Draft Fire Management Plan Environmental Impact Statement

Point Reyes National Seashore and North District of Golden Gate National Recreation Area

National Park Service
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Draft Fire Management Plan and Environmental Impact Statement

Point Reyes National Seashore
North District of Golden Gate National Recreation Area
Marin County, California

Lead Agency: National Park Service

Revisions to the current fire management plan for Point Reyes National Seashore (PRNS) and the North District of Golden Gate National Recreation Area (GGNRA) are needed to meet public and firefighter safety, natural and cultural resource management goals, and wildland urban interface objectives of the park. The action alternatives in this Draft Environmental Impact Statement (DEIS) vary in the emphasis they place on seven fire management goals developed by the park. The current program has been effective in fire suppression, but has not fully guided fuel reduction and/or resource management programs.

This Draft Fire Management Plan (FMP) and DEIS describes and analyzes a preferred alternative and two alternatives for future management of the fire program at PRNS and the GGNRA. The alternatives are: Alternative A (No Action) - Continued Fuel Reduction for Public Safety and Limited Resource Enhancement, Alternative B - Expanded Hazardous Fuel Reduction and Additional Natural Resource Enhancement and Alternative C - Increased Natural Resource Enhancement and Expanded Hazardous Fuel Reduction. The National Park Service prefers Alternative C.

Impact topics assessed in the DEIS include natural resources including air, water, soil, vegetation, wetlands and special status species; cultural resources including archeological sites, historic structures, and cultural landscapes; park operations; and the socioeconomic environment.

Public Comment. The comment period on the Draft FMP and DEIS will end 60 days after the notice of availability is published in the Federal Register. Comments should be addressed to:

Superintendent
Point Reyes National Seashore
Point Reyes, California 94956

Or Email to Ann_Nelson@nps.gov

A public workshop will be held to hear public comments and answer questions. Please contact the Point Reyes National Seashore website at http://www.nps.gov/pore/ to receive date, location and, time.

Executive Summary

Draft Fire Management Plan
Environmental Impact Statement

Point Reyes National Seashore
North District of Golden Gate National Recreation Area

Introduction

National Park Service policy requires that each park with vegetation capable of burning prepare a plan to guide a fire management program that is responsive to natural and cultural resource objectives, reduces risks to developed facilities and adjacent communities, and provides for public and staff safety. Point Reyes National Seashore is currently operating under a Fire Management Plan that was written in 1993. The 1993 plan addresses various fire management techniques, including fire suppression, prescribed fire, and limited use of mechanical treatments to reduce forest fuels. The National Park Service proposes to revise Point Reyes National Seashore's Fire Management Plan to expand the use of prescribed fire and mechanical treatment for all lands under its management.

Purpose of and Need for the Fire Management Plan

The purpose of the Fire Management Plan is to provide a framework for all fire management activities for the Seashore and the North District of GGNRA, 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 Point Reyes National Seashore (PRNS) and the Northern District lands of Golden Gate National Recreation Area (GGNRA). The need for a well-planned and effective fire management program is threefold. 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. As is typical of many national parks and other federal lands, however, active and effective fire suppression efforts for the past 150 years have dramatically changed native ecosystems. Ecosystem changes from the lack of fire include forest and shrub encroachment on grasslands, decadence and death of fire-adapted species, and extremely dense forests.

Second, fire suppression has also resulted in a dangerous accumulation of flammable or hazardous fuels - large quantities of dead and downed trees and branches that have accumulated in overly dense forests and shrublands. Because of these high fuel loads, residences and businesses adjacent to the PRNS and GGNRA are at risk from catastrophic wildfire or a smaller fire spreading from adjacent parklands. Also, a structural fire close to the park could spread into federal lands and develop into a wildland fire that damages park resources.

Third, the park's existing Fire Management Plan (NPS, 1993) needs to be updated. Since the current FMP was published in 1993, the national fire policies have been updated and new guidelines have been issued to park units. In addition, the NPS has conducted fire research and now has a better understanding of the role of fire in ecosystem preservation, resulting in a greater capability of the PRNS to conduct an effective fire program. Updating also allows PRNS to focus more heavily on effectively reducing fire risk along the wildland/urban interface, reducing hazardous fuels, and reestablishing fire in park ecosystems where it is safe to do so.

The following goals have been developed for the updated Fire Management Plan for PRNS and the Northern District lands of GGNRA. These goals were generated from internal staff meetings and public external scoping meetings and presentations, from review of NPS Policies, Directors Orders, and other fire-related guidance documents listed below.

Goal 1: Protect firefighters and the public.
Goal 2: Protect private and public property.
Goal 3: Maintain or improve conditions of natural resources and protect these resources from adverse impacts of wildland fire and fire management practices.
Goal 4: Maximize efforts to protect cultural resources from adverse effects of wildland fire and fire management practices.
Goal 5: Foster and maintain effective community and interagency fire management partnerships.
Goal 6: Foster a high degree of understanding of fire and fuels management among park employees, neighbors, and visitors.
Goal 7: Improve knowledge and understanding of fire through research and monitoring and continue to refine fire management practices.

This draft environmental impact statement (EIS) analyzes three alternative approaches to managing fire in the park. The alternative that is selected would be adopted as the new Fire Management Plan to guide the fire management program. Authority to develop a fire management program is derived from the National Park Service Organic Act (16 U.S.C. 1 et seq.), and in delegations of authority found in Part 245 of the Department of the Interior Manual. Director's Order 18 also provides guidance to National Park Service wildland fire management and Director's Order 12 guides National Park Service implementation of the National Environmental Policy Act (NEPA).

Decisions to be Made

The park superintendent would use information provided in this document, along with input received during the 60-day public comment period, to recommend to the Regional Director of the National Park Service the alternative that should be selected. The selected alternative would update the Fire Management Plan and guide fire management in the park over the next 10-15 years.

Planning Issues Considered

Planning issues are the concerns raised by park staff, other government agencies, and the public that were used to develop and evaluate the alternatives in this document. Concerns ranged from the impacts of wildland fire to the impacts associated with management actions taken to manage fire and reduce fuels. Planning issues discussed in this draft document include impacts to the biological environment (vegetation, species of concern, wildlife), the physical environment (soils, water quality, and air quality), the cultural environment (cultural resources - historic and archeological), and the social environment (health and safety, regional economics, visitor experience, and visual resources).

Alternatives

Formulation of Alternatives

An interdisciplinary team of National Park Service staff developed the alternatives described in this document with input from the public and other agencies such as Marin County Fire Department and Inverness Fire Department. The interdisciplinary team was comprised of staff with expertise in fire management, wildlife, biology, botany, ecology, geology, safety, recreation, cultural resources, and public land policy and regulations. Public and interagency input was solicited and received through a scoping process. Three different approaches to managing fire at Point Reyes National Seashore were identified through this process.

