National Park Service
U.S. Department of the Interior

Pinnacles National Monument
Paicines, California

PINNACLES NATIONAL MONUMENT
FIRE MANAGEMENT PLAN
ENVIRONMENTAL ASSESSMENT
APRIL 2005

Pinnacles National Monument
Fire Management Plan
Environmental Assessment

National Park Service
U.S. Department of the Interior

Pinnacles National Monument
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Paicines, CA 95043

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United States Department of the Interior

NATIONAL PARK SERVICE
Pinnacles National Monument
5000 Highway 146
Paicines, California 95043-9770

IN REPLY REFER TO:

Dear Interested Party,

The following document is the Environmental Assessment for the Pinnacles National Monument Fire Management Plan. The purpose of this document is to present the environmental consequences of the various alternatives for managing fire in the park. Please take some time to read through the document and become familiar with the proposed alternatives. We welcome your comments during the 30 day comment period, starting April 26th and finishing May 26th. After the comment period, the comments will be reviewed and incorporated into the next phase of the planning process.

If you should have questions don't hesitate to contact Tom Leatherman at the park, by phone (831)389-4485 x222 or through email tom_leatherman@nps.gov.

Sincerely,

Cicely Muldoon
Superintendent

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Chapter 1 - Purpose and Need

1.1 PURPOSE

Pinnacles National Monument preserves unique rock formations, landforms, native habitats, natural processes, and cultural resources of the Central Coast region of California, and provides enjoyment, education, inspiration, and scientific study for this and future generations. Pinnacles National Monument fosters partnerships and community involvement to promote natural and cultural resource conservation and outdoor recreation in the region and beyond.

National Park Service Wildland Fire Management Guidelines (DO-18) states, "All parks with vegetation that can sustain fire must have a fire management plan" (NPS, 1999a). The purpose of this action is to develop a fire management plan and program that utilizes the benefits of fire to achieve desired natural and cultural resource conditions while minimizing undesirable effects to park resources. The plan will guide Pinnacles' fire management actions in order to protect life and property, preserve native plant and animal communities, and restore and protect the historic landscape.

1.2 NEED FOR ACTION

According to fire ecologist Dr. Cecil Frost (1998), "… fire once played a role in shaping all but the wettest, the most arid, or the most fire-sheltered plant communities of the United States. (USDA, 2002)" Lightning-caused fires were a major environmental force shaping the vegetation of North America for millions of years prior to human settlement. Fire-dependent ecosystems developed, as did individual plant species dependent upon or adapted to wildland fire.

Effective and safe management of wildland fire at Pinnacles National Monument requires a plan that is adaptive in nature to allow for the incorporation of new research and concepts in fire management. Although the current perspective on fire indicates that there has not been a significant alteration of the natural fire regime, the park must be prepared to manage fire, through either suppression or reintroduction, in response to future changes in fire frequency.

With its hot dry summers, the vegetative communities found within the 24,585 acres of Pinnacles National Monument have evolved with fire. Fire return intervals for large fires (more than 5,000 acres) typically ranged from 20 to 40 years for this area of California. The vegetative communities found within Pinnacles include chaparral, woodlands, riparian, grasslands, and rock and scree. The chaparral community, the largest of the vegetative communities at Pinnacles, covers over 80% of the land surface. This community contains many species that have adapted to, and/or have become dependent upon the natural occurrence of fire. For example, the seeds of some chaparral plants as well as many herbaceous plants lie dormant for long periods before a disturbance, such as fire, stimulates them to sprout.

It has been assumed for many years that fire suppression was a significant threat to healthy chaparral communities by allowing fuel accumulations, which resulted in hotter, more intense,

and larger fires. Current research, however, indicates that increased fire frequencies are more often a cause for concern in this vegetation type. While fuel accumulation can cause an increase in intensity in forested systems, chaparral systems burn differently. Since the primary fuel in chaparral fires is the live shrubs, the accumulation of fuels in these habitats is not likely to increase the intensity or size of a fire (Moritz et al., 2004).

1.3 BACKGROUND

Pinnacles National Monument was established by Presidential Proclamation in 1908 stating that "the natural formations, known as Pinnacles Rocks, with a series of caves underlying them…are of scientific interest, and it appears that the public interests would be promoted by reserving these formations and caves as a National Monument, with as much land as may be necessary for the proper protection thereof." Incorporated into the park were portions of the Pinnacles Forest Reserve, which was established by Presidential Proclamation in 1906.

After its establishment, a series of seven Presidential Proclamations between 1923 and 2000 led to land additions that increased the park's size to its current 24,585 acres. A legislative mandate in 1976 designated 13,270 acres of land within Pinnacles as wilderness, which has increased to 16,048 acres when wilderness lands were added in 2002.

Located in Monterey and San Benito Counties, California, the lands surrounding the park are primarily developed as ranching on the east side and agriculture on the west side. The closest towns are Hollister (35 miles north), King City (28 miles south), and Soledad (10 miles west). The park has two roads that provide access to each side. The east side of the park is accessed via State Route 25 to State Route 146, which ends at the park boundary. The west entrance of the park is accessed from U.S. Highway 101 via State Route 146, which ends at the park boundary, the 2 roads do not connect through the park.

Pinnacles National Monument is located inland in the Central Coast region of California. It is situated among resources and in a region noted for its scenic coastline and numerous recreational opportunities, and is one of the fastest growing regions in the state. Visitation has averaged 170,000 people annually over the past 20 years.

Fire History

Since the establishment of Pinnacles as a National Monument, suppression has been the standard protocol for dealing with fire. Efforts were made in the 1970s, 1980s, and 1990s to use fire as a tool to create buffer zones around the developed areas and to "reintroduce" fire into the ecosystem (GMP). This was based on the hypothesis that fire had been excluded from the ecosystem, due to the park's establishment and subsequent suppression efforts. This approach was documented in the 1970 GMP, 1986 FMP, and the 1999 RMP, and has driven the direction of fire management in the park until recently. These documents state that a successful fire management strategy "has resulted in an unnaturally dense and over-mature vegetative cover over most of the park." The volatile nature of the vegetation in the park, however, meant that many, if not all, of these "successful" suppression efforts were actually ineffective at stopping the spread and intensity of fires. This is supported by observations of suppression efforts during the last three large fires (1994, 1995, and 1998) and by the fire history of the park that recorded

substantial large fires during the last 100 years (Greenlee and Moldenke, 1981). This fire history, which included the entire Gabilan Mountains, was completed in the 1980s and began to look at the natural fire return intervals in the region. Unfortunately, some of the only trees available for dating were gray pines, which do not have a very long lifespan. From this information, we were able to gain some insight into the fire history and fire return intervals for the last 100 years, most of which were influenced by the park's presence.

Although we do not have a complete and accurate picture of fire in the region, we must proceed using the tools available to develop an informed direction for the fire management program. These tools, which include the fire history, fire return intervals, current and past research, current and past anecdotal/observational information, and monitoring data that was collected starting in 1989, give little evidence to support the idea that fire suppression had a significant effect on the natural fire regime in the park. The park's fire history shows an average of one large fire (>2500 acres) every nine years and a reported fire return interval of 40 years. Recent research by Jon E. Keeley and others has produced convincing evidence that the suppression of fire in chaparral areas of California has largely been misinterpreted. This is supported by observational information in the park , as well as our fire history which indicates that over 30 fires of various sizes have been documented in the park over the last 80 years. It is evident that fire has, and will continue to exert its influence over the park. During the 1970s a number of prescribed burns were used to convert chaparral areas to grasslands, in an effort to reduce hazardous fuels around headquarters. It is now evident that these burns contributed to the long-term alteration of vegetation communities, shifting them from native to non-native species. With this updated Fire Management Plan we will incorporate an adaptive strategy for managing fire, so that current and past research, observational information, and current suppression tactics can be incorporated into the management actions. This will, by design, allow for the greatest protection of the visitors, will ensure fire fighter and staff safety and will protect park resource for this and future generations.

Native American Influence

It is well documented that native Californians employed landscape burning, among other tools, to manipulate vegetation for economic, social, political and spiritual well-being (Lewis 1993). Less well-known, however, are the on-the-ground specifics regarding Native American burning, including seasonality, spatial extent and patterning, frequency, intensity and other variables. The voids in knowledge relate to a number of factors, including lack of interest among ethnographers studying native cultures and economic and political changes brought about by Euroamerican colonization. In the case of the Costanoan, the principle ethnographic group that utilized the Pinnacles region, native lands and lifeways were forcibly or voluntarily abandoned for life in the newly established Spanish Missions in the late 1700s and early 1800s.

Based on limited documentary evidence and studies of contemporary cultures that still utilize fire as a management tool, however, some inferences regarding the possible role of aboriginal burning can be developed (Siefkin 2004). Specifically, the more intensively an area is utilized, the greater the frequency at which fire is applied and the more controlled the burn pattern. For example, fuels immediately surrounding villages are often burned on an annual basis to reduce the threat of wildfires and improve the yield and quality of important plant foods and basketry materials. Frequent fuels management in these areas probably reduces the contribution of natural

fire to the local fire regime. Less intensively utilized areas tend to be fired less frequently and with less spatial control (e.g., improve habitat for large game), and it is in these areas where natural fire can play the greatest role.

The presence of Native Americans in the Monument is documented almost exclusively in the form of archeological remains, although the nature of occupation is poorly known. Available evidence does suggest, at least late in prehistory, that much of the Monument was primarily utilized on a temporary or seasonal basis for the purpose of resource extraction (e.g., collecting acorns and seeds, hunting deer). It is likely that these visits were made inhabitants of villages in the adjacent Salinas and San Benito river valleys (west and east of the Monument, respectively).

The field notes of ethnographer J.P. Harrington document the use of over 150 plant species among the Coastanoan for medicine, subsistence, manufacturing and other purposes (Bocek 1984), at least two-thirds of which are known to occur within the Monument. Importantly, a significant number of these taxa show positive responses to fire (e.g., increased growth, improved seed yield) (USDA, Forest Service 2004), and many are known to have been actively burned by native Californians (Lewis 1993; Anderson and Moratto 1996). For example, the understories of oak groves were lightly burned to facilitate the acorn harvest and reduce acorn-consuming pests like filbertworms, and grasslands were fired to improve yields of critical seed crops such as tarweed and redmaids. While accounts regarding Coastanoan fire-use are mostly unspecific, it is likely burning was conducted for reasons similar to those of other tribal groups for whom more information is available.

Keeley (2002) suggested that Native Americans burned the vegetation of the southern and central California coast ranges with the intent of increasing the diversity, quantity and productivity of important resources, including plants, animals and water, reducing the threat of catastrophic wildfires, eliminating hiding places for predators and human enemies, and facilitating travel. Specifically, he hypothesized that Native American burning subsidized the low occurrence of natural lightening in the region as an ignition source, and that landscape patterns of grassland and open shrubland were significantly increased at the expense of dense shrubland. This was accomplished by firing shrublands at an interval (<10-20 years) that was too short to allow regeneration of most shrubs and favored herbaceous vegetation.

If correct, this would be potentially significant in that chaparral is today the dominant vegetation community in the Monument. Recognizing the near absence of historical documentation for shrubland burning, however, Keeley (2002) acknowledged that it would be difficult to determine how much of a given landscape was so altered by Native American burning, and that native burning may have been less prevalent (and thus chaparral more abundant) in areas of rugged and remote terrain like that comprising most of the Monument.

Anthropological studies conducted in the Santa Monica Mountains of southern California, an area with broadly similar vegetation to the Monument, suggest that complex mosaic of vegetation communities in various stages of succession may have been the aim of Native American inhabitants. For example, based on ecological data, historical documentation and an examination of botanical remains from archeological sites, Hammett (1991) suggested that area Native American groups practiced a “fire-follower” adaptation, targeting the diverse array of

herbaceous species available for several years in burned shrublands. She further speculated that by burning small patches of shrubland, groups could maintain maximum biodiversity with shifting mosaics of patches in varying stages of succession. Such conditions could be attained by burning at an interval intermediate between that needed to permanently type convert shrublands to grassland (<10-20 years) and natural fire occurrence (40-100 years). King (1993, 2000) noted that many of the staple plant foods in the Santa Monica Mountains required pre-cooking to improve their edibility (e.g., acorn, hollyleaf cherry, soap plant, yucca [not native to the Monument]), and thus, access to substantial amounts of firewood. Several species of chaparral were identified as carbonized firewood in archeological cooking features, leading King to speculate that groups created and/or maintained stands of live and dead chaparral in proximity to villages and processing sites. He also suggested that measures may have been taken to fire-guard firewood stands from wildfires.

While it remains unclear to what extent Native American burning shaped vegetation in the Monument, it is probably safe to conclude that those areas most frequently utilized by Native Americans (e.g., oak woodlands and grasslands in low gradient topography) were also subject to the most frequent burning. It is these same communities that were most heavily impacted by subsequent Euroamerican ranching activities (e.g., burning, grazing) and conform to the Adaptive Management Areas identified in the preferred alternative of this plan that will be intensively treated with prescribed fire and mechanical means to restore native herbaceous cover. If chaparral was a significant component of the pre-contact vegetation in the Monument, and the fire regime was, as noted, characterized by large and infrequent fires, Native American inhabitants of the Monument and surrounding areas presumably compensated through early season burning around habitation sites and resource extraction locations, as practiced by contemporary non-industrial peoples in highly flammable Australia and the boreal forests of Canada (Lewis 1989; Lewis and Ferguson 1999).

Additional research is likely to yield evidence of Native American influence on the vegetation of the Monument. Among the potential areas of study include further analysis of historical documents, identification of botanical remains from archeological contexts and surveys of living vegetation in proximity to archeological habitation sites.

1.4 GUIDELINES AND POLICIES

This Environmental Assessment (EA) documents the potential environmental effects from actions proposed in the Pinnacles National Monument Fire Management Plan.

Key goals of NEPA are to help Federal agency officials make well-informed decisions about agency actions and to provide a role for the general public in the decision-making process. NEPA documents, such as this EA, focus on providing relevant information to assist the agencies in making appropriate decisions.

In making decisions about National Park Service administered resources, NPS is guided by the requirements of the 1916 Organic Act and other applicable laws, such as the Clean Air Act, Clean Water Act, Wilderness Act, and Endangered Species Act. The authority for the

conservation and management of units of the national park system comes from the National Park Service Organic Act, which directs the agency to "...conserve the scenery and the natural and historic objects and the wildlife therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations." This authority was further clarified in the National Parks and Recreation Act of 1978: "Congress declares that...these areas, though distinct in character, are united...into one national park system.... The authorization of activities shall be construed and the protection, management, and administration of these areas shall be conducted in light of the high public value and integrity of the National Park System and shall not be exercised in derogation of the values and purposes for which these various areas have been established, except as may have been or shall be directly and specifically provided by Congress."

Wildland are areas where development is generally limited to infrequent roads, railroads, utility corridors, and widely scattered structures.

Wildland Fires are any non-structure fires, other than prescribed fires, that occur in the wildland. This term encompasses fires previously called both wildfires and prescribed natural fires.

Prescribed Fires are any fires ignited by management actions in defined areas under predetermined weather and fuel conditions to meet specific objectives.

Wildland Fire Use is the management of naturally ignited (e.g. lightning) wildland fires to accomplish specific pre-stated resource management objectives in predefined geographic areas outlined in Fire Management Plans.

This EA addresses whether the actions of the various alternatives proposed by Pinnacles National Monument impair resources or values that are:

(1) necessary to fulfill specific purposes identified in the enabling legislation of the park,
(2) key to the natural or cultural integrity of the park or opportunities for enjoyment of the park, and
(3) identified as a goal in the park's General Management Plan or other National Park Service planning documents

1.5 FIRE MANAGEMENT OBJECTIVES

The Fire Management Plan (FMP) is a detailed program of action to implement fire management policies and objectives. The FMP will create a framework that both responds to and uses fire to protect the natural and cultural values associated with the Pinnacles National Monument and to protect life and property.

National Park Service Wildland Fire Management Guidelines (DO-18) require that all parks with vegetation capable of sustaining fire develop a wildland fire management plan. This guideline identifies fire as the most aggressive natural resource management tool employed by the National Park Service, and further defines all fires as either wildland fires or prescribed fires. Prescribed fires and naturally- ignited Wildland Fire Use may be permitted with an approved wildland fire management plan if they contribute to a park's resource management objectives. Human-caused wildfires are unplanned events and will not be allowed to burn to achieve resource management objectives.

DO-18 identifies three paramount considerations for each park's fire management program:

- Protect human life and property both within and adjacent to park areas;
- Perpetuate, restore, replace, or replicate natural processes to the greatest extent practicable; and
- Protect natural and cultural resources and intrinsic values from unacceptable impacts attributable to fire and fire management activities

The overall goals and objectives of the Pinnacles National Monument Fire Management Plan are the following:

Goal: Suppress all wildland fires considering firefighter and public safety, while maintaining consistency with resource objectives.

Objectives:

- Insure all fire management activities sustain no injuries to the public and ensure that the number of fire management staff lost time injuries does not exceed 60% of the 1999-2003 five year average.
- Complete a risk analysis for properties adjacent to the park by 2008.

Goal: Implement a prescribed burn program that would address the ecological needs of plant and animal communities in the park, with special emphasis on the chaparral ecosystem.

Objectives:

- Review and evaluate monitoring data every five years to determine the influence of fire on the ecosystem.
- If it is determined that over a 10 year period of time there has not been a fire >2000 acres, a prescribed burn will be conducted.

Goal: Reduce hazard fuels accumulations in defensible space areas.

Objectives:

- Around structures in the developed zones change fuel conditions so that, by 2008, under extreme weather conditions, predicted flame lengths will be less than 4 feet. Width will range from 50 to 100 feet of structures depending on adjacent fuels.
- Identify areas along roads that would potentially inhibit egress during fire events and treat areas to reduce the potential threats to expedient evacuation of staff and visitors during a fire event. Annually review roads for proper clearances regarding egress in an emergency and retreat areas as needed.
- Annually maintain minimum clearances directly adjacent to roads, <2 feet, to reduce the potential for spread of fires from these corridors.

Goal: Manage all wildland fire incidents in accordance with accepted interagency standards, using appropriate management strategies and tactics, and maximizing efficiency via interagency coordination and cooperation.

Objective:

- Annually review and update existing cooperative agreements and the FMP with state and local agencies in order to facilitate close working relationships and mutual cooperation regarding fire management activities.

Goal: Develop and conduct a monitoring program with recommended standard monitoring levels commensurate with the scope of the fire management program, and use the information gained to continually evaluate and improve the fire management program.

Objectives:

- Monitor all fires >100 acres, using standard protocols, for severity, behavior and resources affected.
- Annually review and update information in the FMP based on monitoring data collected during wildland and prescribed fire events.

Goal: Support fire research and integrate knowledge gained through this and other research into future fire management decisions and actions.

Objectives:

- Identify and prioritize fire research needs and develop at least one funding proposal by 2008.
- Review current fire research annually and incorporate any new pertinent information during the annual review of the FMP.

Goal: Develop and maintain professional and technical expertise in all aspects of fire management.

Objectives:

- Provide annual refresher training for all red-carded employees, and facilitate their participation on wildland fire assignments, in order to maintain qualifications.
- Create and implement annual fire training and development plans for each interested employee.
- Annually update and train all staff regarding current and new fire operations and procedures.
- Plan and conduct all fire management activities in accordance with all applicable laws, policies, and regulations.

Goal: Reduce the potential for impacts to natural and cultural resources from suppression activities.

Objectives

- Incorporate the minimum impact suppression tactics policy (see Appendix A) into all suppression activities, to the greatest extent feasible and appropriate.
- By 2007, develop a resource advisor guide so that appropriate management responses and strategies are developed for site specific resource concerns in the park.
- Subsequent to the development of the resource advisor guide, for every wildland fire event, identify and implement appropriate management responses and strategies that address site specific resource concerns.

Goal: Minimize direct, operational and indirect impacts to cultural resources as a result of Fire Management actions

Objectives:

- For every planned and unplanned Fire Management action, implement, as appropriate, each mitigation identified in Appendix A
- By 2005, complete GIS database containing locational information for all cultural resources in the Monument (archeological sites, structures, cultural landscapes, etc.) and make available for Fire Management planning purposes;
- By 2010, alter fuel conditions in 50% of Developed Area FMU such that predicted flame lengths under extreme fire conditions will be less than four feet

Goal: Improved understanding of the role of aboriginal burning and other activities on the biotic communities of the Monument

Objective:

- Seek funding for a comprehensive study, including literature searches, review of existing biological and anthropological data, and consultation with contemporary Native Americans

Goal: Promote public understanding of fire management programs and objectives.

Objective:

By 2007, Develop and implement the public fire information plan, and prevention plan, annually.

Goal: Park Staff and Visitors are protected from unhealthy levels of air pollution from prescribed fires. Average visibility within Pinnacles National Monument is not impaired to levels worse than the dirtiest 20^{th} percentile as a result of prescribed fires.

Objective:

- Ambient concentrations of particulate matter (PM-10, PM-2.5), as measured at critical receptor sites, will not exceed national ambient air quality standards, as established by the US Environmental Protection Agency.
- Visibility will not be allowed to degrade to levels within the worst 20^{th} percentile, for more than four consecutive days.

Principal factors used to determine the proposed action include protecting life and property, preserving and protecting natural processes, wilderness values, native habitats, historical features and providing for the scientific study of these resources. Current fire management activities are limited to the suppression of all wildland fires, while taking into account resource objectives and sensitive resources to be protected. Management of natural ignitions for resource benefit (Wildland Fire Use for Resource Benefit) is not feasible for Pinnacles National Monument. Due to the unpredictable fire behavior and volatility of chaparral vegetation, combined with the small size of the park, it would not be possible to allow a fire to burn and maintain the necessary level of safety. The control of fire spread is further complicated by very few roads and limited access within the park. All wildland fire suppression activities will follow guidelines according to Minimum Impact Suppression Tactics (MIST). (See Appendix A.) Because of the natural role of fire in the chaparral ecosystem, effective fire suppression techniques likely will include allowing fires to burn to natural boundaries as well as the use of backfiring techniques, concentrating direct suppression in areas needed to protect lives and property. The park has primary responsibility for fire suppression, but carries it out through agreements with the California Department of Forestry and Fire Protection.

The park foresees the future need for a prescribed burn program. The park's fire history indicates that, from an ecological standpoint, a "natural" fire interval has been maintained for the park. Our prescribed burn program will focus on maintaining this return interval by addressing the ecological needs of the plants and animals through adaptive management. With the prolonged absence of fire, the park staff, in conjunction with CDF and BLM, will develop prescribed burn prescriptions to meet the ecological needs that are not being met. Likewise, if it determined that fire is too frequent, new strategies will be developed to prevent the continued spread of fires in the area.

Prescribed burning is not an appropriate tool for hazard fuels reduction at Pinnacles. In forested ecosystems, the accumulation of hazard fuels can lead to wildland fires that burn hotter and faster. This is not the case in chaparral systems. Since the primary fuel in chaparral fires is the live shrubs, the accumulation of fuels in these habitats is not likely to increase the intensity or size of a fire (Moritz, Keeley, Johnson, and Schaffner, 2004). Use of non-fire applications, such as hand and mechanical removal of hazardous fuels, is the strategy that will be used to protect defensible space around structures.

1.6 SCOPING ISSUES AND IMPACT TOPICS

The public scoping period for the Fire Management Plan/Environmental Assessment was held from June 21 – July 12, 2004.

Initial scoping for the Pinnacles National Monument Fire Management Plan (FMP) included in-house consultation with regional NPS fire management and resource management professionals and Pinnacles National Monument management and field staff.

Public involvement in the scoping process was sought by mailing a newsletter providing information and asking for comment to contiguous landowners (63 contacts) and mailing the same letter to the park's general interest mailing list (232 contacts). A press release announcing the scoping period and a public meeting was mailed to two local media outlets (The Pinnacle, the primary San Benito County newspaper, and The Rustler, the King City newspaper).

A public meeting was held June 29, 2004; questions focused on how wildfire would be managed, evacuation measures, and historic building protection. No new information or concerns were raised during any of these outreach efforts. A list of people contacted and agencies involved is included in Chapter 4.

1.6.1 *Impact Topics Considered in this EA*

Impact topics are derived from issues raised during internal and external scoping. Not every conceivable impact of a proposed action is substantive enough to warrant analysis. The following topics, however, do merit consideration in this EA:

Soils: Low and moderate-severity fires can benefit soils through a fertilization effect, while high-intensity fires can damage soils. In addition, fire management activities such as hazardous fuels reduction and the digging of firelines can also damage soils; therefore, soils are analyzed in this EA.

Water Resources (including Floodplains): NPS policies require protection of water resources consistent with the Clean Water Act. Fire suppression efforts, on occasion, can adversely affect water quality (sedimentation, turbidity, chemicals); therefore, water resources are analyzed in this EA.

Vegetation: The vegetative communities found within Pinnacles include chaparral, woodlands, riparian, grasslands, and rock and scree. The chaparral and woodland vegetative communities are the largest vegetative communities at Pinnacles and many species within these communities have adapted to, and become dependent upon the natural occurrence of fire. Removing vegetation for clearances and fire suppression efforts can affect vegetation communities and rare plant species; therefore, vegetation issues are analyzed in this EA.

Wildlife: There are resident populations of reptiles, amphibians, birds, mammals, fish, and invertebrates that can be adversely and/or beneficially affected by wildland fire suppression efforts, thinning treatments and prescribed fires. Therefore, wildlife issues are analyzed in this EA.

Threatened and Endangered Species: The Endangered Species Act prohibits harm to any species of fauna or flora listed by the U. S. Fish and Wildlife Service (USFWS) as being either threatened or endangered. Such harm includes not only direct injury or mortality, but also disrupting the habitat on which these species depend. The California red-legged frog (*Rana aurora draytonii*) is a state and federally listed threatened species, although the populations within the park appear to be stable. Pinnacles is currently active in the California condor (*Gymnogyps californianus)* recovery program with a release facility and free flying birds in the park. In light of their occurrences, state and federally listed species within the park are analyzed.

Air Quality: The Clean Air Act stipulates that Federal agencies have an affirmative responsibility to protect a park's air quality from adverse air pollution impacts. All types of fires generate smoke and particulate matter, which impact air quality within the park and surrounding region. Pinnacles is designated a Class I area. This designation mandates the protection of air quality related values from air pollution impacts. Air quality related values include visibility, plants, animals, water quality, historic and cultural resources, and other resources that could be affected by air pollution. In light of these considerations, air quality is analyzed in this EA.

Visitor Use and Experience: The 1916 NPS Organic Act directs NPS to provide for public enjoyment of the scenery, wildlife and natural and historic resources of national parks "in such a manner and by such means as will leave them unimpaired for the enjoyment of future generations." Fire management activities can result in the temporary closure of certain areas and/or result in visual impacts that may affect the visitor use and experience of the park. Therefore, visitor use and experience are analyzed in this EA.

