Fire Modeling Outputs

   iii) Agency Administrator Go/No-Go Pre-Ignition Approval

   iv) Prescribed Fire Operations Go/No-Go Checklist

Tables A3-1, 2
General Park Guidelines, Prescribed Fire Prescriptions, Yosemite National Park. Based on Fire Behavior Prediction System (van Wagtendonk, J. W. 1974, van Wagtendonk and. Botti. 1984)

Head Fires					
Fuel Model	5	8	1	9	2
Vegetation	Manzanita Ceanothus Huckleberry Oak	Incense Cedar White Fir Red Fir Sugar Pine Giant Sequoia	Perennial Grass	Ponderosa Pine Mixed Conifer	Ponderosa Pine Bear Clover
Air Temp	30-75	30-80	30-80	30-75	40-75
RH	30-50	20-65	30-65	30-65	20-65
Mid-Flame Wind Speed	1-5	1-5	1-6	0-6	0-5
1hr TL FM	5-7	4-8	5-8	6-8	5-10
10 hr TL FM	9-13	6-13		9-15	7-16
100 hr TL FM (2)		7-20		10-20	8-20
1000 hr TL FM (2)		10-20 (1)		10-20 (1)	
Live Fuel Moist (3)	80-130				65-170
Rate of Spread (chains/hour)	7-20 (11-32)	0.3-1.7 (0.5-2.7)	4-143	2-7 (1.8-6.4)	3-23 (3.2-24.2)
Heat/Unit Area BTU/ft2	230-700	170-210	84-92	340-400	400-500
Fireline Intensity BTU/ft/sec	30-250	1-6	6-242	11-45	23-170
Flame Length	2-6 (12.3-36.8)	0.5-1 (0.9-1.9)	1-6	1.4-2.6 (1.0-1.9)	1.9-5.0 (1.5-3.5)

Backing Fires				
Fuel Model	5	8	9	2
Vegetation	Manzanita Ceanothus Huckleberry Oak	Incense Cedar White Fir Red Fir Sugar Pine Giant Sequoia	Ponderosa Pine Mixed Conifer	Ponderosa Pine Bear Clover
Air Temperature	40-90	40-90	40-85	40-85
RH	20-40	20-40	20-50	20-60
Mid-Flame Wind Speed	0-6	0-6	0-6	0-6
1hr TL FM	4-6	3-8	4-8	4-8
10 hr TL FM	20-40	20-40	20-50	20-60
100 hr TL FM (2)		7-12	8-15	7-15
1000 hr TL FM (2)		10-20 (1)	10-20 (1)	
Live Fuel Moisture (3)	65-120			65-170
Rate of Spread (chains/hour)	1.0-1.7 (1.6-2.7)	0.2-0.3 (0.3-0.5)	0.7-1.1 (0.5-0.7)	1.9-3.0 (2.0-3.2)
Heat/Unit Area BTU/ft2	550-750	180-250	350-450	450-525
Fireline Intensity BTU/ft/sec	10-23	0.8-1.3	5-8	16-29
Flame Length (ft)	1.3-1.9 (8.0-11.7)	0.4-0.5 (0.7-0.9)	0.9-1.2 (0.6-0.9)	1.6-2.1 (1.1-1.5)

(1) The NFFL fuel model contains no fuels in this size class; thus recorded values do not affect calculated Rate of Spread, Heat/Unit Area, Flame Length, and Fireline Intensity. The 1000 hour time lag fuel moisture is important to assess because such fuels may be abundant in these vegetation types and may affect control, intensity, and tree scorch.

(2) The 100 and 1000 hour time lag fuel moistures muct be calculated under the NFDRS or derived from oven dried samples. These moistures also relate to the moisture content of the lower layers of duff, however NFDRS calculated values relate poorly to actual duff moistures after fall rains have begun. Oven drying of duff samples should be carried out if duff reduction needs to be assessed.

(3) Live fuel moisture must be estimated from Fire Behavior prediction System tables, calculated from an NFDRS station using Woody Fuel Moisture, or derived from oven-dried samples.

Table A3-3
Correction factors for calculated flame lengths and rates of spread using the Fire Behavior Prediction System (van Wagtendonk, J. W. 1974, van Wagtendonk and. Botti. 1984)

Fuel Type (FM)	Flame Lengths Multiply calculated value by:	Rates of Spread Multiply calculated value by:
Bear Clover (2)	0.69	1.05
Ponderosa Pine (9)	0.83	0.91
Ponderosa Pine/Mixed Conifer	0.72	0.67
White Fir/Mixed Conifer (8)	1.87	1.56
Whire Fir/Red Fir (8)	1.69	1.90
Montane Chaparral (5)	6.14	1.59

Prescribed Fire Unit Preparation

Preparation of the prescribed fire unit for burning involves standard procedures that each burn boss does as the prescribed fire plan is developed. Normally the notice is given well in advance that certain units will be burned in an upcoming season. This information is passed onto the various resource specialists so that the burn boss can address concerns in the prescribed fire plan. In most cases a walk through is done with the Archaeologist (Fire), and other resource specialists so that any place line work is done is known and evaluated. The lines and features are flagged so that specialists will know where fireline will be constructed, what snags may be taken down, where water sources may be used or pumps set up, and where thinning will take place as the unit is prepared. This advance notice allows resource specialists to have time to inventory the unit if needed and bring up concerns prior to the development of the prescribed fire plan. It also ensures that work is performed on site. Procedures identified within this section and within the Mitigations Common to all Alternatives section will be followed. Several of the prescribed fire projects are done in phases where some thinning is required during the year the plan is developed. Jackpot and pile burning may precede the actual prescribed burning by a year or so. Fireline installation and snagging will normally be done the year the burn is planned as part of the final preparation.

Managed Wildland Fire Implementation

The decision to allow a wildland fire to burn so that it can accomplish resource benefits requires a Wildland Fire Implementation Plan (WFIP). Specific guidelines are contained in Chapter 9 of NPS Reference Manual 18. As these managed wildland fires cannot be planned for, except by designation of a Fire Management Unit where they may be allowed, these plans must be written when the ignition occurs. All naturally ignited wildland fires may be managed to accomplish resource management goals once an appropriate fire management plan is approved. Human caused wildland fires may receive a suppression response commensurate with values-to-be-protected, firefighter and public safety, and cost efficiency and can be managed or monitored in the Fire Use Unit. Management of wildland fires in the National Park system offers substantial flexibility in how land and resource management objectives can be accomplished. There are no pre-planned Maximum Manageable Areas (MMA) in Yosemite National Park but there are MMA's that have been developed and re-used through adaptive management. Yosemite currently has an agreement with Stanislaus National Forest to allow fire to cross the boundary between the Yosemite Wilderness and the Emigrant Wilderness.

The random pattern of wildland fire occurrence, combined with the possibility that the fire may last for several weeks or even months, requires more intensive planning and evaluation than for prescribed fires and wildland fire suppression actions, especially at the initial decision point when the fire is detected.

The complete implementation process is described, with example forms provided, in the Wildland and Prescribed Fire Policy Implementation Procedures Reference Guide. The reference guide is a dynamic document that is periodically updated based on "lessons learned" or because policy changes as a result of some external or internal influence. The reference guide is a standard agreed to by all fire management agencies. This guide is in the process of being updated and the following description of the WFIP process may look somewhat different in the final Yosemite Fire Management Plan.

Wildland Fire Implementation Plan—WFIP

The Wildland Fire Implementation Plan is a three-stage process and is completed based on the level of risk that is associated with the fire. A wildland fire may be managed under any of the stages and need not have all stages completed.

Stage I – Initial Fire Assessment. Stage I is a decision-making process to evaluate new fire starts and assess ongoing wildland fires in the park. It establishes the foundation information critical to manage the fire, and provides the information for the initial Go/No-Go decision. Stage I consists of two distinct components: *Fire Situation Information, and the Initial Go/No Go Decision.*

Stage I considers the following elements:

- Fire origin and cause
- Affected fire management zone
- Immediate and projected threats to life and property
- Smoke and health concerns
- Availability of necessary qualified personnel and fire management resources
- Availability of qualified wildland fire manager
- Immediate and potential impacts to visitors, users, and local communities
- Projected fire growth under normal and drought conditions

Once the fire is authorized to burn it must be periodically re-assessed to confirm the continued capability to manage the fire. This must be completed irregardless of whether the fire is in Stage I, II or III of the planning process. This is done based on a set time schedule not to exceed at least once every 7 days. During periods of active growth this process is done daily. This revalidation consists of completing a revalidation checklist and assessing the need to perform additional planning by moving to Stage II or Stage III. The re-validation process requires a signature by the agency administrator (Superintendent).

Stage II – Short-Term Implementation Actions. Stage II represents the initiation of management for resource benefits. During this stage, the potential fire behavior is calculated; uncertainty is reduced by assessing risk of the fire, how quickly it could spread, and how intense the fire may burn; fire complexity; necessary immediate and short-term management actions and resources; and evaluation of the need to move directly to Stage III.

Stage II consists of four distinct components: Fire Behavior Predictions and Risk Assessment, Short-term implementation actions, Complexity Rating Worksheet, and Stage III Needs Assessment

Fire Behavior Predictions and Risk Assessment: Short-term fire behavior predictions are vital to initial implementation actions because they provide:

- Estimates of fire size and shape at a given time
- Models of management alternatives
- Determinations of resource needs, production rates, and requirements
- Placement of resources
- Estimates of behavior under differential weather patterns
- Estimates of ignition patterns, including spotting
- Modeling for contingency action planning
- Developing prescriptions through historical weather records
- Verifying prediction outputs

The Short-Term Implementation Actions: Stage II also describes what the initial or immediate implementation actions will be. These actions can vary significantly, depending upon specific circumstances of the particular fire. In cases where the fire may be fuel-limited, surrounded by sparse fuels or natural barriers with only limited spread potential, monitoring may be specified as the necessary implementation action. In other cases, monitoring plus some form of limited mitigation actions may be necessary. In still other cases, fuel types in which the fire is burning may require immediate actions to delay, check, or direct the spread of fire.

- Objectives and Desired Effects
- Safety Considerations
- External Concerns
- Environmental Concerns
- Threats
- Short-Term Implementation Actions
- Estimated Costs
- Signatures

Complexity Analysis: Stage II requires that a Complexity Analysis be completed which is normally an agency agreed to process involving worksheets that address issues related to safety, threats and potential for escape. Where risks are identified from this analysis, they are specifically addressed regarding the possibility to mitigate that risk. This is an evolving process but will include rating complexity elements including but not limited to:

- Fire Treatment Objectives
- Potential for Escape
- Life and Safety
- Values at Risk
- Fuels and Fire Behavior
- Management Organization
- Ecological and Environmental Considerations
- Social and Cultural Values
- Smoke and Air Quality Management
- Project Duration and Logistics
- Magnitude of oversight/political activities
- Ignition and Tactical Operations.
- Interagency Coordination

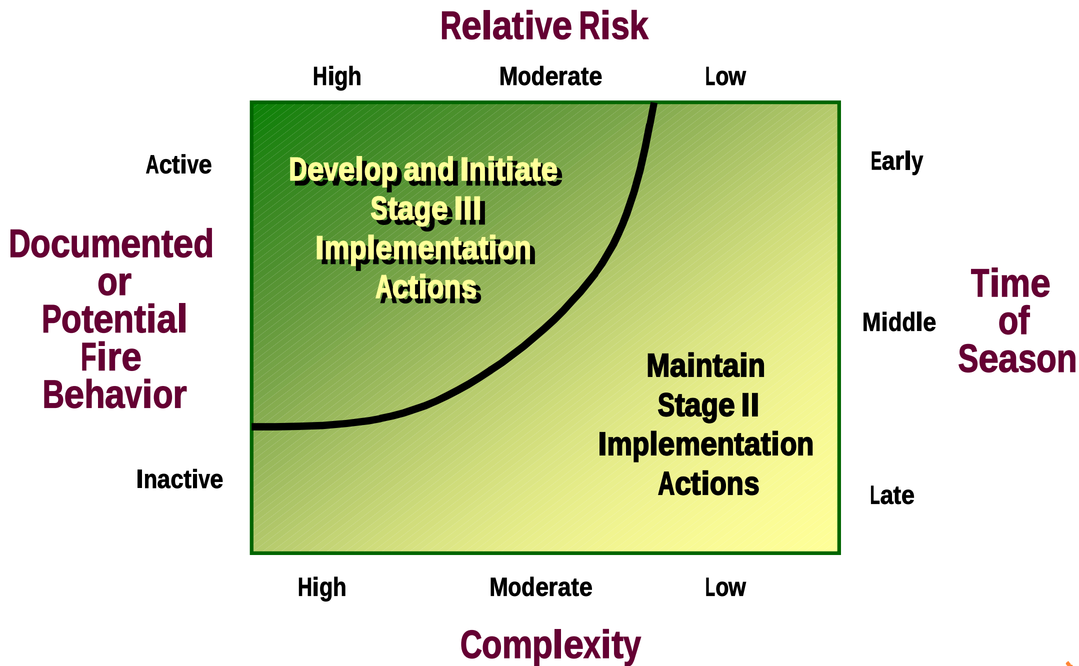
Stage III Needs Assessment: This process is a chart that provides the decision maker a visual aid to determine whether planning needs to proceed to the final level or whether management can continue at the Stage II level. It is currently based on comparing four elements to generate a visual indicator of where the fire is in relation to Stage III needs. The four elements are:

- Time of Season
- Documented or Potential Fire Behavior
- Complexity
- Relative Risk

All four of the above elements are known from completing the first two Stages of planning and are evaluated together to yield a visual aid which can help decide whether planning should proceed to Stage III. By matching indexes top and bottom and side to side the crossing point indicate the need to move to Stage III. This element is in the process of being upgraded and also applied to the decision making process for moving from Stage I to Stage II. For the current time however it is only applicable to the change from Stage II to Stage III.

Once the fire is authorized to burn it must be periodically re-assessed to confirm the continued capability to manage the fire. This is done based on a set time schedule not to exceed at least once every 7 days. During periods of active growth this process is done daily. This revalidation consists of completing a revalidation checklist and assessing the need to perform additional planning. At Stage II the periodic re-assessment and re-validation requirement also requires that the chart described above be evaluated each time the re-assessment is done. The re-validation process requires a signature by the agency administrator (Superintendent).

Stage III Need Assessment Chart



Stage III – Long Term Assessment and Implementation Actions. This is the final stage of the WFIP and its need is determined by the Stage III Needs Assessment Chart or it can be ordered completed by the Agency Administrator (Superintendent). Stage III is normally completed on all fires that display potential for significant growth, have potential to threaten significant values, or have significant holding actions or resource commitment associated with their management. This stage is also normally always completed if a Fire Use Management Team is activated to manage the fire.

Stage III details operational activities and documents the planning completed to ensure adequate mitigation actions have been developed. These actions will provide the best protection against fire activity exceeding acceptable limits. Mitigation actions are those on-the-ground activities that will serve to increase the defensibility of the Maximum Manageable Area (MMA), check, direct, or delay the spread of fire, and minimize threats to life, property, and resources. Mitigation actions may include mechanical and physical non-fire tasks and specific fire applications. Their purpose is to construct firelines, reduce excesssive fuel concentrations, reduce vertical fuel continuity, create fuel breaks or barriers around critical or sensitive sites or resources, create "blacklines" through controlled burnouts, and limited suppression actions to limit fire spread and behavior. There are 15 major components to Stage III of the WFIP:

- Objectives and Risk Assessment Considerations
  - Natural and Cultural resource objectives and constraints/considerations

- Maximum Manageable Area Definition and Maps
- Fire Projections and Maps
- Weather season/drought discussion and prognosis
- Long-Term Risk Assessment (describe techniques and outputs, include maps as appropriate)
- Probability of Success
- Threats
  - Threats to MMA
  - Threats to Public Use and Firefighter Safety
  - Smoke dispersion and effects
  - Other
- Monitoring Actions (actions, frequency, and duration)
- Holding Actions (describe holding actions, management action points that initiate these actions, and key to map if necessary)
- Resources needed to manage the fire
- Estimated costs of long-term implementation actions
- Contingency Actions (describe contingency actions, management action points that initiate them, and resources needed)
- Information Plan
- Post-burn evaluation
- Signatures and Date

Once again the decision to manage a fire at Stage I, II, or III must be periodically re-assessed and validated by the agency administrator (Superintendent). This step provides a process to evaluate the continued capability of the local unit to manage the fire for resource benefits, and to determine if the fire is escalating in complexity and operational needs.

Wildland Fire Implementation Plan Application and Constraints

A fire that is burning in the middle of a Wilderness that has virtually no chance of reaching any valued resources will normally be managed at Stage I of the WFIP process unless it has potential to become a large fire. If a fire has some potential to reach a boundary, facility, or improvement of any type or cause smoke problems it would likely be managed at Stage II so that additional information is collected early into the management of the fire. Fires that are expected to require significant holding actions or mitigations to be successful will likely be managed at Stage III, which requires the most rigorous planning and analysis. These fires normally require a management structure to be set up and must be monitored intensively at the ground level and normally until the onset of fall when conditions moderate.

There are no conditions when Wildland Fires would not be managed in Yosemite except under periods of national moratorium (2000) or when the initial decision elements of the Go/No Go Decision are not acceptable to the agency administrator (Superintendent). Drought periods have long been thought to be times when these fires should not be managed. They are however the only time when the high elevation communities experience fire naturally and are a significant force in Wilderness management. To suppress fire in a system with a 200+ year fire return interval can have long lasting effects and is much the reason why American Forests are in the condition they are. Science has shown us that we cannot continue to do this without possible irreversible impacts. What has been learned over years of management of wildland fire is that you can't manage them all because that also can have detrimental effects when they start exhibiting stand replacement behavior. Because certain parts of the ecosystem are in an unhealthy state, work needs to be done up front before management can be done using natural ignitions (the west side of Yosemite).

Issues that may preclude allowing a wildland fire to burn to accomplish resource benefits include:

- Extreme drought
- No qualified manager available
- Preparedness Levels
- Smoke
- Proximity to Unit boundaries
- No Resources available
- Too many fires already
- Unmitigatible Risk to high values

Wildland Fire Implementation Plan Application

Non-Fire Hazard Fuel Projects

Hazard fuel projects will also have an operational implementation plan. Format for this plan is new in 2001 and is outlined in RM-18 Ch 10. If no prescribed fire is proposed, then a Hazard Fuel Plan will outline the alternative treatments that will be used. If fire is to be applied at a later date to remove duff and forest floor litter, then the entire project would be written up as a Prescribed Fire Plan.

Appendix 4: Smoke Communications Strategy

Prescribed fires and managed wildland fire activities play an essential role in park and wilderness management. The Sierra Nevada ecosystem evolved with fire and has an abundance of fire dependant species. The fire regime for lower elevation areas where mixed conifer vegetation dominates is characterized by short fire return intervals and surface burning fires with very little active crown fire. This regime has been replaced over the years, mostly due to the exclusion of fire because of aggressive fire suppression. Now fires tend to be much more destructive, exhibiting a greater tendency to spread through crowning. The objectives of land and fire managers are to return the landscape to the surface burning fire regime using prescribed fire as the primary tool and vegetation removal where needed. To pursue this objective more burning needs to be done; more burning will create more smoke. Plans for smoke management and for communication with the public about smoke events are an important part of any wildland fire.

Pursuant to Title 17 of the California Health and Safety Code (as revised), a smoke management plan will be submitted for each proposed prescribed fire and developed for each managed wildland fire incident. In the smoke management plan, areas are identified that may be impacted by the fire, and mitigations are established to deal with potential problems. Ways to control or lessen the effects of smoke include burning only with a certain wind direction, burning only a certain number of acres per day, or not burning an area and instead removing fuels by alternative means such as chipping or mechanical removal. In high visitor use areas, limiting the adverse affects of smoke may mean waiting until a time when visitation is at its lowest. Whatever the mitigation, notification of the publics involved will be a priority during preparation for a burn. Who gets notified is different depending on the location of the burn.

Yosemite has managed a fire program for over 30 years and has dealt with smoke issues for much of that time. Evolution of the program has led to development of a notification strategy. The Wildland Fire Use program often results in smoke settling into populated areas, in part because it cannot be planned like prescribed fire. A managed wildland fire incident is normally managed in wilderness where fire is a natural process—these fires are managed and allowed to burn for ecosystem restoration and maintenance. Through naturally occurring fire, forests are naturally thinned, nutrients are recycled, fuels are reduced, and the fire regime continues to function as it always has. Fire effects are varied throughout the area that experiences a wildland fire and diverse and significant vegetative mosaics are established as the fire burns through its different phases, where different levels of fuel are consumed or left untouched. These fires also allow critical fire fighting resources to remain available for unwanted fires that burn in suppression areas, especially near communities where threats to life, property and resources are paramount.

About 10% of wildland fires can and do burn over large areas by the end of the season. Such fires tend to experience rapid growth at some period. During these periods of activity the fire may produce enough smoke to adversely affect air quality in a populated area. When a fire grows by more then 100 acres or makes sustained runs over a period of days and the atmosphere is stable, smoke tends to settle into valleys and drainages causing some degree of reduced visibility and air quality. In the evenings, as air cools, smoke will also settle into drainages. Under stable conditions this situation will persist and clearing during the day may by poor. If the atmosphere is unstable the smoke will likely disperse into higher elevations. Smoke rising into a transport wind may eventually leave the area, however, it may cause problems outside the park.

Smoke management can be even more difficult when additional unwanted wildland fires are burning around the region. During big fire years, when numerous unwanted fires are burning, smoke tends to persist throughout the region. Persistent smoke from wildland fires is quite common during summers in the California foothills. Relief only comes when the fires are suppressed and/or high pressure moves out of the area, permitting better mixing in the atmosphere. Because of this, prescribed burning is closely monitored and coordination is necessary between the Air Quality Districts, the California Air Resources Board (CARB), and land management agencies which conduct prescribed burns. Meteorologists from CARB and the Interagency Fire Forecast and Warning Units (IFFWU) in Redding and Riverside provide forecasting specific to smoke mixing transport winds when requested and also coordinate with the National Weather Service.

Smoke Notification Process

A process Yosemite National Park first developed in 1994 for the Horizon Fire and later used during the Hoover Fire of 2001 involved notifying visitors, residents, and surrounding publics that smoke from the fires would often be persistent and may be quite thick at times. This communication process is ever evolving to educate people about the need for wildland fires and to communicate about health concerns the park has for residents and visitors. The park uses the media (through press releases), public information handouts, educational displays, and internet website postings. Different handouts are prepared and posted to provide information in the local area as the potential for a smoke event increases and, eventually, as the smoke persists.

Communication about a particular incident is done in a three stage process that is stepped up as the level of smoke increases. Based on an Air Quality Index, which relies on sophisticated particulate monitoring equipment, the public is kept informed of the level of exposure to particulate matter. The park also informs people about alternative places to visit during different times of day and keeps visitors informed of fire and smoke conditions and expectations.

Established by the Environmental Protection Agency and adopted by each state, the Air Quality Index (AQI) is a tool for reporting daily air quality conditions. Using numeric information from sensors (e.g., particulate monitors), the AQI provides information about how clean or polluted the air is and the associated health concerns for each level of emissions. The AQI focuses on health problems that can happen within a few hours or even days after breathing, in this case, smoke filled air. The AQI can be thought of as a yardstick that runs from 0 to 500. The higher the AQI value, the greater the level of air emissions and the greater the health danger. The Index identifies six conditions: good (0 to 50), moderate (51 to 100), unhealthy for sensitive groups (101 to 150), unhealthy (151 to 200), very unhealthy (201 to 300), and hazardous (over 300).

In the first stage the park releases an **Air Quality Advisory Notice**. Park staff might also contact visitors directly and may put out a press release about the wildland fires and fire season. Visitors would also be advised of the significance of natural fires in wilderness. At times the park requests that campers voluntarily limit their use of recreational fires in Yosemite Valley. This notice can precede the first significant activity that would generate enough smoke to be evident. Interpreters might also discuss the role of fire and the problem of smoke on nature walks. At this stage the AQI would be increasing but still be in the good to moderate range (<100).

The second stage in the smoke communication strategy would include the issuance of an **Air Quality Alert Notice** which would be directed towards the health effects of prolonged exposure to smoke. This notice would explain that particulate levels could be unhealthy to certain at risk people and suggest options for reducing exposure to smoke. Normally particulate levels would be high in the morning hours but clear up by mid-afternoon. Management actions might include discussions of banning campfire use in certain areas. In the early hours of the day, the AQI would possibly be in the unhealthy range for sensitive groups but in the moderate range in the afternoon. Twnety-four-hour National Ambient Air Quality Standards (NAAQS) for particulate matter (established by the EPA) would be less then 150 at this stage. The park might begin to hold public meetings at this stage.

An **Air Quality Warning Notice** would be issued when the particulate concentrations are at levels where the AQI stays in the unhealthy range day and night. Campfires would be banned in areas of the highest concentrations and visitors would be advised of the potential unhealthy affects of the particulate concentrations. Alternate work schedules may be established for employees, to reduce exposure. Actions would likely be taken to reduce emissions from wildland fires. National Ambient Air Quality Standards for the 24-hour particulate matter concentrations would have exceeded 150 one or more times. Public meetings would be arranged to inform people of monitoring results, management concerns, and actions being taken.

Smoke Monitoring

The park currently has a State-owned Hi-Vol PM-10 sampler which collects a 24 hour sample every 6 days, and a Beta Attenuation Monitor (BAM) which samples PM2.5 and runs continuously and provides hourly updates. These are both located near the Yosemite Valley Visitor Center. As part of the IMPROVE (Interagency Monitoring of Protected Visual Environments) network, there is a transmissometer which measures light extinction and a four-module aerosol sampler; both are located on Turtleback Dome. Portable monitors include another BAM, a DataRam, and cameras set on timers. The park also has ozone samplers in several areas.

While smoke monitoring has been part of the program for several years it continues to be a fragmented collection of data with the exception of the state Hi-Vol sampler on the visitor center which sends the filters to the State for archiving data. Problems identified in the program relate to lack of dedicated personnel to collect and manage data specific to smoke management. Data has often been collected by seasonal employees and, due to the high turn-over in personnel, there has been a lack of continuity for data management. Recent discussions at the South Sierra Fire Managers meetings have considered the possibility of pooling resources to allow better collection of smoke data for the area represented by this group.

Smoke Talking Points

In addition to formal notices and general fire messages/information, the following examples of talking points on smoke would be included in public information. Each talking point includes an example of language that might be used in updates, press releases, articles, presentations, et cetera. The talking points are organized in groups according to trigger points (i.e. specific time periods in an incident):

Year-round
Early Fire Season

Beginning of Incident
Air Quality Index (AQI) exceeds 75 for PM10
AQI exceeds 150 for PM10

Year-round

Wildland fire smoke fits into a larger regional air quality situation.

Example: "The scenic vistas in the parks, especially in the summer, are highly obscured by regional haze. Haze is caused when sunlight encounters tiny particles in the air. These particles may be the result of either natural events or human activities. According to the local Air District, over 95% of the particulate pollution in our area originates from Central Valley sources (i.e. motor vehicles, industrial fuel burning, manufacturing, and agriculture). Less than 5% comes from wildland fire in the Sierra Nevada" (NPS n.d.c).

Smoke, like fire, is a natural ecosystem component.

Example: "A Breath of Fresh Air: Is there a bright side to all this talk about smoke? While it is a health concern for humans, plants have adapted to live with smoke just as they have many other natural elements of the environment. Scientists are discovering that some plants might even depend on smoke for their survival. A recent study looked specifically at the low elevation chapparral plant communities. In the laboratory, scientists exposed various seeds to heat and charring, as in a fire, and certain species remained dormant. When the same seeds were exposed to smoke, germination occurred. While some plants, like the giant sequoia, use heat from fires for seed dispersal, it now appears that other plants rely on smoke for germination." (NPS n.d.c)

Example: "Research has shown that smoke reduces the growth of mistletoe, which can damage black oaks."

Early Fire Season

Use general fire messages and:

Park managers are sensitive to smoke impacts for visitors and employees.
Example: "The Yosemite fire program is committed to balancing the needs of park resources and people. While fire has always been a natural part of this ecosystem, our current society presents unique conditions. Today, there are more people than ever living in or visiting Yosemite National Park. Every fire management action considers this fact when determining incident objectives."

Beginning of Incident

Use the talking points above and:

The park has the ability to monitor particulate levels in Yosemite National Park during smoke events.
Example: "In addition to weekly monitoring, as soon as the park anticipates a smoke event from a wildland fire, air quality technicians begin operating additional Smoke Monitoring Equipment on a more frequent basis. These stationary and mobile units measure particulate levels in the air. Particulates are solid particles produced by things like vehicle emissions, agricultural activities, and fires. The equipment records levels every hour and then computes a 24-hour average which correlates to the National Ambient Air Quality Standards (NAAQS) established by the Environmental Protection Agency (EPA). During extreme smoke conditions, technicians retrieve data from the module daily."

Some characteristics of smoke accumulation are predictable because they are based on daytime and nighttime winds.
Example: "Up-slope or up-canyon breezes occur during the day which will often take smoke into higher elevations. At night, these winds change direction and bring smoke down-slope to the lower elevations."

Some characteristics of smoke accumulation are not predictable since they are dependent on atmospheric conditions.
Example: "With unstable atmospheric conditions, smoke from wildland fires is mostly lofted up to very high elevations where it disperses. When atmospheric conditions are stable, perhaps with an inversion layer, smoke can be trapped at lower elevations.

For prescribed fires include:

Due to the deliberate nature of prescribed fire, audiences can be notified prior to the smoke event about what to expect.

Example*:* "During the week of ignition, visitors traveling through the area will smell and possibly see smoke. Smoke will likely be visible from [specific location]. The smoke will most likely settle in lower elevations during the early morning."

During prescribed burns, fire managers utilize smoke management techniques.

Example: "The entire burn segment is 925 acres, but is split into two sections for smoke management reasons. A fire line has been constructed inside the segment where the fire can be held if smoke production is a problem. The burn boss plans to ignite 30-40 acres per day to minimize smoke output. This will increase the duration of the smoke event but will decrease the ambient level of smoke at any one time."

For Fire Use include:

Small natural fires have the potential to become large fires.

Example: "Burning in heavy mixed conifer fuels, the newly discovered [*Name*] Fire has the potential to expand across hundreds of acres over the next several months. This fire was naturally-caused and will be naturally-extinguished with rain or snow. A "season-ending event" bringing more than ½-inch of rain over a 3-day period usually occurs in October."

There are ways of minimizing smoke output in a fire use project without suppressing the fire.

Example: "While the park hopes to maximize resource benefits by allowing this fire to spread naturally, managers have at least two ways of reducing smoke in special situations. Hand crews can install fire line in strategic locations to contain certain areas of the fire. For example, keeping fire out of the lower Illilouette drainage would reduce smoke in Yosemite Valley. In extreme smoke situations, fire managers can drop water on hotspots. Unlike water drops in suppression actions, these drops are not meant to halt fire movement, but slow it down and reduce smoke."

Example: "With a naturally ignited fire already burning in one of the tributaries draining into a sensitive area fire managers will now be suppressing new ignitions that would impact the same area to reduce additional smoke impacts to this sensitive area.

When AQI Exceeds 75 for PM10

Use the talking points above and:

There are ways for park residents and neighbors to reduce their exposure to smoke.
Example: "Smoke concentrations can be avoided by planning morning activities away from Yosemite Valley and afternoon activities away from higher elevation areas, such as Tuolumne Meadows. Close windows, doors, and outside vents when it is smoky to prevent accumulations indoors. Run your air conditioner, if you have one. Keep the fresh air intake closed and keep the filter clean. Ventilate your home and work place during periods of little smoke. Avoid physical activities while smoke is dense. Paper masks are designed to trap large dust particles, not the tiny particles found in smoke. These masks generally will not protect your lungs from wildland fire smoke."

Example: "Residents of communities affected by smoke from wildland fires and prescribed fires are encouraged to practice the recommended health habits. A healthy immune system is the best protection against the effects of smoke. Immune function is enhanced with regular moderate physical activity, good nutrition, hydration, and adequate rest." (USFS 2001b)

Breathing smoke is not healthy for anyone, but some people are at greater risk.
Example: "People with heart or lung disease, such as congestive heart disease, chronic obstructive pulmonary disease, emphysema or asthma are at greater risk. Children and the elderly are also more susceptible to smoke. These people are advised to use caution and avoid physical activity while heavy smoke is present."

Example: "The risks of occasional exposure to fine particulate and other components of vegetative smoke are minimal for healthy individuals. However, elevated levels of smoke that persist for months or years increase the risk of heart and respiratory disease, especially among the elderly and individuals with pre-existing respiratory or cardiovascular illness." (USFS 2001b)

AQI exceeds 150 for PM10

Use all of the talking points above and hold an open house/meeting to respond to community, public, and employee needs.

TALKING POINTS AT-A-GLANCE

The detailed talking points outlined earlier are indicated below with their corresponding numbers. When incorporating these messages into materials, refer back to the text examples.

Table A4-1
Talking Points at a Glance

Year-round	Early Fire Season	Beginning of Incident	AQI exceeds 75 for PM10	AQI exceeds 150 for PM10
1.Wildland fire smoke fits into a larger regional air quality situation.	3. Park managers are sensitive to smoke impacts for visitors and employees.	4. The park has the ability to monitor particulate levels in Yosemite National Park during smoke events.	11. There are ways for park residents and neighbors to reduce their exposure to smoke.	Use all of the talking points hold an open house/meeting to respond to community, public, and employee needs.
2. Smoke, like fire, is a natural ecosystem component.		5. Some characteristics of smoke accumulation are predictable because they are based on daytime and nighttime winds.	12. Breathing smoke is not healthy for anyone, but some people are at greater risk.	
		6. Some characteristics of smoke accumulation are not predictable since they are dependent on atmospheric conditions.	13. The *Air Quality Index* (AQI) is one tool that helps the park, visitors, and employees quantify daily air quality conditions.	
		PRESCRIBED FIRE 7. Due to the deliberate nature of prescribed fire, audiences can be notified prior to the smoke event about what to expect.		
		8. During prescribed burns, fire managers utilize smoke management techniques.		
		FIRE USE 9. Small natural fires have the potential to become large fires.		
		10. There are ways of minimizing smoke output in a fire use project without suppressing the fire.		

Appendix 5: Cumulative Projects

Introduction

The Council on Environmental Quality's regulations for implementing the National Environmental Policy Act defines cumulative effects as:

> *…the impact on the environment which results from the incremental impact of the action when added to other past, present and reasonably foreseeable future actions regardless of what agency (Federal or non-federal) or person undertakes such actions. (40 CFR § 1508.7)*

The following is a scenario of projects that may have potential cumulative impact when considered along with actions called for in the *Final Yosemite Fire Management Plan/EI*S. The purpose of this scenario is to evaluate (1) whether the resources, ecosystems, and human communities have already been affected by past or present activities, and (2) whether other agencies or the public have plans that may affect resources in the future.

The Affected Region

This list of projects was developed through an iterative process with individuals, groups, and agency officials and attempts to include major projects within the affected environment relative to each impact topic. The region of evaluation was established based upon an observation of natural boundaries, the recognition of potential ecological relationships to Yosemite National Park, and with a general understanding of the common issues to be addressed in the impact analysis. The descriptions of the projects listed below were provided by those contacted either for this or other recent planning actions.

The incremental impacts of the *Final Yosemite Fire Management Plan/EIS* were assessed, for most topics, considering the past, present and reasonably foreseeable future fire and/or fuel management projects or programs, and by considering new development projects that would affect the amount of wildland/urban interface in and near Yosemite National Park.

The region of analysis included surrounding counties and federal lands as follows:

- Mariposa County Fire Department
- U.S. Forest Service – Inyo National Forest, Bishop, CA
- U.S. Forest Service – Stanislaus National Forest, Sonora and Groveland, CA
- U.S. Forest Service – Sierra National Forest, Clovis, CA
- U.S. Forest Service – Toiyabe National Forest, Carson City, NV
- U.S. Bureau of Land Management – Folsom Field Office, Folsom, CA
- Counties with jurisdiction over activities on and near the park boundaries, where projects would potentially represent additions to wildland/urban interface. For this category of projects, staff reviewed the list of projects compiled while completing the Yosemite Valley Plan.

National Park Service planners evaluated each project listed from the perspective of the individual characteristics of each impact topic. Analysis of potential cumulative impacts was specific to those projects that would potentially have a compounding effect when considered with the actions of each alternative.

Cumulative Impacts Scenario

Fire and Fuels Management and Ecosystem Restoration Projects

The U.S. Forest Service has a large number of projects that will take place in the Central Sierra. For example, Stanislaus National Forest has provided the National Park service with a list of 90 projects that they plan to conduct over the next ten years; at least six of these projects would occur in the Groveland District. Sierra National Forest has provided a list of 39 projects for the next five years. The other forests are planning similar amounts of activity as they too work on responding to wildland/urban interface initiatives and meeting other fire, fuels and land management objectives. The projects listed below are representative of the types of recently completed and future projects on land managed by the U.S. Forest Service and by the National Park Service in Yosemite National Park.

Agency Name: U.S. National Park Service, Yosemite National Park

Project Name: Merced Wild and Scenic River Comprehensive Management Plan (Merced River Plan)

Description: In 1999 and 2000, the National Park Service developed a comprehensive management plan for sections of the Merced Wild and Scenic River that it administers. The purpose of the Merced River Plan would be to protect and enhance the river’s Outstandingly Remarkable Values for the benefit and enjoyment of present and future generations.

The final plan and environmental impact statement was released to the public in July 2000; the planning process was completed in August 2000, with the signing of the Record of Decision. Included in the plan are descriptions of the boundaries, the official classification of river segments, and a description of the Outstandingly Remarkable Values associated with the Merced River. The Merced River Plan’s land-use zoning prescriptions have served as a guide to protect river values during the *Yosemite Valley Plan* process, and have thereby directed the type of potential development and potential levels of use allowed within the river corridor in Yosemite Valley, Wawona, and El Portal.

Project Name: Protection of the Mariposa Grove of Giant Sequoias

Description: This project proposes to protect the Mariposa Grove of Giant Sequoias by mitigating impacts caused by human activities. Work will include construction of a quarter-mile of boardwalks in areas where soils have been compacted and sequoia roots have been damaged; restoration of natural drainage patterns by re-routing a quarter-mile of trails to more appropriate sites; control of invasive non-native plant species; and evaluation of the preservation efforts through a monitoring program. This project is identified as priority 9 in the approved *Resources Management Plan* (Project Statement number YOSE-N-305.000).

Project Name: Mariposa Grove Roadway Improvement and Giant Sequoia Restoration

Description: The National Park Service is considering alternatives for restoring giant sequoia habitat in the Lower Mariposa Grove of Giant Sequoias in Yosemite National Park by relocating the existing parking to the South Entrance area. It is expected that water drainage improvements will be made to the Mariposa Grove Road and that the existing water supply line would then be relocated into the road corridor. At the South Entrance area, the roadway would have minor realignments to address roadway safety problems, requiring the relocation of the park's South Entrance Station.

Project Name: Wilderness Management Plan Update

Description: The National Park Service is updating the 1989 *Yosemite National Park Wilderness Management Pla*n. Planning for this project is anticipated during 2004 and 2005.The objective of updating the plan is to provide guidance to park operations for the successful management of Yosemite's designated Wilderness, which covers over 95% of the park. The plan will address land management issues within the wilderness including visitor use, vegetation associations, air resources, noise issues, watersheds, soils, cultural landscapes, and other natural, cultural, and social resource variables. The plan update would also address the use of the five High Sierra Camps in Yosemite National Park.

Project Name: Tuolumne Wild and Scenic River Comprehensive Management Plan

Description: In 1984, the Tuolumne River was designated a Wild and Scenic River. The Wild and Scenic Rivers Act requires that managing agencies develop a comprehensive management plan for Wild and Scenic Rivers that flow in their jurisdiction. Plan development is anticipated to occur during 2004 and 2005. The draft planning objectives of this document include the following:

- Review and finalize classifications and boundaries and establish Outstandingly Remarkable Values for the Tuolumne Wild and Scenic River
- Delineate management zones and develop zoning prescriptions
- Address user capacity

Project Name: Merced River at Eagle Creek Ecological Restoration

Description: This project was completed in 2003. The National Park Service restored human-caused impacts to the riverbank and floodplain at the confluence of Eagle Creek and the Merced River in Yosemite Valley. Actions included in the project were: removal of an undetermined amount of abandoned park infrastructure including a sewer line and manhole; revegetation of the damaged riverbank using brush-layering, seeding, and mulching techniques; construction of a temporary fence to guide visitor activities to resilient areas; and elimination of a road shoulder used for parking.

Project Name: East Yosemite Valley Ecological Restoration Project

Description: Ecological restoration efforts of areas formerly occupied by several abandoned campgrounds in east Yosemite Valley will return natural functioning to the riparian zone along the Merced River. Restoration efforts may include:

- Removal of imported fill material
- Removal of abandoned roads and infrastructure
- Re-establishment of natural contours on the land

- Restoring natural surface and ground water movement
- Replanting native vegetation
- Removing non-native plant and animal species

Planning for the ecological restoration of the former campgrounds is currently underway.

Project Name: Cooks Meadow Ecological Restoration Project
Description: Completed in 2002, the Cook's Meadow Restoration Project was a 6-year effort that restored a dynamic and diverse wetland ecosystem by filling 4 old ditches designed to drain standing water, but which were seriously affecting the natural flow of water across the meadow; removing a raised, abandoned roadbed and a trail that bisected the meadow and affected natural water flow; reconstructing the Cook's Meadow trail on an elevated boardwalk that now allows water to flow freely and reduces foot traffic on sensitive meadow plants; installing culverts under Sentinel Road to direct runoff into the meadow, restoring the natural flow of water from the Merced River during seasonal periods of high water; and, reducing non-native plant species encroaching on native species by using manual, mechanical, and chemical control methods.

Project Name: Happy Isle Fen Ecological Restoration Project
Description: Ecological restoration will restore the filled wetland to a functional fen habitat. Restoration of the eastern arm of the fen will greatly increase the amount of this type of wetland habitat in the Valley. During the fall of 2002, selected plants were salvaged at the restoration site. Equipment was used to remove river-sand fill and the old underground drainage system on the site to expose the original soils. The area was then contoured according to an approximation of the site's topography in 1919. Site revegetation was completed during 2003 and included planning with seedlings, cuttings, and mature salvage plants. A protective split-rail fence is being constructed around the revegetated area and should be completed by Spring 2004. Trails and wayfinding are being redesigned, as necessary. Post-revegetation monitoring will be continued for at least five years.

Agency Name: U.S. Department of Agriculture, U.S. Department of the Interior

Project Name: National Fire Plan
Description: In August of 2000, the Secretaries of Agriculture and Interior were directed to develop a plan to respond to severe wildland fires, reduce their impacts on rural communities and assure sufficient firefighting capacity in the future. The Plan called for action that federal agencies, in cooperation with States and communities, can take to reduce immediate hazards to communities in the urban-wildland interface area, and to ensure sufficient resources are available and prepared for extreme fire conditions in the future.

The National Fire Plan includes five key points:

1) Assure adequate preparedness for coming fire seasons.
2) Restore landscapes and rebuild communities damaged by wildfire.
3) Invest in projects to reduce hazardous fuels fire risk.
4) Work directly with communities to assure adequate protection

5) Be accountable, and establish adequate oversight and monitoring for results.

Agency Name: U.S. Forest Service, Pacific Southwest Region

Project Name: Sierra Nevada Forest Plan Amendment (January 2001)

Description: The framework includes the Sequoia, Sierra, Stanislaus, El Dorado, Inyo, Tahoe, Plumas, Lassen, and Modoc National Forests and the Lake Tahoe Basin Management Unit. In addition, Region 5 of the National Park Service is working with personnel from the Humboldt-Toiyabe National Forest in Region 4 to ensure coordination and compatibility of management across administrative boundaries. The record of decision of decision was issued in January 2001. The effort is focused on five problem areas: old forest ecosystems; riparian, aquatic, and meadow ecosystems; fire and fuels; the spread of noxious weeds; and lower west-side hardwood forests.

Agency Name: U.S. Forest Service, Humboldt-Toiyabe National Forest

Project Name: Forest Plan Amendment – Sierra Nevada Framework (January 2001)

Description: Amended the Forest plan to bring it into line with the Sierra Nevada Framework. Specifically to:

- Protect, increase, and perpetuate old forest ecosystems and provide for the viability of native plant and animal species associated with old forest ecosystems,
- Protect and restore aquatic, riparian, and meadow ecosystems and provide for the viability of native plant and animal species associated with these ecosystems,
- Manage fire and fuels in a consistent manner across the national forests, coordinate management strategies with other ownerships, integrate fire and fuels management objectives with other natural resource management objectives, address the role of wildland fire, and set priorities for fire and fuels management actions,
- Reduce and, where possible, reverse the spread of noxious weeds, and
- Maintain and enhance hardwood forest ecosystems in the lower westside of the Sierra Nevada.

Project Name: Humboldt-Toiyabe National Forest Revision Work Plan (October 2003)

Description: The Records of Decision for the Humboldt and Toiyabe National Forest Plans were signed on August 19, 1986, and June 23, 1986, respectively (from 1986 to present, several amendments for each Forest were processed). Regulation 36 CFR 219.10(g) states that forest plans shall be revised at least every 15 years. This 15-year period ended in 2001 for both the Humboldt and Toiyabe Forest Plans. The Forest received the go ahead to begin the revision process in FY 2003. The work plan outlines the overall process that will be used to accomplish the revision effort, and describes the strategy, time schedule, and staffing needs that we now believe are required to successfully complete the forest plan revision process. The work plan is an adaptable document and is expected to change in response to new information. A Record of Decision is expected in September 2006. The broad goals of the plan are to:

- Promote ecosystem health
- Provide a variety of uses, values, products, and services

- Develop and use the best scientific information available
- Ensure the acquisition and use of an appropriate corporate infrastructure

The Humboldt-Toiyabe NF has determined that the following topics should be addressed during the forest plan revision process:

- Forest and Rangeland Health
- Fire and Fuels
- Grazing Management
- Off-Highway Vehicle Management
- Recreation
- Land Adjustment Strategy

Agency Name: U.S. Forest Service, Inyo National Forest

Project Name: Revised Draft Environmental Impact Statement—Management Direction for the Ansel Adams, John Muir, and Dinkey Lakes Wildernesses

Description: The U.S. Forest Service is preparing a Forest Plan Amendment for wilderness direction and land and resource management plans for three designated Wilderness areas. The original planning began in 1991 and a draft EIS was released in 1997, followed by a one-year comment period. The U.S. Forest Service received over 2,000 comments. A revised draft was released to the public on August 23, 2000. The biggest issues leading to a revised draft were the lack of sufficient data to support the decisions made by the document and concerning commercial uses in the wilderness areas. The document will focus on three main areas:

- Visitor use
- Commercial services management
- Recreational pack stock management
- One of the issues related to commercial use involves commercial outfitters who begin their trips in these wilderness areas and then move into Yosemite National Park. Outfitter operations that travel to Yosemite Valley could be affected by changes in wilderness operations.

Agency Name: U.S. Forest Service, Stanislaus National Forest

Project Name: Stanislaus National Forest – Forest Plan Direction (Alpine, Calaveras, Mariposa and Tuolumne Counties, California; April 2002)

Description: The Regional Forester approved the Stanislaus National Forest Land and Resource Management Plan (Forest Plan) and Environmental Impact Statement (EIS) on October 28, 1991. This document, the Stanislaus National Forest "Forest Plan Direction" presents the current Forest Plan management direction, based on the original Forest Plan as modified the Forest Plan appeals amendment processes. The plan sets management direction, Forest goals and objectives, and describes management practices, Forestwide standards and guidelines, management area direction, land allocation direction, and expected future conditions.

Project Name: Stanislaus National Forest – Fire Management Plan (April 2002)

Description: The Fire Management Plan (FMP) formally documents the fire program approved through the Stanislaus National Forest Land and Resource Management Plan and the Sierra Nevada Forest Plan Amendment (SNFPA) and will help achieve Forest resource management objectives. The FMP provides specific details of the fire program that most efficiently meets fire management direction. The FMP is not a decision document. Rather, it provides the operational parameters needed to implement the Land and Resource Management Plan.

The FMP tiers to the Stanislaus National Forest Land and Resource Management Plan approved in 1991 and the Sierra Nevada Forest Plan Amendment approved in 2001, together referred to throughout this document as the LRMP. The FMP complies with the National Environmental Policy Act (FSH 1909.15), as well as other State and Federal regulatory requirements.

Project Name: Stanislaus National Forest – Forest Road Analysis

Description: The Forest Roads Analysis (FRA) identifies issues, guidelines, and opportunities related to Forest roads management. The FRA will guide future management of Stanislaus National Forest roads and will not produce decisions on specific roads management actions. National Forest Roads Analyses are required by the Forest Service Chief's January 12, 2001 published roads policy, and as such, are not designed to address Off-Highway Vehicle (OHV) or Roadless Area issues.

The product of an analysis is a report for decision-makers and the public that identifies issues, problems, benefits, opportunities and guidelines to be used in subsequent site-specific road management decisions and in further analyses such as Watershed Analyses and Forest Plan revisions. The Forest Service Manual requires that at the Forest scale the Roads Analysis report must:

a. Inventory and map all classified roads, and display how these roads are intended to be managed. The inventory relies on existing data and assesses road conditions of only “major transportation routes determined to be of key importance by the forest (generally maintenance level 3, 4 and 5 roads).

b. Provide guidelines for addressing road management issues and priorities related to construction, reconstruction, maintenance, and decommissioning.

c. Identify significant social and environmental issues, concerns, and opportunities to be addressed in project level decisions.

d. Document coordination efforts with other government agencies and jurisdictions.

Project Name: Stanislaus National Forest, Forest Plan Direction (Amendment) – Motor Vehicle Travel Management (Alpine, Calaveras, Mariposa, and Tuolumne Counties, California; February 2001)

Description: The Stanislaus National Forest issued an Environmental Assessment (EA), Decision Notice and Forest Plan Amendment for on February 18, 1998. As a result of subsequent administrative appeals, the Regional Forester issued an appeal review decision on November 12, 1998. This document, the Stanislaus National Forest “Motor Vehicle Travel Management Forest

Plan Direction" (Motor Vehicle Direction) presents the current Forest Plan motor vehicle travel management direction, based on the original Forest Plan Amendment as modified through the appeal review process and subsequent Forest Plan Amendments. In general, this plan replaces Off Highway Vehicle (OHV) management elements (objectives, practices, standards and guidelines, prescriptions, and monitoring requirements) with Motor Vehicle Travel Management elements and identifies a Forestwide concept for the California Backcountry Discovery Trail.

Project Name: Larson Reforestation and Fuels Reduction Draft Environmental Impact Statement

Description: The USDA Forest Service, Stanislaus National Forest proposes the Larson Reforestation and Fuel Reduction Project, to return a portion of the 1987 Stanislaus Complex fire area to a forested condition, and reduce the fuels which make the area susceptible to another stand-replacing wildfire. The Larson project area is located on National Forest System lands in Tuolumne and Mariposa Counties, California, on the Stanislaus National Forest, Groveland Ranger District. The project area is located south of Highway 120, north of the Merced River Canyon, and is bounded by Pilot Peak Lookout on the west and Yosemite National Park on the east. The project area lies primarily within the Bull Creek and Ned Gulch watersheds, with very small portions in the Merced River watershed and South Fork Tuolumne River watershed. Elevations range from 3,000 feet on Bull Creek to 6,000 feet at Pilot Peak. It includes Anderson Valley and Ned Gulch, for a total of 13,306 acres within the project boundary. The Environmental Protection Agency published a Notice of Availability for the draft EIS in the Federal Register on October 31, 2003. The 45-day comment period ends December 15, 2003.

Project Name: Emigrant Wilderness Direction (2002)

Description: The Stanislaus National Forest issued an Environmental Impact Statement (EIS), Record of Decision (ROD) and Forest Plan Amendment for the Emigrant Wilderness Management Direction (Emigrant Direction) on April 8, 1998. As a result of subsequent administrative appeals, the Regional Forester later issued an appeal review decision. This document, the "Emigrant Wilderness Management Direction" presents the current Emigrant Wilderness Management Direction, based on the original Forest Plan Amendment as modified through the appeal review process. The goal of this Emigrant Direction process is to provide specific, adequate and consistent management direction, including standards and guidelines to prevent significant degradation of the Emigrant Wilderness, in accordance with the Wilderness Act. Activities covered includes fire management.

Project Name: A-Rock Reforestation

Description: This project will occur within Mariposa County at T2S, R19-20E and T3S, R19- 20E. The Forest Service will reforest 5,000 acres within the A-Rock Fire. Reforestation activities may include burning, mechanical, and ground and serial application of herbicides. The decision notice and FONSI were signed in March 1999.

Project Name: Aspen Fuels Reduction (G020003)

Description: The project is located in Tuolumne County at the Evergreen and Aspen Valley Road junction; T1S, R19E, Sec 26 & 35. This project proposes manual and mechanical removal of understory trees to allow 500 acres of under-burning with prescribed fire to improve spotted owl habitat and provide protection to owl habitat and general forest from stand replacing wildfire. A portion of a Spotted Owl Protected Activity Center (PAC) is included within the treatment area.

Project Name: Fire Management Action Plan for Wilderness

Description: This is a forest-wide action to incorporate the 2001 Federal Fire Policy that involves changes in terminology, funding sources, and management of wildland fires. A site-specific environmental analysis is in progress. The fire policy for wilderness allows naturally ignited fires to burn across shared boundaries (between U.S. Forest Service and National Park Service, for example) as long as the fire stays within certain prescribed conditions. As the fire burns, it is monitored and evaluated to ensure that it stays within agreed upon conditions.

Project Name: Orange Crush Fuels Program

Description: This project will occur within Mariposa County at T1S, R19E, Sec. 27, 28, 29, 32, 33 & 34. This project proposes to add 290 acres of prescribed burning of natural fuels outside the timber sale area for the Orange Crush Timber Sale (Crush Multi-Product Environmental Assessment-GO99212) and modify the original prescribed burning prescriptions. The total area to be treated with prescribed fire would be 1,018 acres.

Project Name: Rogge-Ackerson Fire Reforestation

Description: The U.S. Forest Service will reforest 4,500 acres affected by the Rogge-Ackerson fires. Reforestation activities may include burning, slash poling, deep tilling, shredding, and application of herbicides. The decision notice and FONSI was signed in March 1999.

Project Name: Granite Project —Watershed Protection and Enhancement (G049905)

Description: The project is located in Tuolumne County at T1N, T2N, R18, 19E. The watershed protection and enhancement is project proposed for 12,000 acres in the Reed, Jawbone, and Granite Creek Watersheds.

Project Name: Cherry Camping Regulation (G05355)

Description: Mariposa and Tuolumne counties; T2N R19E. Extend Forest Order for health and sanitation and fire prevention in undeveloped areas along the shoreline of Cherry Lake. A decision is expected 11/01/03.

Project Name: Early Intake/Mather Powerline Hazard Reduction (G020004)

Description: Tuolumne County. Project entails right-of-way clearance of hazard trees along powerlines.

Project Name: Five Corners Hazard Tree Removal (G030226)

Description: Mariposa County Sections 16-17 T2S R19E. Project entails removal of hazard trees. A decision is expected 11/01/03.

Project Name: Five Star Hazard Tree Removal (G030225)

Description: Tuolumne County; Sections 22-23, 27-28 T1S R18-19E. Project entails removal of hazard trees. A decision is expected 11/01/03.

Project Name: Hardin 16Y Hazard Tree Removal (G030223)

Description: Tuolumne County; Section 25 T1S R18-19E. Project entails removal of hazard trees. A decision is expected 11/01/03.

Project Name: Hells Hollow Road – Hazard Tree Removal (G030228)

Description: Tuolumne County; Section 32 T1S R17E. Project entails removal of hazard trees. A decision is expected 11/01/03.

Project Name: Bear Mountain Fuels Reduction (G020212)

Description: Tuolumne County; Sections 15-16, 21-23 T1S R19E. Project entails mechanical fuel reduction on 1,600 acres. A decision is expected 1/1/04.

Project Name: Highway 120 Corridor East – Private (G090961)

Description: Mariposa and Tuolumne counties; T1S R16-17E. Project entails mechanical fuel reduction on roadside corridors. A decision is expected 8/1/04.

Project Name: Road Corridor Fuels Treatment – Highway 120 East (G090959)

Description: Mariposa and Tuolumne Counties; T1S R18-19E. Project entails Mechanical fuel reduction on 317 acres of roadside corridors along Highway 120. A decision is expected 9/1/04)

Project Name: Road Corridor Fuels Treatment – Highway 120 West (G030104)

Description: Mariposa and Tuolumne Counties; T1S R17-18E. Project entails Mechanical fuel reduction on 288 acres of roadside corridors along Highway 120. A decision is expected 11/1/03)

Project Name: SWIFT Roadside Brushing Phase I (G020348a)

Description: Mariposa and Tuolumne counties; T1-2S R17-18E. Project entails mechanical fuel reduction on roadside corridors. A decision is expected 11/1/03.

Project Name: SWIFT Roadside Brushing Phase I (G020348b)

Description: Mariposa and Tuolumne counties; T1-2S R16-18E. Project entails mechanical fuel reduction on roadside corridors. A decision is expected 11/1/03.

Project Name: 3NO1 Hazard Tree and Salvage Sale (M1003-24)

Description: Tuolumne County; T2-3N R17-18E. Project entails removal of hazard and blow down trees along 21 miles of 3N01 from 2N14 to highway 108. A decision is expected 10/1/03)

Project Name: Clear Lake Aspen Restoration (M1199-3)

Description: Tuolumne County T3N R18-19E. Project entails removal of encroaching conifers from aspen stands. A decision is expected 8/18/03.

Agency: US. Forest Service, Stanislaus National Forest, National Park Service, Yosemite National Park

Project Name: Merced Burn (G090962)

Description: Mariposa and Tuolumne Counties; Sections 26-35 T2S R19E.Project entails understory and fuel reduction burn on 332 acres. A decision is expected 9/1/04)

Agency: U.S. Forest Service, Sierra National Forest

Project Name: Forest Land and Resource Management Plan (1992)

Description: This Forest Land and Resource Management Plan (Forest Plan) was developed to direct the management of Sierra National Forest. The goal of the Forest Plan is to provide a management program reflecting a mix of activities, allow use and protection of Forest resources and fulfill legislative requirements while addressing local, Regional and National issues. To accomplish this, the Forest Plan describes how issues were dealt with, the desired future state of the Forest, forestwide management direction, management prescriptions for individual management areas; schedules of proposed and possible outputs and activities, management standards and guidelines; monitoring and evaluation requirements; and location maps The Forest Plan is applicable to all National Forest land administered by the Sierra National Forest.

Project Name: Draft Supplemental Environmental Impact Statement for the Sierra Nevada Forest Plan Amendment (Release June 2003; comment period closed 12 September 2003).

Description: The Draft Supplemental Environmental Impact Statement (SEIS) for the Sierra Nevada Forest Plan Amendment (SNFPA) responds to new information regarding several problem areas addressed in the Final Environmental Impact Statement (FEIS) for the Sierra Nevada Forest Plan Amendment (January 2001). Specifically, the Draft SEIS focuses on specific components of the following problem areas: (1) old forest ecosystems and associated species, (2) aquatic, riparian and meadow ecosystems and associated species, and (3) fire and fuels management.

The Draft SEIS presents a range of alternatives for amending the land and resource management plans for the Modoc, Lassen, Plumas, Tahoe, El Dorado, Stanislaus, Sequoia, Sierra, Inyo, and Humboldt-Toiyabe National Forests and the Lake Tahoe Basin Management Unit. One of the alternatives considered in detail is the "no action" alternative, which would continue management direction in the January 2001 Record of Decision (ROD) for the Sierra Nevada Forest Plan Amendment. The Draft SEIS describes new information since the SNFPA FEIS was completed and discloses the expected environmental consequences of the alternatives considered in detail.

Project Name: Miami Timber Stand Improvement

Description: Madera and Mariposa counties; Sections 3, 5, 9, 10, 16, 14, 15, 22, 23 T6S R21E. Project entails pre-commercial plantation thinning and release. Approximately 660 acres of hand thinning and mechanical thinning (mastication) and release. Tractor piling of slash and brush across 75-150 acres. A decision is anticipated Winter 2003.

Project Name: Fellciana Timber Stand Improvement

Description: Mariposa County; Sections 6,7.18 T4S R19E; Sections 1, 12 T4S R18E. Project entails pre-commercial plantation release and thinning. Approximately 1000 acres of plantations for thinning and release by mechanical (mastication) and hand methods. Site preparation and planting to occur. A decision is anticipated Fall 2003.

Project Name: Sonny Meadows Project

Description: Mariposa County; section 25 T5S R20E, sections 8, 9, 16-20, 28-32 T5S R21E, section 1 T6S R20 E, sections 5-8 T6S R21E. Project entails application of silvicultural and fuels reduction treatments to reduce the risk of wildfire loss. Create a buffer between developed areas and wildlands. Thin from below utilizing a combination of precommercial and commercial operations to accelerate development of old forest characteristics and maintain healthy plantations. Treatments would be within 35-40 year old pine plantations (established after a series of wildfires), young growth mixed conifer stands and brushfields. The majority of the proposed project lies within the wildland urban intermix zone. A decision is anticipated winter 2003-04.

Project Name: Redwood Creek

Description: Madera County; sections 30-32 T6S R22E, section 5 T17S R22E. Project entails fuel reduction project at Chepo Saddle area on Road 222. A decision is anticipated in Spring 2003.

Project Name: Isberg Hazard

Description: Madera County; sections 6, 7 T5S R25E, sections 35, 36 T4S R24E, section 31 T4S R25E. Project entails removal of hazard trees along forest roads 5S30, 4S60 and around Granite Creek Campground. A decision is anticipated Summer 2003.

Project Name: Control of Yellow Starthistle in the Merced River Canyon

Description: Mariposa County; sections 13-16, 21 T3S R19E, section 18 T3S R20E. Project entails use of herbicides to treat Yellow Starthistle in the vicinity of Incline Road east of El Portal, along with manual and mechanized methods. A decision is anticipated winter 2003-04.

Projects that May Affect the Wildland/Urban Interface

Some projects would affect the wildland/urban interface in and near Yosemite. They might affect the amount and/or character of wildland/urban interface, the way wildland/urban interface work would be accomplished, and/or the amount of wildland/urban interface work that would be needed. These include:

Agency Name: National Park Service, Yosemite National Park

Project Name: General Management Plan/EIS

Description: Approved in 1980, the Yosemite National Park General Management Plan defines the overall management direction for the park, including major goals and objectives for ecosystem management, the general location and type of visitor services and facilities, and the kind, location, and extent of park maintenance and administrative functions and facilities.

Project Name: Concession Services Plan/SEIS

Description: Tiered off the 1980 General Management Plan (GMP) and approved in 1992, the Yosemite National Park Concession Services Plan amends the GMP and provides a finer level of detail regarding the type, location, and character of visitor services and facilities within the park.

Project Name: Yosemite Valley Plan

Description: The National Park Service Pacific West Regional Director signed the Record of Decision for the *Final Yosemite Valley Plan* and *Supplemental Environmental Impact Statemen*t on December 29, 2000. The purpose of the *Yosemite Valley Plan* is to present a comprehensive management plan for Yosemite Valley—from Happy Isles at the east end of the Valley to the intersection of the El Portal and Big Oak Flat Roads at the west end. It also presents actions in adjacent areas of the park and the El Portal Administrative Site that directly relate to actions proposed in Yosemite Valley. The specific purposes of the *Yosemite Valley Plan* within Yosemite Valley are to:

- Restore, protect, and enhance the resources of Yosemite Valley.
- Provide opportunities for high-quality, resource-based visitor experiences.
- Reduce traffic congestion.
- Provide effective park operations, including employee housing, to meet the mission of the National Park Service.

Yosemite Valley Plan actions will reduce fragmentation between the highly valued natural resource areas from Clark's Bridge downstream to Swinging Bridge. Areas in the eastern portion of Yosemite Valley that have been degraded or fragmented (such as the Merced River and its tributaries, wetlands, meadows, and California black oak woodlands) will be restored to one large and dynamic river-governed ecosystem. There will be minimal new development west of the Yosemite Lodge area.

Parking for 550 day-visitors' vehicles will be consolidated in the Yosemite Village area and (in peak season) in three out-of-Valley areas (El Portal, Badger Pass, and Hazel Green or Foresta). Shuttle buses will transport visitors to locations throughout Yosemite Valley and also between the Valley and out-of-Valley parking areas. A new visitor center and transit center will be located in Yosemite Village adjacent to day-visitor parking. Actions in this alternative will result in a major reduction of vehicular congestion in the eastern portion of Yosemite Valley during summer months.

There will be more campsites and fewer lodging units than there are today. The area of the former Upper River and Lower River Campgrounds will be restored to a mosaic of meadow, riparian, and California black oak woodland communities. The River Protection Overlay, prescribed in the Merced River Plan, will be implemented in Yosemite Valley and the El Portal Administrative Site. Southside Drive will be converted to two-way traffic from El Capitan crossover to Curry Village, and Northside Drive will be closed to motor vehicles from El Capitan crossover to Yosemite Lodge and converted to a multi-use (bicycle and pedestrian) paved trail.

Following is a list of many of the actions that will occur under the *Yosemite Valley Plan* in relation to existing conditions (see Volume IA, page 2-47, of the *Final Yosemite Valley Plan/SEIS* for a complete discussion of actions):

- **Facilities and services that will be removed under the Yosemite Valley Plan include:** roads through Stoneman Meadow and the southern portion of Ahwahnee Meadow (including the road through the former Upper River and Lower River Campgrounds); North Pines Campground; historic Sugar Pine Bridge (to restore the hydrologic system of the Merced River); other historic structures including the concessionaire stable, Concession Headquarters, Village Garage, Cascades Diversion Dam, and five Cascades houses; the abandoned wastewater treatment plant in El Portal (from a sensitive cultural resource area); most parking (including at Lower Yosemite Fall) in east Valley, other than at lodging, campgrounds, and the Yosemite Village area; five motel buildings from Yosemite Lodge; and commercial trail rides in Yosemite Valley.

- **Facilities to be constructed under the Yosemite Valley Plan include:** a day-visitor parking area for 550 vehicles at Yosemite Village; a visitor center and transit center near the day-visitor parking area at Yosemite Village; a new shuttle stop, restroom, enlarged viewing area near the base of Yosemite Falls, interpretive exhibits, and an informal gathering/viewing area in the Lower Yosemite Fall area; a vehicle bridge across Yosemite Creek near Yosemite Lodge; a replacement footbridge at Happy Isles near the Nature Center; lodging at Yosemite Lodge and Curry Village; campsites at Camp 4 (Sunnyside Campground); campsites east of Curry Village, in the Upper Pines and Lower Pines areas, and along Tenaya Creek; employee housing at Curry Village, Yosemite Village, El Portal, Wawona, and Foresta; and two fire stations, one in the Yosemite Village area (outside of the Yosemite Village Historic District), and one in the Curry Village area.

- **The Yosemite Valley Plan will establish and implement:** a Visitor Experience and Resource Protection (VERP) study and program to monitor existing and desired conditions for natural resources, cultural resources, and visitor experience; a traveler information and traffic management system to provide information to visitors, provide incentives for efficient use of available parking and transportation services, and manage access and parking; seasonal out-of-Valley day-visitor parking areas at Badger Pass, El Portal, and Hazel Green or Foresta; some utility hookups for recreational vehicles and shower facilities in campgrounds; and design guidelines for new construction and for rehabilitating the landscape in historic developed areas.

- **The Yosemite Valley Plan will convert:** the Yosemite Museum/Valley District Building back to its historic function as a museum; Southside Drive from El Capitan crossover to Curry Village to two-way traffic (road widened where necessary); Northside Drive from El Capitan crossover to Yosemite Lodge from a vehicle road to a multi-use (bicycle and pedestrian) paved trail; and the trail to the base of Yosemite Falls to a route accessible by people with mobility impairments.

- **The Yosemite Valley Plan will increase or expand:** shuttle bus service west to Bridalveil Fall and out-of-Valley parking areas; interpretive and orientation services, including a new visitor center in Yosemite Valley and visitor contact stations at or near principal park entrances; and multi-use paved trails.

- **The Yosemite Valley Plan will reduce:** stock trails by approximately 0.5 mile (private stock use will continue on all other designated trails); lodging to approximately 961 units (including approximately 100 units at Housekeeping Camp); and traffic entering the east Valley on a typically busy day by 50 percent.

- **The Yosemite Valley Plan will relocate:** employee housing to El Portal, Foresta, and Wawona (subject to further site planning, environmental review and public participation), leaving 723 employee beds in Yosemite Valley; National Park Service and concessionaire administrative stables operations to McCauley Ranch in Foresta; National Park Service and concessionaire headquarters out of Yosemite Valley; the historic Superintendent's house (Residence 1) and its garage to a site within the Yosemite Village Historic District; and museum collections storage, research library, and archives consolidated in Yosemite Valley.

Project Name: Curry Village/East Yosemite Valley Campgrounds Redevelopment Project EA

Description: The *Curry Village and East Yosemite Valley Campground Improvements Environmental Assessment* (closed for public comment on October 11, 2003) evaluated the environmental consequences associated with this project. Approval of a *Finding of No Significant Impact* on the project is expected in December 2003. Specific actions in the plan include:

- Adding campsites and reconfiguring some of the existing campsites to provide a better visitor experience

- Providing a campground check station to consolidate the campground registration function to one location, and add an RV dump station

- Improve restrooms and provide showers for campers

- Provide a day use stock corral (existing stables are likely to be relocated to Foresta)

- Remove the Lower Pines amphitheater and construct a new one
- Redesign registration parking, realign access road, and close road through Stoneman Meadow
- Remove 253 tent cabins and other existing accommodations and add 108 new hard-sided cabins with bath
- Retain and rehabilitate many of the historic Curry Village buildings into guest housing
- Restore Curry Orchard to natural conditions, except for 2 acres to be developed for parking
- Relocate the ice rink, and centralize commercial recreation activities (skating, biking, rafting, mountain store) at that location
- Increase size of store and separate grocery and gift functions; add a deli
- Redesign the Pavilion and Meadowdeck as outlined in the *Concession Services Plan*;
- Add employee dining facilities adjacent to Pavilion kitchen
- Remove Boy's Town and Huff House employee housing
- Construct a fire station near Curry Village
- Complete various projects to restore selected areas to natural conditions.