Alternative A (No Action) - Continued Fuel Reduction for Public Safety and Limited Resource Enhancement

The National Environmental Policy Act requires that environmental analysis documents include a No Action alternative. The No Action alternative for plan modifications, such as the proposed update of Point Reyes National Seashore's Fire Management Plan, assumes that no new actions would be taken, but that current management would continue. The current fire management program outlined in the 1993 Fire Management Plan uses a limited range of fire management strategies - including prescribed fire, mechanical treatment, and suppression of all wildland fires (including natural ignitions). More specifically, existing practices include mechanical hazardous fuel(s) treatments on approximately 500 acres per year (primarily mowing in grasslands), and prescribed burning on approximately 500 acres per year (primarily for fuel reduction in grasslands and for Scotch and French broom control). The total treatments per year are

approximately 1000 acres. Research projects already in progress on reducing Scotch broom and velvet grass through prescribed burning would continue under this alternative.

Alternative B - Expanded Hazardous Fuel Reduction and Additional Natural Resource Enhancement

Alternative B calls for a substantial increase over present levels in the reduction of hazardous fuels through prescribed burning and mechanical treatments (up to a total of 2,000 acres treated per year). Efforts would be concentrated in areas where unplanned ignitions are most likely to occur (e.g., road corridors) and where the creation of defensible space would be most effective at containing unplanned ignitions and protecting lives and property (e.g., around structures and in strategic areas along the park boundary). Natural resource enhancement would occur as a secondary benefit only. For example, in prescribed burns for fuel reduction along Highway 1, the non-native French broom would be eliminated as a secondary resource benefit.

Alternative C (Preferred Alternative) - Increased Natural Resource Enhancement and Expanded Hazardous Fuel Reduction

Alternative C would result in a marked increase in efforts to enhance natural resources, including increasing the abundance and distribution of T&E species, reducing infestations of invasive, non-native plants, and increasing native plant cover. Prescribed burning also would be used to protect or enhance cultural resources, such as reducing vegetation in areas identified as important historic viewscapes.

Alternative C also would include increase reduction of hazardous fuels in high priority areas (e.g., along road corridors, around structures, and in strategic areas to create fuel breaks). Up to 3,500 acres could be treated per year using prescribed fire and mechanical treatments. Under this alternative, research efforts would be expanded to determine the effects of fire on natural resources of concern (e.g., rare and non-native species) and to determine the effectiveness of various fuels treatments. Research results would be used adaptively to guide the fire management program in maximizing benefits to natural resources, while protecting lives and property.

Actions Common to All Alternatives

Some actions, including the continuation of the Wildland Urban Interface Initiative Program, maintenance of fire roads and trails, vegetation clearing around buildings, suppression of unplanned ignitions, public information and education, and fire monitoring would be carried out under all three alternatives. Also, the park intends to build a fire cache to store equipment regardless of the alternative selected. Each of these activities is described below.

Wildland Urban Interface Initiative Program

In 2001, the NPS began implementing provisions of the federal Wildland Urban Interface (WUI) Initiative program. Over the past three years, the NPS has funded over $2.0 million in fuel reduction projects. This program was designed to facilitate cooperative ventures with park

neighbors (including other federal agencies, states, counties, private landowners, and local fire agencies) to reduce the potential for wildland fire to burn from federal lands to neighboring properties. In the future, the PRNS would continue to request funding for defensible space and fuel reduction projects on private lands adjacent to the park.

Maintenance of Fire Roads and Trails

The Seashore routinely clears vegetation and debris from selected dirt and paved roads (See Table 4) that provide routes for emergency evacuation, access for fire suppression activities or conducting prescribed burns, or that serve as control lines for prescribed fire projects. The minimum requirement for defensible space along roadways is 10 feet on each side. This specification provides only the minimum degree of safety for firefighters and the public and is prescribed by California Public Resource Code (PL-4290 and 4291). An assessment of road conditions is performed in early summer, and then a work plan is developed and vegetation clearing needs is prioritized.

Vegetation Clearing around Buildings

Seashore staff routinely clears hazardous fuels (vegetation and flammable debris) adjacent to structures within the project area. These actions would continue under all alternatives. Structural clearing conforms to or exceeds the requirements of California Public Resource Code (PL-4290 and 4291), which also dictates the parameters for structural safety in surrounding residential communities. This code requires a minimum 30-foot cleared buffer of defensible space around all structures.

Suppression of Unplanned Ignitions

The current policy at the Seashore is to suppress all unplanned ignitions using minimum impact suppression tactics (MIST) to the greatest extent possible. Since 1997, an average of three wildland fires per year have occurred at Point Reyes. All of these were kept less than ten acres in size; most were extinguished at less than one acre. To accomplish this, Point Reyes has had a 10-person Hazard Fuels Crew, 1-2 Engine Technicians, and support from the GGNRA and the Marin County Fire Department. Most of the fires occurred in the Olema Valley, and all but one was human-caused. Under all alternatives, all unplanned ignitions would be suppressed.

Public Information and Education

A comprehensive public information and education program would be included as part of all alternatives. PRNS and GGNRA share a full-time Fire Education Specialist. The program emphasizes fire safety and prevention, fuels management, the role of fire in PRNS's ecosystems, the Seashore's fire history, the cultural use of fire on the landscape, and fire research programs and opportunities.

Fire Monitoring

Monitoring of fire effects has been occurring in prescribed burn units at PRNS since 1991, and would continue under all alternatives. Monitoring of fuels, weather, air quality, and fire behavior for wildland and prescribed fires generally follows protocols outlined in the Fire Monitoring Handbook (NPS 2003a). Under these protocols, photo points and vegetation transect data are used to indicate attainment of objectives. Short and long-term objectives applicable to specific burn areas are stated in individual Prescribed Burn Plans.

Fire Program Cache

Currently, fire control vehicles and equipment are stored at the Hagmaier Complex, located approximately six miles from park headquarters. Storage of fire equipment and vehicles in a more central location of the park would decrease response time and facilitate communication between park staff responsible for fire management. Internal scoping discussions among specialists in different fields at the park indicated the cache should ideally be located near park headquarters for logistic and technical reasons. In addition, the environmental effects of siting the building near existing buildings would be minimal. At this time, the park staff has identified a location adjacent to the roads and trails facility at the Bear Valley administrative area (park headquarters) as its preferred choice for the cache.

Environmental Impacts

The environmental impact section of this EIS evaluates the degree of change a particular resource would experience if an alternative were implemented. The resources analyzed have come from park staff, laws, regulations and policies, and the interested and affected public, including other agencies that were contacted during scoping.

NPS director's orders and management policies require analysis of whether an alternative might impair NPS values or resources, as this would be specifically prohibited by the Organic Act. As chapter 4 of this EIS indicates, none of the alternatives would impair park resources or values.

Chapter 3 of this EIS describes the resources and their current state, where chapter 4 analyzes the extent, duration and intensity of impacts to the resources expected under each alternative. A summary of major conclusions in each of these chapters is presented below.