Human Health and Safety: Wildland fires can be extremely hazardous, even life threatening, to humans, and federal fire management policies emphasize that firefighter and public safety is the first priority (NIFC, 1998). Therefore, human health and safety are analyzed in this EA.

Cultural Resources: Section 106 of the National Historic Preservation Act of 1966 provides the framework for federal review and protection of cultural resources, and ensures that they are considered during federal project planning and execution. Pinnacles has 22 structures on the List of Classified Structures that are eligible for listing on the National Register of Historic Places. In addition, Pinnacles contains a 797-acre cultural landscape, which reflects the period of early park development, administration and the craftsmanship of the Civilian Conservation Corps (CCC). There are no component landscapes. Since these buildings and landscapes can be affected by fire and fire suppression activities, cultural resources are analyzed in this EA.

Park Operations: Wildfires, both human caused and naturally ignited, affect park operations, particularly in developed sites like visitor centers, administrative and maintenance facilities. These impacts can occur directly from the threat to facilities or indirectly from smoke and the diversion of personnel to firefighting. Fires can cause the closure of facilities. Thus, park operations are analyzed in this EA.

Wilderness: Over 60% of Pinnacles is designated wilderness. According to National Park Service Management Policies (DOI, 2001b), proposals having the potential to impact wilderness resources must be evaluated. Therefore, wilderness is analyzed in this EA.

1.6.2 *Impact Topics Considered but dropped from Further Analysis*

The topics described below are not substantively affected by any of the FMP alternatives considered and have been dropped from further analysis.

Noise: Noise is defined as unwanted sound. Fuels reduction activities and fire suppression efforts can all involve the use of noise-generating mechanical tools and devices with engines, such as chain saws and trucks. While chain saws, at close range, are loud (in excess of 100 decibels, their use would be infrequent (on the order of hours or days). This is not frequent enough to substantially interfere with human activities in the area or with wildlife behavior. Nor will such infrequent bursts of noise chronically impair the solitude and tranquility associated with park. Therefore, this impact topic is dropped from further analysis in this EA.

Waste Management: None of the alternatives would generate noteworthy quantities of either hazardous or solid wastes that need to be disposed of in hazardous waste or general sanitary landfills. Therefore, this impact topic is dropped from further analysis in this EA.

Utilities: Fire events may temporarily affect above- and below-ground telephone, electrical, natural gas, water, and sewer lines and cables, potentially disrupting service to customers. Other proposed actions may exert a substantial, long-term demand on telephone, electrical, natural gas, water, and sewage infrastructure, sources, and service, thereby compromising existing service levels or causing a need for new facilities to be constructed. None of the alternatives will cause

any of these effects to any extent, and therefore utilities are dropped from further analysis in this EA.

Land Use: Visitor and administrative facilities are located within the park. Fire management activities would not affect land uses within the park or in areas adjacent to it; therefore, land use is dropped for further analysis in this EA.

Socio-economics: NEPA requires an analysis of impacts to the "human environment" which includes economic, social and demographic elements in the affected area. Fire management activities may bring a short-term need for additional personnel in the park, but this addition would be minimal and would not affect the neighboring communities overall population, income or employment base. Therefore, this impact topic is dropped for further analysis in this EA.

Transportation: None of the alternatives would substantively affect road, railroad, water-based, or aerial transportation in and around the park. In a large fire event there may be temporary closures of nearby roads during fire suppression activities or from heavy smoke. Such closures would not significantly impinge local traffic since they would be both very infrequent, and, in the case of prescribed fire, of short duration (on the magnitude of 1-2 hours). Therefore, this topic is dropped from further analysis in this EA.

Environmental Justice / Protection of Children: Presidential Executive Order 12898 requires Federal agencies to identify and address disproportionate impacts of their programs, policies and activities on minority and low-income populations. Executive Order 13045 requires Federal actions and policies to identify and address disproportionately adverse risks to the health and safety of children. None of the alternatives would have disproportionate health or environmental effects on children, minorities or low-income populations as defined in the Environmental Protection Agency's Environmental Justice Guidance; therefore, these topics are dropped from further analysis in this EA.

Indian Trust Resources: Indian trust assets are owned by Native Americans but held in trust by the United States. No Indian trust assets occur within Pinnacles National Monument and, therefore, are dropped from further analysis in this EA.

Prime and Unique Agricultural Lands: Prime and unique farmland has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops. Unique land is land other than prime farmland that is used for production of specific high-value food and fiber crops. No lands of this type are present in the park. Therefore, this impact topic is dropped from further analysis in this EA.

Resource Conservation, Including Energy, and Pollution Prevention: The National Park Service's *Guiding Principles of Sustainable Design* provides a basis for achieving sustainability in facility planning and design, emphasizes the importance of biodiversity, and encourages responsible decisions. The proposed actions would not minimize or add to resource conservation or pollution prevention in the park and, therefore, this impact topic is dropped from further analysis in this EA.

Table 1-1 shows which topics have been retained for consideration in the EA, and which have been dismissed from further evaluation.

Table 1-1 Impact Topics for Pinnacles National Monument Fire Management Plan EA

Impact Topic	Retained or Dismissed from Further Evaluation	Relevant Regulations or Policies
Soils	Retained	NPS *Management Policies 2001*
Water Resources	Retained	Clean Water Act; Executive Order 12088; NPS *Management Policies*
Floodplains and Wetlands	Retained	Executive Order 11988; Executive Order 11990; Rivers and Harbors Act; Clean Water Act; NPS *Management Policies*
Vegetation	Retained	NPS *Management Policies*
Wildlife	Retained	NPS *Management Policies*
Air Quality	Retained	Federal Clean Air Act (CAA); CAA Amendments of 1990; NPS *Management Policies*
Visitor Use and Experience	Retained	NPS *Management Policies*
Human Health & Safety	Retained	NPS *Management Policies*
Cultural Resources	Retained	Section 106; National Historic Preservation Act; 36 CFR 800; NEPA; Executive Order 13007; Director's Order #28; NPS *Management Policies*
Park Operations	Retained	NPS *Management Policies*
Wilderness	Retained	The Wilderness Act; Director's Order #41; NPS *Management Policies*
Noise	Dropped	NPS *Management Policies*
Waste Management	Dropped	NPS *Management Policies*
Utilities	Dropped	NPS *Management Policies*
Land Use	Dropped	NPS *Management Policies*
Socioeconomics	Dropped	40 CFR Regulations for Implementing NEPA; NPS *Management Policies*
Threatened and Endangered Species and their Habitats	Dropped	Endangered Species Act; NPS *Management Policies*
Transportation	Dropped	NPS *Management Policies*
Environmental Justice	Dropped	Executive Order 12898
Indian Trust Resources	Dropped	Department of the Interior Secretarial Orders No. 3206 and No. 3175
Prime and Unique Agricultural Lands	Dropped	Council on Environmental Quality 1980 memorandum on prime and unique farmlands
Resource Conservation, Including Energy, and Pollution Prevention	Dropped	NEPA; NPS *Guiding Principles of Sustainable Design*; NPS *Management Policies*

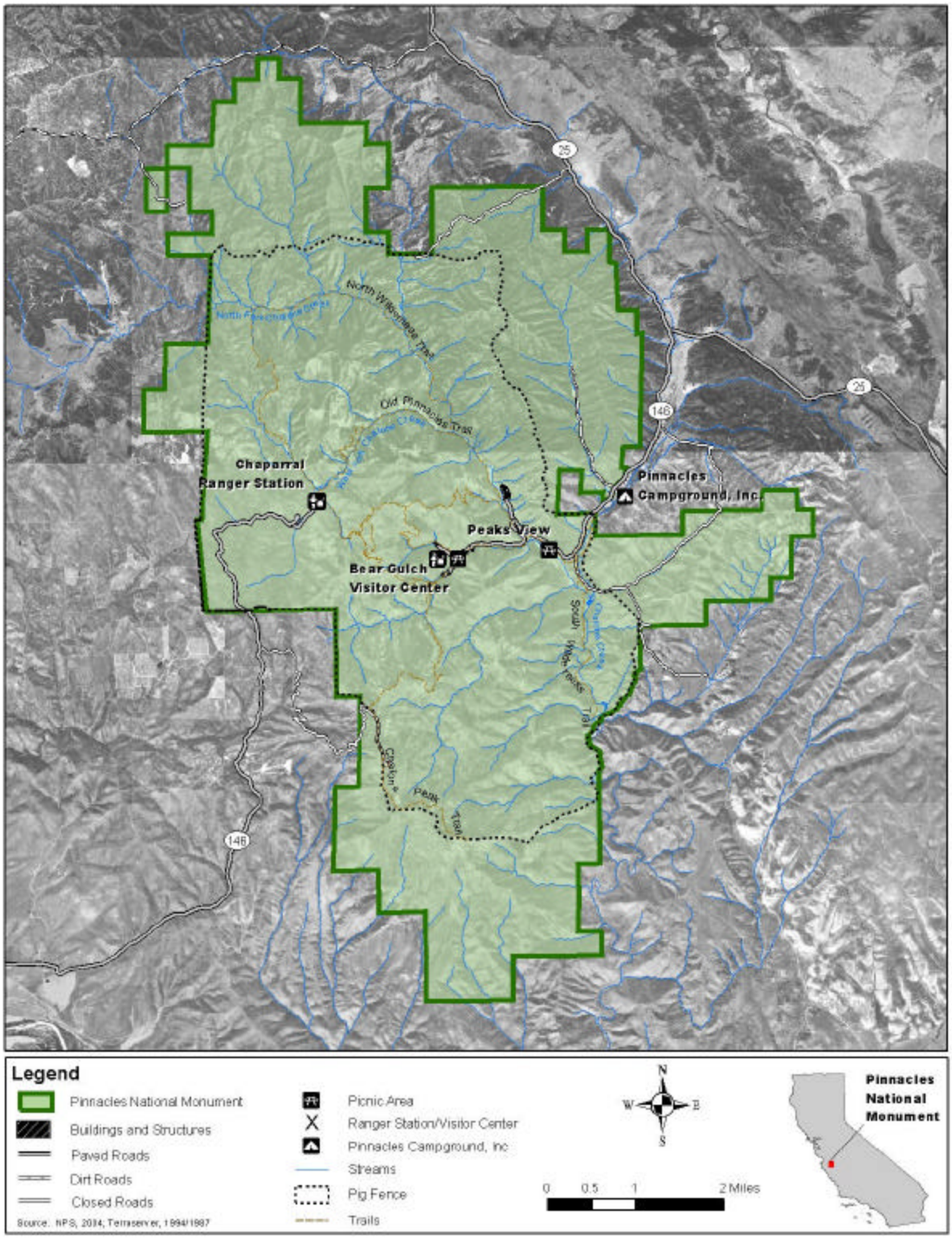

Figure 1-1 Pinnacles National Monument Vicinity

Chapter 2 - Issues and Alternatives

This chapter describes the Proposed Action and No Action Alternatives, formulated to address the purpose of and need for the proposed project. These alternatives were developed through evaluation of the comments provided by individuals, organizations, governmental agencies, and park specialists.

2.1 ALTERNATIVES CONSIDERED AND ANALYZED IN THIS EA

The alternatives presented here are based on the best available science, are programmatic in nature, and are not site specific for all potential projects. Subsequent to the approval of the Fire Management Plan, additional site-specific environmental impact analysis will be completed for projects not specifically addressed in this EA. All of the vegetated land within the park is subject to the effects of naturally occurring fire, and since the exact locations where those events might occur are unknown, the alternatives and the analysis of the effects that follows apply to all vegetated parkland. A number of strategies for fire management were evaluated during the development of the alternatives, some of which have been incorporated into these alternatives and some of which were dropped from further consideration. The two alternatives being considered for this EA are described below, followed by other alternative actions considered but not analyzed further.

2.1.1 *Alternative 1 (No Action Alternative) – Continue with Original 1986 FMP, which included Wildland Fire Suppression and Wildland and Prescribed Fire Use.*

Under this alternative, NPS would continue to manage Pinnacles National Monument under the broad guidelines developed in the 1986 FMP. This alternative divides the park into two Fire Management Units (FMUs): the Natural Fire Management Zone (NFMZ) and the Conditional Fire Management Zone (CFMZ), described below. (See also Figure 2-1, page 2-8).

The intent of the NFMZ, when it was established in the 1986 FMP, was to allow wildland fire to continue to exert its influence on park ecosystems with minimal human interference. This was to be accomplished through the use of the CFMZ, described below, which created a buffer or barrier to fire spread using prescribed fires to burn off chaparral areas. Prescribed fires were to be conducted in the fall, during a time with less extreme burning conditions, to reduce the potential for uncontrollable fires. The buffer zone would need to be reburned regularly, which would commit the park to extensive annual burning in order to maintain its effectiveness.

It has become evident that it is both logistically difficult to accomplish the necessary annual burns and ecologically undesirable to burn during times when fire would not naturally exert its influence on the environment. The rugged terrain and remote nature of the boundary area make the completion of this buffer in a timely or safe manner virtually impossible. Burning in the fall would not address the ecological need for fire, since fire intensities and timing would not be natural. Creating the buffer would open the park up to invasion by exotic plant species along the boundary, the very place where these invasions would most likely occur. Additionally, the risks associated with allowing fires to burn in chaparral has shifted dramatically since the 1986 FMP,

in the wake of the Cerro Grande fires and the fires in southern California. Approximately 85% of the park is included within the NFMZ.

The Conditional Fire Management Zone (CFMZ) proposed an apron of variable width around the perimeter of the park, contiguous with the NFMZ at topographic breaks or along other barriers to fire spread or areas conducive to containment (i.e. roads, fence corridors, accessible grassland). The CFMZ also proposed islands containing the park's developed areas. The principal objectives for fire management in the CFMZ were to (1) retard the potential for fire to spread into or out of the NFMZ and (2) provide for the protection of life and property in the park developed areas. Fire regimes in the CFMZ were not intended to result in arbitrary type conversion of existing vegetation. However, the maintenance of the buffer zone may have led to this result if implemented. Therefore, the emphasis shifted to the second objective exclusively. About 15% of the park is included in the CFMZ.

Based on the recognition of these issues, neither wildland fire use nor replacement fires have been utilized at Pinnacles since the inception of the 1986 FMP. Additionally, since the buffer zone idea has not been implemented, and little prescribed burning has occurred, fire management activities are currently guided by the following assertions:

Fire Suppression
All wildland fires in the park, human-caused fires and naturally ignited fires (e.g. lightning), would be declared wildfires and suppressed in a manner that minimizes the environmental impacts of suppression activities. All wildfire suppression activities would adhere to Minimum Impact Suppression Tactics (MIST) guidelines (Appendix A).

Prescribed Burning and Mechanical Treatments
Mechanical treatments would be used to reduce fuel accumulations threatening improvements or public safety in and around building and structures. Mechanical treatments and/or prescribed fire would be used on a limited basis to re-establish native herbaceous vegetation through the treatment of areas invaded by non-native plants. This is a modification of the original plan based on the parks inability to implement the buffer zone as proposed in the CFMZ.

Wilderness Designation
In areas designated as wilderness, a Minimum Requirement decision process evaluates the appropriateness of activities or methods and determines the best course of action, or Minimum Tool, that will be used to ensure the preservation of wilderness character. This process is described in Appendix B. Aside from wildland fire suppression efforts that are protecting life and property, all activities in designated wilderness will be those actions that are essential to preserve or restore wilderness resources and character.

2.1.2 Alternative 2 - (NPS Preferred Alternative) - Fire Management Plan to Include Wildland Fire Suppression, Creation and/or Maintenance of Defensible Spaces, and the Option to Utilize Prescribed Fire to Achieve Resource Management Objectives.

Under this alternative the park would be delineated into three distinct Fire Management Units (FMUs), based on differences in management characteristics of each unit. Management objectives and pre-selected strategies are assigned to these FMUs to accomplish specific resource objectives. The three FMUs are described below, and shown in Figure 2-2, page 2-9.

Developed Areas (376 Acres): This FMU includes all areas within 50 meters of paved roads and within 100 meters of structures or capital improvements in the park. Main components of this unit are the Bear Gulch Headquarters area, the Chalone Housing/maintenance area, the Chaparral Ranger Station/picnic area, the proposed Westside development area, and the paved roads. These areas are not natural areas because they have been significantly altered by the placement of structures. The developed area is found primarily within the riparian vegetation area, near seasonal or perennial water sources. Since 80 percent of the park is dominated by chaparral, developed areas are surrounded by chamise and California mixed chaparral at various stages of succession. Many of the structures found in the developed area were constructed by the CCC in the 1930s and are historic. Some historic trails also exist in the developed area.

Adaptive Management Areas (203 Acres): This FMU is made up of several parcels scattered throughout the park. These areas contain high concentrations of invasive exotic species that the park intends to control through the use of prescribed fire or mechanical treatments (*e.g.* mowing and weed whacking). In addition, this zone may be used for research burning, in order to learn more about fire effects on the vegetation of the park. These areas may be treated intensely for several years, and then left unburned until natural fires burn through the area.

Wilderness Areas (23,505 Acres): This FMU includes all areas outside 50 meters from paved roads, and 100 meters from buildings and structures not in the Adaptive Management Areas. This is the primary ecosystem of the park and includes the 16,048 acres of designated wilderness. Acceptable fire management strategies in these areas are full wildland fire suppression and the use of prescribed fire to restore and maintain ecosystem structure and function. In areas designated as wilderness, a Minimum Requirement decision process evaluates the appropriateness of activities or methods and determines the best course of action, or Minimum Tool, that will be used to ensure the preservation of wilderness character. This process is included in Appendix B. Aside from wildland fire suppression efforts that are protecting life and property, all activities in designated wilderness will be those actions that are essential to preserve or restore wilderness resources and character.

Principal factors used to develop the proposed action include protecting the health and safety of the park staff and visitors, preserving and protecting natural processes, native habitats, and historical features at Pinnacles and providing for the scientific study of these resources. Fire management activities proposed to meet these management needs include:

- Suppressing of all human and naturally caused wildland fires
- Creating and/or maintaining defensible spaces around park structures
- Using prescribed fire on an "as-needed" basis to achieve resource management needs.

In this alternative, all fires in the park, regardless of origin, would be declared wildland fires and suppressed in a manner that minimizes environmental impacts of suppression activities. A resource advisor guide will be developed so that staff trained on sensitive resources in the park can guide suppression activities and avoid impacts from these activities. All wildland fire suppression activities would adhere to Minimum Impact Suppression Tactics (MIST) guidelines (see Appendix

A). Examples of minimum impact suppression tactics that could be used within the park include, but are not limited to:

- Containing wildland fires within natural fire breaks (*e.g.* roads, streams)
- Using backfiring techniques
- Minimizing the cutting of trees
- Minimizing the digging of firelines
- The use of retardant without dyes to protect the rocks

Mechanical treatment methods would be the primary tool to reduce fire hazard and create defensible space around park structures and paved roads in the developed area.

Defensible space around each of the park's structures would be created and/or maintained by regular clearing and removing hazard fuels around each of the park's structures to a distance of 50 to 100 feet. Defensible space is the area around a structure that can be treated in such a way as to reduce the chance of wildland fire reaching the structure. Hazard fuels that would be removed would be dead, down, and diseased timber, and all burnable woody vegetation. Special precautions would be taken in listed species habitat (see mitigation measures in chapter 3).

Mechanical treatments (*e.g.* weed whacking) may also be utilized in the Adaptive Management Area to remove the accumulations of invasive exotic plant species acting as hazard fuels. Hazard fuels reduction reduces the threat of catastrophic wildland fire, and reduces the risk of negative effects to park resources in the event of a wildland fire. Hazard fuels reduction would also improve conditions for firefighter and public safety, and reduces suppression costs in the event of a wildland fire. Analysis of weed removal projects will be completed in another compliance document.

The park anticipates implementing a prescribed burn program in both the Wilderness and Adaptive Management Units. The park's fire history indicates that, from an ecological standpoint, a "natural" fire interval has been maintained for most areas of the park. Therefore, our prescribed burn program will focus on the ecological needs of the ecosystem and, with the prolonged absence of fire, will develop prescribed burn prescriptions to meet the ecological needs. Since approximately 2,500 acres burn naturally every nine years, the prescribed burn program would be based on these numbers. If a fire of this size has not occurred in the park in a 10-year period, management could initiate a prescribed burn of this size. Areas considered suitable for prescribed fires would be areas that had not burned in over 25 years. Separate consultation regarding listed species would occur for these prescribed fires.

Prescribed fire would also be utilized within the Adaptive Management FMU in order to eradicate starthistle (*Centaurea solstitialis*) and summer mustard (*Hirschfeldia incana*). The park staff would plan to burn 10-50 acres per year for three consecutive years in the spring (before either plant can flower), in order to eradicate these species from the area. While both plants respond favorably to fires, burning prior to flowering ensures that there would be no new seed production. Burning for three consecutive years depletes the rootstock's stores of energy and/or seedbanks, leaving them unable to re-sprout after the three-year treatment is complete. These areas would roughly total 203-acres throughout the park (see Figure 2-2). Special

precautions would be taken in listed species habitat during prescribed fire and mechanical treatment projects (see avoidance measures in chapter 3). These include not drafting water from creeks or reservoirs, timing burns during low sensitivity times, and the ban on retardant of chemicals among other things.

2.1.3 *Environmentally-Preferred Alternative*

The environmentally preferred alternative "causes the least damage to the biological and physical environment; it also means the alternative which best protects, preserves, and enhances historic, cultural, and natural resources" (CEQ, 1978).

In this proposed action, Alternative 2 is the environmentally preferred alternative. Under this alternative, fire management activities would restore and maintain native plant communities, mimic natural ecological processes, and help minimize undesirable fire effects on park resources. This alternative best protects and preserves the historic, cultural, and natural resources in the park for current and future generations, through the adaptive management of fire as an integral part of the ecosystem.

2.2 ALTERNATIVES CONSIDERED BUT NOT ANALYZED FURTHER IN THIS EA

2.2.1 *Fire Management Plan to include Wildland Fire Use*

Wildland fire use is the management of fires ignited by natural means (usually lightning) that are permitted to burn under specific environmental conditions for natural resource benefits. In many cases, national parks and forests employ wildland fire use as a part of the fire management program to obtain natural resource benefits from wildfire. These parks and forests typically have large acreages and the areas identified for its use have few if any private residences and structures nearby (wildland urban interface). In such cases, wildland fire use is a critical component in meeting fire management objectives of federal agencies. While wildland fire use was included as a management tool in the 1986 Pinnacles Fire Management Plan, reaching a point where we can allow fires to burn has not been possible and will not be considered in future plans. This alternative was considered but dropped from further analysis in this EA for several reasons:

- The potential risks to human health and safety and natural/cultural resources under this alternative outweigh any potential resource benefits that would be obtained from including wildland fire use in the Fire Management Plan.
- The current authorized boundary of the park (~24,585 acres) is too small to ensure fire containment within park boundaries;
- The volatile nature of wildland fire in chaparral vegetative communities;
- Control of fire spread is difficult due to few roads and limited access within the park; and
- Staffing limitations

2.3 COMPARISON OF ALTERNATIVES

Table 2-1 briefly summarizes the environmental effects of the various alternatives. It provides a quick comparison of how well the alternatives respond to the project need, objectives, important issues and impact topics. Chapter 3 discusses the environmental consequences of the Preferred Alternative in detail.

Table 2-1 Comparison of Alternatives' Response to Project Need and Impact Topics

	Alternative 1- No Action Alternative Suppress Wildland Fires, Wildland and Prescribed Fire Use	**Alternative 2 (Preferred Alternative) Suppress Wildland Fires, Hazardous Fuels Reduction, and the Option for Prescribed Fire Use**
Project Need		
Ensure health and Safety	Yes	Yes
Reduces hazardous fuels	Yes, hazardous fuels accumulations would be mechanically reduced and maintained within the areas of defensible space around park structures and paved roads.	Yes, hazardous fuels accumulations would be mechanically reduced and maintained within the areas of defensible space around park structures and paved roads.
Maintain/restore Ecological processes	No	Yes, prescribed fire will be reintroduced if needed based on fire history and occurrence of wildfires in area.
Reduction of invasive exotic plant species	Yes, however the control of exotic plant species with fire was not explicitly mentioned in the plan.	Yes, prescribed fire use in the Adaptive Management Area is aimed at eradicating star thistle and summer mustard.
Impact Topics		
Geology and Soils	Negligible to minor and short-term with regard to erosion	Negligible to minor and short-term with regard to erosion
Water Resources	Negligible to minor and indirect, resulting from increased sedimentation and turbidity	Negligible to minor and indirect, resulting from increased sedimentation and turbidity
Vegetation	Minor, from direct removal of vegetation and increased possibility of non-native plant invasions.	Minor, from direct removal of vegetation and increased possibility of non-native plant invasions. Beneficial long-term to native fire-adapted vegetation and as invasive exotics are removed in Adaptive Management Area

Table 2-1 Comparison of Alternatives' Response to Project Need and Impact Topics

	Alternative 1- No Action Alternative Suppress Wildland Fires, Wildland and Prescribed Fire Use	**Alternative 2 (Preferred Alternative) Suppress Wildland Fires, Hazardous Fuels Reduction, and the Option for Prescribed Fire Use**
Wildlife	Individual mortality of some species possible; not likely to adversely affect federal and/or state T&E species.	Individual mortality of some species possible; not likely to adversely affect federal and/or state T&E species; wildlife habitat would improve in the long-term. Beneficial impacts resulting from improved habitat as invasive exotic plant species are removed from Adaptive Management Unit.
Wilderness	Negligible to minor short-term from wildland fire suppression activities Beneficial - fire helps retain the "wilderness character."	Negligible to minor short-term from wildland fire suppression activities Beneficial - fire helps retain the "wilderness character."
Air Quality	Negligible to minor short-term air quality effects, resulting from wildland fire suppression activities and prescribed fire	Negligible to minor short-term air quality effects, resulting from wildland fire suppression activities and prescribed fire
Visitor Use and Experience (including Park Operations)	Minor short-term to visibility and operations. Temporarily closing the park to the public could cause short-term effects.	Minor short-term to visibility and operations. Temporarily closing the park to the public could cause short-term effects.
Human Health & Safety	Potential for injury during mechanical treatments, wildland fire suppression, and prescribed fire activities; very minor exposure to smoke by staff and the public during prescribed fire activit ies	Potential for injury during mechanical treatments, wildland fire suppression, and prescribed fire activities; very minor exposure to smoke by staff and the public during prescribed fire activities
Cultural Resources	Negligible to moderate direct, operational and indirect impacts. Greatest threat from high severity wildland fires. Potential benefits from fuel reduction projects.	Negligible to moderate direct, operational and indirect impacts. Greatest threat from high severity wildland fires. Required mitigations (MIST, Minimum Tools) would reduce impacts. Potential benefits from fuel reduction projects expanded due to increased use of prescribed fire.