Project Name: Curry Village Employee Dorm Construction Project

Description: This project, called for in the *Yosemite Valley Plan*, includes the design and construction of new employee housing and related facilities to accommodate approximately 217 concession employees in the area west of Curry Village in Yosemite Valley. This housing will replace concessionaire units lost at several locations in the Valley during the 1997 flood. The scope of the concessionaire employee housing project includes providing parking and access, an employee wellness center, concessionaire housing and management offices, housing-related maintenance and storage facilities, and postal facilities to serve the residents of the new housing area. The housing complex will be designed in accordance with the character of the area, with particular focus on the adjacent Curry Village Historic District. The concept that was selected consists of 27 one- and two-story buildings scattered throughout the site. Preparation of the site for construction began in Fall 2003.

Project Name: East Yosemite Valley Utility Improvement Project/EA

Description: The existing utility infrastructure serving east Yosemite Valley was identified in the *Yosemite Valley Plan* as being inadequate due to its age, condition, inadequate capacity, inaccessibility to future facilities, and inappropriate location in environmentally sensitive areas. The *East Yosemite Valley Utilities Improvement Plan/EA* identifies major consolidated utility corridors to serve facilities in the east Valley. It will allow the park to design and construct utility systems that provide adequate service to existing facilities as well as those proposed in the *Yosemite Valley Plan*, while minimizing environmental impacts and allowing for maximum restoration of sensitive ecological areas. The utility systems addressed in the *East Yosemite Valley Utilities Improvement Plan* include potable water, sanitary sewage, power, and to a limited extent, communication facilities in east Yosemite Valley. A *Finding of No Significant Impact* for the project was signed on November 24, 2003. Construction is expected to begin in Spring 2004.

Project Name: Replacing Flood Damaged Offices in El Portal

Description: In keeping with actions called for in the *Yosemite Valley Plan*, the National Park Service will construct a new office building in El Portal that will replace offices lost or damaged in Yosemite Valley during the 1997 flood. This two-story structure, totaling approximately 8,584 square feet, will be located adjacent to the existing maintenance/ warehouse complex in the National Park Service administration area of El Portal. Construction will be slab-on-grade, with placement of a steel frame pre-engineered building with metal panel exterior walls. The building also will have a metal roof system. Construction is expected to begin during 2004.

Project Name: Lower Yosemite Fall Improvement Project

Description: The Lower Yosemite Fall Project consists of a series of re-landscaping, removal, restoration, and reconstruction projects at one of Yosemite Valley's most popular natural destination areas. The project Finding of No Significant Impact was sighed in May 2002 and construction, begun in June 2002, is expected to take about two years to complete. This improvement project will:

- Construct a new, large restroom facility out of the primary falls view corridor
- Construct a new, covered shuttle bus stop adjacent to the area
- Create a loop trail system, including a trail to the base of Lower Yosemite Fall which is fully accessible to people with mobility impairments
- Reduce the perception of crowding and congestion at the main view areas and along the trail
- Improve the hydrology of the braided stream system by replacing bridges with narrow openings that restrict the natural stream flow

Project Name: Yosemite Lodge Area Redevelopment Project

Description: The project collectively known as the Yosemite Lodge Area Redevelopment includes four separate actions as described in the *General Management Plan* and the *Yosemite Valley Plan*: redevelopment of Yosemite Lodge, redesign of Camp 4, relocation of Northside Drive, and design of the Indian Cultural Center. The *Final Yosemite Valley Plan* and its *Supplemental Environmental Impact Statement* could not assess the site-specific potential impacts of the project. Therefore, the site designs for this project are evaluated in an environmental assessment in Fall 2003. A Finding of No Significant Impact is expected in Winter 2003-2004, with construction starting in Spring or Summer 2004. All of the actions in the Yosemite Lodge Area Redevelopment occur in the Yosemite Lodge area of Yosemite Valley and include the following:

- **Redevelopment of Yosemite Lodge** – The *Yosemite Valley Plan* calls for improving the character of Yosemite Lodge by changing from a motel-type of experience to one more connected to a national park lodge experience in Yosemite Valley. It also calls for the removal of facilities from the river protection zone and the floodplain. Construction will be phased in order to provide continuous operation of the existing Yosemite Lodge facilities.
  - Phase I: Construct 90 cottage rooms (5 buildings) on available sites; construct new support buildings; demolish 88 existing lodging rooms (4 buildings); construct new guest

parking lots and circulation drives; remove existing employee housing; demolish existing post office; demolish existing parking and circulation drives; construct new overnight bus parking lot; construct new Northside Drive using existing Yosemite Creek Bridge; construct new pedestrian pathways and landscaping; install infrastructure and utility improvements to support new development; construct new shuttle bus stops; convert existing Northside Drive into multi-use paved trail (from east of existing Yosemite Creek Bridge to western edge of Camp 4)

- Phase II: Construct 44 cabin rooms (11 buildings) on available sites; demolish 40 existing lodging rooms (2 buildings); construct new parking area for cabin units; construct new Guest Registration Building; expand Camp 4; renovate existing Registration Building and Mountain Room Bar and Lounge into public space; construct new parking lots and support buildings for Camp 4 expanded campground

- Phase III: Restore existing area south of new Northside Drive to natural conditions

- **Camp 4 Redesign –** As part of the Yosemite Lodge Area Redevelopment, Camp 4 will be redesigned to accommodate the expansion and improvements called for in the *Yosemite Valley Plan*.

- **Relocation of Northside Drive –** According to the *Yosemite Valley Plan*, Northside Drive in the Yosemite Lodge and Camp 4 area will be relocated south of the Lodge to reduce conflicts between vehicles and pedestrians and to provide safer pedestrian access between the Lodge and the Lower Yosemite Fall area.

- **Indian Cultural Center Design** – See project description below, under "Agency Name" National Park Service, American Indian Council of Mariposa County, Inc. (Southern Sierra Miwok).

Project Name: Yosemite Village Parking Improvement Project (Camp 6)

Description: This project was completed in 2003. In an effort to accommodate displaced parking due to the closure of the Lower Yosemite Fall parking area, expansion of the parking lot at Yosemite Village was undertaken. 65 parking spaces were added to the northeast corner of the current parking lot, in an area that had been previously disturbed. The improvements at the Yosemite Village parking area included improved wayfinding, traffic control, and surface treatment to control dust.

Project Name: El Portal Town Development Concept Plan/DEIS

Description: Planning is anticipated to start on this major project during 2004. The *El Portal Town Development Concept Plan/DEIS* follows from the Yosemite Valley Plan's proposals to relocate significant National Park Service and Concession administrative and maintenance facilities and staff housing out of Yosemite Valley to El Portal. The project, possibly pursued jointly with Mariposa County, will determine which facilities and functions slated for relocation could be accommodated in other areas of Mariposa County and which must be constructed in El Portal, and will complete planning for the latter, including necessary infrastructure and circulation facilities.

Project Name: Bridalveil Horse Camp Rehabilitation

Description: This site was identified as a high priority for campground improvement in the park based on severe resource impacts due to soil loss, specifically erosion from failing roads, stock trails, social trails, and deteriorating stock campsites. Planned work includes arresting potential water pollution from stock campsites and rehabilitation of the gravel campground loop road.

Project Name: Hodgdon Meadow Campground Rehabilitation
Description: This project was identified as a priority for campground infrastructure improvement to mitigate impacts to resources.

Project Name: Tamarack Campground Rehabilitation
Description: This campground was identified as the highest priority for campground improvement based on severe resource impacts due to soil loss, specifically erosion from failing roads, trails, social trails, and deteriorating campsites. Much of the eroded soil is being deposited in a fragile creek. Planned work includes rehabilitation of the campground loop, relocation of ten campsites off Tamarack Creek, revegetation of the stream bank, and provision of additional campsites where possible within camp boundaries.

Project Name: Tuolumne Meadows Development Concept Plan
Description: Planning on this project is expected to begin in the next several years. The draft planning objectives of this document include the following:

- Identify sites to be restored to natural conditions.
- Incorporate restoration actions to enhance these conditions and visitor experiences.
- Identify appropriate levels of development.
- Produce a comprehensive design plan for National Park Service and concessionaire housing.
- Assure that site layout, functional relationships, and circulation patterns will be designed in a manner with the least impact on resource values.

Project Name: Wawona Campground Rehabilitation
Description: The purpose of this project is to implement the *General Management Plan* goal to rehabilitate the Wawona Campground. Preliminary design plan, construction drawings, and bid documents will include the following actions: a) rehabilitate the campground entrance and loop road and individual campsite spurs, b) retrofit campsites and restrooms to meet accessibility standards, c) install low-flow toilet, replace toilet partitions, repaint, install energy efficient lights and heat, replace composition roofs with metal, and insulate and winterize the restrooms in loop A and B, d) construct showers e) replace exterior privacy partitions, f) reconstruct the amphitheater, g) remove septic tanks and leach fields, h) extend sewer, electrical service, and telephone 1.5 miles, i) replace existing signs with the new park sign system, and j) prepare a vegetation management plan which includes shoreline protection and reestablishes privacy and shade in the campground.

Project Name: Yosemite Creek Campground Restoration
Description: This campground was identified as the second highest priority for campground improvement in the park based on severe resource impacts due to soil loss, specifically erosion from failing roads, trails, social trails, and deteriorating campsites. Much of the eroded soil is being deposited in a fragile creek. Planned work includes rehabilitation of the campground loop, relocation of eight campsites off Yosemite Creek, revegetation of the stream bank, and the addition of campsites where possible within camp boundaries.

Agency Name: National Park Service, Yosemite Institute

Project Name: Environmental Education Campus Development

Description: This project proposes an educational center at Crane Flat that would enable Yosemite Institute to provide educational and interpretive programs about the park's stories. Facilities would be operated by Yosemite Institute, and accommodate Yosemite Institute groups and park partner interpretive and educational programs, training programs, research and field seminars. The campus design and function would model sustainable energy and resource practices, and would meet accessibility standards. Existing facilities include dormitories, a shower house with bathrooms, kitchen and dining areas, field equipment storage, offices, staff housing, and indoor and outdoor spaces for meetings, training, instruction, and evening and campfire programs. Among the expanded facilities would be a science lab with hands-on study collections of common Sierra plants and vertebrates, and dissecting scopes. The EIS for this project is expected to be released during the Spring or Summer 2004.

Agency Name: National Park Service, State of California

Project Name: Sierra Nevada Research Institute – University of California, Merced

Description: The Sierra Nevada Research Institute facilities are being considered near or in both Yosemite and Sequoia-Kings Canyon National Parks. To serve Yosemite National Park, the potential project locations under consideration are Hazel Green Ranch and Wawona. At Hazel Green Ranch, the project would consist of a new facility that would include a research laboratory, operational and residential space for researchers, and a small student dormitory. At Wawona, the project would consist of providing similar facilities by adaptively using existing buildings located in the Wawona area.

Agency Name: National Park Service, American Indian Council of Mariposa County, Inc. (Southern Sierra Miwok)

Project Name: Indian Cultural Center

Description: This center, located at the site of the last historically occupied Indian village in Yosemite Valley (just west of Camp 4 and Yosemite Lodge), would provide a place for culturally associated Indian people to conduct traditional ceremonies and to practice and teach traditional lifeways. Signing of the project *Finding of No Significant Impact* is expected Winter 2003-2004 as part of the *Yosemite Lodge Area Redevelopment Project Environmental Assessment*. The project is designed with two major components—a traditional village and a modern community building. Indian Council members and volunteers will build the traditional structures. Overnight parking for scheduled activities would be provided at the Indian Cultural Center or other administrative areas. The construction schedule is dependant on fundraising by the American Indian Council of Mariposa County.

Agency Name: U.S. Forest Service, Stanislaus National Forest

Project Name: Pinecrest Basin Forest Plan Amendment (Summit Ranger District)

Description: U.S. Forest Service is evaluating how to manage the current recreational use that is occurring along the Highway 108 corridor (north of the park), particularly in the Pinecrest Lake area. There are 300 cabin permits issued in the lake area in addition to numerous campgrounds. The recreational use is excessive and methods to manage people are being explored. This project is currently in the early planning phase.

Project Name: Pinecrest Fuel Reduction Project (S110016)

Description: Tuolumne County; Sections 19-21, 27-29 T4N R18E. Project entails creating a shaded fuelbreak along two prominent ridges surrounding Pinecrest; includes mechanical thinning and prescribed burning. A decision is expected 10/1/03.

Agency Name: U.S. Forest Service and Bureau of Land Management

Project Name: South Fork and Merced Wild and Scenic River Implementation Plan

Description: The U.S. Forest Service and the Bureau of Land Management developed a joint *South Fork and Merced Wild and Scenic River Implementation Plan* in 1991 for the segments of the main stem and South Fork of the Merced River that are under the jurisdiction of these agencies. The segments include a 15-mile portion of the main stem extending from the El Portal Administrative Site to a point 300 feet upstream of the confluence with Bear Creek; a 21-mile segment of the South Fork that flows from the park boundary to the confluence of the Merced River; and a 3-mile segment of the South Fork just upstream of Wawona, where the National Park Service has jurisdiction over the north side of the river and the U.S. Forest Service has jurisdiction over the south side. The plan calls for the long-term protection of natural and cultural resources and the management of the area for the use and enjoyment of visitors, such that the resource would be unimpaired for future use and enjoyment as a natural setting.

Agency Name: Mariposa County

Project Name: Mariposa County General Plan Update

Description: The County first adopted a Master Plan in 1965. This was replaced with the first General Plan in 1977. The 1977 Plan was revised and made comprehensive to comply with State law in 1981. The 1981 General Plan, with periodic amendments over time, is the County's current General Plan. The 2003 General Plan Update will bring all elements up to State standards. Subsequently, zoning and development codes will be updated to conform with the General Plan and State law. The 2003 General Plan Update reduces the County's development capacity from about 88,000 to about 55,000 people. County population is expected reach about 37,000 during the 20-year lifetime of this General Plan update.

Project Name: Wawona Town Planning Area Specific Plan Update

Description: This project is intended to update the 1987 Wawona Town Plan. The current planning objectives include amendment to and/or revision of Wawona Town Zoning Ordinances to address current nonconforming uses, make the plan more reflective of other existing development, provide for minimal community growth, and seek to establish a formal process for National Park Service involvement in town planning.

Project Name: Yosemite West Special Plan

Description: Yosemite West is a neighborhood within the gates of Yosemite National Park with a growing number of homes utilized as permanent residences, second homes, condominiums, and vacation rentals. The subdivision's lots are similar in size to suburban tracts, but are located on steep, forested hillsides adjoining the park. It has special, localized planning challenges stemming from its unique combination of land uses, ownerships, and residencies. The guiding principles for the Special Plan are simply: (1) preserve the rural and rustic nature of Yosemite West; and (2) manage vacation rental impacts on owners and residents. The Yosemite West Special Plan will resolve current land-use conflicts in Yosemite West by defining standards for land use intensity, building scale and size, site design criteria, and management tools for land use and occupancy. The Yosemite West Community Advisory Committee is currently working with Mariposa County to work out the details of the proposed specific plan. Final adoption may depend on the timing and final adoption of the current Mariposa County General Plan Update.

Project Name: Yosemite West – Bed and Breakfast

Description: This project would be located on 31 acres of land located adjacent to and immediately west of the current Yosemite West Subdivision. Access to the site would require traveling over two segments of roadway located within Yosemite National Park. The complex would need to comply with Mariposa County zoning ordinances and State of California wastewater treatment regulations. Currently (December 2003), although some improvements have been made to the access road and a well has been drilled, no application for a project has been filed.

Project Name: Yosemite West—Wastewater Improvement Project

Description: In 2000, the community of Yosemite West received a Cease and Desist Order from the California Regional Water Control Board requiring it to improve its wastewater treatment facilities—current facilities are undersized and cannot adequately treat the volume of sewage produced by the subdivision. Also, Mariposa County has issued a moratorium on building in Yosemite West until the wastewater treatment facility is improved. Facility planning and design selection have been completed and the County will solicit bids for construction in February 2004. However, because Yosemite West is a dependent special district, State proposition 218 requires a vote of at least 51% of affected ratepayers to approve assessments for special district improvements. Therefore, a 45-day special election for current owners of property will be held in Spring 2004. If ratepayers approve the assessment, construction is expected to start in early summer, 2004, and be completed before the end of the year. The design chosen will allow limited build-out of the subdivision—each undeveloped lot will be limited to water usage equivalent to that of a 3-bedroom/2-bath residence.

Project Name: Seventh Day Adventist Camp Wawona Redevelopment and Land Exchange Joint EIR/EA

Description: Mariposa County is the lead agency on this project. The County released the Draft Environmental Impact Report for the project on December 10, 2003. The Final EIR and Environmental Assessment on the project are expected in Spring 2004.

Camp Wawona is located on private property in the Town of Wawona, a rural community in the southeastern portion of Mariposa County, California. The Proposed Action includes the following actions:

– Adopt a General Plan Amendment to create a conditional use designation for "recreational camp" or "church camp" in the Mountain Residential zoning district of the WTPASP

– Issue a Conditional Use Permit to acknowledge/approve the recreational/church camp

– Complete a land exchange between National Park Service and Seventh-day Adventists under "equal value" provisions. Based on approved land appraisals, 15.36 acres of existing Seventh-day Adventist land would be exchanged to the National Park Service in exchange for 18 acres of current National Park Service property

– Re-zone the exchanged 18 acres of National Park Service land to "Mountain Residential"

- Re-zone the exchanged 15.36 acres of Seventh-day Adventist land to “Environmental Protection”

- Complete a boundary/lot line adjustment to document the property line changes that would result from the land exchange between National Park Service and Seventh-day Adventists

- Remove existing developed facilities from the 15.36 acres of Seventh-day Adventist land to be exchanged and restore that land to a natural condition

- Require the removal of existing encroachments of Camp Wawona and restore the disturbed land to a natural condition. The encroaching facilities that would be removed consist of three buildings, a portion of the Campfire Bowl area, the eastern end of the main entrance road, and a segment of the paved road to the south

Redevelop Camp Wawona to accommodate the land exchange and the plans of the Seventh-day Adventists for future operation of the camp on the reconfigured 33.09 acres of private land

Project Name: Silver Tip Resort EIR

Description: The proposed project, the SilverTip Resort Village, includes applications for amendments to the *Fish Camp Town Planning Area Specific Plan*, a Planned Unit Development, a Conditional Use Permit, and a Land Division. The applications and entitlements described above will permit the development and operation of a resort hotel and conference center which would consist of a four-story, 137-room hotel, conference center, 40 cabins, four small conference centers, a two-story commercial center, eight shopowner living units, a tennis court, swimming pool, decorative ponds, an on-site wastewater treatment and disposal system, a water system and storage tank(s), and related facilities to serve the proposed development. The project site encompasses approximately 47.3 acres located at the intersection of State Route 41 and Fishcamp Lane within the unincorporated community of Fish Camp in Mariposa County.

Project Name: Yosemite Motels Expansion

Description: This project site is located along the north and south sides of Highway 140 at the existing Yosemite View Lodge development, within the El Portal Town Planning Area. Permitting has been completed and construction begun on a 63-unit, 3-story motel building, conference center, and associated parking adjacent to existing building south of Highway 140. Further development phases are being considered on the north side of Highway 140, but no development applications have been submitted.

Agency Name: Tuolumne County

Project Name: General Plan Amendment: Update Housing Element of the Tuolumne County General Plan (2003)

Description: The Housing Element consists of an identification and analysis of existing and projected housing needs and a statement of goals, policies, quantified objectives, financial resources, and scheduled programs for the preservation, improvement, and development of housing. The housing element also identifies adequate sites for housing, including rental housing, factory-built housing, and mobilehomes, and makes adequate provision for the existing and projected needs of all economic segments of the community. Implementing ordinances are currently being drafted.

The unincorporated area of Tuolumne County, which consists of approximately 1.4 million acres, or 2,200 square miles, and is located in the Central Sierra portion of California stretching from the San Joaquin Valley 70 miles eastwardly to the crest of the Sierra Nevada. Tuolumne County is bordered to the north by Calaveras and Alpine Counties, to the south by Mariposa and Merced Counties, to the east by Mono County and to the west by Stanislaus County. Portions of the Stanislaus National Forest and Yosemite National Park cover the easterly section of Tuolumne County.

Project Name: Rush Creek Guest Lodging and Conference Facilities

Description: A development agreement (DA) has been approved for approximately 143 guest units and conference facilities on approximately 18 acres near the intersection of Hardin Flat Road and Highway 120, approximately one mile west of the Big Oak Flat Entrance Station to Yosemite National Park. The Rush Creek Lodge currently occupies the site. An application has been submitted for an amendment to the DA for construction of 24 employee housing units on an adjacent 2-acre parcel. Construction is expected to begin 2005.

Project Name: Evergreen Lodge Expansion

Description: The Evergreen Lodge is located on Evergreen Road just south of Camp Mather, approximately 7.5 miles from Highway 120. Expansion plans have been approved to increase the size of the Lodge from 21 guest units to approximately109 guest units with associated amenities. Construction has started; completion is expected in 2004.

Project Name: Yosemite Gateway Plaza, Big Oak Flat

Description: Original plans for this project included two hotels at 200 rooms each, a 80,000 square-foot commercial center, an IMAX-type theater, fast-food restaurants, a gas station, a 200 space RV park, an information building, and parking to serve Yosemite National Park. Several development groups have obtained permits; the site has been graded, but no construction started. All permits for the project have now expired. A new group has approached the county expressing an interest in purchasing and developing the property, with plans similar to those of the original owners; however, as of December 2003, no development applications have been submitted.

Project Name: Long Gulch Ranch Subdivision

Description: This is a 360-lot residential subdivision approved in 1996. It is located to the east of the Pine Mountain Lake. A developer is currently engaged in a feasibility study and discussions with the Tuolumne County with the prospect of developing the property. With the nearby Pine Mountain Lake airport and 18-hole golf course, and its proximity to Yosemite National Park, the development is expected to be successful.

Agency Name: Tuolumne County, Yosemite National Park, Stanislaus National Forest, Federal State Route (Highway) Administration, City and County of San Francisco, National Park Service, California State Department of Transportation.

Project Name: Evergreen Road Improvement

Description: Discussions have been held regarding the improvement of Evergreen Road through the Forest Highway program. Evergreen Road provides access to Camp Mather and the Hetch Hetchy area from Highway 120 near the Big Oak Flat Entrance Station to Yosemite National Park. The project would improve Evergreen Road and possibly reroute it east of Camp Mather to Hetch Hetchy Road. No action has been taken on this project since discussions were held in October of 1998 and the project appears to be on hold.

Agency Name: Merced County

Project Name: University of California Campus, Merced

Description: A development concept is underway for a new 10,300-acre university community, which would include 8,100 acres owned by trusts, 200 acres owned by the County of Merced, and 2,000 acres that would be donated by a trust. The new development will be located north and east of Lake Yosemite, just outside of Merced, California. Currently, 150 acres are and would remain a golf course; the remaining acreage is currently undeveloped. At completion, the new community is expected to encompass 5,000 developed acres, with 31,500 residents and 31,600 students, faculty, and staff, for a total population of 63,100. The development will consist of 12,000 housing units, 825,000 square feet of commercial property, and a 2,750,000 square-foot business/employment center. This project is expected to bring significant urban development and growth to the northern portion of Merced County. The Merced campus is scheduled to open in fall 2005 and site construction is expected to begin in summer 2001. This development is located approximately 40 miles from Yosemite National Park, it requires approximately two hours of driving time on Highway 140 to reach the park. The site is located at the base of the Sierra Nevada foothills and is primarily composed of grazing land and non-native grasslands, with some wetlands.

Agency Name: City of Merced

Project Name: City of Merced General Plan

Description: By 2015, the City of Merced is expected to increase from its 1999 population of 62,000 to 133,000. The growth area was expanded from 16,000 acres to 20,500 acres in 1997 to accommodate the expected increase in population with the adoption of the City of Merced's General Plan.

Agency Name: Mono County

Project Name: Double Eagle Resort Construction at June Lake

Description: Approved plans for this project include an 11,000 square-foot resort/spa development, a 2,960 square-foot restaurant, a 2,520 square-foot conference facility, and 22 rental cabins with a 4,000-square-foot recreation building. As of December 2003, the project is 90% finished, with completion expected in early 2004

Project Name: Hide-a-Way Down Canyon Condominiums, June Lake

Description: Construction of ten condominium units was recently completed.

Project Name: Highlands, June Lake

Description: This project approved the construction of 113 condominium units and 35 single-family residential lots. The residential lots now available for sale; construction of the condominium has not yet begun.

Project Name: Residential Development, Crowley Lake

Description: An application is pending for this project, which is still in the planning stage and includes a 48-unit multifamily apartment complex.

Project Name: RV Park Specific Plan and Construction, Bodie

Description: This project, though currently inactive, is still being planned. It will be located at the junction of U.S. 395 and S.R. 270 and will propose to impact approximately 13 acres of land on a 155-acre parcel. The project will consist of a general store, office, restroom, 10-unit motel, 600-

square-foot old west museum, 32-space RV park with a restroom/shower facility, 8 cabins, 14 tent camping spaces, and 2 single-family residences.

Project Name: Tioga Inn Improvement, Lee Vining

Description: Renovation of the old Tioga Inn is in process; several units have been completed and are available and the restaurant is functioning. The remaining units are under renovation and nearing completion.

Project Name: Hotel/Restaurant/Gas Station, Lee Vining

Description: Plans have been approved for a 120-room hotel and gas station at the intersection of Highways 395 and Highway 120. The gas station, which includes a small coffee shop, and several residential units have been completed. Construction of the hotel with banquet facilities and a restaurant, plus additional residential housing units (for a total of 10), is expected in the near future.

Project Name: East Mono Lake Residential Subdivision

Description: This project, located off State Highway 167 east of Mono Lake, comprises 14 40-acre residential lots. The project is currently in the scoping phase.

Project Name: Intrawest June Lake Resort Project

Description: Intrawest has an application pending approval for a large resort/residential development at June Mountain. The resort complex will include 50,000 square feet of commercial space and about 900 residential units, a mix single- and multi-family residential and condominiums.

Other Types of Projects

Agency Name: National Park Service

Project Name: El Portal Road Improvements Project

Description: This federal jurisdiction transportation project, which is entirely within the National Park Service's jurisdiction, involves the reconstruction of 7.5 miles of the El Portal Road (Segments A, B, and C) from the Yosemite National Park boundary in El Portal to Cascades Diversion Dam near the intersection of El Portal Road and Big Oak Flat Road. This project improved access to Yosemite Valley and reduced safety concerns. The El Portal Road is a primary route for visitors accessing Yosemite Valley, and is the shortest all-weather route to the Valley. It also serves as the primary commuting route for park employees living in El Portal, Midpines, and Mariposa.

Project Name: Hodgdon Meadow Water and Wastewater Treatment Improvement

Description: Hodgdon Meadow is located at an elevation of 4,575 feet. During peak summer usage, water and wastewater must be provided for 70 residents, up to 440 campers (130 campsites with two restrooms), and up to 5,000 visitors per day who use the Big Oak Flat Entrance Station facilities. Improvements are required to meet state and federal regulations regarding public health and safety and to protect the natural environment. Improvements to the water system will include: providing an additional water source, improving water quality, increasing water storage capacity, improving water system controls, replacing asbestos cement pipe, equalizing system pressure, and constructing a dedicated line from treatment to storage. Improvements to the wastewater system will include: improving solids handling and effluent quality, improving the disinfection system, constructing primary and secondary treatment facilities, improving the spray field, replacing the leach field, and replacing the septic tank.

Project Name: South Fork Merced River Bridge Replacement

Description: The existing flood-damaged and temporary replacement South Fork Merced River Bridge will be replaced with a single-span structure. A Finding of No Significant Impact was signed August 4, 2003. Construction is expected to begin Winter 2003-2004.

Project Name: Rehabilitation of Tuolumne Grove Trailhead Parking

Description: This project would redesign and pave the existing Tuolumne Grove dirt trailhead parking area to accommodate automobile, buses and/or recreation vehicles for summer and winter use. It would include preparation of preliminary design plans, environmental compliance documents, construction drawings, and bid documents. Construction projects include: vault toilets; installation of signs for improved way-finding; development of a picnic area; revegetation of cut slopes; visual screening of the trailhead area from Tioga Road; and providing for accessibility for visitors with disabilities.

Project Name: Tuolumne Meadows Water and Wastewater Improvements

Description: The original objective of these improvements was to halt surface water diversion from the seasonally unpredictable and unprotected Dana Fork, and to develop a water supply from reliable and protected ground water sources. However, hydrogeological evaluations have found no aquifer capable of providing an adequate water supply. The park is steering toward using an infiltration gallery to collect water directly from the main stem of the Tuolumne River. The collection site would be placed under the Tioga Road Bridge that crosses the main stem of the Tuolumne River near Lembert Dome. Also, this project would include design and construction to improve process efficiency of the Tuolumne Meadows water and wastewater treatment facilities, which currently impose grave risks to the environment and threats to public health. Tuolumne Meadows is the largest sub alpine meadow in the Sierra Nevada; the meadow is fragile, with a short growing season, where recovery from resource damage can take years to accomplish. The treatment facilities, located at an elevation of 8,575 feet, support approximately 5,000 park visitors and 200 park staff daily from May through October. Facilities served include a 304-site campground, a visitor center, a retail sales/service station, a 104-bed lodge, food service and grocery facility, and employee housing. Work will include construction of a new wastewater treatment plant, modification of an existing pump station to transport raw sewage to the new plant location, elimination of sewage lagoons, and demolition of the existing plant. The new facility will include extended aeration, a covered 860,000-gallon effluent storage tank, sludge-handling capabilities, and an expanded spray field. The water line and electric service will be extended one mile to the new plant location and the access road will be improved. A 150,000-gallon water storage tank will be constructed. All work will be performed through contracts.

Project Name: White Wolf Water System Improvements

Description: The National Park Service proposes to design and construct upgrades to correct treatment process deficiency and capacity for the White Wolf water distribution, collection, and treatment facilities. The project includes the development of a new underground state-approved water source; the construction of a new state approved treatment facility, and the replacement of approximately 9,200 linear feet of water supply and distribution piping. The project would provide remote supervisory control and data acquisition of SCADA water treatment and improve vehicular and pedestrian access to the water treatment facility in an attempt to minimize existing safety concerns. Once the project is complete, emphasis will be focused on the restoration and revegetation of all disturbed areas.

Agency Name: National Park Service, Yosemite National Park

Project Name: Yosemite Valley Shuttle Bus Stop Improvements

Description: This project, currently in the planning stage, consists of the preparation of preliminary design plans, environmental compliance documents, and construction drawings; and the construction of six 10 x 80 foot concrete braking pads, and the rehabilitation or replacement of 94,000 square feet of asphalt road approaches.

Agency Name: National Park Service/City and County of San Francisco

Project Name: Hetch Hetchy Road Reconstruction

Description: To maintain administrative and visitor access to O'Shaughnessy Dam, the Hetch Hetchy Reservoir, and other associated areas, the National Park Service in 1999 and 2000 improved 8.6 miles of the Hetch Hetchy Road in Yosemite National Park, Tuolumne County, California. This project included:

- Repairing the roadbed
- Resurfacing the road with asphalt concrete
- Re-grading and paving the existing drainage ditch
- Installing 15 culverts and associated inflow and outflow structures
- Repairing damaged embankments and stone wall
- The action stabilized the roadway, decreased annual maintenance needs, reduced the likelihood of future road closures due to flooding, improved the safety of the road, and helped ensure a safe and reliable water supply for the City and County of San Francisco.

Agency Name: U.S. Forest Service, Stanislaus National Forest

Project Name: Trumbull Peak Lookout Cabin Rental Conversion (G060356)

Description: Mariposa County; Section 9 T1S R19E. Project entails conversion of lookout to rental program and repair access trail, with Forest Plan Amendment changing site from Non-Recreation to Recreation. A decision is expected 11/01/03.

Agency Name: U.S. Forest Service, Inyo National Forest

Project Name: Geothermal Power Exploration Leases

Description: Mammoth Pacific Limited Partnership (MPLP) operates three geothermal power plants three miles east of the Town of Mammoth Lakes (the Town). MPLP also owns or controls several geothermal leases, located east and north of the Town, and has submitted plans to complete two geothermal resource exploration drilling projects on portions of leases CA-11667 and CA-14408, located east of the Town and north of State Route 203. These leases were issued in 1981 and 1985, respectively, after lengthy environmental review, including the evaluation of the impacts from a possible power production development. The leases were issued with surface use constraints as well as a commitment to pursue development of a commercially viable geothermal resource.

The proposed exploration projects, known as the Basalt Canyon geothermal exploration projects, are designed to explore for, locate and verify the existence and characteristics of such a resource. The specific objectives of the projects are to drill geologic and geophysical targets to confirm geologic information, measure temperature, sample geothermal fluid and monitor subsurface pressures. In the near future, MPLP may submit exploration proposals with similar objectives targeting other leases, located north of the Town. If commercially viable geothermal resources are discovered, commercial production, either for power generation or non-power uses, such a community heating, may be proposed. Site-specific environmental review will be completed for each exploration or production proposal.

Project Name: Tioga Pass Resort Special Use Permit Issuance

Description: Tioga Pass, Mono County. Project entails a Categorical Exclusion for the issuance of a 20-year Special Use Permit to the new owners of Tioga Pass Resort. A Decision Memo signed October 25, 2002.

Project Name: Gull Lake Recreation Residence Tract—Issuance of Temporary Permit

Description: June Lake, Mono County. Project is and environmental assessment for the issuance of 14 term permits for the Gull Lake Recreation Residence Tract and boat docks, with an expiration date of 12/31/08, to coincide with the expiration date of all recreation residence tracts on the Inyo National Forest. A decision is expected Fall 2003.

Project Name: Silver Lake Resort Development Plan

Description: June Lake Loop, Mono County. The project entails development of a plan for Silver Lake Resort, which includes additional cabins, expansion of the existing RV Park, addition of a boat dock and repair and expansion of existing facilities. A decision is expected in Spring 2003.

Agency Name: U.S. Forest Service, Toiyabe National Forest

Project Name: Twin Lakes Resort Permit Renewal

Description: Mono County. Project entails renewal of a Special Use Permit for the continued operation of the Twin Lakes Resort. A decision is expected in Fall 2003.

Project Name: Virginia Lakes Resort Permit Renewal

Description: Mono County. Project entails renewal of a Special Use Permit for the continued operation of the Virginia Lakes Resort. A decision is expected May 2003.

Agency Name: Bureau of Land Management

Project Name: Briceburg Bridge Reconstruction

Description: The Briceburg Bridge is located approximately 15 miles west of El Portal. It crosses the Merced River from Highway 140 to Burma Grade Road and provides access to a 4.5-mile frontage road on the river's north side. Along this frontage road visitors are provided access to three Bureau of Land Management campgrounds, river frontage for river-related activities such as fishing, river-access points for rafters, and the Merced River Canyon Trail. The bridge was damaged in the flood of 1997 and was reconstructed from August to December 1999.

Project Name: Merced River Canyon Trail Acquisition

Description: A trail for walking and mountain biking runs intermittently from approximately El Portal to Lake McClure along the old railroad bed adjacent to the Merced River. The trail was heavily damaged in a recent flood and is being reconstructed, as money becomes available. Private in-holdings occur throughout the trail's length, thus disrupting the continuity of the trail. The Bureau of Land Management is attempting to negotiate land exchanges in order to acquire some of the private land and create a continuous trail running along the canyon from the Bagby Recreation Area to Yosemite National Park.

Agency Name: Mono County, Town of Mammoth Lakes, U.S. Forest Service, Inyo National Forest

Project Name: Project Sierra and Mammoth Lakes Development

Description: Intrawest, Mammoth Mountain Ski Area (MMSA) and the Town of Mammoth Lakes (TML) are pursuing a number of major projects to modernize the resort town, including some on public land and much on private land. Since January 1996, when it become a partner in MMSA and purchasing all of MMSA's developable real estate, Intrawest has comprehensively analyzed the unique opportunities and constraints associated with the development of the Mammoth Resort Corridor. Its development properties, collectively known as Project Sierra, encompass three neighborhoods within the Resort Corridor individually known as The Village at Mammoth, Sierra Star, and Juniper Springs. Project Sierra covers approximately 240 acres and will take approximately 10 years to complete.

The investment by Intrawest and the Mammoth Mountain Ski Area of over $350 million to date in development projects and on-mountain improvements has led local businesses to follow suit with upgrades to accommodate the increased tourism. Public facility infrastructure needs for the TML are projected to reach $200,000,000 in the next ten years.

Thus a variety of agencies formed the "Public Project Development Group" to most efficiently plan and implement community goals. The Forest Service, although not a member of the PPDG, participates in community planning so that future facilities involving planning efforts affecting national forest lands, including transportation planning for the Lakes Basin, bike trails within the Town of Mammoth Lakes and many public facilities needs, including expansion of the Visitor Center, which is jointly operated by the Forest Service and the Town.

Many recreation providers operate under Special Use Permit on national forest land, including MMSA (which also operates June Mountain Ski Area, Tamarack Lodge and Mammoth Snowmobile Adventures), pack stations and equestrian centers, marinas, resorts, campgrounds, stores and a variety of other businesses, large and small. All of these are expected to benefit as a result of the increased visitation which will result from the Mammoth Lakes development.

The Forest Service is also working with Mono County communities affected by the Mammoth Lakes development to look at future community needs, as reflected in the County's General Plan, and consider land ownership adjustments to provide for community, rather than private, needs. Public meetings, sponsored by Mono County and the Town of Mammoth Lakes, provide the opportunity to hold discussions on potential exchanges within and adjacent to the Town and other communities. Some proposals involve future public facilities, and others involve land already developed under special use permit, such as recreation residences and resort businesses. These public meetings precede the NEPA process, which is a required step in all land exchanges, and are expected to result in future exchanges which receive wide public support, and meet overall Forest Service and community objectives.

Agency Name: California Department of Transportation, Amtrak

Project Name: California State Rail Plan, 2001-2010; The San Joaquin

Description: The passenger rail element of the *California State Rail Plan 2001-02 to 2010-11* (the State Rail Plan) is an examination of intercity passenger rail transportation in California. This element reviews the current operations of State-supported intercity rail passenger service and outlines 10-year plans for the period 2001-02 through 2010-11 for capital improvements and service expansions. The passenger rail element is covered in Part I (Chapters I through VIII) of the State Rail Plan.

In California, Amtrak currently operates all State-supported intercity rail service under the provisions of the Federal Rail Passenger Service Act (49 U.S.C. 24101). The San Joaquin runs between Oakland/Sacramento and Bakersfield, serving primarily the east San Joaquin Valley, with full service, staffed stations in Sacramento, Stockton, Modesto, Merced, Fresno, Hanford, and Bakersfield. Currently there are five round-trips per day in this corridor: four from the Bay Area to Bakersfield and back and one from Sacramento to Bakersfield and back. In 2000-01, ridership for all trains in San Joaquin corridor was 710,833.

Principal 2001-2011 Route Objectives:

- Increase annual ridership 121 percent, from 711,000 to 1,572,000 passengers.
- Increase annual revenues 132 percent, from $19.7 to $45.8 million.
- Increase revenue/cost (farebox) ratio from 45.3 percent to 58.4 percent.
- Reduce the State cost per passenger mile from 18 cents to 11 cents.
- Increase frequency of daily round-trip service from 4 to 5 between Oakland and Bakersfield and from 1 to 3 between Sacramento and Bakersfield.
- Reduce train running times to five and a half hours between Oakland and Bakersfield and four hours forty minutes between Sacramento and Bakersfield.
- Improve the reliability (on-time performance) of trains.

Performance - The TCRP contains funding to double track portions of the San Joaquin Route, which will improve the reliability and on-time performance.

Potential Train Service Improvements – A rail corridor improvement project is underway to upgrade track, signals, etc., along the Union Pacific corridor from Sacramento to Stockton. Another project is planned for improvements to the Burlington Northern corridor between Stockton and Bakersfield. These improvements would decrease running time and increase ridership. The San Joaquin corridor is the fourth most popular corridor in the country in terms of ridership.

The most immediate service need will be for additional round-trips between Sacramento and Bakersfield. The Department will add the sixth round-trip in 2001-02, which will be the second train between Sacramento and Bakersfield. The Department's proposed expansion of the San Joaquin Route is as follows:

- 2001-02 Sacramento - Bakersfield, second train to extend from Stockton to Sacramento (sixth round-trip on route).

- 2004-05 Sacramento - Bakersfield, third train to extend from Stockton to Sacramento (seventh round-trip on route).

- 2006-07 Oakland - Bakersfield, fifth train to extend from Stockton to Oakland (eighth round-trip on route).

Project Name: California Rail Plan - High-Speed Rail

Description: In 1996, the California High-Speed Rail Act founded the California High-Speed Rail Authority (CHSRA) to direct the development and implementation of intercity high-speed rail service. The Authority's June 2000 business plan, *Building a High-Speed Train System for California*, found that a high-speed train system is a smart investment in mobility, an evolutionary step for transportation, and a project in keeping with California's standards for environmental quality and economic growth. The Authority determined that the next step in the development of the project is to proceed to develop a program environmental impact report (EIR). The EIR is expected to be completed by June 2003.

Project Name: Draft California Transportation Plan (June 2003)

Description: The CTP is a long-range transportation policy plan that explores the social, economic, and technological trends and demographic changes anticipated over the next 20 years and their potential influence on travel behavior. The CTP then presents a vision for California's future transportation system, and defines goals, policies, and strategies to reach the vision. The CTP proposes a balanced approach to the projected increase in demand for mobility and accessibility. It seeks to guide transportation investments that benefit our economy, support our communities, and safeguard our environment.

Agency Name: California State Department of Transportation; U.S. Department of Transportation; Mariposa County; Merced County Association of Governments; Mono County; National Park Service – Yosemite National Park; U.S. Forest Service – Sierra and Inyo National Forests

Project Name: Yosemite Area Regional Transportation System (YARTS)

Description: YARTS is a collaborative, inter-agency effort begun in 1992 to evaluate the feasibility of a regional transportation system. YARTS was established as a Joint Powers Authority (JPA) under California law. The National Park Service is an ex-officio partner of the JPA Commission, participating in all discussions but not as a voting member. The YARTS mission statement is as follows:

YARTS will provide a positive alternative choice for access to Yosemite National Park for visitors, employees, and residents. YARTS service is not intended to replace auto-access or trans- Sierra travel, but is intended to provide a viable alternative that offers a positive experience, maximizing comfort and convenience for riders while guaranteeing access into the park. (Yosemite Area Regional Transportation Strategy 1999:4)

YARTS began providing transit service in the Yosemite region in May of 2000, with four primary objectives:

- Increase transportation options

- Reduce reliance on automobiles
- Support local economies
- Improve regional air quality

- The target market for YARTS service includes visitors staying overnight in the gateway communities and Yosemite National Park employees who live in the gateway communities. Decisions on the placement of bus stops and transfer facilities are local land-use decisions that will be made by the County Board of Supervisors in gateway communities, and by the National Park Service for locations inside the park boundaries.

Agency Name: Hetch Hetchy Water and Power, City and County of San Francisco

Project Name: O'Shaughnessy Compound Water System Improvements

Description: The O'Shaughnessy Dam/Hetch Hetchy Reservoir is located in the northwestern portion of Yosemite National Park. The purpose of this project is to repair and replace the piping and appurtenances of the domestic water system for the O'Shaughnessy Dam Compound. During construction there will be reduced access to some portions of the compound and visitor facilities. Excavation and other construction activities may uncover artifacts from the O'Shaughnessy Dam construction period (1915-1938).

Agency Name: Madera County

Project Name: Madera County Regional Transportation Plan – Highway 41 Extension (2001)

Description: A major regional transportation deficiency identified from the LOS analysis for Year 2025/26 is State Route 41 north of the San Joaquin River to the Mariposa County Line. The Madera County Transportation Commission, with affected local agencies and Caltrans, will address some aspects of this deficiency over the next twenty years.

Highway 41 is a two-lane highway extending in a north/south direction through eastern Madera County from the Fresno County Line to the Mariposa County Line. It provides access to Yosemite National Park and the recreational areas of the east county. The *Madera County Area Regional Transportation Plan* (November 1994) lists the following planned improvements for Highway 41:

Table A5-1
Planned Improvements for Highway 41 in Madera County

Location	Mid-Range 2010-2015	Long-Range 2016-2020
2. Avenue 11 to Avenue 12	2 lane highway to 4 lane freeway	
3. Avenue 11 to Street 15		2 lane highway to 4 lane arterial
4. Avenue 12 Intersection		Construct interchange

Note: Projects are listed according to their proximity to Yosemite National Park, those farthest from the park listed first.

State highway 41 is the main access route to Yosemite National Park from the south. CalTrans and the Madera County Transportation Commission have long range plans to improve the highway, including upgrading to at least some four-lane sections, up to the Yosemite National Park boundary. The "Avenue 11 to Avenue 12" improvements are the most likely to occur in the foreseeable future. The others elements probably will not occur until after 2020.

Project Name: Rio Mesa Area Plan

Description: This area plan encompasses approximately 15,000 acres on the east side of Highway 41, between the San Joaquin River and Highway 145. Construction of approximately 29,000 dwelling units is expected over 100 years. The elevation of the project area is almost 500 feet and lower on flat valley land. This project has an approved area plan that at this stage is conceptual. The next step would require the property owners to work together to develop sub-area plans. According to Bob Stone, Madera County Transportation Commission Planner, one developer currently (December 2003) has a project proposal before the county that is under appeal to the Board of Supervisors after having been rejected by the Madera County Planning Commissions because of water issues. He could make no estimates at this time regarding the number of units to be constructed in the next 15 to 20 years. Several different property owners are involved in this project and a timeline for progression to the next tier of planning is difficult to estimate.

Agency Name: Yosemite Sierra Visitors Bureau, Madera County

Project Name: Winter Recreation Feasibility Study

Description: The Yosemite Sierra Visitors Bureau has applied for funding for an Eastern Madera County Winter Recreation Feasibility Study to define the potential or lack of potential for winter recreation opportunities in Eastern Madera and the surrounding area. This would be accomplished through a market research study to: (1) identify if there is an interest in winter recreation opportunities, (2) identify whether this would lend itself to an anticipated winter visitation, (3) obtain feedback from existing U.S. Forest Service recreation business permit holders for the purpose of identifying better levels of service to the general public from these recreation providers, and (4) preparation of an implementation plan which relates the demand and the potential for obtaining funding and in-kind services to support recommendations, if any, from the analyses.

Agency Name: Mariposa County

Project Name: Expansion of County Transit System

Description: Mariposa County plans to use federal funds matched with the local Transportation Fund dollars for bus purchases to meet the needs of the Mariposa County Transit System. Plans are to purchase four new buses that will be used to replace existing buses. As part of this project, service has been expanded from Coulterville and Greeley Hill to Mariposa, adding one trip per week. County transit system service would potentially be merged with the Yosemite Area Regional Transportation System when YARTS is implemented.

Project Name: Incline Road Reconstruction, Foresta Road Bridge to South Fork

Description: During the flood of January 1997, Incline Road sustained substantial damage. The objective of this project was to reconstruct the roadway to pre-flood conditions from Foresta Bridge to a point near the Merced River/South Fork Merced River confluence. The project consisted of reconstructing the roadway by reinforcing the fill and resurfacing with both road base and asphalt. The project was completed in June 2000.

Project Name: Recreation Master Plan

Description: This plan, now in the early planning stage, is intended to address county wide recreational opportunities, facilities, and strategies.

Project Name: Road Improvement and Circulation Policy

Description: This project will establish access standards for subdivisions and other developments; will establish State of California Fire Safety Standards, define a county grading ordinance and establish county-wide road improvement standards.

Agency Name: Mono County

Project Name: Mono County Regional Transportation Plan (October 2001)

Description: The existing transportation system in Mono County includes the highway and roadway system, transit services, aviation facilities, and non-motorized facilities (generally recreational facilities for bicyclists and pedestrians). Alternatives to the existing transportation system in the county are limited by the county's isolation, topography, extreme weather conditions, small population, large distances between communities, large amounts of publicly owned land, and environmental constraints to developing additional facilities outside of existing developed areas.

Due to these factors, the existing highway and roadway system will continue to be the major component of the transportation system in the county. Development of new alternative routes for highways and roadways during the 20-year timeframe of this RTP is unlikely due to lack of demand for additional roads, topography, large amounts of publicly owned land, and environmental constraints to developing additional facilities outside developed areas.

The existing transportation system in the county (highway/roadway system, transit services, aviation facilities, non-motorized facilities) has been designed to accommodate increasing demand for those facilities and services over the 20-year timeframe of this RTP. Demand for additional alternative methods of transportation, other than those currently existing in the county, is not anticipated to occur over the 20-year timeframe of this RTP, given the constraints noted above.

Specifically regarding Yosemite National Park, the goal of this project is summarized as follows: "Through it's transportation planning efforts, the Mono County Local Transportation Commission will assist in the preservation and protection of the park by strengthening the relationship between the Yosemite region and its eastern gateway."

The objectives of this project are as summarized:

a. Support the park's mission to preserve the resources that contribute to Yosemite's unusual character and attractiveness;

b. Encourage diversity in visitor destinations and experiences;

c. Provide for safe and consistent transportation between Yosemite National Park and its eastern gateway; and

d. Develop transportation infrastructure that supports access to and within the gateway communities.

Project Name: Mammoth Lakes Airport Expansion

Description: The Federal Aviation Administration is preparing an EIS, currently in scoping, for expansion of the Mammoth Lakes Airport. The purpose of the expansion is to allow the airport to serve Boeing 737-type planes to land.

Project Name: Lee Vining Airport Expansion

Description: Planning is underway for the expansion of the Lee Vining Airport runway to improve landing safety. The project will not change the type or size of planes that can land and is not expected to increase use.

Appendix 6: Multi-Year Prescribed Fire Schedule

Yosemite National Park Fire Management Plan Multi-Year Project Schedule outlines a projected work plan for the park's fire management program. The average annual number of acres targeted for wildland fire, prescribed fire, and mechanical treatment are shown in table A6-1. Because both managed wildland and prescribed fire are dependent on environmental and social conditions, the average annual targets are not the acreages that are likely to be burned in any one year—they represent the desired annual acreage burned when averaged over many years. This treatment average is based on what is believed to be the amount park ecosystems would encounter, if natural ignitions were allowed to burn freely as they did prior to the latter part of the 19th century.

Table A6-1
Annual Average Acres Targeted for Treatment—Yosemite National Park

Mechanical Thin and Pile Burn	Prescribed Fire [a]	Managed Wildland Fire [b]	Total
1,095	1,817	13,088	16,000 acres

a Prescribed acres represent minimum target; maximum target would be 9,194 acres.

b Managed Wildland Fire acres represent maximum target, minimum target would be 16,000 minus Prescribed Fire acres.

- Below are tables listing the tentative prescribed fire projects by calendar year for Yosemite National Park. These projects and associated acreages are subject to change. Factors that would cause change include, but are not limited to:
- Unwanted wildland fires in the park that may burn units, or portions of units, prior to this schedule.
- Unwanted wildland fires in close proximity to other prescribed fire units that may provide opportunities to treat adjacent units prior to the scheduled date.
- Opportunities to accomplish cooperative projects with adjacent landowners and other agencies in a year other than when the unit is scheduled.
- Opportunities to accomplish additional targeted projects in a given calendar year due to favorable burning conditions.
- Diminished opportunities to accomplish proposed targets due to weather, air quality, or resource availability constraints.
- National or regional preparedness levels that would preclude the use of prescribed fire or managed wildland fire.
- Socio-political or administrative concerns that would preclude the use of prescribed fire or managed wildland fire.
- Lack of available funding and/or staffing to safely and efficiently accomplish projects.
- Cultural or natural resource impacts that cannot be avoided or mitigated.
- Trends from monitoring effects of treatment indicate a change is needed.

- Changes to federal and/or National Park Service fire management policies.

Prescribed fire units are identified in maps in 2-6 through 2-17. It is important to point out that unit locations in each calendar year are positioned in such a way that the workload within the park or a watershed is spread out and one area of the park is not treated at the expense of another. Prescribed fire unit locations and schedules were developed using fire return interval departure (FRID) maps (map 2-4 and 2-5) and fire history maps (map 2-3). This was done in order to target the areas of the park that are considered to be most at risk from unwanted wildland fire and associated ecosystem restoration objectives. Also, a large unit (such as PW-3) may be burned in sections over the course of several years when favorable burning conditions and air quality concerns would prevent the entire unit from being burned in one season, or when a portion of the unit must be avoided due to other considerations (i.e., cultural and natural resources, air quality, or other management concerns).

Wildland/urban interface areas include developed areas within and adjacent to the park and road corridors that are essential for firefighter and public safety. These areas would receive the most intensive treatments, a combination of mechanical cutting and prescribed burning to ensure their protection and restoration to target conditions in the shortest time possible.

Not all burn units identified on maps 2-6 through 2-17 are identified in this proposed schedule, but all should be considered as potential areas for treatment during the lifespan of the Yosemite Fire Management Plan, for reasons given above.

Table A6-2
Annual Projected Prescribed Fire and Mechanical Cutting Treatment Areas—Yosemite National Park and El Portal Administrative Site. M = Mechanical Cutting, Rx = Prescribed Fire. WUI = wildland/urban interface

Calendar Year 2003			Project Target: 10,074
Project	**Type**	**Acres**	**Comments**
Wawona WUI Phase 1	M; Rx	696	Section 35 housing development & Studhorse Burns 9, 10, & 11.
YOSE W WUI Phase 1	M	67	Fuel break on park boundary.
El Portal WUI Phase 1	M	75	Defensible space around all structures.
Foresta WUI Phase 1	M; Rx	153	Defensible space around structures; McCauley Rx.
Valley WUI Phase 1	M	97	Defensible space around structures; small burns within traffic islands and meadow areas.
Aspen Valley WUI	M; Rx	233	Defensible space around structures and road corridor.
Crane Flat WUI	M; Rx	532	Defensible space around structures, road corridors and burns in PW-05 & PW-07.
Hodgdon WUI	M; Rx	513	Defensible space around structures; burn NE of entrance station.
PW-3 Gin Flat	Rx	7,289	Strengthen Fire Use boundary; key burn for PW-2, 4, & 5.
YV-8 South El Cap	Rx	15	Southside Drive from Bridalveil to YV-10.
YV-9 El Cap Meadow	Rx	114	Crossover Bridge area.
YV-10 El Cap Crossover	Rx	94	Southside Drive from YV-8 to Crossover Bridge.
PW-Mariposa Grove 4	Rx	170	Has had some pile/prep work.
PW- Merced Grove 1	Rx	17	NE side of grove.

PW-Tuolumne Grove 8	Rx	10	SE side of grove.
Calendar Year 2004			**Project Target: 6,308 acres**
Project	**Type**	**Acres**	**Comments**
Wawona WUI Phase 2	M; Rx	629	Forest Drive residential area & Studhorse Burns 1, 2, 3, 4, 5, 6, & 7.
YOSE W WUI Phase 2	M; Rx	353	Shaded fuel break on Park boundary; burn PW-17.
El Portal WUI Phase 2	M; Rx	176	Defensible space around all structures; burn upper slope grasslands.
Foresta WUI Phase 2	M; Rx	517	Defensible space around structures; Big Meadow Rx.
Valley WUI Phase 1	M	97	Maintain defensible space around structures; small burns within traffic islands and meadow areas.
White Wolf WUI	M	40	Defensible space around structures and road corridors.
Hetch Hetchy WUI	M	50	Defensible space around structures, road corridors and burns in PW-05 & PW-07.
Tuolumne WUII	M	320	Defensible space around structures.
Glacier Point WUI	M	50	Defensible space around structures and road corridor; strengthen Fire Use boundary.
Badger Pass WUI	M	30	Defensible space around structures and road corridor; strengthen Fire Use boundary.
YV-6 Cathedral	Rx	35	Southside Drive-Cathedral Picnic Area.
YV-7 El Cap West	Rx	30	Northside Drive west from YV-9.
YV-12 East Buttress	Rx	40	Northside Drive east from YV-9.
YV-13 El Cap Picnic	Rx	80	East of YV-12; portion burned in 2001.
YV-18 Leidig Mdw	Rx	94	Meadow west of YOSE Lodge.
YV-23 Stoneman Mdw	Rx	25	Meadow N of Curry Village.
PW-Mariposa Grove 5	Rx	100	S of Clothespin Tree; E of MG-4.
PW- Merced Grove 4	Rx	15	NW side of grove.
PW-Tuolumne Grove 7	Rx	12	SW side of grove.
PW-02 Aspen Valley	Rx	3,115	Portions burned during 1990's.
PW-30 So Boundary	Rx	565	Near Wawona Entrance Station-Mariposa Grove.
Calendar Year 2005			**Project Target: 9,366 acres**
Project	**Type**	**Acres**	**Comments**
Wawona WUI Phase 3	M; Rx	1,125	Maintain mechanical areas and burn Meadow Loop, around SDA and NW corner.
YOSE W WUI Phase 3	M; Rx	1,390	Shaded fuelbreak on Park boundary; burn portion of PW-34.
El Portal WUI Phase 3	M; Rx	251	Defensible space around all structures & road corridors; burn lower slope grasslands.
Foresta WUI Phase 3	M; Rx	566	Defensible space around structures; Burn portions of PW-35.

YV-4 North Bridalveil	Rx	37	Northside Drive-E of Bridalveil Meadow.
YV-5 Sewage Disposal	Rx	30	Southside Drive N of YV-6.
YV-14 V17 Pullout	Rx	22	Southside Drive E of Cathedral Picnic Area.
YV-15 Rocky Point	Rx	42	East of YV-13; W of Leidig Meadow (YV-18).
YV-19 Sentinel Mdw	Rx	60	Meadow W of Chapel; east of Sentinel Picnic Area.
YV-22 Ahwahnee Mdw	Rx	64	Meadow S and W of Ahwahnee Lodge.
PW-Mariposa Grove 2	Rx	50	S of Water Tank; W of MG-4.
PW-Mariposa Grove 3	Rx	40	Grizzly Giant area north to MG-2.
PW- Merced Grove 8	Rx	16	SE side of grove.
PW-Tuolumne Grove 5	Rx	19	NE side of grove.
PW-04 Big Oak	Rx	4,799	Big Oak–Hodgdon area.
PW-18 Bishop Creek	Rx	832	South of PW-17; below.
Calendar Year 2006			**Project Target: 5,713 acres**
Project	**Type**	**Acres**	**Comments**
Wawona WUI Maintenance	M	187	Maintain mechanical reduced hazard fuel areas.
YOSE W WUI Maintenance	M	45	Maintain shaded fuelbreak on Park boundary.
El Portal WUI Maintenance	M	103	Maintain defensible space around all structures & road corridors.
Foresta WUI Maintenance	M	112	Maintain defensible space around structures & road corridors.
YOSE Village WUI Maintenance	M	97	Maintain defensible space around structures; small burns within traffic islands and meadow areas.
Hodgdon WUI Maintenance	M	45	Maintain defensible space around structures & road corridors.
Rest of Park WUI Maintenance	M	150	Maintain defensible space around structures & road corridors.
YV-2 Bridalveil Mdw	Rx	30	Southside Drive-E of Pohono Bridge.
YV-3 Northside Drive	Rx	50	Northside Drive W of YV-9 and E of Pohono Bridge.
YV-16 Southside	Rx	62	Southside Drive below Sentinel Rock.
YV-17 Sentinel Point	Rx	94	Across Southside Drive from YV-16.
YV-21 Cook's Mdw	Rx	64	Meadow between Lodge and Village.
YV-24 Sugar Pine	Rx	12	Meadow area S of Royal Arches.
PW-Mariposa Grove 10	Rx	35	S of MG-3 & MG-5.
PW-Mariposa Grove 9	Rx	35	W of MG-10.
PW- Mariposa Grove 1	Rx	35	N of MG-9; S of MG-2.
PW- Merced Grove 7	Rx	10	SW corner of grove.
PW-Tuolumne Grove 6	Rx	27	NW side of grove.
PW-31 S Fork Merced	Rx	2,842	South Fork – Wawona Dome- S Boundary area.

PW-42 Tamarack Cr	Rx	1,678	E of Crane Flat, below Hwy 120.
Calendar Year 2007		**Project Target: 10,392 acres**	
Project	**Type**	**Acres**	**Comments**
Wawona WUI Maintenance	M	187	Maintain mechanical reduced hazard fuel areas.
YOSE W WUI Maintenance	M	45	Maintain shaded fuelbreak on Park boundary.
El Portal WUI Maintenance	M	103	Maintain defensible space around all structures & road corridors.
Foresta WUI Maintenance	M	112	Maintain defensible space around structures & road corridors.
YOSE Village WUI Maintenance	M	97	Maintain defensible space around structures; small burns within traffic islands and meadow areas.
Hodgdon WUI Maintenance	M	45	Maintain defensible space around structures & road corridors.
Rest of Park WUI Maintenance	M	150	Maintain defensible space around structures & road corridors.
YV-1 Pohono Bridge	Rx	20	Southside Drive-E of Pohono Bridge.
YV-28 Royal Arch East	Rx	37	W of Mirror Lk; north of Mirror Lk Road.
YV-18 Leidig Mdw	Rx	94	W of YOSE Lodge.
YV-23 Stoneman Mdw	Rx	25	N from Curry Camp.
PW-Mariposa Grove 11	Rx	50	NE corner of grove.
PW-Mariposa Grove 12	Rx	15	SW of MG-11.
PW- Mariposa Grove 6	Rx	45	N of MG-5; S of MG-4 & MG-11.
PW-30 Yosemite Valley	Rx	565	NE corner of Valley; includes areas Between YV-22 and YV-29.
PW-33 Crescent Cr	Rx	8,277	SE Corner of Park; boundary to Chiquito Pass.
Calendar Year 2008		**Project Target: 17,684 acres**	
Project	**Type**	**Acres**	**Comments**
Wawona WUI Maintenance	M	187	Maintain mechanical reduced hazard fuel areas.
YOSE W WUI Maintenance	M	45	Maintain shaded fuelbreak on Park boundary.
El Portal WUI Maintenance	M	103	Maintain defensible space around all structures & road corridors.
Foresta WUI Maintenance	M	112	Maintain defensible space around structures & road corridors.
YOSE Village WUI Maintenance	M	97	Maintain defensible space around structures; small burns within traffic islands and meadow areas.
Hodgdon WUI Maintenance	M	45	Maintain defensible space around structures & road corridors.
Rest of Park WUI Maintenance	M	150	Maintain defensible space around structures & road corridors.
YV-27 Upper Pines	Rx	45	Southside Drive-E of Pohono Bridge.

YV-26 Mirror Lake	Rx	30	W of Mirror Lk; S of Mirror Lk Road.
YV-25 Royal Arch W	Rx	45	S of YV-28.
YV-19 Sentinel Mdw	Rx	94	W of Chapel.
YV-22 Ahwahnee Mdw	Rx	64	W of Ahwahnee Lodge.
PW-Mariposa Grove 8	Rx	90	E edge of grove.
PW-Mariposa Grove 7	Rx	15	SW of MG-8.
PW- Mariposa Grove 13	Rx	85	E of MG-5; SW of MG-7.
PW-30 Yosemite Valley	Rx	565	SE corner of Valley; includes areas Between YV-26 and YV-23.
PW-32 Wawona Dome	Rx	2,052	NE of Wawona.
PW-39 North Mtn	Rx	13,435	Kibbie Pass south to Tuolumne River on NW boundary.
Calendar Year 2009			**Project Target: 12,482 acres**
Project	**Type**	**Acres**	**Comments**
Wawona WUI Maintenance	M	187	Maintain mechanical reduced hazard fuel areas.
YOSE W WUI Maintenance	M	45	Maintain shaded fuelbreak on Park boundary.
El Portal WUI Maintenance	M	103	Maintain defensible space around all structures & road corridors.
Foresta WUI Maintenance	M	112	Maintain defensible space around structures & road corridors.
YOSE Village WUI Maintenance	M	97	Maintain defensible space around structures; small burns within traffic islands and meadow areas.
Hodgdon WUI Maintenance	M	45	Maintain defensible space around structures & road corridors.
Rest of Park WUI Maintenance	M	150	Maintain defensible space around structures & road corridors.
YV-29 Tenaya Creek	Rx	91	Far E end of Valley.
YV-21 Cook's Mdw	Rx	64	Meadow between Lodge and Village.
YV-24 Sugar Pine	Rx	12	Meadow area S of Royal Arches.
PW-30 Yosemite Valley	Rx	565	N side of Valley; includes areas Between YV-22 and YV-18.
PW-21 Turner Ridge	Rx	5,086	W of Hwy 41; N of Wawona; S of Bishop Creek.
PW-38 Smith Peak	Rx	5,400	S of Hetch Hetchy (only 20% of unit burned CY 2008; rest of unit to be completed next 4 years).

Calendar Year 2010 and beyond will be developed at a future date.

The number of acres burned each year through managed wildland and prescribed fire and the cumulative totals in Yosemite National Park since the program began are shown in table A-6.3.

Table A6-3
History of Managed Wildland Fire and Prescribed Fire

	Total Acres Per Year				Cumulative Total			
	Managed Wildland Fire		Prescribed Fire		Managed Wildland Fire		Prescribed Fire	
Year	Number of Fires	Total Acres	Number of Fires	Total Acres	Number of Fires	Acres Burned	Number of Fires	Acres Burned
1970			7	664.00	0	0.00	7	664.00
1971			8	1,112.00	0	0.00	15	1,776.00
1972	8	0.31	1	64.00	8	0.31	16	1,840.00
1973	27	56.09	2	192.00	35	56.40	18	2,032.00
1974	22	4,131.71	2	259.00	57	4,188.11	20	2,291.00
1975	20	773.87	7	2,283.00	77	4,961.98	27	4,574.00
1976	35	803.83	13	914.00	112	5,765.81	40	5,488.00
1977	24	149.76	1	20.00	136	5,915.57	41	5,508.00
1978	33	2,485.65	3	4,023.00	169	8,401.22	44	9,531.00
1979	6	78.24	5	2,932.00	175	8,479.46	49	12,463.00
1980	25	6,203.39	5	3,152.00	200	14,682.85	54	15,615.00
1981	39	3,262.39	1	2,450.00	239	17,945.24	55	18,065.00
1982	5	1.17	2	3,120.00	244	17,946.41	57	21,185.00
1983	6	1,660.16	2	2,458.00	250	19,606.57	59	23,643.00
1984	20	1,067.25	3	840.00	270	20,673.82	62	24,483.00
1985	22	3,765.65	6	2,067.00	292	24,439.47	68	26,550.00
1986	8	3,808.11	3	194.00	300	28,247.58	71	26,744.00
1987	40	7,072.98	0	0.00	340	35,320.56	71	26,744.00
1988	43	12,265.00	0	0.00	383	47,585.56	71	26,744.00
1989	0	0.00	11	1,306.00	383	47,585.56	82	28,050.00
1990	21	200.80	9	170.00	404	47,786.36	91	28,220.00
1991	20	1,304.00	7	113.00	424	49,090.36	98	28,333.00
1992	34	576.00	9	950.00	458	49,666.36	107	29,283.00
1993	5	1.80	11	1,073.00	463	49,668.16	118	30,356.00
1994	7	2,147.40	12	1,344.00	470	51,815.56	130	31,700.00
1995	6	815.50	15	399.80	476	52,631.06	145	32,099.80
1996	16	1,469.00	12	1,168.70	492	54,100.06	157	33,268.50
1997	19	127.40	15	5,018.00	511	54,227.46	172	38,286.50
1998	21	200.60	11	2,779.80	532	54,428.06	183	41,066.30
1999	18	14,870.80	14	1,616.60	550	69,298.86	197	42,682.90

	Total Acres Per Year				Cumulative Total			
	Managed Wildland Fire		Prescribed Fire		Managed Wildland Fire		Prescribed Fire	
Year	Number of Fires	Total Acres	Number of Fires	Total Acres	Number of Fires	Acres Burned	Number of Fires	Acres Burned
2000	0	0.00	2	350.00	550	69,298.86	199	43,032.90
2001	25	9,410.00	2	33.00	575	78,708.86	201	43,065.90
2002	11	2,555.6	4	3,725.6	586	81,264.46	205	46,791.5

Appendix 7: National Historic Preservation Act Consultation: Letters Requesting Comments on Draft Environmental Impact Statement

H4217 (YOSE)
L7617

Dr. Knox Mellon
State of California
Office of Historic Preservation
Post Office Box 942896
Sacramento, CA 94296-0001

Reference: Draft Environmental Impact Statement, Yosemite Fire Management Plan

Dear Dr. Mellon:

We are requesting your review and comment on the draft Yosemite Fire Management Plan/Environmental Impact Statement (enclosed), pursuant to the park's 1999 Programmatic Agreement. This plan is a revision of that identified in Stipulation B of the Programmatic Agreement, YOSE Fire Management Plan. This revised plan discusses management actions that have the potential to adversely affect historic properties, and recommends cultural resources treatments to mitigate these potential effects. We are proposing that the treatments identified as mitigating measures in this Fire Management Plan form the basis of park-specific guidelines pursuant to Stipulation A of the PA, and would appreciate specific comment in this regard.

The draft Yosemite Fire Management Plan/Environmental Impact Statement presents four alternatives (including no action) that propose to deal with the complex problems of fire hazard reduction in the wildland-urban interface, while protecting, restoring and maintaining the historic and natural systems that lie outside the development areas of the park. By considering the use of other treatments available for dealing with fuel accumulations, in conjunction with proven methods that have been in use for three decades, we feel that restoration can be accomplished in those areas that have suffered the most from vegetation encroachment , increasing forest density, and overprotection. Lastly, by basing our proposals on the target forest conditions that should be present, these alternatives propose only an appropriate level of work, in the appropriate places, to restore these conditions and reduce the threats from unwanted wildland fires.