Soils

Impacts to soils from the actions anticipated in each alternative include changes in soil productivity and chemistry, as well as erosion following the removal of vegetation. The total acreage of all FMUs where some treatment in at least one alternative would take place totals about 22,000 acres. The potential for erosion of soils following a wildland fire is higher in some FMUs than others, and is particularly high in the Wilderness North FMU, where 64% of the acreage is covered with soils that have very high erosion potential. Overall, about 10,000 acres in all FMUs have high erosion potential, 4,000 have very high erosion potential, and the remaining 7,000 have low or moderate potential for erosion.

The impacts of prescribed burning and average wildland fires (no more than about 30 acres per year) under Alternative A to soil from increased erosion would be negligible to minor. Impacts to soils from prescribed burning would be kept to no more than 10% of soils in the watershed through the use of annual burn plans and NPS review. This mitigation measure would keep increases in soil erosion in this same range for Alternatives B and C as well, although as more acres are slated for prescribed burning, the impacts are progressively more likely to be minor rather than negligible.

Moderate to major, short- to long-term, adverse cumulative impacts to the physical, chemical, and biological properties of soils from a very large or catastrophic wildland fire are possible under any of the three alternatives, although the risk of such a fire and its likely extent both decrease as treatment from prescribed fire and mechanical thinning increase. In addition to increased erosion, formation of hydrophobic soils, gullying, channel cutting, slope failure, destruction of organic material, and microorganisms in the soil are likely in the event of this type of fire. Suppression activities could have additional adverse, short to long-term moderate to major impacts from soil compaction, mixing, reduced infiltration, loss of vegetation, and changes in soils that prevent quick revegetation. Actively suppressing wildland fires before they reach sensitive resources could keep impacts from becoming major and adverse.

Some of these same changes in soil productivity and chemistry would occur during prescribed burning or more average wildland fires, but to a much lesser extent. Because impacts would be monitored and kept to no more than 10% of a watershed, they would be negligible to minor for all three alternatives, although as described above for increases in erosion, they would be greater in Alternative C than B, and greater in Alternative B than A. Negligible to minor impacts to soils from compaction or other physical changes from mechanical treatments are also possible under any of the alternatives.

Air Quality

The predominant regional surface winds in the area are from the north-northwest during winter, spring and summer. In the fall, warm easterly winds can break through to the coast while inland conditions remain hot and dry. These winds lower vegetation moistures levels and begin the season during which the coastal region faces its most significant fire threat.

The westerly winds help disperse air pollution from coastal communities, as does vertical mixing, which is most prevalent during hotter weather or the heat of the day. During winter or during temperature inversions, pollutants concentrate nearer the ground.

Only $PM_{2.5}$ (particulates less than 2.5 microns in size) is measured at PRNS, and the park is well below state and federal standards. Other air pollutants are not measured in the study area, so those from the closest rural locations (Santa Rosa and Vallejo) were used as an approximation. Santa Rosa meets the federal average standard for particulates smaller than 10 microns, but is higher than California's more strict standards. It is well below both the maximum one-hour and eight-hour average federal and state standards for carbon monoxide, and the state and federal one-hour (state) and annual average (federal) standards for nitrogen dioxide. Vallejo is also well

below the federal and California maximum 24-hour and annual average standards for sulfur dioxide. Santa Rosa has exceeded the state's maximum 24-hour ozone average of 50 $\mu g/m^3$ twice over the three-year period measured, and the California one-hour ozone standard once.

Particulate emissions generated annually under Alternative A from all FMP actions and wildfires would have a long-term, adverse but negligible effect on regional haze. Ranches and residences along Highway One and ranches east of Estero FMU could experience infrequent short-term, negligible to minor adverse nuisance smoke effects from prescribed burning.

The annual acreage treatment under Alternative A would not appreciably reduce the potential size or severity of a catastrophic wildfire even after a decade of implementation. The cumulative effect on air quality would be short-term, adverse and major at both Year 1 of implementation and at Year 10.

On an annual basis, Alternative B would generate higher levels of particulate emissions than the No Action Alternative A as twice as many acres would be subject to FMP actions each year. Alternative B would produce 2.86 pounds of PM_{10} per acre managed, a long-term, adverse, minor effect on regional haze. This additional contribution would be offset by the long-term opportunity presented by Alternative B to achieve a major, beneficial reduction in the emissions that could result from a catastrophic fire as compared to the cumulative effect under Alternative A. Nuisance smoke would be an infrequent, short-term, adverse, negligible to moderate air quality impact for residents near prescribed burns during the duration of the burn.

On an annual basis, Alternative C would generate the highest levels of particulate emissions compared to the No Action Alternative A and Alternative B. This is a result of the greater number of acres treated each year and the larger number of forested acres, which produce the highest emission levels. Alternative C would produce 5.3 pounds of PM_{10} per acre managed, a long-term, adverse, moderate effect on regional haze. Contributions of PM_{10} to regional haze would be a long-term, adverse, moderate effect for 13 years rather than the indeterminate period under Alternative A.

This additional contribution would be offset by the long-term opportunity presented by Alternative C to achieve a short-term, major, beneficial, cumulative effect on regional haze relative to the emissions produced under the cumulative scenario in Alternative A.

Nuisance smoke would be an infrequent, short-term, adverse, negligible to moderate air quality impact for residents near prescribed burns during the duration of the burn.

Watersheds and Water Quality

Total Suspended Solids (TSS) and nitrogen in park water resources could be exacerbated by fire management activities. The ash generated by fires is rich in nitrogen, a nutrient essential to biotic reproduction. Excess nitrogen in a water body can increase production of algae and aquatic plants. When this excessive biomass decays, it can deplete a water body of oxygen and lead to fish kills. Sampling of several sites in the park showed that current nitrogen levels, measured as

nitrate and nitrite, were below detectable limits (>0.2 mg/l) (Ketcham, 2001) except in one watershed supporting dairying operations.

Mechanical thinning and prescribed burning activities would also result in compaction, removal of vegetation and other changes, which could increase erosion and suspended solids in water resources. Fire changes vegetation, forest floor cover (e.g., ground vegetation, litter or duff) and structure, and soil properties, all of which can alter the movement of water over, or into, the soil. In the first years following a large fire, watershed storage capacity is reduced and net surface runoff is increased as a result of reduced soil cover, lack of soil cover, and/or increased soil hydrophobicity (water repellency). These changes can result in channel extension, upland erosion, and stream channel incision. These changes to hillslope process result in increased discharges, soil erosion, and higher sediment yield, affecting aquatic habitat conditions within the watershed.

The heating of soils from prescribed or wildland fires can lead to development of a water repellent layer at or below the surface of the soil, a condition called hydrophobicity. This layer reduces the infiltration capacity of the soil and increases the potential for overland flow. The higher the fire intensity/severity, the deeper in the soil this layer will form.