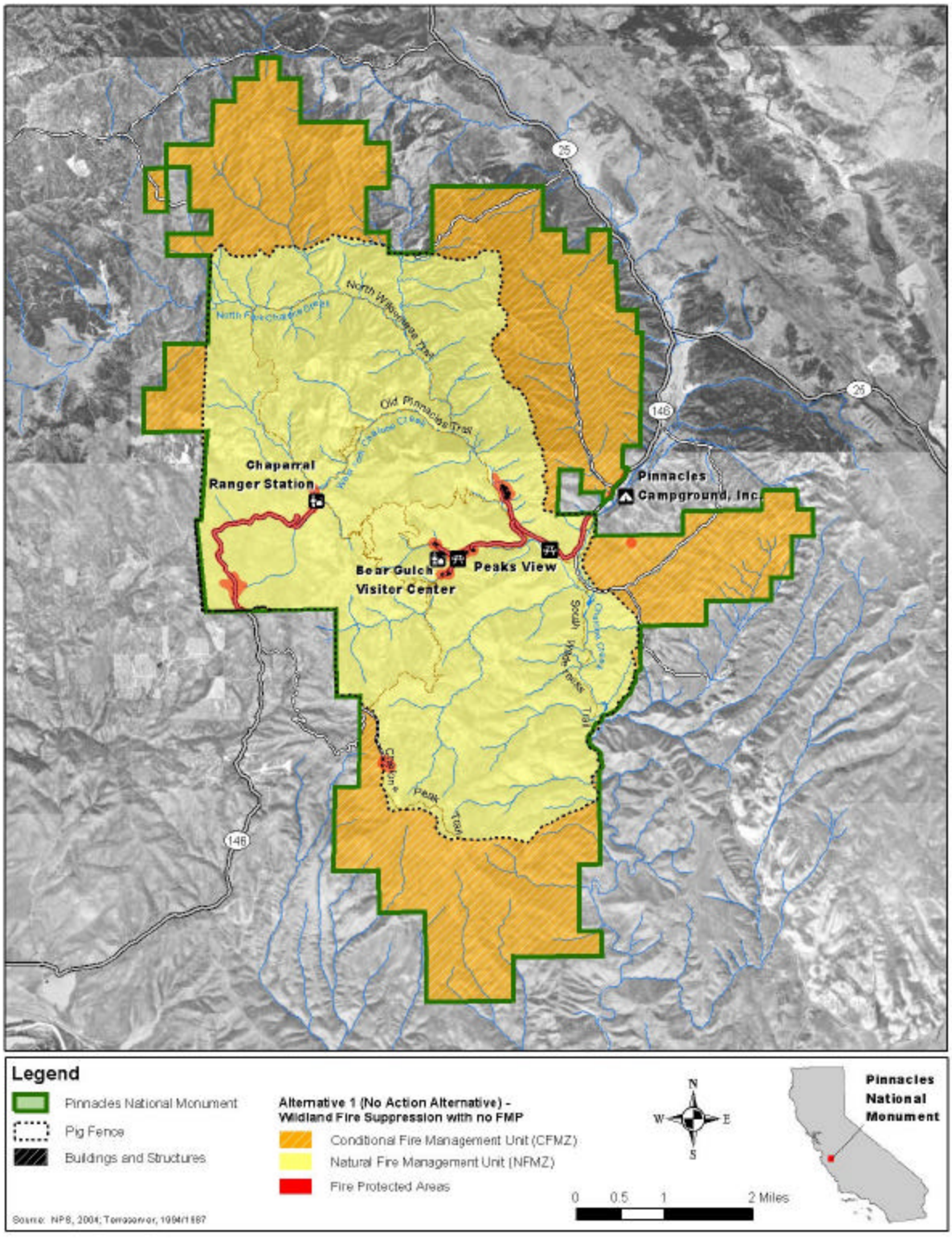

Figure 2-1 Pinnacles National Monument – Alternative 1 (No Action)

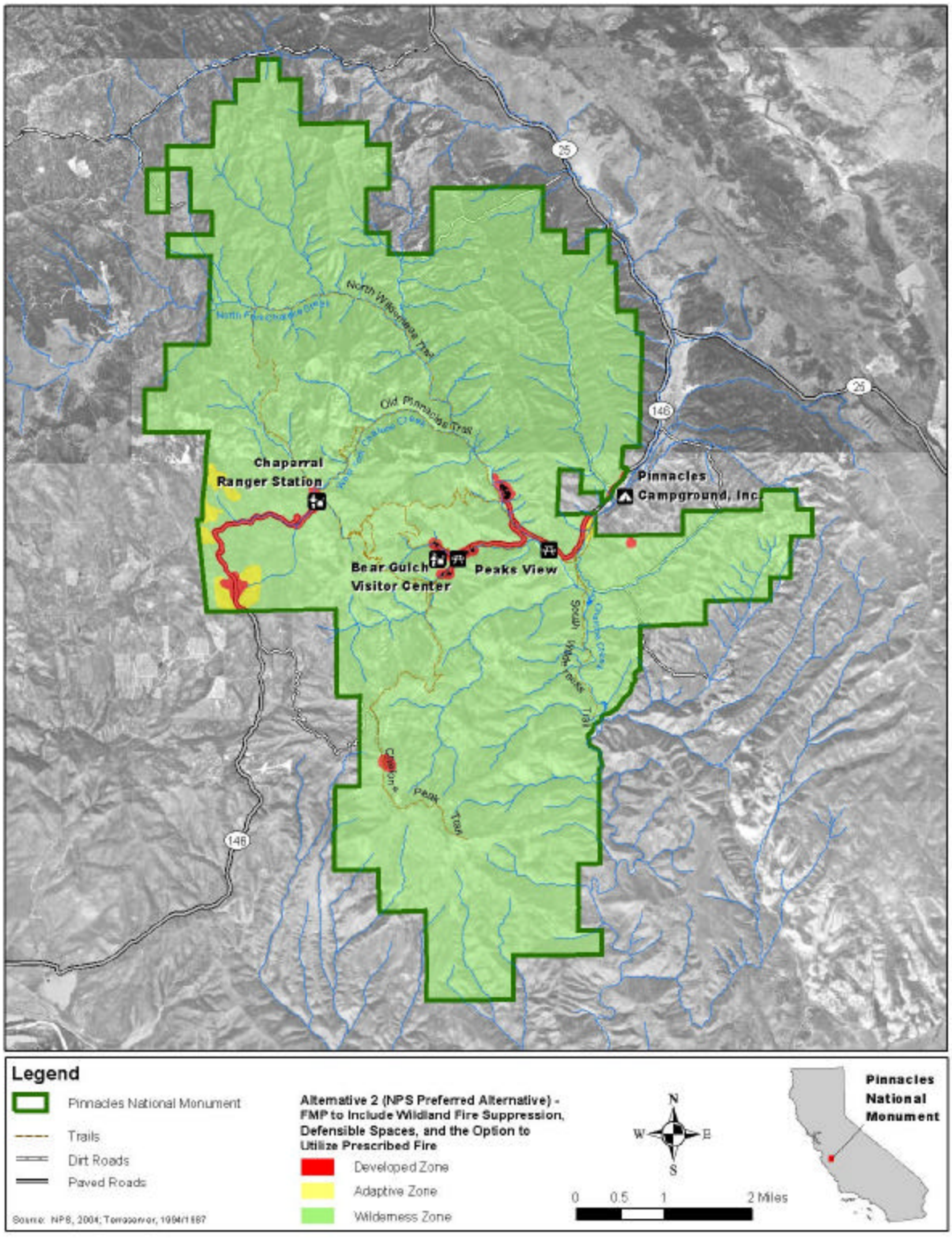

Figure 2-2 Pinnacles National Monument – Alternative 2 (NPS Preferred)

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Chapter 3 – Environmental Analysis

This chapter summarizes the existing environmental conditions and the probable environmental consequences (effects) of implementing the action and No-Action alternatives. This chapter also provides the scientific and analytical basis for comparing the alternatives. The probable environmental effects are quantified where possible; where not possible, qualitative descriptions are provided. As mentioned before, this document is programmatic in nature and not site-specific with regards to all potential environmental impacts. Subsequent to this document, site-specific environmental analysis will be completed for projects not specifically addressed in this EA.

The National Park Service is mandated to protect resources and assure that they are passed on to future generations "unimpaired" (DOI, 2001a). An impairment is an impact that, in the professional judgment of the superintendent, would harm the integrity of park resources or values, including opportunities that otherwise would be present for the enjoyment of those resources or values. An impact would be less likely to constitute an impairment to the extent that it is an unavoidable result from an action necessary to preserve or restore the integrity of park resources or values (DOI, 2001b). This EA addresses whether the actions of the various alternatives proposed by Pinnacles National Monument impair resources or values that are (1) necessary to fulfill specific purposes identified in the enabling legislation of the park, (2) key to the natural or cultural integrity of the park or opportunities for enjoyment of the park, and (3) identified as a goal in the park's general management plan or other Park Service planning documents.

3.1 IMPACT DEFINITIONS

Table 3-1 depicts the impact definitions used in this Environmental Assessment. Significant impact thresholds for the various key resources were determined in light of compliance with existing state and federal laws, and compliance with existing Pinnacles National Monument planning documents.

Table 3-1 Impact Definitions

Resources	"Negligible"	"Minor"	"Moderate"	"Major"	Duration
Soils	Soils would not be affected or the effects to soils would be below or at the lower levels of detection. Any effects to soil productivity or fertility would be slight and no long- term effects to soils would occur.	The beneficial/adverse effects to soils would be detectable, but likely short-term. Damage to or loss of the litter/humus layers that causes slight localized increases in soil loss from erosion; effects to soil productivity or fertility would be small, as would the area affected; short-term and localized compaction of soils that does not prohibit re-vegetation; if mitigation were needed to offset adverse effects, it would be relatively simple to implement and likely successful.	The beneficial/adverse effects on soil productivity or fertility would be readily apparent, long term, and result in a change to the soil character over a relatively wide area; fire severe enough to cause a noticeable change in soil community; intermittent areas of surface sterilization of soils that may cause some long term loss of soil productivity that may alter a portion of the vegetation community; short-to long-term and localized compaction of soils that may prohibit some re-vegetation; mitigation measures would probably be necessary to offset adverse effects and would likely be successful.	The beneficial/adverse effects on soil productivity or fertility would be readily apparent, long-term, and substantially change the character of the soils over a large area in and out of the park. Damage to or loss of the litter/humus layers that would increase soil loss from erosion on a substantial portion of the burn area; fire severe enough to cause substantial damage to the soil community; substantial surface sterilization of soils that may cause long term loss of soil productivity and that may alter or destroy the vegetation community over most of the burned area; long-term and widespread soil compaction that affects a large number of acres and prohibits re-vegetation; mitigation measures to offset adverse effects would be needed, extensive, and their success could not be guaranteed.	**Short-Term** Recovers in less than 3 years **Long-Term** Takes more than 3 years to recover
Water Resources	Neither water quality nor hydrology would be affected, or changes would be either non-detectable or if detected, would have effects that would be considered slight, local, and short- term.	Adverse changes in water quality would be measurable, although small, likely short-term, indirect, and localized; localized and indirect riparian impacts that do not substantively increase stream temperatures or affect stream habitats; no alteration of natural hydrology of wetlands; A U.S. Army Corps of Engineers 404 permit would not be required; no filling or disconnecting of the floodplain; short-term impacts that do not affect the functionality of the floodplain; no mitigation measure associated with water quality would be necessary.	Adverse changes in water quality would be measurable and long-term but would be relatively local, direct and/or indirect; localized and indirect riparian impacts that may slightly increase stream temperatures or affect stream habitats; alteration of natural hydrology of wetlands would be apparent such that an U.S. Army Corps of Engineers 404 permit could be required; alteration of the floodplain apparent; wetland or floodplain functions would not be affected in the long-term; mitigation measures associated with water quality or hydrology would be necessary and the measures would likely succeed.	Adverse changes in water quality would be readily measurable, would have substantial consequences, direct and/or indirect, and would be noticed on a regional scale; localized and indirect riparian impact that may substantively increase stream temperatures or affect stream habitats; effects to wetlands or floodplains would be observable over a relatively large area and would be long-term, and would require a U.S. Army Corps of Engineers 404 permit; filling or disconnecting of the floodplain; long-term impacts that affect the functionality of the floodplain; mitigation measures would be necessary and their success would not be guaranteed.	**Short-Term** Recovers in less than 3 years **Long-Term** Takes more than 3 years to recover

Table 3-1 Impact Definitions

Resources	"Negligible"	"Minor"	"Moderate"	"Major"	Duration
Vegetation	No native vegetation would be affected or some individual native plants could be affected as a result of the alternative, but there would be no effect on native species populations. The effects would be short- term, on a small scale.	Beneficial/adverse short-term direct affects to some individual native plants and would also affect a relatively small portion of that species' population; short-term changes in plant species composition and/or structure, consistent with expected successional pathways of a given plant community from a natural disturbance event; increase in invasive species in limited locations; occasional death of a canopy tree; mitigation to offset adverse effects, including special measures to avoid affecting species of special concern, could be required and would be effective.	The beneficial/adverse effects on some individual native plants along with a sizeable segment of the species' population in the long-term and over a relatively large area; long-term changes in plant species composition and/or structure, consistent with expected successional pathways of a given plant community from a natural disturbance event; increases in invasive species do not jeopardize the overall native plant communities; repeated death of canopy trees; mitigation to offset adverse effects could be extensive, but would likely be successful.	Considerable beneficial/adverse long-term direct effects on native plant populations, including species of special concern, and affect a relatively large area in and out of the park; widespread increase in invasive species that jeopardizes native plant communities; mitigation measures to offset the adverse effects would be required, extensive, and success of the mitigation measures would not be guaranteed.	**Short-Term** Recovers in less than 3 years **Long-Term** Takes more than 3 years to recover
Wildlife/ Threatened and Endangered Species	There would be no observable or measurable impacts to native fish and wildlife species, their habitats, or the natural processes sustaining them. Impacts would be of short duration and well within the range of natural fluctuations.	Temporary displacement of a few localized individuals or groups of animals; mortality of individuals of species not afforded special protection by state and/or federal law; mortality of individuals that would not impact population trends; mitigation measures, if needed to offset adverse effects, would be simple and successful.	Beneficial/adverse direct and indirect effects to wildlife would be readily detectable, long-term and localized, with consequences affecting the population level(s) of specie(s); mitigation measures, if needed to offset adverse effects, would be extensive and likely successful.	Beneficial/adverse direct and indirect effects to wildlife would be obvious, long-term, and would have substantial consequences to wildlife populations in the region; violation of the Endangered Species Act of 1973; mortality of a number of individuals that subsequently jeopardizes the viability of the resident population; extensive mitigation measures would be needed to offset any adverse effects and their success would not be guaranteed.	**Short-Term** Recovers in less than 3 years **Long-Term** Takes more than 3 years to recover
Air Quality Class I	No changes would occur or changes in air quality would be below or at the level of detection, and if detected, would have effects that would be considered slight and short-term.	Adverse changes in air quality would be measurable, although the changes would be small, short-term, and the effects would be localized; temporary and limited smoke exposure to sensitive resources; no air quality mitigation measures would be necessary.	Adverse changes in air quality would be measurable, would have consequences, although the effect would be relatively local; all air quality standards still met; short-term exposure to sensitive resources; air quality mitigation measures would be necessary and the measures would likely be successful.	Adverse changes in air quality would be measurable, would have substantial consequences, and be noticed regionally; violation of state and federal air quality standards; violation of Class II air quality standards; prolonged smoke exposure to sensitive receptors; air quality mitigation measures would be necessary and the success of the measures could not be guaranteed.	**Short-Term** Recovers in 7 days or less **Long-Term** Takes more than 7 days to recover

Table 3-1 Impact Definitions

Resources	"Negligible"	"Minor"	"Moderate"	"Major"	Duration
Visitor Use & Experience	Visitors would be affected or changes in visitor use and/or experience would be below or at the level of detection. Any effects would short-term. The visitor would not likely be aware of the effects associated with the alternative.	Temporary displacement of recreationists or closure of trails, and recreation areas during off-peak recreation use; temporary or short-term alteration of the vista, or temporary presence of equipment in localized area; smoke accumulation during off-peak recreation use. The visitor would be aware of the effects associated with the alternative, but the effects would be slight.	Beneficial/adverse direct changes in visitor use and/or experience would be readily apparent and likely long-term. The visitor would be aware of the effects associated with the alternative and would likely express an opinion about the changes	Permanent closure of trails and recreation areas; conflict with peak recreation use; long-term change in scenic integrity of the vista; substantive smoke accumulation during peak recreation use. The visitor would be aware of the effects associated with the alternative and would likely express a strong opinion about the changes.	**Short-Term** Occurs only during the treatment effect **Long-Term** Occurs after the treatment effect
Human Health & Safety	Human health and safety would not be affected, or the effects would be at low levels of detection and would have an appreciable effect on human health and safety.	The effects would be detectable and short-term, but would not have an appreciable effect on public health and safety; potential for small injuries to any worker or visitor (e.g. scrapes or bruises); limited exposure to hazardous compounds or smoke particulates at concentrations below health-based levels; if mitigation were needed, it would be relatively simple and likely successful.	The effects would be readily apparent and long-term, and would result in substantial, noticeable effects to public health and safety on a local scale; non-life threatening injuries to any worker or visitor; limited exposure to hazardous compounds or smoke particulates at concentrations at or slightly above health-based levels; mitigation measures would probably be necessary and would likely be successful.	The effects would be readily apparent and long-term, and would result in substantial noticeable effects to public health and safety on a regional scale; serious life-threatening injuries to any worker or member of the public; limited or prolonged exposure to hazardous compounds or smoke particulates at concentrations well above health-based levels; extensive mitigation measures would be needed, and their success would not be guaranteed.	**Short-Term** Occurs only during the treatment effect **Long-Term** Occurs after the treatment effect
Cultural Resources	Impact is at the lowest levels of detection - barely measurable with any perceptible consequences, either adverse or beneficial, to archeological resources. For the purposes of Section 106, this equates to a *No Historic Properties Affected* determination.	For archeological resources, the impact affects an archeological site(s) with modest data potential and no significant ties to a living community's cultural identity; temporary, non-adverse effects to registered cultural resource sites, eligible cultural resource sites, sites with an undetermined eligibility, and traditional cultural properties; no effect to the character defining features of a National Register of Historic Places eligible or listed structure, district, or cultural landscape. For the purposes of Section 106, this equates to a *No Historic Properties Affected* or *No Adverse Affect* determination.	For archeological resources, the impact affects an archeological site(s) with high data potential and no significant ties to a living community's cultural identity; temporary adverse effects to registered cultural resource sites, eligible cultural resource sites, sites with an undetermined eligibility, and traditional cultural properties, but would not diminish the integrity of the cultural resource to the extent that its National Register eligibility is jeopardized. For the purposes of Section 106, this equates to a *No Adverse Affect* or *Adverse Affect* determination.	For archeological resources, the impact affects an archeological site(s) with exceptional data potential or that has significant ties to a living community's cultural identity; long-term adverse impacts to registered cultural resource sites, eligible cultural resource sites, sites with an undetermined eligibility, and traditional cultural properties that would diminish the integrity of the cultural resource to the extent that its National Register eligibility is jeopardized. For the purposes of Section 106, this equates to an *Adverse Affect* determination.	**Short-Term** Treatment effects on the natural elements of a cultural landscape (e.g., three to five years until new vegetation returns) **Long-Term** Because most cultural resources are non-renewable, any effects would be long term

Table 3-1 Impact Definitions

Resources	"Negligible"	"Minor"	"Moderate"	"Major"	Duration
Park Operations	Park operations would not be affected or the effect would be at or below the lower levels of detection, and would not have an appreciable effect on park operations.	The beneficial/adverse direct and indirect effects would be detectable and likely short-term, but would be of a magnitude that would not have an appreciable effect on park operations; short-term suspension of non-critical park operations; negligible impact to park buildings and structures; if mitigation were needed to offset adverse effects, it would be relatively simple and likely successful	The beneficial/adverse effects would be readily apparent, be long-term, and would result in a substantial change in park operations in a manner noticeable to staff and the public; long-term suspension of all park operations (1 to 2 days); detectable adverse impacts to park buildings and structures; mitigation measures would probably be necessary to offset adverse effects and would likely be successful	The beneficial/adverse effects would be readily apparent, long-term, would result in a substantial change in park operations in a manner noticeable to staff and the public and be markedly different from existing operations; prolonged suspension of all park operations; substantial adverse impacts to park buildings and structures; mitigation measures to offset adverse effects would be needed, would be extensive, and their success could not be guaranteed	**Short-Term** Effects lasting for the duration of the treatment action **Long-Term** Effects lasting longer than the duration of the treatment action.
Wilderness	A change in the wilderness character could occur, but it would be so small that it would not be of any measurable or perceptible consequence.	A change in the wilderness character and associated values would occur, but it would be small and, if measurable, would be highly localized.	A change in wilderness character and associated values would occur. It would be measurable, but localized.	A noticeable change in the wilderness character and associated values would occur. It would be measurable, and would have a substantial or possibly permanent consequence.	**Short-Term** Recovers in less than 3 years **Long-Term** Takes more than 3 years to recover.

3.2 SOILS

3.2.1 *Affected Environment*

The topography of Pinnacles National Monument ranges from rolling hills to rock spires, crags and other points of sharp relief. Although the terrain is mountainous with locally steep topography, the area is of generally low relief. Elevations in the park range from less than 1,000 feet along South Chalone Creek to 3,267 feet at the summit of North Chalone Peak. Hawkins' Peak, which is composed largely of "the pinnacles", is over 2,600 feet in elevation. The mean elevation of the park is about 2,000 feet above sea level.

The soils of Pinnacles are typically thin, undeveloped sandy loams with large amounts of gravel and little ability to retain nutrients and water. Nutrient supply is low but well balanced. Small areas of soil are quite rich in humus but average only two feet in depth. The soils offer little resistance to root growth, thus allowing extensive root development. These properties tend to increase moisture loss from the soil, causing less water to be available for the plant cover. When the plant cover is disturbed, soils become acutely susceptible to erosion during periods of intense rainfall (NPS, 1999b).

3.2.2 *Environmental Consequences*

Soil effects were qualitatively assessed using professional judgment based on investigations of soil characteristics and information from the park's 1999 Resource Management Plan.

3.2.2.1 Alternative 1 – No Action

Proposed activities with the potential to affect soils include activities associated with wildland fire suppression (*e.g.* digging firelines, and using large amounts of water), and wildland and prescribed fire use.

Minor and short-term effects would result from actions proposed under this alternative. Digging firelines, if deemed necessary, would result in minor, localized soil disturbance and could lead to increased erosion, especially in steeply sloped areas within the park. However, these adverse effects resulting from digging of firelines would be minimized through the use of minimum impact suppression tactics described in Appendix A.

Lastly, using excessive amounts of water to extinguish fires could result in minor and localized erosion and soil disturbance from hydrologic boring action. These would be avoided by using a soaker hose, sprinklers or foggers in mop-up, which would help avoid boring and hydraulic action of a high-pressure fire hose.

The use of wildland or prescribed fire would release nutrients into the soil and the fertilization effects of ash would provide an important source of nutrients for vegetation in the area. In addition to increasing nitrification of the soils, raising pH, and increasing minerals and salt concentrations in the soil, the ash and charcoal residue resulting from incomplete combustion aids in soil buildup and soil enrichment by being added as organic matter to the soil profile. The

added material works in combination with dead and dying root systems to make the soil more porous, better able to retain water, and less compact while increasing needed sites and surface areas for essential microorganisms, mycorrhizae, and roots (Vogl, 1979; Wright and Bailey, 1980).

If a prescribed fire exceeded a burn prescription and burned "hot", resulting in areas of high-burn severity, the organic layer of the soil could be consumed and soil layers could become water repellent. Such water repellent soil conditions are generally temporary (Frederick, et al, 2003), so that during the first minutes (or longer) of rainfall, water beads on or near the soil surface and quickly runs off the plot. Water repellency then deteriorates as rainfall continues, resulting in a gradual recovery in the infiltration capacity of the soil. Since hot fires are the norm in chaparral fires there would be little potential for adverse effects of any high-burn severity prescribed fires on the soils.

3.2.2.2 Alternative 2 –NPS Preferred Alternative

Proposed activities with the potential to affect soils include wildland fire suppression activities, prescribed fire use, and hazard fuels reduction within areas of defensible space. General soil effects related to suppression and prescribed fire activities would be similar to those described in the "No Action" Alternative.

The removal of hazard fuels within areas of defensible space (50 to 100 feet around each structure) would have only negligible adverse effects to soil. The areas around the structures, for the most part, are already clear of significant hazard fuels, and would require minimal clearing. There are a few instances where park buildings abut a hillside and the removal of vegetation could result in soil disturbance or erosion. In these cases, precautions would be taken to minimize any damage to the hillside, and any damage that was caused would be quickly re-contoured and planted with a ground cover of native grasses and forbs, not considered hazard fuels.

Lastly, the use of mechanical treatments (*e.g.* mowing and weed whacking) would only have negligible, short-term adverse effects to soil. Occasionally, there could be localized damage to the soil from these activities, however, this activities and damage would be on such a small scale that it would negligible.

Mitigations
A resource advisor guide will be developed, which will be utilized by trained park staff to identify sensitive resources (such as sensitive soils, vegetation, and cultural resources) in the park during wildland fire events. Minimum impact suppression tactics (MIST) aimed at lessening effects to soils, would be implemented under both alternatives, as described in Appendix A.

Conclusion
Both alternatives would produce minor short-term effect on the soils of Pinnacles National Monument. Minimum impact suppression techniques would reduce the potential for these effects. The implementation of either of the alternatives would not impair geologic and soil resources or values.

3.3 WATER RESOURCES

3.3.1 *Affected Environment*

Chalone Creek is the major drainage of the park. Most of the park's 25 square mile area drains into this tributary, which eventually empties into the Salinas River and Monterey Bay. Because the terrain in the Gabilan Range is rugged and deeply dissected, there is no regular drainage pattern as streams are controlled by fault traces and fractures at intersecting angles.

The tributaries of Bear Gulch Creek and Chalone Creek originate just outside the park boundary. Most of Sandy Creek, which joins Chalone Creek near the east entrance, also originates outside the park. Chalone Creek and Sandy Creek are unimpeded throughout their course in the park, but their uppermost branches are impounded on private lands, in small stock ponds. Bear Gulch Creek is impounded behind a dam within the park built during the CCC era. This reservoir is not used for domestic purposes.

3.3.2 *Environmental Consequences*

Water resource effects were qualitatively assessed using professional judgment based on investigations of water resources, literature reviews, and information from the park's 1999 Resource Management Plan.