A copy of the document was initially forwarded to your office in May, 2002; the formal public comment period ran through August 27, 2002. However, because of a personnel change that occurred during that timeframe, it appears that we failed to send you a cover letter requesting your comments on the draft Yosemite FMP/EIS. This time lapse will not be consequential to our efforts, and will permit us to discuss with you some of the modifications being considered as a result of comments received during the public comment period. Some of these changes will likely reduce the amount of equipment use outside of the wildland urban interface, thus reducing surface and ground disturbance and their potential affects upon unrecorded archeological resources. Treatment of previously unrecorded archaeological resources encountered during associated ground disturbance will follow section VII C (2(2) (h) the 1999 Programmatic

Agreement (PA) among NPS, SHPO, ACHP regarding planning, design, construction, operations and maintenance.

If it would be helpful, we would be delighted to come to your offices and make a presentation on the YFMP/EIS. Or, if it would be more convenient, we could discuss it with you or your representative by conference call.

Should you have questions concerning the draft Environmental Impact Statement, please contact either Jerry Mitchell, Special Assistant to the Superintendent, at (303) 969-2219, or Mr. Tom Nichols, Fire Management Officer, at (209) 372-0325. For questions concerning historic preservation, please contact Ms. Jeannette Simons, Historic Preservation Officer and Native American Liaison, at (209) 379-1372.

Sincerely,

Michael Tollefson
Superintendent

Enclosures:
(1) Draft Yosemite Fire Management Plan/Environmental Impact Statement

H4217 (YOSE)
L7617

Dr. Don Klima
Attn: Ms. Jane Crissler
Director, Office of Planning and Review
Advisory Council on Historic Preservation
12136 West Bayaud Avenue #330
Lakewood, CO 80226

Dear Dr. Klima:

Attached is a copy of the Draft Yosemite Fire Management Plan and Environmental Impact Statement, for your information, per our existing programmatic agreement.

Should you have any questions about the plan, please contact Mr. Jerry Mitchell, at (303) 969-2219.

Sincerely,

Michael Tollefson
Superintendent

Appendix 8: Cultural Resource Plan for Fire Management Plan.

Forthcoming in the Final Management Plan

Appendix 9: USFWS Biological Opinion

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Sacramento Fish and Wildlife Office
2800 Cottage Way, Suite W2605
Sacramento, California 95825-1846

IN REPLY REFER TO:
1-1-03-F-0248

Memorandum

To: Michael J. Tollefson, Superintendent, Yosemite National Park, U.S. National Park Service, Yosemite, California

From: Cay C. Goude, Assistant Field Supervisor, Sacramento Fish and Wildlife Office, Sacramento, California

Subject: Formal Endangered Species Consultation on the Yosemite Fire Management Plan, Yosemite National Park, California

This is in response to your request for formal consultation with the U.S. Fish and Wildlife Service (Service), pursuant to section 7 of the Endangered Species Act of 1973, as amended (16 USC 1531 et seq.) (Act), on the Yosemite Fire Management Plan. At issue are project effects to the endangered Sierra Nevada bighorn sheep (*Ovis canadensis californiana*), the threatened bald eagle (*Haliaeetus leucocephalus*), the threatened California red-legged frog *(Rana aurora draytonii*), and the Valley elderberry longhorn beetle (*Desmocerus californicus*). The Service received your request for formal consultation and the May 2002, *Draft Yosemite Fire Management Plan, Environmental Impact Statement* (DEIS) on May 23, 2002. On June 11, 2003, we received the final additional information requested by this office.

Based on the Service's review of the DEIS, we concur with your determination that the Yosemite Fire Management Plan is not likely to adversely affect the Sierra Nevada bighorn sheep or the bald eagle. The Service also concurs with your determination that the Yosemite Fire Management Plan may affect, but is not likely to adversely affect the California red-legged frog. Therefore, unless new information reveals effects of the proposed action in a manner or to an extent not considered, no additional consultation for these species is necessary. The proposed action may adversely affect the valley elderberry longhorn beetle.

Yosemite National Park provides habitat for the mountain yellow-legged frog (*Rana muscosa*) and Yosemite toad (*Bufo canorus*), both candidates for listing. Although the Act does not afford these species the protections provided to federally listed animals, we are monitoring their status and are providing recommendations for these species in the Conservation Recommendations section of the biological opinion. Yosemite National Park has included Mitigation Measures Common to All Action Alternatives (Mitigation Measures) to minimize effects for these species. We are also providing recommendations for these species in the Conservation Recommendations section of the biological opinion.

The Service has received petitions to list the California spotted owl *(Strix occidentalis occidentalis*) and the fisher (*Martes pennanti*) as threatened and endangered species. The Service believes that it is in the best interest of Yosemite National Park to incorporate all practical measures that would minimize negative impacts to these species. Yosemite National Park has included Mitigation Measures to minimize effects for these species. We are also providing recommendations for these species in the Conservation Recommendations section of the biological opinion.

This biological opinion is based on information provided in: (1) the DEIS; (2) additional information received April 1, 2003; (3) additional information, *Mitigation Measures Common to All Action Alternatives*, received June 11, 2003; and (4) additional information located in Service files. A complete administrative record is on file at the Sacramento Fish and Wildlife Office.

CONSULTATION HISTORY

May 23, 2002. The Service received the DEIS for review.

July 25, 2002. Meeting between Kathy Brown of this office and Yosemite National Park staff to conduct on-site visits, and discuss the Draft Fire Management Plan and associated biological assessment.

September 3, 2002. The Service received additional information from Yosemite National Park regarding the quantity of elderberry plants within the El Portal Wildland Urban Interface and Burn Units.

November 19, 2002. Meeting between Kathy Brown of this office and Yosemite National Park staff to discuss species specific issues.

December 17, 2002. The Service received additional information: the November 7, 2002, *Elderberry Plants in the El Portal Wildland Urban Interface*

April 1, 2003. The Service received the following additional information from Yosemite National Park: the February 2003, *Monitoring Plan: Elderberry Plants within the El Portal Wildland-Urban Interface;* and the February 2003, El Portal Prescribed Burn Rotation Plan in Relation to Elderberry Plants.

June 11, 2003. The Service received the following additional information from Yosemite National Park: *Mitigation Measures Common to all Action Alternatives*.

June 25, 2003. The Service sent a draft Biological Opinion to Yosemite National Park.

July 28, 2003. In a phone conversation between Lisa Acree of Yosemite National Park and Kathy Brown of this office, comments regarding the draft Biological Opinion were discussed.

BIOLOGICAL OPINION

Description of the Proposed Action

The following project description was derived mainly from information presented in the DEIS. Additional information is from sources in the Service's administrative record.

Since 1968, National Park Service policy has been to allow natural processes to occur. The fire management program has pursued this policy for over three decades, yet has not been able to meet park land management objectives of restoring ecosystems and providing protection for developed areas and cultural resources. The long-term buildup of fuels has continued under the existing plan in many areas of Yosemite National Park and the El Portal Administrative Site. Increased application of prescribed fire and additional methods of reducing fuels are needed to restore fire to ecosystems and reduce forest fuels in at-risk areas.

The proposed alternative in the DEIS divides Yosemite National Park into two geographic units: the Fire Use Unit and the Suppression Unit. Each unit would be managed with different techniques and objectives based on existing conditions and needs. A thorough description of the proposed project can be found in the DEIS. The following summarizes most of the actions proposed under the proposed alternative.

The Fire Use Unit is the largest management unit and contains 83% (or 619,888 acres) of Yosemite National Park. The Fire Use Unit is a large, relatively contiguous landscape where old forest conditions and associated ecological processes more or less predominate. Plant communities tend to match target conditions and, in general, naturally occurring fires have taken place at a rate that matches the natural fire return interval. Fuel loads tend to be within the normal range of variability. Vegetation communities in the Fire Use Unit have burned and would continue to burn under the proposed alternative under conditions that are close to their natural fire regime. Lightning would ignite fires in this unit. A lightning-ignited fire in this unit would be assessed and allowed to burn if it met conditions that would maintain or restore the target conditions for the area, and if it met criteria for potential fire behavior for the area, relative risks, and the complexity of the fire. Occasionally, a lightning-induced fire that was controlled due to high fire danger, lack of personnel, or harmful air quality would be re-ignited up to 3 years past the date of the original fire to simulate the benefits of the extinguished fire.

The remaining 17% (or 128,067 acres) of Yosemite National Park is in the Suppression Unit. The Suppression Unit contains areas where fires have been suppressed for decades. In mid- elevation forests along the western boundary of Yosemite National Park, fuel loads are high and plant community structure has changed, largely due to past fire exclusion. As a result, the risk of catastrophic wildland fire could be high in many areas. The Suppression Unit was delineated to reintroduce fire into fire-dependent ecosystems, move toward natural fire regimes, and to protect developed areas and other human values. This would be mainly done through prescribed burning. The initial response to a wildland fire in this unit would be aggressive and immediate suppression. Depending on their location and designation, lands in the Suppression Unit would be managed with different strategies. Burn units would be managed with prescribed fire treatments to reintroduce fire into fire-dependent ecosystems and move toward natural fire regimes, support treatments in developed areas (Wildland Urban Interface) (WUI), and protect sensitive and highly valued areas. WUIs are designated where human habitation meets areas of flammable wildland vegetation. The intention of fire management in these areas is to protect human communities from wildland fires as well as minimize the spread of fires that originate in urban areas. Fuels may be removed with mechanical clearing or one of several other treatments including prescribed burning. After portions of landscapes are brought into a more defensible and fire-resilient condition (as defined by restoration target conditions), they would require periodic maintenance. About 1,095 acres would be treated each year. It is expected to take about 6 to 8 years to achieve the initial goals for WUIs. Distribution of the valley elderberry longhorn beetle habitat in the area administered by Yosemite National Park is restricted to the El Portal Administrative Site, located in the Suppression Unit.

As described in the DEIS, the proposed alternative would accomplish goals by using various restoration, maintenance, and fuel reduction strategies within the Suppression and Fire Use areas. In addition to prescribed fire and managed wildland fire, a combination of aggressive and passive techniques to remove hazardous fuels would be utilized. Aggressive techniques may include mechanical tree and shrub removal with the use of feller-bunchers and forwarders, conventional tree and shrub removal with the use of saws, skidders and grapplers, machine crushing and shredding, and machine piling. Secondary canopy trees would be removed from the forest in some areas to achieve a desired semi-open canopy condition. Passive techniques may include yarding with the use of yarders or fetching arches, hand cutting and piling, cutting and chipping, low-impact skidding, girdling, and limb removal. Additional options designated "Lower Fuel Profile Treatment Options" that may be used in sensitive areas are pile burning, pile and leave, lop and scatter, chip and broadcast burn, chip and broadcast material, and chip and haul.

Status of the Species and Environmental Baseline

The valley elderberry longhorn beetle was listed as a threatened species under the Act on August 8, 1980 (45 **FR** 52803). Critical habitat for the species was designated and published at 50 CFR §17.95. Two areas along the American River in the Sacramento metropolitan area have been designated as critical habitat for the valley elderberry longhorn beetle. Critical habitat for this species has been designated along the lower American River at Goethe and Ancil Hoffman parks (American River Parkway Zone) and at the Sacramento Zone, an area about a half-mile from the American River downstream from the American River Parkway Zone. In addition, an area along Putah Creek, Solano County, and the area west of Nimbus Dam along the American River Parkway, Sacramento County, are considered essential habitat, according to the *Valley Elderberry Longhorn Beetle Recovery Plan* (Recovery Plan) (USFWS 1984). These areas support large numbers of mature elderberry plants with extensive evidence of use by the valley elderberry longhorn beetle.

The valley elderberry longhorn beetle is dependent on its host plant, elderberry (*Sambucus* sp.), which is a locally common component of the remaining riparian forests and savannah areas and, to a lesser extent, the mixed chaparral-foothill woodlands of the Central Valley. Use of the elderberry plants by the animal, a wood borer, is rarely apparent. Frequently, the only exterior evidence of the plant's use by the valley elderberry longhorn beetle is an exit hole. Observations made within elderberry plants along the Cosumnes River, in the Folsom Lake area, and near Blue Ravine in Folsom indicate that larval galleries can be found in elderberry stems with no evidence of exit holes; the larvae either succumb prior to constructing an exit hole or are not far enough along in the developmental process to construct an exit hole. Larvae appear to be distributed in stems which are 1.0 inch or greater in diameter at ground level. The Recovery Plan and Barr (1991) contain further details on the valley elderberry longhorn beetle's life history.

Population densities of the valley elderberry longhorn beetle are probably naturally low (USFWS 1984). It has been suggested, based on the spatial distribution of occupied plants (Barr 1991), that the valley elderberry longhorn beetle is a poor disperser. Low density and limited dispersal capability cause the valley elderberry longhorn beetle to be vulnerable to the negative effects of the isolation of small subpopulations due to habitat fragmentation.

When the valley elderberry longhorn beetle was listed as threatened on August 8, 1980, the species was known from less than 10 localities along the American River, the Merced River, and Putah Creek. By the time the Recovery Plan was prepared in 1984, additional species localities had been found along the American River and Putah Creek. As of 1998, the California Natural Diversity Database (CNDDB) included 181 occurrences for this species in 44 drainages throughout the Central Valley, from a location along the Sacramento River in Shasta County, southward to an area along Caliente Creek in Kern County (CNDDB 1998). The valley elderberry longhorn beetle continues to be threatened by habitat loss and fragmentation, invasion by Argentine ants (*Linepithema humile*), and possibly other factors such as pesticide drift, exotic plant invasion, and grazing.

The following paragraphs analyze the effects of past and ongoing factors leading to the current status of the species, its habitat and ecosystem, throughout the species' range. It includes an analysis of effects from projects that have received incidental take authorization for the valley elderberry longhorn beetle since the species was listed, and an evaluation of conservation efforts aimed at minimizing these effects, based on the best available information.

Habitat loss has been ranked as the single greatest threat to biodiversity in the United States (Wilcove *et al*. 1998). In the 1980 final rule to list the valley elderberry longhorn beetle as threatened, habitat destruction was cited as the primary factor contributing to the need to federally list the species (45 **FR** 52803). As stated in the final rule, by the time the species was listed its habitat had largely disappeared throughout much of its former range due to agricultural conversion, levee construction, and stream channelization. The 1984 recovery plan reiterated that the primary threat to the valley elderberry longhorn beetle was loss and alteration of habitat by agricultural conversion, grazing, levee construction, stream and river channelization, removal of riparian vegetation, riprapping of shoreline, plus recreational, industrial and urban development (USFWS 1984).

Riparian forests, the primary habitat for the valley elderberry longhorn beetle, have been severely depleted throughout the Central Valley over the last two centuries as a result of expansive agricultural and urban development (Katibah 1984, Thompson 1961, Roberts *et al.* 1977). Since colonization, these forests have been "...modified with a rapidity and completeness matched in few parts of the United States" (Thompson 1961). As of 1849, the rivers and larger streams of the Central Valley were largely undisturbed. They supported continuous bands of riparian woodland four to five miles in width along some major drainages such as the lower Sacramento River, and generally about two miles wide along the lesser streams (Thompson 1961). Most of the riverine floodplains supported riparian vegetation to about the 100-year flood line (Katibah 1984). A large human population influx occurred after 1849, however, and much of the Central Valley riparian habitat was rapidly converted to agriculture and used as a source of wood for fuel and construction to serve a wide area (Thompson 1961). By as early as 1868, riparian woodland had been severely impacted in the Central Valley, as evidenced by the following excerpt:

> This fine growth of timber which once graced our river [Sacramento], tempered the atmosphere, and gave protection to the adjoining plains from the sweeping winds, has entirely disappeared - the woodchopper's axe has stripped the river farms of nearly all the hard wood timber, and the owners are now obliged to rely upon the growth of willows for firewood. (Cronise 1868, *in* Thompson 1961).

The clearing of riparian forests for fuel and construction made this land available for agriculture (Thompson 1977). Natural levees bordering the rivers, once supporting vast tracts of riparian habitat, became prime agricultural land (Thompson 1961). As agriculture expanded in the Central Valley, needs for increased water supply and flood protection spurred water development and reclamation projects. Artificial levees, river channelization, dam building, water diversion, and heavy groundwater pumping further reduced riparian habitat to small, isolated fragments (Katibah 1984). In recent decades, these riparian areas have continued to decline as a result of ongoing agricultural conversion as well as urban development and stream channelization. As of 1989, there were over 100 dams within the Central Valley drainage basin, as well as thousands of miles of water delivery canals and streambank flood control projects for irrigation, municipal and industrial water supplies, hydroelectric power, flood control, navigation, and recreation (Frayer *et al.* 1989). Riparian forests in the Central Valley have dwindled to discontinuous strips of widths currently measurable in yards rather than miles.

Some accounts state that the Sacramento Valley supported about 775,000 to 800,000 acres of riparian forest around 1848, just prior to statehood (Smith 1977, Katibah 1984). No comparable estimates are available for the San Joaquin Valley. Based on early soil maps, however, more than 921,000 acres of riparian habitat are believed to have been present throughout the Central Valley under pre-settlement conditions (Katibah 1984). Another source estimates that of approximately 5 million acres of wetlands in the Central Valley in the 1850s, about 1,600,000 acres were riparian wetlands (Warner and Hendrix 1985, Frayer *et al.* 1989).

Based on a California Department of Fish and Game (CDFG 1992) riparian vegetation distribution map, by 1979, there were about 102,000 acres of riparian vegetation remaining in the Central Valley. This represents a decline in acreage of 89% as of 1979 (Katibah 1984). More extreme figures were given by Frayer *et al.* (1989), who reported that woody riparian forests in the Central Valley had declined to 34,600 acres by the mid-1980s (from 65,400 acres in 1939). Although these studies have differing findings in terms of the number of acres lost (most likely explained by differing methodologies), they attest to a dramatic historic loss of riparian habitat in the Central Valley. As there is no reason to believe that riparian habitat suitable to the valley elderberry longhorn beetle (occupied by elderberry plants) would be destroyed at a different rate than other riparian habitat, we can assume that the rate of loss for valley elderberry longhorn beetle habitat in riparian areas has been equally dramatic.

A number of studies have focused on riparian loss along the Sacramento River, which supports some of the densest known populations of the valley elderberry longhorn beetle. Approximately 98% of the middle Sacramento River's historic riparian vegetation was believed to have been extirpated by 1977 (DWR 1979). The State Department of Water Resources (DWR) estimated that native riparian habitat along the Sacramento River from Redding to Colusa decreased from 27,720 acres to 18,360 acres (34%) between 1952 and 1972 (McGill *et al.* 1975, Conrad *et al.* 1977). The average rate of riparian loss on the middle Sacramento River was 430 acres per year from 1952 to 1972, and 410 acres per year from 1972 to 1977. In 1987, riparian areas as large as 180 acres were observed converted to orchards along this river (McCarten and Patterson 1987).

Barr (1991) examined 79 sites in the Central Valley supporting valley elderberry longhorn beetle habitat. When 72 of these sites were re-examined by researchers in 1997, seven no longer supported valley elderberry longhorn beetle habitat. This represents a decrease in the number of sites with valley elderberry longhorn beetle habitat by 9% in 6 years.

There is no comparable information on the historic loss of non-riparian valley elderberry longhorn beetle habitat such as elderberry savanna and other vegetation communities where elderberry occurs (oak or mixed chaparral-woodland, or grasslands adjacent to riparian habitat). However, all natural habitats throughout the Central Valley have been heavily impacted within the last 200 years (Thompson 1961), and we can therefore assume that non-riparian valley elderberry longhorn beetle habitat also has suffered a widespread decline. This analysis focuses on loss of riparian habitat because the valley elderberry longhorn beetle is primarily dependent upon riparian habitat. Adjacent upland areas are also likely to be important for the species (Huxel 2000), but this upland habitat typically consist of oak woodland or elderberry savanna bordering willow riparian habitat (Barr 1991). The riparian acreage figures given by Frayer *et al.* (1989) and Katibah (1984) included the oak woodlands concentrated along major drainages in the Central Valley, and therefore probably included lands we would classify as upland habitat for the valley elderberry longhorn beetle adjacent to riparian drainages.
Between 1980 and 1995, the human population in the Central Valley grew by 50%, while the rest of California grew by 37%. The Central Valley's population was 4.7 million by 1999, and it is expected to more than double by 2040. The American Farmland Trust estimates that by 2040 more than 1 million cultivated acres will be lost and 2.5 million more put at risk (Ritter 2000). With this growing population in the Central Valley, increased development pressure is likely to result in continuing loss of riparian habitat.

While habitat loss is clearly a large factor leading to the species' decline, other factors are likely to pose significant threats to the long term survival of the valley elderberry longhorn beetle. Only approximately 20% of riparian sites with elderberry observed by Barr (1991) and Collinge *et al.* (*in prep*.) support valley elderberry longhorn beetle populations (Barr 1991, Collinge *et al. in prep*.). Jones and Stokes (1988) found 65% of 4,800 riparian acres on the Sacramento River to have evidence of valley elderberry longhorn beetle presence. The fact that a large percentage of apparently suitable habitat is unoccupied suggests that the valley elderberry longhorn beetle is limited by factors other than habitat availability, such as habitat quality or limited dispersal ability.

Destruction of riparian habitat in central California has resulted not only in a loss of acreage, but also in habitat fragmentation. Fahrig (1997) states that habitat fragmentation is only important for habitats that have suffered greater than 80% loss. Riparian habitat in the Central Valley, which has experienced greater than 90% loss by most estimates, would meet this criterion as habitat vulnerable to effects of fragmentation. Existing data suggests that valley elderberry longhorn beetle populations, specifically, are affected by habitat fragmentation. Barr (1991) found that small, isolated habitat remnants were less likely to be occupied by valley elderberry longhorn beetles than larger patches, indicating that valley elderberry longhorn beetle subpopulations are extirpated from small habitat fragments. Barr (1991) and Collinge *et al.* (*in prep.*) consistently found valley elderberry longhorn beetle exit holes occurring in clumps of elderberry bushes rather than isolated bushes, suggesting that isolated plants do not typically provide long-term viable habitat for this species. Local populations of organisms often undergo periodic colonization and extinction, while the metapopulation (set of spatially separated groups of a species) may persist (Collinge 1996).

Habitat fragmentation can be an important factor contributing to species declines because: (1) it divides a large population into two or more small populations that become more vulnerable to direct loss, inbreeding depression, genetic drift, and other problems associated with small populations, (2) it limits a species' potential for dispersal and colonization, and (3) it makes habitat more vulnerable to outside influences by increasing the edge:interior ratio (Primack 1998). These factors, as they relate to the valley elderberry longhorn beetle, are discussed below.

Small, isolated subpopulations are susceptible to extirpation from random demographic, environmental, and/or genetic events (Shaffer 1981, Lande 1988, Primack 1998). While a large area may support a single large population, the smaller subpopulations that result from habitat fragmentation may not be large enough to persist over a long time period. As a population becomes smaller, it tends to lose genetic variability through genetic drift, leading to inbreeding depression and a lack of adaptive flexibility. Smaller populations also become more vulnerable to random fluctuations in reproductive and mortality rates, and are more likely to be extirpated by random environmental factors.

Species that characteristically have small population sizes, such as large predators or habitat specialists, are more likely to become extinct than species that typically have large populations (Primack 1998). Also, a species with low population density (few individuals per unit area) tends to have only small populations remaining if its habitat is fragmented. Populations of species that naturally occur at lower density become extinct more rapidly than do those of more abundant species (Bolger *et al.* 1991). The species may be unable to persist within each fragment, and gradually die out across the landscape.

The valley elderberry longhorn beetle, a specialist on elderberry plants, tends to have small population sizes, and to occur in low densities (Barr 1991, Collinge *et al. in prep.*). Collinge *et al.* (*in prep.*) compared resource use and density of exit holes between the valley elderberry longhorn beetle and a related subspecies, the California elderberry longhorn beetle (*Desmocerus californicus californicus*). The valley elderberry longhorn beetle tended to occur in areas with higher elderberry densities, but had lower exit hole densities than the California elderberry longhorn beetle. With extensive riparian habitat loss and fragmentation, these naturally-small valley elderberry longhorn beetle populations are broken into even smaller, isolated populations. Once a small valley elderberry longhorn beetle population has been extirpated from an isolated habitat patch, the species may be unable to re-colonize this patch if it is unable to disperse from nearby occupied habitat. Insects with limited dispersal and colonization abilities may persist better in large habitat patches than small patches because small fragments may be insufficient to maintain viable populations and the insects may be unable to disperse to more suitable habitat (Collinge 1996).

Studies suggest that the valley elderberry longhorn beetle is unable to re-colonize drainages where the species has been extirpated, because of its limited dispersal ability (Huxel 2000, Barr 1991; Collinge *et al. in prep.*). Huxel (2000) used computer simulations of colonization and extinction patterns for the valley elderberry longhorn beetle based on differing dispersal distances, and found that the short dispersal simulations best matched the 1997 census data in terms of site occupancy. This suggests that in the natural system dispersal and thus colonization is limited to nearby sites. At spatial scales greater than 10 km., such as across drainages, valley elderberry longhorn beetle occupancy appears to be strongly influenced by regional extinction and colonization processes, and colonization is constrained by limited dispersal (Collinge *et al. in prep*.). Except for one occasion, drainages examined by Barr that were occupied in 1991 remained occupied in 1997 (Collinge *et al. in prep*.). The one exception was Stoney Creek, which was occupied in 1991 but not in 1997. All drainages found by Barr (1991) to be unoccupied in 1991 were also unoccupied in 1997. This data suggests that drainages unoccupied by the valley elderberry longhorn beetle remain so.

Habitat fragmentation not only isolates small populations, but also increases the interface between habitat and urban or agricultural land, increasing negative edge effects such as the invasion of non-native species (Huxel 2000, Soule 1990) and pesticide contamination (Barr 1991). There are several edge effect-related factors that may be related to the decline of the valley elderberry longhorn beetle.

Recent evidence indicates that the invasive Argentine ant poses a risk to the long-term survival of the valley elderberry longhorn beetle. Surveys along Putah Creek found valley elderberry longhorn beetle presence where Argentine ants were not present or had recently colonized, and valley elderberry longhorn beetle absence from otherwise suitable sites where Argentine ants had become established (Huxel 2000). The Argentine ant has negatively impacted populations of other native arthropod species (Holway 1998; Ward 1987). Predation on eggs, larvae, and pupae are the most likely impacts these ants have on the valley elderberry longhorn beetle. In Portugal, Argentine ants have been found to be significant egg predators on the eucalyptus borer (*Phorocantha semipunctata*), a cerambycid like the valley elderberry longhorn beetle. Egg predation on the valley elderberry longhorn beetle could lead to local extirpations, as indicated by a population viability study suggesting that egg and juvenile mortality are significant factors affecting probability of extinction for the valley elderberry longhorn beetle (Huxel and Collinge, *in prep*.). The Argentine ant has been expanding its range throughout California since its introduction around 1907, especially in riparian woodlands associated with perennial streams (Holway 1998, Ward 1987). Huxel (2000) states that, given the potential for Argentine ants to spread with the aid of human activities such as movement of plant nursery stock and agricultural products, this species may come to infest most drainages in the Central Valley along the valley floor, where the valley elderberry longhorn beetle is found.

Direct spraying and drift of pesticide, including herbicides and/or insecticides, in or near riparian areas (which is done to control mosquitos, crop diseases, invasive and/or undesirable plants, or other pests) is likely to adversely affect the valley elderberry longhorn beetle and its habitat. Although there have been no studies specifically focusing on the effects of pesticides on the valley elderberry longhorn beetle, evidence suggests that the species is likely to be affected by pesticides. As of 1980, the prevalent land use adjacent to riparian habitat in the Sacramento Valley was agriculture, even in regions where agriculture was not generally the most common land use (Katibah *et al.* 1984), therefore the species is likely vulnerable to pesticide contamination from adjacent agricultural practices. Recent studies of major rivers and streams documented that 96% of all fish, 100% of all surface water samples and 33% of major aquifers contained one or more pesticides at detectable levels (Gilliom 1999). Pesticides were identified as one of the 15 leading causes of impairment for streams included on the Federal Water Pollution Control Act, as amended (Clean Water Act), section 303(d) lists of impaired waters. As the valley elderberry longhorn beetle occurs primarily in riparian habitat, the contamination of rivers and streams affects this species and its habitat. Pesticides have been identified as one of a number of potential causes of pollinator species' declines and declines of other insects beneficial to agriculture (Ingraham *et al.* 1996), therefore it is likely that the valley elderberry longhorn beetle, typically occurring adjacent to agricultural lands, has suffered a decline due to pesticides.

Competition from invasive exotic plants such as giant reed (*Arundo donax*) negatively affects riparian habitat supporting the valley elderberry longhorn beetle. Giant reed, a native of Asia, has become a serious problem in California riparian habitats, forming dense, homogenous stands essentially devoid of wildlife (Rieger and Kreager 1989). This species growing up to 2.5 inches per day and yielding 8.3 tons of oven-dry cane per acre (Rieger and Kreager 1989, Perdue 1958), tolerates drought, floods, and extreme temperatures, and is not significantly affected by insects, disease, herbivory, fire, or mechanical disturbance. It has an extensive root system allowing it to resprout rapidly after any disturbance and out-compete native riparian vegetation. Giant reed also introduces a frequent fire cycle into the riparian ecosystem, disrupting natural riparian dynamics and eventually forming homogenous climax communities. The extent to which giant reed has affected elderberry specifically, however, has not been studied.

Livestock grazing damages or destroys elderberry plants and inhibit regeneration of seedlings. Cattle readily forage on new elderberry growth, which may explain the absence of valley elderberry longhorn beetles at manicured elderberry stands (USFWS 1984). Habitat fragmentation exacerbates problems related to exotic species invasion and cattle grazing by increasing the edge:interior ratio of habitat patches, facilitating penetration of these influences.

The valley elderberry longhorn beetle is found in areas below 3,000 feet in elevation that support the elderberry plant. The El Portal area is the only area in Yosemite National Park that lies below 3,000 feet in elevation. Within the El Portal area, elderberry plants represent a subdominant species within interior live oak forests, live oak forests, interior live oak woodlands, blue oak woodlands, canyon live oak forests, mixed north slope forests, foothill pine/live oak/chaparral woodlands, northern mixed chaparral, interior live oak chaparral, and westside ponderosa pine forests in the project area. No elderberry plants occur within riparian areas. The closest record of an occurrence of the valley elderberry longhorn beetle is 16.5 miles southwest of El Portal near the town of Mariposa, recorded in 1974. Current management of elderberry plants in El Portal follows the Service's July 9, 1999, *Conservation Guidelines for the Valley Elderberry Longhorn Beetle*.

Yosemite National Park consulted with the Service on the Yosemite Valley Plan (Service file 1-1-00-F-0196) that included removal of existing structures, new construction, and vegetative management in El Portal. As a result of proposed project related impacts to elderberry plants, Yosemite National Park will establish a 22.55 acre valley elderberry conservation area to compensate for the loss of up to 124 plants with 651 stems large enough to harbor beetle larvae. To date, none of the projects that would impact elderberry plants have been implemented. Therefore, the conservation area has not been utilized. Under the proposed Yosemite Fire Management Plan, about 40% of elderberry plants are within burn units that overlap with Yosemite Valley Plan El Portal project areas. Therefore, the Yosemite Valley Plan biological opinion may be amended to reflect a change in baseline for the elderberry plants.

EFFECTS OF THE PROPOSED ACTION

Within the project area, up to 134 elderberry plants with stems measuring one inch in diameter or greater at ground level could be directly affected by the proposed project. A total of 527 stems large enough to harbor beetle larvae could be directly impacted. Valley elderberry longhorn beetle adults, eggs, and larvae inhabiting these plants/stems may be harassed or killed during the prescribed burning. All elderberry plants with evidence of valley elderberry beetle exit holes, of which none are recent (currently 14 exit holes are known), would be protected during prescribed fires by reducing fuel or applying water around the perimeter of the plant. Fuels, such as grasses and small twigs, in the periphery of these elderberry plants would be reduced by scraping vegetation or mowing. Prescribed fire units are small and will be closely monitored. Prescribed fires in valley elderberry beetle habitat would be ignited when conditions would produce moderate intensity fires. Elderberry plants, as most others in the foothill woodland community, are fire adapted. Periodic, high-intensity fires are natural in this community. If flame lengths near an elderberry plant containing exit holes reach greater than 2-4 feet, the fire in the area would be extinguished.

Injury or death could occur if prescribed burns occurred during the valley elderberry longhorn beetle's emergence and mating period (March 15 through June 15). No recent exit holes are known to exist in the El Portal area. Surveys conducted in 1997 located exit holes, and 2002 surveys of the same areas detected no new exit holes .

Indirect effects to the beetle could result from habitat fragmentation through the burning of elderberry plants. Habitat fragmentation can inhibit dispersal and colonization of beetles between remaining habitat areas. Fragmentation may lead to population declines and localized extinctions by dividing a population into smaller, isolated subpopulations in restricted areas. These smaller populations may then be adversely affected by inbreeding depression, genetic drift, and other problems associated with small population size (Primack 1998). Occupancy of elderberry plants after a burn may be lower than in elderberry plants that have not been burned (Holyoak, M., *pers. comm.*).

To minimize effects of loss of habitat, Yosemite National Park developed the February 2003, *El Portal Prescribed Burn Rotation Plan in Relation to Elderberry Plants* (prescribed fire rotation plan) (See Appendix A). Prescribed fire within 20 burn units in El Portal will be systematically implemented to provide protection and sustainability of elderberry plants. Treatment of burn units will be managed to retain unburned units adjacent to burned units to minimize habitat fragmentation. If data collected indicates that there is insufficient regeneration, burning will be delayed. All plants with exit holes will be protected from fire. Table 1 below depicts the burn unit rotation and number of plants that could be affected.

Table 1. Burn Unit Rotation

Year	Burn Unit	Plants detected in 2000 survey
1	4A West; 3A; 3B; 8A; 5B	31
2	8B; 1A; 2B; 10	8
3	1B; 4B; 9: 2A	13
4	9A; 5A; 4C; 4A East	24
5	7; 2C; 1C; 8C	58

To monitor the effects of prescribed burning on elderberry plants, Yosemite National Park developed the February 2003, *Monitoring Plan: Elderberry Plants within the El Portal Wildland-Urban Interface* (monitoring plan) (see Appendix B). Each elderberry plant has been mapped and given a reference number. Baseline, preburn, and postburn data will be collected, and information will be used to assess effects of prescribed burning on valley elderberry longhorn beetle habitat.

During prescribed burning, moderate- to high-intensity fires would remove the decadent and decaying portions of elderberry plants and stimulate new growth in the plant. n the event of an intense burn, elderberry plants are adapted to crown-sprout. In addition, actions taken under the proposed action will reduce the chance of catastrophic fire in El Portal.

The Service does not anticipate any adverse effects to beetle critical habitat because it occurs well away from the proposed project area. Therefore, no further analysis of critical habitat for the beetle will be done for this biological opinion.

CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the Yosemite Fire Management Plan are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

The Service is not aware of specific projects that might affect the beetle or its habitat that are currently under review by State, county, or local authorities. Nevertheless, continued human population growth in the Central Valley, in general, is expected to drive further development of agriculture, cities, industry, transportation, and water resources in the foreseeable future. Some of these future activities will not be subject to Federal jurisdiction (and thus are considered to enter into cumulative effects), and are likely to result in loss of riparian and other habitats where elderberry plants and the beetle occur.

CONCLUSION

It is the opinion of the Service that implementation of the Yosemite Fire Management Plan should not appreciably reduce the likelihood of both survival and recovery of this species in the wild by reducing reproduction, numbers, or distribution and therefore should not jeopardize the continued existence of the Valley elderberry longhorn beetle. The proposed action is not likely to result in destruction or adverse modification of critical habitat.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal Regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, carrying out an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with terms and conditions of this incidental take statement.

The measures described below are non-discretionary, and must be undertaken by Yosemite National Park in order for the exemption in section 7(o)(2) to apply. Yosemite National Park has a continuing duty to ensure that the covered activity complies with the terms and conditions of this incidental take statement. If Yosemite National Park fails to adhere to the terms and conditions of the incidental take statement, the protective coverage of section 7(o)(2) may lapse. To monitor the impact of the incidental take, Yosemite National Park must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement.

AMOUNT OR EXTENT OF TAKE

The Service expects that incidental take of the valley elderberry longhorn beetle will be difficult to detect or quantify. The cryptic nature of these species and their relatively small body size make the finding of a dead specimen unlikely. The species occurs in habitats that make them difficult to detect. Due to the difficulty in quantifying the number of valley elderberry longhorn beetles that will be taken as a result of the proposed action, or the number of elderberry stems one inch or greater in diameter at ground level that will exist at any given burn year, the Service is quantifying take incidental to the project as the number of elderberry plants (containing stems one inch or greater in diameter) that could become unsuitable for beetles due to direct or indirect effects as a result of the action.

Upon implementation of the following reasonable and prudent measures, incidental take associated with the Yosemite Fire Management Plan on the valley elderberry longhorn beetles in the form of harm, harassment, or mortality from habitat loss or direct mortality will become exempt from the prohibitions described under Section 9 of the Act for direct impacts; in addition, incidental take in the form of harm, harassment, or mortality associated with the Yosemite Fire Management Plan will be exempt from the prohibitions described under Section 9 of the Act for indirect impacts as a result of the management activities described. The incidental take associated with the proposed action is hereby exempted from prohibitions of take under Section 9 of the Act.

EFFECT OF THE TAKE

The Service has determined that this level of anticipated take is not likely to result in jeopardy to the beetle or result in destruction or adverse modification of critical habitat for the beetle.

REASONABLE AND PRUDENT MEASURES

The Service believes the following reasonable and prudent measure is necessary and appropriate to minimize incidental take of the valley elderberry longhorn beetles:

1. Minimize the effects of project impacts to the valley elderberry longhorn beetles and to elderberry plants (habitat) throughout the proposed project area.

TERMS AND CONDITIONS

In order to be exempt from the prohibitions of section 9 of the Act, Yosemite National Park must ensure compliance with the following terms and conditions, which implement the reasonable and prudent measure described above. These terms and conditions are non-discretionary.

1. The following terms and conditions implement reasonable and prudent measure one (1):

    a. The measures described in the Mitigation Measures (see Appendix C) are hereby incorporated as conditions of this opinion that must be followed to the greatest extent practical. In the event that the measures for threatened or endangered species are not followed or are violated the Service must be notified immediately.

    b. Monitoring of elderberry plants will be conducted by park personnel approved by both Yosemite National Park and the Service.

    c. If new exit holes are discovered during the pre-burn or post-burn monitoring, the Service will be notified immediately. Modifications to the Prescribed Fire Burn Plan may occur if the valley elderberry longhorn beetles are recently known to be within or adjacent to a burn unit. A restriction on activities during the emergence and mating period (March 15 through June 15) may occur in this instance.

Reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize the impact of incidental take on a species that might result from the proposed action. The

Service believes that no more than the number of valley elderberry longhorn beetles inhabiting the number of elderberry plants per burn year rotation within the El Portal burn units will be incidentally taken, as depicted in Table 1. If, during the course of the action, this level of incidental take is exceeded, such incidental take would represent new information requiring review of the reasonable and prudent measures provided. Yosemite National Park must immediately provide an explanation of the causes of the taking and review with the Service the need for possible modification of the reasonable and prudent measures.

Reporting Requirements

Yosemite National Park must provide the Service with annual reports of the results of the Monitoring Plan. The first report is due January 31, the first year after the first prescribed burn, and annually thereafter.

The Sacramento Fish and Wildlife Office is to be notified within three working days of the finding of any listed species or any unanticipated harm to the valley elderberry longhorn beetle. The Service contact person for this is the Chief, Endangered Species Division at (916) 414-6600.

Any dead or severely injured valley elderberry longhorn beetles found (adults, pupae, larvae, or eggs) shall be deposited in the Entomology Department of the California Academy of Sciences. The Academy's contact is the Senior Curator of Coleoptera at (415) 750-7239. All observations of valley elderberry longhorn beetles in any life stage-live, injured, or dead-or fresh beetle exit holes shall be recorded on California Natural Diversity Data Base (CNDDB) field sheets and sent to California Department of Fish and Game, Wildlife Habitat Data Analysis Branch, 1416 Ninth Street, Sacramento, California 95814.

Conservation Recommendations

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities that can be implemented to further the purposes of the Act, such as preservation of endangered species habitat, implementation of recovery actions, or development of information and data bases.

1) To minimize adverse impacts to the California spotted owl, the following measures should be incorporated into your project:

   a. Surveys of suitable spotted owl habitat using acceptable protocols should be conducted to document presence.
   b. All project related activities that may disturb California spotted owl breeding activity should not occur within one-quarter mile of a known nest site during the breeding season (February 1 to August 15), unless a qualified biologist determines that activities will not adversely affect California spotted owls.
   c. If a fire occurs near a known California spotted owl nest site, Yosemite National Park should assess the effects of the fire on the habitat, and the California spotted owls that occupied the area.
   a. Remove nonnative trout species from high mountain lakes and streams to allow the recolonization of historic habitat by these species.

To minimize adverse impacts to the fisher, the following measures should be incorporated into your project:

   a. Conduct surveys in suitable habitat.

3) To minimize adverse impacts to the mountain yellow-legged frog and the Yosemite toad, the following measures should be incorporated into your project:

In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or benefitting listed species or their habitats, the Service requests notification of the implementation of any conservation recommendations.

Reinitiation – Closing Statement

This concludes formal consultation on the Yosemite Fire Management Plan. As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been maintained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

Please contact Kathy Brown or Gary Burton of this office at (916) 414-6600, if you have any questions.

Literature Cited

Barr, C.B. 1991. The Distribution, Habitat, and Status of the Valley Elderberry Longhorn Beetle *Desmocerus californicus dimorphus* Fisher (Insecta: Coleoptera: Cerambycidae). United States Fish and Wildlife Service, Sacramento, California.134 pp.

Bolger, D.T., A.C. Alberts, and M.E. Soule. 1991. Occurrence Patterns of Bird Species in Habitat Fragments: Sampling, Extinction, and Nested Species Subsets. American Naturalist 137: 155-156.

California Department of Fish and Game (CDFG). 1992. Annual Report on the Status of California State Listed Threatened and Endangered Animals and Plants. Resources Agency, Sacramento, California. 203 pp.

California Native Diversity Data Base (CNDDB). 1998. Natural Heritage Division. California Department of Fish and Game. Sacramento, California.

Collinge, S.K., M. Holyoak, C.B. Barr, and J.T. Marty.2001. Riparian Habitat Fragmentation and Population Persistence of the Threatened Valley Elderberry Longhorn Beetle in Central California. Biological Conservation. 100(1):103-113.

Collinge, S.K. 1996. Ecological Consequences of Habitat Fragmentation: Implications for Landscape Architecture and Planning. Landscape and Urban Planning 36:59-77.

Forman, R.T.T. 1988. A Conceptual Model of Land Conversion Processes: Predictions and Evidence from a Field Experiment with Grassland Insects. Oikos 82:66-84.

Conrad, S.G., R.L. MacDonald, and R.F. Holland. 1977. Riparian Vegetation and Flora of the Sacramento Valley. Pp. 47-56. *in* A. Sands (ed), Riparian Forests in California: their Ecology and Conservation. UC Davis. May 14.

Department of Water Resources (DWR). 1979. Land Use Changes in the Sacramento River Riparain Zone, Redding to Colusa, 1972-1977. Northern District Report, June 1979.

Fahrig, L. 1997. Relative Effects of Habitat Loss and Fragmentation on Population Extinction. Journal of Wildlife Management 61:603-610.

Frayer, W. E., D. D. Peters, and H. R. Pywell. 1989. Wetlands of the California Central Valley: Status and Trends, 1939 to mid-1980's. U.S. Fish and Wildlife Service, Region 1. Portland, Oregon.

Gilliom, Robert, J. 1999. Pesticides in the Nation's Water Resources. U.S. Geological Survey. Water Environment Federation Briefing Series Presentation. Capitol Building, Washington D.C. March 19, 1999.

Holway, D.A. 1995. Distribution of the Argentine ant (*Linepithema humile*) in Northern California. Conservation Biology 9:1634-1637.

Huxel, G.R. 2000. The Effects of the Argentine Ant on the Threatened Valley Elderberry Longhorn Beetle. Biological Invasions. 2: 81-85.

Huxel, G. R., and S. K. Collinge *in prep*. Modeling the viability of the valley elderberry longhorn beetle: the influence of habitat loss, fragmentation and restoration. Ecological Applications.

Ingraham, M. G.P. Nabhan, S. Buchmann. 1996. Impending Pollination Crisis Threatens Biodiversity and Agriculture. Tropinet 7:1.

Jones & Stokes Associates. 1988. Final Report: Field Investigation of Life History Characteristics of the Valley Elderberry Longhorn Beetle along the Cosumnes River, Sacramento County, California. Prepared for the U.S. Fish and Wildlife Service. Prepared by Jones & Stokes Associates, Inc.; Sacramento, California. 6 pp. with appendix.

Katibah, E. F. 1984. A Brief History of Riparian Forests in the Central Valley of California. Pp. 23-29 *in* Warner, R. E. And K. M. Hendrix (eds.). California riparian systems: ecology, conservation, and productive management. University of California Press, Berkeley.

Katibah, E. F., K. J. Drummer, and N. Nedeff. 1984. Current condition of riparian resources in the Central Valley of California. In: Warner, R. E. And K. M. Hendrix (eds.). California riparian systems: ecology, conservation, and productive management. University of California Press, Berkeley. Pp. 314-321.

Lande, R. 1988. Genetics and Demography in Biological Conservation. Science 241:1455-1460.

McCarten, N.F. and C.A. Patterson. 1987. Vegetation Quality and Rare Plant Study of Riparian Plant Communities along the Middle Sacramento River, California. CDFG Non-game Heritage Program. November.

McGill, Robert, R., Jr. 1975. Land use Changes in the Sacramento River Riparian Zone, Redding to Colusa. State of California, Resources Agency, Department of Water Resources. April, 1975. 23 pp.

Primack, R.B. 1998. Essentials of Conservation Biology. Second Edition. Sinaur Associates. Sunderland, Massachusetts.

Rieger, John P. and D. Ann Kreager. 1989. Giant reed (*Arundo donax*): a climax community of the riparian zone *in* Protection, management, and restoration for the 1990's: Proceedings of the California Riparian Systems conference; 1988 September 22-24; Davis, CA. Gen. Tech. Rep. PSW-110. Berkeley, CA: U.S. Department of Agriculture, Forest Service, Pacific Southwest Forest and Range Experiment Station: 222-225.

Perdue, R. E. 1958. Arundo donax - source of musical reeds and industrial cellulose. Econ. Bot. 12(4):368-404.

Ritter, John. 2000. Valley of Plenty Fights to Survive the Irrigated Marvel, That Is the World's Richest Farmland Is Losing Ground to Economics and Urban Sprawl. USA Today. March 2.

Roberts, W.G., J.G. Howe, and J. Major. 1977. A Survey of Riparian Forest Flora and Fauna in California. Pp.3-20. *in* A. Sands (ed), Riparian Forests in California: their Ecology and Conservation. UC Davis. May 14.

Shaffer, M.L. 1981. Minimum Populations Sizes for Species Conservation. Bioscience 31: 131-134.

Soule, M. 1990. The Onslaught of Alien Species and Other Challenges in the Coming Decades. Conservation Biology 4:233-239.

Smith, S. 1977. A Short Review of the Status of Riparian Forests in California Pp 1-2 *in* A. Sands (ed), Riparian Forests in California: their Ecology and Conservation. UC Davis. May 14.

Thompson, K. 1961. Riparian forests of the Sacramento Valley, California. Annals of the Association of American Geographers 51: 294-315.

_______. 1977. Riparian forests of the Sacramento Valley, California in A. Sands (ed), Riparian Forests in California: their Ecology and Conservation. University of California, Davis. Davis, California. May 14. Pp. 35-38.

U.S. Fish and Wildlife Service (USFWS). 1984. Valley Elderberry Longhorn Beetle Recovery Plan. Portland, Oregon. 62 pp.

Ward, P.S. 1987. Distribution of the Introduced Argentine Ant (*Iridomyrex humilis*) in Natural Habitats of the Lower Sacramento Valley and its Effects on the Indigenous Ant Fauna. Hilgardia 55:1-16.

Warner, R.E. and K.M. Hendrix. 1985. Riparian Resources of the Central Valley and California Desert. CDFG. 226 pp.

Wilcove, D.S., D. Rothstein, J. Dubow, A. Phillips, and E. Losos. 1998. Quantifying Threats to Imperiled Species in the United States. Bioscience 48 (8): 607-615.

Personal Communications

Holyoak, M. May 7, 2003. Associate Professor, Environmental Science and Policy, UC Davis, Davis, California

Appendix 9A

El Portal Prescribed Burn Rotation Plan & Elderberry Plants

Prescribed Burns have been conducted in the El Portal area of Yosemite National Park since at least 1992. The burns are conducted to establish fuelbreaks to protect the structures located in El Portal, which is situated on the north side of the Merced River in a steep canyon west of Yosemite Valley. This canyon is extremely fire-prone due to the light flashy fuels and steep slopes. Unwanted wildland fires are inevitable; so it is necessary to provide some defensible space for residents in El Portal. Fuels are largely grass with some scattered to dense stands of shrubs, along with oak and grey pine. Along the river, vegetation can be quite dense, with a mixture of the above vegetation types along with blackberry vines, poison oak, and assorted deciduous tree species.

There is one Federal threatened species located in the El Portal area, the elderberry longhorn beetle (VELB). It resides in elderberry bushes, with stems that are approximately 1" DBH or greater. The beetle's presence is detectable through the presence of exit holes on the elderberry stems.

Approximately 160 elderberry bushes are located in the El Portal area (Acree 2002). EL Portal is divided up into 10 burn units with approximately 20 subsegments. During the November 2002 survey, it was determined approximately 134 plants were within the 20 burn unit segments.

From discussions between fire management and resource personnel, it has been concluded that not all of the elderberry bushes can be protected from damage during prescribed burns. It was also discussed that it may not be desirable to protect the elderberry bushes from fire, as it may not serve the long-term interests of the plant, and hence, the beetle. It was concluded that the burns must be done systematically It is necessary to develop an operational and monitoring plan to provide the greatest amount of protection and sustainability for the elderberry longhorn beetle in El Portal.

Based on the elderberry plant populations detected during the November 2002 survey, the following burn segment rotation is proposed for El Portal (refer to map).

Year	Burn Unit
1	4A West; 3A; 3B; 8A & 5B
2	8B; 1A; 2B; & 10
3	1B; 4B; 9: & 2A
4	9A; 5A; 4C & 4A East*
5	7; 2C; 1C and 8C

*Burn Unit 4A would not be burned if monitoring data from year 1 showed lack of elderberry recovery in 4A West. Burn would be postponed unless suitable adjacent elderberry are present.

Wherever possible, elderberry plants would be preserved and protected from fire. Elderberry plants with existing exit holes would be protected from fire. No elderberry bushes would be removed during fireline and fuelbreak construction.

Appendix 9B

Monitoring Plan: Elderberry Plants within the El Portal Wildland-Urban Interface

Monitoring Plan: Elderberry Plants within the El Portal Wildland-Urban Interface

SL Fritzke, Vegetation Management, Division of Resources Management;
KJ Paintner, Fire, Fuels and Ecology, Division of Visitor and Resource Protection

Background

Prescribed burn treatments are a management element of the El Portal Administrative Site. Prescribed burns are conducted for hazard fuel reduction and restoration and maintenance of viable native plant populations including three plant species listed as Rare through the California Endangered Species Act, through the elimination of non-native plant species and reintroduction of fire as a natural ecosystem process. Some prescribed burn units contain elderberry plants, the sole host for the Valley Longhorn Elderberry Beetle (VELB).

Purpose

To monitor the condition of elderberry plants within burn units, and their potential to serve as habitat for VELB. Three key objectives are addressed in this monitoring plan:
1. Maintenance/establishment of shrub structure on individual plants that will support VELB, specifically critical stem size.
2. Natural regeneration and replacement of shrubs that may be consumed during prescribed burn operations - in numbers and densities sufficient to promote a sustainable population of VELB.
3. Phasing and rotation of burns to allow for retention of enough shrubs to support the existing VELB population level.

Monitoring Objectives, Techniques, and Timing

1. Maintenance/establishment of shrub structure on individual plants that will support VELB.

Barr (1991) studied the distribution and status of the VELB in California, and found that evidence of VELB activity was generally located in branches that were greater than one inch in diameter, though activity was infrequently found in stems as small as 0.5 inches in diameter. In El Portal, VELB exit holes have not been found in branches smaller than one inch in diameter, corresponding with earlier studies. Of the 134 plants found within the El Portal burn units that would receive burn treatments, there were 527 stems greater than 1” in diameter. Of those, only 14 had exit holes indicating active or past habitation by VELB.
In order to insure maintenance of habitat appropriate for VELB within these units, each plant has been mapped (GPS downloaded into GIS) and has been given a reference number.

Phases

***Baseline* –** A baseline will be established immediately upon approval of the Yosemite Fire Management Plan to document the current structure of each individual shrub. Data collection will include the following:

- Plant Reference Number
- Total number of live stems
- Number of stems in three diameter size classes (as measured with calipers or a "Go-No-Go tool): ½" to 1 inch; 1 inch, greater than 1 inch

Preburn – As specific burn units are treated, the plants within that unit will be monitored for these characteristics immediately prior to the treatment.

Postburn - Follow-up monitoring will occur
1 week postburn;
3 months postburn (to determine survival of the individual);
one year postburn (to detect new stem sprouting); and
3 years postburn (to get estimates of how fast new stems move into the critical size category).

Each unit is scheduled for burning every five years, and this schedule will allow for adjustments to burn intensity and shrub pre-treatment changes, if necessary, prior to the second and subsequent burns.

2. Natural regeneration and replacement of shrubs - that may be consumed during prescribed burn operations - in numbers and densities sufficient to promote a sustainable population of VELB.
This objective will be tracked using the information from the monitoring described under objective 1, in conjunction with USF&W VELB experts.
3. Phasing and rotation of burns to allow for retention of enough shrubs to support the existing VELB population level.
The current burn schedule insures that at least 5 years will pass between prescribed fire events for any unit. Using data collected in Objectives 1 & 2 above, adaptive management can move burning back (delayed), if there has been insufficient regeneration of critical stems. Treatment of burn units will be done to retain unburned units adjacent to burned units to allow for elderberry plants to serve as potential refugia for VELB that will lose available habitat over the short term. All plants with exit holes will be protected from fire. All other plants will be burned to promote natural regeneration. See separate burn schedule description for the 5-year plan for burns.

References

Barr, Cheryl B. 1991 "The distribution, habitat, and status of the valley elderberry longhorn beetle *Desmocerus californicus dimorphus*." U.S. Fish and Wildlife Service Sacramento, CA

Appendix 9C

Mitigation Measures Common To All Action Alternatives

To ensure that implementation of the action alternatives protects sensitive plant and animal species, a consistent set of mitigation measures would be applied to actions that result from the Fire Management Plan. These mitigation measures would also be applied to future actions that are guided by this plan. The National Park Service would prepare appropriate environmental review for those actions not covered in the Environmental Impact Statement for the Fire Management Plan. As part of the environmental review, the National Park Service would avoid, minimize, and mitigate adverse impacts when possible.

Wetlands

Fire Management activities, including mechanical fuels removal, would comply with Executive Order 11990 (Protection of Wetlands), the Clean Water Act, and Director's Order 77-1 (Wetland Protection).

Increased caution would be used to protect these resources from damage such as erosion or siltation caused by mechanized equipment used to remove fuel and vegetation.

- Wetlands would be delineated by qualified National Park Service staff or certified wetland specialists, and prior to the use of mechanized equipment for fuel reduction activities.
- Prescribed fires would not be ignited in riparian areas.
- Wood removed mechanically as part of wildland fire risk reduction projects would not be piled in riparian areas.

Vegetation (including Special-Status Species)

Mitigation would occur prior to, during, and/or after fuel and fire management activities to mitigate immediate and long-term impacts to vegetation. These activities would vary by fuel reduction project or intensity of wildland, depending on the types of species and habitat affected.

Mitigation would include the following:

- Develop rehabilitation plans for areas affected by unwanted wildland fire. Such plans would provide for an assessment of damage caused by the fire, the implementation of methods to stabilize and rehabilitate damage caused by the wildland fire, and the collection of monitoring information to evaluate the relative success of the program in the achievement of rehabilitation objectives. Protection of the area from further ignition or disturbance by park visitors, stabilization of soil through erosion control measures, or reseeding with native species are techniques that may be employed.
- Use native or seed-free mulch to minimize surface erosion and introduction of non-native plants.
- Locate firelines, helispots, fire camps, and other soil-disturbing fire management activities so that sensitive plant population are avoided, and erosion is minimized.

- Provide for the inspection of vehicles arriving from outside the park to assist in fire suppression activities, to avoid importation of non-native plants and seeds. Vehicles will be cleaned before entering any sensitive sites which are identified by resource advisers.
- Utilize prescribed fire to eradicate non-native plants and create or maintain habitat for native plant species.
- Confine mechanical fuel treatments to specified work areas. Install temporary barriers, guides, fencing, and signs to protect sensitive and natural surroundings, including plants, trees, and roots from damage.
- Protect meadows and other sensitive resource areas, by defining and avoiding these areas, especially with tracked or wheeled vehicles.
- Implement a dust abatement program for mechanical clearing project activities. Standard dust abatement measures could include the following elements: water or otherwise stabilize soils, employ speed limits on unpaved roads, minimize vegetation clearing, and revegetate post logging.
- Projects that generate high levels of noise and other disturbance will be scheduled, to the extent practicable, during periods of the year and times of day when effects on species sensitive to such disturbance would be minimized.

Wildlife: Conservation recommendations for special status species

General recommendations

Prior to mechanical fuels treatment or prescribed fire project implementation, evaluate habitat for sensitive species likely to occur and take steps to minimize impacts on those species determined to be especially vulnerable. This evaluation will be conducted by a qualified biologist.

Provide education and training for wildland fuel reduction contractors and fire management personnel to limit activities destructive to sensitive wildlife species and their habitat. Schedule fuels and fire management activities to occur when disruptive effects on wildlife would be less, such as after nesting season of birds.

Preserve, where possible, natural features with obvious high value to wildlife, such as tree snags.

For mechanical fuel reduction activities, limit the chance of pollution spills, especially where activities are near aquatic or wetland habitats.

Allow natural processes where possible to maintain the presence of very large old trees and snags, large diameter logs, and decaying wood across the landscape through a mosaic of fire effects. Large prescribed fires will also be planned and ignited to achieve a mosaic of fire effects.

Allow natural processes to maintain conditions and habitat features important to California spotted owls and their prey, including oak trees and oak snags trees with their cavities and large woody debris that supports fungal growth. Large prescribed fires will also be planned and ignited to achieve a mosaic of fire effects.

Specific Species Recommendations

Mountain yellow-legged frog

- Avoid filling aerial water buckets from lakes and ponds that contain mountain yellow-legged frogs (MYLF). Many of the remaining populations are composed of relatively small numbers of frogs. Removal of frogs and tadpoles through dipping could have an adverse effect on a remnant population. Chytrid fungus infection is causing further disappearance of MYLF populations. The dipping of a water bucket in an infected lake, and then in an uninfected lake could result in further extinctions of frog populations.
- Ensure that portable pumps used in lakes and ponds that contain MYLF have intake filters. Use of unfiltered pumps can cause mortality of tadpoles and frogs from being sucked up by pumps, Pumps can also cause a reduction of water in smaller ponds, and fuel and gas contamination of water.
- Avoid filling aerial water buckets from lakes and ponds that contain fish, or, if unavoidable, ensure that the helicopter avoids dropping any water from the bucket into any lakes or streams. Inadvertent introduction of fish into a lake or pond containing MYLFcould result in the extinction of that MYLF population. Lakes and ponds that have reverted to a natural, fish-free state are possible locations for reintroduction of MYLF. Introduction of fish in such waters via aerial bucket drops would eliminate them as possible reintroduction sites. Maps will be used to denote bodies of water that should be avoided.
- Avoid retardant drops within 300 feet of water. Retardant could have an adverse effect on MYLF if it enters waters containing this species.
- Maps depicting known MYLF populations should be updated annually and provided to fire personnel. Fire crews should be briefed on the status of the MYLF, and the measures required to protect the MYLF and their habitat.
- Helispots, spike camps, and hand lines would be sited away from known MLYF habitat.

Yosemite toad

- Avoid filling aerial water buckets from lakes and ponds that contain Yosemite toads. Many of the remaining populations are composed of relatively small numbers of toads. Removal of toads and tadpoles through dipping could have an adverse effect on a remnant population. Chytrid fungus infection is causing further disappearance of Yosemite toad populations. The dipping of a water bucket in an infected lake, and then in an uninfected lake could result in further extinctions of populations.
- Avoid using portable pumps without intake filters in lakes and ponds that contain Yosemite toads. Such use can cause mortality of tadpoles and toads from being sucked up by pumps. The use of pumps can cause a reduction of water in smaller ponds, and fuel and gas contamination of water.
- Avoid filling aerial water buckets from lakes and ponds that contain fish, or, if unavoidable, ensure that the helicopter avoids dropping any water from the bucket into any lakes or streams. Inadvertent introduction of fish into a lake or pond containing Yosemite toads would result in the extinction of that Yosemite toad population. Lakes and ponds that have reverted to a natural, fish-free state are possible locations for reintroduction of Yosemite toads. Introduction of fish in such waters via aerial bucket drops would eliminate them as possible reintroduction sites. Maps will denote bodies of water to avoid.

- Avoid retardant drops within 300 feet of water and meadow. Retardant could have an adverse effect on Yosemite toads if it enters waters containing this species. Because most remaining populations of Yosemite toads are found in small, relatively shallow wetlands and ponds, these habitats may not be readily apparent from the air, so retardant drops in meadows should be avoided.
- Avoid cutting fire line, establishing spike camps and helispots, or altering water courses in meadows. Alteration of small streams and wetlands in meadows would have an adverse effect on Yosemite toads.
- Maps depicting known Yosemite toad populations should be updated
- annually and provided to fire personnel. Fire crews should be briefed on the status of the Yosemite toad, and the measures required to protect the Yosemite toad and their habitat.
- Helispots, spike camps, and hand lines would be sited away from MLYF habitat.

California spotted owl

- From existing fuel loading, predict fire intensity in known spotted owl nesting and roost sites, and conduct preparatory burns or mechanical fuel reduction in these specific sites prior to ignition to control fire intensity to avoid reduction in canopy closure and consumption of nesting snags or trees, which would affect habitat quality.
- In spotted owl habitat, when possible, limit burn size, and/or ensure thes area burns at a variety of intensities. If a burn reduces habitat quality for spotted owls in an area, adjacent areas should still provide suitable habitat. At lower elevations (<3,000 feet), wood rats are an important prey item, which are substantially reduced in fires.
- Avoid cutting fire line through known spotted owl nesting or roost sites, especially if trees and snags are to be felled. Disturbance and/or removal of canopy trees or nesting snags would affect current breeding efforts, and have an adverse effect on the long-term habitat quality of the site.
- Minimize the felling of snags in spotted owl habitat, and especially in known spotted owl nesting and roost sites. Hollows and cavities in snags and infirm trees (especially oaks) are the preferred nest sites of spotted owls in the central Sierra Nevada. Suitable nest sites are a limiting factor for spotted owls, with certain nest sites used for many years. Removal of these key features could have long-term effects on habitat quality.
- Minimize the consumption of coarse, down, woody debris. Such debris enables the growth of hypogeous fungi ("truffles"), which are an important food source for northern flying squirrels, an important prey item for spotted owls.
- Maps depicting known California spotted owl populations should be updated annually and provided to fire personnel. Fire crews should be briefed on the status of the California spotted owl, and the measures required to protect the California spotted owl and their habitat.
- Water and retardant drops would be avoided near known nest sites during the nesting season.
- Helispot and spike camps would be located away from known nest sites during the nesting season.

Pacific fisher

To minimize adverse impacts, the following measures should be incorporated into projects:

- All project related activities that may disturb fisher birthing and kit rearing should not occur within one-half mile of a known den site during the denning season (March 1 to June 30), unless a qualified biologist determines that activities will not disturb fishers.
- Maps depicting known fisher den sites should be updated annually and provided to fire personnel. Fire crews should be briefed on the status of the fisher, and the measures required to protect den sites.
- If a fire occurs near a known fisher den site, Yosemite National Park wildlife biologists should assess the effects of the fire on the fisher habitat, and the den site if affected.
- Minimize the loss of large trees and snags with cavities, especially black oaks. Large trees with cavities are the most important sites for dens, and the availability of such trees appears to be a limiting factor to fishers.
- Maintain canopy closure greater than 60% over trees and snags that provide potential den sites. Fishers avoid forest openings, and select habitat with a high degree of canopy closure. A potential den site tree or snag could be preserved, but if canopy closure over the site were reduce to below 60%, it would be unlikely that it would be used by a fisher.
- Minimize the consumption of coarse, woody debris, or ensure variable burn intensity over the area. Habitat complexity in the form of down trees of various sizes and understory vegetation are important fisher habitat features, providing cover, den sites, and subnivian (under snow) spaces hunting and cover in winter.
- In fisher habitat, when possible, limit burn intensity or size, and/or ensure the area burns at a variety of intensities. If a burn reduces habitat quality for fishers in an area through consumption of coarse woody debris, reduction in canopy closure, and reduction in understory complexity and potential den sites, adjacent areas should still provide suitable habitat.
- For known den sites, manage fuels around the site to avoid their loss, and minimize human activity around the site. Given the extremely low density of fishers in Yosemite, every den site is important (note: no fisher den sites have been found in Yosemite for decades, although their presence is suspected).

Terms and Conditions for listed species

Valley Elderberry Longhorn Beetle

All National Park Service personnel working in the areas in which the insect is found will be briefed on the status of the beetle, the need to protect to protects the host elderberry plants, requirements to avoid damaging elderberry bushes, and possible penalties for noncompliance with identified avoidance and mitigation measures.

Contractors and all contractor on-site personnel should be briefed on the location of elderberry shrubs, avoidance requirements, and penalties for noncompliance.

Before clearing or burning takes place in the El Portal WUI zone, a qualified NPS employee will flag all elderberry bushes in the project area. No mechanical clearing of elderberry bushes would occur within the VELB burn units.

Elderberry plants in El Portal burn units will be burned on a cycle of no less than five years, and monitored to ensure burn objectives are met.

California red-legged frog

California red-legged frogs have disappeared from Yosemite, but the park does have potential habitat. Retardant drops within 300 feet of surface water will be avoided unless there is a threat to human life. Dipping with helicopters from waters known to contain bullfrogs will not occur unless there is a threat to human life. Maps of bullfrog infested areas and potential red legged frog habitat will be used to avoid transportation of bullfrogs into red-legged frog habitat.

Bald eagles

There are no known nesting bald eagles in Yosemite National Park. Bald eagles forage inside the Park at Lake Eleanor, and nest outside the Park at Cherry Lake. Smoke from burns could disturb foraging bald eagles. No burning during the nesting season (from February 15 to August 15) near known nesting sites unless a qualified biologist determines that activities will not adversely affect the bald eagle.

Appendix 10: Fire Management and the Vegetation Management Plan

Table A10-1
Goals And Management Objectives of the *Vegetation Management Plan*

Vegetation Management Plan: Primary Goal and Management Objectives
The primary goal of the Vegetation Management Plan is to preserve, restore and perpetuate the natural processes, which act upon the plant life as part of natural ecosystem functioning. It is recognized that American Indian groups have had an influence on some existing plant communities and are components of today's natural system (National Park Service 1997).
Manage and allow for natural process events such as disease, drought, fire, and insects. Implement management actions which will preserve and restore vegetation structure (or range of structural variability) that would have existed today without Euro-American interference and perpetuate the Native American Indian and natural fire regime.
Provide for visitor recreation, access, enjoyment, safety, and understanding of park plant communities and ecosystems. Manage for and allow only those types and levels of public, administrative, or consumptive uses that do not impair park native plant communities or threatened, endangered, candidate, or sensitive species. Reduce risk to visitors and property consistent with the perpetuation of ecosystem processes. Protect cultural landscapes, scenic resources, and ecologically sensitive areas to prohibit impairment. Direct development and use to environments least vulnerable to degradation or where such use will not impact the viability of these areas and their scenic and scientific values.
Work with neighboring agencies and landowners to protect native plant communities through perpetuation of natural disturbances across private and political boundaries where feasible.
Inventory and monitor trends of plant populations, communities, and ecosystem processes such as fire, insects, and disease to allow for long-term evaluation of their dynamic nature and conditions over time. Acquire information to provide for comparisons with similar altered and non-altered environments.
Consistently evaluate and analyze needs for additional information and research. Explore new technologies and techniques that will provide expanded knowledge of park ecosystems. Acquire information that is vital to making informed decisions affecting the management of biotic and physical resources.
Prioritize needed management actions and information requirements and seek funding, data and partnerships from all possible sources including the private sector, universities, and other state and federal agencies.
Quantify and evaluate the effects of management actions on park ecosystems and cultural resources. Assure that management actions are meeting defined project objectives and desired resource conditions. Refine project objectives and adjust prescriptive management actions based on results.
Identify and phase out, or eliminate immediately, those human activities and management actions that are conflicting with the above objectives. Priority will be given to those activities that affect resource integrity.

Table A10-2
Vegetation Types: Comparison of Yosemite Fire Management Plan Types and 1997 Vegetation Management Plan Types.