Extremely high levels of sediments can also injure fish by clogging their gills, obscuring the presence of food, or covering the gravel surface of spawning areas. All watersheds sampled for the Point Reyes National Seashore Water Quality Monitoring Report (Ketcham, 2001) had TSS that exceeds the recommended standard. Sampled watersheds were Lagunitas Creek, Olema Creek, Drakes Estero, Drakes Bay, and Pacific Drainages. Sediment data was not collected from the Bolinas Drainages, Pine Gulch Creek, or Tomales Bay watersheds.

These types of impacts would occur on a small-scale from prescribed burning in Alternative A, and would be negligible to minor and short-term. Trampling and the removal of vegetation would also result in some negligible to minor, short-term localized increases in erosion. However, in this or any alternative, a large-scale unplanned fire could have adverse, potentially long-term, and major impacts to both water quality and features of watersheds, including riparian zones and watercourses. Fire management activities would reduce the risk of this much larger watershed level impact. In this regard, Alternative A could provide moderate, long-term benefits to watersheds and water quality through prescribed burning, and additional minor to moderate benefits from mechanical thinning.

In the context of the 90,000 acre study area, the impacts to water quality and watershed characteristics of Alternative B or C would be nearly indistinguishable from Alternative A. In other words, over the entire study area, any alternative would provide a combined moderate to major benefit to watersheds through the use of prescribed burning and mechanical treatment in reestablishing natural hydrological processes and reducing fuel loads and potential for catastrophic wildfire. Each could also result in minor, adverse, short-term impacts to water quality from ash or increases in erosion and suspended solids. Because the treated acreage would be larger in Alternative B than Alternatve A, and larger still in Alternative C, benefits and adverse impacts could be quite noticeable on a localized basis.

Vegetation

PRNS owes much of its distinctive character to the assemblage of plants that occur on the Peninsula. The Seashore is home to over 910 plant species, 55 of which are of management concern. Of the 910 plant species, roughly one third are not native to the area. Nine broad vegetative communities are addressed in the EIS. They are Bishop pine forest, Douglas-fir and Coast Redwood forest, Hardwood forest, Monterey pine and Monterey cypress, riparian forests and shrublands, coastal scrub, California coastal prairie, pasture, and coastal dunes.

Vegetation mapping in the park indicates approximately 3,570 acres of Bishop pine forest occurring within Seashore boundaries. In 1995, approximately 35% (1,250 acres) of this acreage was burned in the Vision Fire. Fire plays an important ecological role in maintaining Bishop pine forests, and regeneration in the burned area has been prolific.

The Douglas-fir (*Pseudotsuga menziesii*) and Coast Redwood (*Sequoia sempervirens*) forest is the most common forest type in the project area. Douglas-fir is shade intolerant and requires stand-destroying disturbance (e.g., wildfire, logging, extensive windthrow) to initiate a new cohort of seedlings. Coast Douglas-fir can survive moderately intense fires, particularly if they are more than about 100 years old. However, most cannot withstand a crown fire. This is a risk in the project area, where many stands have substantial ladder fuel accumulations.

Hardwood forest, usually dominated by California bay, coast live oak, or eucalyptus, occupies about 1900 acres of the 21,000+ acres that may be treated through fire management activities in the study area. Eucalyptus is notable because it is an invasive non-native hardwood species in the park, and would be treated in some alternatives by thinning and herbicide application to prevent stump resprouting.

Monterey pine and Monterey cypress are both introduced species in the area. These forests occur over a small portion of the FMUs slated for treatment. Monterey pinecones are only opened when exposed to heat such as fire or high air temperature.

Broad-leaved deciduous trees or shrubs such as red alder, mixed willows, and arroyo willows, dominate riparian forests and shrublands. Red alder quickly invades forest openings, such as those created from fires. Its seeds can travel several hundred yards in wind to recolonize these disturbed areas. Most willows resprout from the root crown or stem base following fire. They are also prolific seeders, and off-site plants are important as a seed source for revegetating burned areas.

Coastal scrub is a highly variable vegetation type including all of the shrublands of the study area and a small amount of chaparral. Coastal scrub is one of the most widespread plant community types in the project area and is present to some degree in all FMUs. Coastal sage and coastal scrub community types are fire-dependent, with prominent shrubs establishing by seed and sprouting. They are flammable vegetation types that may burn again 1 to 2 years after fire if dry conditions exist.

The most extensive cover type at Point Reyes is rolling grassland referred to as California coastal prairie. Although pristine coastal prairie is dominated by perennial bunchgrasses, non-native grasses dominate roughly 80% of the grasslands in the Seashore.

Pasture is distinguished from grazed grasslands and other grazed naturally occurring vegetation types in the project area as it is used to graze cattle or horses, or managed to produce silage for cattle, or used for other agricultural purposes. Very little pasture is in the treatable area identified in this plan/EIS, although the Minimal Management FMU is predominately pasture.

Coastal dunes are dominated by non-native species, in particular European beachgrass and non-native iceplant. Some remnant patches of native plants covering about 25% of this vegetative community exist.

Under the continuation of existing management described in Alternative A, prescribed burning would be used to manage hazardous fuels along primary roads and reduce the areal extent and density of non-native invasive plant species, including Scotch broom, French broom, and Monterey pine. In Alternative B, burning would be conducted in the same FMUs for the same reasons as in Alternative A, although significantly more burning in shrublands and grasslands in Limantour Road and Bolinas Ridge FMUs would occur, primarily to reduce fuels. In addition to more treatment to reduce fuels and increase the ability to fight wildfires, under Alternative C the Seashore would use fire to enhance the condition of natural and cultural resources. Some treatment of natural resources would involve the widespread attempt to eliminate non-native species, but treatment to improve species richness and wildlife habitat also would occur.

The focus of mechanical treatment in Alternative A would be mowing grasslands to reduce hazardous fuels and control Scotch and French broom, as well as cutting Monterey pine to help eliminate this non-native species. This would remain true of Alternatives B and C as well, although progressively more acreage would be treated in each.

In the FMUs treated with prescribed fire, minor, short-term adverse impacts associated with loss of vegetation, and the possibility of introduction or spread of non-native plants could be greater than under other alternatives. However, the burns also would result in minor to moderate beneficial impacts as burns would stimulate growth of many native plant species, and would kill non-native vegetation. Although they would remain moderate, the potential for beneficial effects from Alternative B are greater than Alternative A, and from Alternative C are greater than either of the other alternatives because of the increasing number of acres treated.

Mechanical fuel reduction would have minor short-term adverse impacts on native vegetation through crushing or other physical impacts, but clearing of dense vegetation also would have possibly long-term, minor to moderate benefits on most plant communities as well. The effects would be greater in Alternative C than under Alternative B, and greater under Alternative B than Alternative A because more acres would be treated.

Treatment of non-native Scotch broom with prescribed fire has been successful, and would provide minor to moderate benefits to coastal scrub and grassland habitat in any alternative. Mechanical treatment of Scotch and French broom in coastal scrub, grasslands, and pasture

would provide additional moderate to major benefits to these vegetative communities. Additional minor benefits to coastal scrub from prescribed burning to increase native species richness in Alternatives B and C would occur in Palomarin and Bolinas Ridge FMUs. Prescribed burns and mechanical treatments in grasslands could have beneficial or adverse impacts, as results are highly variable. Monitoring and adaptive management would keep these impacts from becoming more than minor if they are adverse.