3.3.2.1 Alternative 1 – No Action

Proposed activities with the potential to affect water resources include building fire lines, and prescribed and wildland fire use. These are expected to be short-term, negligible to minor, and indirect. The principal effects to water quality resulting from wildland fire suppression stem from erosion-induced suspended sediments, turbidity, and sedimentation, in addition, intense fires may introduce large quantities of organic material (ash) into aquatic systems, transported by runoff. In light of the minimum impact suppression tactics employed during wildland fire suppression activities, there would be little, if any, direct adverse effects on surface water resources in the park. During fire suppression, water will be used in lieu of fire retardant whenever possible. If retardant must be used, a non-fugitive dye-free type will be chosen, and bodies of water avoided. Retardant or other chemicals would not be used for prescribed fire activities.

There is the potential for negligible to minor, short-term adverse indirect effects to water quality with an increase in turbidity and sediment delivery in Chalone Creek, Bear Gulch Creek, and Sandy Creek as a result of soil erosion following suppression activities and mechanical treatments. Turbidity and sedimentation can alter the hydrologic regime of surface waters and adversely affect aquatic habitats, invertebrates and fish. However, as described under Section 3.1.2.1, the degree of soil erosion would be minor and localized. The degree at which the water quality could be indirectly affected would be dependent, however, on the actual amount of water flowing in the streams. At periods of low flows, a flush of sediment into a stream would have greater effects to water quality than at periods of high flow, because there would be less water to dilute and flush the sediments downstream. In addition, many of the streams in the park are

intermittent, and end up as a series pools along the stream channel. If sediment were to enter these pools, it could potentially affect water quality of the pools. This would be a short-term and minor in nature, as these pools are flushed with spring rains.

In addition, this alternative is unlikely to lead to any substantial change in the flow of streams draining the park; that is, it would not result in large pulses of water delivered to these streams during storm events from somewhat greater runoff on burned or disturbed ground surfaces.

3.3.2.2 Alternative 2 – NPS Preferred Alternative

Adverse indirect effects resulting from wildland fire suppression and prescribed fire use would be the same as those described in the "No Action" Alternative. Effects to the water resources at Pinnacles resulting from the activities proposed under this alternative would be short-term and negligible to minor.

There would be no adverse effects to water quality from hazard fuel reduction activities in defensible areas. The small area being affected and the proximity of park structures to any of the drainages reduce the potential for adverse effects. In addition, many of the buildings are within riparian areas, which are naturally more resistant to burning, due to higher fuel moisture.

There would also be no adverse effects to water quality from either mechanical thinning or prescribed fire activities proposed in the Adaptive Management Unit. Mechanical thinning would only be used for weed control and would not totally remove ground cover. This would protect the soil from erosion during runoff. Prescribed fire would only be conducted on a relatively small scale (10-50 acres per year) and would occur on relatively flat land.

Mitigations
A resource advisor guide will be developed, which will be utilized by trained park staff to identify sensitive resources (such as sensitive soils, vegetation, and cultural resources) in the park during wildland fire events. The MIST techniques, Appendix A, aimed at lessening the indirect adverse impacts to the water resources of the park are those that mostly mitigate against soil disturbance and erosion problems that could lead to excessive runoff.

Conclusion
Both proposed alternatives would have short-term, negligible to minor, indirect, adverse effects to the water resources of the park. The implementation of any of the alternatives would not impair water resources or values.

3.4 VEGETATION

3.4.1 *Affected Environment*

General Vegetation
The vegetative communities found at Pinnacles have developed as a result of interactions amongst the various plant species and such factors as soil type, direction of exposure, slope, moisture regime and fire history. Many of the native plant communities have been altered by

human activities such as invasion by non-native plants and animals (e.g. historic grazing, feral pigs, trespass cattle); air pollution; erosion; and disturbance by park operations and visitors (NPS, 1999b). Vegetation at Pinnacles has been broadly grouped into five major habitat types or vegetation associations, which include chaparral, oak woodland/savanna, riparian woodland, grassland, and scree.

Chaparral, covering 80% of the park, is the dominant vegetation type. Many chaparral plant species have adapted to the natural occurrence of fire. For example, seeds of some chaparral plants lie dormant in the seedbank for years before a fire stimulates them to sprout. Dependent on disturbance and seedcoat scarification for seed germination, these plants may appear suddenly after a fire, even in areas in which they have long been absent.

Oak woodlands are the second most common vegetation type, covering approximately 10% of the park. Blue oak (*Quercus douglasii*), a deciduous species, is the dominant tree in this association. The understory is most often dominated by non-native grasses, but there are areas in the park where native oak understory still exists. This native understory consists mainly of native bunchgrasses with a suite of native perennial and annual forbs blooming in succession throughout the year. Valley oak woodlands are also part of this category. These woodlands, dominated by valley oaks (*Quercus lobata*), are uncommon in the park and are limited in distribution to the open, flat alluvium at the confluence of Chalone and Sandy Creeks. Oak trees have a number of strategies that enable it to survive fire. Mature trees are fire resistant, while top-killed seedlings and saplings will re-sprout from the root crown.

The remaining 10% of the park is a mixture of riparian woodlands, grasslands and rock/scree vegetation types. Although these types are small in land coverage they are some of the most diverse and unique areas. With the exception of the grassland areas, which are often an artifact of past burning practices, the other types do not often experience the effects of fire (since they are rocky or contain a lot of water).

Non-native plants

Many non-native plant species have become established in Pinnacles National Monument. These plants displace native species and quickly colonize any disturbed area, natural or human caused. The proximity of the park to grazing and ranching practices makes Pinnacles especially vulnerable to the introduction of new invasive species. As of 2004, there are 118 known introduced plant species in the park. Most of these weed species will increase in numbers following a fire. Not all non-native species can be managed, so efforts are focused on the most invasive and most controllable of the species present. Currently, yellow starthistle (*Centaurea solstitialis*) and summer mustard (*Hirschfeldia incana*) are the two most in need of management, and both are found within the Adaptive Management Unit (NPS, 1999b). Other invasive non-native species may be found in the park that will need management attention. These will be addressed in revisions to the Fire Management Plan.

Special status species

While there are currently, no federally listed plant species found within the park's boundaries, there are several state listed species, which include:

- Slender Pentachaeta (*Pentachaeta exilis ssp. aeolica*)

- Hooked Popcorn Flower (*Plagiobothrys uncinatus)*
- Indian Valley Bush Mallow (*Malacothamnus aboriginum)*
- Pinnacles Buckwheat (*Eriogonum nortonii)*
- Coast Larkspur (*Delphinium californicum ssp. interius)*

3.4.2 *Environmental Consequences*

Vegetation impacts were qualitatively assessed using literature reviews and quantitatively assessed by acres impacted.

3.4.2.1 Alternative 1 – No Action

Proposed activities with the potential to affect vegetation include wildland fire suppression activities and wildland and prescribed fire use. Fire suppression activities could result in the mortality of plants and trees in the areas where wildland fire suppression is underway. The digging of firelines, removal of trees, and setting of backfires are all examples of wildland fire suppression tactics that could cause mortality of individual plant species. These effects are expected to be minor because the loss of individual members of a given plant species would not jeopardize the viability of the populations on and adjacent to the park. These would also be limited to the area of treatment and would be temporary, as native vegetation would be expected to recolonize after wildland fires had occurred. However, any fire suppression activities that resulted in soil disturbance (e.g. building of firelines) would make them more susceptible to the spread of invasive exotics, such as starthistle, that thrive in open disturbed areas.

If fires were not as frequent as described in the park's fire history there may be long-term minor effects to the vegetation, due to lengthened fire return intervals. Three of the state listed plant species found within the park are adapted to fire and may be affected if fire return intervals are too long. The slender pentachaeta, hooked popcorn flower, and Indian valley bush mallow are all considered "fire followers," which means that after a fire event, their numbers and vigor would tend to increase. Other sensitive species would not likely be affected.

Wildland and prescribed fire use on the park could result in the mortality of individual plant species. These effects are expected to be minor and short-term because the loss of individual members of a given plant species would not jeopardize the viability of the populations on and adjacent to the park. Impacts would be limited to the area of treatment only, and native vegetation would be expected to recolonize after the prescribed fires had occurred.

3.4.2.2 Alternative 2 (NPS Preferred Alternative)

Proposed activities with the potential to affect vegetation include wildland fire suppression activities, prescribed fire use, manual and mechanical treatments. The general effects from wildland fire suppression in all three areas and prescribed fire use in the Wilderness Area are expected to be the same as those described in the "No Action" Alternative.

Prescribed fire would be utilized within the Adaptive Management FMU, on roughly 10-50 acres per year, in order to control the invasive exotic plant species starthistle (*Centaurea solstitialis*) and summer mustard (*Hirschfeldia incana*). The park would burn identified plots for three

consecutive years in the spring (before either plant can flower) in order to eradicate these species from the area. While both plants can resprout from rootstock after a fire, burning prior to flowering would ensure that there would be no new seed production would occur from within the treatment area, and burning for three consecutive years would deplete the rootstocks stores of energy, leaving them unable to re-sprout after the three-year treatment is complete (USDA, 2002b).

Prescribed fire could also be used in the Wilderness area in the event that the natural fire return internal was not being met. In these cases the ecological benefits of fire would be reintroduced, leading to long-term effects on the native vegetation. There is also the potential, by burning, to provide habitat for non-native plants. Three of the state listed plant species found within the park are adapted to fire and may be affected if fire return intervals are too long. The slender pentachaeta, hooked popcorn flower, and Indian valley bush mallow are all considered "fire followers," which means that after a fire event, their numbers and vigor would tend to increase. These species would benefit from the prescribed burn program, assuming the burn prescription was correct. All burns would be monitored to determine these trends and prescriptions would be altered if it were determined that non-native species were replacing native species as a result of these burns. Other sensitive species would not likely be affected due to there location in the park.

Creating defensible space around park structures and roads inside the Developed Area would have only minor direct long-term effects to native vegetation in the park. As 30-50 foot-wide area of defensible space is created around park structures and paved roads, it would be necessary to remove some vegetation. This would have a long-term effect, as the park would continue to maintain these areas indefinitely. The effects of this removal would be minor because the loss of individual members of a given plant species would not jeopardize the viability of the populations on and adjacent to the park. Also, effects would be limited to the area of treatment.

Activities proposed in both the Developed and Adaptive Management Areas would have no impacts to any of the state-listed plant species, as none are known to inhabit these areas. These species are only known to occur within the Wilderness Area.

Mitigations

A resource advisor guide will be developed, which will be utilized by trained park staff to identify sensitive resources (such as sensitive soils, vegetation, and cultural resources) in the park during wildland fire events. The MIST techniques, Appendix A, aimed at lessening the indirect adverse impacts to the water resources of the park are those that mostly mitigate against soil disturbance and erosion problems that could lead to excessive runoff.

Monitoring of prescribed fires would occur to track changes in vegetation due to prescribed fires.

Conclusion

Both the "No Action" and the "NPS Preferred" Alternative would have long-term beneficial effects to vegetation with the continuance of a natural fire regime. Under the "NPS Preferred" Alternative, a competitive advantage would be given to native plant species found in the Adaptive Management Area, as prescribed fire would be used to help remove invasive exotic plant species. The

implementation of any of the alternatives would not impair vegetation resources or values in the park.

3.5 WILDLIFE (INCLUDING THREATENED AND ENDANGERED SPECIES)

3.5.1 *Affected Environment*

Forty-nine mammalian species are known to occur within Pinnacles National Monument. Representative species include: black-tailed deer (*Odocoileus hemionus*), bobcat (*Lynx rufus*), gray fox (*Urocyon cinereoargenteus*), raccoon (*Procyon lotor*), jackrabbit (*Lepus californicus*), brush rabbit (*Sylvilagus bachmani*), ground squirrel (*Otospermophilus beecheyi*), chipmunk (*Eutamias minimus*), and several species of bat. Badgers (*Taxidea taxus),* coyotes (*Canis latrans),* a wide variety of rodents, and mountain lions (*Felis concolor)* inhabit the park (NPS, 1999b).

Three mammals, the house mouse, opossum, and feral pig, have been introduced to Pinnacles. The house mouse (*Mus musculus*) and opossum (*Didelphis virginiana*) are rare and not considered threatening to the park ecosystem. Feral pigs (*Sus scrofa*), on the other hand, are abundant within the region and have caused extensive damage to the park's native vegetation. A fence is now in place to exclude feral pigs from approximately 14,000 acres of the park's 24,585 acres, and pigs within the fenced area are being eradicated. Impacts from feral pigs are still evident outside of the fenced area.

Birds are the most visible animals visitors are likely to encounter at Pinnacles National Monument, with over 140 species documented in the park since 1908. The variety of habitat types at Pinnacles attracts a diverse assemblage of birds to the park for seasonal nesting and migratory stopovers, and numerous species live in the park year-round. Much of the bird diversity at Pinnacles is focused along the riparian corridors of Bear Gulch and Chalone Creek, because they provide an abundance of food, water, and shelter for many species. Certain species favor the pine and oak woodlands in the park. Among the gray pines, western tanagers (*Piranga ludoviciana),* Townsend's warblers (*Dendroica townsendi),* and hairy woodpeckers (*Picoides villosus*) are evident. In the oak woodlands, California quail (*Callipepla californica),* oak titmice (*Baeolophus inornatus),* western scrub jays (*Aphelocoma californica),* mourning doves (*Zenaida macroura),* ash-throated flycatchers (*Myiarchus cinerascens),* and northern flickers (*Colaptes auratus*) are commonly seen. The dense, low scrub of the chaparral covers the majority of the park, and provides ideal habitat for many birds, including residents like California thrashers (*Toxostoma redivivum),* spotted towhees (*Pipilo maculates),* wrentits (*Chamaea fasciata),* bushtits (*Psaltriparus minimus),* and seasonal species including sage sparrows (*Amphispiza belli).*

The rocky summits and peaks of Pinnacles provide nesting habitat and roosts for many raptors, including prairie falcons (*Falco mexicanus*) and golden eagles (*Aquila chrysaetos*), as well as smaller bird species including the vocal canyon wren (*Catherpes mexicanus*) and the acrobatic violet-green swallow (*Tachycineta thalassina*). Other common species include turkey vultures

(Cathartes aura), acorn woodpeckers (*Melanerpes formicivorus)* and Steller's jays (*Cyanocitta stelleri).*

Compared to the rest of Central California, Pinnacles is home to a high diversity of reptiles: eight lizards, thirteen snakes, and one turtle. Species most commonly encountered include the western whiptail (*Cnemidophorus tigris*), coast horned lizard (*Phrynosoma coronatum blainvillii*), western fence lizard (*Sceloporus occidentalis*), common garter snake (*Thamnophis sirtalis*), striped racer (*Masticophis lateralis*), gopher snake (*Pituophis melanoleuces*) and western rattlesnake (*Crotalus viridis*) (NPS, 1999).

Six species of amphibians, including Pacific tree frog (*Pseudacris regilla*), California red-legged frog (*Rana aurora draytonii*), and western toad (*Bufo boreas*), breed in the park's streams and ponds (NPS, 1999b). Due to the intermittent nature of Pinnacles' streams, the three-spined stickleback *(Gasterosteus aculeatus)* is the only native fish. A predatory feeder, it eats predominately aquatic insects, and reaches three inches in length when full-grown (NPS, 1999b).

In addition to the mammals, birds, reptiles and amphibian Pinnacles is also home to a variety of insects, both aquatic and terrestrial. Of special note are the 400 species of bee that have been identified in the park. Butterflies and moths are also present at a high level of diversity, the latter of which are dependent on woody vegetation, such as mature chaparral shrubs and trees.

There are two federally listed species that are found within Pinnacles National Monument the Federally threatened California red-legged frog (*Rana aurora draytonii*), and the federally endangered California condor (*Gymnogyps californianus).*

The California red-legged frog occupies a fairly distinct habitat, occupying the Chalone creek drainage and a newly-established population in the Bear Gulch Reservoir. Extensive surveys and monitoring have been conducted over the last 10 years giving the park detailed data on the location and occupation of habitat within the park. The adults require dense, shrubby or emergent riparian vegetation closely associated with deep (greater than 2 feet deep) still or slow moving water. California red-legged frogs can enter a dormant state during summer or periods of dry weather in small mammal burrows and moist leaf litter. They have been found up to 100 feet from water in adjacent dense riparian vegetation (USFWS, 2002). The reintroduction of the California red-legged frog to the reservoir has proven successful to date, and demonstrates the species' ability to flourish in the park.

Condors historically used this region until the 1970s and evidence of nesting exists in Pinnacles National Monument dating back to 1898. By the early 1980s, the total number of both wild and captive California condors had plummeted to just 22 because of lead poisoning and pesticide use. Today, thanks to captive breeding and restoration efforts, that number has risen to over 240. In 2003, six California condors were reintroduced into Pinnacles National Monument, and six more are expected to be released in late 2004. Within the park, California condors roost on trees, snags, cliffs, and rocky outcrops and where launching for flight is optimal. These isolated roosts are also important because they provide protection from predators. Typically, foraging sites are in grasslands or oak-savannah regions at lower elevations, and roosting and nesting sites are located at higher elevations on cliffs.

Table 3-2 lists the Species of Special Concern that are located within the boundaries of Pinnacles National Monument.

Table 3-2 Federal and State Species of Special Concern Found at Pinnacles

Species of Concern	Scientific Name	Habitat
Pinnacles shieldback katydid	*Idiostatus kathleene*	Terrestrial, Chaparral
Pinnacles riffle beetle	*Optioservus canus*	Aquatic, fast-flowing sections of Chalone Creek
Southwestern pond turtle	*Clemmys marmorata pallida*	Aquatic, Riparian
Townsend's big-eared bat	*Corynorhinus townsendii*	Terrestrial, Caves
Western mastiff bat	*Eumops perotis californicus*	Terrestrial, Caves
Big-eared kangaroo rat	*Dipodomys elephantinus*	Terrestrial, chaparral-covered slopes
Silvery legless lizard	*Anniella pulchra pulchra*	Terrestrial, loose sandy soil
Coach Whip	*Masticophis flagellum*	Terrestrial, dry open areas in open grassland prairies and rocky hillsides.
Two-striped garter snake	*Thamnophis hammondii*	Riparian, In or near fresh water, including wooded streams, marshes, ponds, lakes
Cooper's hawk	*Accipter cooperi*	Forested areas
Sharp-shinned hawk	*Accipter straitus*	Forested areas
Golden eagle	*Aquila chrysaetos*	Open areas, cliffs used in nesting
White-tailed kite	*Elanus leucurus*	Wide range of habitat, prefers to nest in trees such as California live oak
Prairie falcon	*Falco mexicanus*	Dry open country, usually near cliffs, and rock outcrops.
Peregrine falcon	*Falco peregrinus*	Open areas with rocky outcroppings and/or cliffs for nesting
Long-eared owl	*Asio otus*	Terrestrial, Caves
Pallid bat	*Antrozous pallidus*	Terrestrial, Caves
American badger	*Taxidea taxus*	Terrestrial creates burrows in principally in dry, open country.

3.5.2 *Environmental Consequences*

The effects of the alternatives on wildlife were qualitatively assessed using professional judgment based on literature reviews, general knowledge, and research specific to the area. Many species benefit from the changes in vegetation and habitat after fires, while others suffer from the effects of these changes. Highlighted below are the species of greatest concern and/or the ones that are most affected by the differences in the alternatives.

3.5.2.1 Alternative 1 – No Action

Proposed activities with the potential to affect wildlife include wildland fire suppression activities such as digging of hand lines and removal of vegetation, and prescribed fire.

All the fire suppression activities could result in the temporary displacement of wildlife or individual mortality of wildlife species. While species like rodents and deer may temporarily benefit from increase forage and food source, these changes would be minor and temporary. These changes would not jeopardize the viability of the populations on and adjacent to the park.

Aquatic species (including both Species of Special Concern) in Bear Gulch Creek and Chalone Creek or their tributaries would not be affected by fire line construction, since it would not result in significant amounts of soil erosion and sediment delivery to the park's streams, which could affect aquatic habitats.

Fire management activities are not likely to adversely affect either the federally threatened California red-legged frog or the federally endangered California condor.

Nearly all of the potentially adverse effects to either the California condor or California red-legged frog would result from wildland fire suppression activities or from a wildland fire itself. However, it is expected that wildland fire suppression would likely not adversely affect any of the federally listed threatened or endangered species found within the park. As detailed in Appendix A (MIST), fire suppression activities would avoid ground disturbance within known natural sites (*e.g.* critical habitat, known areas where T&E species exist). When a wildland fire suppression activity (*e.g.* hand line construction) is not discretionary and deemed necessary to protect human life or property in or around these resource locations, it would involve as little ground disturbance as possible and be located as far outside of resource boundaries as possible. During fire suppression, water will be used in lieu of fire retardant whenever possible. If retardant must be used, a non-fugitive dye-free type will be chosen, and bodies of water avoided.

Prescribed fires are not likely to adversely affect the California red-legged frog. This is because all prescribed burn plans and plans for mechanical treatment in a given year would be reviewed and any important riparian areas or other habitat for red-legged frogs avoided. All fire management actions would adhere to a setback from breeding and non-breeding habitat for red-legged frogs. In the bear gulch area, where structures are closer than the required setbacks, a biologist will survey the sites prior to and during activities to ensure no frogs are present. If frogs are found during these surveys the areas will be avoided. Prescribed fire, because it is used to restore the natural vegetation structure in park habitats, would have long-term benefits to red-legged frogs and their habitat.

As outlined in the concurrence letter received from the USFWS on December 17, 2003 for the condor reintroduction project (Appendix C), wildland and prescribed fire activities are not likely to adversely affect California condors in the park. In the event that a wildland fire threatened the California condor release site, those birds kept within confinement at the site would be evacuated to a temporary safe zone as outlined in the established evacuation plan. Any birds that could not safely be evacuated from the site would be released from the flight pen. California condors already free-flying are highly mobile and would most likely stay clear of both wildland fires and areas where wildland fires were being suppressed. Any nesting areas would likely be on rock cliffs, and would not be susceptible to fires. Prescribed fires would be evaluated for potential effects to California condors and would not be allowed to burn or would be modified if there were a potential to affect the condors.

State Species of Special Concern could be affected by wildland fire suppression activities. These would negligible to minor, as the loss of individuals of a non-threatened or endangered species would not jeopardize the viability of the populations on and adjacent to the park. MIST

strategies would be used to reduce the potential for these effects. While wildland and prescribed fire use could have minor short-term effects to a few species of special concern by causing the direct mortality of individuals in the treatment areas, it would also provide long-term beneficial impacts to those terrestrial species of special concern, by benefiting the natural vegetation structure of the park's habitats and reducing the risk of catastrophic fire. Areas with known populations of these species would be avoided if possible, or timed to reduce these effects.

3.5.2.2 Alternative 2 – NPS Preferred Alternative

Proposed activities with the potential to affect wildlife include wildland fire suppression activities such as digging of hand lines and removal of vegetation, mechanical treatments, and prescribed fire use. General effects to wildlife from wildland fire suppression activities and prescribed fire use would be similar to those described in the "No Action" Alternative.

Adverse effects to wildlife from creating defensible spaces in the Developed Area would be negligible and short-term, since these areas are already kept mostly clear of vegetation, and would involve minimal treatments.

Fire management activities in the Adaptive Management Area would result in minor adverse short-term impacts to non-threatened wildlife. With mechanical treatments (*e.g.* mowing, weed whacking) and annual prescribed fire use, there would include the temporary loss of some habitat and isolated mortality of individuals of a non-threatened or endangered species. On the other hand, the use of prescribed fire would enhance the variety and diversity of native plant and wildlife habitats in the park. Nutrients released to plants through the fertilization effects of ash would also provide an important source of nutrition for wildlife in the area.

No adverse impacts are expected to either the Federally Threatened California red-legged frog or Endangered California condor from fire management activities proposed in either the Developed or Adaptive Management Areas under this alternative. The reduction in hazard fuels would not be used in areas of existing or potential red-legged frog habitat, as these are not near buildings. In the bear gulch area, where structures are closer than the required setbacks, a biologist will survey the sites prior to and during activities to ensure no frogs are present. If frogs are found during these surveys the areas will be avoided. Fire clearances would be completed around the condor facility to protect the structure during wildfire. These clearances will be conducted in conjunction with the condor crew to reduce potential effects to condors both inside and outside the captive facility (they will occur at night or during trap-ups). In the event of a wildfire evacuation procedures already established for the project would be used to assure the safety of the birds.

Negligible to minor adverse impacts are possible but will be mitigated in the Adaptive Management Unit. This zone would include the use of prescribed fire, but if a species of special concern were known to inhabit an area within this FMU, fire management activities would be altered to avoid that species. Critical avoidance measures include: not drafting water from creeks or reservoirs, timing burns during low sensitivity times, watching winds to avoid smoke at the facility and commonly used roosts, limiting the use of aircraft to areas not occupied by these species, and the ban on retardant of chemicals for holding the lines.

Mitigations

A resource advisor guide will be developed, which will be utilized by trained park staff to identify sensitive resources (such as sensitive soils, vegetation, T&E animals, and cultural resources) in the park during wildland fire events. During all suppression activities, minimum impact suppression tactics will be incorporated to the greatest extent feasible and appropriate, employing methods least damaging to park resources for the given situation. These are included in Appendix A.

General Avoidance Measures for Listed Species

1. To ensure that implementation of fire management plan actions conforms to findings of this assessment, subsequent five-year plans and individual projects would be subject to NPS project review. Prior to approval, all projects would be submitted through an NPS internal review process wherein an interdisciplinary team would evaluate if the potential effects of the proposed projects were adequately addressed through the FMP NEPA process. Conformance to the conclusions in the FMP EA will be documented for the NEPA record by a Memo to File. If the interdisciplinary team finds that the project has the potential for new environmental effects not addressed in the EA or effects greater than those assessed in the EA, a separate environmental process would be conducted.

2. Known populations of special-status animal species would be monitored to ensure long-term impacts are avoided. GIS maps of population locations will be kept current and available for consultation in case of uncontrolled wildland fire and for planning prescribed burns.

3. Prescribed burns in areas with known populations of Species of Special Concern would be planned to reduce effects to these species. Critical avoidance measures include: not drafting water from creeks or reservoirs, timing burns during low sensitivity times, watching winds to avoid smoke at the facility and commonly used roosts, limiting the use of aircraft to areas not occupied by these species, and the ban on retardant of chemicals for holding the lines. Retardant or other chemicals would not be used for prescribed fire activities.