VEGETATION TYPES	
Fire Management Plan	**1997 Vegetation Management Plan**
Whitebark pine/mountain hemlock	Whitebark pine, whitebark pine/mountain hemlock, whitebark pine/lodgepole pine, mountain hemlock
Lodgepole pine	Lodgepole pine
Red fir	Red fir
Western white pine/Jeffrey pine	Western white pine, Jeffrey pine, Jeffrey pine/fir
Montane chaparral	Montane chaparral
Giant sequoia	Giant sequoia/mixed-conifer
White fir/mixed-conifer	Sierra white fir, white fir/mixed-conifer, Douglas-fir/mixed-conifer
Ponderosa pine/mixed-conifer	Ponderosa pine/mixed-conifer
Ponderosa pine/bear clover	Westside ponderosa pine
California black oak	Black oak forest, black oak woodland

Canyon live oak	Canyon live oak, mixed north slope forest
Dry montane meadow	Dry montane meadow
Foothill pine/live oak/chaparral	Foothill pine/live oak/chaparral, interior live oak forest, interior live oak woodland
Foothill chaparral	Northern mixed chaparral, interior live oak chaparral, chamise chaparral
Blue oak	Blue oak, California annual grassland

Appendix 11: Prescribed Fire Units

Prescribed fire – Burn Unit Descriptions

PW1- This 1601 acre unit is located adjacent to the Aspen Valley area of YNP. It is surrounded by PW2 and PW37, and the vegetation type is mixed conifer, dominated by white fir and ponderosa pine. It consists mostly of fuel models 8 and 2, along with elements of models 9 and 5. Most of the unit is considered Condition Class I, with approximately 10% Condition Class III. This unit had a prescribed fire in 1997 and was affected by the Ackerson fire in 1996. There are 20 fire effects "retro style" monitoring plots installed in this unit. In 2002, the fuel loading was calculated at an average of 52.9 tons per acre. This unit gives protection to houses and cabins in Aspen Valley. This unit is currently 92% FRID class 0-2.

PW2- This 3,116 acre unit is located in the Aspen Valley area of YNP. It is surrounded by PW1 and PW3, and the vegetation type is mixed conifer dominated by ponderosa pine much of it with a bear clover understory. The unit consists of fuel models 2, 8 and 9 with a brush component mixed in. It is considered Condition Class I. This unit had prescribed fires in 1983, 1988, 1997, 1998,and 1999 and wildfires in 1990 and 1996. This unit gives protection to houses and cabins in Aspen Valley. Using a photo series, the fuel loading for the unit was estimated to be 35 tons per acre. This unit is currently 86% FRID class 0-2.

PW3- This 7,289 acre unit is located in between the old Big Oak Flat Road and the Tioga Pass Road in YNP. It is surrounded by PW2, PW4, PW5, and PW41, and the vegetation type is mixed conifer including white fir, ponderosa pine, and sugar pine. The unit consists of fuel models 5, 8, 9 and 10. 65% of the unit is considered Condition Class III, while 35% is considered Condition Class I. Parts of this unit have burned in prescribed fires in 1983, 1989, 1997, 1998, 1999 and 2002. The Ackerson wildfire burned part of the unit in 1996. In the entire unit, there are 21 FMH fire effects monitoring plots. The fuel loading in the area that was burned in 2002 was calculated at an average of 17.8 tons per acre after the burn. The unburned portion of the unit was calculated between 2001 and 2002 to be 86.5 tons per acre. The entire unit, including both the unburned and burned areas, has an average of 52.2 tons per acre. This unit gives protection to the WUI areas of Crane Flat, Yosemite Institute and Hodgdon Meadows campground and housing units. The unit is currently 63% FRID class 0-2, and 35% FRID class >4.

PW4- This 4,799 acre unit is located in the Hodgdon Meadow area of YNP to the north of the Big Oak Flat entrance station. It is surrounded by PW3, PW5, and PW37, and the vegetation type is mixed conifer dominated by ponderosa pine. It consists of fuel models 9 and 10. The unit is considered 75% Condition Class III, and 25% Condition Class II and I. PW4 had a prescribed fire in 1999 and has been thinned and burned as part of the Hazard Fuel Reduction Program. Within the unit there is a campground and housing unit with a heavy accumulation of dead and downed material. In 1997, there was a lightning fire that burned a portion of the unit. Using a photo series, the fuel loading for the unit was estimated to be 45 tons per acre. The unit is currently 19% FRID class 0-2, and 74% FRID class >4.

PW5- This 3,222 acre unit is located to the south of Hodgdon Meadows in YNP. It is surrounded by PW4, PW6, and PW7, and the vegetation type is mixed conifer, dominated by white fir. Much of the vegetation in this area was altered in the 1930's by logging operations. It consists mostly of fuel model 5, with some fuel model 8. Most of the unit is considered Condition Class III, with 20% Condition Class I. There are 2 FMH fire effects monitoring plots installed in this unit. In 1996, the fuel loading was calculated at an average of 61.9 tons per acre. This unit is 20% FRID class 0-2, and 80% FRID class >4.

PW6- This 300 acre unit is located in the Merced Grove by the old Coulterville Stage Road in YNP. It is bordered by PW5, and the vegetation type is mixed conifer including white fir, ponderosa pine, and giant sequoias. The unit consists of fuel models 8 and 10. The majority of the unit is considered Condition Class II, with 20% Condition Class III. Using a photo series, the fuel loading for the unit was estimated to be 55 tons per acre. The unit is currently 59% FRID class 0-2, and 30% FRID class >4.

PW7- This 4,327 acre unit is located to the north of Highway 120 and to the south of the Tamarack Flat campground in YNP. It is bordered by PW8, PW9, PW10, and PW5, and the vegetation type is mixed conifer. The unit consists of fuel models 8 and 9. It is considered Condition Class II. This unit had a prescribed fire in 1979 and the A-Rock wildfire in 1990 burned a portion of the unit. Using a photo series, the fuel loading was estimated to be 45 tons per acre. This unit protects the campground at Tamarack Flat, as well as Crane Flat. The unit is currently 85% FRID class 0-2, and 13% FRID class >4.

PW8- This 1,262 acre unit is located to the southwest of Highway 120 near Crane Creek in YNP. It is bordered by PW7 and PW10, and the vegetation type is mixed conifer. It consists of fuel models 2 and 9. The unit is considered Condition Class I. This unit was burned in the A-Rock wildfire in 1990. Using ocular estimates, the fuel loading was estimated to be 25 tons per acre. The unit is currently 39% FRID class 0-2, and 42% FRID class>4

PW9- This 622 acre unit is located just to the north of the tunnel on Highway 120 near Tamarack creek in YNP. It is bordered by PW7, PW10, and PW36, and the vegetation type is mixed conifer. It consists mostly of fuel model 9. The unit is considered Condition Class II. This unit had a prescribed fire in 1979 and was also burned by the A-Rock wildfire in 1990. Using ocular estimates, the fuel loading was estimated to be 25 tons per acre. The unit is currently 40% FRID class 0-2, and 59% FRID class >4.

PW10- This 1,804 acre unit is located in the Crane Creek area just north of Foresta in YNP. It is bordered by PW7, PW8, and PW35, and the vegetation type is mixed conifer, dominated by ponderosa pine. It consists of fuel models 2 and 9. Over 75% of the unit is considered Condition Class II. This unit had a prescribed fire in 1975 and was also burned by the A-Rock wildfire in 1990. Using ocular estimates, the fuel loading was estimated to be 25 tons per acre. The Unit is currently 18% FRID class 0-2, and 77% FRID class >4.

PW11- This 2,112 acre unit is located just to the east of Little Yosemite Valley in YNP. It is bordered by PW12, and the vegetation type is mixed conifer, dominated by Jeffrey pine and white fir. It is also bordered on the east by the 100 acre unit of Lost Valley, which had a prescribed burn in 1999. The unit consists of fuel models 8 and 9. Over 75% of the unit is considered Condition Class III. Using photo series, the fuel loading was estimated to be 50 tons per acre. The unit is currently 23% FRID class 0-2, and 64% FRID class >4.

PW12- This 1,143 acre unit is located just to the east of Half Dome in YNP. It is bordered by PW11, and the vegetation type is mixed conifer, dominated by Jeffrey pine, white fir and incense cedar. It consists of fuel models 5, 9 and 10. The unit is considered 50% Condition Class II, and 50% Condition Class III. This unit had a prescribed fire in 1985. Using a photo series, the fuel loading was estimated to be 50 tons per acre. The unit is 58% FRID class 0-2, and 22% FRID class >4.

PW13- This 3,376 acre unit is located to the south of the tunnel on Highway 41 by Old Inspiration Point in YNP. It is bordered by PW34 and PW14, and the vegetation type is mixed conifer. It consists mainly of fuel models 8 and 9, now with a large brush component after a catastrophic fire. 75% of the unit is considered Condition Class I, while 25% is considered Condition Class III. Most of this area was severely burned by the Steamboat fire in 1990. Using ocular estimates, the fuel loading for this unit was estimated to be 25 tons per acre. This unit is currently 69% FRID class 0-2, and 24% FRID class >4.

PW14- This 1,439 acre unit is located to the east of Highway 41 in the Grouse Creek drainage in YNP. It is bordered by PW13, PW15, and PW34, and the vegetation type is mixed conifer. It consists mainly of fuel models 8 and 9, now with a large brush component after a catastrophic fire. 75% of the unit is considered Condition Class I, while 25% is considered Condition Class III. Some of this unit was severely burned by the Steamboat fire in 1990. Using ocular estimates, the fuel loading was estimated to be 25 tons per acre. This unit gives protection to the Badger Pass Ski Area on Glacier Point Rd. The unit is currently 75% FRID class 0-2, and 24% FRID class >4.

PW15- This 1,064 acre unit is located to the south of Glacier Point road in between Chinquapin and Badger Pass Ski Area. It is bordered by PW14 and PW16, and the vegetation type is mixed conifer. It consists of fuel models 8, 9 and 5. The majority of the unit is considered Condition Class III, and 25% is considered Condition Class I. Using a photo series, the fuel loading was estimated to be 45 tons per acre. This unit protects the WUI areas at Chinquapin and at Badger Pass. The nit is currently 30% FRID class 0-2, and 69% FRID class >4.

PW16- This 3,398 acre unit is located to the east of Highway 41 and just south of Badger Pass Ski Area in YNP. It is bordered by PW15, PW18, and PW20, and the vegetation type is mixed conifer dominated by white fir, ponderosa pine, and Jeffrey pine. It consists of fuel models 8, 9, 10 and 5. 75% of the unit is considered Condition Class I and 25% is Condition Class III. This unit had a prescribed fire in 1981. Using ocular estimates, the fuel loading was estimated to be 45 tons per acre. The unit is currently 78% FRID class 0-2, and 22% FRID class >4.

PW17- This 1,406 acre unit is located to the west of Highway 41 and just south of the Yosemite West community in YNP. It is bordered by PW16 and PW18, and the vegetation type is mixed conifer dominated by white fir, ponderosa pine, and sugar pine. There are heavy fuel loads along the roads in this unit. It consists of fuel models 8, 9 and 10. Most of the unit is considered Condition Class III, with 20% Condition Class I and II. There was a prescribed fire in this unit in 1998. There is one FMH fire effects monitoring plot installed in this unit. In 1996, the fuel load was 78.7. This unit protects the WUI area of Yosemite West. The unit is currently 10% FRID class 0-2, and 76% FRID class >4.

PW18- This 832 acre unit is located to the east of Highway 41 and just north of Bishop creek in YNP. It is bordered by PW19, PW16, and PW17, and the vegetation type is mixed conifer, dominated by ponderosa pine. It consists of fuel models 2, 5 and 9. Over 85% of the unit is considered Condition Class III. Using a photo series, the fuel loading was estimated to be 55 tons per acre. The unit is currently 11% FRID class 0-2, and 87% FRID class >4.

PW19- This 4,046 acre unit is located to the east of Highway 41 in between Bishop and Alder creeks in YNP. It is bordered by PW18, PW16, PW20, and PW21, and the vegetation type is mixed conifer, dominated by ponderosa pine and white fir. The unit consists of fuel models 8, 9, 10 and 5. Over 85% of the unit is considered Condition Class III. Using a photo series, the fuel loading was estimated to be 55 tons per acre. The unit is currently 16% FRID class 0-2, and 84% FRID class >4.

PW20- This 5,132 acre unit is located about 1 mile east of Highway 41 in between Bishop and Alder creeks in YNP. It is bordered by PW16, PW19, and PW21, and the vegetation type is mixed conifer. It consists of fuel models 8, 9 and 5. The unit is considered 50% Condition Class I and 50% Condition Class III. In 1986, a lightning fire burned a good portion of this unit. Using a photo series, the fuel loading was estimated to be 50 tons per acre. The unit is currently 59% FRID class 0-2, and 41% FRID class >4.

PW21- This 5,086 acre unit is located between Alder creek and the Wawona Information Center on Turner Ridge in YNP. It is bordered by PW19, PW20, PW32, PW22, and PW23, and the vegetation type is mixed conifer. It consists of fuel models 9 and 10. The unit is considered 30% Condition Class I, and 70% Condition Class III. This unit had prescribed fires in 1975 and 1999. Using a photo series, the fuel loading was estimated to be 55 tons per acre. This unit gives protection to the town of Wawona, located just to the south of it. The unit is currently 25% FRID class 0-2, and 67% FRID class >4.

PW22- This 865 acre unit is located just to the north of the Wawona community in a narrow strip along the west side of Highway 41. It is bordered by PW19, PW21, and PW23, and the vegetation type is mixed conifer. It consists of fuel models 9 and 10. Over 50% of the unit is considered Condition Class I, while 35% is considered Condition Class III. This unit had a prescribed fire in 1999. Using a photo series, the fuel loading was estimated to be 55 tons per acre. The unit is currently 59% FRID class 0-2, and 41% FRID class >4.

PW23- This 1,588 acre unit is located in and around the Wawona campground, on the west side of Highway 41. It is bordered by PW22, PW21, and PW24, and the vegetation type is mixed conifer. The unit consists of fuel models 2 and 9. The entire unit is considered Condition Class III. There are 21 "retro style" fire effects monitoring plots in this unit. In 2001, the fuel loading was calculated at 39.2 tons per acre. The unit is currently 97% FRID class >4.

PW24- This 464 acre unit is located west of Highway 41 in Wawona and just north of Mt. Savage. It is bordered by PW23, PW25, and PW26, and the vegetation type is mixed conifer with a fair amount of bear clover and black oak. The unit consists of fuel models 2, 5 and 9. Over 50% of the unit is considered Condition Class II, and 35% is considered Condition Class I. This unit had a prescribed fire in 1985. Using a photo series, the fuel loading was estimated to be 30 tons per acre. This unit abuts and offers protection to the historic Wawona meadow and golf course. The unit is currently 41% FRID class 0-2, and 58% FRID class >4.

PW25- This 1,053 acre unit is located in between Wawona and the South entrance just to the west of Highway 41 in YNP. It is bordered by PW24, PW26, and PW27, and the vegetation type is mixed conifer with bear clover and black oak. It consists of fuel models 2, 5 and 9. The unit is considered 50% Condition Class II and 50% Condition Class I. Using a photo series, the fuel loading was estimated to be 30 tons per acre. The unit is currently 44% FRID class 0-2, and 56% FRID class >4.

PW26- This 1,242 acre unit is located to the west of the South entrance near Mt. Savage in YNP. It is bordered by PW29 and PW25, and the vegetation type is mixed conifer. The unit consists of fuel models 2 and 9. Over 75% of the unit is considered Condition Class III. This unit had prescribed fires in 1984 and 1985. Using a photo series, the fuel loading was estimated to be 35 tons per acre. The unit is currently 24% FRID class 0-2, and 75% FRID class >4.

PW27- This 1,163 acre unit is located between the Mariposa Grove and the south entrance of YNP. It is bordered by PW26, PW29, PW30, and PW31, and the vegetation type is mixed conifer with ponderosa pine and abundant bear clover. The unit consists of fuel models 2 and 9. 65% of the unit is considered to Condition Class III, and 35% Condition Class I. Using a photo series, the fuel loading was estimated to be 35 tons per acre. The unit is currently 23% FRID class 0-2, and 70% FRID class >4.

PW28- This 85 acre unit is located just south of Tenaya lake, broken into smaller pieces along the Tenaya creek drainage. No other units border this one, and the vegetation type is upper mixed conifer. It consists mostly of fuel model 8. 30% of the unit is Condition Class I, 30% is Condition Class III, and 30% is barren, rock or water. Using a photo series, the fuel loading was estimated to be 40 tons per acre. The unit is 43% FRID class 0-2, and 38% FRID class >4.

PW29- This 749 acre unit is located between the south entrance and the park border along the west side of Highway 41. It is bordered by PW26, PW27, and PW30, and the vegetation type is mixed conifer. It consists of fuel models 2, 8 and 9. Over 50% of the unit is considered Condition Class III, while the rest is Condition Class I. This unit protects the South Entrance Gate outbuildings. Using a photo series, the fuel loading was estimated to be 45 tons per acre. The unit is currently 45% FRID class 0-2, and 53% FRID class >4.

PW30- This 565 acre unit is located south of the Mariposa Grove parking area. It is bordered by PW29 and PWMG. The vegetation type is mixed conifer with ponderosa pine, giant sequoias, and abundant bear clover. The unit consists of fuel models 2, 8 and 9. Most of the unit is considered Condition Class III. This unit abuts and protects the South Entrance Gate to the east. Using a photo series, the fuel loading was estimated to be 45 tons per acre. The unit is currently 91% FRID class >4.

PW31- This 2,842 acre unit is located just north of the Mariposa Grove, running all the way to the community of Wawona. It is bordered by PWMG and PW32, and the vegetation type is mixed conifer with ponderosa pine, bear clover, and some giant sequoias. It consists of fuel models 2, 8 and 9. The entire unit is considered Condition Class III. Using a photo series, the fuel loading was estimated to be 45 tons per acre. The unit is currently 95% FRID class >4.

PW32- This 2,052 acre unit is located in between Chilnualna Creek and the South fork of the Merced River, near Wawona Dome. It is bordered by PW31, PW33, and PW21, and the vegetation type is mixed conifer, dominated by ponderosa pine. The unit consists primarily of fuel models 5 and 9. 95% of the unit is considered to be Condition Class III. Using a photo series, the fuel loading was estimated to be 45 tons per acre. This unit protects the Wawona community. The unit is currently 94% FRID class >4.

PW33- This 8,277 acre unit is located north of the South fork of the Merced near Crescent and Johnson lakes in the Wawona area. It is bordered by PW32 and PW31, and the vegetation type is mixed conifer. It consists of fuel models 8 and 9. 50% of the unit is considered Condition Class I, and 40% is considered Condition Class III. This unit burned in a lightening fire in 1983. Using a photo series, the fuel loading was estimated to be 35 tons per acre. The unit is currently 50% FRID class 0-2, and 45% FRID class >4.

PW34- This 4,603 acre unit is located just south of Highway 140 at the Arch Rock entrance station. It is bordered by PW35, PW13, and PW14, and the vegetation type is mixed ponderosa pine. It consists mostly of fuel models 5 and 9. 50% of the unit is considered Condition Class I, and 40% considered Condition Class III. The Steamboat wildfire of 1990 burned this area. Using a photo series, the fuel loading was estimated to be 30 tons per acre. This unit could offer some protection to the Yosemite West community. The unit is currently 44% FRID class 0-2, and 39% FRID class >4.

PW35- This 2,785 acre unit is located just north of Highway 140 at the Arch Rock entrance station. It is bordered by PW34, PW10, and PW13, and the vegetation type is mixed conifer, dominated by ponderosa pine. It consists of fuel models 5 and 9. The majority of the unit is considered Condition Class I. The A-Rock wildfire of 1990 burned this area. Using a photo series, the fuel loading was estimated to be 30 tons per acre. The unit is currently 28% FRID class 0-2, and 58% FRID class 3-4.

PW36- This 1,038 acre unit is located north of the tunnel on Highway 120 in YNP. It is bordered by PW9, and the vegetation type is mixed conifer. It consists of fuel models 5 and 9. The majority of the unit is considered Condition Class III. Using a photo series, the fuel loading was estimated to be 30 tons per acre. The unit is currently 89% FRID class >4.

PW37- This 21,489 acre unit is located to the northeast of Big Oak Flat entrance station near Bald Mountain. It is bordered by PW1 and PW38, and the vegetation type is mixed conifer. It consists of fuel models 2, 8 and 9. The majority of the unit is considered Condition Class I. This area was burned by the Ackerson wildfire of 1996. Using a photo series, the fuel loading was estimated to be 40 tons per acre. The unit is currently 88% FRID class 0-2.

PW38- This 27,004 acre unit is located west of White Wolf and just south of Hetch Hetchy in YNP. It is bordered by PW37 and PW39, and the vegetation type is mixed conifer. It consists of fuel models 8, 9 and 10. 70% of the unit is considered Condition Class I, and 30% is Condition Class III. This area was burned by the Ackerson wildfire of 1996. Using a photo series, the fuel loading was estimated to be 50 tons per acre. The area is currently 70% FRID class 0-2, and 29% FRID class >4.

PW39- This 13,435 acre unit is located directly north of the Hetch Hetchy entrance in YNP. It is bordered by PW38, and the vegetation type is mixed conifer. It consists of fuel models 2, 5 and 9. Most of the unit is considered Condition Class I. This area was burned by the Ackerson wildfire of 1996. Using a photo series, the fuel loading was estimated to be 25 tons per acre. The unit is currently 90% FRID class 0-2.

PW40- This 537 acre unit is located east of the Hetch Hetchy reservoir in the Grand Canyon of the Tuolumne River. No other units border this one and the vegetation type is mixed conifer. It consists of fuel models 2, 5 and 9. 30% of the unit is considered Condition Class I, 30% is Condition Class II, and 30% is Condition Class III. This area was burned by the Leconte wildfire in 1999. Using a photo series, the fuel loading was estimated to be 35 tons per acre. The unit is currently 55% FRID class 0-2, and 24% FRID class >4.

El Portal Unit

PWEP- This 52 acre unit is located in the El Portal Administrative Unit of YNP. It is broken into 13 segments, and provides protection for the community of El Portal. It is bordered by PW34, and the vegetation type is chaparral and grass. It consists of fuel models 1, 6 and 9.

Mariposa Grove Units

PWMG- This 518 acre unit is located east of the South entrance in YNP, in the Mariposa Grove of Giant Sequoias. It is bordered by PW31, PW27, and PW30, and the vegetation type is mixed conifer dominated by white fir, ponderosa pine and giant sequoias. It consists of fuel models 8, 9 and 10. Most of the unit is considered Condition Class I. The unit is broken down into 13 smaller subunits (see below). The prescribed fire program in Yosemite began in these units, with prescribed fires dating back to 1971. It is a high priority burn unit because Sequoias are dependant upon fire for reproduction. There have been small prescribed fires within the grove in 1971, 1975, 1976, 1979, 1983, 1984, 1985, 1989, 1990, 1993, 1995, 1997, 1998 and 1999. Within the entire unit there are 12 FMH and 28 “retro style” fire effects monitoring plots. There is a lot of variation in the fuel loading within this unit. The average fuel load over the entire area, calculated in 2002, is 48.1 tons per acre. The area is currently 88% FRID class 0-2.

MG1- This 40 acre unit is located to the northeast of the Mariposa Grove parking lot. It is bordered by MG2, MG9, and MG3, and the vegetation type is a Sequoia grove with mixed conifer. It consists of fuel models 8 and 10. There are several concentrations of heavy downed fuel in this unit, and it was burned in 1998 and 1990. There is FMH fire effects monitoring plot installed in this unit. The fuel load in 2002 was 55.4 tons per acre.

MG2- This 50 acre unit is located to the north of the Mariposa Grove road and to the south of the water tank in YNP. It is bordered by MG4, MG1, and MG3, and the vegetation type is a Sequoia grove. It consists mainly of fuel model 8. This unit was burned in 1983. There are 20 “retro style” fire effects monitoring plots installed in this unit. In 1987, the fuel loading was calculated to be an average of 34.8 tons per acre.

MG3- This 40 acre unit is located in the Mariposa Grove by the Bachelor and Three Graces and the California trees on the south side of the grove. It is bordered by MG2, MG4, MG9, and MG10, and the vegetation type primarily ponderosa/ sugar pine dominated mixed conifer with a small percentage of Sequoias. It consists of fuel models 8 and 9. This unit was burned in 1985 and 1983. Using a photo series, the fuel loading was estimated to be 35 tons per acre.

MG4- This 140 acre unit is located in the Mariposa Grove just to the north of the water tank and to the west of the Mariposa Grove road. It is bordered by MG11 and MG2, and the vegetation type is primarily mixed conifer, dominated by incense cedar and white fir with some Sequoias. It consists of fuel models 8 and 10. This unit was burned in 1984, 1995, 1998, and 1999. This unit has 1 FMH and 8 "retro style" fire effects monitoring plots installed within it. The fuel loading in 2002 was averaged at 40.7 tons per acre.

MG5- This 105 acre unit is located in the Mariposa Grove just to the south of the Clothespin tree. It is bordered by MG4, MG6, MG10, and MG13, and the vegetation type is upper mixed conifer. It consists mainly of fuel model 8. This unit was burned in 1989. This unit has 3 FMH fire effects monitoring plots installed in it. In 1999, the average fuel loading was calculated to be 89.5 tons per acre.

MG6- This 80 acre unit is located in the Mariposa Grove just to the north of the Clothespin tree. It is bordered by MG4, MG5, MG8, and MG12, and the vegetation type is upper mixed conifer with a small percentage of Sequoias. It consists mainly of fuel model 8. This unit was burned in 1975. There is one FMH fire effects monitoring plot installed in the unit. The fuel load in 2002 was calculated at 73.6 tons per acre.

MG7- This 65 acre unit is located in the Mariposa Grove near the Telescope tree at the northeastern edge of the grove. It is bordered by MG8 and MG13, and the vegetation type is ponderosa pine dominated mixed conifer with a small amount of Sequoias. It consists mainly of fuel model 8 and 10. This unit was burned in 1987. There is 1 FMH fire effects monitoring plot in this unit. The fuel load in 2002 was calculated at 121.2 tons per acre.

MG8- This 80 acre unit is located in the Mariposa Grove directly west of the Fallen Wawona Tunnel tree. It is bordered by MG6, MG7, MG11, and MG12, and the vegetation type is upper mixed conifer and Sequoia. It consists mainly of fuel model 8. This unit was burned in 1975 and 1977. There is 1 FMH fire effects monitoring plot in this unit. The fuel load in 2002 was calculated at 69.6 tons per acre.

MG9- This 35 acre unit is located in the Mariposa Grove to the southwest of the Grizzly Giant tree. It is bordered by MG1, MG2, MG3, and MG10, and the vegetation type is mixed conifer, dominated by white fir with some pine and cedar. It consists of fuel models 8 and 10. There are several concentrations of heavy downed fuel in this unit, and it was burned in 1988, 1990, and 1997. There are 3 FMH fire effects monitoring plot in this unit. The fuel load in 2002 was calculated to be an average of 54.4 tons per acre.

MG10- This 35 acre unit is located on the eastern boundary of the Mariposa Grove just to the north of the Fish Camp road. It is bordered by MG3, MG5, and MG9, and the vegetation type is mixed conifer. It consists mainly of fuel model 8. This unit was burned in 1990. Using a photo series, the fuel loading was estimated to be 45 tons per acre.

MG11- This 40 acre unit is located on the northern edge of the Mariposa Grove. It is bordered by MG4, and the vegetation type is upper mixed conifer with Sequoias. It consists of fuel model 8. This unit was burned in 1995. There are 3 FMH fire effects monitoring plot in this unit. The fuel load was calculated between 2001 and 2002 to be an average of 69.4 tons per acre.

MG12- This 40 acre unit is located on the northern edge of Mariposa Grove south of Mariposa Grove road. It is bordered by MG6, and the vegetation type is upper mixed conifer. It consists of fuel model 8. Using a photo series, the fuel loading was estimated to be 45 tons per acre.

MG13- This 100 acre unit is located on the eastern edge of Mariposa Grove to the south of the Telescope tree. It is bordered by MG5 and MG7, and the vegetation type is upper mixed conifer with a small amount of Sequoias. It consists of fuel model 8. Using a photo series, the fuel loading was estimated to by 45 tons per acre. This unit was burned in 1989.

Merced Grove Units

Merced Grove - This 17 acre unit is located in the northeastern corner of the Merced Grove in YNP. It is bordered by MERCEDGROVE4, and the vegetation type is an upper mixed conifer Sequoia grove. It consists of fuel models 8 and 10. This unit was burned in 1977 and 1990. Using a photo series, the fuel loading was estimated to be 55 tons per acre.
MERCEDGROVE2- This 15 acre unit is located in the northwestern corner of the Merced Grove in YNP. It is bordered by MERCEDGROVE3, and the vegetation type is an upper mixed conifer Sequoia grove. It consists of fuel models 8 and 10. There is a ranger station located in this unit, and the unit was burned in 1977 and 1990. Using a photo series, the fuel loading was estimated to be 55 tons per acre.
MERCEDGROVE3- This 10 acre unit is located in the southwestern corner of the Merced Grove in YNP. It is bordered by MERCEDGROVE2, and the vegetation type is an upper mixed conifer Sequoia grove. It consists of fuel models 8 and 10. This unit was burned in 1977 and 1990. Using a photo series, the fuel loading was estimated to be 55 tons per acre.
MERCEDGROVE4- This 15 acre unit is located in the southeastern corner of the Merced Grove in YNP. It is bordered by MERCEDGROVE1, and the vegetation type is an upper mixed conifer Sequoia grove. It consists of fuel models 8 and 10. This unit was burned in 1977 and 1990. Using a photo series, the fuel loading was estimated to be 55 tons per acre.

Tuolumne Grove Units

TG- This is a 46 acre unit that is divided into 4 smaller subunits (see below). The entire unit has 3 FMH fire effects monitoring plots installed in it. The vegetation type for the unit is a mixer conifer Sequoia grove with white fir. It consists of fuel models 8 and 10. The fuel loading for the unit was calculated in 2002 to be an average of 135.3 tons per acre.
TG5- This 10 acre unit is located in the northeastern corner of the Tuolumne Grove in YNP. It is bordered by TG8. This unit was burned in 1991.
TG6- This 17 acre unit is located in the northwestern corner of the Tuolumne Grove in YNP. It is bordered by TG7. This unit was burned in 1991.
TG7- This 12 acre unit is located in the southwestern corner of the Tuolumne Grove in YNP. It is bordered by TG6. This unit was burned in 1991.
TG8- This 7 acre unit is located in the southeastern corner of the Tuolumne Grove in YNP. It is bordered by TG5. This unit was burned in 1991.

Wildland Urban Interface Areas

EL PORTAL WUI- This unit is located west of the Arch Rock entrance station in the community of El Portal. The WUI boundaries stretch from the warehouse to Crane Creek and Highway 140 to Foresta road. The vegetation type is chaparral. It consists of fuel model 1, 4, 6 and 9. Approximately 400 structures are in the El Portal area.
FORESTA WUI- This unit is located north of Arch Rock Entrance Station and around the community of Foresta. The vegetation type is ponderoas pine, meadow, and manzanita. The Foresta area burned during the 1990 A-Rock Fire, with 45 structures lost. It consists of fuel models 2, 6 and 9. Approximately 173 structures are in the Foresta area.

HODGDON WUI- This unit is includes the areas of the Big Oak Flat entrance station and Hodgdon Meadow campground and fire station. The vegetation type is mixed conifer. It consists of fuel model 2, 8 and 10. Approximately 57 structures are in the Hodgdon area.

WAWONA WUI- This unit is located in and around the community of Wawona in YNP. The vegetation types are mixed conifer, meadow and ponderosa pine and bear clover. It consists mainly of fuel model 2 and 8, with some 10. Approximately 825 structures are in the Wawona area. Within this area there are two prescribed fire units, the Studhorse complex and the Soupbowl complex (see below).

YOSEMITE VALLEY WUI- This unit is located in Yosemite Valley and includes the entire community. The vegetation types are mixed conifer, ponderosa pine, meadow, scrub oak and black oak. It consists mainly of fuel models 2,3 6, 8 and 10. Approximately 1000 structures are in the Yosemite Valley area.

YOSEMITE WEST WUI- This unit is south, east and north of the private development of Yosemite West. The vegetation consists mainly of mixed conifer. It consists mainly of fuel models 8 and 10. Approximately 114 structures are in the Yosemite West area.

Multi-Project Areas

STUDHORSE COMPLEX- The Studhorse complex is a 470 acre area directly adjacent to the Wawona Hotel property, the Seventh Day Adventists' Camp and numerous government and private homes and buildings on the east side of highway 41. The Complex consists of 13 smaller subunits. Some or all of these subunits had prescribed burns in the years 1970, 1972, 1985, 1992, 1993, 1994, 1995, 1996, 1997, 1998 and 2002. Thinning under the WUI treatments began in 1997. There are 11 FMH fire effects monitoring plots within the entire Complex. Three of these (located in the Studhorse-10 subunit) are also monitoring the effects of thinning as well as fire. In 2002, much of the entire complex burned in a prescribed fire. After the burn, the average fuel loading in the burned areas was 24.4 tons per acre. In the unburned areas, the fuel loading averaged 27.9 tons per acre. The fuel loading for the entire complex was calculated at an average of 26.1 tons per acre in 2002.

SOUPBOWL COMLEX- The Soupbowl Complex is a 1,300 acre area located on the west side of highway 41. It is defined by highway 41 on the east side, the Four Mile fire road on the south and west sides, and the Meadow Loop fire road on the north side. It is broken into 3 smaller subunits. There are 5 FMH fire effects monitoring plots within the entire complex. In 2002, the average fuel loading for the complex was 68.5 tons per acre.

Yosemite Valley Units

YV1- This 20 acre unit is located near the Pohono bridge in Yosemite Valley. It is bordered by YV2 and YV30, and the vegetation type is mixed conifer. It mainly consists of fuel model 9. This area had a prescribed fire in 1980.

YV2- This 30 acre unit is located at the Bridalveil meadow in Yosemite Valley. It is bordered by YV1, YV3, YV4, and YV30, and the vegetation type is half low elevation meadow and half ponderosa pine dominated mixed conifer. It consists of fuel models 1 and 9. This unit has had prescribed fires in 1971, 1976, 1991, 1997, and in 1999.

YV3- This 62 acre unit is located between El Capitan and Northside Drive in Yosemite Valley. It is bordered by YV30, and the vegetation type is mixed conifer dominated by ponderosa pine. The unit consists of fuel model 9. This unit was burned in 1997 and has been thinned under the WUI treatments since then. There is one FMH fire effects monitoring plot in the unit, looking at the effects of both the thinning and the burning. In 2002, the fuel load was calculated to be 52.9 tons per acre.

YV4- This 37 acre unit is located north of Bridalveil creek in Yosemite Valley. It is bordered by YV2, YV3, and YV5, and the vegetation type is ponderosa pine dominated mixed conifer. It consists mainly of fuel model 9.

YV5- This unit is located in the sewage disposal area in Yosemite Valley to the west of El Capitan meadow. It is bordered by YV4, YV6, and YV7, and the vegetation type is mixed conifer dominated by ponderosa pine. It consists mainly of fuel model 9. This area had a prescribed fire in 1980.

YV6- This 35 acre unit is located below Cathedral rock in Yosemite Valley. It is bordered by YV5, and the vegetation type is mixed conifer, dominated by ponderosa pine. It consists mainly of fuel model 9.

YV7- This 30 acre unit is located at the west end of El Capitan between the Merced river and Northside Drive in Yosemite Valley. It is bordered by YV9, YV8, and YV5, and the vegetation type is ponderosa pine dominated mixed conifer and meadow. There are several heavy concentrations of downed fuel in the unit. It consists of fuel models 1, 9 and 10. This unit has prescribed burns in 1986, 1997, and 1998.

YV8- This 15 acre unit is located at the south end of El Capitan between the Merced river and Southside drive in Yosemite Valley. It is bordered by YV7 and YV9, and the vegetation type is ponderosa pine dominated mixed conifer and meadow. It consists of fuel models 1, 2 and 9. This unit has 11 "retro style" fire effects monitoring plots installed in it. The fuel load was calculated in 2002 to be an average of 29.3 tons per acre.

YV9- This 114 acre unit is located at El Capitan just to the west of the crossover road between North and Southside drives in Yosemite Valley. It is bordered by YV7 and YV8, and the vegetation type is ponderosa pine dominated mixed conifer. It consists mainly of fuel model 9. This area had prescribed fires in 1976, 1986, and 1992. The fuel load in 1999 was 53.5 tons per acre.

YV10- This 94 acre unit is located at the El Cap crossover in Yosemite Valley. No other units border this one, only roads and the Merced River. The vegetation type is ponderosa pine dominated mixed conifer. It consists mainly of fuel model 9. This unit was burned in 1986, 1987, and 1995 and has also been thinned under WUI treatments. There are 2 FMH fire effects monitoring plots installed in this unit, looking at the effects of both fire and thinning. The fuel loading was calculated between 2001 and 2002 to be an average of 54.4 tons per acre.

YV11- This 42 acre unit is located south of Southside drive near the El Cap crossover in Yosemite Valley. It is bordered by YV16 and YV30, and the vegetation type is ponderosa pine dominated mixed conifer with some oak woodland. It consists mainly of fuel model 9. This area had a prescribed fire in 1995 and has been thinned under WUI treatments since then. There are 2 FMH fire effects monitoring plots installed in this unit, looking at the effects of both fire and thinning. The fuel loading was calculated in 1997 to be an average of 102.7 tons per acre.

YV12- This 40 acre unit is located in the East buttress meadow in Yosemite Valley. It is bordered by YV13, and the vegetation type is primarily mixed meadow with a small amount of mixed conifer. It consists mainly of fuel model 1. This area had prescribed fires in 1976, 1993, and 2001.

YV13- This 80 acre unit is located in the El Cap picnic area in Yosemite Valley. It is bordered by YV12 and YV15, and the vegetation type is mixed conifer, dominated by ponderosa pine. It consists mainly of fuel model 9. This area had prescribed fires in 1971 and 1976.

YV14- This 22 acre unit is located between the Merced river and Southside drive just west of Sentinel Falls in Yosemite Valley. It is bordered by YV12 and YV15, and the vegetation type is primarily lower mixed conifer with some pine/ annual grass. It consists mainly of fuel models 2 and 9. This unit was burned in 1979, 1980, and 1990 and has been thinned since then under WUI treatments. There is 1 FMH fire effects monitoring plot installed in this unit, looking at the effects of both fire and thinning. The fuel loading was calculated in 2000 to be 121.7 tons per acre.

YV15- This 42 acre unit is located between the Merced river and Northside Drive about halfway between Yosemite Lodge and El Capitan in Yosemite Valley. It is bordered by YV13, and the vegetation type is mixed conifer, dominated by ponderosa pine. It consists mainly of fuel model 9. This area had a prescribed fire in 1979.

YV16- This 62 acre unit is located between Southside drive and the Four Mile trailhead loop in Yosemite Valley. It is bordered by YV 30, and the vegetation type is equal parts mixed conifer, ponderosa pine, and oak woodland. It consists of fuel model 9. This area had a prescribed fire in 1993.

YV17- This 94 acre unit is located at the Sentinel picnic area in Yosemite Valley. It is bordered by the river and road, but no other units. The vegetation type is lower mixed conifer and grass. It consists of fuel models 2 and 9. This unit was burned in 1976 and 1991.

YV18- This 94 acre unit is located in Liedig meadow in Yosemite Valley. It is bordered by YV21, and the vegetation types are primarily perennial grasses and sedges. It consists of fuel model 1. This unit was burned in 1993 and is currently included in the WUI area.

YV19- This 60 acre unit is located in the Sentinel meadow in Yosemite Valley. It is bordered by the river and road, but no other units. The vegetation types are perennial grasses and sedges, and the unit is currently included in the WUI area. It consists of fuel model 1. This area had prescribed fires in 1976 and 1994.

YV20- This 25 acre unit is located in the Chapel meadow in Yosemite Valley. It is bordered by no other units and the vegetation type is meadow. It consists of fuel model 1. This unit is currently included in the WUI area.

YV21- This 64 acre unit is located in the Cook's meadow in Yosemite Valley. It is bordered by YV18, and the vegetation type is mixed meadow and oak woodland. It consists mainly of fuel models 1 and 9. This unit is currently in the WUI area. This area had prescribed fires in 1976, 1989, and 1994.

YV22- This 64 acre unit is located in the Ahwahnee meadow in Yosemite Valley. It is bordered by trails and roads, and the vegetation type is low elevation meadow. It consists of fuel model 1. This unit is currently in the WUI area. This area had prescribed fires in 1971, 1976, and 1995.

YV23- This 25 acre unit is located in the Stoneman meadow in Yosemite Valley. The vegetation type is both meadow and oak woodland. It consists of fuel models 1 and 9. This unit was burned in 1989, 1990, and 1996 and is currently in the WUI area.

YV24- This 12 acre unit is located below the Royal Arches in Yosemite Valley. It is bordered by YV25 and YV28, and the vegetation type is ponderosa pine dominated mixed conifer. It consists mainly of fuel model 9. This unit is currently in the WUI area and has had a prescribed fire in 1971.

YV25- This 45 acre unit is located in the Royal Arch meadow in Yosemite Valley. It is bordered by YV24 and YV28, and the vegetation type is mixed conifer with some fir and cedar. It consists of fuel models 1 and 9. This unit is currently in the WUI area.

YV26- This 30 acre unit is located between Tenaya creek and the Mirror Lake road in Yosemite Valley. The vegetation type is mainly mixed conifer with old growth ponderosa pine and incense cedar. It consists of fuel model 9. This unit was burned in 1995 and is currently in the WUI area.

YV27- This 45 acre unit is located to the north of Happy Isles in Yosemite Valley. The vegetation type is primarily ponderosa pine dominated mixed conifer, and this unit is currently in the WUI area. It consists of fuel model 9.

YV28- This 37 acre unit is located to the northwest of the Mirror Lake road in Yosemite Valley. It is bordered by YV24, YV29, and YV25, and the vegetation type is primarily ponderosa pine dominated mixed conifer. It consists of fuel model 9. This unit is currently in the WUI area and has had a prescribed fire in 1971.

YV29- This 91 acre unit is located east of what was once Mirror Lake in Yosemite Valley. It is bordered by YV28, and the vegetation type is black oak and mixed conifer. It consists of fuel model 9. This unit was burned in 1992.

Appendix 12: Responses to Public Comments

The Role of Public Comment

Solicitation of public comment on draft plans for major National Park Service actions is required under the National Environmental Policy Act (NEPA). Further, the National Park Service must "assess and consider [the resulting public] comments both individually and collectively." These comments are viewed by the National Park Service as critical in helping park managers shape responsible plans for our national parks that best meet the Service's mission, the goals of NEPA, and the interests of the American public. During the formal comment period the public can review and comment on a draft plan's alternative proposals for achieving stated park goals. (The comment period described here is part of a broader effort of public involvement and agency consultation fully described in the Consultation and Coordination chapter.) The comments received are analyzed and the results considered by park management while developing the Final Yosemite Fire Management Plan/EIS.

What is the Response to Public Comments?

This portion of the *Final Yosemite Fire Management Plan / Environmental Impact Statement(FYFMP/EIS)* describes the process used to "assess and consider" the public comments received (from June 19, 2002, through August 27, 2002) on the *Draft Yosemite Fire Management Plan/ Environmental Impact Statement* (*DYFMP/EIS)*. This appendix also presents the public concerns identified, and provides responses to each concern, as prepared by Yosemite staff. Each public concern statement is accompanied by quotes, taken directly from public comment letters that support the concern and provide context for the staff response.

Analysis of Public Comment on the Draft Yosemite Fire Management Plan/EIS

All letters, e-mails, faxes, and comment forms (from public open houses and visitors) received as comment on the DYFMP/EIS were read and analyzed by members of the planning team, using a process called "content analysis," for comprehensively analyzing the content of public comment on a proposed plan or project. Over the last five years the content analysis process has been used for several important planning efforts, including the Draft Yosemite Valley Plan / SEIS and Draft Merced Wild and Scenic River Comprehensive Management Plan/Environmental Impact Statement. This analytical process comprises three main components: a coding structure and process, a comment database, and this narrative summary. Initially, a coding structure is developed to help sort comments into logical groups by topics. The topical coding structure was derived from an analysis of the range of topics covered in relevant present and past planning documents, legal guidance, and letters received from the public. Use of these codes allows for quick access to comments in the database on specific topics. The coding structure was inclusive rather than restrictive in order to sufficiently capture all comments. The second phase of the analysis involved reading each piece of correspondence and assigning codes to statements made by members of the public in their letters, faxes, and emails. Each letter was divided into discrete comments that were each assigned a code. Codes were assigned by one staff person, validated by another, and each discrete comment was entered as a verbatim quote, with its assigned code, into the comment database. The third phase included identifying statements of public concern and preparing the narrative summary. Public concerns were derived directly from letters and through a review of the comment database. Each public concern presents, in a simple statement, a common theme found in the body of public comment. The public concern statement is worded to capture the action the public feels the National Park Service should undertake and provides decision-makers with a clear sense of actions the public is requesting. Concern statements are not intended to replace actual comment letters or sample quotes. Rather, they can help guide the reader to comments on the specific topic in which they are interested. During the process of identifying concerns, all comments were treated equally—they were not weighted by organizational affiliation or other status of respondents, and it did not matter if an idea was expressed by a hundred people or a single person. Emphasis is on the content of a comment rather than who wrote it or the number of people who agree with it. All public concerns identified are included in this appendix, whether supported by the comments of one person or many people. The process is not one of counting votes and no effort was made to tabulate the number of people for or against a certain aspect of the Draft Yosemite Fire Management Plan/ EIS. There are many reasons for this, the primary one being a desire to prepare the Final Yosemite Fire Management Plan /EIS in a way that meets the mission of the National Park Service and best serves all the people—not just some.

Table.1 presents three parameters that give a general picture of the scope of public response to the *Draft Yosemite Fire Management Plan /EIS*. Because some people commented more than once, the number of signatures, though probably close, does not reflect the actual number of people submitting comments.

Table A12-1
Number of Responses, Signatures and Comments Received During the Public Comment Period for the Draft Yosemite Fire Management Plan/EIS

Number of Responses:	Number of Signatures:	Number of Comments:
143	147	753

Although these numbers give a general sense of public comment, they should be interpreted with caution—the analysis process used attempts to capture the full range of public comments, but those who responded do not constitute a random or representative sample of the general public. Thus, although this information can provide insight into the perspectives and values of the respondents, it does not necessarily reveal the desires of society as a whole.

For more information, the reader should refer to the original comment letters for the *Draft Yosemite Fire Management Plan/EIS*, the *Summary of Public Comment*, anddatabase reports, all available in the Yosemite Research Library (write to: National Park Service, P.O. Box 577, Yosemite National Park, California 95389).

Considering Different Types of Comments under the National Environmental Policy Act

Agencies have a responsibility, under the National Environmental Policy Act (NEPA), to first "assess and consider comments both individually and collectively" and then to "respond…, stating its response in the final statement." The content analysis process used by the YFMP/EIS planning team considered all comments received "individually and collectively" and equally, not weighting them by the number received or by organizational affiliation or other status of the respondent. However, besides the public concern statements developed by the Planning Team, comment letters are considered in several different ways. Public concern statements and supporting quotes form the basic summary of public comment and are the primary focus of park management when considering public comment collectively. These statements are formulated by reading each individual letter, coding each identifiably different concern in each letter to a topical database, and then using that database to identify the range of public concerns in the whole body of public comments. This process treats all comments equally. Demographic information gathered from responses is another way of looking at comment letters collectively, allowing park planners to obtain a picture of certain general aspects of the responding public, like the geographic distribution of commenters, their affiliation with a government agency or private organization, and how different members of the public chose to offer their comments (e.g., by letter, fax, email, public testimony, etc.). Finally, park managers and planners consider all letters from government agencies and American Indian Tribes, from nongovernmental organizations (NGOs), and particularly informative and well-written letters from individuals. The National Environmental Protection Act mandates that managers consider (and print in the final document) all letters received from the first two types of commenters (see Chapter Six, Consultation and Coordination, for copies of these letters). On the other hand, nongovernmental organizations typically represent a number of people, often with pertinent perspectives on one or more aspects of planning for Yosemite National Park and their letters are of interest to managers in making decisions. Public concern statements coded by subject and demographic information may be used in combination by park planners and managers to seek a clearer picture of certain issues, such as what range of issues particular groups are commenting on or, conversely, what different groups are commenting on a particular issue, such as fire protection activities in wildland/urban interface. All of these methods together are used to ensure that the National Park Service assesses and considers public comments "both individually and collectively."

The National Environmental Protection Act requires that after the National Park Service considers comments, they respond to those comments. However, the type of response depends on the type of concern identified. Comments, or the concerns identified from them, are typically classified as those that fall within the scope of decision making for the plan in question and those that fall outside that scope for any number of reasons. Counsel on Environmental Quality regulations define "scope" and require the National Park Service to explain why comments are determined to be out of scope. Generally, the scope of a plan is the range of connected, cumulative, or similar actions, the alternatives and mitigation measures, and the direct, indirect, and cumulative impacts to be considered in the environmental impact statement. If a concern was considered out of scope, the explanation of why is provided by staff. Generally, the types of comments received, and concerns identified, that are considered out of scope include those that:

- Do not address the purpose, need, or goals of the *Yosemite Fire Management Plan*
- Address issues or concerns that are already decided by law or national policy

- Suggest an action not appropriate for the current level of planning
- Propose untenable restrictions on management of the park or conflict with approved plans not being revised by the *Yosemite Fire Management Plan*
- Did not consider reasonable and foreseeable negative consequences
- Point to only minor editorial corrections
- Comments within the scope of the plan are typically classed as either substantive or nonsubstantive. As defined in the National Park Service's NEPA guidance (Director's Order #12) and based on Council of Environmental Quality regulations, a substantive comment is one that:
- Questions, with reasonable basis, the accuracy of the information in the environmental impact statement
- Questions, with reasonable basis, the adequacy of environmental analysis
- Presents reasonable alternatives other than those presented in the environmental impact statement
- Causes changes or revisions in the proposal

Nonsubstantive comments include those that simply state a position in favor of or against the proposed alternative, merely agree or disagree with National Park Service policy, or otherwise express an unsupported personal preference or opinion. Although a commenter's personal opinions on a subject may influence the development of the final plan, they generally would not affect the impact analysis.

The agency is required to respond only to substantive comments. However, to fully inform the public, Yosemite management has asked planning staff to respond to all public concerns identified during content analysis, within and out of scope, substantive and nonsubstantive alike. Responses to out of scope concerns are typically restricted to describing why it is out of scope and does not merit further consideration, although a more elaborate answer may be provided. Responses to substantive concerns are typically more extensive and complete and, more importantly, often result in changes to the text of the final environmental impact statement, for purposes of clarification, if nothing else. Reference to the part(s) of the final document influenced by a concern may constitute or supplement the response. If several concerns are very similar, they may be grouped, with a single answer for the group.

Screening Public Concerns – Identifying Planning Issues Overview

For the *Draft Yosemite Fire Management Plan/Environmental Impact Statement*, an extensive process of screening public concerns and identifying planning issues was undertaken. This process involved methodically: 1) categorizing the public concern statements and supporting quotes received; 2) sorting them based on whether they needed to be reviewed by management or could be sent directly to staff for a response; 3) identifying issues raised by the concerns; then 4) organizing and tracking those concerns, based on the sorting criteria, through regular reports to the Yosemite staff responding to comments and the park management review team. This process, described in detail below, was used to effectively manage and respond to the 202 public concerns derived from the 753 public comments received on the *Draft Yosemite Fire Management Plan/EIS*.

Public Comment Processing

Receipt of Comments—Yosemite National Park staff received all comments, including letters, email, faxes, and comment forms. Each was stamped with a received date, given a unique number, and pertinent data entered into a log. Copies were made for the YFMP planning team and the original was retained in the park's Planning and Compliance Office. Comments received at open houses were numbered, logged, and distributed in the same manner.

Coding Comments—Members of the YFMP planning team were trained in the process of coding. They then read and coded responses according to the categories listed on their coding structure. This information was entered into a master database. From this database, three separate databases were created: Public Concern Statements, Immediate Attention Items, and Information Requests. The screening and tracking process for Immediate Attention Items, Information Requests, and Public Concern Statements each followed a different process, described below.

Responding to Information Requests and Immediate Attention Letters—The Planning and Compliance office provided immediate response to these letters, most of which were requests for copies of the *Draft Yosemite Fire Management Plan/EIS* or to be added or removed from the park's planning mailing list. A few requested other types of information. Using criteria developed during the writing of the *Yosemite Valley Plan*, the National Park Service identified letters needing to be seen quickly by park staff. Letters falling in this category were presented to the Project Manager for review and reference, and for consultation with the management team if needed. The types of letters identified for Immediate Attention include:

- A notice of appeal or litigation, or a threat of harm
- A Freedom of Information Act request
- A proposal for a new alternative
- An excellent review of an issue, or one that was particularly informative and well written
- From a government entity (federal, tribal, state, county, city elected official or agency)
- Requests for an extension of the public comment period
- From a nongovernmental organization (defined broadly)

Public Concern Statement Screening—In reviewing and responding to the Concern Statements and example comments, team members were asked to screen concern statements and provide responses, and in so doing, determine any need to do any of the following:

- Modify alternatives including the proposed action
- Develop and evaluate alternatives not previously given serious consideration by the agency;
- Supplement, improve or modify its analysis;
- Make factual corrections;
- Explain why the comments do not warrant further agency response, citing the sources, authorities, or reasons which support the agency's position and, if appropriate, indicate those circumstances which would trigger the agency reappraisal or further response

Issue Development—Concerns raising an issue that implied a change in plan direction were discussed by the Planning Team and then referred to a team member for response. This response was presented as a recommendation to the Superintendent. Although there were over 200 concerns, only a small number of topical issue areas were referred.

Comment Response—For all public concern statements, including those that did not raise issues needing management review, the YFMP/EIS Team identified the changes needing to be made to the text of the *Draft Yosemite Fire Management Plan /EIS* and the location of these changes. They also began writing the responses that accompany each concern in this appendix.

Management Deliberation on Issues

In a meeting with the Superintendent on April 4, 2003, a briefing paper was presented that consisted of major issue-related concern statements, example public comments and recommended responses. After deliberation, the Superintendent and representatives of the Management Team provided decisions and planning direction. Management deliberation also included input from consultation between park staff, government agencies, and Native American tribes. There were a number of important changes made to the Preferred Alternative in the *Final Yosemite Fire Management Plan/EIS*. These changes are discussed in Chapter 2.

How to Use this Appendix to the Final YFMP/EIS

The public comment information is presented with three elements:

- Concern Statement
- Example(s) of public comments that related to the Concern Statement
- Response, as prepared by a member of the YFMP/EIS planning team.

Comment Response

Purpose and Need For Action

Concern #1: The Fire Management Plan should focus only on managing/reducing fire risks, not on restoring/managing plant communities.

Letters 115, 133, 125, 134

Letter Number: 115

Comment: Why has this plan intermingled fire management to prevent catastrophic or hazardous fires with vegetation restoration? Are these compatible? Based on what criteria? What proof?

Letter Number: 133

Comment: First, the supposed "restoration" of historic conditions is not among the purposes and needs for this project. This is the Fire Management Plan. Only prescriptions designed to reduce severe fire conditions and maintain a natural role for fire are appropriate.

Response: NPS Director's Order 18, which guides all fire management activities in units of the National Park System, directs that, "Each park with vegetation capable of burning will prepare a fire management plan to guide a fire management program that is responsive to the park's natural and cultural resource management objectives and to safety considerations for park visitors, employees and developed facilities." Ecosystem and vegetation management objectives are discussed in the Purpose and Need for the draft Yosemite Fire Management Plan/Environmental Impact Statement, because of the guidance in DO-18, Yosemite's General Management Plan, Resource Management Plan, and other guiding documents. Preparing a fire management plan as suggested could potentially result in unintended negative consequences for park ecosystems. There is ample scientific literature describing resource impairment that can occur if fire is used improperly during certain phases of species' reproductive cycles. The restoration of the natural role of fire is closely tied to the restoration and maintenance of more natural ecosystems, as ecosystem processes are closely related to ecosystem structure.

Concern #2: The Fire Management Plan should focus on both managing/reducing fire risks and on restoring/managing plant communities.

Letter: 130, 112, 22, 137,

Letter Number: 112

Comment: EPA supports the Park Service's goals of reducing the adverse effect of prior fire suppression, maintaining the natural fire regime in park ecosystems, and addressing the unique needs of developed areas, cultural resources, and the wildland/urban interface

Letter Number: 130

Comment: It needs to be emphasized that the purpose of the plan is more than catastrophic fire prevention. The first purpose identified is to restore the ecosystem and its processes such that fire is allowed to fulfill its natural role. General public perception of the natural role of fire is a non-damaging fire ignited sporadically by natural causes. Forest conditions sufficient to reduce the risk of catastrophic wildfire may not be sufficient to restore the ecosystems and processes in existence for the last 12,000 years. Modern fire fighting capabilities enhance the resistance of a forest to wildfire. Consequently, the extremity of the natural range of variability may provide adequate fire protection. The tree density would be much larger, gap distribution less frequent, fuel loading much heavier and most importantly, a change in species composition and diversity. Fire risk reduction may be accomplished with minimal but more frequent active management.

Response: The draft Yosemite FMP/EIS was written to address this matter. The purpose and need for the document address both managing/reducing fire risks and restoring and maintaining park ecosystems. This is consistent with NPS policy.

Concern #3: The Fire Management Plan should not be a way to justify logging of timber.

Letter: 65, 66, 89, 65,

Letter Number: 66

Comment: ...we see this Plan is a way to provide saw timber for commercial ventures rather than a genuine means of reducing fire hazard. This Park and its timber belong to the people of the United States and should be protected for future generations, no mater what the cost.

Response: The YFMP/EIS was not prepared with a purpose of providing saw timber for commercial ventures. Such a purpose was neither stated nor suggested. The plan identifies various tools for successfully accomplishing the objectives and purpose and need for the plan. Timber thinning was one of the tools identified. The sizes of trees to be included in the treatment prescription will be changed in the Final YFMP/EIS, in response to public comments and technical information.

Concern #4: The National Park Service should clarify whether the FMP is an implementation or programmatic plan.

Letter: 110, 38, 63

Letter Number: 110

Comment: Please make clear in the Final version whether the plan is an Implementation plan or Programmatic.

Letter Number: 38

Comment: The present Draft fails to make clear whether it is a programmatic document, or is intended to be at the Implementation (project) level. This is a basic flaw which suggests that the Park Service itself didn't know. Little wonder that the Draft Plan has resulted in so much confusion, which can be clarified only with a new Draft.

Response: The Draft YFMP/EIS discusses the difference between general management planning and implementation planning, on page 1-18, and project-specific planning, on page 1-25. The Final YFMP/EIS will clarify that this document is an implementation plan for the Yosemite fire management program, and that it addresses NEPA compliance for a suite of fire management actions. It will also clarify the actions for which additional NEPA compliance, tiered to this EIS, will be required.

Park Purpose and Significance

Concern #5: The National Park Service should see Yosemite as a place where any kinds of fire affects are appropriate, and not to be interfered with.

Letter: 105, 102, 4, 77, 73, 54

Letter Number: 105

Comment: Let's let Yosemite be how it should, and when a huge fire comes to destroy everything in its path, give Yosemite a little help sure...but over all, let it go how God intended to go.

Letter Number: 102

Comment: I think a National Park, especially Yosemite should be totally un-manipulated by man, with the exception of managed fires, much like the Indians used to do. If a fire takes it all out, by getting out of control, then it was a natural thing, and nature knows how to heal itself, and it's all a learning experience for us. I can't imagine thinking that we, in our 100 years of experience with fire suppression in forests in this country would even think that we know better than nature as to how to cultivate these forests. If we can just keep the chain saws out, it'll take care of its self. The other thing is, how do they think that they can get rid of bug infestations without fire?

Response: Unfortunately, a great amount of change has occurred in some parts of Yosemite National Park and in large part due to the well-intentioned policies and fire protection measures in place since and before park establishment. For decades National Park Service policy dictated that fires be suppressed. As is discussed in the draft document on page 1-5, and in more detail on page 1-6, fire policies were changed in the 1970's to recognize the important role of fire in national park ecosystems. The draft YFMP/EIS and previous versions did in fact recognize that managed wildland fires should be used in most of the park (83% of the park is proposed as Fire Use Unit). However, 17% of the park consists of either wildland urban interface or lands highly altered by past fire suppression actions; these areas of the park require that other actions be considered—including prescribed fire—to restore and/or maintain ecosystems. Without these actions fire could result in negative rather than positive effects, including altered watersheds, forest stands and wildlife habitat, and on a landscape scale. These effects could not be easily justified.

Planning Process

Concern #6: The National Park Service should be sincere in asking for and using public comment on the draft Fire Management Plan/EIS

Letter: 116,

Letter Number: 116

Comment: We are well aware that by submitting these comments we are merely enabling the Park Service to demonstrate compliance with NEPA by providing the public 'an opportunity' to comment. We further understand that as the lead agency, you have no requirement to be responsive to public comment and that Congress has given you full discretion to do as you please. So why waste our time??? Out of respect to those respondents/friends who have invested hours of time and energy investigating the Fire Management Plan, sincerely believing you will administer the public process with integrity.

Response: The Final Yosemite Fire Management Plan/Environmental Impact Statement includes changes that were made because of public comment. For example, the location and tree size limits for thinning operations will be changed in the Final. This occurred because of constructive comment offered on this subject by many members of the public. In any plan of this type, there are a great number of varied interests affected. By no means were the public's comments unanimous in requesting specific changes to the plan, but most were offered in the spirit of cooperation and with a desire to contribute to improving the fire management plan. It is easier to respond to comments that offer suggestions or questions, with understandable rationales or explanations.

Concern #7: The National Park Service has made an effort to involve the public in the preparation of the Fire Management Plan/EIS

Letter: 25, 117,

Letter Number: 25

Comment: Your staff was very helpful in answering questions both about Yosemite fire management and other Yosemite issue. However, I was disappointed in how few members of the public attended in the time we were there from 3 to 5 pm.

Letter Number: 117

Comment: Thank you for the opportunity to review and comment on the draft EIS as well as to interact with your staff to discuss the plan, to ask questions, and to walk through elements of the plan in the park. We appreciate and applaud the special efforts you and your staff have made to raise awareness and educate the public about the plan.

Response: No response necessary; the compliments are appreciated.

Concern #8: The Yosemite FMP/EIS does not have adequate scientific basis, or an acceptable focus.

Letter: 113, 76

Letter Number: 113

Comment: The draft Fire Plan referenced above should be rejected and entirely rewritten based on sound scientific methods, historical evidence and research. The YNP Fire Plan Alternatives B and D are smokescreens for a major commercial logging operation that will accommodate future commercial development and privatization of Yosemite National Park. Alternative B is the most "aggressive" option within the plan, and the most likely to be used even though Alternative D is the "preferred" option. This Fire Plan does not address how the National Park Service will effectively manage projected fire activities given the severe nationwide shortage of trained fire personnel.

Further, National Park Service Fire Plan writers have based proposals on pre-fire management standards dating back to 1860 - without consideration for restoring and reversing man-made changes to Valley hydrology, and without clearly researching or utilizing Native American history of fire management in the Valley. NPS Staff writers have put forth a plan without analyzing consequences of proposed actions. Instead, the plan's emphasis is on removing commercial timber while leaving acres of debris to accumulate over several years, producing a greater potential for major catastrophic fires. While a fire management plan is necessary for Yosemite, in many ways this plan fails the litmus test for common sense.

Response: Please consult Chapter III, *Affected Environment*, for information on the historical and scientific basis for the fire management program. Please consult Chapter IV, *Environmental Consequences*, for the analysis of environmental consequences of the various alternatives. The focus of the Fire Management Plan is set forth by Federal Fire Policy and NPS Fire Management Policy. The alternatives are all geared toward achieving the fire management program's purpose and need. The plan emphasizes meeting fire and resource management objectives; it does not call for commercial logging or an accumulation of acres of logging debris. Prescribed fire and wildland fire are the primary ecosystem and maintenance tools; with thinning restricted to areas adjacent to roadsides and to the six WUI communities, all restricted to the Suppression Unit. All alternatives are based upon an expectation that funding and staffing will continue to be adequate; like all agencies, actual funding and staffing is subject to appropriation decisions.

Concern #9: The Yosemite FMP/EIS does have adequate scientific basis and/or acceptable focus.

Letter: 62, 141, 122, 129, 120,

Letter Number: 129

Comment: The Board of Supervisors has been very concerned by the build up of vegetation and fuel accumulation on lands throughout Mariposa County relative to safety for the public and surrounding communities. The National Fire Plan adopted by Congress has directed all agencies to take a strong look at reducing fuels and the threat to real property from wildland fire. The County recognizes that the National Park Service has a very difficult task before them as evidenced from the analysis contained in the Draft Fire Plan. The health and safety of Mariposa County comminutes is very dependent on successful management strategies by the National Park Service.

Letter Number: 141

Comment: I am personally impressed by your decision to release the Draft Yosemite Fire Management Plan/Environmental Impact Statement. It is obvious that you and your staff are people of vision and have shown the ability to adapt to changing times and conditions in our national parks. National Parks are special places that need to be managed for ecosystem health, and natural processes however we cannot disregard threats posed by wildland fire to infrastructure, facilities and human life. Recognizing that the past practice of fire exclusion and immediate suppression has affected ecosystem health can be rectified using prescribed fire and wildland fire over time. Immediate protection of values within the park can be expedited using aggressive treatments that your plan clearly lays out.

Response: No response necessary.

Concern #10: The National Park Service should not use the recent large fires in the west as an excuse to cut trees in Yosemite.

Letter: 114, 124

Letter Number: 114

Comment: ...with huge wildfires burning across the nation, and few firefighting personnel and limited resources to attack these fires, the Bush administration's new fire plan dovetails with Yosemite National Park Service's draft Fire Plan to allow commercial logging in our national parks. This is unacceptable.

Response: Thinning of trees in certain areas was proposed in the draft YFMP/EIS as a means of reducing fire danger and restoring historic forest stand structure. In preparing the Final YFMP/EIS, changes were made to the limits on location and size of trees that can be thinned in Yosemite to accomplish fire and resource management objectives. Logging in and of itself was not an objective.

Concern #11: The Yosemite draft FMP/EIS is too broad; an individual EA should be done on each unit.

Letter Number: 33

Comment: My basic objections to this plan 1. It is too broad and an individual EA should be done on each unit.

Response: The National Park Service prepares its fire management plans as park-wide documents and "on an ecosystem basis across agency boundaries, and in conformance with the natural ecological processes and conditions characteristic of the ecosystem (Director's Order 18)." A benefit of this approach is an understanding of effects on a landscape scale.

National Park Service policy for Fire Management Plans, and their environmental compliance documents, states that a programmatic approach will be used. This approach is intended to eliminate the need for EA's or CE's to be done on individual projects that are already described within the FMP EIS/EA. Individual EA's are done for projects outside of the FMP EIS/EA, or if controversies arise over any project, including those that were described in the FMP EIS/EA.

Timeframe for Planning.

Concern #12: The FMP/EIS should indicate how long the plan will be in effect.

Letter Number: 88

Comment: After watching many devastating fires this year; and having witnessed the destruction of the fires in and around Yosemite National Park, I know an updated fire management plan is sorely needed. The beauty of the park cannot be erased by fire because we did not act in time and in best faith. I would like to know how long this plan will be in effect; 10 years, or 20; and when will the next plan be started. Or is this the plan to end all plans?

Response: The short answer is ten to fifteen years, but this version of the YFMP/EIS was written to provide direction for as long as needed to accomplish program objectives. The last version of the FMP was written in 1990, and this version of the FMP could be in effect for a similar period of time, unless policy changes make it necessary to prepare a new revision. Policy changes were one reason for this new YFMP/EIS.

Clarity of Planning Documents:

Concern #13: The draft FMP/EIS is unclear and complicated.

Letters: 115, 123, 119, 116, 76, 74, 86, 70, 67, 90, 59, 100, 63, 65, 110,

Letter Number: 123

Comment: I have attempted to make some sense out of the Draft Plan after looking at it on your web site. I have experienced great difficulty in this, so I really feel I have been shut out of the process by the failure of the Park Service to present the issues in an intelligible manner. However, in talking with a few people who have been struggling with this, I believe some key issues have become evident. One, I believe it is necessary for the Park Service to start over again, and issue a new Draft which a citizen of reasonable intelligence could understand.

Letter Number: 76

Comment: I must say in reviewing the plan that it is mind-boggling, loaded with legal terminology that the average citizen can not grasp the intended repercussions there-in. For the future, I would suggest a detailed yet simple paraphrased format for the average citizen, whom can request the legal terminology format if they so desire.

Response: Concern #'s 13 and 14 both address clarity of the document, but from differing perspectives. These will be addressed together.

Fire management activities, including those described in the draft Yosemite Fire Management Plan/Environmental Impact Statement, are complex and they have risks. In Yosemite National Park, they are employed in a diverse set of plant communities, and in highly variable human communities. In addition, the fire management plan was written to be consistent with terminology adopted in the National Fire Policy and Plan and NPS Fire Management Policy, and for a target audience that includes fire and resource management professionals, local residents, representatives of special interest groups, government officials, and unaffiliated but interested publics.

Efforts to make descriptions “more general or simple” would, as such efforts have done in the past, lead some readers to assume that a limited set of solutions exist that solve all fire-related problems; there is no such universal solution, just as there is no one simple description for the role of fire in ecosystems. Ecosystems differ, and the effects of fire and fire management actions upon them vary. These differences are important considerations, not just for decision makers but for the public.

The complexity of these factors was considered at the onset of writing the draft YFMP/EIS. An editor was used to edit and refine the writing, to make it as reader-friendly as possible without losing important technical meaning needed by some target audiences. As we prepare the Final YFMP/EIS, we will do so with an eye to making the document easier to comprehend, but without losing technical meaning. The Executive Summary will include a short section on changes between the DEIS and FEIS.

Concern #14: The draft FMP/EIS is clear, comprehendible and user-friendly

Letters: 83, 135, 111, 112,

Letter Number: 135

Comment: As a general comment, this DEIS is one of the clearest written and most comprehensive FMPs we have ever read. Your staff should be credited with doing a superb job of writing.

Letter Number: 111

Comment: First I must comment on the excellence of the layout and clarity of the Draft. The text was clear and the use of maps and charts to support each alternative was outstanding. In addition the explanation of the supports which would be used for all alternatives help to clarify many of the questions as to how you would perform and support the alternatives you presented.