Limited prescribed burning in Alternative A may have negligible benefits to hardwood, Douglas fir, or Bishop pine forests from decreasing fuel loads. This would increase to minor or moderate benefits in the other two Alternatives as fuel reduction would take place over a larger area. Additionally, possible major benefits to Douglas-fir forests from the return of natural fire intervals following treatment with prescribed burning are likely in Alternative C. In all alternatives, mechanical fuel reduction could have negligible to minor short-term adverse impacts to hardwood and other forests (including Bishop pine and Douglas-fir forests) from trampling, or from the inadvertent introduction and spread of non-native species.

All alternatives would result in minor to moderate localized benefits to native vegetation from the removal of Monterey pine and cypress trees. For these beneficial impacts to persist, however, follow-up activities must be conducted to remove new recruits that come into the site in years following prescribed burning or mechanical treatments.

Alternatives B and C would offer minor benefits to coastal dune vegetation from the burning of non-native beachgrass.

The risk of a catastrophic wildfire would progressively decrease as more acres are prescribed burned or mechanically treated. In some native vegetation communities, such as Bishop pine or hardwood forest, large-scale fire could be beneficial by eliminating non-native species or otherwise creating conditions favoring the spread of native plants. In others, such as Douglas-fir/coast redwood forests, hot crown fires can destroy the seed source for a large area, making re-establishment difficult. Riparian areas may also experience major adverse impacts from hot fires from the destruction of seed source or root crown. The effect of a wildland fire in coastal scrub or grassland is more complex and less well understood, as some native and non-native species are benefited and some are adversely affected. Overall, the cumulative effects of a large-scale fire and all other activities such as development, historic logging, disease, and the introduction of exotics have and would continue to have major, long-term, adverse impacts on native vegetation communities in the park. Alternative B and C would reduce the risk of such a fire, but should it occur, the impacts on most vegetative communities at the Seashore would be major, long-term and adverse.

Wetlands

Wetlands, including salt and fresh-water wetlands, make up about 300 acres of the study area. Impacts to wetlands associated with fire management activities are similar in many respects to impacts described in the preceding sections on soils and vegetation. Impacts on wetland sites, however, can differ from impacts on upland sites because wetlands usually have a higher level of soil moisture and denser vegetation cover than non-wetlands, which can result in variable

impacts. These conditions can result in wetlands being more vulnerable to impact from certain activities. Wetlands are also considered unique habitats that support a diversity of vegetative and wildlife species, and so are protected by the Clean Water Act and other laws and policies.

No burning or mechanical treatment in wetlands is prescribed in any of the alternatives; however, wetlands do occur in treated areas, and vegetation in some small wetlands may unintentionally be burned. Thinning may be required to reduce the risk of prescribed burns encroaching on wetland vegetation.

In all three alternatives, short-term, minor adverse impacts from unintentional burning of vegetation are possible, especially in dry years. However, some research and observations at the Seashore indicate wetland vegetation can be thinned and stimulated to reproduce by low or moderate intensity fires. These same fires can destroy non-native plants in wetlands. Minor to moderate short to long-term benefits on wetland vegetation from prescribed burning or even small wildfires in an average year are therefore possible in all three alternatives. In both adverse effects and beneficial effects, the degree of impact is greater the more acreage treated; therefore beneficial impacts are more likely to be moderate in Alternative C than A, for example.

Minor short-term adverse impacts on wetlands from unplanned wildfires and their suppression could occur in any alternative. Minor beneficial effects also could occur due to reduction of non-native plant species or stimulation of germination and resprouting in native species.

Mechanical treatments would avoid wetland areas to the greatest extent possible. If such treatments in wetlands were deemed necessary to ensure fire safety around structures or along roads, these treatments would have negligible to minor short-term adverse impacts on vegetation in Alternative A, and minor adverse impacts in Alternatives B or C. Clearing vegetation also could have minor short-term benefits to wetland species if native species establishment is enhanced in all three alternatives.

Cumulative impacts from development in the park may have a minor adverse impact on wetlands. However, a large-scale wildfire could have major, long-term adverse impacts on wetlands from destruction of vegetation and reproductive ability, and invasion by non-native species.

Wildlife

The project area supports a wide diversity of wildlife species, including 28 species of reptiles and amphibians, 65 species of mammals, and breeding habitat for 130 species of birds. Nearly 490 bird species (representing 45% of the avian fauna documented in the United States) have been sighted on land and over near shore waters at Point Reyes. PRNS is also home to innumerable invertebrates. The waters of the Pacific Ocean and Tomales Bay support rich and diverse fisheries.

Generally, the effects of fire on wildlife depend on the characteristics of the fire itself (e.g., intensity, duration, frequency, size, shape, season, and time), the characteristics of the vegetation or habitat burned, and on species characteristics (e.g., size, mobility, habitat preferences). The

types of impacts to wildlife can be direct or indirect. Direct impacts include incineration, asphyxiation, injury, or avoidance of an area, and are most often experienced by less mobile species of life stages. Wildlife may also experience indirect effects. For example, fish or aquatic invertebrates can be harmed by sedimentation in a creek due to post-fire soil erosion, or carnivores can suffer from reductions in the prey base as a result of either direct mortality of the prey, or a reduction in the food and cover resources used by the prey species.

Habitat loss itself is a possible adverse indirect impact from fire, and can be short- or long-term. Changes in vegetation structure and composition, down and dead woody material, and snags that occur after the fire can all affect wildlife. In particular, the loss of down and dead woody material and snags during a prescribed burn remove essential structural habitat components for a variety of wildlife and reduce species diversity (McMahon and deCalesta, 1990). Depending on the season, a fire can also have adverse effects on a species' nesting or reproductive success. The nature of the fire, e.g., its severity, patchiness, whether it is a crown or understory fire, etc., will also determine if ground-dwelling or canopy-dwelling species are affected. If wildland fires burn extensive areas, and/or the fire is of high intensity, entire populations or subpopulations of wildlife can be affected.

Wildlife can also benefit from fire. For instance, populations of species dependent on early seral stage vegetation increase following a burn. Vegetation that grows in the first 2-10 years after a burn often contains higher levels of nitrogen, which can cause increases in some herbivore populations. Decreased cover can improve the growth of forage and can improve predator hunting success. Decreased parasite loads and increased dispersion in some species can diminish disease levels.

Hot, stand replacing fires, which become more likely with increased fuel loads, can type change the vegetation, e.g., a forest that changes to brush/grassland after a severe fire can have a long-term adverse impact on fauna that thrive in dense forest habitat. Patchy low intensity fires do not dramatically alter landscapes and remaining unburned vegetation provides habitat for existing species and impacts are relatively minor and short-term. Evidence suggests that maintenance of a variety of successional stages with patchy fire patterns ensures the highest levels of wildlife biodiversity (Nichols and Menke, 1984). In other words, patchy, low intensity fires can provide long-term benefits to a variety of wildlife.