California Red-legged Frog (RLF)

1. To protect California red-legged frogs, areas to be treated by mechanical means or prescribed fire would have a buffer area of 100 feet from habitat and 300 feet from known occupied habitat. In the bear gulch area, where structures are closer than the required setbacks, a biologist will survey the sites prior to and during activities to ensure no frogs are present. If frogs are found during these surveys these areas will be avoided.
2. For wildland fire control and prescribed fire activities, erosion control measures would be implemented where project actions could leave soils exposed to runoff prior to revegetation. Natural recovery of native vegetation is generally quick and additional treatments are not necessary in most cases in the park. However, in disturbed areas with little potential for immediate native plant recovery, erosion control measures may include covering exposed soils with weed-free chipped material, native duff, or erosion control blankets.

3. Retardant or other chemicals would not be used for prescribed fire activities. During fire suppression, water will be used in lieu of fire retardant whenever possible. If retardant must be used, a non-fugitive dye-free type will be chosen, and bodies of water avoided.

California Condor (CACO)

1. The NPS has provided the California Department of Forestry, the agency responsible for wildfire suppression in the Monument, with maps and a briefing on the CACO reintroduction program. This will foster awareness of CACO-related sensitive areas and issues in the event of a wildfire emergency.
2. The entire park is currently avoided by aircraft during non-emergency fire suppression activities. If a wildfire related emergency arises, CACOs will be evacuated from the release facility via a pre-existing road.
3. If a timely evacuation of the CACOs in the release facility cannot be performed, they will be released from the facility.
4. Fire clearances would be completed around the condor facility to protect the structure during wildfire. These clearances will be conducted in conjunction with the condor crew to reduce potential effects to condors both inside and outside the captive facility, (they will occur at night or during trap-ups).
5. Prescribed burns will be evaluated for potential effects to the CACO in the release facility. . These may include changing the timing, location, smoke effects, aircraft use and methods of burning. If the NPS determines that prescribed burn activities are negatively affecting the CACO, burn activities will be suspended to ensure that there will be no effects to the CACO.

To the extent possible, known populations of special status species would be avoided when locating fire lines, helispots or spike camps during wildfire suppression actions.

Conclusion

Fire management activities from both alternatives would temporarily displace some wildlife species, and increases the possibility of individual mortality of some species. However, there would be long-term beneficial effects as habitat improves from the ecological benefits of a natural fire regime. The proposed activities in either alternative would not likely adversely affect either the federally threatened California red-legged frog or the federally endangered California condor.

The implementation of either of the alternatives would not impair wildlife resources or values in the park.

3.6 WILDERNESS

3.6.1 *Affected Environment*

Pinnacles contains 16,048 acres of Congressionally-designated wilderness. The park's wilderness contains many features characteristic of a Coast Range chaparral vegetation community and the remains of a relic volcano. The Pinnacles wilderness is characterized by

outstanding opportunities for solitude, dark night skies, natural quiet, Class I air, healthy ecosystems, and unconfined recreation.

Pinnacles management of designated wilderness is guided by NPS Management Policies, and the park is in the process of developing a Wilderness Management Plan. NPS Management Policies direct that parks manage wilderness as follows:

> *"All management decisions affecting wilderness must be consistent with a minimum requirement concept. ……When determining minimum requirement, the potential disruption of wilderness character and resources will be considered before, and given significantly more weight than economic efficiency and convenience. If a compromise of wilderness resource or character is unavoidable, only those actions that preserve wilderness character and/or have localized, short-term adverse impacts will be acceptable."*

3.6.2 *Environmental Consequences*

Impacts to wilderness were evaluated qualitatively by examining the letter and spirit of the 1964 Wilderness Act and NPS policies. None of the alternatives will impair areas designated by Congress as Wilderness under the 1964 Wilderness Act.

3.6.2.1 Alternative 1 – No Action

This alternative would have negligible effects on designated Wilderness within the park. Under this Alternative, these designated areas would retain their "wilderness character," would receive no human habitation, and would still appear "to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable" (Section 2(c), Wilderness Act). Fire is a natural force, and thus neither wildland fire use nor occasional prescribed fire are deemed by federal land managers as being inherently incompatible with wilderness character and values; indeed, they are encouraged.

Minimum Impact Suppression Tactics will used in suppression and park staff would follow the Minimum Requirement Process when doing any prescribed burning.

Wildland fire suppression activities conducted in the wilderness area could have minor, short-term effects to wilderness. As these activities will likely be used to protect life and property, they will not be analyzed further. Post-fire rehabilitation would reduce the visual and ecological impacts of large fire suppression activities, as listed in the Minimum Suppression Impact Tactics.

3.6.2.2 Alternative 2 – NPS Preferred Alternative

Effects associated with wildland fire suppression activities and prescribed fire in the designated wilderness areas would be similar to those described in the "No Action" Alternative. These proposed activities should not seriously compromise wilderness values. In fact, the maintenance of natural fire regimes through the use of prescribed fire is consistent with the restoration and

preservation of wilderness values as described in the Wilderness Act, and would have long-term beneficial impacts to the wilderness character. Adverse impacts to designated wilderness would likely be short-term and minor. However, Pinnacles would not conduct prescribed fires within designated Wilderness until it has an approved Wilderness Management Plan.

Fire management activities conducted in the Developed and Adaptive Management Areas would have no direct adverse impacts to the Wilderness Area. Indirect adverse impacts arising from noise generated by wildland fire suppression, prescribed fire, or mechanical treatments would be short-term and negligible.

Wildland fire suppression activities conducted in the wilderness area could have minor, short-term effects to wilderness. As these activities will likely be used to protect life and property, they will not be analyzed further. Post-fire rehabilitation would reduce the visual and ecological impacts of large fire suppression activities, as listed in the Minimum Suppression Impact Tactics.

Mitigations
A resource advisor guide will be developed, which will be utilized by trained park staff to identify sensitive resources (such as sensitive soils, vegetation, wilderness boundaries and cultural resources) in the park during wildland fire events. Temporary effects (*e.g.* noise, visual impacts) on the wilderness would be mitigated through the use of a minimum requirement assessment and Minimum Impact Suppression Tactics.

Conclusion
Neither alternative would have adverse effects to the designated wilderness areas of the park. The use of fire for resource management purposes in both alternatives is consistent with the restoration and preservation of wilderness values as described in the Wilderness Act. In addition, temporary effects (*e.g.* noise, visual impacts) on the wilderness would be mitigated through the use of a minimum requirement assessment and Minimum Impact Suppression Tactics. This mitigation would prevent impairment and preserve wilderness resources or values identified as a goal in the park's planning documents.

3.7 AIR QUALITY

3.7.1 *Affected Environment*

Pinnacles National Monument is one of 48 units of the National Park System designated as a mandatory Class I area for air quality (USEPA, 2002) under the 1977 Clean Air Act Amendments (CAAA). Class I airsheds receive the greatest protection under the CAAA, and the NPS is required to do all it can to ensure that air quality-related values are not adversely affected by air pollutants. To this end, NPS personnel review all permit applications for industrial or other facilities that may contribute to the deterioration of the airshed.

The U.S. Environmental Protection Agency (EPA) promulgated rules in 1980 that included language directed at “reasonably attributable” sources of visibility impairment. With the addition of section 169B in the CAAA of 1990, Congress addressed “regional haze” visibility in the

nation's national parks and wilderness areas. The USEPA has determined that all 156 mandatory Class I areas across the nation demonstrate impaired visibility based on Interagency Monitoring of Protected Visual Environments (IMPROVE) monitoring data (USEPA, 1999).

Of particular concern in the Class I areas is visibility, which is critical to preserving views of outstanding scenery and landscapes for which national parks are famous. Both the scattering and the absorption of light by particles in the atmosphere reduce visibility.

National Park Service fire management activities which result in the discharge of air pollutants (*e.g*. smoke, carbon monoxide, and other pollutants from fires) are subject to, and must comply with, all applicable federal, state, interstate, and local air pollution control requirements, as specified by Section 118 of the Clean Air Act, as amended (42 USO 7418). However, it is not the primary intent of the Clean Air Act to manage the impacts from natural sources of impairment (*e.g*. prescribed and wildland fires). Smoke from these fires is an inevitable by-product.

Fires are not considered point sources of emissions, but tend to be spatially distributed singular events, and the temporary impacts to visibility are recognized, expected, and managed. This may include temporary closures or warnings during the progress of management approved, ecologically essential fires. These fires are termed ecologically essential because fire plays a principal, and in some cases a dominant role, in maintaining the integrity of park resources.

Wildland Fires and Air Quality

The combustion of vegetation produces various chemical compounds. These compounds include nitrogen oxides (NOx), organic compounds, carbon monoxide, and particulate matter or small particles (PM). The pollutants that affect visibility that derive from vegetative burning are PM10, PM25, nitrates, ozone, organic carbon, and elemental carbon. Ozone, which as stated above can form "smog" or haze, is not directly produced by fires, but as a byproduct of the chemical reaction other combustion products (NOx and volatile organic compounds or VOC's). About 90 percent of smoke particles from wildland and prescribed fires are PM10 and about 70 percent are PM2.5 (USEPA, 1998).

One of the main factors determining the degree of air pollution from wildland fires is smoke dispersion. Smoke dispersion is a function of ventilation, which refers to the process within the atmosphere that mixes and transports smoke away from its source. Ventilation is a function of stability, mixing height, and transport winds. Mixing height is defined as the upper limit of a mixed layer in unstable air, in which upward and downward exchange of air occurs. The transport wind is the arithmetic average (speed and direction) of wind in the mixing layer.

Most of the year Pinnacles National Monument has superb "Class I" air quality. The NPS Air Quality Office and EPA established a monitoring station near the east entrance in 1987. An air clarity study (using a transmissometer) has been completed. Particulate (IMPROVE), ozone, dry and wet deposition, and meteorological monitoring continues. Occasionally north winds and a persistent inversion layer draw air pollutants from the Santa Clara Valley into the park. This usually happens in the summer, and in recent years Pinnacles has had as many as four non-

attainment days, when the air quality standard exceeded the federal levels. Despite the occasional hazy days, the air quality at Pinnacles is a defining feature of the park and an important resource. However, an encroaching urban landscape is steadily decreasing the distance between pollution sources and the park, with a resulting trend towards declining air quality (NPS, 1999a).

3.7.2 *Environmental Consequences*

Air quality impacts were qualitatively assessed upon review of National Park Service best management practices to reduce air emissions, State of California prescribed fire permit specifications and requirements, and the extent of proposed prescribed fire activities under all the alternatives.

3.7.2.1 Alternative 1 – No Action

Direct adverse impacts to air quality under this alternative would be short term, and would be minor to moderate. The impacts would be dependent on fuel loading and burn intensity and duration. However, during treatments with prescribed fire and wildland fire use incidents, if NAAQS cannot be met or if significant visibility impairment occurs, ignition would be halted and the burn would be suppressed or allowed to burn out. Prescribed fires ignited to meet resource and protection objectives (i.e., hazard reduction, etc.) and naturally ignited wildland fires managed for resource benefits can collectively reduce years of fuel accumulation. This can result in long-term benefits to regional and local air quality through reduced emissions.

Prior to any prescribed fire, the park would request an open burning permit from the fire suppression agencies and the state of California. The Permit identifies the location and size of the proposed prescribed fire, as well as the fuel types to be burned. Each prescribed fire plan would include smoke trajectory maps and identify smoke-sensitive areas. Fire weather forecasts will be used to correlate ignitions with periods of optimal combustion and smoke dispersal. Mitigation measures would be defined in the plan and arrangements made prior to ignition to ensure that designated resources are available if needed to implement the mitigation measures. Prescribed fire would not be implemented when atmospheric conditions exist that could permit degradation of air quality to a degree that negatively affects public health. (Federal and state air quality standards will be the basis for this decision.) Any smoke situation that arises and threatens any smoke-sensitive areas will entail immediate suppression action.

Smoke generated by management-ignited prescribed fires would be managed to minimize degradation of air quality and visibility. The park's guidelines for smoke from a management-ignited prescribed fire are:

1. All burn plans will have clear objectives and will monitor impacts of smoke on the human and natural environments.

2. Prescribed burns ignited in close proximity to structures will only be ignited during periods of low visitation and if the prevailing winds will carry the smoke away from the structures.

3. Current and predicted weather forecasts will be utilized along with test fires to determine smoke dispersal.

4. Smoke dispersal will be visually monitored on a continuous basis at set intervals during the course of all prescribed burns. If air quality standards are exceeded or smoke creates a hazard or nuisance, especially in or near smoke sensitive areas, the prescribed burn will be extinguished.

5. An Air Quality Monitoring Plan will be developed and implemented for management-ignited prescribed fires larger than 100 acres and expected to last for more than three days.

6. When management-ignited prescribed fires are conducted, notification will include the Bureau of Land Management (BLM); local communities that may experience smoke; park staff; and park visitors.

Under this Alternative, wildland fire suppression would have short-term air quality effects. Normally, smoke effects to the park and surrounding communities would be minimized, as most suppressed wildland fires would be kept relatively small in size and would have mitigating fire suppression actions taken. Some fires that escape initial attack or that must be placed in confinement or under a containment strategy due to difficult terrain, firefighter safety concerns, or lack of resources, would gain size in acreage and consequently could increase quantities of air pollution released into the air. Air pollution increases would normally last only a few days, or until the fire is contained and mop-up begins.

Smoke from suppression fires could also reduce visibility in the park. The extent would depend on the fire size, duration and location. Most small fires would produce some visible smoke in the sub-drainage in which the fire was located, but would have minimum effect on air quality or overall visibility. Larger fires would affect views for a larger area downwind, creating haze that obscured or partially obscured some views. Inversions, which often form in valleys at night, have the effect of trapping smoke until daytime warming improves air circulation. For this reason, the effects to visibility would usually be greatest in the early morning and early evening.

3.7.2.2 Alternative 2 – NPS Preferred Alternative

General impacts to air quality resulting from wildland fire suppression and prescribed fire use would be the same as those described the “No Action” Alternative.

Mitigations
The suppression response selected to manage a wildland fire will consider air quality standards.

All prescribed burns burning outside their defined prescription (*e.g.* change in wind direction, producing excessive smoke) the fire will be immediately suppressed. This should help reduce smoke production.

Conclusion
The proposed Fire Management Plan under either alternative would comply with Federal and State regulations governing air pollution and smoke management and all applicable NPS policies and guidelines related to wildland fire management and ecosystem health. Implementation of either Alternative would not significantly affect air resources because all effects are short-term or produce only minor to moderate amounts of pollutants from wildland fire suppression and prescribed fire use. In addition, mitigation measures used during prescribed fire would also help limit the amount of smoke that could reach sensitive receptors. Implementation of either the "No Action" or "NPS Preferred" Alternative would not impair overall air quality resources or values.

3.8 VISITOR USE AND EXPERIENCE (INCLUDING PARK OPERATIONS)

3.8.1 *Affected Environment*

Visitation in the past 10 years has ranged from 160,000-170,000, with approximately 85% of the visitors entering from the east side of the park. Bear Gulch Visitor Center is located on the east side of the park and Chaparral Ranger Station is on the west side. There are nine housing units in the park that are occupied by staff that are required occupants and their families.

The present trail system is well developed and is centered on the Bear Gulch Visitor Center and Chaparral Ranger Station. The Bear Gulch area of development is also a result of the Civilian Conservation Corps work projects during the 1930s. Currently, there are approximately 32 miles of maintained trails and several miles of cross-country trails. The trail system directs visitors into 10% of the park's resources, leaving 90% virtually unused. Recreation opportunities for park visitors include rock-climbing, caving, bird and wildlife viewing, and hiking. The park also offers visitors both formal and informal interpretive programs, and has an active education program. Staff size ranges from 29 to 60 employees, depending on the season and on special projects.

3.8.2 *Environmental Consequences*

Recreation impacts were qualitatively assessed in light of the intensity and duration of fire management activities as they related to visitor use and experience. Visual resource impacts in this environmental assessment were assessed in terms of scenic integrity, visual wholeness, and unity of the landscape.

3.8.2.1 Alternative 1 (No Action)

During prescribed fires or wildland fire suppression activities visitors to the park, park residents and employees may experience areas of the park being closed, and inconvenienced, due to fire

activity. Short term smoke affects may be seen, but burn prescriptions will be developed to reduce the potential for smoke influence in the developed areas of the park. In addition, immediately after a prescribed fire or suppression event, there would be some short-term reduction in scenic integrity from the presence of fire crews, and smoke. These effects to scenic integrity, however, would be minor because fire management activities would likely involve only short-term presence of vehicles and people. New fires would provide educational opportunities to explain the benefits of this natural process. Interpretation would develop over time as vegetation returns to the burned areas.

Fires rarely occur and so would only occasionally disrupt routine park operations, particularly when developed areas and other values are threatened from wildland fires. In the event of a wildland fire in and around the park, park operations could be affected. These could result from demands relating to traffic control and law enforcement, possible emergency medical services, fire information services, transporting supplies and personnel, closing the park to the public, and follow up maintenance work. However, actively suppressing any wildland fire that may occur would help reduce those effects. With the aid of local fire management personnel, the likelihood of park operations and park facilities being affected long-term under this alternative would be greatly reduced.

3.8.2.2 Alternative 2 (NPS Preferred Alternative)

General impacts to visitor use and experience, park residents, and park operations resulting from wildland fire suppression and prescribed fire use would be the similar to those described in the "No Action" Alternative.

Mechanical treatments in both the Developed and Adaptive Management Areas would be completed during the week, when visitation is low. These would be small and limited in scale so that visitor use and experience of noise from equipment would be minimal. There would be no adverse effects to park operations. Creating defensible space around park structures would have long-term beneficial effects to park operations as greater protection from wildland fires is given to park structures.

Mitigations
Park neighbors, visitors and local residents will be notified of all planned and unplanned fire management events that have the potential to affect them.

Prescribed fires will not be ignited in close proximity to park structures during periods of peak visitation.

Conclusion
Both alternatives would have only short-term minor effects on visitor use and experience resulting from wildland fire suppression activities and prescribed fires (*e.g*. trail closures or limited access to certain areas, presence of work crews in the vista). However, creating defensible space as proposed in Alternative 2 would have long-term, beneficial effects to park operations as greater protection from wildland fires is given to park structures.

3.9 HUMAN HEALTH AND SAFETY

3.9.1 *Affected Environment*

Pinnacles National Monument is completing this fire management plan, which is dedicated to ensuring the safety of the public and park employees. Numerous safety measures are followed to maintain the highest safety standards possible for park employees, residents, visitors and neighbors.

Fire management activities are inherently risky, involving hard physical work in difficult terrain, sometimes under adverse weather conditions. For personnel, the hazards of wildland fire suppression and wildland and prescribed fire use include falling limbs and trees, smoke inhalation, burns, heat stress, use of sharp tools, power tools, risks involved with helicopter flights in mountainous terrain, and cross-country travel across rugged terrain.

For visitors, residents and neighbors, the hazards of fire include the effects of smoke and the risk of fire burning across trails or boundaries. Hazard fuel reduction and prescribed fire are both activities that are pre-planned to minimize risks to human health and safety.

3.9.2 *Environmental Consequences*

Human health and safety impacts were qualitatively assessed through determination of activities, equipment and conditions that could result in injury, literature review of type and extent of injury caused by equipment and conditions.

3.9.2.1 Alternative 1 – No Action

Under this alternative, activities that potentially could have the greatest threat to human health and safety would be those associated with wildland fire suppression and smoke inhalation.

Threats to human health and safety from wildland fire suppression activities could range from minor to major, from small injuries and bruises to accidental death. Factors most likely to adversely impact firefighter health and safety include sprains, strains, cuts, bruises, burns, and smoke inhalation from accidental tripping and falling. In addition, there is the potential for injuries from the use of firefighting equipment, inhalation, falling trees, and, in severe cases, injuries from wildland fires themselves. While each of the crew is trained in the use of firefighting equipment, accidental injuries may occur from time to time. Strict adherence to guidelines concerning firefighter accreditation, and equipment and procedure safety guidelines would minimize accidents. The risks of this work would be mitigated through the use of established safety precautions, Appendix A.

Smoke inhalation can also pose a threat to human health and safety. Smoke from wildland fires is composed of hundreds of chemicals in gaseous, liquid, and solid forms. The chief inhalation hazard appears to be carbon monoxide (CO), aldehydes, respirable particulate matter with a median diameter of 2.5 micrometers (PM2.5), and total suspended particulate (TSP). Adverse health effects of smoke exposure begin with acute, instantaneous eye and respiratory irritation

and shortness of breath, but can develop into headaches, dizziness, and nausea lasting up to several hours. Based on a recent study of firefighter smoke exposure, most smoke exposures were not considered hazardous, but a small percentage routinely exceeded recommended exposure limits for carbon monoxide and respiratory irritants (USDA, 2000).

Adverse impacts of smoke on public health would normally be minor and short-term, as the park is located in a rural area, without large concentrations of people. There is no way to eliminate the impacts of smoke on the local communities, or sensitive receptors (*e.g.* Pinnacles Campground, visitor center) from wildland fires. Park staff would pay close attention to projected fire behavior and weather conditions to determine the potential extended impacts on the public and park residents. Neighbor notification and public education and warnings would be needed during episodes of heavy smoke, so that people who are smoke sensitive can respond appropriately to limit their exposure. Use restrictions applied to areas of prescribed fires would minimize or eliminate public human health and safety concerns resulting from smoke exposure and fire injuries.

The risks of wildland fire burning onto privately-owned lands (within the boundaries of the park or bordering the park) would be mitigated through aggressive fire suppression of all unplanned fires. This would be facilitated by a coordinated interagency response to ignitions. When using prescribed fire, mitigation measures, such as construction of fire lines, the presence of engines, and strict adherence to prescribed fire plans, would minimize the potential for an out-of-prescription burn or escape. Elements of the prescribed fire plan that relate to ensuring a safe burn include such measures as fuel moisture, wind speed, rate of fire spread, and estimated flame lengths. While the potential for a fire escape will always exist when conducting prescribed fires, with the precautions established through the development of a burn plan, that potential is extremely small.

Prior to the ignition of any prescribed fire in the park, all the burn parameters of the existing and approved prescribed fire burn plan must be met to ensure a safe and effective prescribed fire. Prescribed fire is a commonly used tool of the landowners in this area, therefore not an uncommon sight. Visiting public will be informed and educated by park staff whenever prescribed burns take place in the park. In the event of potentially hazardous wildfires within the park, the park superintendent and appropriate staff would coordinate public notification efforts within and outside the park. The extent of public notice would depend on the specific fire situation. In every case, assuring visitor and park staff safety would take priority over any other activities.

3.9.2.2 Alternative 2 – NPS Preferred Alternative

The general impacts to human health & safety under this Alternative would be similar to those under the "No Action" Alternative. There would be negligible adverse impacts from creating defensible space around park structures (*e.g.* small scrapes and bruises, pulled muscles).

Mitigations
Only fully qualified (i.e. meeting NPS qualifications and accepted interagency knowledge, skills and abilities for the assigned fire job), red-carded employees will be assigned fire management

duties (unless assigned as trainees, in which case they will be supervised closely by an individual fully qualified for the given position). A red-card, or fire qualification card is issued to fire rated persons showing their training and their qualifications to fill specified fire suppression and support positions in large fire suppression or incident organization.

No fire management operation will be initiated until all personnel involved have received a safety briefing describing known hazards and mitigating actions, current fire season conditions, and current and predicted fire weather and behavior. Hazards specific to the park include:

- Snags and dead trees with weak root systems
- Stinging/biting insects, ticks, and poisonous snakes
- Dehydration, heat exhaustion and heat stroke
- Steep terrain, uneven surfaces and loose rocks

Park neighbors, visitors and local residents will be notified of all planned and unplanned fire management events that have the potential to affect them.

The park superintendent or designee may, as a safety precaution, temporarily close all or part of the park to the visiting public.

Smoke on roadways will be monitored and traffic control provisions taken to ensure motorist safety during fire events at the park. The following procedures will be taken to compensate for reduced visibility when a paved road is affected by smoke (the incident commander on a particular event will determine visibility levels):

- Posting of "Smoke on Road" signs on either side of the affected area
- Reducing the posted speed limit when visibility is strongly reduced and escorting vehicles as necessary
- Closing the road to traffic when visibility is severely reduced

Conclusion
Under both alternatives, there is the potential for injury to workers from suppressing wildland fires, and carrying out prescribed fire activities, but this would be minimized through the mitigation measures described above.

3.10 CULTURAL RESOURCES

The National Park Service recognizes five types of cultural resources: archeological resources, structures, cultural landscapes, ethnographic resources and museum objects (NPS, 1997).

Archeological resources are the physical evidences of past human activity, including evidences of the effects of that activity on the environment, and are frequently conceptualized and managed as spatially discrete archeological sites.

Structures—constructed works built to serve some human activity—are usually immobile and can be of either prehistoric or historic age. Examples include buildings and monuments, trails, roads, dams, canals, fences and structural ruins. The National Park Service manages structures through the

List of Classified Structures (LCS), an inventory of all prehistoric and historic structures with historical, architectural, or engineering significance.

Broadly defined, *cultural landscapes* are a reflection of human adaptation and use of natural resources and 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. The character of a cultural landscape is defined both by physical materials, such as roads, buildings, walls, and vegetation, and by use reflecting cultural values and traditions.

Ethnographic resources are basic expressions of human culture and the basis for continuity of cultural systems. These encompass both the tangible and the intangible, and include traditional arts and native languages, religious beliefs and subsistence activities.

Finally, *museum objects* include specimens, objects and manuscript and archival collections. These are frequently kept in a museum or designated curation facility.

It is important to note that a given cultural resource may qualify as one or more of these types.

3.10.1 *Affected Environment*

Prehistory, Ethnography and History
No prehistoric chronological sequence has been developed specifically for the Gabilan Range, and most researchers have utilized sequences developed in adjacent areas such as the western San Joaquin Valley and Monterey Bay area (Breschini et al., 1983). Although archeological materials dating from the late Pleistocene through late Holocene have been documented in the greater region, the majority of assemblages from the Pinnacles area appear to post-date the middle Holocene. Rather than indicating a lack of early human presence, however, this may be reflective of limited archeological investigations and geomorphological processes that eroded or buried earlier deposits.

The Monument lies near the historic boundary of the Coastanoan and Salinan tribal groups, although it may have been encompassed within the territory of the Coastanoan *calon* (or Chalon) Tribelet (Breschini et al., 1983). The Chalon numbered perhaps 900 individuals and held the upper San Benito and middle Salinas valleys. The Chalon followed a hunter-gatherer subsistence pattern, relying on wild plant and animal foods, although the abundance and distribution of these resources was influenced by management practices such as periodic burning. The historic settlement pattern included villages surrounded by procurement areas used for the extraction of specific resources. Villages were located in the best habitation areas (flat topography, perennial water), conditions that occur only in the east-central portion of the Monument. The relationship between the Chalon and their Salinan neighbors to the south was apparently poor. East-west trade between the Pacific Coast and San Joaquin Valley was very important, and a potential Native American (and later stock) trail may have traversed the Monument (Oberg, 1978).