Letter Number: 112

Comment: EPA commends the Park Service for developing a thorough and user-friendly DEIS. We found the maps and other graphics included in the DEIS to be of particularly high quality. We also appreciate the extensive list of projects identified as part of the cumulative impacts analysis.

Response: Please see the response above under Concern #13

Concern #15: The draft FMP/EIS is too general and imposes too little constraints on management.

Letter: 63, 82, 66, 103,

Letter Number: 63

Comment: In our view, the proposed management plan is so general and imposes so little constraint on management activities as to require that separate environmental analyses be prepared for every fuels management project.

Letter Number: 103

Comment: This draft plan is not adequate and does not fulfill the disclosure provision of NEPA. Please, prepare a more detailed and specific plan so one might assess the impact of the actions outlined. More detail is needed regarding exactly which trees would be cut and where.

Response: Please see Mitigation Measures, in Chapter 2, *Alternatives*, under *Actions common to all Action Alternatives*. Additional mitigations—especially as they relate to fish and wildlife and their habitat—were added in the Final YFMP/EIS. With respect to treatment area boundaries, please see the map graphics at the end of Chapter 2. In the final YFMP/EIS, mechanical thinning projects for any fire or vegetation management activities outside the ¼-mile protection zone adjacent to the six wildland urban interface communities would require additional NEPA compliance (tiered from the EIS). The limits on locations and sizes of trees that can be cut in thinning projects were changed in the Final; these are now similar to the limits adopted in the Sierra Nevada Forest Plan Amendment (see Chapter 2, Alternatives). The location of treatments, the kinds of treatments that may be used (or cannot be used) in various treatments areas, objectives of treatments, and the effects of these treatments on various resources and issues of concern are described in the document, particularly in Chapter 4.

Concern #16: The FMP/EIS should be available in PDF format.

Letter Number: 25

Comment: Make the online documents, particularly the executive summary, available in PDF format so that we can download a document of interest and study it offline.

Response: Many of Yosemite's planning documents are made available on PDF formal. We will explore making the Final FMP/EIS available in that format as well.

Planning Goals:

Concern #17: The National Park Service should address its fire hazards.

Letter: 30, 104, 25,

Letter Number: 30

Comment: With big fires this year in California, Colorado, Oregon and Arizona; I'm glad that Yosemite National Park is finally going to address their fire problem.

Letter Number: 104

Comment: A Fire Management Plan should focus on this accumulation of tinder particularly near human habitation, historic structures, and maybe the giant

sequoia groves.

Letter Number: 25

Comment: Since we live in a fire-prone area in the Sierra foothills seven mile south of the town of Mariposa, we can appreciate the need to reduce the fuel buildup that leads to catastrophic fires.

Response: A principal focus of the DEIS is on the identification and mitigation of wildland fire threats to public safety, communities, and park resources. Emphasis is placed on communities in the wildland urban interface and on special resources such as giant sequoia groves. The DEIS also proposes implementing the risk reduction program at a faster pace than has been done in the past.

Concern #17a: The National Park Service should include actions to support goals related to protecting helibases, heavy use areas and cultural resources.

Letter Number: 130

Comment: Firefighter and public safety are listed as the number one goal of the management plan and protection of cultural resources is listed as number two. The plan notes that three helibases have marginal safety clearances. There is no indication of the condition with respect to areas of heavy recreational use or cultural resources. It is unclear what if any treatment is being proposed to provide safety clearance surrounding these areas. RCRC would support the treatment of helibases, heavy use areas and cultural resource

Response: Helibase clearance will be maintained to meet requirements of both NPS policy and that of the Office of Aircraft Services to ensure safe aviation operations. The Fire Return Interval Departure (FRID) analysis done in the DEIS displays areas at significant risk of harm from wildland fire, principally in the frontcountry of the park. Such areas are also where heavy visitor use occurs. The DEIS proposes both treatment methods and treatment schedules to mitigate wildland fire risk in the next few years.

Concern #18: The National Park Service should not adopt goals that allow logging.

Letter: 6, 101,

Letter Number: 6

Comment: We are alarmed and frightened by the new Yosemite Fire Management plan which proposes logging of large trees to protect the park's infrastructure of development. We think that logging is a heinous tool for fire prevention, and that it clashes basically with the park's mission which is to protect the "natural objects" in its aegis.

Response: See response to Concern #3.

Concern #19: The National Park Service should not attempt to target conditions at any particular point in time/prior to 1860/prior to fire suppression activities.

Or, The National Park Service should allow natural processes to prevail rather than focus on restoring 1860 conditions.

Letter: 71, 115, 80, 121, 19, 75, 125, 70, 77, 65, 66, 67, 40, 60, 59, 41, 103, 38, 43, 117, 113

Letter Number: 71

Comment: Any attempt to commingle this process with the idea of restoring Yosemite to someone's vision of what it looked like in 1860 (or any other year) would be immensely complicated, invalid, and probably illegal.

Letter Number: 125

Comment: It is totally illogical to select the year 1860 as a benchmark, with the assumption that many of the trees which started growing since then are "unnatural," and therefore subject to being cut. The Park Service picked 1860 because some attempts to suppress wildfires started at that time. In actuality, the suppression attempts would have been largely ineffective because of the primitive nature of communications and transportation, lack of mechanized equipment, lack of firefighters, etc.

And the Park boundaries have undergone massive changes since 1860, so the land base then isn't even the same as now. The use of the 1860 date as a basis for the calculations would result in the CUTTING OF TREES UP TO 31.5 INCHES IN DIAMETER, and EVEN LARGER on the more productive sites, which is totally unacceptable. See Point 2.(f.) above.

There should be no adoption of ANY year, or time frame, as a basis for determining what is "natural." Any date selected would be arbitrary, irrelevant, and contrary to the 1980 General Management Plan.

This is because the NPS is trying to pick a date that represents a time when "natural conditions" prevailed, and "natural conditions" is in the mind of the beholder. After thousands of years of human intervention, we have no idea of what a "natural condition" would look like now---meaning if humans had never affected the natural processes. And why should conditions created by the setting of fires by Native Americans be considered any more natural than conditions BEFORE arrival of the Native Americans? To the extent that open, park-like forest stands did exist, how do we know it was the result of burning by Native Americans, and not lightning caused? In other words, whom are we trying to emulate, the Native Americans or God? Perhaps we should be attempting neither.

Letter Number: 63

Comment: Also, to accomplish the objectives of fuel and catastrophic fire reduction, there is no need to remove the larger fire-resistant trees. If the objective is to restore the natural forest structure that would exist today, had there been no human interference with natural processes; this requires an ability to determine accurately what the current structure would be. The DFMP does not include a rigorous analysis that will predict such a structure. We doubt seriously that such predictions can be made or that restoration to a predicted condition can be accomplished; because the human manipulations have probably altered irrevocably the trajectories of the forests (See Rapp, 2002, Attachment - E, file PNW_Sci_UPD-B).

Response: The DEIS does not propose the restoration of vegetative conditions to any specific point in time, nor does it propose to maintain such conditions perpetually. We agree that it is difficult to separate lightning ignitions from Native American burning in the fire history research done in the Sierra Nevada and elsewhere. However, there is ample scientific literature that links the accumulation of dead and down woody fuels, the escalating severity of wildland fires, and the increasing density of vegetation to the absence of fire. The mitigation of unnaturally severe wildland fires involves the thinning of vegetation, to levels more in line with those that existed prior to fire suppression. The DEIS proposes to thin vegetation, based on the best scientific information, to reflect a range of conditions which existed when wildland fires played a more benign and natural role. Thinning would be done with fire except in areas immediately near wildland urban interface communities or roadsides in the Suppression Unit. Following the thinning of fuels which contribute to unnaturally severe wildland fires, natural fire will be allowed to function as fully as possible. It is expected that the restoration of lightning fires, and prescribed fire where lightning fires cannot be allowed to burn, will result in a range of fire cycles and ecological conditions similar to those which existed prior to the onset of fire suppression.

Concern #20: The National Park Service should restore ecosystems to their pre-fire suppression conditions.

Letter Number: 7

Comment: This is a vote of confidence for being as aggressive as you can to restore the forest to its 150 year ago conditions.

Response: The DEIS proposes to restore and maintain the natural role of fire to the greatest degree which is feasible, within as short a timeframe as practical.

Concern #21: It is legitimate to thin trees to restore fire regime, but the ultimate goal of the Fire Management Plan should be to restore natural processes.

And: It is legitimate to thin trees/target some species for purposes of restoring the fire regime.

Letter: 86, 126, 123, 6, 140,

Letter Number: 86

Comment: Due to a history of not allowing this to happen in Yosemite, it is not possible to suddenly revert to the use of fire as a brush removal mechanism everywhere. Natural processes, though, should be the ultimate goal that the park service is working toward. Every plan, no matter where it focuses in the park, should aim toward restoring the natural processes.

Response: Response: thinning of trees, either by mechanical means near communities or with prescribed fire elsewhere in the park, is an important step in the restoration and maintenance of fire as an ecological process, which is a goal of the DEIS.

Concern #22: The National Park Service should employ the most aggressive approach to restoring forest health and reducing the potential for catastrophic fire.

Letter: 7, 79, 20, 17,

Letter Number: 20

Comment: I am impressed by the Draft Management Plan's option of rapidly reducing the fuel buildup which threatens large areas of the Park and the surrounding country. There's no time to waste. It would be a shame to see more large catastrophic fires like A-Rock do extensive damage to lower-elevation

Response: The DEIS recognizes that it is important to increase the pace at which wildland fire risk is mitigated and fire restored to a more natural ecological process. Alternatives B, C, and D were developed with this goal in mind. The preferred alternative, D, represents a blend of techniques which achieve this mitigation with mechanical means near communities and with prescribed fire elsewhere in the park within a shorter time than would occur under the current plan.

Concern #23: The National Park Service should use the least aggressive approach to implementing fire management treatments.

Letter: 70, 128, 117, 63,

Letter Number: 70

Comment: I take some comfort from your statement that Alternative D "would likely reverse trends toward vegetation type conversion and reduce the potential of returning large areas of the park to early seral stages of ecosystem development, as happened during the A-Rock Fire." At least we have some goals in common. As I recall, the A-Rock Fire was a managed wildland fire that went awry. What a price to pay for reintroducing fire suppression where season and risk demand it. Given that experience has shown some mistakes to be inevitable as you feel your way through the myriad conflicting demands made upon yourselves, I strongly urge moderation in your pursuit of successive panacea.

Letter Number: 117

Comment: First, aggressive treatments are not necessary. The fuels reduction and "restoration" objectives outlined in the draft EIS can be achieved by using passive treatments and prescribed fire alone. As the EIS clearly indicates, the only advantage to aggressive techniques is that they achieve fuels reduction objectives more quickly.

An equally effective way to accelerate reduction of fuel loads, therefore, may be to increase the number of days during which prescribed burning, other currently used techniques, and proposed passive techniques are used, rather than increasing the intensity of the practices used. This type of approach would provide the NPS with more opportunities to educate visitors about the role of fire, and would avoid the unnecessary impacts of aggressive fuels management. Second, the aggressive approaches are extremely damaging and ecologically disruptive. Even if they were necessary, the environmental harms would far outweigh any fuels reduction or "restoration" benefits. These aggressive techniques, which include cable shredders, would result in ecological impacts that would be significant, long-term, and detrimental. Numerous researchers have provided evidence of these impacts, demonstrating that aggressive mechanized silviculture, such as the practices proposed in the EIS, can spread exotic species, cause erosion, compacts soil, and reduce wildlife usage, among other harms.

Moreover, many scientists both inside and outside federal agencies agree that aggressive silvicultural techniques such as those proposed by the NPS for Yosemite can, in fact, create conditions that increase the risk of wildfire, by increasing exposure to winds and desiccation, changing microclimates, and increasing ignition sources. The Park Service's proposal, which involves in some cases to lop and scatter, and chip and broadcast woody, also risks increasing levels of slash and flashy fuels, which would exacerbate the fuels problem.

Response: See response to Concern #22. As a point of clarification, the A-Rock fire was an unwanted wildland fire, and a suppression response was taken towards it from the moment it was discovered. We agree that any mechanical treatment can have impacts on sensitive resources. The mitigation actions in the FEIS which were developed in consultation with the U.S. Fish and Wildlife Service are designed to address this concern. Fuels generated by mechanical thinning would generally be chipped on site, chipped and hauled off site, or burned in piles over the following winter.

Science/Resource-Based Decision-Making

Concern #24: The National Park Service should follow guidance from Scientific Research

Letter Number: 100

Comment: - FOLLOW GUIDANCE FROM SCIENTIFIC RESEARCH -- The US Forest Service Pacific Northwest Research branch recently published a "Science Update" to help policy-makers deal with fire risk. It should be reviewed and its findings and recommendations should be incorporated in this fire plan analysis. It constitutes some new information that should be considered, as required by NEPA. This "Science Update" is available at http://www.fs.fed.us/pnw/ or you can download it directly at: http://www.fs.fed.us/pnw/scienceupdate2.pdf .

Response: See response to Concern #8. We agree that objectives and procedures for the fire management program need to updated as new research is developed. The Yosemite fire program will also continue to sponsor research done in the park to provide guidance.

Concern #25: The National Park Service should not manage for conditions that existed prior to fire suppression activities, because they had no scientific significance whatsoever and/or there is no evidence to support them.

Letter: 86, 133

Letter Number: 86

Comment: The idea that the year 1860 be utilized as some sort of benchmark for fire management. I cannot imagine what on earth motivated the park service to select that particular point in time. Although it may be associated with a moment when there was a change in fire management philosophy, it has no scientific significance whatsoever, and given the limitation of technology at that time I cannot imagine that it actually marks a significant change in actual fire suppression.

Response: See response to Concern #19.

Concern #26: The draft FMP/EIS should be supported by rigorous analysis that has undergone peer-review.

Letter Number: 63

Comment: Most of the statement about "adverse or beneficial effects" appear to be conclusory and unsupported by rigorous analysis. The sections on the various affected resources should be submitted for peer-review to outside scientists in the various disciplines, who are uninfluenced by the effects of their conclusions on their careers.

Response: Even though a 'strict' peer review process was not followed, park and research professionals consulted with a variety of sources of information in the development of the document. Please see *Organizations and Agencies Consulted* in Chapter 6, *Consultation and Coordination*, and the *List of Preparers* in Chapter 7. The FEIS will contain a Biological Opinion written by the U.S. Fish and Wildlife Service on management requirements for the protection of sensitive species.

Concern #27: The National Park Service should allow its experts to carry out a science-based, active fuels management program.

Letter Number: 9

Comment: It is time to stop caving in to political pressure and threats of litigation and allow NPS experts to finally carry out the right resource management activities in YNP, including a science based, active management fuels program.

Response: The intent of the plan is to manage with a science-based program.

Concern #28: The National Park Service should conduct field trips for the public (like the ones held during the public comment period) to describe and discuss proposed treatments.

Letter Number: 115

Comment: * OBSERVATIONS REGARDING THE FIRE MANAGEMENT PLAN FIELD TRIP CONDUCTED BY THE YOSEMITE FIRE MANAGER IN YOSEMITE ON JULY 24, 2002. FoYV appreciates the Field Trip and marking of the demonstration plot at Happy Isles put together by the NPS Fire Manager. This kind of opportunity to see an actual plot and discuss it with the manager is the kind of experience the public needs in order to better be able to review plans, project and proposals and ask questions and discuss them with the managers. We hope that this is seen as a two-way dialogue in which we all learn from each-other in our mutual quest to preserve and restore Yosemite. However, the amount of manipulation explained to be part of the fire plan's preferred alternative to the area was alarming.

Response: We're glad that the field trips were useful and will continue to use them as tools to promote discussion and comment on plans.

Concern #29: The FMP has adequate scientific support.

Letter Number: 10

Comment: Very pleased with depth of scientific research done on background.

Response: See response to Concern #8.

Relationship to Other Park Plans/Planning

Concern #30: The National Park Service should identify the type of emergency/evacuation response plan it has developed, working with other regional and local agencies.

Letter Number: 15

Comment: What type of emergency/evacuation response plan has been develop between the Park Service, the Department and the regional and local emergency/evacuation response units (i.e. the California Department of Forestry, local fire and rescue units, etc.)?

Response: Evacuation and emergency plans have been developed by Visitor Protection Division staff. Copies of plans pertinent to the fire program will be placed into the final Fire Management Plan.

Concern: #31: The National Park Service should expand the scope of the FMP to include the full range of reasonable alternatives for vegetation management.

Letter Number: 70

Comment: You refer (on page 1-8) to the General Management Plan (1980), the Resources Management Plan (1993), and the Vegetation Management Plan (1997) as the basis for limiting the scope of the Fire Management Plan and EIS. As each of these plans postdates 1969, indicate here the EISs that were prepared for each of them (NEPA review is prerequisite to adopting a plan or policy). Since the Draft Fire Management EIS considers only the means and speed with which Vegetation Management Plan is implemented, it is obviously tiered off the latter. Should there have been no Vegetation Management Plan EIS, it is incumbent upon you to expand the scope of the present EIS to evaluate the impacts of the full range of reasonable alternatives for vegetation management, not just the aggressiveness with which they are implemented.

Response: The scope of a fire management plan is defined by NPS fire management policy (Director's Order 18). The DYFMP/EIS neither states nor indicates that the scope of the plan was limited by the GMP, RMP, or Vegetation Management Plan. Instead, it references these plans as part of the foundation for its goals and objectives (NPS fire management policy directs that fire management plans derive fire management objectives from other land, natural and cultural resource plans). Fire is a tool that can be used to accomplish certain vegetation management objectives but not all of them. Many needed vegetation management-related actions (for example, eradicating certain exotic plant species, re-vegetating disturbed sites, identifying issues related to the use of pack stock, campground restoration, or maintaining certain cultural landscapes) have no relationship to fire, thus, they would not fall under the scope of a fire management plan.

Concern #32: The draft FMP/EIS may be in conflict with other plans including the Merced River Plan, Yosemite General Management and other plans, and these conflicts should be discussed.

Letters: 76, 15,

Letter Number: 76

Comment: The aggressive method is too aggressive, and I'm not so sure it doesn't compete contradictory to the Merced Scenic + Wild River Plan or other facets of the Yosemite Valley Plan or General Management Plan, not to mention the heavy machinery diesel-spewing fumes will add to pollution.

Letter Number: 15

Comment: The potential conflicts between this plan and other Yosemite Park plans should also be discussed.

Response: Please see Relationship of the Yosemite Fire Management Plan to other Yosemite National Park Plans, on page 1-18, in Chapter 1 of the DYFMP/EIS.

General Management Plan

Concern #33: The draft FMP/EIS is in conflict with the GMP and its goal, to “Allow natural processes to prevail.”

Letters: 125, 123, 125, 58, 89, 38, 60, 110,

Letter Number: 125

Comment: One of the five broad goals in the 1980 General Management Plan is "Allow Natural Processes to Prevail." The only concession to "simulating" nature is in the case of "developed areas like the Valley." That paragraph concludes by saying, "In areas that have been disturbed by man's activity, natural processes will be allowed to restore the scene."

Letter Number: 123

Comment: I protest the presumption that a Park planner could be qualified to tell me what the Park ought to look like. I object to someone having decided that they will make the Park look like it did in 1860. It seems to me that your General Management Plan, which calls for allowing natural processes to prevail, should be adhered to. Some of us spent a lot of time and effort participating in the GMP process more than twenty years ago, and I object to the Park Service blithely ignoring it now.

Response: With respect to the Yosemite GMP’s goal to allow natural processes to prevail, it recognizes that “controlled burns or mechanical removal of vegetation” may be needed to simulate the natural role of fire. The draft and final YFMP/EIS was written by fire management specialists, in consultation with fire ecologists, resource management specialists, and research scientists; their intent was to allow natural processes to prevail in most of the park, and where that was not possible at this time (17% of the park), to propose steps to maintain the ecosystem (simulating the natural role of fire) or restore it to where natural processes could again prevail. The intent of the FMP/EIS is not to recreate and maintain a specific point in time.

Concern #34: The draft FMP/EIS's provision for helipads is inconsistent with the GMP direction of eliminating all man-made features.

Letter Number: 4

Comment: It seems the helipad project is inconsistent with the General Plan that is restoring Yosemite back to nature and eliminating all man-made features.

Response: Actually, the Yosemite GMP does not call for eliminating all man-made features. Even so, the helibase upgrades are not new development, but are improvements aimed at making the sites safer for helicopter use.

Yosemite Valley Plan

Concern #35: The FMP/EIS should not facilitate new development in Yosemite National Park

Letters: 116, 115,

Letter Number: 116

Comment: Our greatest fear is that THIS Fire Management Plan has been prepared to serve as a vehicle for clearing out Yosemite Valley to make way for proposed development. In the name of 'fire safety,' trees will be cut down so that roads can be widened and lodging and employee housing can be constructed. Activity can also occur with an eye toward future plans enabling the Park to claim areas have been 'already disturbed.' This is not fire management; this is site development.

Response: Please see Chapter 1, *Purpose and Need*. Facilitating new development is not a purpose of the Yosemite FMP/EIS. Under the FMP/EIS, no new roads will be constructed, no existing roads will be widened.

Concern #36: The draft FMP/EIS's restoration objective should be consistent and coordinated with other plans, including the Yosemite Valley Plan.

Letter Number: 117

Comment: Second, we question whether the "restoration" objective itself (to restore pre-suppression species composition percentages), which is the NPS's primary justification for large tree removal, is appropriate in the WUI areas and are concerned that, from our reading, this objective is neither part of a comprehensive plan for the entire park nor well-coordinated with the Yosemite Valley Plan (YVP). Rather than establish restoration objectives in a single-use plan such as this one, any such objectives should be derived from and consistent with the broader YVP. The YVP did not discuss forest "restoration" and additionally contains components (Black Oak removal to build dormitories, for example) that are inconsistent with the proposed "restoration objectives" in the draft EIS.

Response: Both the YFMP/EIS and the Yosemite Valley Plan (YVP) are implementation plans that tier from the Yosemite General Management Plan. However, the YVP and other park plans were consulted, and will continue to be consulted, to assure consistency and to identify potential conflicts or areas of cooperation. In situations where tree thinning is already occurring, such as in the Yosemite Falls project and the Hazard Tree Removal program, restoration objectives under the EIS/FMP may already be at least partially met.

Resources Management Plan

Concern #37: The National Park Service should have a Forest Management Plan, for which the fire management plan is not a substitute.

Letter Number: 138

Comment: I believe you need a FOREST Management Plan in place and certainly should not use a Fire Management Plan as a substitute for that.

Response: The YFMP/EIS utilizes fire as a tool for accomplishing objectives derived from other land and natural and cultural resource management plans. Please see *Relationship of the Yosemite Fire Management Plan to Other Yosemite National Park Plans*, in Chapter 1.

Applicable Laws and Regulations

Concern #38: The draft FMP/EIS would subject public assets to fraud and abuse because of lack of transparency.

Letter Number: 40

Comment: Ambience sees red flags waving over your Fire Management Plan. As written, Yosemite's Fire Management Plan subjects public assets to fraud and abuse because of lack of transparency typical of the defamed accounting found in prominent recent cases such as Tyco, WorldCom and Enron.

Response: Oversight of the fire management program is conducted via audits done by the regional and national fire management offices. Specific contracts for fuels management are subject to review by park and regional contracting officials, as well as by the Superintendent. Contracts will be created and managed according to federal requirements and procedures.

NPS Legal Authority

Concern #39: The National Park Service should not allow logs to be removed from the park because it would violate its Organic Act.

Letter Number: 125

Comment: To haul large volumes of logs (former trees) out of the Park would probably a violation of your Organic Act, which calls for preserving the natural features unimpaired for the enjoyment of future generations.

Response: The NPS Organic Act and Yosemite National Park designating legislation preclude commercial timber harvest in the park, but do not preclude the use of tools needed to effectively manage natural and cultural resources consistent with the NPS mission (16 U.S.C. 54 allows for the removal of mature, dead or down timber, as deemed necessary or advisable for protection or improvement of the park). It should be noted that most of the trees cut under the plan would be left in place, but there will be situations where prescribed burn bosses cannot conduct prescribed burns until concentrations of down material can be reduced, because of the risks to plant communities and wildland urban interface. To remove this material would not be a violation of the Organic Act and in fact could help protect against fire-related impairment, such as damage to soils through extensive heat from pile burning, or scorching of overstory trees.

Land Management Laws, Executive Orders, Policies and Guidelines

Concern #40: The National Park Service should be commended for efforts to comply with Federal Fire Policy; it should clarify the ways in which the past plan was inconsistent, and ways in which interagency implement issues will be dealt in the new plan.

Letter Number: 135

Comment: The National Park Service and Yosemite National Park should be commended for your efforts to implement and abide by the 1995 and 2001 Federal Fire Policy. The NPS plays a vanguard role among other agencies in its implementation of the spirit and letter of the Fire Policy. Questions: How and why does the current FMP not comply with the National Fire Plan and Federal Fire Policy? Will the new FMP allow wildland fire use from human-caused ignitions, as the 2001 Fire Policy provides? Also, what provisions, if any, has the Yosemite FMP developed for interagency cooperative planning and management of wildland fires that may burn onto adjacent Forest Service land? Will the Park be forced to suppress wildland fires near its boundaries if the Forest Service does not wish to have fires burn onto its lands, as is implied on pg. 1-11? In Appendix 3 (pg. 3-7) it for prescribed fires or for wildland fire use, too? In our opinion, if an adjacent agency does not have a current, approved FMP, or does not have the desire to manage fires cooperatively, it should not be the burden of the Park to suffer the adverse effects of suppression to try to confine fires within Park boundaries.

Response: Terminology has changed, and the 1990 Yosemite plan did not address the importance of WUI protection, or discuss tools by which this protection could be done. In the new plan, burn units were updated, and WUI areas where mechanical fuel treatments could be allowed were identified. Most importantly, a commitment to firefighter and public safety as the highest priority is made in the revised FMP/EIS. Current policy does not allow human-caused fires to be counted as wildland fires used for resource benefits, but human-caused fires can be managed with the most appropriate techniques. Joint wildland fire use and prescribed fire plans are being discussed and implemented with the neighboring USFS lands. The pages in question in Appendix three are concerned with prescribed fire.

Concern #41: The National Park Service should clarify whether the layers of protection for Yosemite justify the protection of buildings.

Letter Number: 138

Comment: Were the several layers of protection mandated for Yosemite Valley since Abraham Lincoln's time written to protect buildings?? Have you reviewed these mandates lately?

Response: The mandates relating to managing Yosemite National Park and fires on federal lands were consulted while preparing the draft and final YFMP/EIS. Yosemite designating legislation makes the Secretary of Interior responsible for the "management and care of the park and for the protection of the property therein..." For additional discussion of mandates, please see Chapter 1, *Purpose and Need*.

Concern #44: Per Director's Order 2, the FMP is General Management planning, which means that the National Park Service must do site specific analysis on each of its projects, and present that information to the public.

Letter Number: 63

Comment: Each project proposed to achieve the DFMP objectives must be analyzed in a site-specific manner and published for pubic review in accordance with NEPA. Attention is called to Director's Order # 2, SS 3.3.1.2:3.3.1.2 General Management planning will constitute the first phase of tiered planning and decision making. It will focus on why the park was established and what resource conditions and visitor experiences should be achieved and maintained over time. The general management plan will take the long view, which may be many years

> into the future when dealing with the time frames of natural and cultural processes. The plan will consider the park holistically (in its full ecological and cultural contexts) as a unit of the national park system and as a part of the surrounding region. It will identify the appropriate visitor services. The general management plan will also identify connections among the various park programs and park management districts. This will help avoid inadvertently creating new problems in one area, while attempting to solve problems in another. Decisions about site-specific actions will be deferred to implementation planning. More detailed, site-specific analyses of implementation plan alternatives will be required before any major federal action is undertaken. (Emphasis added.)
>
> The "general" nature of the DFMP is revealed on Maps 2-6 to 2-11, 2-14, & 2-15; in which approximately 160 "Burn Units" are identified. No detailed, site specific information on current or target conditions is provided for these project areas. At a minimum, an Environmental Assessment (EA) must be prepared for those units that will be treated within each year of implementation of the FMP. Each EA must contain all the pertinent existing and target data [treatment area, basal area, size distribution, height to base of crown, crown bulk density, canopy closure, fuel loading (< 3" & > 3"), elevation, slope and aspect, etc.] for each treatment unit encompassed by the EA.

Response: The comment suggests that the YFMP/EIS is a general management plan, per (NPS) Director's Order #2. It is not. The YFMP/EIS is an implementation plan that tiers from the Yosemite General Management Plan (please see page 1-8 and 1-18 in the draft YFMP/EIS). The burn unit maps referenced in the comment provide information as to the areas within which suites of fire management actions (described in Chapter 2, *Alternatives*) would be employed. Target conditions, by plant community type, are provided in Chapter 2. The draft and final YFMP/EIS indicate that the objective of the fire management program is to return forest stand conditions to, and maintain them within, the natural range of variability. These conditions will be achieved by using a standard suite of prescriptions for the application of prescribed fire, listed in Appendix three. The application of fire using these prescriptions is adjusted by the factors listed in the comment, such as fuel loading, to achieve a consistent result, with the expected environmental effects listed in Chapter 4. Each burn block will always require its own clearance for species of concern, cultural resources, and air quality burning permits.

National Environmental Policy Act and CEQ Regulations

Concern #42: The draft FMP/EIS violates the National Environmental Policy Act, in that it fails to present information in a way that can be understood by a reasonably informed and intelligent public.

Letters: 77, 125, 42, 71, 80, 38

Letter Number: 125

Comment: The present Draft violates the National Environmental Policy Act (NEPA). In a nutshell, it is incomprehensible. Failure to present the material in a way which can be understood by a reasonably informed and intelligent public constitutes a violation of NEPA, the most basic intent of which is to DISCLOSE the nature of the proposed action and its potential impacts. You have failed to disclose.

NEPA requires that there be an opportunity for the public to COMMENT, which the incomprehensibility of the present draft renders almost impossible. Failure to provide for public comment is another NEPA violation.

Response: Please see the response to Concerns #13 and #14.

Concern #42a: The National Park Service should not combine fire management and vegetation management activities under one FMP/EIS, because is it not legal under NEPA to use a fire management document to gain NEPA approval for activities that don't reduce fire risk.

Letter Number: 82

Comment: Removing large trees to get back to Pre-European conditions may or may not have ecological value or justification, but it is completely illegal and illogical to use a fire management document to gain NEPA approval for the removal of trees that have no significant effects on fire risk or fire suppression. A separate NEPA document and analysis is necessary in order to avoid misleading the public in this matter. Large trees do not create fire risk. As each of you fully realizes, the removal of trees larger than 20" (and probably larger than 12" dbh) would not significantly reduce rate of spread, flame lengths, fire intensity, or the likelihood of a stand replacing fire.

Response: We are not aware of any clause within the National Environmental Policy Act that makes it illegal to undertake fire management-related activities for any reason other than to reduce risks. The purpose and need for the YFMP/EIS is discussed in Chapter 1, *Purpose and Need*. NPS fire management policy directs that fire management objectives be derived from park land and natural and cultural resource management plans (see the *Yosemite General Management Plan*, for example). The reason that fire management activities are used in vegetation management, in general, is that fire is one of the most profound and important change and maintenance agents to influence the natural ecosystems in Yosemite (thus the proposal to continue managing wildland fire in most of the park). Because of past fire suppression activities, the distribution of tree sizes has changed in many areas, thus fire regimes, forest stand structure and species compositions are altered. Mechanical thinning may be used near developed areas of the park to facilitate the use of fire throughout the park. The maximum diameter of trees removed in the WUI areas has been reduced from 31.5" to 20."

Concern #43: The National Park Service should do site-specific planning, using fuel reduction only as its justification, and this information should be presented to the public prior to taking any actions under the FMP/EIS.

Letter: 86, 77, 63, 11, 82, 38,

Letter Number: 86

Comment: Yosemite is too large and too varied in both terrain and human presence for it not to be necessary to plan individually before taking action at a particular site. There must be site-specific planning to identify what would be the most appropriate fire management techniques to use. These specific plans should, of course, be presented to the public for their review. Not one very broad brush, not several broad brushes, not any pre-fabricated brush would provide a suitable way of addressing the complex variety of Yosemite's needs. Each site must receive individual assessment and the subsequent plans must be open to public

Letter Number: 77

Comment: Because of the highly contentious nature of tree-cutting within a national park, the SITE SPECIFIC ANALYSIS must be an open process, with notification to the public, and ample opportunity for public input to the process. And this is assuming that the analysis is only for the purpose of fuel/hazard reduction. Any attempt to commingle this purpose with the idea of restoring the Park to someone's speculative vision of what it looked like in 1860 (or any other year) would be immensely complicated, invalid, and probably illegal.

Response: In the Final YFMP/EIS, clarifications were made regarding project level compliance. Under the umbrella of this EIS, the NPS will manage wildland fires in the Fire Use Unit, conduct prescribed fires in the Suppression Unit, and carry out mechanical thinning work in the ¼-mile wide inner protection zone around six WUI communities and roadside thinning in the Suppression Zone. If mechanical thinning related to fuel and/or vegetation management is needed in the outer ¼-mile up to 1 ½ -mile wide WUI area following the initial use of prescribed fire, it will require additional NEPA compliance, including public review and comment. Even those activities undertaken under the umbrella of this EIS will require additional site specific documentation, review by subject matter experts, and, when needed, consultation on cultural resources and special status species. Regarding the interrelationship of fire and vegetation management, please see the response to Concern #42 above.

California State Agricultural and Prescribed Burning Regulations

Concern #45: The FMP/EIS should comply with federal, state and local air quality regulations.

Letter Number: 118

Comment: The Yosemite Fire Management Plan should comply with federal, state, and local air quality regulations.

Response: The NPS has addressed compliance with all local, state, and federal air quality regulations in the FMP/EIS. Prior to the writing of the draft YFMP/EIS, park staff consulted with county and state officials, and developed the analysis used in the draft and final in response. The Air Quality discussions disclose all necessary information required by law. In the draft

YFMP/EIS, see the discussion beginning on page 3-40, and the analyses on pages 4-88, 4-169, 4-238 and 4-303.

In Chapter Two, page 2-45 of the FMP/EIS, under the banner "Air Quality," it is written that "all proposed prescribed burns would adhere to requirements of Title 17 California Code of Regulations regarding Agricultural Burning Guidelines, as well as regulations developed by Tuolumne County Air Management District, Mariposa County Air Management District, and/or San Joaquin Unified Air Management District, all of which have jurisdictional boundaries within Yosemite National Park." On page 2-48, under the heading "Air Quality/Smoke Management," it further states that "with all actions in Yosemite National Park or the El Portal Administrative Site involving prescribed fire or managed wildland fire, there would be strict adherence to state and federal regulations. This process mandates consultation with California Air Resources Board (CARB) and local (county) air pollution control officers (APCO), and other federal and state agencies that are involved with similar land treatments." Actions taken under this FMP/EIS will comply with federal, state and local air quality regulations.

Concern #46: The FMP/EIS should consider the effects of fire on regional air quality, human health and scenic resources

Letter Number: 118

Comment: The Yosemite Fire Management Plan should consider the effects of fire on regional are quality. The District concurs with this statement. This statement is consistent with the SMP and Title 17 requirements which requires daily communication between air districts, fire protection agencies and other public agencies, including other states if conditions warrant. The National Park Service should consider smoke impacts on health, visual resources, and events. The District concurs with this statement. This statement is consistent with the District's SMP requirements and of Title 17 requirements. Minimizing smoke emissions and preventing smoke impacts are integral components of the Smoke Management Program. Yosemite's Smoke Communication Strategy implements notification, monitoring and talking points for a comprehensive program to alert the public of smoke impacts.

Response: As discussed in Concern #45, prescribed fire and managed fire use incidents in Yosemite National Park will comply with federal, state and local air quality regulations. These regulations are in place to protect human health and minimize pollutants that would degrade regional air quality. Projected air emissions for the four alternatives considered can be found in Chapter Four of the draft FMP/EIS, on pages 4-303 to 4-307. The cumulative impacts of the preferred alternative, Alternative D, would be major, adverse and short-term. However, it is important to understand that emissions from prescribed fires are approximately 2/3 of the amount of emissions that could be expected from a wildfire (according to FOFEM {First Order Fire Effects Modeling}). Thus, it is prudent to say that prescribed fire over the same piece of ground would result in less emission than a wildfire burning the same area.

As for scenic resources, smoke impacts obscuring scenic vistas are usually short-lived. Variable weather patterns tend to change the volume of smoke that is emitted, and winds tend to shift during the day, causing the smoke column to alter. Inversions can cause smoke to settle over an area for several hours or days; prescribed burns are scheduled during times of adequate dispersal, in consultation with the California Air Resources Board. Wildland Fire Use fires from natural ignitions (usually lightning) can burn for several months and may be subject to periods of large growth followed by periods of near-dormancy, depending on weather and fuel conditions. Most Wildland Fire Use fires remain at less than 10 acres, but some in recent years have exceeded 1000 acres in size. The 2001 Hoover Fire, a lightning fire that started in early July, burned into December for a total of approximately 8500 acres. Smoke from the Hoover Fire, combined with smoke from several suppression wildland fires burning outside the Park (Creek, Highway 180, Star and North Fork fires), degraded regional air quality. While the fires outside the Park were being suppressed, Yosemite took action to limit the growth of the Hoover fire on 50% of its perimeter, causing significant reduction in smoke production.

Fires that are causing impacts to air quality will be evaluated for effective measures to curtail or significantly reduce smoke production (See page 2-45, *Air Quality,* in the Draft FMP/EIS).

Implementation Funding

Concern #47: The National Park Service should seek funding to treat fuels in ways that benefit the ecosystem, rather than spend greater amounts of money to suppression fires that are destroying resources.

Letter Number: 87

Comment: A thought that must have occurred to many is that it costs ten of millions of dollars to put out a large fire, after the resource is destroyed. Why not put the millions up front to cut pile and burn small problematic trees and brush that have built up after decades of fire suppression. The nutrient value of this burned vegetation would remain on sight and be recycled into the ecosystem, not hauled off to a mill.

Response: Congress has recognized that funding spent on fuels management can mitigate the occurrence, and high costs, of unwanted wildland fires. As a result, the park has received a significant increase in its fuels management funds. As stated in the DEIS, an important reason for fuels management is to mitigate the occurrence of large, damaging wildfires that have burned thousands of acres in the park in the last few years.

Concern #48: The National Park Service should use donated funds to increase fire management activities.

Letter Number: 122

Comment: Why don't you take some of that Yosemite Fund money, that 12 million dollars and spend it on preservation, by increasing managed fire program in the park, and start budgeting more money in that area, so that eventually Yosemite won't have areas that are so thick with combustible material?

Response: the park has submitted proposals to the Yosemite Fund seeking funding for both fire ecology research and public education of the fire program, and the Fund has approved funding for these activities.

Concern #49: The National Park Service should not offer commercial incentives or seek to recover costs through wood sales, because offering incentives to private operators is a slippery slope that could open Yosemite to tree harvesting.

Letter: 77, 58, 114, 68, 121, 113, 116, 135, 59, 67, 134, 42, 71, 38, 103, 125, 71, 75, 74, 87,

Letter Number: 77

Comment: Do not allow logging companies to remove any wood from Yosemite. As a business they have their own financial interests at heart and will be faced to take more than what is allocated in order to cover expenses.

Letter Number: 71

Comment: But calculations using the Park Service's own figures show that, under their Plan, more than FIVE HUNDRED logging truck loads per year would be hauled out of Yosemite to lumber mills!!

The only way to avoid Yosemite being subjected to commercial logging is to require that cut material remain in the Park, preferably as close to its point of origin as possible. The smaller material would have to be burned under controlled conditions to avoid excessive fuels build up. Trying to fund the fuel reduction program by offering commercial incentives to private operators is a slippery slope. It inevitably leads to biasing the process to permit larger trees to be cut in order to subsidize the operation. Oppose this funding mechanism.

Response: The DEIS does not propose commercial tree harvesting has a method of fuels management. Thinning and removal of smaller trees would result in piles of material which would be burned in place, sold as firewood, or utilized within the park such as for fencing. If material removed through mechanical means cannot be burned in place because of an inability to obtain burning permits from local air pollution control agencies, and cannot be utilized inside the park, the material would be disposed of in the same manner as that utilized for many years by the hazard tree removal program. Chipped material may be hauled away to be utilized by cogeneration plants. In any case, any funds received could not be used to subsidize the Yosemite fire management program.

Concern #50: The National Park Service should explore ways to support energy and wood products through thinning operations.

Letter Number: 136

Comment: The cost should be minimal, for a thinning operation produces sources of energy and wood products which cannot be duplicated by fire.

Response: See response to Concern #49.

Public Involvement

Concern #51: The FMP/EIS should include more synthesis of the group and agency consultations conducted during preparation of the plan.

Letter Number: 65

Comment: While the proposed Draft Plan purports to have consulted numerous groups and agencies, there does not seem to have been much synthesis and the resultant Plan is not clear enough for interested parties to understand.

Response: Please see *Organizations and Agencies Consulted* in Chapter 6, *Consultation and Coordination*. A synthesis of the issues of interest to each is included.

Concern #52: The NPS should aggressively educate visitors and interested public to the importance of fire.

Letter: 134, 132,

Letter Number: 134

Comment: We would ask that the Park aggressively educate visitors and interested public to the importance of fire to the Park's and the Sierra Nevada's ecosystem. Help visitors to learn that some smoke and charred trees and landscape are natural, and explain how fire is beneficial and necessary for natural processes and ecosystem elements.

Response: This is a good suggestion, considering the complexity of fire-related issues in a park as diverse as Yosemite. The Division of Interpretation makes frequent efforts to interpret fire in its established interpretive programs and in support of efforts to manage actual fire events. This past year, a fire information display was developed covering the topics suggested. It was in use in the Yosemite Valley Visitor Center for several months. This display will continue to be used periodically, and as needed. We are also considering the development of an educational video, working with our many partners in the scientific community.

The fire management program will step up the rate of public education as the rate of fuel management increases. Interpretive programs, media releases, coordination with U.C. Merced science staff, establishment of fire education staff positions and development of a fire management website are envisioned to meet public education needs.

Coordination With State Agencies

Concern #53: The FMP/EIS should indicate the role of Transportation Management Centers in any fire-related evacuation of Yosemite National Park

Letter Number: 15

Comment: Both District 6, Fresno and District 10, Stockton have Transportation Management Centers (TMC). The District 6 TMC would likely be the Department lead in coordinating any evacuation of Yosemite Park. These coordinated and planned efforts should be a part of any Yosemite Fire Management Plan and any park emergency/evacuation plan.

Response: Park evacuation plans are developed by the Visitor Protection Division. Information concerning evacuation of Yosemite due to fire activity will be in the final Fire Management Plan.

Concern #54: The FMP/EIS should assess the affect of smoke from Yosemite on the rates of evaporation and water level increase at Mono Lake (per the State Water Board's order).

Letter Number: 95

Comment: The State Water Board in 1994 amended L.A.'s water licenses by requiring the City to release enough water into the lake to raise it to 6392 feet above sea level. That rise is taking longer to unfold because possible flaws in the modeling used to project the rate of rise. A layer of smoke over the Mono Basin seems to create a type of mini-green house effect that actually raises the air temperature here. A warmer temperature here increases the rate of evaporation of water from Mono Lake. How will additional smoke from Yosemite affect the State Water Board's order to raise the lake?

Response: We have conducted a literature search and asked NPS and USFS subject matter experts if they were aware of any research indicating a relationship between smoke and evaporation rates on Mono Lake. We were unable to find substantiated information that could serve as a basis for conducting the analysis suggested. There is a possible effect, but smoke from prescribed fire activities is a very periodic event at Mono Lake, thus we were not able to substantiate an effect upon the lake's rate of filling. We would be interested in any scientific literature pertaining to this subject which the author of this comment could provide to us.

Concern #55: The FMP/EIS should more fully address interagency cooperation (with USFS, BLM and others) on fuel reduction projects and managed fires along boundary areas.

Concern #55a: The FMP/EIS should address the activities of other agencies, and their influence upon the annual constraints to burning for the NPS.

Letters: 111, 83, 130

Letter Number: 83

Comment: ·While the Plan addresses the various communities within the Park, it does not speak to cooperation between agencies such as USFS and BLM to reduce fire risk along Park boundaries. Because fire knows no political boundaries, what thought has been given to keeping fire out of the park from the National Forest and adjoining BLM land and keeping fire from within the Park from entering the National Forest and BLM land? We strongly suggest looking at an interagency Fire Plan that would reduce fuels along Park boundaries. Some of that is going on with the USFS, Groveland District already. Continuation of those efforts would be an exemplary project.

Letter Number: 130

Comment: We applaud the park for recognizing the need to provide special management at the park boundaries. Land owners have a responsibility to protect neighboring lands from damage extending over property lines. If both the Forest Service and the park service identified the boundaries as a priority, the two agencies could provide complementary management that provides protection to both incoming and exiting fires without either carrying the total burden. Consultation with the Forest Service would be especially timely as they evaluate the Sierra Nevada Forest Plan Amendment.

Response: On page 1-2 of the Draft FMP/EIS, it is written, "With this plan, Yosemite's fire management program would employ fire management activities to accomplish land and resource management objectives and to reduce the risk of unwanted fire in and adjacent to the park." This implies that there would need to be cooperation and collaboration with park neighbors. On page 1-4, the fifth bulleted item reads, "Fire management activities require collaboration with federal, state, county, tribal and local agencies, and a fire management plan provides a basis for communication, coordination, and project planning with partner agencies." On page 1-12, under the goal of "Conduct a fire management program based on existing policy and in compliance with federal and state regulations," it is intended that this FMP/EIS be consistent with National Park Service and federal wildland fire policy, which includes "coordination and communication with other agencies and jurisdictions." Finally, on page 1-14, in Table 1.1, the fourth bulleted statement reads "Promote an interagency approach to managing fires on an ecosystem basis across agency boundaries and in conformance with the natural ecological processes and conditions characteristic of the ecosystem."

On the western boundary of Yosemite National Park, 17 prescribed burn units have been identified that share common boundaries with the Stanislaus or Sierra National Forests (See Map 2-14; Parkwide Burn Units). These burn unit boundaries were designed for future cooperative project with adjacent agencies. Prescribed burn projects that straddle both sides of the boundary and have cooperator's support will receive high priority. An example of this is the proposed 2003 Moss Creek burn in PW-5 and 6, a Yosemite project that was pushed to a higher priority to complement the Stanislaus NF Larsen Project on the other side of the boundary line.

Yosemite has managed natural ignition fires (Wildland Fire Use; formerly Prescribed Natural Fire) since 1972. In the past few years, both the Stanislaus and Sierra National Forests have begun to implement Wildland Fire Use. Agreements are in place with the Stanislaus to allow fires to cross the boundary line in the Fire Use Zone on the NW and north end of Yosemite National Park. An agreement with the Sierra National Forest will be developed in the near future to cover fire use incidents on the southern boundary of Yosemite. By "erasing" the boundary lines in permissible fire use zones, fire will be able to better fulfill its role as a factor in the ecosystem.

For suppression fires and fuels work (both mechanical and prescribed), mechanisms are in place to share resources (personnel and equipment) between the federal and state agencies. These have been used often in the past, and will continue to be used as long as all parties are agreeable.

Concern #56: The National Park Service should consult with local government bodies in the Mono Basin, regarding smoke effects of its fire management activities.

Letter Number: 95

Comment: The GBAPCD will be the agency that will be monitoring (like it or not) the smoke from managed burns in Yosemite. Their instrumentation was designed, built, and stationed in the Basin to monitor the air quality here, which has been impaired over the years as a result of uncontrolled water diversions from Mono Lake, by the City of L.A. As you may know, the lowering of the lake has exposed particulate matter that becomes airborne during windy periods (which is the majority of the afternoons spring through fall). We are trying to improve our air quality here in the Mono Basin. When I spoke with the GBAPCD people today, they told me no one from Yosemite had contacted them regarding how smoke from Yosemite burns may affect their work here in Mono Basin.

Response: As part of Title 17, Smoke Management Guidelines for Agricultural and Prescribed Burning, Yosemite is required to notify the Air District having jurisdiction, as well as neighboring air districts that may be affected by smoke from prescribed fires. This has been done in the past, and will continue to be done in the future. During the 2002 PW-3 Gin Flat Prescribed Fire, smoke impacts were noted on the east side of the Sierra, in the Mono Basin area. Prior to ignition of this unit, the Great Basin Air Pollution Control District, as well as the State of Nevada Air Quality Management District, were both contacted via telephone by Yosemite Fire Management. Additionally, all neighboring air districts, including the two above, received a fax each morning that ignitions were conducted. The fax included a contact telephone number in the park for questions or concerns. This procedure will be followed on future fires as well.

A scoping meeting for comments on the draft FMP/EIS was held in July of 2002 at Mammoth, CA. A presentation of all four alternatives and potential impacts was delivered by Yosemite Park staff, followed by a question and answer period. It was open to all local government agencies, as well as the general public.

Partnerships

Concern #57: The National Park Service should utilize stewardship partnerships, to allow wood removal consistent with restoring healthy forests.

Letter Number: 79

Comment: Establish a partnership. In exchange for logs, logging companies would thin the forest, clear out debris and assist in promoting a healthy, more diverse forest as established between the forest service and the logging companies.

Response: The NPS has been directed by the Department of the Interior to utilize contracts whenever possible to remove hazardous amounts of fuel, either via mechanical thinning or the use of prescribed fire. There is no program envisioned under the DEIS for trading fuel reduction work performed in exchange for logs. However, if prescribed fire cannot reduce hazardous amounts of fuel adjacent to the six WUI communities, contracts could be established to allow the removal and sale of hazardous fuel. Such a process would involve the preparation of a site-specific environmental compliance document, such as an Environmental Assessment, and provide an opportunity for public comment.

Concern #58: The National Park Service should utilize stewardship partnerships, to allow wood removal consistent with restoring healthy forests, but only within 300 feet of WUI and private property.

Letter Number: 82

Comment: Our Center does not object to the removal of large wood from the Park…even in some sort of trade for treatment exchange (such as a Stewardship Contract kind of agreement) IF AND ONLY IF such mechanical treatments are limited to the 300 ft. buffers around private property, utility lines, and structures. We do NOT agree that 300 ft or even 200 ft buffers alongside of roads should be treated aggressively, since many road areas can easily be maintained through periodic prescribed burning treatments. Road buffers should only be mechanically treated in those few situations where prescribed burning cannot possibly meet fuels objectives in a safe manner.

Response: See response to Concern #57. In addition, mechanical fuel removal as the initial fuel reduction treatment would be limited under the preferred alternative to within ¼ mile of the six wildland-urban interface communities (El Portal, Yosemite West, Wawona, Yosemite Valley, Hogdgon Meadow, and Foresta.) The selection of ¼ mile as a buffer was based on the minimum distance required for the safe utilization of prescribed fire; less than that distance would pose a significant risk to structures due to flying embers from prescribed fire. Mechanical work could be done between ¼ and 1 ½ miles of these communities if prescribed fire does not result in sufficient reduction of hazardous fuels or in the attainment of vegetation management targets. Such mechanical follow-up work would require an environmental compliance document and provide for public comment. Clearing of roadside buffers would not be done to meet vegetation management targets, but rather to facilitate the use of roads as fuelbreaks and evacuation corridors. Roadside thinning and brushing under utility line corridors would not employ aggressive techniques, but would use hand thinning and piling methods.

Concern #59: The National Park Service should not utilize stewardship partnerships, because there is no reliable monitoring, supervision or auditing in place to protect the park's natural resources.

Letter Number: 114

Comment: "Partnering with private enterprise" would open the door for Yosemite's NPS to harvest vast tracts of forest because there is no reliable monitoring, supervision or auditing processes to scrutinize NPS (and partner) activities to begin with, including the GAO. When the General Accounting Offices personnel have requested documents and data, Yosemite's upper brass has failed to produce requested documentation on numerous occasions, and for purposes of illustration, investigation into the use of 1997 flood-recovery monies more than qualifies. Yosemite's National Park Service has caved into political agendas, and promoted more than a few of their own, openly co-opting environmental organizations while teaming up with corporations to commercialize and develop Yosemite National Park – then posturing publicly as an agency that protects our nation's natural resources.

Response: There is no use of stewardship partnerships envisioned at this time, which would exchange fuel reduction work for logs. Fuel reduction contracts would be limited in scope to areas around wildland-urban interface communities, roadsides, and utility corridors in the Suppression Unit. All contracts would be managed and inspected by contract representatives and monitored to ensure that contract specifications are met. Mechanical fuel reduction work would be replaced by wildland and prescribed fire as often as practical throughout the park, following the initial treatment.

Development of the Proposed Alternatives

Concern #60: The National Park Service should consider adding criteria related to meadow enhancement, vegetative species conversion, cultural sites, heavy use areas, and wildlife areas, for purposes of guiding implementation of the alternatives.

Letter Number: 130

Comment: We concur with the Park that all alternatives achieve the goals and objectives, differing only in time and methods. We support the criteria established. As stated above, we recommend meadow enhancement, vegetative species conversion, cultural sites, heavy use areas and wildlife areas be added as criteria and Level 1 priority under Special Management Areas.

Response: All the criteria listed are considered in project planning for prescribed fire, wildland fire use and mechanical thinning. They are an important management emphasis for the park's natural resource management program. As high priority projects are identified by the Resource Management Division, within which fire can be used as a tool, prescribed fire projects will be developed to support these priorities.

Concern #61: The National Park Service should explain why past treatments were so limited in scale, and why in the future it will be different under the action alternatives.

Letter Number: 11

Comment: The document does not explain why past treatments were so limited in scale, nor why suddenly that will magically change if an aggressive action alternative is selected. Any alternative should be based upon an accurate assessment of both budgets, political limitations, and personnel limitations.

Letter Number: 11

Comment: How is it that the Park now expects that funding and staffing, burn windows, paperwork completion, and other factors will suddenly result in Alternative D (or B) burning considerably more acres per year?

Response: Since the last FMP was developed in 1990, several new factors have appeared. The fire management staff has added new prescribed fire specialists as well as a new fuels management crew to dedicate full time to the program. Contracting has been made a major emphasis by the Dept. of the Interior, so that the private sector can be hired to accomplish fuel projects; in support of this, Congress has made available millions of dollars for contracting. This commitment of funds and staffing is a result of the new importance the Executive and Legislative branches of the federal government, as well as the state and local governments, have placed on a proactive, rather than reactive, response to wildfires. The effect has been more aggressive fuel management programs, with extra emphasis placed on community involvement and protection. Another important factor has been that land managers are being held accountable for accomplishing the magnitude of fuels projects that they say they can do

Concern: #62: The FMP/EIS should give higher priority to protecting Sequoia groves than to protecting Wildland/Urban Interface.

Letter Number: 63

Comment: If human developments were to be destroyed by a catastrophic fire event, they could be replaced - probably within a decade -- although we would not recommend that replacement occur, since the destruction would be a consequence of a natural process. But replacement of the sequoia groves would take millennia and might not ever be possible. Therefore, we recommend that the groves be given a higher priority for protection than the urban/wildland interface. While the groves themselves represent a small number of acres, it is essential that the surrounding forest also be treated to assure protection

Response: As directed by the 2001 Federal Wildland Policy Review, natural and cultural resources are given the same priority as property. The only higher priority is given to firefighter and public safety. In 2003, prescribed fires will be conducted the sequoia groves while WUI work is being done around communities. Increased funding and staffing allows both programs to proceed concurrently.

Concern #63: The FMP/EIS should include additional discussion of the relationship between zone size (in the Fire Use Unit and Suppression Unit) and the fire return interval departure analysis.

Letter Number: 130

Comment: Additional discussion of the designation criteria for lands identified in the Fire Use Unit and the Suppression Unit would be beneficial. The plan categorizes 48% of the park as "significant deviation" to "highly compromised" from the natural range of variability. The plan also concludes the greater the deviation the greater the risk of catastrophic wildfire. It is therefore confusing to find only 17 percent of the park in the Suppression Unit. At a minimum, the 48,912 acres (6.5 percent of the park) in the Fire Use Unit that is identified as needing additional prescribed fire before wildland fire would be safe and appropriate, should be included in the Suppression Unit until it is safe and appropriate. The plan reports most prescribed burn units require multiple burns to meet resource objectives and 7 to 12 years typically pass between prescribed burns. Therefore, lands identified as needing additional prescribed fire could require decades before it is safe and appropriate to allow the use of wildland fire.

Response: In the discussion of the Fire Management Units in Chapter 2, it states that parts of the Fire Use Unit, 48,912 acres, are placed in prescribed burn units due to high fuel loads and resources of concern. The Fire Use boundary is not based on the Fire Return Interval Departure (FRID) analysis alone. It also considers natural fuel and topographic boundaries. Managed wildland fire is the primary tool in these units, but this does not exclude the use of prescribed fire as a tool in areas with unnaturally high fuel buildups. By being placed in the Fire Use Unit, wildland fire may be used to achieve resource management objectives. Wildland fires are much less likely to be allowed to burn to achieve fuel and resource objectives in the Suppression Unit, because of risk to communities, for example. Placing these areas in the Fire Use Unit indicates that they may be treated by either prescribed fire or wildland fire used for resource benefits.

Concern #64: The fire return interval analysis needs to be consistent between forest types.

Letter Number: 130

Comment: The comparison of fire return intervals is inconsistent between forest types. For example, the red fir forest analysis uses the maximum return interval of 92 years to declare the affect of fire departure has been minimal. Using the minimum fire return interval of 9 years or even the median interval of 30 years would paint a different picture. In fact it is similar to the western white pine/Jeffrey pine forest that has a maximum fire return interval of 96 years, minimum of 4 years and median of 12 years. Using the maximum return interval concludes the vegetation has not been altered by fire exclusion. Using the median of 12 years most of the forest has been significantly altered by missing up to five fires. There should be consistency in the comparisons.

Response: One of the ecological strengths of the fire return interval departure analysis (FRID) is that it has the ability to differentiate between fire regimes in different forest types. The discussion of forest types and FRID in Chapter 3 use both the Maximum and Median Departure to look at how different vegetation types are reacting to fire suppression. All comparisons of Environmental Consequences in Chapter 4 used median departure, which is a moderate view of vegetation community departure.

Range of Alternatives

Concern #65: The FMP/EIS should not include alternatives that would remove trees up to 31.5 inches.

Letter Number: 117

Comment: The preferred alternative proposes to remove up to 31 inches d.b.h. to "restore" species composition to assumed pre-suppression percentages. We are extremely concerned that, in the name of “restoration," the agency has proposed a limit on tree size that is far too permissive. The agency's proposal, as it stands, will be ecologically damaging, will likely create significant public concerns, and will set a truly unacceptable precedent within the National Park System and potentially beyond. While we appreciate and respect individual NPS staff assurances that the 31-inch limit will be implemented judiciously and in good faith, our organizations will not support, and will publicly oppose, a fire plan that allows the NPS to remove trees up to 31 inches in diameter. We have four principal reasons for saying this.

Response: For the Final YFMP/EIS, the upper limit for size of tree that can be cut during thinning operations was revised from 31.5 inches to 20 inches in the proposed action. Furthermore, under the FEIS, this thinning for forest restoration would only occur within ¼ mile of the six WUI communities.

Concern #66: The FMP/EIS alternatives should include provisions to tailor the approach in WUI to the particular circumstances of each (this includes Yosemite Valley).

Letter Number: 117

Comment: Consideration of the option(s) recommended in the EIS would allow the NPS to tailor its approach in WUIs to the particular circumstances of each, as well as to determine whether in Yosemite Valley there is any need to depart from the current conservative approach. In fact we would expect this analysis to reveal that there is no need to depart from current policies in the Valley, because we understand from conversations with Park staff that fuels reduction objectives could be met in the Valley without any change in existing policies.

Response: Each WUI area was considered individually in designing its boundary, or area of concern. This was done taking into account fuel continuity on both a horizontal and vertical plane, topography, and probable routes a fire would travel into or out of that area. There has not been a blanket approach in designing the boundaries of each WUI area; nor would there be for treatments. It is not a "one-size-fits-all" approach; each area is and will continue to be evaluated for the appropriate treatment for the specific area. In many instances throughout the WUI areas in the park, Yosemite Valley included, prescribed fire as a primary treatment next to structures would be too risky without some thinning of fuels and standing trees. Once the thinning has been completed much of the risk for prescribed burning will have descended to a more manageable level. The community of Wawona is an excellent example of a range of treatment methods. In some areas, because of distance from structures and the lay of the land, broadcast burning has been the primary treatment. In other areas, because of high fuel loads and topographic position, small diameter tree thinning and pile burn were necessary primary treatments. Once the areas were mechanically treated, prescribed fire was used as a follow-up treatment. The philosophy of the FEIS/FMP is to consider the use of fire first to reduce fuels and restore target conditions. In those areas where fire as the initial tool would be unsafe, mechanical thinning is done, followed by prescribed fire.

Concern #67: The range of alternatives is limited because the draft FMP/EIS should have considered alternatives that attempted to increase the frequency-of-use and period-of-use for existing policies and less intrusive techniques.

Letter Number: 117

Comment: The National Environmental Policy Act (NEPA) requires the agency to consider a full range of alternatives in its planning, yet all of the action alternatives in the draft EIS are a simple "variation on one single theme." They all consider differing mixes of "passive" and "aggressive" techniques--variations on the intensity of management. We are concerned that the NPS has not considered any alternatives that attempt to increase the frequency-of-use and period-of-use of existing policies and less intrusive techniques (e.g., increase the number of days per week that prescribed fire is used). Similarly, the agency has assumed it will operate under a 31-inch diameter limit across all action alternatives, and it has not yet examined alternatives that propose lower diameter limits along with less intensive methods. Because this is a National Park, we believe that the agency should not only consider, it should in fact adopt, the least intensive methods operating with the strictest logging limits.

Response: See response to comment #66. It should be noted that the National Park Service considered more alternatives than just those included in the range of alternatives and the list of alternatives considered but dismissed, but it would have been infeasible to include an all-inclusive list of "variation" alternatives. The requirement of NEPA is that the agencies consider a reasonable range of alternatives. The alternative suggested in the comment is very similar to No Action, an alternative that was considered. It should be noted, however, that some policies in the No Action alternative were inconsistent with the 2001 Federal Fire Policy, which said, "A full range of fire management activities should be used to achieve ecosystem sustainability, including its interrelated ecological, economic and social components." The No Action alternative failed to adequately address wildland/urban interface issues, as required by the 2001 Federal Fire Policy. Reasons for eliminating an alternative from further study (per NPS Director's Order 12 Handbook) include: "conflict with an up-to-date and valid park plan, statement of purpose and significance, or other policy, such that a major change in the plan or policy would be needed to implement." The suggested alternative could also be seen as a variation on, <u>Disallow the use of</u>

Mechanical Fuel Treatments, which was included in *Alternatives Considered and Dismissed,* in the Draft YFMP/EIS.

The 31-inch tree size referenced in the comment is from the restoration target condition, which is based upon the management objective, "Manage ecosystems within the natural range of variability for plant community structure and fuel loads." This tree size is not an action per se; it relates to the project purpose and need. All alternatives should attempt to accomplish this objective. It should be noted, however, that the maximum size of tree to be cut in thinning operations under Alternative D was reduced in the Final YFMP/EIS to 20 inches. However, it is still the objective of the fire management program to achieve the target condition, through a combination of prescribed fire and thinning. We agree that, in the past, certain administrative factors have precluded a fuller use of prescribed fire. Increased budgets have resulted in more personnel, which has resulted in the undertaking of more complex projects, as well as in the ability to conduct fuel reduction activities year round.

Concern #68: The range of alternatives is limited, because the draft FMP/EIS should have considered an alternative that focused on approaches to protecting WUI and structures without fuel treatment.

Letter Number: 115

Comment: * INADEQUATE RANGE OF ALTERNATIVES. An example of a potential alternative that was not presented nor analyzed. It has been reported to us that in the early 1990s' or late 80s, in lower Yosemite, there was much success with saving some historic building-cabin(s), with a type of tent that inflated and sprayed with fire-retardant foam. While it would be a large financial investment to buy all those tents and foam, money would be saved with less personnel and fire trucks. Was this method evaluated? It could be a better method than clearing, which has its own problems with erosion, weeds, etc.

Response: The alternative suggested does not represent an alternative per se for managing fire to accomplish park fire and resource management objectives. It could certainly remain a tactical option for protecting structures. Application of foam to prevent combustion of many homes in a community would still require engines and personnel to apply foam, and depending on the speed of the fire, it may not be possible to apply foam safely. The reduction of fuels around communities increases the survivability of the building, even if engines are not present.

Alternatives

Concern #69: The National Park Service should adopt Alternative C over Alternatives B or D, because it is less aggressive and could be more easily modified to be less obtrusive/damaging.

Letters: 28, 46, 11, 48, 52, 82, 44, 50, 51, 45, 63, 55, 99, 3, 27, 93, 98, 94, 53, 97, 34, 36,

Letter Number: 11

Comment: It may also be important to note that the table on page 2-17 shows that the selection of Alternative C would result in "ecosystem restoration in 25 years," while the selection of Alternative D would result in "ecosystem restoration in

17.5 years." First, ecosystem restoration is an imprecise, relatively ambiguous measurement, and it is extremely questionable as to whether or not any target goals will be reached uniformly across treated acres. Second, to somehow calculate that it would take 7.5 years longer to use more natural treatments methods (prescribed fire) instead of aggressive mechanical treatments may be a reasonable, although debatable, calculation, but the public would assuredly choose to take a little longer and forego the logging of large trees in the Park.

Letter Number: 82

Comment: CRERC strongly supports the selection of a modified Alternative C, where the increased level of prescribed burning and a moderate level of mechanical treatments could be increased within a 300 ft. strip of buffer along structures, development, and private property. We believe that a modified Alternative C will have the strongest public support, will withstand legal challenge more than Alternative B or D, and will be the most likely to achieve fire and fuel goals with likely levels of funding from Congress.

Letter Number: 63

Comment: Alternative C - with some minor modifications - is the only acceptable action Alternative. The "Preferred Alternative" (D), which attempts to compromise between Alternatives B and C, still includes "Commercial Logging," which is inappropriate for a national park. The DFMP makes a deliberate and systematic effort to create the impression that selection of Alternative C is a prescription for disaster.

Response: The decision on the Yosemite Fire Management Plan/Environmental Impact Statement will be based upon several factors, including the program's purpose and need, its goals, objectives and criteria, and public comment. Aggressiveness per se is not a goal in the purpose and need, but the potential effects of adopting a longer duration, less aggressive approach are more negative than positive. There is a greater potential for failing to achieve the intended goals of the project because of the increasing potential for large, catastrophic fires with time. In the Final YFMP/EIS, modifications were made in the Alternatives to address public concern over the sizes and locations for tree thinning operations, but the timeframe remains the same; a larger part of the workload will be undertaken by prescribed fire, rather than mechanical, operations. Commercial logging is not an action proposed in any alternative.

Concern #70: The National Park Service should adopt either Alternative B or D, because Alternatives A and C are not aggressive enough and because the risk of undesirable, high-intensity fire is too great.

Letters: 25, 47, 13,

Letter Number: 25

Comment: Under option A, no action, we probably would never catch up with the backlog of areas needing burning. Under Option C, passive, we would take ten or more years to catch up. Both of these options increase the risk of undesirable, high-intensity wildfires. Therefore, I think that we should reject options A and C, and select either B or D.

Letter Number: 47

Comment: A more realistic approach would include as much prescribed burning as possible, combined with more aggressive treatments. I advocate adopting a Modified Alternative B which states that aggressive action would be used until you reach certain previously defined benchmarks which accomplish the primary objectives and return the Park to safe and sustainable conditions. Then you would shift (with great fanfare, public participation, etc.) to Alternative D.

Letter Number: 13

Comment: While I feel the more aggressive approach of Alt. B is highly desirable for the western front of Yosemite NP, Alt. D- Multiple Approaches is my recommendation for the Preferred Alternative.

Response: The decision on the Yosemite Fire Management/Environmental Impact Statement will be based upon several factors, including the project's purpose and need, its goals, objectives and criteria, and public comment. Aggressiveness per se is not a factor in the purpose and need, but the potential effects of an alternative with a shorter duration, more aggressive approach are considered positive, in that there is a greater potential for achieving the intended goals of the project before there are additional occurrences of large, catastrophic fires.

Concern #71: The National Park Service should adopt Alternative B, because aggressive action is needed to restore natural conditions and reduce risks of catastrophic fire near WUI.

Letters: 57, 39, 85, 106, 132, 9, 129, 83, 81, 9,

Letter Number: 57

Comment: After reviewing the four alternatives I have decided that Alternative (Aggressive Action) is what is needed for the park. I have based my decision on four main points. First, the FRID is quite substantial in some areas. Aggressive action is needed to get these areas back to natural conditions. Second, the twenty year goal of Alternative D is too long a time to bring the forest back in line. The risk of a catastrophic fire in that time period is too great. Third, hiking experiences and scenic vistas are diminished by a thick under story which needs to be addressed as soon as possible in order to comply with the original purpose of the park. Fourth, original habitat needs to be restored so that the area brings the flora and fauna back into balance, which will accelerate the healing of the ecosystem.

Letter Number: 39

Comment: I support Alternative B - Aggressive Action. But even this falls short of the need I see at Yosemite.

Letter Number: 129

Comment: The Wawona Town Planning Advisory Committee has concluded that it is imperative to reduce fuels in and near Wawona and the rest of Yosemite Park in the timeliest manner possible. Consequently, the committee fully endorses Alternative B - Aggressive Action.

Letter Number: 129

Comment: After reviewing all five alternatives, the County has determined that Alternative B Aggressive Action would be the preferred treatment for reducing the vegetative fuels in Yosemite National Park. In addition, the Wawona Town Planning Advisory Committee after receiving both a presentation and copies of the DYFMP also supports Alternative B - Aggressive Action Plan. Under Alternative B, aggressive techniques would be ued to reduce fuels in and near developed areas within a period of 5 years. The County believes this alternative produces the most beneficial results by reducing fuels and protecting people, homes, developed areas, valued resources, facilities, and utilities. Further, the County supports the physical removal of fuels in addition to the use of prescribed fire methods that were also described in this alternative. The presence of these techniques and treatments in this alternative provides for the greatest opportunity to achieve sustainable forest land management.