Under Alternative A, prescribed fire and mechanical treatment would have a beneficial, short or long-term minor impact on wildlife by creating more open habitat and reducing the risk of catastrophic fire. Short-term minor adverse impacts on species using existing down wood or dense forest habitat are also likely.

Some wildfire suppression activities or actions to control prescribed burns, such as spike camps, access or creating fire lines, would have short-term adverse and therefore minor impacts on wildlife. Others, such as creating helispots or the use of helicopter buckets of water or retardants, may have longer lasting impacts. Overall, these activities are not expected to have more than minor impacts to wildlife. This is true of Alternatives B and C as well. Impacts would remain minor, but be greater in Alternative B than A, and greater in Alternative C than B. Actions to

suppress large fires would likely be more intense, with short-term major or long-term moderate adverse impacts to wildlife.

The machinery used for chipping and shredding would be loud, which would have negligible, short-term impacts to some species, such as nesting birds, through disturbance.

In the context of the 90,000 acre study area, the impacts to wildlife of Alternative B would be nearly indistinguishable from Alternative A. Treatment with prescribed fire and through mechanical means would result in short- to long-term, negligible to minor benefits to wildlife from the reestablishment of the natural fire cycle, reduction of fuel loads, and reduction of the potential for catastrophic wildfire. However, compared to No Action, Alternative B could offer moderate short- to long-term benefits to wildlife because twice as many acres would be treated (2000 total; 2% of total acres managed) and noticeable on a local scale. Forest dwelling species would suffer negligible to minor short-term adverse impacts from reductions in habitat overall, and minor to moderate impacts relative to those from the No Action alternative.

In the context of the entire study area, Alternative B would result in negligible to minor short- to long-term benefits to wildlife from creating open habitat using mechanical thinning. Compared to Alternative A, these benefits could be moderate.

Treatment with prescribed fire and through mechanical means in Alternative C would result in short- to long-term, minor to moderate benefits to wildlife from the reestablishment of the natural fire cycle, reduction of fuel loads, and reduction of the potential for catastrophic wildfire. However, compared to No Action, Alternative C could offer moderate to major short- to long-term benefits to wildlife because four times as many acres would be treated (2000 total; 2% of total acres managed) and be noticeable on a local scale. Forest dwelling species would suffer minor to moderate short-term adverse impacts from reductions in habitat overall, and moderate or even major localized impacts relative to those from the No Action Alternative A.

In the context of the entire study area, Alternative C would result in minor short to long-term benefits to wildlife from creating open habitat using mechanical thinning. Compared to Alternative A, these benefits could be moderate.

Special Status Species

The study area supports 47 listed animal species - 14 are federally listed as endangered, 8 as threatened and 24 as “species of concern.” Among these are the endangered Brown Pelican (*Pelecanus occidentalis*) and Myrtle’s silverspot butterfly (*Speyeria zerene myrtleae*). Federally threatened species include Northern Spotted Owl (*Strix occidentalis*), Western Snowy Plover (*Charadrius alexandrinus*), and the California red-legged frog (*Rana aurora draytoni*). Nineteen federally listed plant species (seven of which also are state listed) and an additional 25 listed or proposed for listing by the California Native Plant Society (CNPS) have been documented in the study area.

Federally listed plants in the study area that may be affected by fire management activities include Sonoma alopecurus (*Alopecurus aequalis* var. *sonomensis*), Sonoma spineflower

(*Chorizanthe valida*), Tiburon paintbrush (*Castilleja affinis* ssp. *neglecta*), Marin dwarf flax (*Hesperolinon congestum*), beach layia (*Layia carnosa*), and Tidestrom's lupine (*Lupinus tidestromii* [var. *layneae*]). Others are listed as federal "species of concern." Species of concern are species for which USFWS is collecting additional information to determine if they warrant consideration for future listing. In addition, two species (Point Reyes blennosperma and Mason's ceanothus) are considered rare by the state of California and one species is state endangered (Point Reyes meadowfoam). In Alternative A, although no federal or state listed species have been found in FMUs that would be treated with prescribed fire, one state rare species (Mason's ceanothus) is present in the Bolinas Ridge FMU. Bolinas ceanothus does not occur in any FMUs slated for mechanical treatment in this alternative. Several federal species of concern are present in Estero and Limantour Road FMUs, which would be treated with both prescribed fire and mechanical thinning.

The following threatened or endangered animal species are those listed under the Endangered Species Act and considered likely or possible to experience impacts from fire management activities: Northern spotted owl (*Strix occidentalis caurina*), California red-legged frog (*Rana aurora draytonii*), Central California coho salmon (*Oncorhynchus kisutch*), Central California Coast steelhead (*Oncorhynchus mykiss*), California freshwater shrimp (*Syncaris pacifica*), Myrtle's silverspot butterfly (*Speyeria zerene myrtleae*), and Western snowy plover (*Charadrius alexandrinus nivosus*). The Seashore is also home to many animal federal species of concern and those listed by the state of California. One species in particular from this list, the Point Reyes Mountain Beaver is discussed in more detail because it may be more likely than other species to experience effects from fire or fire management activities.

Fire management activities have potential to affect these species in the ways identified above in the sections on vegetation, wetlands, and wildlife. For example, several of these species occupy stream or riparian habitat, which could be adversely affected by increased sedimentation in creeks and/or persistent turbidity following wildland or prescribed fire. Fire management activities such as cutting fire line or removing vegetation to reduce fuel accumulations could destroy or harm individuals or damage their habitat. Conversely, as is the case for common plants and wildlife, many special-status species in the project area are adapted to periodic fire, and application of fire to the ecosystems could benefit these species by providing a wider diversity of habitats, by stimulating seed germination, or by improving habitat for prey species.

All known individuals of the six federally threatened and endangered plant species in the study area occur in the Minimum Management Fire Management Unit, and so would not be subject to either prescribed burning or mechanical fuels treatments. The populations could be subject to impacts associated with an unplanned wildfire or by fire suppression activities, but this is unlikely because the populations occur in wet sites within pastures routinely grazed by cattle, or in beaches or rocky outcroppings where fire is unlikely to carry.

Plant species that are not federally listed, but are of concern are more likely to benefit from prescribed burning, as the Point Reyes ecosystem evolved in a regime that included frequent low-intensity fires. As progressively more of the study area is treated, natural fire cycles and intensities would be more likely over a wider area. Therefore, benefits from Alternative C would be greater than Alternative B, and Alternative B greater than Alternative A, although all would

be minor on a landscape scale. Some patches or individuals of these species may experience minor, adverse effects from destruction through fire or suppression, or from the inadvertent stimulation of invasive exotic species burning may sometimes have in any of the alternatives.