The history of the Monument area is summarized in Oberg (1978) and Breschini et al. (1983). Sustained Spanish presence in the region began with the creation of Mission Nuestra Señora Dolorossima de la Soledad in the Salinas Valley southwest of the Monument in 1791. The local Native American population, including the Cholan Tribelet, was soon enticed or forced to join the

mission ranks. While none fell within the present boundary, several Spanish land grants were claimed on the lands surrounding the Monument, the occupants of which emphasized the raising of stock.

Following the acquisition of California by the United States, mining became an important economic driver in the region. Development of the New Idria quicksilver mine (approximately 30 km. east of the Monument) in the 1850s encouraged the rise of a regional transportation network and associated communities of Paicines, Tres Pinos and San Benito. Concurrently, lands within and surrounding the Monument were claimed by homesteaders intent on ranching and other agricultural endeavors to serve local communities and rapidly growing population centers in the San Francisco Bay area. Still, in the mid to late 1800s the region was remote and also attracted a less desirable element. The enigmatic bandit Joaquin Murrietta supposedly maintained a hideout near the Monument in the early 1850s, as did Tiburcio Vasquez, whose illegal activities in the Paicines area in the 1870s are well chronicled.

The spectacular geological features of the Monument gained local attention by the late 1800s. By the early 1890s, a movement arose to preserve the area for future generations, and enlisted the help of Stanford University President, Dr. David Starr Jordan, a prominent biologist. With such an endorsement, Gifford Pinchot, Chief Forester of the United States Forest Service, compelled President Theodore Roosevelt to set aside 16,000 acres as Pinnacles National Forest Reserve in 1906. The concurrent passage of the Antiquities Act, which enabled the President by proclamation to establish national monuments, prompted Pinchot to seek a change in status as it would afford greater protection than a national forest reserve. This was accomplished in 1908, and administrative responsibilities for the 2,080 acre Monument were transferred to the Department of the Interior in 1910, and to the National Park Service upon its creation in 1916. Significantly smaller than the original national forest reserve, early land acquisitions were made to expand the Monument.

Development of Monument infrastructure was slow, with no road access until 1923. In 1933, Civilian Conservation Corps (CCC) Camp Pinnacles was established within the Monument. Over the next 11 years, the CCC undertook the development of the major administrative and visitor facilities. Subsequent developments and improvements have been carried out by the NPS, and the Monument has expanded to 16,265 acres through additional land acquisitions and transfers.

Archeological Resources

Information on the archeological resources within Pinnacles National Monument is summarized in several sources (Olsen et al., 1967; Fritz and Smith, 1978; Haversat and Breschini, 1981). A total of 28 archeological sites has been recorded and numerous others, known to park staff, await formal documentation. Of these, 25 represent Native American occupations, while three are the remnants of homesteads settled in the late Nineteenth or early Twentieth centuries.

Perhaps five percent of the Monument has been inventoried for archeological resources, with most efforts focused on high probability areas close to reliable water sources and gentle topography. Factors influencing survey effectiveness include thick vegetation, rugged terrain and alluvial and colluvial erosion and deposition. Although only one subsurface archeological investigation has been conducted within the Monument (auger testing on a prehistoric archeological site), many

archeological sites are expected to have buried components. An increase in archeological fieldwork at the Monument is anticipated with the initiation of an archeological overview in 2006.

Documented prehistoric resources include both rockshelters and open-air sites, often containing flaked stone artifacts (cryptocrystalline silicates and fine to coarse-grain volcanic and metamorphic rock), bedrock and portable milling tools, and midden constituents (ashy soil, bone, fire-cracked rock). Most of these sites occur near water sources in the Chalone Creek drainage, although this area has also received by far the most extensive survey coverage. Very few temporal data are available, although the majority of the sites probably date to late prehistoric times. The archeological record seems to reflect a rather restricted range of activities (hunting, plant extraction and processing) performed by small groups of individuals. Based on rather meager evidence, three of these sites were nominated to the National Register of Historic Places (NRHP) as the Chalone Creek Archaeological District in 1978. No other prehistoric archeological resources have been formally evaluated. It is anticipated that significant prehistoric archeological resources may be found associated with oak woodlands on newly and soon-to-be acquired lands in the east-central portion of the Monument.

The historical sites include building foundations associated with other landscape modifications (rock walls, pits, fences), and trash scatters containing an array of artifacts (stoves, cans, glass, ceramics, ammunition, farm implements). None of these historical sites has been formally evaluated for National Register significance as archeological resources.

With regard to distribution in the FMUs of the preferred alternative, archeological sites occur primarily in Wilderness (n=23), with a few documented resources in the Developed Areas (n=3) and Adaptive Management (n=2) zones.

Structures and Cultural Landscapes

At total of 42 structures is listed on the LCS for Pinnacles National Monument, 31 of which have been determined eligible for listing on the NRHP (Appendix D). Another nine have not been formally evaluated, while two others were determined to lack eligibility but are still managed as cultural resources. These range from buildings to smaller scale elements such as retaining walls and trails. With the exception of trails and a couple of other features, all Monument structures lie within the Developed Area FMU identified in the preferred alternative.

A large number of significant structures are located within the NRHP-eligible, 797-acre Pinnacles East Entrance District, located in the east-central portion of the Monument. The District encompasses park roads, and the Chalone, Condor Gulch, Bear Gulch, and Moses Springs developed areas, and is associated with early park development between 1923 and 1941 (Provencher et al., 2002).

Many structures in the Monument are constructed of a combination of flammable (weatherboard, wood shakes) and nonflammable (fieldstone, concrete) materials. None of the historic structures contain external or internal sprinkler systems, although hazard fuel removal in the form of prescribed burning and manual thinning has been regularly performed around most developed areas. Due to the presence of flammable structures (weatherboard) and the nature of surrounding fuels

(chaparral), the structures in the Chalone area are generally considered to be at greatest risk from wildland fire.

Five potential cultural landscapes have been identified within the Monument—Chalone CCC Camp, Lyons Homestead, Pinnacles East Entrance District, Pinnacles Ranch, and Pinnacles Trail System. Of these, all but the Pinnacles Ranch have received some level of field documentation and at least preliminary statements of significance. The Chalone CCC Camp and Lyons Homestead have both been recommended to lack National Register eligibility as cultural landscapes due to poor integrity (Fitzgerald and Provencher, 2002; Provencher and Fitzgerald, 2002). The Lyons Homestead has also been documented as an unevaluated historical archeological site. It is anticipated that the Pinnacles Ranch may have significance as a rural historic landscape (S. Provencher, personal communication, 2004).

The Pinnacles Trail System cultural landscape encompasses the recreational trail network and associated features (e.g., comfort stations, Bear Gulch Dam) developed by the CCC and NPS between 1923 and 1941 (Fitzgerald and Provencher, 2001). Although the boundaries of the landscape have not been formally defined, portions fall within all of the FMUs identified in each alternative. The Pinnacles Trail System cultural landscape has been recommended to be eligible for listing on the NRHP.

The Pinnacles East Entrance District cultural landscape conforms with the NRHP-eligible, historic district of the same name described above (Provencher et al., 2002). Importantly, and in addition to the previously identified structural components, vegetation is a contributing characteristic to the Pinnacles East Entrance District. Specifically, in the 1930s and 1940s, the CCC and NPS made plantings of native species around buildings and along roads in order to restore natural conditions (following building and road construction and a 1931 wildfire) and minimize erosion. While distinguishing planted and natural vegetation is difficult today, the heavily vegetated areas surrounding buildings and along roads stand in strong contrast to the open landscape seen in photographs of the 1930s and 1940s (Figure 3-1). Under both alternatives, fuels treatments (mechanical thinning, prescribed burning) could be utilized in proximity to structural elements of the cultural landscape.

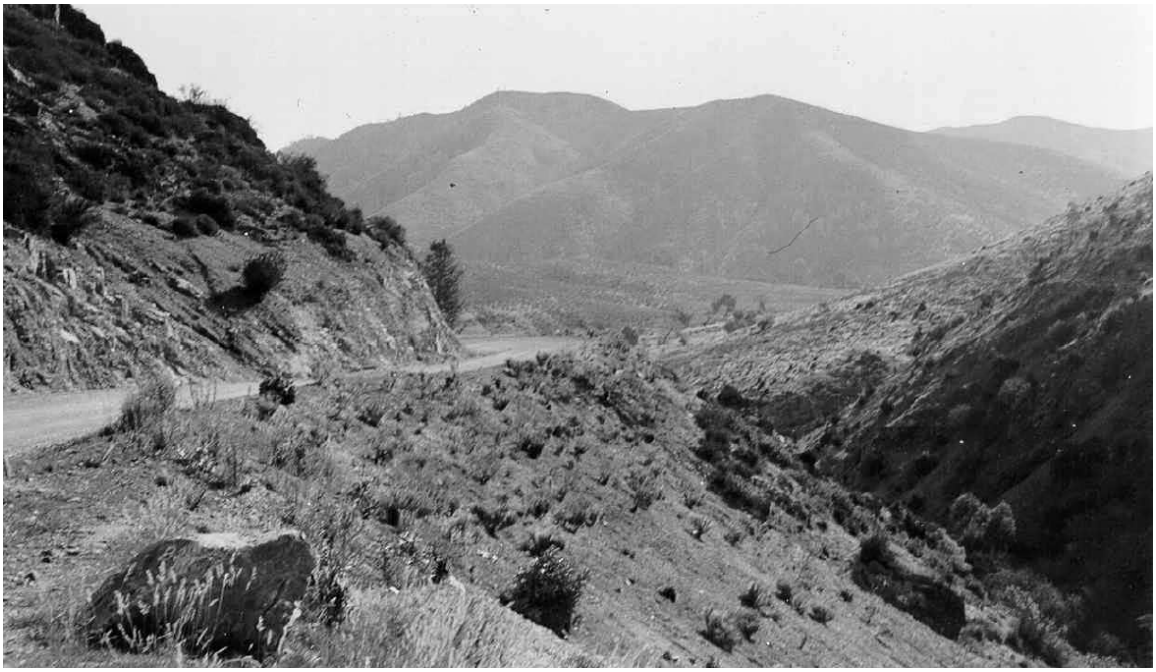

Figure 3-1. Replanted fill slope along Bear Gulch Road, ca. 1936 (Pinnacles National Monument Archives)

Ethnographic Resources
No ethnographic resources have been formally documented within Pinnacles National Monument. Although no Federally-recognized American Indian Tribes have expressed interest in the cultural resources of the Monument, informal consultation has been conducted with non-recognized groups with a perceived linkage to the area. It is highly probable that additional interaction would yield much information on past and contemporary Native American activities and concerns about the Monument.

Museum Objects
More than 7,500 cataloged items are curated in the Monument museum, located in the Bear Gulch developed area. The museum is constructed of fieldstone and weatherboard, with a composition shingle roof. Housed items include archives, photographs, and natural and cultural resource collections. An assessment of the museum identified several deficiencies with regard to Federal curatorial standards presented in 36 CFR 79.

3.10.2 *Environmental Consequences*

NEPA recognizes three types of impacts—direct, indirect, and cumulative. Direct impacts are those that are caused at the same time and place as the action, indirect impacts occur later in time and at a distance, while cumulative impacts are additive. In regard to cultural resources, direct, operational and indirect impact categories are utilized. Direct impacts are those where the fire itself is the cause of the impacts, operational impacts occur as a result of associated operations like line construction

or staging, while indirect impacts are ones where fire and/or associated operations result in changes to local context such that cultural resources will be impacted. As such, direct and operational impacts for cultural resources are the equivalent of direct impacts under NEPA, while indirect impacts on cultural resources correspond to indirect and cumulative impacts.

Under the National Historic Preservation Act (NHPA) and NEPA, historic properties, those listed or determined eligible for listing in the NRHP, are the cultural resources against which assessment of impacts are made. The Monument will consider all cultural resources lacking formal evaluation for NRHP eligibility to be historic properties. It may also be the case, however, that certain cultural resources which do not qualify as historic properties are desirable to protect from potentially adverse impacts.

Direct Impacts

Cultural resources vary in terms of their susceptibility to direct fire effects. Predicting whether a particular cultural resource or its attributes will be impacted by a given fire event, however, can be difficult. (Buenger, 2003) suggested the following variables are important in relation to direct effects on cultural resources:

- Fuel model and load
- Fire behavior
- Peak temperature and duration of heating
- Proximity of resources to fuels
- Class of resource

The primary vegetation communities in the Monument include chaparral (80%), oak woodland with annual grass understory (10%), and minor representation by annual grassland, rock/scree, and riparian communities. Quantitative fuel load data are not available for the Monument, although accumulations are likely greatest in chaparral, particularly of the larger fuel classes. Fire behavior in chaparral is generally characterized by running surface or crown fires, with most heat energy released into the atmosphere. Still, peak ground surface temperatures of 700°C have been measured during chaparral fires, although the duration of such heating is likely quite short (DeBano et al., 1998). Under extreme conditions, chaparral fires can exhibit flame lengths in excess of 10 m. and high potential for long-range spotting.

Grasslands tend to burn as stand-replacing surface fires with low residence time (10-20 seconds), small flame lengths, and low spotting potential. Peak fire temperatures in annual grasslands like those found in the Monument tend to be quite low (<400°C) and exhibit little sustained heating (Buenger, 2003). Higher fire temperatures and longer residence times will occur in locations of heavier fuel accumulations, such as fallen oak trees. There, peak ground surface temperatures might exceed 800°C, and exhibit elevated temperatures for several minutes to over an hour (Buenger, 2003). The same can be expected in heavier fuel accumulations of riparian communities.

Ryan (n.d.) showed that the excellent insulation properties of soil generally restrict peak fire temperatures to within 10 cm. of the ground surface, although deeper heat pulses can occur beneath and adjacent to heavy fuels such as logs, stumps and roots. The implication for archeological resources is that buried materials are typically less vulnerable to direct effects than surface materials. Surface archeological materials in direct contact with the flaming zone are most prone to

impacts, although during severe fire behavior, artifacts or features within several meters of the flaming zone can be affected. The vulnerability of above-ground features like structures is also related to the proximity and nature of fuels. Cohen (1999) suggested that large wildland fire flame fronts (chaparral fires under extreme conditions) will not ignite typical wooden surfaces through direct flame impingement at distances greater than 40 m. Long distance spotting is a threat to structures in areas where surrounding fuels produce large numbers of firebrands.

Materials comprising the cultural resources at Pinnacles National Monument vary with regard to direct fire effects. In the case of common archeological resources, a distinction should be drawn between the direct impacts of fire on the physical integrity of a specimen (e.g., complete or partial destruction) and the loss of associated attribute data. For example, a chert projectile point might not break as a result of exposure to a grass fire, but other potentially important data such as artifact color or protein residues might be compromised. Direct effects to common cultural resource materials are briefly summarized in Appendix E.

Cultural resources at Pinnacles National Monument are distributed within all of the major vegetation communities. For those which data are available, archeological sites are found in chaparral (n=12), oak woodland (n=7), riparian (n=3) and grassland (n=2). Point structures such as buildings occur in riparian (n=8), chaparral (n=4), oak woodland (n=4) and grassland (n=1), whereas linear structures like roads and trails cross-cut multiple vegetation communities.

In summary, cultural resources in Pinnacles National Monument are most vulnerable to direct effects in chaparral vegetation communities, as well as locations with heavier fuel accumulations in grasslands and riparian corridors. Potential for direct impacts are low in areas where grass is the main fuel component. Cultural resources located on or above the ground surface are more susceptible to impacts than subsurface remains.

Operational Impacts

A variety of ground disturbance occurs during the course of many fire management actions. Firelines are commonly constructed in anticipation of prescribed burns, mechanical thinning projects and suppression efforts. The placement of such lines during planned undertakings can generally be done to avoid or minimize resource impacts, whereas line placement is usually far less systematic during wildfire suppression. Likewise, planned actions allow for the use of low impact hand tools. Heavy equipment like bulldozers is routinely employed by CDF during initial attack. While heavy equipment is prohibited within the Monument unless approved by the Superintendent, the likelihood is greater when human safety and property are at stake, and many of the cultural resources in the Monument are located in or near developed areas. Schub (1999) noted an old bulldozer scar within an archeological site following the Stonewall Fire.

Other instances where ground disturbance may occur include pile construction, vehicle and personnel staging, tree felling, mopping up and rehabilitation. Cultural resource impacts related directly or indirectly to ground disturbance include resource displacement and breakage, vegetation loss and soil compaction.

(Andrews, 2004) summarized the effects of ground disturbance related to vegetation treatments on archeological resources. In general, impacts such as artifact displacement and breakage are most

pronounced when exposed to heavy equipment performing intensive vegetation alterations (e.g., chaining, slash piling), whereas strict surface treatments such as mowing were far less impacting. Wettstaed (1993) described heavy damage to an archeological site resulting from mop-up activities, including extensive subsurface disturbance and artifact breakage resulting from tool blows. Emergency measures are often employed after wildfires to stabilize hillslopes, stream channels and roads, implementation of which can involve significant ground disturbance (Robinchaud et al., 2000).

Archeological resources are particularly prone to the effects of ground disturbance. Structural and cultural landscape elements of the Monument might also be impacted by heavy equipment during wildfire suppression (e.g., removal of vegetation, damage to small-scale elements). As noted, the landforms of the Monument are inherently unstable, a factor which could be exacerbated by vegetation removal and soil compaction resulting from the use of heavy equipment or intensive foot traffic.

A large amount of vegetation can be manually or mechanically removed during Fire Management actions. As noted, this can result in ground disturbance. Another aspect of vegetation removal related to cultural resources at the Monument is the loss of significant vegetation associated with cultural landscapes. A wildfire in proximity to significant structures might dictate rapid removal of a substantial amount of vegetation. Likewise, in the absence of proper planning, mechanical thinning and prescribed burn projects could remove significant vegetation surrounding structures and along park roads.

Fire retardants are frequently protected from directed impacts through the application of fire retardants. Physical agents, such as water and dirt, generally provide short-term protection against combustion. Water is sometimes combined with additives that either reduce surface tension (i.e., wetting agents) that allow treated water to penetrate deeply into combustible material, or increase water viscosity (i.e., thickening agents) so that treated water congeals on the surface of fuels. The latter is considered particularly effective, and is often delivered as a gel or slurry. Chemical agents afford long-term protection, and are also generally applied as slurries. Backback pumps, fire hoses, and aircraft are typically used to deliver fire retardants.

Protection of historical and other structures during wildland fire will likely take the form of CDF Type 3 engines and limited Monument suppression resources. While water is the most likely fire retardant to be used, gels are being employed more frequently in wildland-urban interface structure protection, and aircraft have been known to deliver chemical agents on structures under emergency situations. Recent concerns have surfaced over the effects of these substances on structures, which have been summarized by the United States Forest Service, Wildland Fire Chemical Systems (USDA, 2002c):

- Long-term retardants such as wet and dry concentrates can leave white, blue or black residues on contacted surfaces. Fertilizer salts in such retardants are prone to lodge in highly porous wood and attract water, causing wood to swell and contract.
- Wetting agents such as foams will hasten oxidation on metallic surfaces by removing protective coatings, and deeply penetrate woody materials to cause swelling and contracting.

- Water enhancers like gels can absorb tremendous amounts of water, placing strain on unstable structures. Furthermore, gels can be extremely difficult to remove from wooden surfaces, sometimes requiring the use of a pressure washer.

It is uncertain what effects chemical agents would have on the physical and aesthetic properties of the structures in the Monument. The method of retardant delivery can also influence the potential for impacts. For example, thousands of gallons of retardant dropped from an aircraft onto a structure could result in damage.

Looting and vandalism of cultural resources by Fire Management personnel has been documented, mostly commonly during the suppression of wildfires (Traylor, 1990). Generally speaking, archeological resources are the most susceptible to such impacts.

In summary, operational impacts are most likely to occur during the suppression of wildland fires, and almost certainly at the greatest magnitude. It is anticipated potential for impacts will be enhanced around developed areas and main park roads, particularly in association with severe fire behavior.

Indirect Impacts

Indirect impacts can occur when the context in which a cultural resource is found is altered by fire and/or fire management actions. The impacts can occur immediately following an action or later in time. Those indirect impacts of possible concern at the Monument include erosion, tree mortality and carbon contamination, and looting.

It is well documented that erosion is a potentially significant consequence of fire and fire management (DeBano, et al. 1998), which is a concern in that soils of the Monument are unstable. First, fire and/or operations can completely remove vegetation from an area, potentially shortening the time for water saturation in exposed mineral soils and increasing the opportunity for erosion. Second, high fire temperatures at the ground surface can create a water-repellent soil layer (hydrophobic) that inhibits infiltration.

Of these, the first is of greatest concern in the Monument. A significant number of recorded archeological resources reside on footslopes and toeslopes below very steep side slopes. These areas are prone to burial through alluvial and colluvial deposition, while active alluvial erosion occurs in stream channels. Artifacts, apparently dislodged from archeological sites, are frequently found in Monument stream channels following flood events. Schub (1999) recognized potential erosion threats at several archeological sites following the Stonewall Fire.

Tree mortality is common during and following fires, and dead and weakened trees pose threats to above ground and subsurface cultural resources. For example, Hamm and Burge (2003) documented the loss of a historic cabin following a fire that was crushed by a fire-killed snag. Archeological resources can also be dislodged and crushed by falling trees, and burned out stump holes are sources of modern carbon that could yield erroneous radiocarbon determinations and promote destabilization of subsurface remains. While trees are not well represented throughout the entire Monument, Schub (1999) documented stump holes on three sites following the Stonewall Fire.

Looting following fire management actions is a concern primarily associated with archeological resources, as ground visibility improves and artifacts are exposed. A number of recorded archeological sites within the Monument are located in close proximity to roads and recreational trails.

In summary, indirect impacts are most likely to occur in specific geographic locations (e.g., areas prone to erosion) and following wildland fire suppression actions.

3.10.2.1 Alternative 1—No Action

Short and long-term, negligible to moderate, direct, operational and indirect impacts could occur to cultural resources as a result of the proposed actions of this alternative.

Potential for direct impacts will be lessened in proximity to developed areas and areas with noxious, exotic herbaceous vegetation through fuel reduction practices. It is anticipated, given the nature of the cultural resources present and projected fire behavior, prescribed burning in grasslands will result in negligible to minor impacts. If mechanically thinned vegetation were piled and burned on or in close proximity to cultural resources, greater fire intensity could result in more potential for moderate direct impacts. The absence of fuel reduction practices throughout most of the Monument will allow for increased fuel loads, and thus, higher intensity wildland fires with greater potential for moderate impacts.

Operational impacts during planned projects in developed areas and areas of weed eradication are likely to be minimized through the ability to optimally implement such actions as pre-project surveys, fire line and pile placement, selection of minimum impact tools, close supervision of crews, and so on. Impacts in such situations should be negligible to minor. Suppression of wildland fires in these same areas and the balance of the Monument has a greater potential to result in moderate operational impacts, particularly if threats to human safety and developments dictate the use of heavy equipment such as bulldozers and aircraft. Irrespective of threats to safety and infrastructure, large numbers of fire personnel, including engines and handcrews, will be present during extended suppression actions within the Monument, increasing the opportunities for adverse operational impacts.

For the reasons identified with operational impacts above, indirect impacts can be lessened to negligible and minor levels following planned actions in developed areas and areas proposed for weed eradication. Moderate indirect impacts are most likely to occur after wildland fires, with the greatest potential for damage associated with large, high severity fires.

The proposed actions in this alternative can also result in short to long-term beneficial impacts to cultural resources. The reduction of fuels in proximity to developed areas will reduce the possibility of direct impacts to structures from wildland fires, as well as enhancing the effectiveness of structural protection by improving firefighter safety. Archeological resources also will benefit through reduced on-site fuel loads. In coordination with the appropriate technical specialists, mechanical thinning and prescribed burning within the boundaries of identified cultural landscapes can provide a mechanism to restore and/or maintain significant vegetation and views.

3.10.2.2 Alternative 2—(NPS Preferred Action)

Short and long-term, negligible to moderate, direct, operational and indirect impacts could occur to cultural resources as a result of the proposed actions of this alternative.

Potential for direct, operational and indirect impacts to cultural resources from the proposed actions are similar to those described under Alternative 1. However, the potential to implement larger-scale prescribed fire treatments (up to 2,500 ac.) in the absence of sufficient wildland fire in areas beyond developed and weed-infested areas expands the ability to account for resource damage in the pre-implementation phase. For example, unsurveyed areas can be inspected, resources assessed and, if necessary, mitigations implemented, options that are rarely available during wildland fire suppression. Furthermore, the reduction of fuels under conditions favorable to resource protection may also result in lower severity (in treated areas) and smaller fires, which can also lower the potential for moderate impacts to cultural resources.

As with Alternative 1, proposed actions in this alternative also convey potential long and short-term beneficial impacts to cultural resources. Given the opportunity to proactively treat larger areas under Alternative 2, the potential for benefits is likely enhanced.

Mitigations
The object of mitigation with respect to cultural resources is to attain negligible or minor impacts (equivalent of *No Historic Properties Affected* or *No Adverse Affect* determinations). This will be accomplished if the mitigation procedures presented in Appendix F are employed in conjunction with Alternative 2. It was determined that moderate impacts can be less easily mitigated under Alternative 1.

Conclusion
While the potential for moderate impacts to cultural resources exists with both alternatives, Alternative 2 provides the best opportunity to proactively mitigate potential impacts. Given the highly flammable nature of vegetation within the Monument, however, it may never be possible to fully protect a given cultural resource from direct, operational and indirect impacts, and emphasis will be placed on proactively treating fuels and/or thorough documentation around particularly significant and/or vulnerable resources.

3.11 CUMULATIVE EFFECTS

The Council on Environmental Quality (CEQ) regulations, which implement the National Environmental Policy Act of 1969 (42 USC 4321 *et seq*.), require assessment of cumulative impacts in the decision-making process for Federal projects. Cumulative impacts are defined 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" (40 CFR 1508.7).

The cumulative effects analysis for the fire management plan environmental assessment considers the past, present, and reasonably foreseeable future actions on land uses that could add

to (intensify) or offset (compensate for) the effects on the resources and that may be affected by the fire management plan alternatives. Cumulative effects vary by resource and the geographic areas considered here are generally the park and areas adjacent to the park. In some instances, activities may result in both negative and positive effects when considering the short and long-terms.

There are no past or current actions that could potentially add to or offset the effects on the resources and that may be affected by the fire management plan alternatives. There are two foreseeable future actions that could have effects on the proposed actions: the relocation of the west side maintenance facility and visitor contact station, and a potential land acquisition of approximately 2,000 acres.

Both of these foreseeable future actions could be easily incorporated into either of the proposed alternatives, as there would only be a slight increase in acreages in both the developed and wilderness areas. Neither of the proposed alternatives would result in any significant adverse cumulative effects and only minor beneficial cumulative effects (*e.g.* protection of cultural resources from wildland fire, ecological benefits of a natural fire regime), from either of these foreseeable future actions.