We hope you will consider these comments carefully and urge you to select Alternative B - Aggressive Action.

Response: The decision on the Yosemite Fire Management/Environmental Impact Statement will be based upon several factors, including the project's purpose and need, its goals, objectives and criteria, and public comment. Aggressiveness per se is not a factor in the purpose and need, but the potential effects of being aggressive are considered positive. However, there are also negative consequences associated with Alternative B that can be reduced and/or avoided by being more selective in the application of various treatments, including thinning. The immediate focus of the initial stages of the alternatives will be on the protection from wildland fire of the six WUI communities; the period to achieve the restoration of target conditions for forest restoration will be longer under A, C, and D than under B.

Concern #72: The National Park Service should not adopt any of the alternatives, because of the approach taken in the document.

Letters: 69, 66, 33, 60, 115, 36,

Letter Number: 60

Comment: THE FOUR ALTERNATIVE ALL HAVE TOO LIMITED A SCOPE AND ALL USE TOO MUCH FUELS TO IGNITE FIRES.

Response: The scope of the document was developed using Federal Fire Policy, NPS Director's Order 18, and Reference Manual 18 as guidance. Please see Chapter 1, *Purpose and Need*.

Concern #73: The National Park Service should adopt Alternative A, No Action.

Letters: 72, 4, 54

Letter Number: 4

Comment: How does the EPA arrive at Alternative A choice? Certainly they have done their own extensive studies, and why does Yosemite disagree with the study done by the EPA? What assumptions is the EPA making about Yosemite?

Response: Much good has been done in Yosemite over the years under the No Action Alternative. However, through monitoring and evaluation, much has also been learned about what is needed to refine and improve the program. This, combined with the policy changes that came about as a result of the 2001 Federal Fire Policy and National Fire Plan, led to the decision to revise the Yosemite Fire Management Plan. There is a need to build on the successes of the 1990 FMP with methods and objectives not envisioned at time. [It should be noted that the Environmental Protection Agency did not recommend the No Action alternative; the commenter was misinformed on this matter.]

Concern #74: The National Park Service should adopt a preferred alternative that restores natural processes.

Letters: 68, 93, 60, 74, 28, 27, 80,

Letter Number: 68

Comment: ...restoration of natural processes must be the preferred alternative, not manipulation attempting to restore the land to a concept of the mid-19th century. Refer to the 1980 General Management Plan.

Letter Number: 93

Comment: Please select an alternative that mimics natural processes--not one that relies on heavy, invasive

Letter Number: 119

Comment: THERE MUST BE NO INTERFERENCE WITH NATURAL PROCESSES. The main thrust of any plan should be to restore natural processes, of which wildfire is one. In my 68 years of experience with the forest of the Sierra Nevada, I have never known of a fire in native closed-canopy old-growth forest that has not been beneficial in the long run (as well as inevitable). It's the logged, dried-out, bulldozed places that burn devastatingly hot.

Response: We agree that fire is an extremely effective process in maintaining the ecosystems of the Sierra Nevada. In much of Yosemite (83%), natural fire processes are being used to maintain ecosystems. However, some parts of Yosemite (especially those along the western edge of the park) have progressed through succession (because of past fire suppression activities) to the point where fires burn with more intensity and severity than they did under natural conditions and processes. In 17% of the park, prescribed burning is needed to prevent deleterious effects, on a landscape scale, and to allow the eventual return of natural processes to much of the area. In wildland/urban interface, thinning and prescribed burning are needed to reduce risks and mimic fire. The 1980 General Management Plan recognizes this need.

Concern #75: The National Park Service should not adopt any alternative that proposes to thin vegetation/mechanically remove large trees/scrubs or use aggressive treatments.

Letters: 92, 121, 63, 117, 124

Letter Number: 92

Comment: I have a big problem with your Preferred Alternative, Alternative D - Multiple Action. I don't like logging or killing trees 16" dbh - 31.5" dbh. I also don't like helicopter and mechanical logging in National Parks like Yosemite.

Letter Number: 63

Comment: Given that the probability of a catastrophic wildfire event during the 25 year period of Alternative C is only 0.03%; and given that numerous scientific studies (including the 1999 GAO Report, the Forest Service 2000 Cohesive Strategy, and the PNW 2002 Science Update) have shown that removal of large, fire-resistant trees does not contribute to fuel reduction; and given that such software programs as "Behave" and "Farsite" can effectively predict fire behavior and consequences, thereby enabling identification of high-risk areas for preventive treatment; there appears to be no reason to select the more aggressive Alternative D; unless this selection is motivated by an intent to initiate commercial logging in national parks. Alternative C can be made acceptable by inclusion of statements to the effect that: No materials will be removed from the Park for the purposes of commercial end products; No mechanical equipment will go beyond the wilderness boundary OR reach beyond the boundary for the purpose of removing vegetation.

Response: For the Final YFMP/EIS, the Alternatives will be modified to change the size and location limits used for tree thinning operations, to make them more similar to the treatments used by the USFS under the Sierra Nevada Forest Plan Amendment. However, the restoration and maintenance targets will continue to be used as a tool, because they are based on data that help the program move toward restoring a more natural range of variability. It should be noted that BEHAVE and FARSITE are fire behavior and spread models; they do not model fire effects or ecosystem benefits. The FRID analysis used in the Draft and Final YFMP/EIS is a tool that can be used to identify high risk areas. [the draft YFMP/EIS neither intended nor stated a goal of supporting commercial logging. Nor did it state or imply that helicopter or heavy mechanical equipment would be used in wilderness for purposes of removing vegetation; in fact, the draft and final YFMP/EIS state that aggressive treatments would not be used in wilderness. Reaching over into the wilderness is also not allowed in the FEIS/FMP.]

Concern #76: The National Park Service should adopt Alternative D, the preferred alternative.

Letters: 24, 22, 37, 18, 16, 127, 135, 130, 13, 118, 141, 56, 91, 88,

Letter Number: 5

Comment: …please adjust the preferred alternative (Alternative D) so that only trees directly adjacent to development will be logged, and in no case (except for reasons of immediate hazard) any trees be removed that are larger than 20 inches in diameter. Also, please make expanded use of prescribed burning as a management tool. This use of natural processes can provide a healthy forest without the use of heavy equipment to crush brush, chip fuels, or skid cut logs out of to the nearest roads, heavy equipment that causes damage to trees and terrain.

Letter Number: 24

Comment: Yosemite needs the flexibility to use each action and would be the best judge of which technique to use. Alternative D fills this requirement.

Letter Number: 18

Comment: After reviewing the draft of the new park fire management plan, I would like to add my support for it. It is long overdue that land owned by the government be managed in a responsible way, minimizing the damage to people and property that is caused by fires, while allowing the natural processed caused by fire to proceed. The reason that we have seen so many serious fires on federal property during the past few years is because the federal government did not properly manage their land and sometimes even prevented private property owners sometimes even prevented private property owners from properly protecting their land.

Letter Number: 135

Comment: We are concerned about the mechanical thinning and possible commercial uses of those trees, and suspect that the Park has been receiving similar comments from other members of the public. However, knowing some of the Park fire management staff and feeling confident in their competence and commitment to the values of the National Park Service, we are willing to support Alternative D, Multiple Action. This would be the best compromise between aggressive and passive actions, and would help achieve the goal of allowing the maximum use of wildland fire use for ecological restoration.

Letter Number: 118

Comment: The District is in agreement with the DFMP in providing an alternative that would encompass a multiple action scenario (Alternative D - Multiple Action). This alternative is consistent with the Smoke Management Program (SMP) adopted by the District on September 25, 2001, and the Smoke Management Guidelines for Agricultural and Prescribed Burning (title 17), which was amended and adopted on March 14, 2001, by the California Air Resources Board. These regulations are intended to "provide increased opportunities for prescribed burning and agricultural burning, while minimizing smoke impacts on the public." Title 17 and the District's SMP require that alternatives to burning be considered when developing smoke management plans for prescribed burns.

Letter Number: 141

Comment: Your proposals exhibit clear concern for the welfare of visitors, residents and the communities that are within and adjacent to Yosemite National Park. The proposals clearly establish a program to deal with the increasing problem of excessive fuel loading in the park and should be expanded to other wilderness areas as well. By specifically identifying areas that would be thinned and treated to provide protection for recognized values (villages, sequoia groves, historic and cultural sites) you clearly show that very little land base would be subjected to the use of aggressive fuel reduction techniques. The Wildland Urban Interface maps make this very clear and it appears that these treatments only apply to developed areas as opposed to truly wild areas. It is my understanding that these truly wild areas would be left to natural process utilizing wildland fire and some prescribed fire where burn units have been identified. By using all of the tools, you can correctly apply the treatment to the location where work needs to be expedited to meet protection objectives. I fully support your preferred Alternative which allows for use of all treatments where the need is warranted.

Response: No response necessary.

Concern #77: The National Park Service should adopt Alternative D, the preferred alternative, but modified to reduce reliance on aggressive treatments over time.

Letters: 2, 78,

Letter Number: 2

Comment: Alternative D includes some of the more aggressive proposed fuel reduction techniques on a limited basis. The plan seems to suggest that these more aggressive techniques are included in Alternative D due to the urgency of the situation. Alternative D should include the clearly stated goal of bringing the areas subject to aggressive reduction techniques towards the natural fire regime condition and that upon achieving this status the subject areas will be treated with a much less aggressive fuels treatment

Response: The proposed action, Alternative D, was modified to limit aggressive treatments under the FEIS to the areas that are within ¼ mile of the six wildland/urban interface communities. It is the intent to use prescribed fire perpetually for ecosystem maintenance, following the initial mechanical thinning operation. Elsewhere in the park, and in particular the wilderness areas, prescribed and wildland fire are the only techniques used for ecosystem restoration and maintenance.

Concern #78: The National Park Service should not adopt Alternative D, the preferred alternative, because it is too aggressive or because its proposed treatments are unnecessary.

Letters: 48, 11, 133, 3, 34, 27, 128, 44, 97, 98, 94, 50,

Letter Number: 48

Comment: we realize the need for action to prevent the devastating fires we've seen over the past 15 years, (and still mourn the destruction of Foresta), but your Plan D is just too heavy-handed, ESPECIALLY the cutting of BIG TREES, and clearing closer than 300 feet from structures.

Letter Number: 11

Comment: The preferred alternative's polarizing approach to fire management is both unnecessary and unproductive. A more moderate approach that minimizes the most controversial treatments is far more likely to be successful in both achieving fuel reduction and in building public support for fuel management within the park.

Letter Number: 133

Comment: The language describing Alt. D is extremely broad, and opens the door to widespread logging in Yosemite. For example, in the Wildland/Urban Interface area of the Suppression Unit, "in areas close to development, feller-bunchers might be used to remove large and small trees…" DEIS, p. 2-39. Aside from the obvious horror of loggers operating feller-bunchers in Yosemite National Park, the text does not explain what "close to development" means. The purpose of this language is clearly geared toward protecting structures, but no limits are articulated. Is "close" 200 feet? 200 meter? 1 mile? The DEIS is totally open-ended in this regard, which opens the door to massive abuse. As fire scientist Jack Cohen's research has shown, the only way to protect structures is to reduce the flammability of those structures themselves and reduce brush within at most 100 to 200 feet from those structures. See "Reducing the Wildland Fire Threat to Homes: where and how much?", Jack D. Cohen, U.S. Forest Service, Research Physical Scientist, Fire Sciences Lab Rocky Mtn. Research Station (1999). There is NO scientific basis for hazardous fuels treatments more than 200 feet from structures ostensibly to protect those structures. Likewise, in the Non-Wildland/Urban Interface, Non-Wilderness area of the Suppression Unit, logging of large trees could occur supposedly to meet "Restoration Target conditions: or for "hazard tree removal. Timber sales would be used as the tool if it was deemed to be the most economical means - even if it wasn't the most effective means to reduce severe fire behavior. See DEIS, p. 2-40. Again, this language is fatally overboard and opens the door wide to abuse. In the Wildland/Urban Interface area of the Fire Use Unit, "aggressive actions" (i.e. logging) would be used "in limited instances along roads and utility corridors". DEIS, p 2-40. Again, what is "limited" and how close to roads does "along roads" mean? The same problem exists for the Non-Wildland/Urban Interface, Non-Wilderness area of the Fire Use Area. DEIS, p. 2-40 (i.e., logging could occur along roads and utility corridors, but there are no specific limits or standards).

Response: see response to Comment #77. Roadside thinning would be limited to 200' from the centerline along roads in the Suppression Unit. Thinning around the six WUI communities would be restricted to within ¼ mile of these communities, and in situations in this area where prescribed fire cannot be safely used as the initial tool for fuel reduction or restoration of target conditions.

Concern #79: The National Park Service should not adopt Alternative D, the preferred alternative, because it is not aggressive enough.

Letter Number: 47

Comment: I think Environmentally Preferred Alternative D is not aggressive enough, in addition to being unrealistic in the predictions of how soon it will accomplish its goals

Response: Alternative D allows more time to achieve program objectives than does Alternative B, while allowing more aggressive techniques within ¼ mile of the six WUI communities than does Alternative C. We believe that Alternative D represents a good compromise between the immediate need to mitigate risk to WUI communities from wildland fire and the selection of several techniques to do this.

Concern #80: The National Park Service should not adopt Alternative D, the preferred alternative, because the risk of catastrophic fire is greatly over emphasized.

Letter Number: 63

Comment: In the 70 year period from 1930 to 200, there have been three catastrophic fires in the Park (A-Rock,
Steamboat, and Ackerson Complex). A-Rock and Steamboat should possibly be considered one fire event because they occurred simultaneously on the north and south sides of the Merced River respectively. It is conceivable that -- if these fires had occurred at different times -- sufficient resources could have been mobilized in each case, to reduce the acreage burned in either fire. The total number of fires in the Park in the 70 year period (including A-Rock, Steamboat, and Ackerson) was 4,034; of which 482 were prescribed burns, leaving 3,542 that were lightning or human caused. (See Table D-1, Attachment -- D.) Of these 3,542, 575 were Managed Natural Fires and 3 were unmanageable (catastrophic), leaving 2,964 that - without management activities - did not become catastrophic. These would be considered conforming to the Natural Fire Regime along with the Managed Natural Fires would have accomplished desired ecological objectives. The probability of a catastrophic fire during the 25-year period of Alternative C (Pcc) is:

Pcc = 3 X25/(3,543X70) =0.000303 or 0.0303 percent

If A-Rock and Steamboat are considered a single event, Pcc becomes 0.0202%.

For the "Preferred Alternative" (D), the probability of catastrophic fire is:

Pcd = 3X15/(3,542X70) = 0.000181 or 0.0181%.

And the predicted size of such fires - for either Alternative - is the ratio of the acres burned in the three catastrophic fires (approximately 47000 +22,000 = 69,000) to the total acres burned in this interval (69,000 = 160,104) times the ratio of years these catastrophic fires burned (2) to the total period (70) times the potentially-burnable area of the park (forested = 626,383 acres). Thus the probability under Alternative C -- is:

Acat = 69,000X2X628,383/(229,104X70) = 5,407 acres.

Given the randomness of lightning or human ignitionss, there is no assurance that any of the Alternative will prevent a catastrophic wildland fire over the Alternative's periods; or even that such events will be prevented after completion of the terms. An ignition situation -- such as the Ackerson - where six lightning ignitions occurred within a 13 kilometer distance and almost simultaneously (when measured as fractions of the fire's duration), will not be manageable with the available resources, regardless of which Alternative is selected.

One may argue that the probabilities are higher than the above estimates because the fuel loads have increased over the period under consideration. This argument is not persuasive because increased fuel loads do not increase the probability of an unmanagable wildland fire. They only increase the severity if such an event occurs. However, a review of the fuel loads in Table D.1, Attachment D (file Attxl_D*/xls), indicates that the current fuel loads - except for the Whitebark pine/mountain hemlock and Giant sequoia/mixed conifer forests - do not exceed significantly the proposed target ranges Presumably, the Giant sequoia/mixed conifer forests (that are considered a highly valuable resource of the Park) will be scheduled for early treatment with prescribed fire; especially since these comprise such a small fraction (0.03%) of the Park area.

The small difference in probabilities of catastrophic fires (0.12%) between the Preferred and Passive Alternatives -- makes the arguments against Alternative C appear to border on hysteria.

Letter Number: 63

Comment: Furthermore, we believe the DFMP exaggerates vastly the risk catastrophic fires; in order to justify unnecessary and excessive mechanical thinning operations. We base this conclusion on data presented in the Draft Plan itself, information provided at the various workshops, and many scientific articles and reports. The DFMP also lacks essential data and analysis that would enable the reader to form a quantitatively accurate picture of current and proposed conditions and their associated risks. The DFMP fails to demonstrate that there is a high risk for catastrophic wildfire events. In fact, much of the substantive information in the document leads, to a conclusion that the majority of the Park displays a negligible risk. The document presumes the risk to be high as if it were a given--as self-evident as heliocentrism.

Response: An assessment of the probability for catastrophic fire would necessarily be multi-variate in nature, although the analysis above is an interesting exercise. We ask the respondent to recognize the fact that large, catastrophic fires have occurred only in the recent period, rather than scattered over the history of the park. This is not a coincidence. Conditions that now contribute to the increases in fire severity, spread and extreme behavior have changed over time, and are less variable than they were under natural conditions. Increased fuel loads and changes in forest structure do increase the probability of a fire becoming unmanageable. Real time factors (weather, fuel moisture, availability of suppression resources, number of ignitions, and others) contribute to the complexity of managing fires, and when combined with the changes in fuel and forest conditions that have occurred over time, the potential for catastrophic fire has increased. To aid in responding to this need, the NPS and USGS completed the FRID analysis. Although not an analysis of the probability for catastrophic fire, it does help us target the areas where, potentially, the greatest changes have occurred, and wildfires would produce the most severe changes. We do not believe we are exaggerating the risks associated with these changes, and we believe that residents of WUI communities would agree with our assessment.

Concern #81: The FMP/EIS should include additional discussion of implementing Alternative D, the preferred alternative, under existing air quality constraints.

Letter Number: 130

Comment: The No Action alternative identifies past staffing levels and air quality issues as limiting constraints. The past program has averaged 1,472 acres of prescribed fire and 2,567 acres of managed wildland fire annually. The preferred Alternative D proposes to burn 1,817 acres through prescribed fire and 9,194 acres through managed wildfire. These are significant increases. The preferred alternative expects to increase air emissions by over 50%, yet the plan provides no discussion as to the removal of the currently limiting constraints. Air constraints may be the single most limiting factor that prevents enactment of this alternative. It warrants a thorough analysis.

Response: While it is true that in the past there have been significantly limiting constraints of budget and staffing, recent initiatives, direction and appropriations from Congress have removed many of these barriers. Staffing levels have increased, as has our ability to bring in outside resources from federal, state, local and private sources to assist with projects. As long as the staffing and budget support continues, there will be adequate personnel and equipment to do the work.

Air quality and the potential impacts to the airshed remain a concern. The local air districts, as well as the California Air Resources Board, have recognized the potential of these impacts as government agencies begin to increase their prescribed burn acreages. In response, Title 17, Smoke Management Guidelines for Agricultural and Prescribed Burning were revised to address this issue. Part of Title 17 requires communication between the burners and with air regulators to share airsheds and avoid impacts from simultaneous projects. It also has provided for more sophisticated forecasting of atmospheric conditions conducive to smoke dispersal, which will also help mitigate impacts. Better forecasting is expected to lead to the identification of more burn days.

In the past, most of the prescribed burning in Yosemite was largely concentrated in the fall, after the peak of fire season and before winter snows and rain. This was largely due to a reliance on seasonal staffing. With an increased permanent staff and the potential to share resources with other agencies or hire private contractors, it is now possible for burning to be conducted throughout the entire year. During the winter of 2002-2003, approximately 400 acres of piles were burned in the park. Much more burning will take place in the spring, when atmospheric conditions for smoke dispersal are most favorable. Also, with an increased federal fire workforce, it will now be possible to conduct prescribed burns during the summer fire season. In summary, previously Yosemite was only able to conduct prescribed burning during the fall, or 25% of the year. Now, because of increases in staffing and better communication with other burners and air quality regulators, Yosemite may be able to utilize the entire 12 months in a year to accomplish treatment objectives.

Concern #82: Alternative D should use tree thinning only within the 300 foot buffer around structures and private property, and use more natural methods such as prescribed burning beyond the 300 ft. buffer.

Letter: 82, 45,

Letter Number: 82

Comment: Under the current preferred alternative, the Park would treat up to roughly 3,750 acres with the logging or removal of large trees. CSERC believes that the tree removal (20" dbh and less) should be tried on a limited acreage area in the 300' buffer around structures and private property, including also utility line corridors, and that once that work is completed, that a reassessment and reevaluation look to see if there is truly any need to expand the work. It is likely that alternative, more natural methods such as prescribed burning can easily be used to achieve fuel goals beyond the 300 feet buffer area.

Letter Number: 45

Comment: Although I know fire is an ever present danger and fuels need reducing, I can't see that logging the biggest trees and going on a rampage with heavy equipment to smash down smaller growth is the way to do it. The problem with Alternative D is that it could be mostly a "foot-in-the-door" for loggers to just get the nice big trees, and leave a mess of the rest. Also men on bulldozers are known in many landscapes to become all carried away with pushing down trees, scraping etc. which gets to be in excess of what is necessary and our parks, if nowhere else should be places to see natural areas not all torn up. I'm not sure about chainsaw use. I feel that would be acceptable as a temporary measure to quickly get small trees out of the urban interface if it were a temporary measure. And [let?] big, more fire-resistant trees more opened-up and widely spaced. But again, I'd have to suspect the proposed chainsaw use within Yosemite Park is part of a suspicious-looking proposal (D) which looks like it would open the door to a lot of landscape destruction in the name of fire fuel reduction

Response: The following revisions were made for the Final YFMP/EIS: Tree thinning activities will be restricted to six wildland urban interface communities and along roadside and utility corridors in the Suppression Unit. Within the ¼-mile inner defense zone around the edge of WUI, vegetation and fuels will be mechanically treated and then burned; prescribed fire may be the initial treatment method where safe and practical. The figure of 300’ may be workable in some situations, but not in others, due to fuels and topography. In the outer defense zone, from ¼-mile up to 1-1/2-mile, vegetation and fuels will be burned, and thinned only if needed to accomplish objectives (forest target conditions), but only after subsequent NEPA analysis, public review, and compliance.

Concern #83: The FMP/EIS should include cost/benefit analysis for mechanical thinning operations.

Letters: 33, 34

Letter Number: 34

Comment: NEPA requires an objective economic analysis of alternatives considered. When an honest valuation of the cost of the impacts of mechanical manipulation of the National Park forest lands is weighed against the benefits in terms of wood fiber recovery and expedited achievement of the target stand conditions the decision will not be in favor of this alternative.

Response: Generally, costs for fire management activities in Yosemite are as follows:

Mechanical thinning; small diameter trees/dead and down	$650-$2800 acre*
Mechanical thin large diameter logs	$1000 per acre
Pile burning (from mechanical thinning)	$100 per acre
Chipping small diameter trees/dead and down	$200 per acre
Small (less than 100 acres) WUI prescribed burns	$350-$700 per acre
Small non-WUI prescribed burns	$250 per acre
Large non-WUI prescribed burns	$100-$200 per acre
Large WUI prescribed burns (over 100 acres)	$200-$500 per acre
Wildland Fire Use	$50-$600 per acre**
Fire Suppression	$400-$6000/ acre**

*Cost is dependent on density of fuels; accessibility; and workforce being utilized. For an average, figure $1500 per acre for mechanical thinning. Note this does not include disposal (either by pile burning or chipping).

**Cost varies by location and size of fire. Generally, the more acres of a given fire, the lower the cost.

Anecdotally, during the 2002 Yosemite Fire Season, the following cost figures were recorded for projects and fire incidents:

Mechanical Thinning Yosemite West	40 acres@$2800/acre= $112,000
Small WUI Prescribed Burn Studhorse 11	28 acres @$450/acre = $12,600
Large non-WUI Prescribed Burn Gin Flat	3517 acres@$145/acre = $511,000
Wildland Fire Use Wolf Fire	1814 acres @$112/acre = $203,168
Fire Suppression Liberty Fire	101 acres @ $990/acre = $100,000

Cost of Implementation

Concern #84: The National Park Service should not consider commercial incentives as a funding mechanism.

Letters: 43, 41, 87,

Letter Number: 87

Comment: Controlled burns and selective cutting and burning of very small trees and brush in the highest risk areas will be expensive but in the long run may cost less than putting out a major fire. Using a park resource (medium size and old growth trees) as a funding source to resolve this problem is simply unacceptable. A solution must be found without involving commercial timber interests or other methods requiring product removal from national park lands.

Response: The DEIS does not envision selling or exchanging wood products or logs for fuel management funding or services. The DEIS does propose using contractors to assist in fuel removal through mechanical thinning or prescribed fire, but woody material would not be sold to provide funding for the fuel management program, or any NPS program.

Concern #85: The National Park Service should include more information on the cost of implementing each of the alternatives.

Letter Number: 4

Comment: In reviewing the first few chapters in depth, and then skimming the rest and the Table of Contents I do not see any financial or fiscal impact in the report for the various alternatives A-D. This is a crucial element missing from the various choices. I can surmise on my own that Alternative A, the least costly, Alternative B, the most costly, Alternative C, a little more than Alternative A in cost and Alternative D, a little less costly in compared to Alternative B. Is this correct? However the actual numbers could be preferable. Also knowing where the money comes from would help as well.

Response: See response to Concern #83 for additional information regarding treatment costs. In general, the following per acre estimates* are used for fire management activities:

Mechanical Thinning	$1500 per acre
Mechanical thin of hazard trees/logs	$1000 per acre
Small WUI Prescribed Burn	$500 per acre
Large WUI Prescribed Burn	$350 per acre
Large non-WUI Prescribed Burn	$200 per acre

Wildland Fire Use	$150 per acre
Fire Suppression	$1000 per acre

*Estimates are derived from average costs of Yosemite fire management and forestry projects during the last three years and are used for budget submission purposes. Actual costs of individual projects may vary substantially either positive or negative from estimates.

Using the above estimates and Table 2.5 from the Draft FMP/EIS, the costs for each alternative is as follows:

Alternative A (Will not accomplish Park Objectives)

Prescribed Burning	1472 acres x $350 =	$515,200
Mechanical Thinning	150 acres x $1500 =	$225,000
Wildland Fire Use	2567 acres x $200 =	$513,400
Fire Suppression	5760 acres x $1000 =	$5,760,000
	TOTAL PER YEAR	$6,811,100

Alternative B (Accomplish objectives in 12.5 years)

Prescribed Burning	7696 acres x $350 =	$2,693,600
Mechanical Thinning	1533 acres x $1500 =	$2,329,500
Wildland Fire Use	2567 acres x $200 =	$513,400
Fire Suppression	5760 acres x $1000 =	$5,760,000
	TOTAL PER YEAR	$11,296,500

Alternative C (Accomplish objectives in 25 years)

Prescribed Burning	3848 acres x $350 =	$1,346,800
Mechanical Thinning	766 acres x $1500 =	$1,149,000
Wildland Fire Use	2567 acres x $200 =	$513,400
Fire Suppression	5760 acres x $1000 =	$5,760,000
	TOTAL PER YEAR	$8,769,200

Alternative D (Accomplish objectives in 17.5 years)

Prescribed Burning	5505 acres x $350 =	$1,926,750
Mechanical Thinning	1095 acres x $1500 =	$1,642,500
Wildland Fire Use	2567 acres x $200 =	$513,400
Fire Suppression	5760 acres x $1000 =	$5,760,000
	TOTAL PER YEAR	$9,842,650

The costs and acreage for Wildland Fire Use and Fire Suppression were kept constant through all four alternatives due to the uncertainty and unpredictability of these events. Acreage estimates for prescribed burning were derived from taking an average of the maximum and median FRID values on Table 2.5. Mechanical thinning acreages were taken directly from Table 2.5.

Funding for fire management activities is received from the National Park Service Fire Management Program Center in Boise, ID. Annual funding for each category is largely dependent on Congressional appropriations and can fluctuate. Current emphasis within the federal government is on proactive treatment of fuels rather than reactive fire suppression, especially around wildland urban interface (WUI) areas. This emphasis reflects an increased understanding among researchers and fire managers that fuels treatment will greatly assist in reducing losses due to large, unplanned, catastrophic fires.

The funding Yosemite receives for fire management activities is separate from the normal Park operations funding; an increase or decrease in fire management funding would not impact normal park operations, though it would effect attainment of Park fire-related resource objectives, human safety, property (both public and private), and overall health of the forests.

Mitigations

Concern #86: The National Park Service should employ cool fires and wood harvest to mitigate air quality impacts.

Letter Number: 70

Comment: Cool fires may offer the greatest mitigation potential. You've stated that cooler fires emit less NOx and I presume also less methane (which is 21 times more potent than CO2). Cooler fires mean mostly prescribed burns in shoulder seasons when vegetation is not too dry. Repeated prescribed burns might then be required to achieve your objectives, but the likelihood of inadvertent stand-kills would likewise be reduced. Far more acres would be treated by prescribed burns, far fewer burned by managed wildland fire. Small and slow managed wildland fires would be tolerable; vigorous ones would not.

Letter Number::70

Comment: The next greatest mitigation in terms of potential significance may be harvesting, sequestering carbon by using wood for lumber or pulp, or burning wood productively in lieu of fossil fuel. Alternatives B and D contemplate some cutting, but usually for controlling incineration - not for sequestration or for offsetting fossil fuel use. Harvesting can be controlled; most desired trees can be saved; roadside vegetation can be protected. Harvesting won't be pretty, but I don't believe you offer a fully thought-out alternative. Prescribed burns are generally less selective; one roadside is inevitably marred if the roadbed serves as a fuel break. Some of your early prescribed burns along the Big Oak Flat Road disfigured the roadside, but they must have been too cautious as they failed to protect even the largest trees from the subsequent A-Rock Fire. In some areas, a single carefully-controlled harvest could set the stage for subsequent prescribed burns. In some of the most productive forest, repeated harvesting for fuel load maintenance may be environmentally superior. Would that too greatly compromise NPS values? Quite possibly. Perhaps it was naïve to include within YNP its western fringe; fuel accumulation and global warming were not then issues. These areas were included primarily to protect scenery, wintering wildlife and some magnificent trees. These objectives could be achieved outside the Park with greater flexibility and a less compromised NPS ethic. Perhaps a different administrative designation would better suit the South Fork Merced watershed as well as much of the lower montane forest and lands to the west that lie well back from the Tuolumne and Merced Gorges.

Response: Cool fires and hand thinning have accomplished some of the Park's objectives of hazard fuel reduction and ecosystem restoration and will continue to be used where appropriate. In some cases, such as Sequoia regeneration, a hot fire may be needed to open the canopy and prepare a proper seedbed conducive to seedling germination. In other situations, too much moisture in the litter layer and live fuels will not support flaming combustion, and result in a fire that smolders and smokes for days on end. The fuel and weather prescriptions under which prescribed burns are conducted have a wide range to give fire managers the opportunity to meet the project objectives while still retaining control of the fire.

Concern #87: The FMP/EIS should include the costs and impacts of mitigations measures to control non-native plants.

Letter Number: 70

Comment: 2-47: Since you propose to create widespread opportunities for non-native plants to colonize, please describe in some detail the "mitigation measures" you allude to, their impacts and cost, and the likelihood of their being implemented on the scale of the groundcover removal you propose to undertake.

Response: Potential impacts of non-native plants are considered in pre-burn planning. Costs for control of fire related exotic species are developed on a burn unit by burn unit basis, following a post-fire evaluation. At this time, many of the prescribed fires at Yosemite are in areas with relatively small invasive species issues. Plots will be placed in areas that are mechanically treated to provide early detection of invasive plants. Mitigation measures proposed by the U.S. Fish and Wildland Service will also be included in the FEIS.

Concern #88: The FMP/EIS should recognize the need for debris flow retention structures and other mitigation, following catastrophic fires like the A-Rock.

Letter Number: 1

Comment: …issue that should be raised in this Environmental Impact Statement is the feasibility of mitigation measures that can be utilized to minimize potential damage from debris flows following fires. For example, following the August 1990 Arch Rock (A-Rock) fire, debris-flow retention structures were constructed and successfully employed to protect housing areas in El Portal at the base of the severely burned watersheds. Assessments of the potential for fire-induced debris flows and plans for mitigation measures against debris flows are becoming a more common action following many fires on Federal lands. In addition, the USGS has recently identified the subject of fire-related debris flows as a topic of increased research priority in its Landslide Hazards Reduction Program.

Response: This is a very good comment. In the Final YVP/EIS, a discussion will be added to Chapter 2, under *Actions Common to all Action Alternatives, Mitigation Measures*, to describe Burned Area Emergency Rehabilitation (BAER) work that may be needed following catastrophic fires. BAER team objectives are to: 1) Determine if an emergency condition exists after a fire; 2) Alleviate emergency conditions to help stabilize soil; control water, sediment and debris movement; prevent impairment of ecosystems; mitigate significant threats to health, safety, life, property and downstream values at risk; and 3) Monitor the implementation and effectiveness of emergency treatments. The added discussion will indicate that assessments of the potential for fire-induced debris flows will be completed and, as needed, debris-flow retention structures will be constructed to protect watershed values and structures.

Park Resources

Concern #89: The draft FMP/EIS should describe direct and cumulative impacts of the proposal.

Letter Number: 15

Comment: The potential direct and cumulative impacts of this proposal should be discussed.

Response: Please see Chapter IV, *Environmental Consequences*.

Concern #90: The National Park Service should adopt a management option that does not result in landscape devastation and risk unintended ecosystem consequences.

Letter: 45, 115, 72,

Letter Number: 45

Comment: Our parks are the only places left where natural landscapes may still be maintained. Although fire safety is a difficult issue for everyone, if at all possible a management option must be chosen that does not give [?] [?] to unnecessary levels of landscape devastation.

Letter Number: 115

Comment: Any fire management actions or treatments taken now in Yosemite will affect the forests, the meadows and the ecology for decades and in many cases centuries. These actions can drastically change the ecosystem trajectory of the areas. This plan calls for major manipulation of the ecosystems in Yosemite carrying with it major risks of unintended consequences. The Park Service's Fire Management Plan for Yosemite could lead to more, not less "catastrophic" fires. It could lead to a shorter, rather than a longer "fire return time."

Response: This concern mirrors the ecological intent of the plan. During the process of developing alternatives and evaluating their environmental consequences, this idea was used. We believe that the modified Alternative D is the best balance to achieve program objectives while avoiding undesirable environmental consequences.

Concern #91: The National Park Service should use the impact analyses (in Chapter 3 and 4) as a focus for improving and correcting the management plan, and identifying priorities for protecting species.

Letter Number: 130

Comment: The Alternatives should be developed to correct the areas identified that under the current management program will have a major impact. Those areas include wildlife in general, the California spotted owl, the pacific fisher, air quality, archaeology, cultural landscape resources and noise. The effects on old growth are not evaluated but should be added. It is interesting that old growth and wildlife, specifically the spotted owl, has been used as the principle reason to change forest management practices over the last decade, yet the park management plan does not acknowledge these species as a priority to protect. Apparently it is only important enough to protect wildlife from people who could harass, but not from wildfire that could kill. We believe if these species are important enough to devastate communities they are important enough to include as a priority to protect from wildfire.

Response: This is a constructive suggestion, and, indeed, the process of writing the draft YFMP/EIS was an iterative one that led to many modifications (prior to the plan's release). It should also be noted that spotted owl and other special status species were addressed individually in the draft and final YFMP/EIS. However, in the Final YFMP/EIS, mitigations specific to special status species will be emphasized in *Mitigation Measures*, under *Actions Common to All Action Alternatives*, in Chapter 2, and in support of a Biological Opinion issued by the U.S. Fish and Wildlife Service involving sensitive species.

Concern #92: The Bibliography repeats and/or wrongly attributes one piece of research.

Letter: 135, 70

Letter Number: 70

Comment: 3-2: I couldn't find a list of references that included U.C. Davis, 1996b. Nor could I find other "Affected Environment" references.

Letter Number: 135

Comment: James Agee[1]s "Fire Ecology of Pacific Northwest Forests" was inadvertently repeated and wrongly attributed to Kat Anderson in the References section in Appendix One.

Response: There are several errors in the Bibliography of the DEIS that will be corrected in the final EIS.

Concern #93: The FMP/EIS should include more analysis as to why large trees would need to be logged.

Letter: 11, 133, 114, 117,

Letter Number: 11

Comment: There also needs to be a far greater analysis as to why any medium to large trees would be logged at all for fuel reduction purposes.

Letter Number: 133

Comment: G) The DEIS (p. 2-25) uses the 31"dbh size because it states that these are tree likely to have been established in the "era of fire exclusion:. This, again, is historically weak. To equate any fire exclusion activities in the 19th century with the post-WWII era of modern fire suppression is ludicrous. Indeed, it is even a stretch to equate the extent and magnitude of fire suppression in the early 20th century with the era of modern fire suppression after WWII. Many areas of the Park may never have been affected by fire suppression. And, most of the areas that have been affected significantly are more likely to have been thus affected in the more recent ear, producing a more dense undergrowth as opposed to a more dense overstory. Further, the reference to trees 31" dbh tacitly, and incorrectly, assumes that fires would have generally killed most of these trees AND that fire suppression efforts were generally successful in stopping fires - both of which are likely to be faulty assumptions, at least in a substantial part.

Response: The DEIS describes the process by which the influence of fire suppression has affected forest demography. While the degree to which fire suppression affected forest demography around the park is debatable, the influence and effectiveness of fire suppression is logically more pronounced near the wildland urban interface communities of Yosemite. Trees in the smaller size classes (less than 20” in diameter) are overrepresented relative to more natural conditions, and should be thinned to restore and maintain these conditions. In most areas of the park, this thinning will be accomplished through the use of natural and prescribed fire. In a few areas adjacent to wildland urban interface communities, in which the use of fire is impractical because of safety issues, mechanical thinning will be employed initially as a surrogate for fire. Following this thinning, prescribed and natural fire will be used to maintain forest demographic characteristics within target conditions as much as possible.

Concern #94: The FMP/EIS should address how climate change will affect park ecosystems, ecotypes, climate, etc.

Letter: 70, 8,

Letter Number: 70

Comment: Climate changes over the centuries. The pre-1850 climate was significantly cooler than at present. Peak snowpack and runoff now come nearly a month earlier. Mid-elevation snowfed forests (lower and upper montane forests) now experience a ~1 month longer (and probably hotter) summer drought. This alone would make late-season fires more intense. It should also lead ecotypes to migrate to elevations more than a thousand feet higher. How much of Yosemite's snowfed forests is now relic, still hanging on, but likely to be replaced by chaparral once burned severely?

Response: The effects of climate change on the Sierra Nevada forests and fire is poorly understood. The park is participating in ongoing research through the Sierra Nevada global change research program to better understand potential changes in vegetation, climate and fire. When more results come from this work it will be incorporated to our plan through the adaptive management process. Nonetheless, unnaturally severe wildfires due to unnaturally high amounts of fuel would likely worsen the effects of global warming on park ecosystems.

Concern #95: The draft FMP/EIS may underestimate tree density under pre-1860 conditions.

Letter Number: 70

Comment: I suspect that your 31.5" diameter breast height criterion is both flawed and biased. First, only a fraction of the pre-1860 trees remain in place, for trees die, fall, and rot. Second, did not both Indians and European settlers down trees for lumber and firewood? Describe how your criterion accounts for these processes. If it doesn't, it probably underestimates tree density under pre-1860 Indian influence. As for natural density, I submit that we have no basis.

Response: The tree densities come from a combination of actual plot data and discussions among several research scientists. It is possible that target densities for trees could be underestimates, and as a result, thinning will be done to achieve only the higher end of the range of target densities. The park has funding for two different research studies that will give even better estimates. One of the studies will reexamine forest plots installed in 1911. However, it is likely that the combination of soil disturbance caused by historic logging in the Valley, changes in meadow hydrology, and the suppression of fires has resulted in a dense, second growth forest without precedent.

Concern #96: The draft FMP/EIS may overemphasize areas that have missed more than 3 fire events. The draft FMP/EIS may overemphasize the significance of missed fire return intervals.

Letter: 70, 82

Letter Number: 70

Comment: Map 2-4 Median Fire Return Interval Departure (MFRID): If you depict separately the 0-1 MFRID, it will become readily apparent that much (~1/2) of the fire suppression zone has burned more recently than 1 fire return interval. This is the dominant situation in western YNP north of Yosemite West. Distinctly less acreage has avoided fire for more than 3 intervals. Were it not for your predisposition to eradicate all environments that have survived more than 3 MFRIs, the immediate needs for vegetation management would be rather local.

Letter Number: 82

Comment: The assessment of risk in the DEIS is based on the departure from the natural fire return interval - the number of fires mixed. This makes no sense, because one stand-replacing fire, such as the A-Rock fire, may have altered fuels and ecological character of the site far more than numerous lower intensity fires. Risk should be based on existing conditions… not how many natural fires "might" have burned through based on extrapolating past fire return interval patterns.

Response: See the response to Concern #80. We agree that resetting FRID to 1 after an areas burns in simplistic, and is only one step in determining the need, if any, for additional hazard reduction treatments, or if the area can be moved from the Suppression Unit to the Fire Use Unit. On the ground monitoring of postfire fuels and vegetation recovery will determine the postfire FRID, and the need, if any for further application of prescribed fire to mitigate fire risk. Much of the A-Rock fire area was converted from forest to brush, which presents a new fire management issue. In this area, fire suppression may be needed, rather than prescribed fire, to allow an opportunity for the chaparral to succeed to forest. The fire cycle for a FRID = 1 in grass ecosystems is much shorter than a FRID = 1 in mixed conifer; too short a fire cycle may eliminate more natural vegetation types in favor of exotic ones. Therefore, the FRID is only one consideration in fire management decisions.

Concern #97: The FMP/EIS should explain how the FRID analysis was ascertained, and how anthropogenic influences are considered.

Letter Number: 70

Comment: Though fire return intervals (FRIs) are central to your proposal, you don't explain how they were ascertained. Those for redwood groves in the Southern Sierra seem credible for ground-level fires, for they are based on tree-ring correlations of repeated cycles of burning and re-growth into open fire scars. Such scaring is common for redwood and incense cedar, but less prevalent among other species. This leaves me skeptical. How were FRIs established for the other vegetation types? How credible are they? Are the maximum FRIs real or do they span a data gap where no trace of fire has been found? If the latter, both the maximum and median FRIs are too large. Why don't your FRIs reflect Anthropogenic influence? Why, for example, is the median FRI for foothill chaparral (which has evolved to recover quickly from fire) roughly an order of magnitude longer than the FRIs montane meadows or ponderosa pine forests? If natural fires are from lightning, why have montane meadows burned more frequently than the surrounding forest (where lightning should have struck)?

Response: A description of Fire Return Interval Departure (FRID) and all of the fire return intervals chosen for the analysis is found in Chapter 2, pages 2-5 thru 2-14. The fire return interval (FRI) chosen for the analysis is derived from published literature, fire histories, and the best estimates available for the park. Additional fire history research efforts are underway.

Anthropogenic influences are considered in some of the FRI chosen, such as for Montane meadows. This range represents the amount of time between burns conducted by the Miwok as well as other tribes. The relative contribution, by vegetation type, of ignitions from lightning vs. ignitions by Native Americans, is difficult to ascertain, but information on this issue will be applied to calculation of FRI as it is made available through research. The target vegetation conditions were produced by a range of fire histories and mixtures of Native American and lightning ignitions; the prescribed fire program does not attempt to restore one ignition type vs. another, but rather re-establish a range of forest target conditions.

Concern #98: The National Park Service should use satellite maps in its annual planning and interagency coordination activities.

Letter Number: 111

Comment: The use of satellite maps both of the park and the surrounding forests taken annually in the spring and fall of each year should become part of your over all plan. These map can easily be layer into the GIS format that you are using to show you damage from the preceding winter, to help layout plans for both fire and maintenance project for the coming summer and to inventory the vegetation types and growth. The late fall photos will show you the back wilderness areas that have burned and the progress of your controlled burns in these areas. These maps can also be used to help support agreements with other agencies and coordinate cooperative work projects.

Response: satellite imagery is a vital part of the fire management program. Fire behavior models use vegetation maps and fuel maps to enable managers to predict the direction and characteristics of fire. Relative Greenness images show managers whether areas are relatively more moist or more dry compared with surrounding areas, and therefore assists in the development of fire management decisions and tactics. The FRID maps were developed from satellite imagery.

Concern #99: The FMP/EIS should include more analysis of the potential for debris flow and rockfall related hazards following high-intensity fires.

Letter: 1, 70

Letter Number: 1

Comment: …debris flows can result from severe rainfall events after highly intense fires, particularly where hydrophobic soil conditions have developed from the burning of organic compounds. This subject is briefly mentioned in this document on pages 3-37 and 3-38. However, the relative degree of hazard and potential impacts from debris flows subsequent to high intensity fires is not adequately addressed. For example, the statement (p. 3-37) High-intensity fire may also create the conditions for shallow debris flows by itself does not adequately address the hazards posed by the possible cumulative effect of many of these shallow debris flows coalescing within a channel to form a rapidly moving, high debris-flow front.

Letter Number: 70

Comment: On talus slopes (such as the Rockslides), the visual impact will be severe for several years. Loss of cover will facilitate a washing of soil particles deeper into the talus. Surface seedbed will be lost, but subsurface moisture retention capacity will rise. Where fire significantly reduces oak cover, there may be a small increase in rockfall hazard (by greater speed and travel farther beyond the talus base).

Response: We agree; the intent was to describe the general influence of fires of unnaturally high severity on soil stability. Burned Area Emergency Rehabilitation work, such as that done after the 1990 A-Rock wildfire, included a significant amount of erosion control measures. The cost of such work has also contributed to the rising cost of fire suppression nationally.

Concern #100: The National Park Service should not set any more fires until more research is done.

Letter Number: 138

Comment: I do not believe any more fires should be set in Yosemite until more research comes in.

Letter Number: 138

Comment: I stand by my Scoping Comments of April 30, 2001. You have not addressed the natural fire frequency in Yosemite National Park, nor answered the question of whether there was ever a natural fire in Yosemite Valley.

Recent articles and even you have claimed that there is much to learn about the use of fire. Will you continue to lay waste to Yosemite's forests and destroy the habitat of even rarer birds and animals while you learn if this is the right thing to do? Your map, though the detail is vague as usual, shows that you have burned virtually the entire Yosemite Valley since 1970. Shame on you.

Response: Yosemite National Park has been doing research on the effects of fire and fire exclusion since the late 1950s. There has been ongoing research and monitoring since the early 1970s. All of this data are used to help modify and refine the current program; the common term for this type of learning is Adaptive Management. We will never have 'all' the answers, but by using current and past research and monitoring, we move forward with the best science based program possible.

Adaptive management is now widely practiced. It is a common sense approach to learning by doing. Organizations or programs can take a conservative approach to filling information gaps through study and hypothesis testing on a limited scale. The lessons learned are then adopted and refined. Adaptive management can be a useful tool to an organization that wants to learn and respond to evolving needs and issues. The prescribed fire program is also supported by a fire effects monitoring program, which has been tracking the effects of the fires since the 1970's. Data is examined by scientists, ecologists, and biologists; no reasons have emerged to suggest that the effects of the program are not meeting the overall goal of the restoration of the natural ecological influence of fire on fire-dependent park ecosystems.

Concern #101: The FMP/EIS should write the equation for FRID in the simplest form.

Letter Number: 63

Comment: What is the purpose for writing the equation for the FRID using absolute value notation:

"FRID = Fire Return Interval -- (Current Year -- Year Last Burned)"

Fire Return Interval

instead of the simpler form:

FRID = Current Year -- Year Last Burned -- Fire Return Interval ?

Fire Return Interval

Response: The narrative describing the formula has been clarified to note that absolute value notation is used.

Concern #102: The Fire Management Plan does not adequately address the influence of Native American burning on Yosemite.

Letter: 130, 113, 61, 115,

Letter Number: 130

Comment: Fire, ignited by Native Americans, is acknowledged throughout the report but does not appear to be seriously factored into the restoration goals. The consistent message is to return fire to its natural role. It is unclear whether the Park Service includes Native American ignited fires in its analysis of "natural" role although it is included in its definition in Chapter 1. Numerous subsequent statements question its inclusion. For example: the first sentence under Need for the Plan appears to exclude Native American fire by stating, "Since 1968, National Park Service policy has been to allow natural processes to occur" but obviously have not replicated the Native American use of fire. The Goals and Objectives section includes, "a crucial goal of Yosemite's is to restore or maintain natural fire regimes so the ecosystems can function essentially unimpaired by human interference." "Naturally ignited fire is a process that is part of many of the natural systems that are being sustained in parks. Human-ignited fires often cause the unnatural destruction of park natural resources." Finally, an objective of the Park General Plan is to "restore altered ecosystems as nearly as possible to conditions they would be in today had natural ecological processes not been disturbed." The forests in California have not been without human interference for 12,000 years. Unless it is included, there will continue to be a disconnect between the condition that existed prior to European settlement and the natural forest controlled only by forces of nature. As indicated in the report, Native Americans were partners with nature in the management of the Park for 12,000 years. The combination of natural fire occurrences and Native American ignited fires created the baseline for Yosemite. Failure to include the role of Native Americans in the restoration of Yosemite will prevent a recreation and maintenance of the historical condition. Elimination of fire suppression will allow natural fires to fully perform its historic contribution but only partially achieve the desired condition. As indicated in Chapter 3, natural fire occurrences over the last 70 years will not produce the historical fire return interval. The restoration of the partnership of natural fires and active management is necessary and must be acknowledged as the "natural" condition.

Much of the fire plan is based upon historical burning cycles. Studies in the Klamath indicate that cool fires frequently do not leave evidence on tree rings. Archeology studies in the Sierra indicate fires ignited by Native American were an annual occasion. The light fuels may have limited the extent of the fires and only occasionally produced enough heat to char trees. The possibility of more frequent fires should be factored into the historical perspective that serves as the foundation for this plan.

Response: We agree that certain areas of the park, and in particular Yosemite Valley, were influenced by Native American ignitions. In other portions of the park, there appears to be ample lightning activity to account for historic fire frequencies. It is not an objective per se to replicate Native American burning practices, results, or purposes. However, to the degree that the historic range of target conditions which the FMP/DEIS seeks to recreate was maintained by Native American burning practices, then the use of prescribed fire captures some of this influence.

Concern #103: The FRID analysis in the draft FMP/EIS should be revised and/or clarified.

Letter: 63, 70,

Letter Number: 63

Comment: We agree that the FRID can be a useful criterion for determining priority of treatments, particularly when the maximum FRID is used as in Map 2-5. Based on the FRI values provided on Map 2-2 and the acreages in Table 3.1, the Parkwide Average Median FRI is 60.3 and the Average Maximum FRI is 144.2. [See Revised Table 3.1 and subsequent calculations -- Attachment -- B (file Attxl_B.xls.)]

FRI (max)/FRI (med) = 2.39

Thus, FRID, for the areas shown in red on Map 2-5, would be >=5x2.39 >=12 when referred to the Median FRI. However, we are not persuaded that the probability for catastrophic fire events is solely dependent on the "Median" or "Maximum Fire Return Interval Departures" nor are these departures solely dependent on "Vegetation Type," without consideration for elevation, slope and aspect, lightning strike density, -- as implied by the data on Map 2-2.

We disagree completely with the assignment of "0 years" to areas of rock and water. This implies that these areas burn almost continuously -- or at less than at 6 month intervals -- as well as resulting in a mathematically unacceptable condition -- division by zero. For consistency, the appropriate figures would be very large numbers -- something like >10 (to the 7th) or >10 (to the 8th) years.

Who knows? There may have been forests that burned in these areas before the Sierra Nevada uplifted.

Letter Number: 70

Comment: 3-14: The last two paragraphs under Ponderosa pine/mixed conifer forest have been made confusing by inclusion of much non-comparable data and exclusion of critical data. Of 33,998 acres, 19,626 acres have burned since xxxx (not 1930, for 10,976 acres are ascribed to prescribed burns)? So you are anxious to "treat" the ~14,400 acres (42%) that have not burned since xxxx. If xxxx is 1972, the de facto fire rotation since then has been 52 years. 3-15: 12,169 acres (36%) haven't burned since 1930. Incidentally, "12,169 acres have missed up to 11 maximum return intervals" is incorrect, for "up to" means "less than". All 33, 846 acres have missed 0 – 11 intervals.

Letter Number: 70

Comment: To reduce the propensity for catastrophic fire, you generally propose to burn all areas that have missed more than three FRIs. If pursued vigorously, this would reduce diversity by eliminating long unburned, very late succession forests. Why is it important to eradicate succession? Leaving some stands unburned would not greatly compromise your overall objective.

Response: See response to Concerns #96 and #97. The fire return interval for water and rock is listed at zero since these areas won't burn. While the concern expressed about removal of late successional forests is noted, it is unlikely that this would happen. Fires rarely burn everything, prescribed fire and wildland fire use in particular leave a patchy mosaic of burned and unburned patches. The late successional forests are more at risk from catastrophic wildfire, which will totally change their forest structure and character. Forests which have a naturally long fire cycle still have a low FRID, which is the case in forests in the Fire Use Unit. The high FRID merely indicates which areas in the park have missed several natural fire cycles, and are therefore most at risk from an unnaturally intense wildfire. It does not mean that forests that have naturally long fire-free intervals need to be artificially burned on shorter rotations.

Concern #104: The NPS should clarify the basis for the assertion that .2.4% of the park burned yearly, on average.

Letter Number: 70

Comment: 1-4: What is basis for assertion that 2.4% of Parks burnable vegetation have burned yearly, on average?

Response: This percentage was calculated by taking the acreage of each vegetation type and dividing it by the maximum fire return interval for the type. This calculation gives us the most conservative estimate of how many acres burned annually. It is likely in most years before fire exclusion a larger percentage of the park would have burned. It is also possible that in some years less would have burned, depending on annual precipitation patterns, for example.

Concern #105: The FMP/EIS should provide information on the annual accumulation of fuel, and the affects of forecasted removal on same.

Letter Number: 81

Comment: 1) It is incomprehensible that a fire management plan can be designed for removal of fuels in the Park without first quantifying the magnitude of the problem. Nowhere in the plan is there any quantification of the tonnage of cellulose (fuel) that is being added to Yosemite's forestlands on an annual basis. Without that sort of inventory it is incomprehensible how anyone can determine whether the proposed plan is adding or subtracting fuel on an annual basis. Given the sophistication of modern forest inventory techniques this would not be incredibly difficult numbers to generate. It needs to be done.

2) The same criticism can be made regarding estimated quantities of fuel (cellulose) that are being forecasted for removal on an annual basis under each alternative. Subtracting this number from the annual increase number in "1" above would quickly determine whether each proposed alternative would actually be reducing the total tonnage of fuel or not.

Response: The fuel loads by burn unit are found in Appendix 6. Estimates of removal are compared in the air quality environmental consequences section, Chapter 4. In general, it is logical to assume that the higher the FRID, the greater the amount of wildland fuel due to missed fire cycles.

Concern #106: The National Park Service should take quick action to reduce fuel accumulation and the density of tree stands, to make fires and their air quality affects manageable.

Letter Number: 141

Comment: As we have seen in the past few years, nowhere is immune from the affects of large fires when the area is drought stricken. Quick action to reduce fuel accumulation and thin out tree stands near values is needed before another drought occurs in the Central Sierra. Regardless of where the fires occur, when drought conditions exist these fires are behaving in ways not often seen in the past. It has been documented in several post fire evaluations and articles that intense fires slow down and cause much less damage once they encounter a thinned area or recently burned area. Several cases of this were documented in the past few fire seasons and your own Ackerson Complex is an example as well in the North Mountain area. It is also true regarding air quality that the worst smoke events occur from large out-of-control wildland fires as opposed to short prescribed fire events.

Response: Yosemite Fire mangers concur. Some experts have stated it may take 30 years to reverse the effects of 80-150 years of fire suppression. The preferred alternative would accomplish target restoration goals in 15-20 years. Park staff are already working to thin and burn around the major developed areas of the park, as well as carrying out a series of prescribed burns along the western slope, and managing lightning ignitions in the fire use zone to restore and maintain the ecosystems found there.

Concern #107: The restoration target conditions in the FMP/EIS should not be so broad.

Letter Number: 63

Comment: The tolerances in the "Restoration Target Conditions" (Gap Distributions, Tree Density and Frequency, and Fuel Load) are so broad that any prescribed (Rx) treatment would be permitted.

Response: The restoration targets represent the current best estimate based on research, monitoring, and the expert opinions of research scientist working in these areas. They are broad, but we believe this represents the range of natural variability that would have been seen across the landscape before fire exclusion. The adaptive management process is in place to refine these as we learn more from research and monitoring. The broadness also is reflective of the fact that the EIS/FMP does not intend to recreate the ecosystems back to some specific year in the past.

Concern #107a: The restoration target conditions in the FMP/EIS are questionable:

Letter Number: 117

Comment: The "restoration" objective is, as indicated, also questionable. Many interventions and modifications have occurred in the WUIs since the onset of fire suppression (for example the development of trails and structures), and will remain unchanged. In this sense, true "restoration" is not being sought at Yosemite and will never be achievable in WUIs.

Response: WUI areas contain many developments, and will not be restored to a pristine condition so long as the developments exist. This does not negate the importance of restoring as fully as possible a non-degraded ecosystem. Such degraded systems may contain large quantities of understory trees, which pose not only a wildland fire risk but also cause stress to larger overstory trees, which will then often succumb to insects and diseases. The 1963 Leopold Report, which is a cornerstone of NPS natural resource management policy, also touched on another important issue. The authors noted that dense thickets of trees, or “doghair thickets,” formed a scene that was depressing rather than uplifting, and not representative of a “vignette of primitive America” that visitors to national parks seek.

Concern #107b: The National Park Service may not know enough about pre-settlement conditions to develop restoration target conditions.

Letter Number: 133

Comment: Second, we do not know what presettlement conditions were. At best, we can make rough guesses.

A) To the extent that forest conditions in certain parts of Yosemite were more "open" when white settlers arrived, it may well have been a result of recent fire events that thinned forest stands - stands that may have been much more dense just a few decades earlier.

B) It may also have been the case that some areas were more open and may other were more dense, including backcountry areas that may not have been photographed in the late 19th century (i.e., it may well be that the only areas we have early photos of were areas that were a bit more open at that time, but may not have been representative of the lager area).

C) Also, it may well be that the 19th century photos that have been relied upon to demonstrate that Yosemite forests were more "open" were actually taken AFTER significant human-related removal of trees had already occurred. This is certainly true of early pictures of Yosemite Valley, which were invariably taken after whites had been felling trees for firewood, corrals, cabins, and bridges in the Valley for at least 15 years already.

D) In additions, populations of Native Americans were probably more likely to be more concentrated in the Valley than in other areas of Yosemite and, thus, the Valley may have been more open due to Native Americans' use of timber even before white settlers arrived.

E) Further, to the extent that some areas were more open historically, it is more likely that they were more open in the UNDERSTORY - i.e., beneath the canopy. In other words, they may have had closed canopy conditions from dominant and codominant trees, but still had open understories. In this regard, removing large trees up to 31 dbh would not restore historic conditions.

F) Those who have claimed that Sierra forests were generally more "open" historically (as a justification for removing medium and large trees) have badly misrepresented the historical record. As the Sierra Nevada Ecosystem Project Report (Vol. 1, p. 63, 1996) points out: "J. Godsborough Bruff, a forty-niner who traveled the western slopes of the Feather River drainage between 1849 and 1851, kept a detailed diary. He clearly distinguished between open and dense conditions and recorded the dense condition six times more frequently than the open. Many other accounts of early explorers (e.g., John C. Freemont, Peter Decker, William Brewer), identify dark or impenetrable forest; the presettlement forest was far from a continuum of open, parklike stands."

Response: See response to Concerns #95 and #100. There are many theories about the presettlement forest, as noted in the comment. Some evidence of how fire is thought to have behaved under presettlement conditions can be seen in the pattern of burning left behind by a low intensity prescribed fire, and by higher intensity wildland use fires in the Fire Use Unit. Both types of fires leave thickets of trees in some areas or aspects, while burning away understory, and occasionally overstory, trees in other areas. It is this mosaic of fire effects that is believed to have been the hallmark of historic fires, and the type of pattern the EIS/FMP seeks to restore or maintain. Conversely, it is the widespread, uniform destruction seen in modern wildfires that the EIS/FMP seeks to prevent.

Concern #108: The FMP/EIS exaggerates the risk of catastrophic fire and should justify why some fires are considered catastrophic and why action is needed to reduce their potential for their occurrence.

Letter: 63, 115,

Letter Number: 63

Comment: Although the alleged purpose of the FMP is to reduce the potential for catastrophic or stand-replacing fires; the document does not report the history of such fires as the A-Rock--16,700 acres (1990), Steamboat--5,700 acres (1990), or the Ackerson Complex--46,000 acres (1996). Except for acres burned (which are not easily located in the document), no data are provided on these or other "unwanted wildland fires" (areas of low, medium, and high intensities, mortality, fireline intensity, fuel loadings, previous fires, or "management" activities). There is only the statement:

"The three large wildland fires that burned in the park (A-Rock, Steamboat, and Ackerson) were excluded from this analysis because they are believed to have been outside of the natural range of variability for fire." This means that those fires could not be "managed" and thereby utilized to accomplish desired objectives. Nevertheless, absent such information, a reviewer cannot assess meaningfully the potential for catastrophic or stand-replacing fires in other potential treatment areas, or the probability that the proposed treatments will reduce this potential. In our view, the document not only exaggerates the risks, but also exaggerates the potential for risk reduction achievable through the proposed treatments.

Response: Please see additional discussion under *Wildland Fire Management Situation*, on page 3/3 of the DYFMP/EIS and *Vegetation and Fire Ecology*, beginning on page 3-4. Fires that are considered catastrophic result in loss of life, personal property, and/or threatened or rare resources; or fires that result in long-term detrimental changes to the ecosystem. Usually these fires are large stand-replacing type fires. Potentially, stand-replacing type fires could occur anywhere within Yosemite's forested areas. Prior to fire suppression, unabated lightning fires and aboriginal burning practices maintained forest fuels and tree stocking levels at a low level. Fires burned frequently, and with low intensities, because of the lack of available fuels. After 80 years of intense fire suppression in and around Yosemite, there are many more trees and fuels to burn. With more fuels, fires burn hotter and with more intensity. In the past, fires would move mostly on the ground, through the needles and branches. Now, with plenty of fuel ladders to climb, and trees more densely packed together, the potential for a fire to burn through the crowns and take out an entire stand of trees is much more increased.

Researchers at Yosemite believe there have never been similar fires to the three large fire events occurring in the 1990's (A-Rock, Steamboat and Ackerson). These fires certainly would be considered catastrophic. During the A-Rock and Steamboat fires, the park was closed for 11 days and 45 structures and homes were burned in Foresta. California spotted owl habitat and nesting sites were destroyed and will probably take 80 years to recover, according to Steve Thompson, the Yosemite Park Wildlife Biologist. Certainly there was a threat to life, as some of the Foresta residents were evacuated at the last moment. The fire scars from those fires have been and will be visible for years to come.

The potential for more catastrophic fires remains. Threatened resources include the Hetch Hetchy watershed, Hodgdon developed area, Merced, Tuolumne and Mariposa groves of Giant Sequoias, Yosemite West subdivision (which was almost overrun by the 1990 Steamboat Fire), Wawona, and portions of Yosemite Valley. A large fire in any of these areas could result in a loss of life, property, cultural and natural resources, and/or a disruption to the local economy. The potential for catastrophic fire is not exaggerated.

Concern #109: The FMP/EIS should define a healthy forest as one that fosters wide plant and animal diversity.

Letter Number: 79

Comment: I suggest we start defining a healthy forest as one that fosters wide plant and animal diversity.

Response: We agree, and fire is one agent of change that leads to diversity. It is also why the FMP/EIS does not attempt to recreate or maintain a specific point in time or ecological phase, but rather a range of conditions.

Concern #110: The FMP/EIS may not be able to accomplish meadow restoration objectives with fire and thinning alone.

Letter: 135, 101, 109, 138, 116,

Letter Number: 135

Comment: Our understanding is that tree encroachment of meadows is not solely due to fire exclusion, but also due to changes in hydrological processes caused by the system of roads and other development in the valley floor that has lowered the water table. Thus, simply thinning trees back to historic species composition and stand density, and then reintroducing prescribed fire may not be effective in restoring the spatial extent of meadows. Questions: is the Park willing to consider road removal and un-development along with its proposed large tree removal (mainly incense cedars and white firs) as a more comprehensive restoration strategy? How will meadow restoration be successful with just mechanical thinning and prescribed fire alone?

Response: It is true that the meadows of Yosemite Valley have been effected by alteration of many natural processes including fire and ground and surface water dynamics. According to the Yosemite Vegetation Management Plan (1997 – page 19), “historic uses including grazing, farming, ditching, and present visitor use levels and patterns have degraded meadow functioning to unacceptable levels.”

In response to these changes and the gradual loss of meadow acreage in Yosemite Valley, the NPS has developed a comprehensive approach to ecological restoration of meadows using fire and thinning as two tools in a larger set of management options. For example, recent specially funded projects have facilitated restoration of more natural surface water flows through Cook’s and

Sentinel meadows, re-established connections with the Merced River through installation of road culverts, and established boardwalks and pathways that allow for public use while protecting the soils and plants within the wet areas of each meadow. In Cook's meadow a historic road was removed, historic ditches were filled, and original oxbow contours were re-established to encourage increased surface water inundation of the entire meadow.

The Yosemite Valley Plan (2000 – page 2-50) calls for the removal of the road through Stoneman Meadow and the southern end of Ahwahnee Meadow. The roads and utilities through Bridalveil, El Capitan, and Cook's meadows would be evaluated and, if needed, realigned or reconstructed to restore critical surface water and shallow subsurface water flows that sustain the native meadow vegetation and wildlife and discourage conifer invasion.

Reintroduction and use of prescribed burning, and thinning of trees can help restore and maintain meadow systems, but will not be used exclusive of the other tools of water table manipulations, removal/modification of deterrents to natural water flows, and removal of non-native species.

Concern #111: The Fire Management Plan should recognize that fire has resource-related benefits that biomass removal and/or logging do not.

Letter: 122, 2, 11,

Letter Number: 122

Comment: Fires kill bark beetles, while logging does not.

Letter Number: 2

Comment: I am concerned about the plans to sell or give away the chips generated by the "Cutting/Chipping" and "Chip and Haul" processes (page 2.26). It seems intuitive that the biomass of the vegetation identified for chipping contain nutrients taken from the soil and that the loss of these nutrients from the ecosystem would be detrimental. An analogy would be whether it is better to leave my lawn clippings on the lawn versus bagging and taking them to the landfill. Is there research to support or refute this assertion? What is gained by removing the clippings as opposed to leaving them on site for prescribed burning?

Response: The goal of the DEIS is to restore fire as a critically important component of park ecosystems. Areas that are thinned will be treated with prescribed fire; the thinning near communities would be done to facilitate the use of prescribed fire near them. While most piles of woody debris would be burned on site, some may be removed or hauled off site, particularly in situations where smoke from burning piles would pose a health hazard. Air regulators have requested that woody fuels be chipped when feasible to avoid smoke impacts on nearby communities. Prescribed fires would generally be used perpetually after the heavy amounts of fuel are reduced through chipping, so the benefits of fire would still occur over time.

Concern #112: The National Park Service should recognize that prescribed fire may not prevent catastrophic fires.

Letter Number: 8

Comment: You assume that a pre-emptive strike (prescribed fire) will prevent a catastrophic fire in the foreseeable future. In the 1930's, the Tillamook Burn in Oregon was followed by three more huge fires at seven-year intervals.

Response: Many large fires in the Pacific Northwest and Lake States in the latter part of the 19th and first part of the 20th century were caused by extensive areas of untreated slash. Such intense fires killed enormous numbers of trees, setting the stage for subsequent large fires. The DEIS does not guarantee that large fires will not occur, but rather reduces the chance for such fires to occur by reducing fuel loads and restoring a mosaic pattern of burns of many ages. The potential for large fires to occur is reduced as the continuous layers of wildland fuels that have accumulated due to fire suppression are broken up.

Concern #113: Off-season prescribed burns and re-ignitions may not result in the same effects as wildland fires that are allowed to burn.

Letter Number: 4

Comment: the plan discusses prescribed burns in the fire off-season and or re-igniting wildfire burns in the fire off season! Have any studies been done to determine the effectiveness of a fire in the off season and regrowth of the forest and vegetation? It seems to me, that since most fires occur in the summer there is also a reason for this, that we may yet not know about similar to the one about letting wildfires burn. In the past we put them out for decades, now we know we shouldn't have. Can we really correct the mistakes we have made? Maybe there could be more erosion of the soil or the inability for seedlings to replant and the forest floor would remain barren longer.

Response: It is the goal of the FMP to allow wildland fires to burn as naturally as possible. Where this is not feasible, prescribed fires will be ignited as close to the natural fire season as possible. For re-ignition, fire behavior computer models are used to assess what the movement of the natural fire might have been, to guide the ignition pattern of the prescribed fire operation. The development of a prescribed burn plan will include consideration for the sensitivity to fire of plant and animal species, especially to early season fires. The program also utilizes a fire effects monitoring system to gather data to ensure that unplanned or unwanted effects on natural resources are not undetected.

Concern #114: The National Park Service should focus only on the removal of small trees, to reduce fire risks, rather than thin larger trees to restore the natural range of variability for forest stand structure.

Letter: 11, 43, 41, 71, 125, 67, 92, 68, 117, 48, 38, 100, 33,

Letter Number: 11

Comment: Medium large trees, including trees 20" and larger, are almost always not the problem when it comes to high fire risk. They do not form a fuel ladder because they seldom have foliage (low branches) that will provide a flashy fuel low to the ground. Trees in the 20-31" range are inappropriate to remove for fuel reduction purposes, especially given the mandated mission of Yosemite National Park.