In Alternative A, prescribed fire and mechanical treatments would offer negligible to minor, long-term benefits on a limited scale to northern spotted owls, red-legged frogs, and California freshwater shrimp (from fire only) by reducing the threat of catastrophic fire and the habitat destruction it would bring. This benefit would increase as the number of acres treated increases, to minor benefits in Alternative B and moderate benefits in Alternative C. Mechanical treatments such as hand thinning and pile burning actions taken to manage prescribed fire would have a minor, short-term adverse effect on owls through possible human disturbance, reduction of prey species, and habitat alteration in unknown roosting and nesting sites, and on frogs from inadvertently killing individuals in all three alternatives. Large-scale wildfires could have more serious adverse effects on owls by eliminating habitat, and on frogs by burning riparian vegetation and increasing sedimentation in any of the alternatives. Both these species experience a positive cumulative impact from the large blocks of conservation land adjacent to the study area.

Under any alternative, adverse impacts to coho salmon and steelhead trout from prescribed burning would be negligible to minor, as riparian vegetation would be retained. Negligible positive benefits from reducing the risk and extent of a catastrophic burn would result from both prescribed burning and mechanical thinning. A large-scale wildfire would have more serious adverse effects by increasing siltation of streams and burning riparian vegetation, which in turn would increase water temperature.

Both Myrtle's silverspot butterfly and snowy plovers occur only in the Minimum Management FMU, and so would not be subject to either prescribed burning or mechanical fuel treatments in any alternative. The populations could be subject to impacts associated with an unplanned wildfire or by fire suppression activities, but this is unlikely because the populations occur within pastures routinely grazed by cattle (silverspot) or beach areas (plover) where fire is unlikely to carry.

The impacts of fire management activities, including those of average size and intensity wildfires in the study area on Point Reyes mountain beaver would be kept to no more than minor and short-term through the use of mitigation measures in any alternative. Large-scale wildfires could have moderate adverse impacts that may be long-term.

There would be some indirect long-term benefits by conducting research and fire education. There are no adverse impacts to special status species by the construction of the fire cache in any alternative.

Cultural Resources

The Seashore has recorded 124 prehistoric, terrestrial sites, and estimates an additional 41 to 123 occur within current park boundaries. These sites are either habitation or use sites that reflect Coast Miwok occupation or resource processing sites. Another 92 historic terrestrial

archeological sites have been recorded, and it is estimated that another 5 to 37 sites are likely to exist within the boundaries of PRNS. These sites typically reflect historic occupations and use of the peninsula; first by homesteaders and dairy ranch communities, and later by government lighthouse and lifesaving personnel and private radio telecommunications companies. Park cultural resource staff has also counted 9 known and recorded terrestrial archeological sites that contain both prehistoric and historic components (not necessarily related to each other). They estimate another 5 to 14 such sites within park boundaries exist but have not yet been identified. PRNS also manages 39 cultural landscapes; 23 are within the boundaries of Point Reyes National Seashore and 16 are within the North District of GGNRA. The landscapes primarily reflect the maritime, ranching, communications, and military history of the park.

The intensity of a fire and susceptibility of resources to heat is one factor that ultimately determines the degree of damage from the direct effect of fire. In general, the longer a cultural resource is exposed to heat, the greater the likelihood of damage. Fire can result in the complete elimination of an artifact or feature (e.g., through consumption) or can alter attributes of an artifact or feature such that important research (e.g., obsidian hydration rinds, residues on pottery, bone burning) is hindered, or traditional (e.g., Native American spiritual sites) or other values are impacted.

The behavior of a fire (ground, surface, and crown) and proximity to a cultural resource are also important. While running surface fires and crown fires reach extreme temperatures (500 to 1500° C) and have high energy release rates, relatively little of that heat is directed towards the surface of the ground. Conversely, ground fires can result in long duration heating (400 to 700° C) within the upper 15 cm. of the soil profile. Ground or creeping active surface fires are usually associated with prescribed burns, whereas running surface and crown fires occur primarily during wildfires. Very generally, cultural resources located above the ground surface (e.g., rock imagery panels, historical structures) are most vulnerable to direct fire effects during crown and active surface fires, while ground and creeping surface fires threaten those found at or just below the ground surface (e.g., archeological sites). Because of this, the chances of adversely affecting a high percentage of cultural resources found exclusively on or near the ground surface are often greater. This is significant because cultural resources generally considered to have high data potential, such as Native American villages with subsurface components, may actually have a far lower percentage of artifact classes or attributes exposed to direct fire effects than a lithic scatter, often considered to have low data potential that is restricted to the ground surface.

Direct effects of fire management actions on cultural resources can also be beneficial, as mechanical thinning or reduction of fuels around important cultural resources can result in their preservation should a wildfire occur in the same area.

Impacts can also result from fire management operations, including mechanical thinning and fire suppression. These effects would generally be restricted to the displacement, breakage, and/or destruction and looting of cultural resources. Except in rare situations, operational effects are likely to be most pronounced on cultural resources found on and near the ground surface. Operational effects would be most likely to occur, and at the greatest intensity, during wildfires. This is due primarily to the fact that such actions are often carried out with little or no pre-planning and without consultation or supervision by a cultural resource specialist.

All alternatives would result in moderate short-term benefits to historic buildings by reducing fuels around these structures, both through prescribed burns and mechanical treatment. Benefits would remain moderate but be greater in Alternative C than Alternative B, and in Alternative B than Alternative A.

Mitigation measures would keep adverse impacts to archeological resources from pre-treatment prescribed burns, or mechanical thinning activities from becoming more than short-term and minor in Alternatives A and B. The potential for these impacts to archeological resources is moderate in Alternative C because more acres and FMUs are being treated.

Moderate long-term benefits to cultural landscapes such as grasslands from the restoration or maintenance of them through prescribed fire or mechanical treatments are also likely in all alternatives, although benefits would be greater in Alternative C than Alternative B, and greater in Alternative B than in Alternative A.

All alternatives could have negligible impacts to permanent major adverse effects on cultural resources, including historic structures and archeological resources from suppression activities associated with even average sized wildfires. Impacts to cultural landscapes would be minor to moderate, as only a small portion of the landscape would be burned. Larger wildfires would be much more likely to result in major permanent impacts from the burning of historic structures, damage to buried resources, and the loss of a significant portion of cultural landscapes.

No adverse or beneficial effects are anticipated with the construction of the new fire cache or implementing research activities on historic structures, archeological sites, or cultural landscapes.

Visitor Use and Visitor Experience

The project area is unique not only in its assemblage of natural and cultural features, but also in its proximity to a major urban population. This juxtaposition makes PRNS's resources and recreational opportunities readily accessible to a large number of people, and enhances the importance of the special qualities for which it was set aside. Over 2.25 million people visit PRNS annually. Visitation estimates for 2002 found that the North District of the park (north of Bear Valley) receives roughly 60% of the overall visitation. Over 700,000 visitors went to the 3 park visitor centers and over 70,000 visitors have extended contacts with park interpretive staff through ranger-led programs.