Chapter 4 – Consultation and Coordination

4.1 COMPLIANCE REQUIREMENTS

National Park Service (NPS) policy (*Director's Order #18: Wildland Fire Management)* requires that every park unit with burnable vegetation develop a fire management plan (FMP). The FMP serves as a detailed and comprehensive program of action to implement fire management policy principles and goals, consistent with the unit's general management objectives. The park's fire management program, guided by federal policy and the park's resource management objectives, will serve to protect life, property, and natural and cultural resources. The proposal to prepare a fire management plan for Pinnacle National Monument is consistent with the park's management documents and with the Federal environmental laws and agency regulations listed below.

4.1.1 Federal

4.1.1.1 National Environmental Policy Act

The National Environmental Policy Act requires the consideration of the environmental effects of proposed Federal actions. This Environmental Assessment has been prepared in accordance with the National Environmental Policy Act to evaluate the impacts of the project on the human and natural environment and provide an opportunity for the public to review and comment on the project.

4.1.1.2 Consultation with the U.S. Fish and Wildlife Service

Section 7 of the ESA 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. In accordance with the provisions of the Endangered Species Act, the NPS initiated consultation with the US Fish & Wildlife Service.

The U.S. Fish and Wildlife Service has indicated that the proposed project will not likely adversely effect any federally listed threatened or species of special concern.

The NPS initiated informal consultation on threatened and endangered species by contacting the United States Fish & Wildlife Service on September 8, 2004.

4.1.1.3 Consultations with the State Historic Preservation Officer (SHPO)

Section 106 of the National Historic Preservation Act, as amended (36 CFR 800), requires federal agencies to consider the affects of projects they fund, permit, or license on historic properties that are listed or eligible for listing in the NRHP. In accordance with Section 106 of the National Historic Preservation Act, the NPS initiated formal consultation with the State Historic Preservation Officer on March 8, 2005; please see Appendix C for response.

4.2 LIST OF PREPARERS/PERSONS CONSULTED

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Scoping

Details of the scoping process and the issues that arose from it are described in Chapter 1, Section 1.5 – *Scoping Issues and Impact Topics*.

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Glossary

Air Quality-The characteristics of the ambient air (all locations accessible to the general public) as indicated by concentrations of the six air pollutants for which national standards have been established, and by measurement of visibility in mandatory Federal Class I areas.

Appropriate Management Response – Specific actions taken in response to a wildland fire to implement protection and fire use objectives.

Appropriate Management Strategy – A plan or direction selected by an agency administrator to guide wildland fire management actions and meet protection and fire use objectives.

Class I Area - An area set aside under the Clean Air Act (CAA) to receive the most stringent protection from air quality degradation. Mandatory Class I Federal areas are: (1) international parks, (2) national wilderness areas that exceed 5,000 acres in size, (3) national memorial parks that exceed 5,000 acres in size, and (4) national parks that exceed 6,000 acres and were in existence prior to the 1977 CAA Amendments. The extent of a mandatory Class I Federal area includes subsequent changes in boundaries, such as park expansions.

Contain – To surround a fire, and any spot fires there from, with control line as needed, which can reasonably be expected to check the fire's spread under prevailing and predicted conditions.

Confine – To limit fire spread within a predetermined area principally by use of natural and pre-constructed barriers or environmental conditions. Suppression action may be minimal and limited to surveillance or monitoring under appropriate conditions.

Control – To complete a control line around a fire, any spot fires therefrom, and any interior islands to be saved and cool down all hot spots that are immediate threats to the control line.

Criteria air pollutants - A group of common air pollutants regulated by EPA on the basis of criteria (information on health and/or environmental effects of pollution) and for which NAAQS have been established. In general, criteria air pollutants are widely distributed over the country. They are: particulate matter (PM), carbon monoxide (CO), sulfur dioxide (S02), ozone (03), and lead.

Cultural Landscape - A geographic area, including both cultural and natural resources and the wildlife or domestic animals therein, associated with a historic event, activity, or person or exhibiting other cultural or aesthetic values. There are four general kinds of cultural landscapes, not mutually exclusive: historic sites, historic designed landscape, historic vernacular landscape, and ethnographic landscape.

Disputed Fire Management Responsibility – Any wildland fire where responsibility for management is not agreed upon due to lack of agreements or different interpretations, etc.

Disputed fire policy – Differing fire policies between suppression agencies when the fire involves multiple ownership is an example.

Energy Release Component – A number that expresses the rate of heat release (in BTUs / sec) per unit area (in square feet) within the flaming zone of the fire.

Expected Weather Conditions – Weather conditions indicated as common, likely, or highly probable based on current and expected trends and their comparison to historical weather records. These are the most probable weather conditions for this location and time.

Experienced Severe Weather Conditions Weather conditions that occur infrequently, but have been experienced during the period of weather records. For example, rare weather conditions that significantly influence fires may have occurred only once, but their record can be used to establish a baseline for worst case scenario.

Extended Exposure to Unusually Hazardous Line Conditions – Extended burnout or backfire situations, rock slides, cliffs, extremely steep terrain, abnormal fuel situations such as frost-killed foliage**,** etc.

Fire Frequency – The historic return interval of fire in a defined environment.

Fire Management Area (FMA) – A geographic area within a Fire Management Unit that represents a pre-defined ultimate acceptable management area for a fire managed for resource benefits. This pre-define area can constitute a Maximum Manageable Area (MMA)n and is useful for those units having light fuel types conducive to rapid fire spread rates.

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

Fire Management Unit (FMU) – Any land management area definable by objectives, topographic features, access, values to be protected, political boundaries, fuel types, major fire regimes, etc., that sets it apart from the management characteristics of an adjacent unit. FMUs are delineated in Fire Management Plans.

Hazard Fuel - A fuel complex that, by nature, presents a hazard to socio-politico-economic interests when ignited. The hazard fuel condition can be mitigated through hazard fuel reduction.

Haze -An atmospheric aerosol of sufficient concentration to be visible. The particles are too small to see individually, but reduce visual range by scattering light.

Holding Actions – Planned actions required to achieve wildland and prescribed fire management objectives.

Initial Attack – An aggressive suppression consistent with firefighter and public safety and values to be protected.

Intermittent Stream - A stream that flows only at certain times of the year when it receives water from rainfall, surface runoff, or springs.

Management Action Points – (also called "Trigger Points")-Either geographic points on the ground or specific points in time where an escalation or alteration of management actions is necessitated. These points are defined and the management actions taken are clearly described in an approved Wildland Fire Plan (WFIP) or Prescribed Fire Plan. Timely implementation of the actions when the fire reached the action point is generally critical to successful accomplishment of the objectives.

Maximum Manageable Area (MMA) – The firm limits of management capability to accommodate the social, political, and resource impacts of a wildland fire. Once established as part of an approved plan, the general impact area is fixed and not subject to change.

Mitigation Actions – On-the-ground activities that will serve to increase the defensibility of the Maximum Manageable Area, check, direct, or delay the spread of fire, and minimize threats to life, property, and resources. They can include mechanical and physical non-fire tasks, specific fire applications and limited suppression actions. These actions will be used to construct firelines, reduce excessive fuel concentrations, reduce vertical fuel continuity, create fuel breaks or barriers around critical or sensitive sites or resources, create "blacklines" through controlled burnouts, and to limit fire spread and behavior.

National Environmental Policy Act (NEPA) - Establishes procedures that Federal agencies must follow in making decisions on Federal actions that may affect the environment. Procedures include evaluation of environmental effects of proposed actions, and alternatives to proposed actions, involvement of the public and cooperating agencies.

National Ambient Air Quality Standards (NAAQS)- Standards for maximum acceptable concentrations of "criteria" pollutants in the ambient air to protect public health with an adequate margin of safety (primary standard), and to protect public welfare from any known or anticipated adverse effects of such pollutants (e.g., visibility impairment, soiling, materials damage, etc.) in the ambient air (secondary standard).

Ozone - A gas that is a variety of oxygen. Ozone consists of three oxygen atoms stuck together into an ozone molecule. Ozone occurs in nature; it produces the pungent odor smelled near a lightning strike. High concentrations of ozone occur in a layer of the atmosphere -- the stratosphere -- high above the Earth. Stratospheric ozone shields the Earth from harmful rays from the sun, particularly ultraviolet B. Smog's main component is ozone; this ground-level or tropospheric ozone is a product of reactions among chemicals produced by burning coal, gasoline and other fuels, and chemicals found in products including solvents, paints, hair sprays, etc.

Potential for Blow-up Conditions – Any combination of fuels, weather and topography excessively endangering personnel.
Preparedness – Activities that lead to a safe, effective, and cost effective fire management program in support of land and resource management objectives through appropriate planning and coordination. This term replaces pre-suppression.

Pre-existing controversies – These may or may not be fire management related. Any controversy drawing public attention to an area may present unusual problems to the fire overhead and local management.

Prescribed Fire – Any fire ignited by management actions to meet specific objectives. A written, approved prescribed fire plan must exist, and NEPA requirements must be met, prior to ignition.

Prescribed Fire Plan – A plan required for each fire ignited by managers. It must be prepared by qualified personnel and approved by appropriate Agency Administrator prior to implementation.

Prescription – Measurable criteria that guide the selection of appropriate management responses and actions. Prescription criteria may include safety, economic, public health, environmental, geographic, administrative, social or legal considerations.

Scoping - Planning process that solicits "stakeholders" opinions on the value of a park, issues facing a park, and the future of a park. Also used in the NEPA process at the outset of preparing an EA or an EIS to help determine the scope of the study and the major issues that merit investigation and analysis.

Sensitive Receptors - Locations where human population tend to concentrate and where smoke could impact the health of those population or significantly impact visibility that may be detrimental to either health or the enjoyment of scenic qualities of the landscape. These may be residential concentrations in the form of towns or cities, or locations where people tend gather in groups such as parks. Travel routes such as highways may be labeled as sensitive receptor sites where smoke can be a factor in potential motor vehicle accidents. Particular areas along highways or other locations may be more prone to being declared sensitive receptor sites because of topographic and microclimate features.

Smoke Management – Any situation that creates a significant public response, such as smoke in a metropolitan area or visual pollution in high-use scenic areas.

Threatened and Endangered Species – Threat to habitat of such species, or in the case of flora, threat to the species itself.

Wildfire – An unwanted wildland fire.

Wildland - An area where development is generally limited to infrequent roads, railroads, utility corridors, and widely-scattered structures. The land is not cultivated (i.e., the soil is disturbed less frequently than once in 10 years), is not fallow, and is not in the United States Department of Agriculture (USDA) Conservation Reserve Program. The land may be neglected altogether or managed for such purposes as wood or forage production, wildlife, recreation, wetlands or protective plant cover. It may be publicly or privately-owned.

Wildland Fire – Any non-structure fire, other than prescribed fire, that occurs in the wildland. This term encompasses fires previously called both wildfires and prescribed natural fires.

Wildland Fire 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 to a wildland fire. 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 have only a portion of Stage I completed.

Wildland Fire Management Program – The full range of activities and functions necessary for planning, preparedness, emergency suppression operations, and emergency rehabilitation of wildland fires, and prescribed fire operations including non-activity fuels management to reduce risks to public safety and restore and sustain ecosystem health.

Wildland Fire Situation Analysis (WFSA) – A decision-making process that evaluates alternative management strategies against selected safety, environmental, social, economic, political, and resource management objectives.

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

Wildland/Urban Interface - The line, area or zone where structures and other human development meet or intermingle with wildland.

Wildland Fire Use – The management of naturally-ignited wildland fires to accomplish specific, pre-stated resource management objectives in pre-defined geographic areas as outlined in the Fire Management Plan.

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APPENDIX A

MINIMUM IMPACT SUPPRESSION TACTICS (RM-18, CHAPTER 9)

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MINIMUM IMPACT TACTICS GUIDELINES

The change from FIRE CONTROL to FIRE MANAGEMENT has added a new perspective to the role of fire manager and the firefighter. The objective of putting the fire "dead-out" by a certain time has been replaced by the need to make unique decisions with each fire start, to consider the land and resource objectives, and to decide the appropriate management response and tactics which result in minimum costs and resource damage.

Traditional thinking, "the only safe fire is a fire without a trace of smoke" is no longer valid. Fire Management now means managing fire "with time" as opposed to "against time." This change in thinking and way of doing business involves not just the firefighter, but all levels of management as well.

NPS fire management requires the fire manager and firefighter to select management tactics commensurate with the fire's potential or existing behavior, yet leaves minimal environmental impact.

The intent of this guide is to serve as a checklist for the Incident Command and Planning Section Chief, Operations Section Chief, Logistics Section Chief, Division/Group Supervisors, Strike Team/Task Force Leaders, Single Resource Bosses, and firefighters. Accomplishments of minimum impact fire management techniques originates with instructions that are understandable, stated in measurable terms, and communicated both verbally and in writing. Evaluation of these tactics both during and after implementation will further the understanding and achievement of good land stewardship ethics during fire management activities.

AGENCY ADMINISTRATOR/INCIDENT MANAGEMENT TEAM/FIREFIGHTER CONSIDERATIONS FOR MINIMUM IMPACT MANAGEMENT

The following guidelines are for park superintendents, incident management teams and firefighters to consider. Some or all of these items may apply, depending upon the situation.

Consider:

<u>Command and General Staff</u>

1. Evaluate each and every suppression tactic during planning and strategy sessions to see that they meet superintendent's objectives and minimum impact management guidelines.
2. Include agency resource advisor and/or local representative in above session.
3. Discuss minimum impact management techniques with overhead during overhead briefings, to gain full understanding of tactics.
4. Ensure minimum impact management techniques are implemented during line construction as well as other resource disturbing activities.

<u>Planning Section</u>

1. Use resource advisor to evaluate that management tactics are commensurate with land/resource objectives, and incident objectives.
2. Use an assessment team to get a different perspective of the situation.

3. Use additional consultation from "publics" or someone outside the agency, especially if the fire has been or is expected to be burning for an extended period of time.
4. Adjust line production rates to reflect the minimum impact management tactics.
5. Use brush blade for line building--when dozer line is determined necessary tactics.
6. Leave some trees randomly in fireline.
7. Ensure that instructions for minimum impact management techniques are listed in the incident action plan.
8. Detail objectives for extent of mop-up necessary--for instance:
9. "_____ distance within perimeter boundary."
10. If helicopters are involved, use long line remote hook in lieu of helispots to deliver/retrieve gear.
11. Anticipate fire behavior and ensure all instructions can be implemented safely.
12. Consider coyote camps versus fixed campsite in sensitive areas.
13. In extremely sensitive area, consider use of portable facilities (heat/cook units, latrines).

Operations Section

1. Emphasize minimum impact management techniques during each operational period briefing.
2. Explain expectations for instructions listed in incident action plan.
3. Consider showing minimum impact management slide-tape program or video to the crews upon arrival at airport/incident.
4. Consider judicious use of helicopters--consider long lining instead of helispot construction.
5. Use natural openings so far as practical.
6. Consider use of helibucket and water/foam before call for air tanker/retardant.
7. Monitor suppression tactics/conditions.
8. Distribute field guide to appropriate supervisory operations personnel.

Logistics Section

Ensure actions performed around areas other than Incident Base, i.e. dump sites, camps, staging areas, helibases, etc., result in minimum impact upon the environment.

Division/Group Supervisor and Strike Team/Task Force Leader

1. Ensure crew superintendents and single resource bosses understand what is expected.
2. Discuss minimum impact tactics with crew.
3. Ensure dozer and falling bosses understand what is expected.
4. If helicopters are involved, use natural openings as much as possible; minimize cutting only to allow safe operations.
5. Avoid construction of landing areas in high visitor use areas.
6. Monitor suppression tactics/conditions.

Crew Superintendents

1. Ensure/Monitor results expected.
2. Discuss minimum impact management techniques with crew.
3. Provide feedback on implementation of tactics--were they successful in halting fire spread; what revisions are necessary?
4. Look for opportunities to further minimize impact to land and resources during the suppression and mop-up phase

IMPLEMENTATION GUIDELINES

Minimum impact management is an increased emphasis to do the job of suppressing a wildland fire while maintaining a high standard of caring for the land. Actual fire conditions and your good judgement will dictate the actions you take. Consider what is necessary to halt fire spread and ensure it is contained within the fireline or designated perimeter boundary.

Safety

1. Safety is of utmost importance.
2. Constantly review and apply the 18 Situations that Shout Watchout and 10 Standard Fire Orders.
3. Be particularly cautious with:
   a. Burning snags you allow to burn down.
   b. Burning or partially burning live and dead trees.
   c. Unburned fuel between you and the fire.
   d. Identify hazard trees with either an observer flagging and/or glow-sticks.
4. Be constantly aware of the surroundings, of expected fire behavior, and possible fire perimeter one or two days hence.

Fire Lining Phase

1. Select procedures, tools, and equipment that least impact the environment.
2. Give serious consideration to use of water as a firelining tactic (fireline constructed with nozzle pressure, wetlining).
3. In light fuels, consider:
   a. Cold trail line.
   b. Allow fire to burn to natural barrier
   c. Consider burn out and use of "gunny" sack or swatter.
   d. Constantly re-check cold-trailed fireline.
   e. If constructed fireline is necessary, use minimum width and depth to check fire spread.
4. In medium/heavy fuels, consider:
   a. Use of natural barriers and cold trailing.
   b. Cooling with dirt and water, and cold-trailing.
   c. If constructed fireline is necessary, use minimum width and depth to check fire spread.
   d. Minimize bucking to establish fireline; preferably build line around logs.
5. Aerial fuels--brush, trees, and snags:
   a. Adjacent to fireline; limb only enough to prevent additional fire spread.
   b. Inside fireline; remove or limb only those fuels which if ignited would have potential to spread fire outside the fireline.
   c. Brush or small trees that are necessary to cut during fireline construction will be cut flush with the ground.
6. Trees, burned trees, and snags:
   a. MINIMIZE cutting of trees, burned trees, and snags.
   b. Live trees will not be cut; unless determined they will cause fire spread across the fireline or seriously endangers workers. If tree cutting occurs cut stumps flush with the ground.
   c. Scrape around tree bases near fireline if hot and likely to cause fire spread.
   d. Identify hazard trees with either an observer, flagging and/or glow sticks.
7. When using indirect attack:

a. Do not fall snags on the intended unburned side of the constructed fireline, unless they are an obvious safety hazard to crews working in the vicinity.
b. On the intended burnout side of the line, fall only those snags that would reach the fireline should they burn and fall over. Consider alternative means to falling, i.e. fireline explosives, bucket drops.

Mop-up Phase

1. Consider using "hot-spot" detection devices along perimeter (aerial or hand-held).
2. Light fuels:
   a. Cold-trail areas adjacent to unburned fuels.
   b. Do minimal spading; restrict spading to hot areas near fireline only.
3. Medium and heavy fuels:
   a. Cold-trail charred logs near fireline; do minimal scraping or tool scaring.
   b. Minimize bucking of logs to check for hot spots or extinguish fire; preferably roll the logs.
   c. Return logs to original position after checking or ground is cool.
   d. Refrain from making bone-yards; burned/partially burned fuels that were moved would be arranged in natural position as much as possible.
   e. Consider allowing larger logs near the fireline to burnout instead of bucking into manageable lengths. Use lever, etc. to move large logs.
4. Aerial fuels--brush, small trees and limbs; remove or limb only those fuels which if ignited have potential to spread fire outside the fireline.
5. Burning trees and snags:
   a. First consideration is allow burning tree/snag to burn themselves out or down (Ensure adequate safety measures are communicated).
   b. Identify hazard trees with either an observer, flagging, and/or glow-sticks.
   c. If burning trees/snag pose serious threat of spreading firebrands, extinguish fire with water or dirt. FELLING by chainsaw will be last means.
   d. Consider falling by blasting, if available.

Camp Sites and Personal Conduct

1. Use existing campsites if available.
2. If existing campsites are not available, select campsites that are unlikely to be observed by visitors/users.
3. Select impact-resistant sites such as rocky or sandy soil, or opening within heavy timber. Avoid camping in meadows, along streams or lakeshores.
4. Change camp location if ground vegetation in and around the camp shows signs of excessive use.
5. Do minimal disturbances to land in preparing bedding and campfire sites. Do not clear vegetation or do trenching to create bedding sites.
6. Toilet sites should be located in minimum of 200n feet from water sources. Holes should be dug 6-8 inches deep.
7. Select alternate travel routes between camp and fire if trail becomes excessive.
8. Evaluate coyote camps versus fixed campsites in sensitive areas.

Restoration of Fire Suppression Activities

1. Firelines:
   a. Waterbar, as necessary, to prevent erosion, or use wood material to act as sediment dams.

b. Ensure stumps from cut trees/large size brush are cut flush with ground.
c. Camouflage cut stumps, if possible.
d. Any trees or large size brush cut during fireline construction should be scattered to appear natural.

2. Camps:
   a. Restore campsite to natural conditions as much as possible.
   b. Scatter fireplace rocks, charcoal from fire; cover fire ring with soil; blend area with natural cover.
   c. Pack out all garbage and unburnables.
3. General:
   a. Remove all signs of human activity (plastic flagging, small pieces of aluminum foil, litter).
   b. Restore helicopter-landing sites.

Cover, fill in latrine site

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APPENDIX B

MINIMUM TOOL

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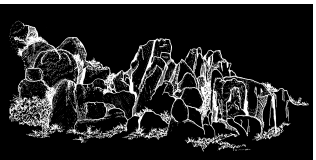
MINIMUM REQUIREMENT ANALYSIS WORKSHEET
PINNACLES NATIONAL MONUMENT



PINN-160 (5/2003)

PROPOSED ACTION: Fire Management Plan DATE: 4/5/2005

LEAD PERSON(S): Tom Leatherman WORK UNIT(S):

PART A: Minimum Requirement *(should the action be done in wilderness)*

1 IS ACTION AN EMERGENCY?

YES → ACT ACCORDING TO APPROVED EMERGENCY MINIMUM TOOL CRITERIA

NO ↓

Answer: ☐ Yes ☒ No
Explain:

2 CAN ACTION BE ACCOMPLISHED OUTSIDE OF WILDERNESS AND STILL ACHIEVE ITS OBJECTIVES?

YES → DO IT THERE

NO ↓

Answer: ☐ Yes ☒ No
Explain:

3 DOES ACTION CONFLICT WITH LEGISLATION, PLANNED WILDERNESS GOALS, OBJECTIVES OR FUTURE DESIRED CONDITIONS?

YES → DO NOT DO IT

NO ↓

Answer: ☐ Yes ☒ No
Explain:

4 IS ACTION PRE-APPROVED BY THE WILDERNESS AND BACKCOUNTRY OR OTHER PARK MANAGEMENT PLAN?

YES → DO ACCORDING TO APPROVED CRITERIA

NO ↓

Answer: ☐ Yes ☒ No
Explain:

5 CAN ACTION BE ACCOMPLISHED THROUGH A LESS INTRUSIVE ACTION THAT SHOULD BE TRIED FIRST? (Visitor Education…)

YES → DO IT

NO → DO PART B

Answer: ☐ Yes ☒ No

Explain:

PART B: Minimum Tool *(how the action should be done in wilderness)*

6 DESCRIBE, IN DETAIL, ALTERNATIVE WAYS TO ACCOMPLISH THE PROPOSED ACTION * (These may include, primitive skill/tool, mechanized/ motorized, and/or combination alternatives) (Use addition pages if necessary)

* Minimum questions to answer for each alternative:
- What is proposed?
- Where will the action take place?
- When will the action take place?
- What design and standards will apply?
- What methods and techniques will be used?
- How long will it take to complete the action?
- Why is it being proposed in this manner?
- What mitigation will take place to minimize action impacts?

GO TO NEXT STEP

7 EVALUATE WHICH ALTERNATIVE WOULD HAVE THE LEAST OVERALL IMPACT ON WILDERNESS RESOURCES, CHARACTER AND VISITOR EXPERIENCE **

** Minimum criteria used to evaluate each alternative:
- Biophysical effects
- Social/Recreational/Experiential effects
- Societal/Political effects
- Health/Safety concerns
- Economical/Timing considerations

GO TO NEXT STEP

8 SELECT AN APPROPRIATE, PREFERRED ALTERNATIVE

IF REQUIRED → **9** ATTACH TO APPROPRIATE PROJECT PROPOSAL/CLEARANCE FORM FOR REVIEW AND APPROVAL/DISAPPROVAL SIGNATURE

Alternative 1: Fire is recognized as a natural part of the parks ecosystem. In this alternative, the no action alternative, management of fire would remain the same. As with the action alternative, in areas designated as wilderness, a Minimum Requirement decision process evaluates the appropriateness of activities or methods and determines the best course of action, or Minimum Tool, that will be used to ensure the preservation of wilderness character. Aside from wildland fire suppression efforts that are protecting life and property, all activities in designated wilderness will be those actions that are essential to preserve or restore wilderness resources and character. Large prescribed burns to restore ecosystem function would not be possible in this alternative and may affect the wilderness character over the long run.

Alternative 2: Fire is recognized as a natural part of the parks ecosystem. This alternative divides the park in three zones, the largest of these being the wilderness zone, which contains all of the areas designated as wilderness. These areas would be managed as in the no action alternative (using the Minimum requirement decision process for activities) with the exception that large prescribed fires would be used to restore ecosystem function in the absence of these events. Again, aside from wildland fire suppression efforts that are protecting life and property, all activities in designated wilderness will be those actions that are essential to preserve or restore wilderness resources and character.

Alternative 3:
List preferred alternative and give justification: Both alternatives recognize fire as a natural part of the park's ecosystem, and would evaluate activities using the minimum requirement decision process. Alternative 2 ,the preferred alternative, would also provide for the greatest protection and enhancement of wilderness values in the park by allowing prescribed fires to restore ecosystem function. Prepared by: Tom Leatherman Date:4/5/2005

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APPENDIX C

CONSULTATIONS WITH THE CALIFORNIA STATE HISTORIC PRESERVATION OFFICER AND THE U.S. FISH AND WILDLIFE SERVICE

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H4217(PINN)

Tuesday, March 08, 2005

Milford Wayne Donaldson
California State Historic Preservation Officer
Office of Historic Preservation
Department of Parks and Recreation
P.O. Box 942896
Sacramento California 94296

Dear Mr. Donaldson:

In accordance with the regulations of the Advisory Council on Historic Preservation, 36 CFR Part 800: Protection of Historic Properties, we request your review and comment on a proposed fire management plan environmental assessment (EA) for Pinnacles National Monument. This EA evaluates two alternatives for management of fire in the park. Both alternatives incorporate a full suppression strategy around historic properties, and limited prescribed burn activities. Additional effort was made to identify the vulnerability of cultural material to direct fire activities (Appendix E) and cultural resource mitigation procedures for fire management activities in the park (Appendix F). The background information in Chapter 1 (pages 1-2 through 1-5) and the discussion of environmental consequences in chapter 3 (pages 3-29 through 3-39) provide detailed information about the cultural resources in the park and potential effects from the two alternatives. A copy of the proposed EA (Enclosure 1), that will be available for public review soon, is attached.