Letter Number: 11

Comment: CSERC urges that there be a reduction in the size limit that the Park proposes for fuels reduction treatments from the current proposed limit 31.5"dbh to a maximum of 20" dbh. At most.

Letter Number: 117

Comment: In sum, the Park Service should establish strict, scientifically based diameter limits on the size of tree that can be removed, that is based upon desired fire behavior. We believe there is good scientific justification and precedent for a limit of about 10-12 inches d.b.h. in most WUIs.

Response: The maximum size for thinning has been reduced from 31.5" as proposed in the DEIS to 20." The area of forest restoration thinning under this EIS has also been reduced to no more than ¼ mile in and around the six WUI communities. This has been done to focus more on smaller trees that contribute to fire behavior, as well as to increase the probability that trees selected for thinning, and are in, or adjacent to, wildland urban interface communities, will be trees that originated following the onset of fire suppression in the latter part of the 19th century.

Concern #115: The National Park Service should leave all cut material on site, to provide for nutrient cycling and other natural processes.

Letter: 125, 77, 38, 66, 84, 86, 100, 63, 75, 119, 80,

Letter Number: 125

Comment: All cut material should be recycled (natural decay, mechanical treatment, burning) within the Park as close to its point of origin as possible, in order that habitat and nutrients would be available for numerous species, including future trees. (Some material would need to be removed to a safer location within the Park if leaving it where it lies would result in unacceptable fire risk.)

Response: This is the goal of the fuel reduction and forest restoration programs. In an effort to reduce hazardous fuels and potential for catastrophic fire, some fuels will have to be removed. In the Wildland Urban Interface (WUI) areas, where all of the thinning to restore forest target conditions will be done, the goal is to decrease the fire hazard. Leaving cut fuels in place will increase the fire hazard, by adding even more fuels in the critical areas. However, some nutrient cycling will occur when cut material is piled and burned on site. Not all cut materials will be removed. Some areas will be chipped, and some of these chips will be spread on-site to decompose. However, resource managers at the Park have requested that the chips be spread no deeper than one inch. They have found that deeper than one-inch chip piles promote the invasion and spread of non-native plant species. Excess chips will be used elsewhere in the Park, or disposed by other means.

Removal of fuels for fire protection is a priority which will be accomplished quickly, as noted in the alternatives. These are trees less than 12” dbh. The removal of trees for forest restoration purposes (20” dbh and smaller) in and within ¼ mile of the six WUI communities is a lower priority. Consequently, the removal of trees for the latter purpose can be done at a slower rate, at least partially avoiding an accumulation of fuel that cannot be burned safely on site and must be removed offsite. A slower removal of trees for forest restoration purposes also permits a greater opportunity to utilize the wood internally within the park, such as for firewood. The sale of the trees, such as is done currently for the Hazard Tree program, would be the least preferred method for removal of the trees, under the fire management plan.

Concern #116: Site-specific analysis should be completed before actions are taken by the National Park Service.

Letter: 38, 123, 114, 71, 74, 124, 115, 67, 101, 65, 66, 77, 58, 59, 60, 43, 41, 116, 109, 80,

Letter Number: 38

Comment: To the extent that the cutting of some trees may be warranted for fuel/hazard reduction purposes, there is no magic number for all situations to determine the maximum diameter tree which would be permissible to cut. There are simply too many variables. In addition to fuels build up, density and size of living materials, etc., many other factors affect the risk of fire becoming catastrophic. Some of those factors are slope, aspect, elevation, average temperatures and moisture content, typical prevailing winds, latitude, geographic location, etc. Some of this would fall under the headings of "macro" and "micro climate." Additional major factors are proximity and condition of surrounding forests (especially downslope, and including degree of canopy closure), proximity to valuable and/or historic structures, and recovery time if something were destroyed (e.g. thousands of years in the case of a sequoia grove). Given the possibly endless combinations of variables, each different site--or grouping of sites with somewhat similar conditions--requires a site specific analysis to determine which trees must be cut to achieve the necessary fuel/hazard reduction.

Response: Yes, a tactical, site-specific analysis would be completed prior to the initiation of individual projects. Planning procedures and requirements are discussed in Appendix 3, *Wildland Fire Response, Planning, and Implementation Procedures*. These kinds of procedures and requirements have been in place even before this revision of the YFMP. Under the 1990 YFMP (which is the basis for the No Action Alternative), individual plans (commonly referred to as burn plans, even when they include a thinning component) were completed and then reviewed and refined by subject matter experts (fire, safety, and natural and cultural resource management specialists) prior to project approval and implementation. This requirement would continue. The purpose of the EIS/FMP is to analyze and describe the strategies that may be employed, upon which the tactical documents are based and written.

Concern #117: The Fire Management Plan may overemphasize fire risks and/or the potential for catastrophic fire.

Letter: 11, 63,

Letter Number: 63

Comment: Also notable are the locations for treatments in the Wildland/Urban Interface (WUI) areas shown in the maps for Wawona, Foresta, and Yosemite West (Map 2-6,2-10, and 2-11 respectively). In Table 2-9, these areas are identified for "Aggressive: and "Fire Use" Units. Large portions of these proposed treatment areas are upslope from the communities they are intended to protect. Fire administrators have informed us that - as a rule of thumb - upslope fire will burn 16 times faster than downslope fires. We recognize that this figure has a reference range of variability depending on the slope steepness, fuel load, and atmospheric conditions. Nevertheless, a fire backing down a slope - which by itself will generate an updraft condition - will not race towards the communities as would a fire burning upslope from the Sierra National Forest toward Yosemite West.

Certainly, if the surface fuel load and live fuels (ladder trees) are sufficient to sustain a crown fire, they must be reduced. However, the DFMP does not contain analysis sufficient to convince us that live trees in the 15 - 31.5 inch DBH range represent a hazard. These would be 75 feet to 150+ feet in height and the bases of the crowns would be well above the flame lengths expected when the surface and ladder fuels are reduced to acceptable levels. In our view these data make it abundantly clear that the DFMP grossly exaggerates the potential for catastrophic wildland fires. Given SNEP's "Critical Finding" regarding timber harvest; the proposed aggressive thinning may exacerbate the problem by altering the stand structures and microclimates.

Response: See response to Concern #108. It is true that some of the Wildland Urban Interface (WUI) zones contain land that is upslope from the community. Part of the intent of a protection zone around a developed area is to not only protect from fires which may burn into it, but also to be able to control a fire that may be burning away from it. Certainly a high density of visitor or resident use increases the risk of a fire start in those developed areas. Also, potential spot fires from trees torching out or logs rolling downhill are a concern. A one-quarter mile (1200 feet) zone of reduced fuels will significantly diminish ember showers raining down on communities (with many wood shake roofs). And, while a fire will respond to topography and burn upslope several times faster than downslope, the primary influence of fire direction and spread is the wind. A downslope wind, or a microburst from a thundercell does send fire downslope quite rapidly and unexpectedly. The key to successful defensible space is to provide a buffer zone all around a community, as well as provide ingress and egress routes for safe passage/evacuation.

The WUI areas where thinning will be conducted represent less than 1% of the Park's total acreage. Trees up to 20 inches diameter breast height (DBH) in and within ¼ mile of the six WUI communities will be considered for removal to meet forest restoration and hazard fuel reduction targets. Some trees up to 20 inch DBH on main roads within the Suppression Unit will be removed to meet hazard fuel reduction objectives, which are concerned with breaking up the continuous layer of canopy often caused by trees originating on the disturbed soils of road cuts. Fire can easily be carried from crown to crown under dry, windy conditions, and spread embers up to a mile away, as well as burn intensely enough to close the road for evacuation purposes. Once those objectives have been achieved mechanically, prescribed fire will be considered the main tool for their maintenance.

Concern #118: The FMP/EIS should increase the use of prescribed fire and managed wildland fires to accomplish fire and resource management objectives.

Letters: 134, 36, 98, 23, 51, 11, 110,

Letter Number: 134

Comment: We applaud the efforts the Park has made to reintroduce fire into its ecosystem and to reduce fuels using prescribed burns. This program needs to be greatly expanded as the primary tool for reducing the risk of catastrophic fire. Let prescribed fire, and natural ignition fires w/in prescription, reestablish a new, "natural" mosaic appropriate to this (the current) period of time, remembering that it is most critical to treat the surface fuels to lower the risk of catastrophic fire.

Response: All Alternatives, with the exception of Alternative A, propose to increase the use of prescribed fire over the levels generally reached in the recent past.

Concern #119: The FMP/EIS should NOT increase the use of prescribed fire and managed wildland fires to accomplish fire and resource management objectives.

Letters: 138, 30, 61, 32,

Letter Number: 138

Comment: And that 7/8 of the Park, virtually the entire "high country" is for "Wildland Fire Use". Fire USE?? You are using this precious land for fire?? I do not trust you to do this. Again, I stand by my scoping comments of April 30, 2001

Letter Number: 30

Comment: I don't think that the concept of prescribed burns is viable. They require that the forest be not too dry or too wet. They are limited by temperatures/humidity and wind velocity/acceptable direction. According to the meeting on the Plan held in Sonora by the Yosemite Park team; most prescribed burns require two consecutive burn-days which limits their use, and they are not used on Fridays or weekends when the Park is crowded with tourists. Since the plan states that prescribed burns shall conform to California's air quality requirements, there won't be very many days that allow prescribed burns.

Letter Number: 138

Comment: I resent that you have divided the ethereal Yosemite into what you call " burn units" as though there is not a complex, interactive symphony of life taking place there.

Response: All Alternatives, with the exception of Alternative A, propose to increase the use of prescribed fire over the levels generally reached in the past. This is because we are not treating enough acres with fire to prevent serious environmental degradation and the increased threat of catastrophic wildfire. The full terminology of “fire use” is wildland fire used for resource benefits, which underscores that fire is an important ecological factor for Yosemite ecosystems. We agree that burn units should be as large as possible to capture the many nuances of a fire mosaic.

Concern #120: The National Park Service should increase prescribed fire and managed wildland fire rather than rely heavily on thinning activities.

Letters: 11, 77,

Letter Number: 11

Comment: The document does not fairly assess the value of increasing prescribed burning rather than relying heavily upon mechanical treatments in interface areas.

Response: See Concern #118. The thinning which is proposed in areas adjacent to wildland urban interface communities is designed to facilitate the restoration of fire to areas where the use of prescribed fire is neither safe nor practical because of existing fuel characteristics. In the FEIS, the size of trees to be thinned was reduced from 31.5" to 20", and it was clarified that such thinning would only occur along road corridors and WUI communities in the Suppression Unit. The intent to use prescribed fire and wildland fire as the main tools for ecosystem restoration and maintenance, as well as wildland fuel reduction, remains.

Concern #121: The FMP/EIS should clarify how much of the proposed project work would be for fire management and how much would be for vegetation management.

Letter Number: 115

Comment: How much of the Rx and the M in the WUI and the Wilderness and wildlands areas, Project by Project as per Table A-6-2 and Table A-6-3, are for fire management? How much of the Rx and the M in the WUI and the Wilderness and wildlands areas, project area by project area as per Table A-6-2 and Table A-6-3, are for vegetation restoration?

Response: There are no acres in wilderness that are being managed with mechanical means to restore vegetation management conditions. Prescribed and wildland fire are used to accomplish both vegetation and fire management objectives in wilderness. Outside of wilderness (i.e., generally, the Suppression Unit), prescribed fire is the only tool which will be used to accomplish both vegetation and fire management objectives. Mechanical means to achieve vegetation management target objectives will only used in those projects which fall within ¼ mile of the six WUI communities of Yosemite Valley, Hodgdon Meadow, Wawona, El Portal, Yosemite West, and Foresta. Hazard reduction thinning will also occur along roads in the Suppression Unit, Mechanical means to achieve vegetation management objectives in any project area anywhere else in the park will require a separate EA, subject to public review and comment.

Concern #122: The FMP/EIS should propose to cut trees only for purposes of protecting wildland urban interface, and under a limited set of conditions.

Letters: 82, 11, 110, 99, 93, 104, 101, 27, 115, 43, 122, 50, 44, 101, 100, 36, 123, 41

Letter Number: 82

Comment: It is NOT necessary to remove all snags within the buffer area that encompasses the vegetation within 30 ft of structures or private property. Maintaining the appropriate level of large snags and down logs is important for ecological purposes. We ask that clear standards and guidelines be established that specify minimum snag and down log retention levels.

Letter Number: 11

Comment: CSERC strongly supports aggressive fuels treatment in Yosemite's urban interface areas where high fire risk truly exists. We recognize the need, and we understand the desire by Park staff to reduce the existing fuel load near areas of development, as well as in areas of unnatural fuel build-up. Our Center also supports a far more intensive program of fuel reduction than has occurred in recent years.

Letter Number: 93

Comment: I believe there should be no cutting of any large trees more than 300 feet away from buildings or private property. No trees large than 20" in diameter should be cut for fuel treatment purposes in the Park.

Letter Number: 101

Comment: Crews hired to cut trees and brush need to be supervised by knowledgeable, trained NPS supervisors.

Letter Number: 115

Comment: The plan proposes to cut trees up to 31.5" in diameter. The plan hypothesizes that this is the minimum diameter the trees would be today that started growing before fire suppression began in 1860. While the plan does not call for selling the trees outright, it allows private companies to sell the logs -- that is commercial logging. The commercial incentive for saleable size trees to be cut, be it by the National Park Service or commercial enterprises, must be completely eliminated.

Response: The language in the DEIS has been modified. The maximum diameter of tree that will be thinned to meet target conditions for forest restoration objectives has been reduced from 31.5" to 20" dbh." Such thinning will be limited to the community itself plus a radius of ¼ mile from the edge of the wildland urban interface communities (Wawona, El Portal, Yosemite Valley, Hodgdon Meadow, Foresta, and Yosemite West). Roadsides in the Suppression Unit would be thinned for hazard reduction objectives. All these areas will be thinned to meet fuel reduction objectives, followed by pile and prescribed burns. From ¼ mile to 1 ½ mile radius around these communities, prescribed fire will be used first; if target conditions are not reached, thinning of trees up to 20" dbh may be done following preparation of site specific environmental compliance documents subject to public comment. Target conditions for vegetation restoration and maintenance will be achieved by prescribed and wildland fire throughout the rest of the park. Material generated by thinning operations will be burned, chipped, or utilized for in-park projects. Some may be sold following the same process used by the Hazard Tree program, but under the fire management plan, this would be a last resort.

Concern #122a: The FMP/EIS should propose to cut trees only for purposes of creating a 300 feet buffer zone around and protecting the inner core of wildland urban interface, and under a limited set of conditions.

Letters: 63, 82, 128, 126, 33, 130, 94, 134

Letter Number: 63

Comment: Although YAA disagrees with pollicies that permit high-value, high-risk developments within the Park (or elsewhere on the range); we concur that the existence of such developments demands more intense protective measures than would be appropriate in undeveloped areas. Thus, we support the concept of the 300 feet (100 meter) buffer zone around such developments, when there are excessive accumulations of surface and live (fire ladder) fuels. However, some smaller diameter, fire-susceptible tress must be retained to provide recruitment for the large trees when they become decadent and die. In developed area the distribution function (number of trees v. diameter) must be widely divergent from that used in the undeveloped areas.

Letter Number: 82

Comment: The Wildland Urban Interface zones should be divided into distinct areas for action purposes. The area within a certain distance of structures and private property, where the greatest potential for harm exists, should be approximately 300 ft. wide. That inner core fuel treatment "needs" area may, indeed, be appropriate for extremely aggressive mechanical treatments, whereas the rest of the WUI area may be more appropriately managed through less intensive management strategies.

Response: the size limit for thinning, and the radius around communities to which these thinning standards are applied, are consistent with those developed by the Forest Service Forest Plan Amendment EIS. While a 300’ buffer zone does provide protection from wildland fires, especially if reinforced by an engine, it may be too narrow to allow firefighters to safely conduct prescribed fires, such as to prevent the ignition of buildings from flying embers. This is especially true since in the FEIS prescribed fire is to be used as the initial thinning agent in the ¼ to 1 ½ mile radius outer WUI zone around the six wildland urban interface communities, in lieu of mechanical thinning. The inner WUI zone when implemented may be less than ¼ mile in specific areas where fuels and topography allow, but the zone will not be wider than ¼ mile. Thinning for forest restoration purposes near WUI communities would take into account forest demography to ensure that young trees are available to replace older trees when they die.

Concern #123: The FMP/EIS should utilize cutting and piling of small trees, in addition to prescribed fire, to achieve resource management objectives.

Letters: 87, 88, 63, 79, 133, 13, 82, 29,

Letter Number: 87

Comment: Semi natural processes (controlled burns) should be used whenever possible to correct this problem. In areas where controlled burns would present an unreasonable risk of catastrophic fire, cutting and piling very small trees and brush for burning under suitable conditions should be considered.

Letter Number: 79

Comment: There are huge areas in Yosemite that desperately need thinning and ongoing maintenance, some areas need light thinning other areas need heavy thinning. Fire breaks need to be established and maintained for access in case of fire. This does not mean wholesale logging. If well intentioned people would only compare the damage from careful thinning to the results of catastrophic fire they would embrace a managed forest.

Response: We agree with these comments.

Concern #124: The FMP/EIS should utilize thinning and/or logging activities as needed to achieve resource management objectives.

Letter: 136, 83, 32, 135, 141, 47, 39, 35, 121, 81, 13, 131,

Letter Number: 141

Comment: The issue of removing trees from the park forests will surely be controversial. It is a basic change in past practice for parks. It is a sign of dealing with changing times and changing conditions however, and it must be done to reduce stem density which has been shown to contribute to crown fire. I support this concept of dealing with the problem and also think that the limited amount of tree removal will not lead to widespread "logging" as some people think. I applaud you for proposing these measures for protection and yet preserving the park ethic of allowing natural process to prevail for the rest of the park. Widely publicized and interpreted experimental sites would show these groups that it can be done right.

Response: Thinning of trees up to 20” for forest restoration objectives would be done around six wildland urban interface communities. Core samples from trees would be collected to identify those trees which likely became established after the onset of fire suppression, approximately 90 to 130 years ago. A portion of these trees would be removed to meet restoration targets, bringing the density of these trees more in line with that present prior to the onset of fire suppression activities. Following the removal of these trees, the area would be treated with prescribed fire perpetually to mimic the natural influences of fire, to the maximum extent possible.

Concern #125: The FMP/EIS should indicate that prescribed burns would follow fuel removal and thinning activities. The FMP/EIS should indicate that prescribed fire is the predominant treatment, even in areas treated with fuel removal and thinning activities.

Letters: 117, 58, 110, 136,

Letter Number: 58

Comment: To avoid excessive fuel build up, require that cut material remain in the Park where it can be burned under controlled conditions.

Letter Number: 117

Comment: We also request that the final plan state clearly that fuel removal, either by prescribed burns or some other silvicultural method, will always be used following mechanical treatment. In addition, we would like the plan to direct that no new roads will be built to support forest thinning.

Response: Prescribed fire and pile burns will be used as a part of all mechanical fuel treatments, with prescribed fire used wherever practical to do so. Fuels will be treated as they are cut, such as chipped or piled and burned when dry, to avoid a buildup of even more hazard fuels. Prescribed fire and wildland fire are the primary ecosystem management treatment methods. No new roads will be constructed in support of any forest thinning operations, nor will any existing roads be widened.

Concern #126: The National Park Service should employ prescribed burning in non-wilderness areas, and only managed wildland fires should be used in wilderness.

Letters: 75, 135,

Letter Number: 75

Comment: NPS must implement a prescribed burning program in the parts of YNP that are not Wilderness or managed as Wilderness that mimics the natural seasonality, duration, frequency, intensity, rate, evenness of burn, start locations, vegetation mosaic/patchiness, and regime of fire. This will require research on the different ecosystems in YNP. No prescribed burning should be allowed in the part of YNP that is Wilderness or managed as Wilderness. Allow Nature to determine the ecosystems in a manner similar to how fire reacted in Yellowstone National Park. In Yellowstone National Park, after all the media who-ha, scientists found that the fires created healthier ecosystems.

Letter Number: 135

Comment: In table 2.9 on page 2-41, it appears that managed wildland fire will not be used within the suppression unit, even within designated wilderness. This does not appear to comply with the Federal Fire Policy that mandates the full range of possible responses to wildland fires. Even a "suppression" incident could involve simple monitoring on a portion of the fire, or confinement strategies that resemble monitoring. Question: will the suppression unit be a fire exclusion zone?

Response: The intent of the FMP/EIS is to fulfill one of Yosemite National Park's management goals " to allow natural processes to prevail." As much as possible, managed fires from natural ignitions occurring in the wilderness will be allowed to burn and maintain the ecosystem. However, there are concerns along the western portion of the Park, where developed areas are in close proximity to the wilderness boundary, where wilderness was excluded from the Fire Use zone. In these areas, prescribed fires will be used to reduce hazard fuels and restore the ecosystem to conditions similar to pre-suppression era. Once the restoration is completed and the fire hazard risk has been abated or significantly reduced, these areas will have potential to be included in the Fire Use Unit.

On page 1-12 of the draft FMP/EIS, the management objective on the bottom of the page reads: "Implement a fire management program that is compliant with National Park Service and federal wildland fire policy and applicable regulations." Both NPS and federal fire policy state that a fire must be managed with an appropriate management response, based on resources at risk, cost/benefit, firefighter safety, and available staff to mange the incident. Appropriate management response can be a full suppression effort, or a modified response that includes containing, confining, or monitoring the fire. Yosemite Fire Management intends to utilize the full suite of management options for fires occurring within the suppression zone.

One constraint that remains is air quality impacts. While it is recognized that fire is a natural agent maintaining the ecosystem, smoke from fires inside Yosemite travels outside to communities all around the Park. When health concerns exist for residents in and around Yosemite, actions will needed to be taken to suppress or limit fire growth and spread.

Concern #127: The National Park Service should not allow any commercial logging or removal of cut materials

Letters: 100, 110, 113, 105, 108, 109, 84, 103, 115, 101, 114, 11, 90, 63, 67, 143, 138, 43, 45, 77, 123,

Letter Number: 110

Comment: 3. Prohibit the removal of any wood from the park resulting from the proposed actions. None of the material from trees thinned/hazard trees cut, etc. should be permitted to wind up on store shelves somewhere. Why? Simply because the calculus used to determine which trees should be thinned and what sizes of trees are to be thinned should not be allowed to become a proxy for making the operations commercially profitable. NO EXCEPTIONS. Yosemite National Park should not suddenly become a store of sawlogs simply because some of the park's vegetated areas suffer from the effects of fire

Letter Number: 115

Comment: A conservative estimate based on the plan is that 5 - 6 million board feet of timber per year would be logged for the next 6 - 8 years. Approximately 500 logging trucks per year heading from Yosemite to lumber mills. That does not include "hazard tree" cutting, nor set-backs from roads.

Response: In many lower montane coniferous forest stands the trees are so dense that crews have to cut openings just to pile the cut vegetation. Lopping, shredding, or crushing alone will not be practicable for some forest stands at Yosemite, where the great accumulations of fuel would result in extremely long residence times and high fire severity, killing roots of large overstory trees. In these situations, removal of logs may be necessary, but only after attempts to burn at least some of the material on site, or to use it internally for firewood, for example, have failed. The removal of logs may be especially needed where the use of fire would heavily damage or kill the crowns of the remaining overstory trees.

National Park Service Management Policies direct that natural landscape and vegetation conditions altered by human activity may be manipulated where the park management plan provides for restoring the lands to a natural condition. Management activities to restore human-altered landscapes may include restoring natural processes and conditions to areas disturbed by human activities such as fire suppression. U.S.C. 16 Section 3 allows the Secretary of the Interior...upon terms and conditions to be fixed by him, to sell or dispose of timber in those cases where in his judgement the cutting of such timber is required in order to control the attacks of insects or diseases or otherwise conserve the scenery or the natural or historic objects in any...park... The terms and conditions define timber that is designated for removal from the land as personal property, and require that it be disposed of in accordance with property regulations.

Utilization of excess dead and down timber has continued in Yosemite at least since John Muir skidded windfalls to the sawmill he operated in Yosemite Valley several decades after Native American burning in Yosemite Valley had been disrupted. Contracts with private licensed timber operators have been used with excellent results to remove routine tree hazards and tree failures since the 1970's. Extensive timber sales were completed with good results after the Steamboat and A-Rock fires of 1990, and the Happy Isles Rockfall and Ackerson Fire of 1996. Work accomplished greatly exceeded National Park Service capacity and has allowed the National Park Service to avoid hundreds of thousands of dollars of equipment and personnel costs.

Concern #128: The National Park Service should recognize that the removal of mature trees actually increases fire danger.

Letters: 115, 98, 8, 63, 71,

Letter Number: 98

Comment: Logging of big trees is not necessary for the reduction of fire risk. In fact, I am concerned that logging of big trees could increase the fire risk if the trees are co-dominant and dominant trees in the canopy - reducing the canopy can result in drying out of the land. Trees that are in co-dominant and dominant positions in the canopy should not be removed at all. Only smaller understory trees that are part of the ladder fuels to the canopy should be removed as this will help keep fire out of the canopy. Trees should only be removed in areas close to development -- buildings and private property.

Letter Number: 63

Comment: A Critical Finding of the Report to Congress of the Sierra Nevada Ecosystem Project (SNEP), states (p. 1-62): Timber harvest, with its effects on forest structure, local microclimate, and fuel accumulation, has increased fire severity more than any other recent human activity.

Response: Only a subset of trees less than 20"dbh will be thinned in areas adjacent to six wildland urban interface communities, and fuels generated from this process will generally be burned or chipped on site, followed by the use of prescribed fire on a regular rotation. As a result, fire will play a more natural role in these ecosystems while mitigating the risk of high intensity wildland fires and preventing an accumulation of unnaturally heavy fuels. Thinning of trees would not occur over extensive portions of the landscape, but rather be limited to areas near the six WUI communities and roadsides in the Suppression Unit.

Concern #129: The NPS should recognize that skidders and other motorized equipment cause substantial disturbance, and allows the introduction of non-native plants and other impacts.

Letters: 101, 116, 115, 122, 113,

Letter Number: 101

Comment: The use of large motorized equipment and skidding to remove trees brings a substantial disturbance to the soils. It prepares openings for new or additional incursions of non-native plants into all the areas of the Park where this equipment would be used. If thinning is done, it should be non-motorized.

Concern #129a: The NPS should not restrict equipment use if they can be used with limited impacts.

Letter Number: 120

Comment: Please do not artificially restrict appropriate equipment that may be used for mechanical reduction. Consider the impacts, not the nomenclature.

Response: Soil disturbance and erosion concerns are currently addressed by a Registered Professional Forester monitoring day-to-day operations and implementing best management practices, in-lieu practices, or remedial mitigation as needed

Non-native plants are a major staff concern, since logging contractors mitigating tree hazards in Foresta after the 1990 A-Rock fire spread noxious weeds. A new contract clause already requires contractors with off-road equipment to certify that their equipment is weed-free before entering Yosemite National Park, and monitoring plots are used to identify vegetation at work locations before and after fire hazard reduction contracts are implemented. Identified non-native plants are classified, prioritized, and managed by park staff in accordance with ecological restoration protocols.

Sensitive plants and vegetation communities are considered during detailed individual project planning. A records check identifies sensitive species present or likely to be in the work area. Pre-implementation surveillance and monitoring confirms presence and determines whether avoidance or more active mitigation is required. In extreme cases, individual plants are salvaged for replanting during site rehabilitation.

Habitats for plants and animals will be affected, but generally returned to conditions closer to the range of natural variation. Prescriptions will generally meet best management practices for preservation of California spotted owl habitat: live conifer trees greater than 20 inches in diameter and all montane hardwood trees would be retained. Snags and the largest two logs per acre are also prescribed to be retained

The U.S. Forest Service has been burning crushed and shredded fuels in demonstration and production projects for several years with very good results. Even without removing fuels from the site, rearranging and compacting fuels and breaking the vertical continuity of ladder fuels reduces probabilities of catastrophic fires and crown fires, and greatly reduces resistance to control.

Concern #130: The National Park Service should not cut large trees (over 20 (or over 15) inches and up to 31.5 inches).

Letters: 33, 28, 64, 23, 128, 55, 46, 63, 36, 72, 128, 117, 133, 21,

Letter Number: 63

Comment: Also, to accomplish the objectives of fuel and catastrophic fire reduction, there is no need to remove the larger fire-resistant trees. If the objective is to restore the natural forest structure that would exist today, had there been no human interference with natural processes; this requires an ability to determine accurately what the current structure would be. The DFMP does not include a rigorous analysis that will predict such a structure. We doubt seriously that such predictions can be made or that restoration to a predicted condition can be accomplished; because the human manipulations have probably altered irrevocably the trajectories of the forests (See Rapp, 2002, Attachment - E, file PNW_Sci_UPD-B).

Response: The maximum size of 31.5” proposed in the DEIS has been reduced to 20” dbh. Research indicates that trees less than 20” tended to originate in the period when fire suppression activities began, approximately 90 to 130 years ago. Such trees are also the size class most likely to be thinned out through the use of prescribed fire. Mechanical thinning is a surrogate for prescribed fire in areas adjacent to wildland urban interface communities in which it is not practical to use fire at an intensity sufficient to thin this size class. Following this thinning activity, prescribed fire will be used to maintain fuel and vegetation characteristics within target conditions.

Concern #131: The National Park Service should utilize hand thinning and passive treatments only.

Letters: 14, 33, 137,

Letter Number: 137

Comment: To decrease fuel build up with passive reduction and to support the practice of hand cutting.

Letter Number: 33

Comment: I would prefer the use of horses and ATVs to remove smaller trees and shrubbery or non-heavy equipment to remove larger limbs and trees.

Response: These treatments will be utilized where they are effective; where they cannot be effective when used alone, other treatments are considered, consistent with NPS and Federal Fire Policy.

Concern #132: The National Park Service should employ the stand thinning standards identified by the USFS in the Sierra Nevada Forest Plan Amendment.

Letter Number: 117

Comment: We endorse that these Standards and Guidelines are designed to create conditions that allow fires to burn less severely. They are appropriately not driven by objectives to "restore" forest structural conditions (see below).

The Forest Service's current fuels reduction policy is based upon a wealth of research conducted over the past decade, which clearly demonstrates the need to retain and recruit large trees across the Sierra Nevada, and which underscores the significant impacts of removing them. Their Standards and Guidelines reflect the fact that any opportunity cost of retaining large trees (for example, the creation of future hazardous snags) are far outweighed by the ecological costs of cutting them. Moreover, the opportunity costs of retaining trees may be an important consideration in the Park Service's planning, but they are largely speculative, while the environmental costs of removing large trees are real, significant, and well-documented.

Response: The standards for thinning from the Forest Plan Amendment EIS have been incorporated into the FMP/EIS. Guidelines for snag retention for wildlife habitat will also be incorporated into the final FMP document. Thinning will be limited to areas in or adjacent to the six WUI communities, and along roadsides in the Suppression Unit. We agree with the ecological importance the Forest Service has placed on large trees.

Concern #133: The National Park Service should not allow managed wildland fires to become too intense and destructive

Letter Number: 64

Comment: I have reviewed subject plan and concur that the risk of catastrophic fire must be reduced. However I feel that some of the past managed wildland fires were allowed to become too intense particularly the Walker Fire which was allowed to burn during a hot and windy period when most of the adjacent Stanislaus National Forest was closed to public entry. Hundreds of acres of old growth conifers in the upper Tamarack Creek drainage were killed and replaced with highly flammable brush fields. The NPS informed me that the fire was burning within "prescription". How are more brush fields going to reduce the risk of catastrophic fire. More Walker Fire situations should not be accepted under Alternative D.

Response: The intent of Yosemite in the Fire Use zone is to allow for natural processes to prevail. A fire that is threatening structures, or will not accomplish resource management objectives, or is causing health concerns because of smoke production, will receive some degree of management action to mitigate the problem. The managed wildland fire this comment refers to, the 1988 Walker Fire, was actually controlled when it exhibited extreme fire behavior, and in fact was the first recorded crown fire in red fir. Its spread was stopped at the Tioga Road at 3450 acres. Future managed wildland fires will continue to receive an appropriate management response, dependent on both internal and external influences. Wildland fires allowed to burn are monitored regularly, and management plans are developed by fire staff and approved by the Superintendent for implementation.

Concern #134: The National Park Service should clearly articulate where it proposes to utilize mechanical thinning.

Letter: 117, 63,

Letter Number: 63

Comment: There are approximately 110 miles of paved road and 49 miles of unpaved roads (shown in Table 2.11). Assuming a road width of 40 feet, the 200 feet -- from each side of the centerline to the wilderness boundary - leaves 360 feet eligible for treatment activities. The 159 miles amounts to 6,938 acres in which the only prohibition is that "all mechanical equipment [must remain] outside the wilderness boundary." The additional acreage represented by the 360 feet on the total length of the paved roads and those in Table 11.2, makes an absurdity of the statement that the treated area "will be less than one half of 1% of the Park;" particularly when these corridors are identified in Table 2.9 as eligible for "Aggressive

Letter Number: 117

Comment: 1. MANAGEMENT OUTSIDE OF WILDLAND URBAN INTERFACE AREAS Our greatest concern with the preferred alternative is the language in the draft EIS that indicates, suggests, or otherwise reveals that mechanized treatments have been proposed outside Wildland Urban Interface (WUI) areas. It is our understanding, based upon recent discussions with National Park Service (NPS) staff, that the agency will rely only on prescribed burning and managed wildland fire outside of these areas. We appreciate that agency's verbal assurance that no mechanized treatment will occur outside of WUIs, and we wish to memorialize this point in writing. We urge the NPS to articulate this policy clearly and in no uncertain terms in the final EIS.

Response: The WUI zone is a belt up to 1 ½ miles wide around the six WUI communities in and near the park: El Portal, Yosemite West, Foresta, Hodgdon Meadow, Wawona, and Yosemite Valley. Under the FEIS, mechanical thinning of trees less than 20”dbh to achieve target vegetation management conditions will only be done within ¼ miles or less of the six wildland urban interface communities. This inner ¼ mile will involve thinning followed by prescribed fire (unless fire can be used initially safely). The ¼ to 1 ½- mile wide outer portion of the radius will be treated with prescribed fire initially. If unsuccessful in achieving forest restoration target conditions, project-specific environmental compliance documents will be prepared in support of mechanical thinning operations to achieve these conditions in the outer area. Thinning of some trees less than 20" dbh for hazard reduction will be done along road corridors in the Suppression Unit only, in support of the management of prescribed or wildland fires by establishing fuelbreaks This material will be chipped or burned, generally on site. Some thinning will also be done under utility corridors.

Concern #135: The National Park Service should not consider all of Yosemite Valley to be a Wildland Urban Interface area.

Letter Number: 117

Comment: Adopting this suggestion (--I.e., considering at least one alternative that increased the days of the week on which burning can occur, and a lower diameter limit--) will allow the Park Service to recognize the unique status of Yosemite Valley in finalizing this plan. In our view, the Valley is not a "real" urban wildland interface; it is the heart of one of the nation's crown jewel parks, and a place of sublime beauty, notwithstanding the extensive development that has occurred there. Accordingly, it should not be treated like an "ordinary" WUI, but rather should be treated separately and more conservatively, under the circumstances.

Response: Only the eastern half of the Valley is a wildland urban interface. Prescribed fire has been, and will continue to be, used in the western half of the Valley, and in some areas in the eastern half where safe and practical to do so. The proximity of businesses, homes, schools, medical facilities, and other developments in the eastern half of the Valley will require careful use of mechanical techniques as well as prescribed fire, particularly in regard to smoke management, to restore a more natural forest density and composition.

Concern #136: The National Park Service should thin trees along roads, so that they can serve as fuel breaks.

Letters: 62, 88, 130, 142,

Letter Number: 62

Comment: The Park Service should aggressively clear and maintain a fuel break along the major Highways through the park. One of the stated goals of the Yosemite Fire Management Plan (FMP) is to "reduce the risk of catastrophic fire…" By maintaining clear, defensible open forest with canopy separation along these highway corridors, a wildfire which would be otherwise unstoppable, might be contained. For example the road between the South Entrance and Chinquapin is almost entirely hemmed-in with thick accumulations of dead and dying small trees, brush, and downed fuel. A defensible buffer zone may prevent a catastrophic fire from spreading into Wawona. Another example would be a wildfire in the lower elevations of the western portion of Yosemite which might be halted along highways 120 and 41.

Letter Number: 130

Comment: Roads and trails used for fire protection should be treated to the same standard as the urban interface. Fire fighter and public safety is the number one goal. Treatment of areas adjacent to roads and trails will protect against entrapment of firefighters and public users.

Response: We agree with these comments. The thinning of trees along 200' of either side of road centerlines in the Suppression Unit is an important part of the fire management program, since road corridors often define the boundaries of prescribed fire units. The use of prescribed fire in such units reduces the risk of catastrophic wildland fire burning through them, and towards communities at risk. The preparation of road corridors also provides safer locations for firefighters to ignite backfires and suppress unwanted wildland fires, and for evacuation of the public.

Concern #137: The National Park Service should not allow logging roads in wilderness.

Letters: 115, 114,

Letter Number: 115

Comment:: * NO LOGGING ROADS. No logging or other roads should be cut into Yosemite Wilderness or wild areas to accommodate tree thinning (logging) nor in developed areas. Any new logging roads in the Sierra and in Yosemite would be detrimental to ecosystem health. Each new road creates serious impacts (See the report on Roads in the Sierra).

Response: No new roads, or road widening, are proposed in the DEIS.

Concern #137a: The National Park Service should not allow construction of logging roads.

Letters: 113, 109,

Response: See #137.

Concern #138: The National Park Service should not allow thinning in wilderness.

Letters: 8, 82, 11, 10, 51, 114, 14,

Letter Number: 82

Comment: Other than within the 300' buffer zone, CSERC strongly opposed the use of any chainsaws or other mechanical treatments within wilderness areas. The use of chainsaws is not necessary --- only convenient, in such areas.

Response: No mechanical thinning to meet forest restoration target conditions is proposed for any wilderness area in Yosemite. Some mechanical fuel removal, done with chainsaws for fire protection, may be done in the Wawona area where designated wilderness is immediately adjacent to homes. Chainsaw use in wilderness with regard to fire management is limited to preparation of firelines for the management of prescribed and wildland fires.

Concern #138a: The National Park Service should modify the Wawona WUI boundary so that it includes no wilderness.

Letter Number: 117

Comment: Based upon our review of the maps presented in the draft EIS, it is our understanding that five out of six WUIs delineated by the Park Service hold no existing wilderness within their boundaries (El Portal, Yosemite Valley, Hogdgon Meadow, Yosemite West, and Foresta). In the remaining area, Wawona, the map depicts approximately one-half of a square kilometer of existing wilderness falling within the WUI boundary. How was the WUI boundary determined in Wawona and why did the agency choose to delineate the WUI so that it includes wilderness? We recommended that the agency avoid the controversy of logging within wilderness by re-delineating in Wawona WUI so that its boundary coincides.

Response: Response: the WUI boundaries were selected as logical places where fire managers could modify fuels in locations where such modifications could be expected to mitigate wildland fire behavior. The DEIS has been modified to clarify that mechanical thinning for the restoration of target conditions will not be done in the wilderness next to Wawona, although thinning of small trees followed by pile and prescribed burning may be used to meet fire hazard clearance requirements next to homes. Under the FEIS, no mechanized vehicles will be used in wilderness for mechanical fuel reduction, nor will equipment “reach over” along the boundary from non-wilderness into wilderness areas for fuel removal.

Concern #138b: The McCauley Ranch area should not be included in wilderness because of the need to respond to fires

Letter Number: 131

Comment: Recent proposals to add more Wilderness areas on the Western boundary of the Park would complicate dealing with fire danger. The McCauley Ranch and Crocker Ridge lands are separated from the present Wilderness area in the Park and designating them as Wilderness would only add complexity to fire management. In my opinion, these areas do no meet the minimum requirements for designations. The Board of Supervisors took action recently to strongly oppose the designation of more Wilderness areas in Mariposa County. I would hope that your recommendation of the suitability assessment of these areas was to not designate them as Wilderness.

Response: McCauley Ranch wilderness suitability will be assessed in a separate process; it is not within the scope of the YFMP/EIS. This comment, however, will be shared with the team responsible for initiating the wilderness suitability study.

Concern #139: The National Park Service should better explain why some upper montane forest is within the Fire Use Unit and some is within the Suppression Unit, and why different treatments are proposed.

Letter Number: 70

Comment: Much of the upper montane forest lies within the proposed managed wildland fire unit. Why should a naturally-ignited fire yield a "natural" result if a century of fire suppression really has created an unnaturally large accumulation of fuel? Has the EIS been alarmist?...misleading...blind to the stand-killing potential of al the alternatives considered? Would not low-intensity prescribed burns better cope with an unprecedented fuel buildup? Consider Lost Valley. Their hearts gutted by repeated ground fires, many of the largest cedar in Lost Valley now stand precariously on mere legs of bark and phloem. Is this what Alternative D seeks to achieve? If not, how is it to be avoided?

Response: See response to Concern #63. In some cases, more remote stands of chaparral have burned without significant influence from fire suppression, especially prior to the use of aircraft in the 1960's. Chaparral below or near communities will be managed differently than chaparral stands in more remote locations. All alternatives seek to avoid damage caused by unwanted wildland fires; to the extent that Lost Valley cedars have been burnt by unnaturally intense wildfires, or by groundfires set through human carelessness, the alternatives propose methods to mitigate the damage caused by such fires.

Concern #140: The National Park Service should utilize thinning to protect the Sequoia groves.

Letters: 82, 33, 84, 71, 134, 123, 67,

Letter Number: 82

Comment: CSERC strongly supports doing thinning logging, biomass removal, or similar treatments around/outside the Sequoia groves if it is deemed essential to protect the groves, but that should NOT include mechanical treatments within the groves themselves.

Response: The NPS agrees that thinning outside the groves could help mitigate some of the fire potential within the groves, but not all of it. Prescribed fire will be the tool for managing fuels and performing ecosystem restoration within and surrounding the groves. No mechanical work to restore forest target conditions is proposed for the groves. If prescribed fire does not achieve target condition objectives, an environmental assessment would be provided for public review before any mechanical thinning was done in the groves.

Concern #140a: The National Park Service should utilize hand thinning only in Sequoia groves.

Letters: 113, 98

Letter Number: 98

Comment: In wilderness areas clearing of ladder fuels (primarily brush and duff - lateral fuels - so as to reduce the risk of fire getting in the canopy) should only be done by hand removal to protect the soil and wilderness characteristics.

Response: See response to Concern #140. Also, the letter of concern addressed thinning in the wilderness, where hand thinning of lateral fuels should be the only mechanical method utilized, and this generally in support of prescribed or wildland fire management activities. This FMP/EIS states that under the preferred alternative (D), wildland fire would be the primary treatment used in wilderness. Hand cutting, pile burning, and the use of prescribed fire would be the secondary tools to accomplish fuel reduction work in the designated wilderness, generally to protect backcountry developments and to check fire spread when needed, such as for smoke management. Limited passive reduction techniques would be used along roads and utility corridors, but all heavy mechanical equipment would remain outside the wilderness boundary. Use of equipment would have to meet the minimum tool requirements for wilderness." (page 2-39, FMP/DEIS). Passive reduction techniques (from Table 2.6) would include Yarding; Hand cutting/piling; Cutting/chipping; Low-impact skidding (single person, horses or ATV's with a fetching arch); Girdling; and Limb removal. These activities would be mostly concentrated along WUI communities, WUI/Wilderness boundaries, and Park boundaries.

Concern #141: The National Park Service should insist that structures be built/maintained according to firesafe standards.

Letters: 6, 116,

Letter Number: 6

Comment: Protecting developments, sacrificing grand-old trees, seems to be a ludicrous goal. Structures must be first designed to withstand low-intensity natural fires, and we see no fire management plan addressing this goal. For example: CDF urges home-owners to "seal the undereaves and make the attics airtight" (the video "Firesafe: in and out). Does the Fire management Plan address this simple prerequisite well-known to 100's of home-owners in California? No, it doesn't. The plan is fatally flawed. Making developments firesafe should be the nation's and park's first priority. The second priority is to control the fire's intensity by removing dense ground brush.

Given fire-intensity levels of 1,2, & 3, Yosemite should require all structures in its domain to withstand first and second degree fire-intensity wildfires. Yosemite should reduce fuel-loading to prevent third degree burns.

Logging will not make structures firesafe, and logging of large trees will not reduce fuel-loading on the ground. What does logging do, then, for fire control?

Response: We agree that maintaining buildings in a firesafe condition greatly enhances their chances of surviving a wildfire. Many buildings in Yosemite, including historic buildings, have shake roofs and other features that pose a problem to their defense. The fire management staff is working with project planners to ensure they are aware of code and design features which should be included. The retrofitting of existing buildings requires the prioritization and availability of construction funding which is outside of the fire management program. Nonetheless, the removal in the vicinity of buildings of vegetation which can carry a flaming fire front has also been shown to be a critical component in the protection of any building.

Concern #142: The National Park Service allows wood collection as a means of reducing fuel loads.

Letters: 31, 19, 4,

Letter Number: 31

Comment: It would seem obvious that if you wish to clear an area of most fuel you could post conspicuously signs such as : "FREE WOOD GATHERING AREA; TAKE DEAD WOOD ONLY DO NOT USE POWER TOOLS". Yellow danger tape could be used to mark those areas which are off limits. Dead trees could be removed prior to the posting to avoid that hazard. Areas not adjacent to campgrounds could also be posted and information on their locations could be given to campers. This program would both get rid of the fire hazard and be good public relations as the campers would thank you for the source of wood. This could be the MOST inexpensive solution to your problem and could easily be "spin doctored" to thank the public for helping with your program to reduce the fire danger. This wold be much more popular than any other program which might remove the wood rather than make it available the visiting public. After this measure had been in effect for a time you could attempt to use managed fire to remove any small twigs which remain.

Response: Wood collection of dead and downed material for firewood is allowed in Yosemite National Park in all areas except Yosemite Valley, giant sequoia groves, and elevations above 9600 feet. This information is published in the Yosemite Official Map and Guide, which are distributed to visitors at the entrance stations. Chainsaws are not permitted for wood collection outside the established woodyards. The effectiveness of the public gathering firewood is evident around the perimeter of many of the campgrounds. By mid-summer, a useable fuelbreak around the campgrounds has been created by campers gathering wood. This FMP/EIS does nothing to change the existing policy.

Concern #143: The National Park Service should burn the debris piles that currently exist in some wildland urban interface areas.

Letters: 113, 88, 129, 116,

Response: Agreed. Over the past two years, approximately 8000 debris piles have been burned in Yosemite. Some piles, because they were constructed of green vegetation late in the fall, must cure out during the winter and following summer because they simply are not flammable until they dry out. Lighting “green” or wet piles requires more fuel (a gasoline and diesel fuel mixture) and creates more smoke, as well as an inefficient use of personnel time.

Concern: #143a: The National Park Service should factor in the risk associated with leaving debris piles unburned or using equipment in WUI.

Letters: 113, 8,

Letter Number: 113

Comment: Since NPS lacks personnel to manage prescribed burns for existing debris piles, the conclusion that there is a lower potential for catastrophic fire in the treated areas is erroneous because it does not factor in the potential timeframe (years) in which debris piles could stand untreated, and the plan does not accurately forecast the risk or danger created by these activities.

Letter Number: 113

Comment: Wildland/Urban Interface areas with human populations should be protected. Currently, there are hundreds of debris piles that ring Wawona from Spelt Road to an area locally known as the Grotto, to Chilnualna Falls, across the bridge and to the end of the road. These piles have been on the ground for two summers, and if they were to catch fire, it is obvious catastrophic conditions could occur rapidly and wipe out this community. The wood and debris are dry, and the piles are within feet of one another on a carpet of forest litter. The National Park Service does not have fire personnel or equipment to handle a massive wildfire in Wawona, especially a fire created by a heavy fuel load of debris piles. Before NPS creates any more ground debris it should take care of the piles it has already created, and reduce the risk for catastrophic fires.

Response: See response to Concern #143 concerning timeframes for pile burning. The piles referred to in letter #113 were burned during the fall and winter 2002-2003, after they had sufficiently dried out and when 2002 fire season had ended.

Burn piles are usually located under openings in the forest canopy to minimize scorch on remaining trees. This technique will also help to avoid fire traveling into the upper canopy, which is one of the main objectives of the hazard fuel reduction program. While it is true that piles may be accidentally ignited at an unscheduled time, the NPS believes the risk from the piles burning is less than if the fuels were left in place. After a thinning operation has taken place, and before the piles are burned, there are islands of concentrated fuels (piles) in a sea of much sparser, lighter fuels. A fire occurring in the sparse fuels would spread slower and have smaller flame intensities, making it easier to control.

It is the intention of the NPS to have piles disposed of within 18 months of their construction. The reduced fuels in the areas surrounding the piles mitigate the added risk posed by piles remaining intact for this period.

Concern #144: The National Park Service should utilize outside resources in the suppression of fires in Yosemite, before they become uncontrollable.

Letter Number: 113

Comment: These three wildland fires demonstrate the range of potential devastation that has occurred, and can occur in the future, given Yosemite's short supply of trained fire personnel, NPS's current fire management policies, and limited fire management resources in California and nationwide. While fire personnel from the National Forest Service and the California Department of Forestry can respond to major wildland fires in Yosemite, they must have an invitation first from Yosemite's National Park Service. The current practice is for Yosemite's NPS fire personnel to attempt to assess/address the situation with their resources first. However, fire units outside Yosemite's borders cannot "come to the party" without their invite. An exception occurs when the threat is to structures; Mariposa County Fire Personnel can come into the Park to assist NPS.

This NPS "we got it handled" machismo mentality does not work and should be abandoned in favor of fire policies that require Yosemite National Park Service to engage all available resources before wildland fires become uncontrollable. Given projected debris fields and slash piles to be created by mechanized timber extraction activities alone, as proposed by this plan, the potential for future catastrophic fires will increase exponentially each year.

Response: The Yosemite fire management program is part of the interagency fire community and is able to utilize suppression resources as the need arises. Almost all unwanted wildland fires are contained at the initial attack stage, generally within 48 hours of detection. Fires which are not contained at this stage are analyzed using the Wildland Fire Situation Analysis used by federal agencies. Additional resources, and if warranted, an Incident Management Team, are ordered. As experienced by all fire agencies, a specific combination of weather, fuels, and topography will result in a very few fires in Yosemite becoming very large and resistant to control in spite of the best efforts by firefighters.

Concern #145: The National Park Service should add or modify prescribed burn units in Wawona Section 35, to include previously unidentified areas.

Letters: 106, 85, 129,

Letter Number: 106

Comment: The NPS has acquired numerous lots in the Wawona area Section 35. Some lots are vacant and some have uninhabitable structures. Many of these lots are overgrown with trees and covered with burnable fuels (needles, trees, etc). Many are next to fire-safe private homes. These lots need to be included in an appropriate burn unit. Particular areas I know of that desperately need cleanup include the area below Forest Drive near the SDA camp (Mariposa County Map Bk 10-pg 280) and your lot on Koon Hollar Road Bk 10-pg 270 lot 7 that is enclosed by the Telaro, Thompson, Ortiz and Wood lots.

Response: The NPS-owned areas within Section 35 of Wawona are mostly small-sized lots adjacent to structures. Each lot will/has been assessed for fire hazards and will receive an appropriate treatment, either mechanical or prescribed fire. The number of NPS-owned lots and checkerboard pattern in Section 35 makes it difficult and redundant to identify each individual lot as a burn unit, so the entire collection is lumped under the general project title "Wawona WUI."

Concern #146: The FMP/EIS should clearly state where the impacts of mechanical equipment would occur.

Letter Number: 113

Comment: Based on the description of the machinery, the destruction will be extensive and the impacted areas will take years, if not decades, to recover. To be clear, the plan should state that these machines will destroy over 4,000 of the proposed 7,664 acres to be treated. As it reads now, plan working is deceptive as heavy machinery will be used extensively in wildland areas where timber harvests are less likely to be witnessed by the public.

Response: the impacts of mechanical treatment to achieve vegetation management targets would principally occur within ¼ mile of the six wildland urban interface communities in the park. Mechanical work may be done in the ¼ up to 1 ½ mile outer WUI area around these communities, but only after prescribed fire has been shown to be unable to attain target objectives, and only after the preparation of environmental compliance documents. No such work would be done in wilderness, but would be done near developments, with access provided by existing roads.

Concern #147: The FMP/EIS should include more explanation of the 3 large fires that have occurred in the park's history.

Letter Number: 113

Comment: In the draft Fire Plan, NPS Fire Plan writers excluded an historical analysis of three major wildfires fires. It is worth noting that decisions made by the National Park Service based on "let it burn" fire management policies contributed to the vast devastation of these fires. This analysis should be provided to the public. In particular, the Arch Rock fire was mismanaged in its earliest stages as several aircraft loaded with fire retardant were turned away by Yosemite's Superintendent instead of being allowed to extinguish this fire. The Arch Rock fire destroyed the Foresta community and thousands of acres of Yosemite National Park.

Response: The three fires in question, Steamboat, Arch Rock, and Ackerson, were classified as unwanted wildland fires from the moment they were detected. None of these fires received consideration to be, or were ever treated as, wildland fires that could be allowed to burn. The three fires exemplify the increasing severity of unwanted wildland fires, and the DEIS describes treatment methods which are envisioned as mitigating the severity of future wildland fires.

Concern #148: The FMP/EIS should have more information on the cost and need for the helibases described.

Letter Number: 4

Comment: Wawona Helibase, I think it is a good idea to have clear parking for this area. El Portal Helibase, actually I would have to see this one as well as the Crane Flat one to see what actually is occurring and if it is necessary upgrading the 3 helipads should have the cost built into it and reported in the Draft of the plan. It seems that in order to rebuild a new pad at Crane Flat there would be a proposal to remove the existing one and the costs of that included. I would like to know about currency training on towers, page 2-33 of the draft of the plan. Wouldn't constructing these towers also conflict with the General Plan? Again it would be nice to include the costs of this project and while you are using old steel beams, how much will a contractor charge to erect them? What is currency training and for what purpose? To keep current on what skill? Firefighting, rappelling in a fire, since there will be no tower in a forest fire, maybe actual practice would be better since they will be using the helicopters anyway? Maybe some alternatives could be drafted, currency training with helicopters only, currency training on the tower only or a combination of currency training with tower training. I like the last choice best. Since we don't know the cost of helicopter training or the cost to erect the beams we cannot tell in the long run which choice is better.

Response: The El Portal and Crane Flat helibases involve relatively minor upgrades, costing approximately $9,000 and $14,000, respectively. Much of this cost is for transporting and leveling fill material to enlarge helipads into safer configuration. The Wawona helibase is the planning stage, with approximately $35,000 needed for an archaeological survey of the proposed area, and approximately $10,000 planned for construction labor and materials.

Concern #149: The FMP/EIS should include more information on the impact of temporary helispots, created during fire incidents.

Letter Number: 111

Comment: Your commented on the needed to improve the permanent landing sites of helicopters used in both fire and rescue, which is only right both for the safety of the crews, and people on the ground. But no comments were made about developing summer sites (no permeate facilities other then clearing) for use by fire strike forces or rescue personal.

Response: Helispots are generally not constructed for fire management operations in wilderness. Existing bare areas, such as meadows and rock domes are used. Rappelling is also done to lower firefighters down to fires. If unimproved helispots are needed for the management of large fires, tentative sites would be identified and reviewed by natural and cultural resource management specialists who would identify sensitive resources, if any, in the area of the proposed helispot.

Concur #150: The National Park Service should recognize that lightning ignited fires alone can accomplish the role of restoring natural fire regime.

Letter Number: 63

Comment: Given the lightening strike density for one year - as shown in Map 3-1 - it is remarkable that there have not been more catastrophic fires over the thirty year period. Park employees tell us that there are many more lightning-strike fire events than those shown in Table A-6-3. These are fires that accomplish their ecological functions without need from management and that most of the time they self-extinguish. It appears that these -- in concert with the proposed "Prescribed Burning Program" and the anticipated "Managed Wildland Fires" - will adequately accomplish the objective of restoring the natural fire regime to these fire-adapted forests, without the need for aggressive thinning of large trees. These data confirm the impression, the fire management since 1970 has indeed successfully mimicked the role of natural fire.

Response: The DEIS agrees with this statement in the Fire Use Zone, 83% of the park. In the Suppression Zone, a combination of more resources at risk, higher departure from median FRID and the three examples of catastrophic wildfires (Arock, Steamboat and Ackerson), lead us to believe that treatments with prescribed fire and thinning are needed before we can safely let fire resume its natural role. It is the ultimate goal of this fire management plan to increase the acreage in which we can safely use wildland fire for resource benefit.

Concern #151: The FMP/EIS should provide more information on what a burn unit represents, and how they will be used.

Letter: 70, 88,

Letter Number: 70

Comment: Maps 2.6 through 2.15: What does "burn unit" mean? Do the mapped burn units merely indicate the areas potentially subject to prescribed burns? Do they represent the size of individual burns? Potentially of general interest are the burn frequency (or interval), burn season, and the size of individual burns or of a single year's contiguous burns. Not all these issues were thoroughly addressed.

Response: While Appendix 6 lists which burn units will be treated in a given calendar year from now until 2008, there are many factors affecting ability and decision to implement a prescribed burn project, so the schedule can best be viewed as “tentative.”

Issues that drive the size and timing of a burn project are focused in four arenas: fire behavior and weather; funding and staffing; resource concerns; and air quality. Air quality is and remains the most limiting factor on size and scheduling of burns. Permission to burn must be granted from the local air quality management district, with concurrence and collaboration from the State of California Air Resources Board. For example, in the fall of 2002, Yosemite attempted to complete a 7,288 acre prescribed burn, called PW-3 Gin Flat. After 10 days and an ever-growing number of complaints, the local air district requested that Yosemite suppress or significantly reduce emissions from the Gin Flat prescribed burn. This required managers to stop the unit at the halfway mark, for a total of 3517 acres burned out of the proposed 7,288 acres. The rest of the unit will be burned in several segments.

Until the public's tolerance of smoke changes, it is highly likely that management-ignited prescribed burn projects at Yosemite will be less than 100 acres per day and no more than 7-10 days in duration.

It is the intention of Yosemite National Park Fire Management to treat with fire (e.g., wildland suppression fires with acceptable results, prescribed fires, and wildland fire use) about 16,000 acres per year. This is the average amount of acres that burned every year in Yosemite before fire suppression occurred. In some years, especially if it is a severe fire season, that amount could be doubled (25,000 acres burned in 1990 during the A-Rock and Steamboat wildfires) or even tripled (47,000 acres burned during the 1996 Ackerson Fire). Other years, because of wet weather or some of the issues mentioned above, the total acres treated could be significantly less than 16,000. Due to the uncertainty of many factors affecting prescribed burn projects, "tentative" is a good word to describe any long-range prescribed burn planning schedule.

To conduct a prescribed fire, an extensive "Prescribed Burn Project Plan" is written and reviewed by Park staff representing fire management, resource management, and visitor protection. This is an implementation plan that lists all the management actions that must be implemented, as well as who is responsible. Once this plan has been reviewed and recommended by Park staff, the Park Superintendent has the final decision for approval. This planning, review and approval process can take 1-3 months. And even though the Park Superintendent has approved the project, the ultimate say on whether or not a particular project can take place on a scheduled day is the province of the air quality regulators. This approval or permission to burn from the air quality regulators is granted the afternoon before a prescribed burn, giving the burn manager about 15 hours to do the final notifications and resource ordering. Approval from the air quality regulators may be delayed for days because it is dependent on the atmospheric conditions of the surrounding airshed.

Concern #152: The FMP/EIS should include more information on the constraints to burning, including self-imposed and regulatory.

Letter Number: 82

Comment: Some important information is missing from the document, which constrains the options that the public can identify. For example, the Park currently strives not to burn on weekends. Allowing far more burning to take place on weekdays not only adds to the window of timing, but it also increases the ability for the Park to start a project and to keep it going until completion (rather than shutting it down or holding off on completion until after the weekend. CSERC urges the Park to get realistic about getting rid of all the minor reasons that interfere with large scale prescribed burning… and to implement it on a far more aggressive basis.

Response: The more aggressive restoration of fire to park ecosystems will require more innovative techniques as well as an examination of past practices that have limited this restoration. The concept of adaptive management will be used to develop and implement methods which reduce the risk of unwanted wildfires while mitigating, for example, the impact of smoke on the public through timing of ignitions and size of burn block. Additional methods will include improved community outreach and public education to build support for a more aggressive program.

Concern #153: The final FMP/EIS should indicate the number of acres hand-thinned in Wawona in the last 5 years.

Letter Number: 114

Comment: How many acres were hand-thinned with chainsaws in Wawona over the last five years?
Please include this data in the Final Fire Plan.

Response: The acres of hazard fuel reduction accomplished in the Wawona area for the past five years (1998-2002) are:

2002	147 acres
2001	118
2000	98
1999	93
1998	93
TOTAL	549 acres

The total above captures all hazard fuel reduction (thinning, piling, raking, mowing)

activities. Also, approximately 93 acres per year are routine annual fuels maintenance and defensible space for structures within Wawona. Of the 549 acres, approximately 277 were accomplished by hand thinning (3600 piles burned divided by an average of 13 piles per acre).

Concern #154: The National Park Service should conduct its prescribed burning is such a way as to allow for recruitment in stand populations.

Letter Number: 63

Comment: We have been told that this site is "atypical" (extremely productive) and the calculated basal area (385 sq. ft./ac.) confirms this. It is puzzling to us that this "atypical" site was chosen to illustrate the proposed treatments. Also, of concern is the number of standing-dead-trees and stumps (11 and 3 respectively) included in the proposed remnant Plot. At a Plot area of 0.4017 acres, this translates to 27 standing-dead-trees and 7.3 stumps per acre.

Table C.4 - Attachment - C (file Att_C-4, *.xls), indicates that the retained live trees will be only 67 per acre. Thus, there will be 40% as many dead trees as live trees in a typical treatment zone. We appreciate the importance of retaining snags for wildlife habitat, but this proportion of dead to live seems unnatural to us. Since the site will be maintained with fire alone after the initial treatment -- and treatment with prescribed fire should be repeated two more times to be effective -- the opportunities will be slight for growth of replacements for intermediate and mature trees as they become decadent and die. We suggest that - following the three prescribed fire treatments - subsequent treatments be deferred at least one FRI, to permit survival of some new growth by the "patchiness" of natural fire (as mimicked by the Rx treatments).

Response: We agree. After the first prescribed fire in an area like the one used for the demonstration site, there will be a flush of germination and establishment of trees. Subsequent burns due to the patchy nature of fire will kill not all of these trees. This will allow regeneration and develop a forest with a patchy uneven aged structure.

Concern #155: The FMP/EIS should indicate who outside contractors might be.

Letter Number: 4

Comment: …alternative B, Aggressive Action there is no mention of who the outside contractors might be? I would like to know in advance who the National Park Service has in mind to carry out this massive task.

Response: Any contracts awarded by Yosemite National Park are subject to the Federal Acquisition Regulation (FAR) and the NPS Director's Order 20. Both the law and the policy spell out what is and isn't permissible for contracting in Yosemite. To answer the above concern, the correct answer would be "Anybody or any company willing to do business with Yosemite National Park who can provide best value for the intent of the contract."

It is likely that a number of contractors would be employed at Yosemite National Park to do fuels management work. One intention of the National Fire Plan is to find or develop contractors in the local area surrounding each federal property. Yosemite Fire Management has already started trying to find interested individuals and companies to do fire hazard fuels work. Interested parties are encouraged to contact the Yosemite Contracting Office or the Small Business Administration.

For the 2003 fire season, it is expected that two contracts will be awarded. One will be given to the California Conservation Corp, a state agency that helps promote natural resource careers for young adults. The other contract will probably be awarded to a minority-owned local contractor who is registered with the Small Business Administration and has successfully completed contract work for several of the National Forests surrounding Yosemite.

Concern #156: The FMP/EIS should indicate the effects of reburns in its prescribed burning activities.

Letter Number: 135

Comment: The DEIS discloses that some areas have been reburned several times. (pg. 3-9) This is one of the most controversial issues in fire management. Question: what have been the effects of reburns? Has it resulted in deforestation?

Response: We are currently working on looking at the monitoring data for areas that have been prescribed burn more than once. This data will help us look at the potential transition between restoration and maintenance targets and help us to further refine our target conditions. In some areas of the park, like the Aspen Valley burn units, we believe we have achieved our restoration objectives and will now burn based maintenance targets. Such areas may reburn many times without drastic shifts in ecosystem characteristics.

In general, wildfires of unnatural severity have caused deforestation in the park. Portions of the Steamboat fire along Highway 41 and the A-Rock fire along Highway 120 have been converted from forests to brushfields. Given enough time without another wildfire, the areas may succeed back to forests. The sudden conversion of one ecotype to another, on a landscape-scale, due to a catastrophic wildland fire, is one deleterious effect the EIS/FMP seeks to avoid through hazard reduction activities.

Concern #157: The FMP/EIS should indicate whether prescribed burns or re-ignitions would be superior to accomplishing overall objectives.

Letter: 70

Comment: I applaud your rationale for suppression and later re-ignition of managed wildland fire, but shouldn't a prescribed burn be inherently superior for meeting your overall objectives than simple re-ignition?

Response: The re-ignition of a wildland fire which was suppressed is, by policy, a prescribed fire. The pattern of ignition would approximate that of a wildland fire, guided by computer models which predict how the wildland fire would have acted if it had been allowed to burn. For example, fewer points of ignition might be used relative to a more typical hazard fuel reduction burn, allowing the prescribed fire more opportunity over time to create a mosaic of fire effects, much as a natural wildland fire would do.

Concern #158: The FMP/EIS should indicate whether emergency fuel reduction measures, such as salvage logging, would be used in Yosemite.

Letter 135

Letter Number: 135

Comment: The reference to emergency fuel reduction is unclear. (pg. 4-15) On past wildfires (e.g. the Big Bar Complex) the USDI used "emergency fuel reduction" to log commercial-grade trees while the fire incident was still active. Question: is this a specific program for emergency fire salvage logging in the USDI? What kinds of EFR activities would occur within Yosemite?

Response: The removal of trees killed due to an unwanted wildland fire can be done if they pose a threat to human life and property. Individual trees on a small scale can be removed much as tress are currently removed under the Hazard Trees program. Groups of trees on a large scale, such as were killed due to the Steamboat fire in 1990 near Yosemite West, can be removed following the preparation of environmental compliance documents, which are subject to public review and comment. Other emergency rehabilitation activities might include installation of check dams and hay bales for erosion control, trail repair, stabilization of damaged building, and inventory and monitoring of sensitive cultural and natural resources.

Concern #159: The National Park Service should not suppress fires in Yosemite National Park

Letter Number: 40

Comment: Yosemite's current plan is justified on grounds that it may suppress fire. This is peculiar logic. With its currently proposed Fire Management Plan, Yosemite openly acknowledges that previous fire suppression policy has, along with other factors including changes in global circulation of water triggered by global warming, created risk of dangerous forest fires. While disclosing this now well-documented risk of fire suppression, you would nevertheless embark on a policy of fire suppression, as if fire suppression does not create risk. It is difficult not to notice some comic aspects to this peculiar logic.

Response: For 2/3's of Yosemite National Park, Wildland Fire Use is the primary option for managing wildland fires. Fire has, and will continue to have, a natural role as one of the main agents in the ecosystems. There will be times, because of air quality concerns or threats to escape an approved project area, that some wildland fires in the Fire Use zone will have to be suppressed or restricted.

For the western 1/3 of Yosemite National Park, uncontrolled wildland fires pose a risk to life or property within and outside the Park boundaries. Where as the east side of the Park is mostly granite rock, an effective barrier to fire spread, the west side is a layer of nearly continuous fuels leading to the San Joaquin Valley. Neighboring communities and cooperating fire agencies would be very concerned (and rightly so) if Yosemite did not take actions to prevent or control wildland fire from spreading out of the Park and into their communities.

As fire management understanding increases, and projects near the west side are completed, it may be possible in the future to expand the Fire Use zone westward.

Concern #160: The FMP/EIS should include the costs for future staffing and housing, and the potential for finding qualified personnel.

Letter Number: 62

Comment: The three action alternatives, B, C, and D all involve substantially more staffing, yet the FMP ignores the future cost, housing, and the availability of qualified personnel.

Response: Staffing for the fire program for all alternatives is not envisioned to increase significantly beyond the current level. Federal fire management funds are not expected to increase significantly, and much of the fuels management work in the wildland urban interface area is expected to be contracted. Housing and office space issues are addressed in the scope of other park documents such as the Yosemite Valley Plan.

Concern #161: The FMP/EIS should indicate whether funds are available/guaranteed for monitoring.

Letter Number: 8

Comment: Are funds guaranteed to be available for monitoring? Other federal agencies have had trouble with this.

Response: The fire effects monitoring program has been in existence for as long as prescribed fire has been used in Yosemite. While subject to budget uncertainties, as are all federal programs, the fire effects monitoring program is expected to continue for as long as prescribed fires are conducted.

Concern #162: The National Park Service should consider additional measures of residual trees in treatment areas, such as basal area.

Letter Number: 120

Comment: Please have staff consider some additional measure of residual trees in treatment areas, such as basal area.

Response: The wide ranges of desired density and frequency by species composition are intrinsically based on the sizes of trees and the range of natural variation of stocking. Adaptive management techniques may be used to link a range of basal areas to density and frequency, as more research is conducted on their relationship.

Concern #163: The National Park Service should find ways to conduct fire management activities with a minimum of fuel consumption.

Letter: 62, 114,

Letter Number: 62

Comment: In reference to oil-based fuel consumption, i.e, saws, motor vehicles and drip torches, in all of the action alternatives, NPS staff must always find a way to accomplish the objectives while using less fuel. One example is pile burning where in fact it can be more efficient and easier to ignite slash piles using burning embers and coals, rather than wasting more fuel from a drip torch. Currently there is no incentive to minimize use of fuels.

Response: Allowing some wildland fires to burn, or reducing hazardous fuels with prescribed fire, will reduce the expenditure of fuel because large, unwanted wildland fires are less likely to occur. Such fires cost large amounts of money to suppress, and usually involve hundreds or even thousands of fire personnel in the effort. On a smaller scale, once a few piles are ignited, wildland fuels can be added to these piles to keep them burning, rather than igniting many separate piles individually with drip torch fuel.

Concern #164: The FMP/EIS should include more information on the effects of fire suppression activity, including equipment use.

Letter Number: 135

Comment: Information on the environmental effects of fire suppression and holding actions are scattered throughout the document, but could be grouped into a single section. More analysis and disclosure of the "lasting impacts of suppression actions" (pg. 1-15) is needed under all alternatives. We disagree with the statement that "emergency fire suppression actions and their immediate effects are beyond the scope of this document and will not be evaluated." (pg. 1-26) We do not believe "the range of emergency suppression actions. would be too broad, speculative, or conjectural to lend themselves to meaningful analysis." (pg. 1-26) This document is, after all, a Fire Management Plan, and it is replete with references hinting at environmental impacts (e.g. "Impacts from actions to suppress fires would be most intense under this alternative" pg. 4-46), and therefore they must be within the scope of analysis. If the DEIS can offer speculative statements on the effects of another future A-Rock fire, then it should provide disclosure of standard suppression techniques and their general environmental impacts in the FEIS. This disclosure will help the Park make a better case for proactive restoration activities, including mechanical thinning, in order to allow more wildland fire use and avoid unnecessary aggressive suppression operations.

Response: The document is not the Fire Management Plan, but rather the EIS for this plan, which will be developed following the Record of Decision. The emphasis on the plan was mitigation of the many deleterious ecological effects of unnaturally severe wildland fire, as well as describing the effects of excluding fire of more natural intensities from ecosystems which have evolved in its presence. The risk to public safety and communities, and the mitigation of this risk, is also a cornerstone of the EIS/FMP. We agree, however, that fire suppression activities can also have negative impacts. Some of these will be listed in the mitigation actions for species of concern which was developed for the FEIS. Others, such as the restriction on the use of dozers for suppression activities and the inspection of vehicles for weed and weed seed, will appear as management practices in the FMP. The final FMP will also feature extensive use of the Wildland Fire Situation Analysis, which is a tool to assist managers in the selection of a strategy which best blends safety, ecological, and economic considerations.

Concern #165: The FMP/EIS should include information on the economic impacts to communities.

Letter Number: 130

Comment: Conspicuously absent from the analysis is the economic impact to local communities. If the park or any of its facilities closed due to fire, the economic loss would be great to surrounding communities. From last minute supplies purchased by visitors to hotel taxes, the communities receive an economic benefit from a healthy park.

Response: Please see *Potential Indirect Effects* under *Local Communities*, in Chapter 4, *Environmental Consequences, Social Environment*, and particularly the analysis for the No Action Alternative on page 4-109 in the DYFMP/EIS.

Concern #166: The FMP/EIS should include measures to protect cultural resources and historic buildings from fire.

Letter: 13, 61,

Response: Measures to protect cultural resources and historic buildings are generally described in Chapter 2, under Mitigation Measures – Cultural Resources (2-48) in the draft EIS. More detail on protection measures is provided in Chapter 4, Environmental Consequences, in the following sections: Mitigation of Impacts to the Cultural Environment, Archeological Resources, Ethnographic Resources, and Cultural Landscape Resources, Including Individually Significant Historic Sites and Structures (4-14 through 4-18).

Concern #167: The following word choice should in the draft FMP/EIS should be corrected.

Letter Number: 135

Comment: There is a word choice error on pg. 3-17. The word, anthropocentric, means human-centered, and is a popular concept used in the literature on environmental philosophy. The FEIS should use the word, Anthropogenic, which means human-caused, and is commonly used in reference to landscapes or ecological conditions.

Response: Anthropogenic has replaced anthropocentric.

Concern #168: Fire and vegetation management treatments would impact the park experience.

Letter Number: 59

Comment: Removal of logs from the park should be kept to an absolute minimum. If any are removed, the impact of logging trucks on the environment and the park experience should also be included in the draft statement.

Response: We agree that removal of logs from the park should be kept to a minimum. Thinning activities will be limited to areas within and adjacent to the six WUI communities in the park, as well as road corridors and under utility lines in the Suppression Unit. Outside of these areas, there should be little or no impact on park visitor experience from mechanical thinning activities. It is expected that most woody material, including logs, will be burned or chipped on site, or used for administrative purposes such as fences. The surplus amount that will need logging trucks for removal should be small, since both the rate and location of thinning can be altered to largely eliminate the buildup of such a surplus of material of this size.

Concern #169: Fire and vegetation management treatments would not impact the park experience.

Letter Number: 141

Comment: I have no doubt that these treatments can be carried out in a manner, and at a time that will in no way impair the quality of experience that the visitor has come to the park for.

Response: See response to Concern #168.

Concern #170: Smoke from fire management activities would result in persistent impacts.

Letter Number: 70

Comment: 4-183: Smoke from managed wildland fire will impact recreation throughout the area from which it can be seen. If individual smoky fires persist or subsequent fires replace them, the cumulative effect is persistent, not short term.

Response: For purposes of the draft FMP/EIS, parameters for short-term air quality impacts were defined as: "Associated with the duration of a specific fire event." (FMP/EIS page 4-12). For wildland fire use fires, the impacts are considered short-term because: 1) most fire remain small, less than 10 acres; 2) fires that persist and grow larger than 10 acres do so sporadically with varying amounts of smoke generated; and 3) the lifespan of a wildland fire rarely exceeds 4 months.

During the 2002 fire season a lightning fire ignited in the fire use zone west of the White Wolf Development in Yosemite National Park. The fire was named the Wolf Fire and was managed from its start on July 11, 2002 until extinguished by rains on November 7, 2002, with a final acreage of 1971 acres burned. This was the largest individual fire use fire of 2002. Total acres burned for the 14 wildland fire use fires in 2002 was 2557.

During the four months the Wolf Fire burned, the largest acreage growth in one day was approximately 100 acres. Its average daily growth over the four months was just over 16 acres per day. It was the largest fire use fire of the 2002 fire season. There were smoke impacts during the course of the incident, but nothing that could be termed "persistent." Indeed, there were several times during the four months that fire managers thought it had gone out because of the lack of smoke production. Then the weather would warm and turn drier, and it would get more active. Instead of becoming a negative recreational impact, the fire actually began to draw visitors to the White Wolf area, spurred on by a local newspaper's reporting on the opportunity to see a forest fire up close.

Finally, there are many who believe that fire is a natural component of the wilderness and that fire (and smoke) should not be excluded from the wilderness experience. Yosemite National Park hopes to preserve that type of experience for not only for visitors, but also more importantly, for the wilderness itself. However, where smoke becomes a health concern, action will be taken to restrict the spread of the fire.

Concern #171: The FMP/EIS should address traffic impacts and emergency evacuation procedures.

Letter Number: 15

Comment: Three different districts in the Department operate three different primary roads into and out of the park. These are Highway 41- District 6, Fresno; Highway 12- - District 9, Bishop; and Highway 140 - District 10, Stockton. Potential impacts to these state highways, as a result of this plan and its alternative, need to be analyzed and discussed. If mitigation is necessary to lessen, avoid or reduce these impacts, then mitigation also needs discussion. This Fire Management Plan does not address any traffic impacts or outline or discuss any type of emergency/evacuation response plan. The Department has the following suggestions and recommendations:

- Because a catastrophic fire, flood, or other event is possible in Yosemite Park, the Department suggest discussion of how the park administration would respond to such an event and an outline of what procedures and policies are in place.

- Potential impacts to state highway facilities and the mitigation of these potential impacts needs to be discussed. How would the Park Service notify the Department affected districts during a controlled burn, fire outbreak, etc.? How would the Park Service coordinate with the affected districts should smoke or fire create hazardous driving conditions inside and outside the park?

Letter Number: 15

Comment: The Department suggests the development of an emergency/evacuation response plan. This plan should identify emergency/evacuation routes and corridors inside and outside the Park. The Park, the Department, and other local and regional emergency units should develop an emergency response action plan and team. Bridges, parking areas, and roadways should be maintained and retained to provide for effective emergency response both inside and outside the park.

Response: The FMP/EIS discusses generally the impact of unwanted wildland fires on road closures which may arise from catastrophic fire. The park has emergency response and evacuation plans with will be included in the appendices of the final Fire Management Plan, which is the tactical implementation document for the fire management program.

Concern #172: The FMP/EIS should limit the size of the maximum manageable area, for managed wildland fire, to less than 1 acre in the Hetch Hetchy Valley, to protect the San Francisco water supply

Letter Number: 96

Comment: The maximum manageable area (MMA) boundaries in the Hetch Hetchy vicinity should be designated to exclude management fires larger than one acre from the inner gorge. If early assessment of a natural fire in this zone suggests that the incident has the potential to reach several acres in size, appropriate containment measures should be employed. In addition, we suggest that the document include emphasis on protection of the City's water supply as an important, high value resource.

Response: In the FMP/EIS discussion of Chapter Four: Environmental Consequences of the Physical Environment *Watersheds, Soils and Water Quality* for all four alternatives, effects of managed wildland fire are characterized as "beneficial, short-term and moderate." (page 4-299).

The steepness of the slopes in Hetch Hetchy Valley would make it difficult to control an ignition at one acre. In effect, a fire would need to be suppressed immediately after it was detected to keep it under one acre. The suppression actions of line construction (erosion) and retardant and water drops (chemicals) would have the potential to degrade water quality.

In 1999, the LeConte Fire Use fire burned approximately 8517 acres on the northeast side of Hetch Hetchy Reservoir. No long-term adverse effects are known to have occurred. In 1996, the northeast advance of the 47,000 acre Ackerson Fire was halted by the Frog Fire, a wildland fire use event that occurred in 1991. By allowing frequent, low severity burns to occur, the chance of a high severity fire damaging to the watershed can be lessened.

Concern #173: The FMP/EIS should clarify the effect of fire treatments on watersheds.

Letter: 70, 8

Letter Number: 70

Comment: 4-299: You propose fire to control fuel buildup. Yet you state here that "fire would typically burn along ridge tops and upper slopes, with only partial intrusion into slope bottoms and riparian areas". Is not fuel buildup concentrated on lower slopes, lowland flats and riparian areas?

Response: The text in question relates to the impact of managing wildland fire in the Fire Use Unit. It is true that lower slopes, lowland flats and riparian areas contain concentrations of fuel, but in Yosemite the buildups that are most unnatural (considering type of plant community, its fuel attributes, and the natural periodicity of fires) are in mid-elevation mixed conifer communities, and the greatest of these are in the Suppression Unit and along the western edge of the Fire Use Unit. The areas of the park that have been designated as Fire Use Unit are typically within or nearer the natural range of variability for fuel loads, and they also may be in communities that have longer fire return intervals. Some of the Fire Use Unit is dominated by short-needle conifer types, which don't sustain burning as readily as the long-needle pines because of the compaction of litter and duff. These and other factors result in managed fires that can burn into lower slopes, lowland flats and riparian areas, but typically with more moderate intensity than is seen in the high-intensity fires that occur in areas that are more altered (naturally, shorter fire return interval areas, where fire has been excluded), found in the Suppression Zone.

Concern #174: The National Park Service should reduce fuel loads and minimize the threat of large, stand replacing fires, but should not allow high-intensity wildland fires in Hetch Hetchy Valley, because of the impacts upon water quality.

Letter Number: 96

Comment: We consider catastrophic wildfire to be one of the main threats to water quality in these two watersheds. Therefore, the SFPUC is very supportive of the National Park Service's efforts to re-introduce fire as a viable component of the ecosystem in order reduce fuel loading and minimize the threat of large stand replacing wildfires that can introduce sediment and other contaminants San Francisco's drinking water sources.

Letter Number: 96

Comment: We have some concerns with management fires that create large, intensely-burned areas within the inner gorge of the Hetch Hetchy Reservoir Basin. In terms of potential adverse impacts to water quality, we believe there is little difference between a high-intensity management fire and a wildfire, where large incidents below the rim are concerned. As we experienced after the 1996 Ackerson Complex Fire, these types of events can contribute burned debris and abnormal sediment loads directly into the water supply. This precludes its use for domestic purposes, often for sustained periods of time. If many acres of vegetation buffering the shoreline are destroyed, we've lost the natural barriers that tend to trap and filter material before it reaches the water.

Response: The Ackerson Fire was not a managed wildland fire. It was a wildfire. The team responsible for suppressing it attacked its western edge first, which allowed it to burn up to the rims of Hetch Hetchy Reservoir. The following year—when the great amount of debris came into Hetch Hetchy Reservoir—the (rain on snow) winter floods of 1997-1998 occurred.

We share the concern that fire management activities be undertaken in manner that limits their risk of becoming out-of-control, high severity (catastrophic) wildfires. We also recognize that high severity wildfires can impact water quality. Prescribed fires and managed wildland fires can reduce the likelihood of high severity, catastrophic wildfires. While it is true that vegetation in a watershed buffers surface waters (i.e., it captures sediment, organic materials, etc.), it is also true that as the amount of vegetation and fuel in a watershed increases, the risk of catastrophic wildfire increases as well. Prescribed burning and wildland fire use—though they generally result in near-term increases in sedimentation—cause a lesser loss of the duff layer (compared to high severity wildfire). This helps to reduce soil erosion and supports recovery of vegetation. In contrast to high severity wildfires, infiltration rates should not be greatly reduced and conditions which cause overland flow of sediment into stream channels are more limited.

Concern #175: The National Park Service should not artificially manage Sequoia groves.

Letter Number: 115

Comment: * YOSEMITE SEQUOIAS. In part because of the long life-span of the Sequoia trees, nobody knows the full range of natural conditions that Sequoia groves were formed by and have lived through. Evidence of hot fire in the past means that there must have been some severe fuel build ups. So, part of the natural variation over time would be that there are built up areas of fuels/kindling waiting for that lightning bolt. Sequoias do not need fire to germinate. They do respond to fire by germinating lots and lots of seedlings. but they also sprout wherever nature creates a small opening, such as when a giant falls down and its roots tip up moving a lot of bare soil to the surface, and also when a gopher digs a hole with a small patch of sunlight. The fact that Sequoias respond after a fire is not a reason to disturb the soil just to make them respond. The Sequoias reproduce and survive after disturbance, but when there is no disturbance there is a status quo... new seedlings are redundant. Consider that the trees there now can survive 3500 years and become up to 35 feet in diameter. Even if one seedling every century per acre survived, that would make 35 huge giants an acre, all producing cones and seeds. And consider that Sequoias do not usually occur in pure stands but are mixed with other conifer species, each requiring nutrients, etc. So, this alarm over groves not reproducing is probably not valid in Sequoia time. People have reported seeing young Sequoia in almost every grove. A Sequoia grove is, of course, not a tree farm.

Response: The natural regeneration of the giant sequoia is strongly dependent upon conditions produced by recurring moderate intensity fires (Harvey et al. 1977). The primary management objective for each grove would be to preserve, maintain and propagate the giant sequoia. It is not to make as many giant sequoias as possible. Other objectives are to mange the grove for aesthetic beauty, maintain scenic vistas, restore cultural landscapes and preserve historic resources. The limited extent of our groves, high visitation, and potential for impairment have helped us to chose prescribed fire as the primary tool for managing fuels and performing ecosystem restoration and maintenance within and surrounding the groves.

Concern #176: The National Park Service should clarify the use and relevance of Sierra Nevada Ecosystem Project (SNEP) old growth forest information.

Letter Number::130

Comment: The plan uses the Sierra Nevada Ecosystem Project (SNEP) old growth information that is inaccurate. It states the park has 54% high-quality, late successional forest, which is about twice as much as the neighboring national forest lands. SNEP reported the adjacent forests, Stanislaus and Sierra, have 33 percent late successional or nearly two thirds that of the park. But the SNEP analysis favored park forests. The inventory was assessed by evaluating patches for percent old growth then evaluating the number of old forest patches that were in a polygon. Polygons were tabulated based upon the percent of old forest patches. The larger the patch, the greater the odds are that something other than old growth will be present, reducing the percentage of old forest in the patch. SNEP reported:

"For reasons of past inventory practices, polygons on the national parks were generally smaller, about the size of national forest patches. These differences may have biased comparisons between national parks and national forests, because polygons tended to be ranked lower if late successional patches were comparatively smaller and fragmented, a problem in larger polygons."

In-other-words, an old forest polygon on the national park would have only been an old forest patch on the national forest. Most of the surrounding forest patches would also have had to be old forest for the national forest polygon to have qualified as old forest. Therefore, old forest areas were credit to national parks where identical old forest areas were not credit to national forests. Subsequent work of Dr. Fites-Kaufmann verifies more homogeneity exists the smaller the area assessed.

Additionally, the definition used for old forests favored national parks by downgrading for evidence of human influence. Again SNEP reported:

"Also, the degree of past human influence on polygons was a strong component of the rankings; a polygon that had experienced significant past human-caused disturbance tended to be ranked lower than an otherwise similar polygon without such influences."

Finally, national parks set the measurement standard. Rather than develop an old forest condition that existed pre-settlement, the authors accepted dense forests stands with large trees interspersed. Thinned forests on national forests were downgraded because of the evidence of human influence and the lack of forest density, even though the condition may have more nearly mimicked pre-settlement conditions.

"Despite reflecting increased forest density and fuel loading due to fire suppression, forests in the national parks provide an instructive reference point for estimating pre-contact levels of high-quality late successional forests, as only minor areas have been subject to significant timber harvest...although many more forest stands in the national parks still carry excessive tree densities and unnatural fuel levels than have been restored to proximate pre-contact conditions, and extreme fire events continue to be suppressed. Although current conditions reduce the value of the national parks as indices of natural forest conditions, parks remain the best available benchmarks."

The only accurate conclusion that can be drawn from the SNEP information is that more national parklands look like national parks than do national forests.

Response: The SNEP data are used to document that Yosemite National Park has large acreages of high quality old growth forest. This is an important natural resource and has a bearing on how fire is managed at Yosemite. The SNEP dataset, like all datasets, has some inaccuracies, but other datasets expressed at similar landscape scales seem to corroborate the general quality and amount of old growth found at the park compared to surrounding national forests.

Concern #177: The National Park Service is excessively self-confident, considering the amount of unknowns.

Letter Number: 115

Comment: * EXCESSIVE SELF-CONFIDENCE REGARDING THE FIRE MANAGEMENT PLAN AND THE ALTERNATIVES. The amount of confidence displayed in this Fire Management Plan with its major and significant amount of manipulation of the forests, meadows, riparian areas and vegetation and its potential unknown effects on the ecology is amazing. A small example of what is not known. During the Fire Management Plan field trip on July 24, the Yosemite Fire Manager explained that before the A-Rock fire no one knew there were Knob cone pines in Yosemite. In fact, there is a ridge below where we were standing when this was said which is known as, "Knob cone hill" in Foresta because of the Knob cone pines which are known to have been there by Foresta residents long before the fire. The cones roll down the hill, which is why in part there are many knob cone pines in Forest before the fire and now.

Response: The draft EIS/FMP notes that adaptive management is an underpinning of the fire management program. The FMP/EIS is based on the best, rather than perfect, science and information. The incorporation of a fire effects monitoring system into the program assists in the identification of unplanned effects as they arise so that they can be better managed in future operations. The monitoring system can verify that prescribed fire projects, for example, have achieved planned objectives.

Concern #178: The FMP/EIS should provide clarification regarding the number of fires and acres burned in the Foothill pine/live oak/chaparral woodland.

Letter Number: 63

Comment: On page 3-18, under "Foothill pine/live oak/chaparral woodland," are the following statements:

"The foothill pine/live oak/chaparral woodland covers 6,985 acres in Yosemite and 372 acres in the El Portal Administrative Site… Fuel loads can reach 22 tons per acre for foothill pine but are usually much lower (van Wagtendonk et al. 1998)"

"Lightning is infrequent. Since 1930, 34 lightning fires have burned 8,514 acres in the park, and the A-Rock fire burned 41 acres of the type in the El Portal Administrative Site …. Over 90% of the foothill pine/live oak chaparral woodland has burned during the past 70 years, leaving only 607 acres unburned. A total of

3,637 acres in the park have burned one time, 2,340 acres have burned two times, 312 acres have burned three times, and 90 acres have burned four times." (Emphasis Added)

607 + 3,637 + 2,340 + 312 +90 = 6986

3,637 + 2,340 + 312 + 90 = 6379 = 91.3% of 6986

The one acre difference (6896 - 6895) probably results from rounding to the nearest acre; but we cannot reconcile the 8514 acres ascribed to the 34 lighting fires.

Response: Thank you for your attention to detail. The reason that more acres, 8,514 have burned than are in the vegetation type, 6,985 is that some areas have burned 2,3 and even 4 times.

Concern #179: The FMP/EIS should explain why range of vegetation is narrowed compared to the 1997 Vegetation Management Plan (as per Appendix 10-27).

Letter Number: 115

Comment: Why is the range of vegetation narrowed compared to the 1997 Vegetation Management Plan as per Appendix 10-2?

Response: The vegetation has been grouped into categories that better reflect potential fire behavior. None of the vegetation types from the Vegetation Management Plan were excluded from analysis.

Concern #180: The National Park Service should consider reducing or revising the gap size target ranges.

Letter: 117, 70, 115,

Letter Number: 117

Comment: We also suggest reducing the gap size target ranges as described in Table 2-3. Research conducted by Weatherspoon for the Sierra Nevada Ecosystem Project finds a gap size of 1/4 - 2 acres to be consistent with stand structures where fires naturally burned frequently but at low to moderate severity with infrequent high severity fires.

Response: We agree. The gap size range suggested in this comment is the size that is wanted for the majority (normally 75-95%) of the types for which data is available. Ongoing research at the park will further refine these numbers.

Concern #181: The National Park Service should put major emphasis on dealing with/reversing vegetation (type) conversions.

Letter Number: 130

Comment: The vegetation classification section provides ample evidence that vegetation conversions should occupy a prominent part of the fire management plan. Regeneration of shade-intolerant species such as ponderosa pine, sugar pine and black oak is disappearing from many areas within the park. Black oak is estimated to cover less than 10% of Yosemite Valley than it did in 1860. Meadows have been reduced by 50% in the last 120 years. Reintroduction of fire, without a focus on forest type conversions, will not create the forest openings needed to restore dwindling ecosystems. We strongly encourage the park service to address restoration efforts needed for meadows, ponderosa pine/mixed-conifer, ponderosa pine/bear clover, and California black oak woodland and forests.

Response: We agree that fire exclusion, among other factors, has resulted in a transition from shade-intolerant to shade tolerant species. It is the expectation of the fire management program that the re-introduction of fire will at least partially reverse this process. Post-fire data will be collected from prescribed fires set in Yosemite Valley, which will measure the validity of this expectation. If unsuccessful, other methods would be developed in a revised vegetation management plan.

Concern #182: The National Park Service should not use chemical treatments or poisons to remove vegetation or create snags.

Letter Number: 113

Comment: no chemical treatments should be used for removing live vegetation and/or species from a site, even if they meet additional compliance requirements. Trees should not be shot with poisons, or otherwise killed and left to stand in place while they die as described in the plan. This would create a vast forest of dead trees that would contribute significantly to catastrophic fire.

Response: The FMP/EIS does not propose to use chemical treatment methods.

Concern #183: The National Park Service needs to have complete information before it implements the FMP/EIS, rather than fill information gaps through adaptive management.

Letter Number: 115

Comment: * DESIGN/BUILD A SCARY WAY TO MANAGE CALIFORNIA BLACK OAK WOODLANDS, ETC. Table 2.3 indicates that determining the Gap Distribution, Density and Frequency by Species Composition and Fuel Load of the following vegetation types -- California Black Oak, Canyon Live Oak Forest, Ponderosa Pine/Bear Clover Forest, Low Meadows/Dry Montane Meadows, Foothill Pine/Live Oak/Chaparral Woodland and Blue Oak Woodland -- "Will be determined through research and monitoring, i.e., through the adaptive management process." The major amount of manipulation in this plan will subject these areas to an unacceptable amount of human interference without knowing or being able to predict the consequences for the future. What right does one generation have to do this to Yosemite? Where is common sense? Where is respect for nature and the gift of Yosemite?

Response: Adaptive management is now widely practiced. It is a common sense approach to learning by doing. Organizations or programs can take a conservative approach to filling information gaps through study and hypothesis testing on a limited scale. The lessons learned are then adopted and refined. Adaptive management can be a useful tool to an organization that wants to learn and respond to needs, rather than remain static and unresponsive in accomplishing its program goals. The text being referenced in this comment refers to limited information on the range of variability for a subset of plant communities. These particular plant communities are among the most complex to understand. The intent is to point out that we endeavor to understand the range of variability for these communities. We feel that this is a more prudent method by which to proceed, as opposed to continuing to risk significant damage due to wildfire through inaction.

Concern #184: The National Park Service should first address other threats to California Black Oak, including lawns and lawn watering.

Letters: 115, 116,

Letter Number: 116

Comment: It has been explained that a justification for removing cedars is to improve conditions for Black Oaks, yet lawns and watering are allowed in the Park Service Historic District creating conditions detrimental to Oaks; furthermore, while walking in Curry Village this past weekend, we noted lawns in front of some of the cabins with a sign by the tour pick-up area claiming meadow restoration with broken sprinklers just running (and we're supposed to be in a drought situation). Do as I say, not as I do…

Response: The majority of California black oak woodland and forest acreage in Yosemite National Park lies within undeveloped portions of the park including stands surrounding Wawona, Big Meadow, and Hetch Hetchy. The viability of this type has been severely altered in some areas by decades of fire suppression and changes in fire regime brought about by human influences such as infrastructure development. These impacts can be readily seen throughout the western, relatively undeveloped sections of Yosemite Valley where broadly branched old black oak trees are surrounded by (and sometimes entwined with) younger shade-tolerant conifers.

Black oak woodlands in developed areas, where landscaping activities such as lawns and irrigation occur, comprise a small proportion of the entire extent of this vegetation type in the park. These areas are managed under a different set of guidelines that seek to balance a variety of objectives including preservation of landscape character, maintenance of specific attributes of openness and shade, and requirements for safety of both visitors and residents. Site-specific landscaping plans have been developed for most developed areas of the park in an effort to define these "character defining features" most important to each site, including the presence and continued maintenance of individuals and stands of black oaks.

Black oak woodlands in undeveloped but conifer-dominated areas provide critical habitat for many wildlife species and represent the greatest potential for re-establishment of natural plant and wildlife communities. The NPS is committed to restoring these sites to natural density and stand characteristics, as they have the most potential for providing habitat in the present and the future. These sites are also able to regenerate and to continue as viable communities. Developed stands have little to no potential to provide this habitat due to the levels of human use, lack of understory cover, and lack of natural regeneration.

Concern #185: The FMP should make note of the amount of prescribed burning that has been done in Western white pine/Jeffery pine forest and the purpose of burning live oak.

Letter Number: 70

Comment: 3-9: It may be worth noting that 21,071 (=132,708-88,703-2,709-326-3,970-15,929) acres (16%) of the Western white pine/Jeffrey pine forest have burned within less the past 12 years (1 median fire return interval).

Letter Number: 70

Comment: 3-16: The primary benefit I foresee from burning oak forest reducing its ability to convey fire to other ecotypes. Because live oak tends to sprout from whatever fire leaves behind, be it branch, trunk, or root, fire shouldn't dramatically reduce tree and shrub density.

Response: It is noted on page 3-9 that 21,071 acres of Western white/Jeffrey pine have burned in the last 12 years. It is noted on page 3-16 that reduction of Canyon live oak fuel loads will reduce the probability that high intensity fire will spread from this type to neighboring ecotypes.

Concern #186: Efforts to open up the canopy might have negative effects upon soils, mosses, fungi and small but important vegetation.

Letter Number: 115

Comment: The drastic amount of tree removal, both large, medium and small saplings exhibited in the demonstration plot at Happy Isles, leaves us to wonder about the effects of so much opening to the sun all at one time on the soils, mosses, fungi and small, but important vegetation and what that could do to the existing fauna and ecology of the area.

Response: Effects of reduced canopy cover from thinning and fire are evaluated in Chapter 4, Environmental Consequences. Small gaps in the canopy are very important for overall plant diversity. Many herbaceous plants decrease in size, number and diversity under shady conditions. Fungi are often more abundant after prescribed fire than before. Mitigations have been, and will, be used to protect the soil from damage during mechanical thinning treatments. There isn't much information about the effect of fire on mosses, some mosses increase after fire, but some shade tolerant species decrease with an increase in sun or fire. The important factor is that the small gaps created under managed conditions are more likely to preserve microclimates than is the creation of large gaps due to intense wildfire. Similarly, small gaps can also be lost as dense, shade tolerant vegetation becomes dominant during fire-free periods due to fire exclusion.

Concern #187: The prescribed restoration target might leave too many standing dead trees.

Letter Number: 63

Comment: If the "Demonstration Site" -- used in the July 24, 2002 workshop - reflects target conditions in other areas; we believe the percentage of retained dead trees (34%) is too high.

Response: Use of prescribed fire under the DEIS's preferred alternative would be aimed at restoring and maintaining a more natural forest structure. This includes a natural abundance and age diversity of snags (standing dead trees). Snags have been described as perhaps the most valuable tree form in the forest to wildlife, because of the food and shelter they provide to a wide range of species. Several species of bats depend on snags for roost sites, an array of woodpecker species drill into snags for food and to create nest cavities, and many species of animals secondarily use these cavities. Snags are important nest sites for rare species such as California Spotted Owls and Great Gray Owls.

In a prescribed fire, the intensity of the burn will vary over the area, which is how a fire under natural fuel conditions would burn. Some areas may not be touched by fire or burn only lightly, while in other areas clusters of trees may be killed, creating gaps in the forest canopy. This diversity of burn intensities results in a high degree of variability in habitat types over a relatively small area, which supports a wide diversity of wildlife species. Gaps in the forest canopy are especially important, because they create an "edge" between habitat types that is favored by many animal species.

Concern #188: The National Park Service should not cut large trees because they are a benefit to wildlife.

Concern #188A: The National Park Service should not thin late successional forest because they are a benefit to wildlife, including spotted owl, goshawk, great gray owl, and Pacific fisher.

Letters: 138, 113, 135, 133,

Letter Number: 138

Comment: You want to cut trees up to 31 1/2 inches in diameter, especially around your buildings. In the beautiful forest where I am staying I have noticed that it is precisely the trees that have attained that size that are most attractive to squirrels & chipmunks and to varied species of songbirds that are attracted to these older trees for food and for singing and feeding their young. I walked through many younger trees last evening without hearing or seeing birds and suddenly there was a chorus of singing and birds flying to and fro between two large Jeffries with a trunk diameter of approximately 30 inches, and young cones on its branches. There were at least five species of birds, and young ones being fed, and a boisterous atmosphere of activity and joy. I notice that the Douglas Squirrels are invariably in these older trees cutting their cones and that the pine needles built up at their bases are full of chipmunk holes and squirrel diggings. These older trees ought to be preserved wherever possible. Visitors to Yosemite marvel at the beautiful trees and receive great joy observing the wildlife.

Letter Number: 135

Comment: It does not seem feasible to propose large tree removal from areas comprised of potential suitable spotted owl nesting habitat. This may be the biggest legal vulnerability of the restoration activities proposed in the FMP. Question: have there been any surveys for presence of spotted owl nests? If not, will such surveys be conducted prior to implementation of large tree removal? What would be the potential effects on spotted owls from removing large white firs or incense cedars?

Letter Number: 133

Comment: The proposed removal of trees up to 31" dbh would threaten the viability of the Pacific fisher, and could lead to its listing under the ESA. The fisher's current population status, according to the Sierra Nevada Forest Plan (SNFP) is "Outcome D" - - far below the bare minimum of Outcome B required for viability. See SNFP FEIS, Vol. 3, Ch. 3, part 4.4, p. 16, Table 4.4.1.1d.

Response: While removal of trees would occur in small areas of the park, the resulting forests in these areas would support a natural diversity of tree sizes and densities.

All mechanical thinning of trees would occur in non-wilderness areas, and would primarily occur in areas adjacent to development in order to provide a defensible buffer against wildfire. Nonetheless, even the thinning in these areas would provide forest conditions that fall within the natural range of density for the forest type. These areas, because of their limited extent, and proximity to development are unlikely to have an appreciable effect on sensitive species such as California spotted owls and Pacific fishers.

In many areas, and especially in Yosemite Valley, a long history of fire suppression, and alteration of natural hydrology have led to rapidly shrinking meadows from invasion by trees, and the historic views obstructed by dense forests. Because of the long history of fire suppression, many of these trees that crowd Yosemite Valley and other areas are relatively large, but represent the legacy of human-altered habitats. While these thick forests provide good habitat for some animal species, they have become unsuitable for a wider range of species, especially those that thrive in a more open and diverse habitat, or in the very productive meadows that are rapidly shrinking.

The use of mechanical thinning, prescribed fire, and wildland fire will result in more natural fuel conditions and forest structure, which will directly benefit native wildlife species; all of which are adapted to natural fire regimes, and the resulting forest structure. Thinning near developed areas under the Yosemite Fire Management plan is designed to not only protect these areas, but also achieve a natural forest structure. The far greatest threats to these species under current conditions are the large, high-intensity fires that are likely unless measures are taken to reduce the unnatural amounts of fuel that have accumulated in Yosemite's forests.

Concern #189: The National Park Service should use forest thinning in Yosemite to provide a diversity of wildlife habitats.

Letter Number: 79

Comment: Open, thinned areas provide diverse habitat with grasses, bushes, shrubs and berries which act as a hatchery for insects, rodents, small birds and prey of all kinds for larger birds and mammals.

Response: While mechanical thinning of forests under the Yosemite Fire Management Plan is designed to achieve forest conditions that fall within the natural range of forest density and structure, such activity would be largely be limited to areas adjacent to developed areas. Use of prescribed fire and natural wildland fires, however, would be used over wide areas of the park to achieve reduced fuel loading and natural forest structure. These conditions would provide a diversity of wildlife habitats that would result from variation in fire intensity over the burned area. Patches of trees would be killed, creating forest openings, while other areas would burn lightly or remain untouched. Such diversity results in habitats that can support a large number of wildlife species over a relatively small area.

Concern #190: The FMP/EIS should not base its analysis on the potential for catastrophic fire.

Letter Number: 63

Comment: In Table 2.14 Summary of Environmental Consequences, we find 31 statements regarding the potential for adverse effects of such fires (primarily in the "No-Action Alternative), and 31 statements regarding the beneficial effects of "reduction of risk of catastrophic fires" (spread among the three Action Alternatives). The language used is misleading. For example: Under California Spotted Owl, Pacific Fisher, Great Grey Owl and Valley Elderberry Longhorn Beetle, Alternative A includes the statement "Adverse, long-term, and major impacts due to potential for catastrophic fire."

There is no "adverse impact" to any species from the "potential" for catastrophic fire. Impacts only occur when such an event happens; not as a result of an altered probability for the event. This appears to be an effort to garner support for the proposal by creating apprehensions of a catastrophic event and an unmerited confidence that the proposed treatments will prevent such an event.

Response: Regarding the comment, and the example impact assessments, please read as, “There remains a high potential for catastrophic fire. The impact of catastrophic fire would be adverse, long-term and major.”

Concern #191: The FMP/EIS should clarify why air emissions will be elevated during 2005 and 2009.

Letters: 113, 114

Letter Number: 113

Comment: The Final Yosemite Fire Plan should clearly indicate all of the reasons why air emissions will be at elevated levels during 2005 and 2009, as opposed to the other years listed on page 4-170 in Alternative B, and page 4-305 in Alternative D. Given the short burn windows available in shoulder seasons, these projected air emissions will have far greater impacts than Fire Plan writers have disclosed.

Response: Emissions from fire correspond directly to the amount of fuel consumed, which is a function of acres burned, fuel type, fuel density, fuel moisture content ,and other meteorological conditions. This is stated in the air quality methodology section of the FMP/EIS. In general, it is expected that emissions will decline over time, as more areas are reburned, rather than burned for the first time in many decades. Reburns are expected to have significantly less duff and litter on the forest floor, which contribute a great deal to smoke due to smoldering.

Concern #192: The National Park Service should obtain a waiver from air quality boards, to conduct prescribed burns and apply modified air quality standards.

Letter Number: 47

Comment: One solution is to obtain a waiver from air quality control boards to apply modified standards for prescribed burns. Justification could come from studies that would show how much public health suffers from wildfire pollution compared to how much it would suffer from prescribed burns over similar acreage under waiver conditions. This approach might help in the future, but it would not be approved soon enough to meet current needs and priorities.

Response: Under the Clean Air Act, federal agencies must comply with federal, state, and local air quality regulations, and be held to the same standards as those to which the public must comply. Legislation to grant a waiver would have to be introduced and laws passed to allow this to occur. The park has asked for variances from no-burn days in the past, and will continue to do so where data exists to show that local meteorological conditions are favorable.

Concern #193: The National Park Service should adhere to existing air quality regulations, and consider the effects of prescribed fire upon local and regional communities.

Letter: 107, 91, 95, 107,

Letter Number: 107

Comment: The air quality section of the DEIS is well prepared and provides the reader with sufficient information to understand the air quality implications of the proposed project.

Letter Number: 107

Comment: In November of 1993, the Environmental Protection Agency (EPA) published the "General Conformity Rule." This rule applies to federal activities. The SJVAPCD adopted this rule for the purpose of reviewing and commenting on federal actions. This rule establishes "diminimis levels' for various pollutant emissions. The Executive Summary (pages ES-12 and ES-13) clearly states the intentions for air quality, smoke management and air quality watershed strategy. For "all treatments of fire, there would be strict adherence to state and federal regulations", which the SJVADCD finds applicable to all Alternatives. The EPA has designated the San Joaquin Valley Air Basin (SJVAB) as severe non-attainment for the federal one-hour ozone standard and serious non-attainment for the federal one-hour and 24-hour PM10 standard. Each Alternative would exceed conformity thresholds for ozone/ozone precursors and PM10/PM10 precursors. The following threshold emissions apply to the SJVAB: Ozone (VOC's or Nox) are twenty-five (25) tons per year per project, PM10's are seventy (70) tons per year per project. A copy of the General Conformity Rule 9110 is enclosed. The California Air Resource Board (ARB), on March 23, 2000 amended Title 17, Agriculture Burning Guidelines (which became the Smoke Management Guidelines for Agricultural and Prescribed Burning). Title 17 requires the SJVAPCD to develop a Smoke Management Program (SMP) to minimize the production of smoke from all open burning, including prescribed and hazard reduction burning. The SJAPCD's proposed SMP is a broad document that contains a number of required elements. Included in the SMP is the SJVAPCD's burn authorization system, regulations to minimize smoke from burning, procedures for conducting various burn activities, meteorological and monitoring data criteria, and several other factors. Title 17 also requires rules, regulations or other enforceable mechanisms be adopted by the SJVAPCD prior to April 1, 2003. Enclosed is a copy of the Proposed SMP.

The SJVAPCD has been operating a smoke management program for several years and adopted Rule 4106 (Prescribed Burning and Hazard Reduction Burning) to incorporate into the SJVAPCD Smoke Management Program. Rule 41006, Section 4.0, Requirements; 4.9, Prescribed Burning; 5.2, Smoke Management Plans from Prescribed Burning; 5.3, Naturally Ignited Fires; 5.6, Registration of Prescribed Burning Projects; 5.7, Smoke Management Plan Review and Approval are applicable to fire management within the Park. Enclosed is a copy of Rule and 4106.

The Park should be aware of the SJVAPCD's ongoing efforts to reduce emissions of PM10 for fugitive dust sources. On November 15, 2001 the SJVAPCD adopted amendments to Regulation VIII, Fugitive Dust Requirements for Control of Fine Particulate Matter, which because effective on May 15, 2002. This Regulation is a series of rules designed by the SJVAPCD to reduce PM10 emissions generated by human activity. This will apply to unpaved forest roads and/or felled timber storage areas. A copy of Regulation VIII is enclosed.

Letter Number: 91

Comment: Fifty percent or more of the population is > 50 years old in the communities of Bass Lake and Big Oak Flat/Groveland. The communities of Mi-Wuk Village, Twain Harte, Sonora, Jamestown, and Mariposa also have significantly large numbers of residents over the age of 50.
A host of recent scientific studies have shown that children, the elderly, adults

who exercise rigorously, asthmatics, and those with impaired lung function can suffer illness and even premature death from short-term exposure to ambient PM10(*2) such as that generated from prescribed fire. In fact, the USEPA estimates that as many as 60,000 U.S. residents per year may die from breathing particulate at or below legally allowed levels(*3) .

Highest concentrations of smoke from prescribed burn activities are most likely to occur in downslope communities for periods of 8 to 12 hours during the nighttime and morning hours when there is poor atmospheric smoke dispersion and diurnal downslope winds prevail. These are the times when community residents can experience adverse health impacts from high levels of fine smoke particles (often much higher than the federal health standards) for periods generally less than 24 hours.(*2) For example: Health affects of outdoor air pollution. Committee of the Environmental and Occupational Health Assembly of the American Thoracic Society, American Journal of Respiratory Critical Care Medicine, Jan 1996; 153(1):3-50, and, Borja-Aburto VH, et al, Instituto Politecnico Nacional, Mexico, DF, Mexico; Mortality and ambient fine particles in a southwest Mexico city, 1993-1995; Environmental Health Perspectives; Dec 1998;106(12):849-55, and, American Lung Association, "The Perils of Particulate", 1-800-LUNG-USA.(*3) Joel Schwartz, Dust to Dust: A Particularly Lethal Legacy, Science News, 139:212, 1991

Letter Number: 91

Comment: There is one thing that would help complete the otherwise very thorough analysis of cumulative effects. Alternatives D & B propose to increase smoke emissions that can be hazardous to human health, particularly PM10, PM2.5 and VOC's, 5-6 and 8 times respectively over current levels. The FMP acknowledges and identifies mitigations for the potential health impacts of these increased emissions on visitors and residents within the Park boundaries, but does not sufficiently address impacts to residents in the downwind and downslope communities of the Sierra foothills.

Response: The Yosemite fire management program works on a daily basis with local and state air quality regulators and meteorologists. We appreciate the importance of protecting human health from smoke emissions. The air regulators also appreciate the importance of using fire under managed conditions, as opposed to the emissions from uncontrolled wildfires. The objectives of both fire and air managers can be made more compatible through improved modeling of meteorology, emissions, and fire behavior, by gauging the public's tolerance for smoke, and by improved communication among air quality managers, fire managers, and the affected publics. The park views this communication as a cornerstone of a successful fire program.

Concern #194: The National Park Service should not use prescribed burning because of the impacts on local communities.

Letters: 30, 35,

Letter Number: 30

Comment: Why should we neighboring stakeholders put up with all that smoke, smell and reduced visibility, Yosemite's 1990 fire management plan also proposed prescribed burns, but smoke complaints limited their implementation. The whole prescribed burn concept is really not a viable solution to reducing the enormous fuel load. Prescribed burns in steep, mountainous terrain are a recipe for disaster.

Response: Wildfires are a reality of living in wildlands anywhere in the United States, and the magnitude, cost, and damage from these fires has grown dramatically in recent years. Congress has directed agencies to undertake fuel management programs to mitigate wildfire damage; the Yosemite FEIS has been developed with this direction in mind.

Smoke can be unpleasant, unsightly and unhealthy. Smoke will occur regardless if the fire is a prescribed burn, wildland fire use fire, or an unwanted wildland fire. Prescribed burning emissions, however, are typically less than 2/3's of the quantity of emissions generated by an unwanted wildland fire burning over a similar area and fuels (see FMP/EIS, Air Quality, pages 4-8 to 4-12). Prescribed fires cause far less ecological damage than do unnaturally intense wildfires; wildfires can also cause significant economical impacts due to road closures and loss of tourism.

Yosemite National Park and the local air districts are working together to manage the airsheds within and surrounding Yosemite. Part of that effort includes education on why prescribed burning is so important, as well as providing timely and accurate information on when smoke events may be likely. It is a difficult balance being a good neighbor to surrounding residents and communities, while at the same time trying to be an effective steward of the Park and resources contained therein. Yosemite is committed to doing both.

Concern #195: The FMP/EIS should include information of the effects of the fire management program on global warming.

Letter Number: 70

Comment: 4-11a, Table 4.2: CO will oxidize within days to CO_2. I assume that 39.2 tons/acre CO_2 becomes 52.8 tons/acre CO_2 (39.2 +[44/28]x8.7) when evaluating the impact on global warming.

4-11b: A glance at Map 2-3 (Fires by Decade since 1930) shows that far more acreage burned during the 1991-2000 decade than burned in the previous 6 decades, primarily due to change in fire management policy. The 5,760 acre annual burn rate you've chosen as a baseline for estimating wildfire air emissions cannot be sustained for long within the fire suppression unit unless emission factors are reduced to values commensurate with long-term fuel production rates.

Letter Number: 70

Comment: Though you provide a partial basis for evaluating potential impacts on global warming, you failed to follow through. Averaging the annual totals for 2003-2009 (Table 4.17, page 4-304) yields 1,067,520 tons CO_2/yr and 6400 tons NO_x/yr for

> Alternative D. Multiplying these CO2 emissions by 1.35 (see 4-11a) yields 1,438,000 tons CO2/yr. Further, if all NOx were NO2, this would be equivalent in its global warming impact to another 1,984,000 tons CO2/yr (as EPA claims NO2 is 310 times more potent than CO2), for a total of 3,422,000 tons CO2/yr. These contributions are major. To give perspective, a car making 20 miles/gallon produces 1 ton CO2 every 1740 miles. To offset merely the impact of 1,438,000 tons CO2/yr would require the avoidance of 2.5 billion car miles/year. If YNP sought to mitigate that impact by adding 1000 overnight units in Yosemite Valley, each one avoiding a 90 mile daily roundtrip to Mariposa on say 150 days each year, only 13.5 million car miles would be avoided - a mere drop in the bucket. Compared to the impact on global warming, the impacts you've chosen to evaluate in this draft EIS and the range of vegetation management alternatives you've elected to consider are quite trivial. You may argue that you merely seek to undo the inadvertent benefits of past practices, but your timing is bad. A warming trend is underway and even Yosemite is affected. Moreover, as managed wildland fires march across the West, the public's affection for once forested wilderness is likely to wane.

Response: We concur that CO is a precursor to CO_2. However, beyond quantifying the annual emissions of certain pollutants that contribute to global, it was not our intent to address the global warming potential of the fire emissions as it is beyond the scope of the analysis. We will revise the FMP to reflect that CO is a greenhouse gas precursor, but will not calculate CO_2 equivalence.. We believe the that, in the long-term, the preferred alternative will have a beneficial impact on global warming because wildfire emissions will be reduced.

We concur with the comment regarding 4-11b. Air emissions will diminish as fuel loading and fuel consumption are returned to natural levels and we enter into maintenance burning.

Wildland fire has been a component of the natural ecosystem processes occurring in our forests for thousands of years and predates the dramatic increase in CO_2 levels that began at the beginning of this century. It is only recently that high intensity, catastrophic wildfires have begun to frequently occur as a result of heavy fuel loadings associated with many years of fire suppression. These high intensity fires consume a much greater percentage of branch and crown fuels than would typically be expected under natural conditions. As a result, they produce a much greater amount of greenhouse gasses. This is demonstrated in Table 4.2 where the CO_2 emission factor for a high intensity wildfire is given as 67.3 tons/acre. The intent of the FMP is, in part, to return fuel loads to natural levels thereby preventing the otherwise inevitable occurrence of high intensity fires. Therefore, in the long-term, fire management as described under the preferred alternative will reduce impacts on global warming. Again, beyond quantifying emissions of certain pollutants that contribute to global warming, calculating the global warming potential of fire emissions is beyond the scope of this document.

Concern #196: The FMP/EIS should contrast the number of tons of fuel that needs to be burned annually and the resultant quantities of smoke that can be released into air under current air quality regulations.

Letter Number: 81

Comment: 3) The discussion regarding air quality regulations and their effect on the amount of smoke that can be released into the air under any of the alternatives is hopelessly shallow. There needs to be an analysis done that would contrast the number of tons of fuel that needs to burned annually and the resultant quantities of smoke that can be released into air under current air quality regulations. How can anyone determine if the job that needs to be done can be done without being able to see those numbers?

Letter Number: 118

Comment: The National Park Service can manage the effects of smoke from planned prescribed burning, but not from large unwanted, wildland fire events.

Most prescribed burning projects involve many hours of planning and preparation to achieve the desired results, including minimizing smoke emissions. Large unwanted wildland fire events are themselves unpredictable and create large amounts of emissions. It is very difficult to manage smoke from planned prescribed burns much less wildland fire events.

Response: The amount of pollution that is allowed into the air before standards are exceeded is a function of daily meteorological conditions, and current ambient air quality. The amount of emissions varies as a function of fuel moistures, fuel types, fuel loading, and firing patterns. A chief reason for the reduction of emissions over time will be the removal of unnaturally heavy amounts of wildland fuels, with fuel loads of lower, more natural amounts then maintained perpetually with prescribed and wildland fire. Predictions are made for meteorological conditions during the prescribed fire planning process, which also uses smoke emission models. This information is utilized to make decisions on whether a burn will be ignited or not. Once a fire is ignited weather conditions are assessed daily to determine if conditions are conducive to good atmospheric dispersion.

Concern #197: The National Park Service should reduce or eliminate campfires in Yosemite/Yosemite Valley to reduce air quality impacts.

Letter: 110, 12, 118,

Letter Number: 110

Comment: 6.a. Wood burned in campfires and YCS concession fireplaces should be reduced to accommodate additional prescribed burning when conditions suggest this would be an effective way to limit increased impacts upon air quality. This is a reasonable sacrifice for the public and an intelligent choice for park managers, already confronted with significant locally and regionally generated amounts of air pollutants from non-natural sources in some areas of the park, particularly in Yosemite Valley. Commercial sale of timber from thinning should not be viewed as an alternative in order to reduce impacts on air quality from reducing fuels.

Response: The authority to eliminate or restrict campfires does not reside in the fire management program, except during periods of extreme fire danger.

Concern #198: The National Park Service can manage the air quality effects of prescribed fires, but not those of managed wildland fires.

Letter Number: 118

Comment: The District is in favor of a balanced approach for reducing the potential for catastrophic wildfires. Emissions from wildfires have been shown to cause exceedences of air quality standards and a corresponding increase in health risks to the public.

Response: We agree; one benefit from the mitigation of the risk of unwanted wildland fire through the use of prescribed fire is a reduction in unhealthful emissions from unwanted wildland fires.

Concern #199: The program in the FMP/DEIS, in combination with other NPS actions, would result in negative (unacceptable) air quality impacts.

Letter Number: 116

Comment: THIS Fire Management Plan also evaluates the foul emissions associated with the use of this equipment projecting a deterioration in air quality-this on top of more than 500 logging trucks estimated per year and 500 roundtrip diesel shuttle buses per day during peak season. So much for a Class I Airshed . . . This is unacceptable.

Response: The FMP/EIS deals with the cumulative effects of smoke from multiple fires burning with the ability to impact Yosemite's airshed. Interagency cooperation and regulatory guidance will assure minimal cumulative impacts from multiple fires burning in or near the same airshed. In addition Yosemite NP is implementing various strategies to reduce emissions from non-fire sources, such as mass transit measures to reduce mobile source emissions. The park is also reducing their emissions from other internal air pollution sources as diverse as gas burning boilers and restaurant barbecue grilles, by implementing sustainable best management practices throughout the park.

Concern #200: The National Park Service, because of its responsibilities to protect visibility, should conduct its prescribed burning in short campaigns, when visitation is down and waterfalls are not at their best.

Letter Number: 70

Comment: 2-47: Air quality regulations and agricultural burning guidelines are intended to protect health and safety, not visibility. They actually encourage visibility impairment by redirecting burning to less polluted days. The draft EIS gives every indication you intend to follow a similar course. For those who prize vistas and clear air, this is a forbidding prospect. It also violates your statutory mandate. The Clean Air Act designated Yosemite National Park and nearby National Forest Wilderness Areas as Class I Federal areas where visibility is an important value. 40 CFR 51.166 charges the Federal Land Manager of Class I lands with "affirmative responsibility to protect the air quality related values (including visibility) of any such lands". This could be accomplished by confining prescribed burns and managed, but smoky, wildfires into fairly short campaigns, preferably when visitation is down and waterfalls not at their best, such as late October through early November.

Response: As a Class I air shed Yosemite is responsible for protecting all air quality related values, including visibility. The NPS takes this responsibility very seriously and will do everything feasible to minimize the impacts of smoke on scenic park resources, while perpetuating the fire-dependent species and ecosystems which is also its responsibility. We agree that breaking large prescribed and wildland fires into segments is one way to balance these responsibilities.

Concern #201: The National Park Service should employ thinning operations to restore scenic resources/retain or restore views.

Letter Number: 136

Comment: I can advise from my own observations that the visual result of a cleaned up thinning operation is much more beautiful than the visual result of fire; there are grass and ferns among large and small timber stands which truly exemplify a park like setting. In contrast, Yosemite has areas near your park entrance roads which withstood burns years ago and still look awful.

Response: See # 202 below.

Concern #202: The National Park Service should not employ thinning operations to restore scenic resources/retain or restore views.

Letters: 4, 70, 103,

Letter Number: 103

Comment: Do not cut trees to retain views. Over time trees grow and views change. Trying to suppress this natural process is wrong. The trees are beautiful as are the rocks. This policy sounds like the policy of bombing a village in Vietnam in order to "save it."

Response: Use of mechanical methods for vista management is consistent with The Yosemite General Management Plan (GMP), which directs park managers to:

- “Preserve, protect, and restore scenic resources
- Identify the major scenic resources and the places from which they are viewed
- Provide for the preservation or protection of existing scenic resources and viewing stations

- Provide for historic views through vista clearing”

The GMP also directs that: “In developed areas …the natural role of fire in vegetative communities will be simulated with controlled burns or mechanical removal of vegetation.”

Uncertain meaning:

Letter Number:

Comment: happens all the time - disastrous fires started by campfires, "-People will not take control of their own situations " Therefore people use of this and other areas of the park must be limited - Our beloved Redwoods were in "Threat Mode -" I had no hope they could be saved - a typical example of mans inability to do the job necessary to protect our Forest Environ. - Wildlife Habitat (Home) and keep it all safe from logging waste and mis-management - its been proven over and over-man cannot do the job that needs to be done - Bottom Line - Expense

Response: This comment is determined to be out of scope. Its meaning is uncertain, making it difficult to draw a connection to the purpose, need or goals of the Yosemite Fire Management Plan.

Appendix 13: Minimum Requirement Decision Process for Administrative Actions in Wilderness

Introduction

> " …there shall be no commercial enterprise and no permanent road within any Wilderness area designated by this act and, except as necessary to meet minimum requirements for the administration of the area for the purpose of this Act (including measures required in emergencies involving the health and safety of persons within the area), there shall be no temporary road, no use of motor vehicles, motorized equipment or motorboats, no landing of aircraft, no other form of mechanical transport, and no structure or installation within any such area."
>
> Sec. 4 (c), Wilderness Act

Director's Order #41 (Wilderness Preservation and Management) states:

> "A process to determine the 'minimum requirement' for administrative actions… and equipment use in Wilderness will be identified and established. It must specify how the process is to be implemented in the park and that a record of the decisions generated through this process must be kept for public inspection."

In accordance with section 4 of the Wilderness Act, NPS Director's Orders, and the Yosemite National Park Wilderness Management Plan, the "minimum requirement" for the administration of Yosemite Wilderness is documented by the decision tree process. **The minimum requirement process applies to all administrative actions, programs, and activities within Wilderness and potential Wilderness additions.**

The minimum requirement decision process (MRDP) will be followed and documented for all proposed administrative actions in Yosemite Wilderness not specifically allowed by the Wilderness Plan. Long term, continuing actions will be evaluated before being included in the next version of the Wilderness Plan. Completed decision documents must be reviewed by the Wilderness Manager before approval by the Chief Ranger and should be used in conjunction with the Yosemite National Park Planning Clearinghouse process and any other necessary environmental compliance.

It is important to understand the difference between the terms "minimum requirement" and "minimum tool". According to D.O. 41,

Minimum Requirement is a documented process the NPS will use for the determination of the appropriateness of all actions affecting Wilderness.

Minimum Tool means a use or activity, determined to be necessary to accomplish an essential task, which makes use of the least intrusive tool, equipment, device, force, regulation, or practice that will achieve the Wilderness management objective. This is not necessarily the same as the term "primitive tool," which refers to the actual equipment or methods that make use of the simplest available technology (i.e., hand tools)."

Permitted Public Use: Permitting special uses in Wilderness is itself an administrative action which is subject to the minimum requirement process. These special uses include all commercial use, special events, and scientific research. The minimum requirement process for these uses has specific restrictions and are covered in a supplement to this document.

Emergencies: A true emergency presents an immediate threat to human life, or natural or cultural resources within the area, and often requires a quick response beyond that available by primitive means. Emergencies do not require documented analysis prior to approval of a generally prohibited activity or use in Wilderness. The Incident Commander needs to determine quickly whether a true emergency exists and should be trained in the minimum requirement concept. The flow chart attached to this document can be used as a quick tool to assist with minimum requirement decisions for emergencies. The rationale for authorizing such use should be documented in the incident report.

The Minimum Requirement Decision Process

Produce any required documentation on separate sheets.

Step 1

Determine whether the proposed action takes place in designated Wilderness or in a Potential Wilderness Addition.

In general, the Yosemite Wilderness boundary is 100' from development and 200' from the centerline of roads. In Yosemite Valley, the boundary is the 4200' contour, except in the Vernal – Nevada Falls corridor. If you are unsure whether or not your proposed action will take place within the Wilderness boundary, check the appropriate 7 ½ minute USGS quadrangle map or contact the Wilderness Manager.

Potential Wilderness additions were designated where a previous non-conforming use precluded Wilderness designation. These areas include the High Sierra Camps, Ostrander Ski hut, many utility corridors, and some access roads. The California Wilderness Act states that "lands designated as potential Wilderness additions shall be managed by the Secretary insofar as practicable as Wilderness until such time as said lands are designated as Wilderness".

If the proposed action will take place in designated Wilderness, proceed to step 2.

If the proposed action will take place in a potential Wilderness addition, proceed to step 2a.

If the proposed action will not take place in Wilderness or a potential Wilderness addition, proceed with the Planning Clearinghouse (PCH) process.

Step 2

Determine whether the proposed action is required for the administration of the Yosemite Wilderness.

D.O. # 41 states: "In order to allow a prohibited activity, the activity must be necessary to manage the area as Wilderness."

The proposed action should contribute toward meeting the management objectives listed in the Yosemite Wilderness Management Plan, which are appended at the end of this document. The action must also comply with all other applicable laws and policies.

If the action is not required for the administration of the area, it is not allowed.

If the action is required for the administration of the area, document what Wilderness management objective is being met and why this action is essential to meet that objective. Proceed to step 3.

Step 2a (For actions in Potential Wilderness Additions only)

Determine whether the proposed action is required for the continuation of the existing nonconforming use.

If the action is not required for the continuation of the existing non-conforming use, it is not allowed.

If the action is required for the continuation of the existing non-conforming use, proceed to step 3.

Step 3

Determine if the objectives of the proposed action can be met with actions outside of Wilderness or potential Wilderness.

Consider:

- Can the objective be met outside of Wilderness or potential Wilderness?
- Will increased educational efforts help attain the objective?
- Will a reduction in visitor use (through disincentives, quota reductions, or closures) eliminate or reduce the need for the action? If so, will that reduction be an acceptable impact to the visitor experience?

If the objectives of the proposed action can be met with actions outside of Wilderness or potential Wilderness, proceed with established compliance and conduct action outside of Wilderness or potential Wilderness addition.

If the objectives of the proposed action can not be met outside of Wilderness or potential Wilderness, document the reasons and proceed to step 4.

Step 4

Develop a list of alternatives to meet the objective of the proposed action.

Include ways to reduce or mitigate the impacts of each alternative.

Include a no action alternative.

All proposed actions should include a range of alternatives that include varying degrees of administrative intrusion on Wilderness character. For example, a proposal to protect the habitat of a rare species might include: 1. No action/education only, 2. Voluntary closure with signs. 3. Overnight use prohibition with signs, and 4. Closure to all visitors with signs and fences.

Any proposed actions that include an alternative involving motorized equipment or mechanized transport should also include an alternative using non-motorized equipment and non-mechanized transport.

Include ways to reduce or mitigate the impacts of the action in each alternative:

- Can the action be timed to minimize impacts to the visitor experience or ecological health?
- Do your alternatives include all available options, tools and techniques?
- Can increased education help mitigate the impacts of the action?
- Can reduced use (through disincentives or quota reductions) reduce the scale of the action?

List each alternative along with any applicable mitigation measures.

Step 5

Determine the effects of each alternative on Wilderness health and character. Include cumulative effects.

Consider:

1. Biophysical effects

- Describe any effects this action will have on the ecological health of the area, including air and water quality, wildlife, introduction of exotic species, erosion, siltation, wetlands, and rare, threatened, endangered, or sensitive species. Include both biological and physical effects. Consult subject matter experts as needed.

- In potential Wilderness additions, describe whether this action will make restoration to a Wilderness condition more difficult when the area is designated as Wilderness.

2. Experiential effects

- Describe any effects this action will have on the experience of Wilderness visitors. Consider the effects on the opportunity for solitude, natural quiet, self-reliance, surprise, and discovery.

– Describe any effect this action will have on the natural appearance of the area.

3. Effects on Wilderness character

– Describe any interference with natural processes, constraints on the freedom of wildlife or visitors, increase of management presence, or other reduction of wildness that this action may cause.

Proceed to step 6 before documenting these effects.

Step 6

Determine the management concerns of each alternative.

Consider:

1. Health and safety concerns

– Describe any health and safety concerns associated with this action. Include health and safety considerations of both employees and the public.

2. Societal/political/economic effects

– Describe any political considerations such as MOUs, agency agreements, etc. that may be affected by this action.
– Estimate the economic costs of this action.

Describe the effects of each alternative as determined in steps 5 and 6. Quantify these effects when possible, and describe whether the effects are short or long term, adverse or beneficial, and localized or far-reaching.

Step 7

Choose an alternative

NPS management policies states:

“Potential disruption of Wilderness character and resources and applicable safety concerns will be considered before, and given significantly more weight than, economic efficiency. If some compromise of Wilderness resources or character is unavoidable, only those actions that have localized, short-term adverse impacts will be acceptable.

Using the information developed in steps 5 and 6, and using the law and policy guidelines presented in this document, choose a preferred action and carefully justify in writing your reasons for choosing this alternative. Submit this document to the Wilderness Manager when completed.

Attach this signature page to your documentation.

Check one:

- ❑ The proposed action is a temporary, one time activity.
- ❑ The proposed action will be an on-going, long term activity.

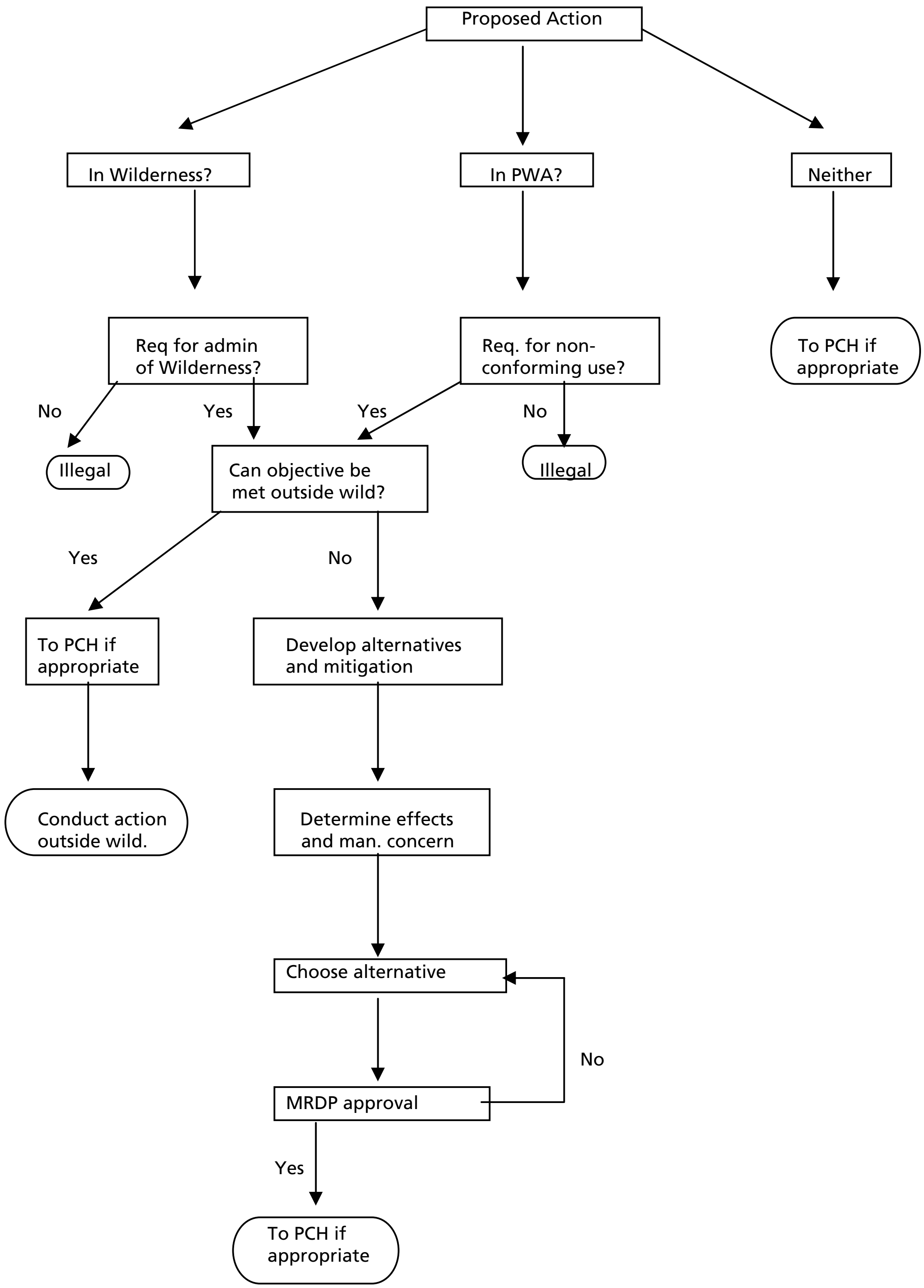
Reviewed By:

Wilderness Manager Date
(Attach any comments and conditions)

Approved By:

Chief Ranger Date
(Attach any comments and conditions)

Superintendent's approval may be required for some actions. See Wilderness Management Plan. Yosemite National Park Minimum Requirement Decision Tree for Administrative Actions in Wilderness



WILDERNESS MANAGEMENT OBJECTIVES

Manage for Ecosystem Integrity. The Park Service will administer this Wilderness not only as the whole of many attributes, but also as an interrelated part of the greater ecosystem of the southern and central portion of the Sierra Nevada. Decision-making efforts will link internal components of the resource with adjacent land management activities. Continued involvement with the Central and Southern Sierra Wilderness Management Group and utilization of the findings of the Sierra Nevada Ecosystem Project is paramount to achieving this objective.

Preserve Native Biodiversity. Native Biodiversity in Yosemite Wilderness will be preserved by identifying and monitoring species and communities at risk; and removing or mitigating threats to those species and communities. This can include removal of alien species; removal of structures in sensitive sites or wildlife migration corridors; limiting recreational use of such sites, and, if no other effective alternative exists, cautious management of ecological processes.

Allow Natural Processes to Continue. Natural processes such as fire, flood, disease, insect infestation, evolution, ecological succession, and predation will not be interrupted. Management of such processes will be the minimum necessary to ensure the survival of endangered species, protect threatened cultural resources, and protect human health and safety. When such processes have a significant effect on areas outside the Wilderness boundary, an ecosystem-based decision making process will be undertaken with the appropriate outside agencies to determine management response. Structures and management activities in Wilderness will be designed to minimize interference with natural processes. Some areas may be temporarily closed during natural disturbances to ensure visitor safety.

Mitigate, reduce or eliminate human induced change. Management will focus on maintaining ecological relationships and processes that would prevail if not for excessive or inappropriate human influences. The Park Service will impose limits on human activities that cause unacceptable impacts to Wilderness attributes. Maximum use levels and quotas will be established and regularly monitored, and certain areas or activities may be restricted to accomplish this objective.
Park management will ensure that designated and potential Wilderness in Yosemite is managed according to the principals of the Wilderness Act and the policy set forth in this plan. Significant cultural resources will be preserved in such a way that will not compromise ecological integrity.

Allow for a quality Wilderness experience. Management will assure that a spectrum of high quality, diverse, but Wilderness-appropriate experiences are available. Visitors have differing desires and expectations and should have the opportunity to have them met. Regulatory restrictions will be minimized to assure maximum freedom consistent with Wilderness resource objectives. Wise visitor use will be encouraged through education, example and sound management.

Recognize and integrate all Wilderness values. Wilderness will be managed as one resource with inseparable parts. It will be managed to provide opportunities to fulfill the recreational, scenic, scientific, educational, conservation, and historical purposes of Wilderness. Interdivisional, interagency, and public consultation and cooperation will be fostered to achieve this multi-faceted approach.

As the nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned pubic land and natural resources. This includes fostering a sound sense of our land and water resources; protecting our fish, wildlife, and biological diversity; preserving the environmental and cultural values of our national parks and historical places' and providing for the enjoyment of life through outdoor recreation. The department assesses our energy and mineral resources and works to ensure that their development is in the best interests of all our people by encouraging stewardship and citizen participation in their care. The department also has a major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.

Yosemite National Park
P.O. Box 577
Yosemite, CA 95389

www.nps.gov/yoes/planning/

March 2004
NPS D-1153A

EXPERIENCE YOUR AMERICA