The proposed plan has been reviewed by the regional cultural resource staff in our Oakland office and they concur that the proposed actions are not likely to have an adverse effect on buildings or structures that may be eligible for the National Register of Historic Places.

We appreciate your timely review and comment on the proposed EA. If you have not responded within 30 days of receipt of this letter we will assume that you concur with our findings. Should questions arise in the review, please feel free to contact Tom Leatherman, Chief of Research and Resource Management, Pinnacles National Monument, 831-389-4485 ext. 222.

Sincerely,

Cicely Muldoon
Superintendent

Enclosures
1. Fire Management Plan Environmental Assessment for Pinnacles National Monument

IN REPLY REFER TO:

United States Department of the Interior

NATIONAL PARK SERVICE
Pinnacles National Monument
5000 Highway 146
Paicines, California 95043-9770

L7617

September 8, 2004

Diane Noda
U.S. Fish and Wildlife Service
Ventura Fish and Wildlife Office
2493 Portola Road, Suite B
Ventura, CA 93003

Re: Request for Informal Consultation, Pinnacles National Monument Draft EA

Dear Ms. Noda:

The purpose of this letter is to present the Draft Environmental Assessment (Draft EA) for Pinnacles National Monument's Fire Management Plan (FMP) in sufficient detail to determine to what extent the actions proposed by the preferred alternative (Alternative B) could affect species listed under the Endangered Species Act (ESA) [16 USC 1536]. Our consultation request conforms to the legal requirements of Section 7 of the ESA and the guidance in the Service's Consultation Handbook. Based on the scope, location and nature of proposed FMP actions under all alternatives, the following federally-listed species were evaluated for potential effect in the Draft EA and are the subject of our consultation request.

Common Name	**Species**	**ESA Status**
California condor	*Gymnogyps californianus*	E
California red-legged frog	*Rana aurora draytonii*	T

CONSULTATION TO DATE

In conjunction with the condor recovery project at Pinnacles National Monument, consultation already occurred with regard to the condors and operational issues in the park, including fire. The concurrence letter, dated December 17, 2003, listed the specific strategies for managing fire and condors in the park. These have been incorporated into the actions described in the EA.

NATIONAL ENVIRONMENTAL POLICY ACT (NEPA) ANALYSIS

The NPS prepared a Draft EA in conformance with the National Environmental Policy Act (NEPA) (1970) and NPS Director's Order 12 (2001), which provides the regulatory framework for NPS

NEPA implementation. The Draft EA evaluates the potential for impacts of the FMP on federally-listed species. The determination of the potentially impacted species was derived from the Service's species list, information from the California Department of Fish and Game's Natural Diversity Database, Pinnacles' records, interviews with knowledgeable local scientists, and site surveys conducted.

Based on the extensive information on these two listed species at Pinnacles, the NPS concluded that they could potentially be affected by actions under the preferred alternative.

This analysis has undergone internal technical review by Tom Leatherman, Pinnacles Chief of Research and Resource Management, Jim Petterson, Pinnacles Wildlife Biologist, Paul Johnson, Pinnacles Biological Science Technician (implemented the red-legged frog reintroduction program), and Dr. Sarah Allen, Point Reyes National Seashore Science Advisor.

The Draft EA is currently in an agency review period for 30 days. Following this it will be released to the public for consideration and input for a 30 day period. If no substantive comments are received the NPS will publish a Finding of No Significant Impact (FONSI) that will include project conditions, mitigations or modifications, including any to be recommended by the Service as necessary to avoid or minimize potential effects. We have provided your office with a copy of our Draft EA, which details specific actions associated with this plan. For purposes of this consultation, please refer to Alternative B (Preferred Alternative) in Chapter 2, pages 2-2 through 2-4. Proposed mitigation measures (i.e., avoidance measures) are listed on Appendix 3. Areas with sensitive biological resources are not mapped in the Draft EA, but can be provided upon request.

In accordance with National Park Service policy (Director's Order 12), the Draft EA describes actions under Alternative B as having a negligible, minor, moderate or major effect to clarify the intensity of the potential effect for the reviewing public. We would like to clarify that these descriptors are specific to NEPA as practiced by the NPS per Director's Order 12. The definition of these descriptors in relation to impacts to special status species can be found in Chapter 3, page 3-1. Under the ESA, we propose that the actions proposed for the preferred FMP alternative are "not likely to adversely affect" the species concerned based on the avoidance measures described in both this letter and the Draft EA.

PROJECT DESCRIPTION

The purpose of the FMP is to provide a framework for all fire management activities for Pinnacles National Monument, including suppression of unplanned ignitions, prescribed fire, and mechanical fuels treatments. It is intended to guide the fire management program for approximately the next 10-15 years. The plan would include concise program objectives, details on staffing and equipment, and comprehensive information, guidelines, and protocols relating to the management of unplanned wildfire, prescribed burning, and mechanical fuels treatment.

Fire management is an essential component of NPS operations in Pinnacles. The need for a well-planned and effective fire management program is twofold. First, the project area's ecosystems have evolved through time with the periodic occurrence of fires, both natural and human-ignited, and many components of these systems require the continuation of periodic fire.

At the present time the NPS believes that a relatively natural fire regime has been maintained at Pinnacles. The use of prescribed fire (in situations where fires have been too few), or the exclusion of fire (in cases where fires have been too frequent), may be necessary in the future to maintain fire as a natural process. This will be evaluated annually and actions taken to address these concerns as they arise.

Second, the park's existing FMP (NPS, 1986) needs to be updated. Since the current FMP was published in 1986, the national fire policies have been updated and new guidelines have been issued to park units. In addition, fire research conducted in chaparral areas of California has provided a better understanding of the role of fire in these ecosystems. Whereas before we were more concerned with not having enough fire, there is currently more concern about fires occurring too frequently.

SPECIES WITH POTENTIAL TO BE AFFECTED

In Chapter 3 of the Draft EA (pages 3-12 through 3-17) the species potentially affected by the preferred alternative are described and the consequences of the proposed actions are discussed. These include discussions of the California condor and the California red-legged frog.

PROJECT EFFECT AND AVOIDANCE MEASURES

Fuel reduction actions described in the Draft EA would be implemented in conjunction with avoidance measures designed to minimize or avoid potential environmental effects to listed species. In many cases, specific avoidance measures have been developed for the protection of individual listed species. General Avoidance Measures have also been developed and would be applied to each fire management action with potential to affect a listed species or its habitat.

General Avoidance Measures for Listed Species

1. To ensure that implementation of fire management plan actions conform to findings of this assessment, subsequent five-year plans and individual projects would be subject to NPS project review. Prior to approval, all projects would be submitted through an NPS internal review process wherein an interdisciplinary team would evaluate whether the potential effects of the proposed projects were adequately addressed through the FMP NEPA process. Conformance to the conclusions in the FMP EA will be documented for the NEPA record by a Memo to File. If the interdisciplinary team finds that the project has the potential for new environmental effects not addressed in the EA or effects greater than those assessed in the EA, a separate environmental process would be conducted.

2. Known populations of special-status animal species would be monitored to ensure long-term impacts are avoided. GIS maps of population locations will be kept current and available for consultation in case of uncontrolled wildland fire and for planning prescribed burns.

3. To the extent possible, known populations of special status species would be avoided when locating fire lines, helispots or spike camps during wildfire suppression actions. If new populations are discovered or existing populations expanded, species-specific measures

described below will be applied. Similarly, new information will be incorporated through the individual project review process.

Species-Specific Avoidance Measures for Listed Species

California Red-legged Frog (RLF)

RLF could be affected if fire management activities remove emergent vegetation, remove cover vegetation, remove shading vegetation, remove prey habitat, accelerate runoff and sedimentation into streams or drawdown excess water supplies. Fire management activities could also disrupt RLF breeding behavior. Avoidance measures protect RLF habitat from these effects during fire management activities making adverse effects unlikely. RLF habitat could be affected as a result of wildland fire suppression actions but the application of avoidance measures and the typical small size of wildfires, and proximity of these fires to frog habitat at Pinnacles make adverse effects unlikely. The Draft EA found that potential adverse effects would be short-term and of negligible intensity with the application of the following avoidance measures:

1. To protect RLFs, areas to be treated by mechanical means or prescribed fire would be separated from known habitat by a buffer around the outer edge of riparian vegetation as follows: 30 feet from non-breeding habitat, 100 feet from breeding habitat during the period of February 15 – May 15, and 30 feet from breeding habitat for the remainder of the year.

2. For wildland fire control activities, erosion control measures would be implemented where project actions could leave soils exposed to runoff prior to revegetation. Erosion control measures include covering exposed soils with weed-free chipped material, native duff, erosion control blankets or certified sterile rice straw.

3. During fire suppression, water will be used in lieu of fire retardant whenever possible. If retardant must be used, a non-fugitive dye-free type will be chosen, and bodies of water avoided.

California Condor (CACO)

California condors are being held in a flight pen facility in Pinnacles. This facility itself could potentially be threatened by wildfires. The birds could potentially be affected by smoke during both prescribed fires and wildfires. The Draft EA found that potential adverse effects would be short-term and of negligible intensity with the application of the following avoidance measures:

1. The NPS has provided the California Department of Forestry (CDF), the agency responsible for wildlife suppression in the park with maps and a briefing on the CACO reintroduction program. This will foster awareness of CACO-related sensitive areas and issues in the event of a wildfire emergency. It should also be noted that CDF has indicated that in the event of a wildfire in the vicinity of the flight pen, they could dispatch a helicopter and be at the site within 10 minutes due to the close proximity of their fire station.
2. The entire park is currently avoided by CDF aircraft during non-emergency fire suppression activities. If a wildfire-related emergency arises, CACOs will be captured, crated, and evacuated from the flight pen via a pre-existing road.

3. If timely capture, crating, and evacuation of the CACOs from the flight pen cannot be performed, they will be released by cutting the mesh in the flight pen and herding the birds to freedom.
4. Prescribed burns will be evaluated for potential effects to the CACO in the flight pen. If the NPS determines that prescribed burn activities may affect the CACO, burn activities will be suspended or modified to ensure that there will be no effects to the CACO.

These are the same measures outlined in the previous consultation letter.

SUMMARY CONCLUSION
The following information summarizes the conclusions reached in the Draft EA. More extensive discussion, including the assessment of likely cumulative affect, can be found in the Draft EA.

Prescribed fire and mechanical treatments would offer moderate, long-term benefits on a limited scale to CACOs and RLFs (from fire only) by maintaining fire as part of the natural ecosystem, and reducing non-native plant populations in the park. With avoidance measures in place, prescribed fire or mechanical treatments would not likely have effects on these species. In general, areas with these species would not be treated by actions in the Draft FMP, and known occurrences would be surrounded by an untreated buffer to avoid adverse effects.

Large-scale wildfires could have more serious adverse effects on RLFs during suppression actions, but also by burning riparian vegetation and increasing sedimentation. The MIST strategies described in appendix 3 would be implemented to reduce the effects of the suppression actions. The location of the riparian areas and the small amount of area occupied by this vegetation type in the park (<5%) make it unlikely that much of this habitat would be affected at any one time. Areas which burned recently (1998) continue to have some of the healthiest populations of red-legged frogs, indicating that fire has not adversely affected the habitat there. In addition, the establishment of the population in the reservoir helps with the long-term stability of the population in the park and would aid in recovery of affected areas if necessary, although this is not anticipated.

In conclusion, based on the best professional judgment of our resource management staff, we believe the proposed project is not likely to have adverse effects on the federally-listed species discussed in this letter.

We are seeking your concurrence with our conclusions and determination. If we can provide you with any additional information, please contact Jim Petterson or Tom Leatherman at (831)389-4485 x223 and 222 respectively. Thank you very much for your support and assistance with this management plan.

Sincerely,

Cicely Muldoon
Superintendent

Appendix D

LIST OF CLASSIFIED STRUCTURES, PINNACLES NATIONAL MONUMENT

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List of Classified Structures, Pinnacles National Monument

Structure Name	Location	Material(s)
Retaining Wall	Chief Ranger Residence	Fieldstone, concrete
Stone stairs and walks	Chief Ranger Residence	Fieldstone, concrete
High Peaks Trail	--	Earth, fieldstone
Tunnel Trail	--	Earth, fieldstone
Condor Gulch Trail	--	Earth, fieldstone
Moses Spring Trail	--	Earth, stone
Bear Gulch Caves	Bear Gulch	Fieldstone, concrete
Rock Wash	Chalone Maintenance Area	Fieldstone
Bear Gulch Road	--	Asphalt
Chalone Peak Trail	--	Earth, fieldstone
Visitor Center	Bear Gulch	Fieldstone, shake
Chief Ranger's Residence	Bear Gulch	Fieldstone, asphalt
Ranger Office	Bear Gulch	Fieldstone, weatherboard, asphalt
Conference Room	Bear Gulch	Fieldstone, weatherboard, asphalt
Superintendent's Office	Bear Gulch	Fieldstone, weatherboard, asphalt
Superintendent's Residence	Bear Gulch	Wood
Administration Office	Bear Gulch	Fieldstone, weatherboard, asphalt
Maintenance/Compliance Office	Bear Gulch	Fieldstone, weatherboard, asphalt
Residence "Honeymoon Cabin"	Bear Gulch	Fieldstone, weatherboard, asphalt
Museum/Interpretive Laboratory	Bear Gulch	Fieldstone, weatherboard, asphalt
Bear Gulch Comfort Station	Bear and Condor Gulches	Fieldstone, shake
Moses Spring Comfort Station	Bear Gulch	Fieldstone, shake
One Car Garage	Chief Ranger Residence	Weatherboard, shake
Gas and Oil House	Condor Gulch	Fieldstone, asphalt
Horse Barn	Condor Gulch	Fieldstone, asphalt
Maintenance Shop	Chalone Picnic Area	Weatherboard, asphalt
Truck and Car Garage	Chalone Picnic Area	Weatherboard, asphalt

Tack Room	Chalone Picnic Area	Weatherboard, asphalt
High Peaks Comfort Station	Juniper Canyon/ High Peaks Trail	Fieldstone, shingle
Chalone Peak Comfort Station	North Chalone Peak	Fieldstone, shingle
Bear Gulch Dam	Bear Gulch	Fieldstone, concrete
East Entrance Pylons (2)	East Entrance Station	Fieldstone, concrete
Box Culvert with Wing Walls	Bear Gulch	Fieldstone, concrete
Stone Guard Wall	Bear Gulch Road	Stone
Masonry Culverts and Headwalls	--	Stone, concrete, metal
Storage Shed	Chalone Maintenance Area	Concrete, metal
Stone Tree Wells	Bear Gulch	Stone
Chalone Creek Road	--	Asphalt
Eastern Approach Road	--	Asphalt
Moses Spring Parking Area	Bear Gulch	Asphalt
Condor Gulch Road	--	Asphalt

Appendix E

VULNERABILITY OF COMMON CULTURAL MATERIALS AT PINNACLES NATIONAL MONUMENT TO DIRECT FIRE IMPACTS

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This appendix briefly summarizes the vulnerability of materials comprising the cultural resources of the Native American and historical occupations at Pinnacles National Monument to direct fire impacts.

The contention is often made that many cultural resources, and prehistoric archeological remains in particular, must have been previously exposed to direct fire effects prior to the era of fire suppression and during historical wildfires (many archeological sites within Pinnacles National Monument lie within wildfires). While this may be the case, there are several reasons why direct impacts should be taken into account for managed and unmanaged fires. First, fires within vegetation communities of the Monument often burn in a mosaic fashion, with great variability in terms of spatial patterns and severity. Thus, simply because an archeological site is located within an area that previously burned does not mean it was ultimately exposed to detrimental fire temperatures. Second, with fire suppression, fire severity of today's burns may exceed that of pre-suppression times, with the implication that cultural resources were not previously exposed to excessive fire temperatures. Third, those resources located on or above the ground surface are the most vulnerable to direct impacts. Erosion, deposition, rodent burrowing and other forces constantly act to move cultural materials between surface and subsurface contexts. As such, artifacts or features on the ground surface today may have been buried during a previous fire or fires.

Native American Materials

As noted, archeological materials comprising the Native American occupation of Pinnacles National Monument include flaked stone artifacts (cryptocrystalline silicates and fine to coarse-grain volcanic and metamorphic rock), bedrock and portable milling tools, and midden constituents (ashy soil, bone, fire-cracked rock).

Cryptocrystalline silicates and fine to coarse-grain volcanic and metamorphic rocks are vulnerable to mineral oxidation and thermal fracturing at temperatures exceeding 300-500°C (Buenger 2003; Deal 2001). Prehistoric peoples frequently pre-heated cryptocrystalline silicates to improve flaking qualities, which often resulted in color and minor structural alterations that could be potentially masked by subsequent exposure to fire. Schub (1999) documented minor sooting and spalling on flaked stone artifacts in several sites that burned during the 1998 Stonewall Fire in the Monument. Obsidian, although rarely expected to occur in Monument archeological sites, can be adversely impacted by exposure to relatively low fire temperatures (Loyd et al. 2002).

Bedrock and portable groundstone tools are frequently fashioned from fine to coarse-grain volcanic and metamorphic rocks. Spalling, fracturing and oxidation are expected to occur at temperatures exceeding 300-500°C. Schub (1999) documented fire-induced cracking, exfoliation and mineral oxidation on groundstone at several sites following the Stonewall Fire. Organic residues on flaked and groundstone artifacts can be compromised at temperatures ranging from 100-500°C (Deal 2001).

Midden constituents are variably affected by direct fire impacts. At temperatures above 200°C bone and antler combusts while calcination occurs at 700-1000°C (Buenger 2003). The impacts of

fire on archeobotanical remains such as pollen and carbonized seeds are equivocal, while midden soils may undergo some chemical and physical alterations. Theoretically, the ability to age fire hearths with thermoluminesence dating (TL) could be compromised with exposure to high-intensity, long duration heating (Buenger 2003).

Historical Materials

Historical archeological materials occurring in the Monument include primarily metals, glass, and ceramics. Common metals exhibit a wide range of melting points (Table 1), although damage (e.g., hastened oxidation) can occur when a given metal is exposed to temperatures below its melting point. Soda lime glass, commonly used for containers, windows, pressed and brown-ware and lighting products, has a melting temperature of about 695°C, while lead glasses melt at 380°C (Haecker 2000). Buenger (2003) documented thermal fracturing and spalling in glass exposed to temperatures in excess of 200°C. Potential direct impacts to ceramics are dictated by the characteristics of the paste, glaze, painted decorations, as well as the temperature to which the artifact is exposed (Haecker 2000). Refined (i.e., glazed) earthenwares (e.g., ironstone, hotel wares) will crack and become discolored at even relatively low temperatures. Porcelains have a melting temperature of about 1,550°C, although overglaze paint decorations and makers marks can become discolored and/or eliminated at much lower temperatures.

Table 1. Melting Points of Metal Materials Commonly Found on Historical Archeological Sites

Material	*Temperature (°C)*	*Artifacts*
Aluminum	660	Kitchenwares
Brass (yellow)	932	Cartridge cases, military buttons and insignia
Cast iron	1,350 to 1,400	Kettles, Dutch ovens, wood stoves
Copper	1,082	Kitchenwares, building materials, coins
Gold	1,063	Coins, jewelry
Iron	1,540	Tools, nails, horseshoes, cans, corrugated roofing
Lead	327	Bullets
Nickel	1,455	Plating
Pot metal	300 to 400	Flatware, pots, faucets
Silver	960	Coins, jewelry
Solder (tin)	135 to 177	Patch repair on brass and iron objects
Steel (stainless)	1,427	Eating utensils, kitchenwares
Steel (carbon)	1,516	Heavy machinery parts
Tin	232	Kitchenwares, toys, building materials
White pot metal	300 to 400	Kitchenwares
Zinc	375	Plating for iron objects

Data from Haecker (2000).

The structures in Pinnacles National Monument are constructed primarily of weatherboard, wood, fieldstone and concrete. Wood ignites at various temperatures depending on condition; exposed dimensional lumber typically ignites at 350°C (Haecker 2000). Fieldstone and concrete are vulnerable when exposed to high fire temperatures, with spalling, cracking, breakage and discoloration being the most common impacts. Significant vegetation associated with structures and cultural landscapes could be killed or completely consumed by fire.

References Cited

Buenger, Brent A. 2003. The Impact of Wildland and Prescribed Fire on Archaeological Resources. Doctoral dissertation, University of Kansas.

Deal, Krista. 2001. Fire Effects to Lithic Artifacts. On file at the Western Archeological and Conservation Center, Tucson.

Haecker, Charles. 2000. Effects of Fire on Historic Structures and Historic Artifacts. On file at the National Park Service, Intermountain Support Office, NHL Program, Santa Fe.

Loyd, Janine, Thomas M. Origer, and David A. Fredrickson, eds. 2002. The Effects of Fire and Heat on Obsidian. Online at http://www.obsidianlab.com/book_effects_of_fire.html

Schub, Lisa. 1999. Stonewall Fire Cultural Resources Damage Assessment Project, Pinnacles National Monument. On file at Pinnacles National Monument.

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APPENDIX F

CULTURAL RESOURCES MITIGATION PROCEDURES FOR FIRE MANAGEMENT ACTIONS, PINNACLES NATIONAL MONUMENT

Qualifications

Responsibility for the management of cultural resources at Pinnacles National Monument presently falls to the Chief of Resources Management, in consultation with regional archeologists, historical architects, landscape architects, and anthropologists. Mitigation of impacts to cultural resources from Fire Management actions will be coordinated through the Chief of Resources Management and appropriate subject matter experts, each of whom will meet minimum qualifications put forth in the *Secretary of Interior's Guidelines for Historic Preservation Projects, Professional Qualifications Standards* (1983). In addition, all personnel who perform cultural resources mitigation on active incidents will meet the appropriate requirements of the current *Interagency Standard for Fire and Fire Aviation Operations.*

Prescribed Fire and Mechanical Thinning Projects

The following measures will be employed in conjunction with each prescribed fire and mechanical thinning project carried out within the Monument.

- For each project, Fire Management will provide to Resources Management a burn plan and/or pertinent information specified in Chapter 10 of Reference Manual 18-Wildland Fire Management (e.g., detailed project description, maps, anticipated fire intensity, etc.) from which a determination of potential impacts can be made. Ideally, such information will be provided at least six months prior to project implementation.
- Background research will be conducted in advance of each project to ascertain the presence and significance of previously cultural resources, previous cultural resources inventories, sensitivity of previously unsurveyed areas, vulnerability of recorded resources to proposed actions, etc. Consultation with Native Americans will occur per current Monument policy.
- Additional cultural resources inventory will be conducted as needed prior to each project. All areas of proposed ground disturbance will be inspected. Field methods will be appropriate to local topography, vegetation, ground visibility, and suspected resource form and vulnerability. Inventory will be performed by the appropriate subject matter experts.
- All newly recorded cultural resources will be documented to current professional standards on appropriate state of California (DPR 523) and/or National Park Service forms.
- If it is determined that cultural resources of concern are threatened by a given Fire Management action, steps will be take to mitigate those threats. With regard to *direct impacts*, the following measures, at a minimum, may be employed:

(1) Exclude fire from resource through the use of fire breaks, wet lines, fire retardant, fire shelters, etc.;
(2) Remove on-site fuels to reduce fire temperature and/or duration;
(3) Permanent or temporary removal of vulnerable artifacts; and
(4) Avoid placing burn piles on or adjacent to resources.

Operational impacts will be minimized by:

(1) Avoiding ground disturbance on and upslope from cultural resources;
(2) If ground disturbance will occur on or adjacent to a cultural resource, appropriate tools, equipment and activities will be employed (e.g., hand tools and minimal foot traffic on archeological resources);
(3) Prior to implementation, operations personnel will be educated on cultural resources of the Monument, historic resources preservation laws, and proper protocol; and

(4) If necessary, a cultural resource specialist will monitor operations on and around known or suspected cultural resources.

The following may be used to mitigate *indirect impacts* after prescribed fire and mechanical thinning projects:

(1) Soils on and adjacent to cultural resources will be assessed for erosion potential. If recognized, noninvasive preventative measures such as scattered vegetation cuttings and geofabric matting are preferred, and vulnerable resources will be monitored long-term;

(2) Vulnerable resources will be inspected for the presence of hazard trees. If necessary, these will be removed through consultation with a cultural resource specialist;

(3) Post-project archeological inventory will be conducted if survey conditions improve (e.g., improved ground visibility). Any previously undocumented resources will be recorded to current professional standards;

(4) All previously recorded and newly recorded archeological resources will be evaluated for vulnerability to looting. If potential is recognized, measures will be taken to mitigate impacts, including artifact removal, camouflaging through burial under soil or vegetation, and monitoring.

- For each project or group of projects, a XXX form and accompanying documents will be submitted to the Pacific West Region Section 106 coordinator for review and processed under the terms of the 1995 Programmatic Agreement among the National Park Service, ACHP, and National Conference of State Historic Preservation Officers.
- In the event of unanticipated effects, project activities will cease (if possible) and the California SHPO, Pacific West Region Cultural Resource Division, and other interested parties contacted as needed. The effects will be documented, stabilization and/or mitigation implemented as needed. Project activities will not resume until it can be determined that no additional impacts will occur.
- In the event of discoveries during project activities, all work will cease (if possible) in proximity to the discovery until the nature and vulnerability of the resource can be determined. Any effects will be documented, stabilization and/or mitigation implemented as needed. The California SHPO, Pacific West Region Cultural Resource Division, and other interested parties will be contacted, as needed. Project activities will not resume until it can be determined that no additional impacts will occur.

Suppression and Rehabilitation

The following measures will be employed to minimize impacts to cultural resources from wildfire suppression and rehabilitation actions:

- A resource advisor, identified in a delegation of authority, will be assigned to all incidents within or adjacent to the Monument. The appropriate technical specialists will be ordered to serve as camp and/or line advisors;
- A GIS database containing cultural resources information (e.g., locations of archeological sites, structures, cultural landscapes) will be compiled and provided to Fire Management. This database will be updated as necessary;
- For all incidents exceeding one operational period, the California SHPO, Pacific West Region Cultural Resource Division, and other interested parties will be contacted as needed;
- A resource advisor will participate in the design and implementation of all rehabilitation and stabilization activities that have the potential to result in impacts to cultural resources;

- At the conclusion of each incident, the Chief of Resources Management or designated representative will prepare a report summarizing cultural resource impacts, mitigation and stabilization practices, etc. This report will be submitted to the California SHPO, Pacific West Region Cultural Resource Division, and other interested parties.

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