The area supports 147 miles of hiking trails, backcountry campgrounds, and numerous beaches. Activities include hiking, water sports, horseback riding, fishing, camping, wildlife viewing, and other interpretive opportunities.

Hiking is primarily a day-use activity. Approximately 50 trails are designated throughout PRNS, and they encompass a range of habitat types from wooded mountains to sandy beaches. Overnight stays are available through 4 backcountry campgrounds, the Stewart Horse Camp, the Point Reyes Hostel, a private campground, and local hotels and inns. Dozens of visitors bring

horses to ride on designated horse trails, and hundreds rent horses every week from commercial stables.

Water sports include kayaking, canoeing, boating, and swimming. The majority of paddle crafts use Tomales Bay as it provides protection from ocean waves and surf, while power boaters more freely use the ocean. Though Stinson Beach and Bolinas attract more surfers, North Beach is known as a challenging surfing area. Nature study and wildlife viewing are important activities at Point Reyes. Visitors make special trips to PRNS to see migrating whales, shorebirds, breeding elephants seals, tule elk, and spring wildflowers. Information received from visitor surveys conducted by Sonoma State University (NPS, 1997 and NPS, 1998) found that most park visitors spend 2-6 hours at PRNS in a variety of activities dependent upon the season, ranging from whale watching and kayaking to hiking and bird watching.

The NPS gathers standardized annual surveys for each park unit to determine the percent of visitor satisfaction based on park facilities, visitor services, and recreational opportunities. During Fiscal Year 2002, based on a random visitor survey conducted by the University of Idaho, the park received a 98% visitor satisfaction ranking (NPS, 2002a).

Prescribed burning would have minor positive effects by opening and restoring scenic vistas, in all alternatives, but varying adverse effects on some visitors from blackening of vegetation from prescribed fires. In Alternatives A and B, this adverse effect would be minor, but because more acreage would be treated with prescribed fire in Alternative C, the impact may be more moderate. Smoke and closures would also have temporary minor adverse impacts on visitors in Alternatives A and B, but may extend to up to 50 days out of the year to complete burning in Alternative C, a moderate adverse impact.

Mechanical treatment may adversely affect nearby visitors through noise and closures. In Alternatives A and B, these impacts would be minor. However, because closures would be more extensive in Alternative C, impacts would be moderate. Changes in the treated area resulting from mowing or hand cutting would be adverse for some visitors, but beneficial for others. Pile burning may also cause localized changes that some visitors find to be negative and others positive. Overall, impacts from mechanical treatment would be short-term and minor in Alternatives A and B, and moderate in Alternative C, regardless of whether they are adverse or beneficial.

Actions to suppress wildfire have the potential to have short-term effects on visual resources, in the form of evidence of helispots and spike camps. These effects would be local in scale and probably not encountered by most visitors. Effects would be adverse, short-term, and minor in all three alternatives.

Providing information to the public to increase understanding of the objectives of the fire program would be indirectly beneficial, minor and long-term in any alternative.

The relocation of the fire cache would have short-term adverse impacts to visitors from noise and dust associated with construction.

While construction projects or past fire management activities would have no more than minor short-term cumulative impacts to visitors, a large-scale wildfire could result in major adverse impacts to recreational activities or scenic quality for several years in any of the alternatives.

Park Operations

The park currently has about 90 permanent staff, 23 term employees, and 47 temporary staff working on a variety of projects and programs. This represents about 115 FTE (full time equivalents or one person for a full year). During the peak summer months, the park staff increases to about 160 staff members, including Youth Conservation Corps enrollees who provide assistance in a number of ways to Point Reyes National Seashore. This work force is supplemented by 20,000 hours of Volunteers-in-Parks service, three Student Conservation Assistants, and AmeriCorps.

The Fire Management Office is staffed by a Fire Management Officer, a program analyst, a hazardous fuels specialist, an eight-person hazard fuels crew, one engine foreman, and a four-person engine crew. Three fire staff members are also trained as emergency medical technicians at the basic life support level. Providing technical assistance to both the fire management offices at PRNS and GGNRA are technical staff including a GIS technical specialist, an education specialist, and an environmental planner. PRNS, GGNRA, and Pinnacles share a fire ecologist and a team of five fire effects monitors. PRNS has mutual aid agreements with Marin County Fire Department, Bolinas Fire Protection District, Inverness Public Utility District, and Nicasio Volunteer Fire Department. While PRNS has direct protection authority for federal lands, Marin County has been given "delegated initial attack responsibility" for these same lands. This allows Marin County to assume authority of initial suppression actions until Seashore firefighters arrive.

Financial resources available to achieve the park's annual goals include a base operating budget of approximately $4,900,000. In addition, the park receives supplemental support for fire operations, cyclic maintenance, special natural resource projects, and repair and rehabilitation of structures. Fire funding for operations is approximately $770,000 annually for wildfire suppression, mechanical treatments, and prescribed fire. For the last three years, Point Reyes and GGNRA have received an additional $700,000 annually for Wildland Urban Interface (WUI) projects. Staffing for all aspects for fire management is approximately 13 FTE's.

Because funding and staffing levels would remain the same for all aspects of the fire management program, no positive or adverse impacts to either are expected from No Action. Small increases in budget in Alternative B to conduct additional prescribed burning and thinning would have minor adverse impacts to park operations and management compared to Alternative A. This alternative would require a $211,000 in annual operating funds, a 3.8% increase to overall park funding. An overall 5.9% increase in budget and additional 5 FTEs in staffing in Alternative C to conduct additional prescribed burning and thinning would have minor adverse impacts to park operations and management compared to Alternative A.

The one time funding of a new fire cache would have a short-term negligible adverse impact to the park's budget, but would have long-term minor benefits in terms of fire management operations by creating new efficiencies.

Ongoing past, present, and future development and resource management projects in the park would have a negligible adverse effect on park operations and management. However, suppression of a large-scale wildfire would result in a short-term adverse major effect on park operations, management, and budget. This is true for any of the alternatives.

The cumulative impacts of all the projects listed with this proposed action (except large-scale wildfire) would have a negligible adverse effect on park operations and management. Suppression of a large-scale wildfire would a short-term adverse major effect on park operations, management, and budget.

Public Health and Safety

The protection of public and firefighter safety is the most important goal of the PRNS fire management plan, and many of the actions in each alternative are geared to provide the most safe and defensible environment possible. In addition, several of the communities in the vicinity, including Inverness, Bolinas, and Olema, were recently published in the Federal Register as key communities at risk from wildfire because of their proximity to forested federal lands managed by the Departments of Agriculture and Interior. In recognition of potential risk, the National Park Service, through the Wildland Urban Interface (WUI) Program, has been funding fire education, fuel reduction, and roadway improvement projects in these communities; 2002 is the third year of local National Fire Plan funding.

Prioritization of projects needed in the wildland urban interface has been informed by a study of strategies for rehabilitating the resources in the Vision Fire burn area and preventing future similar occurrences. Prepared for the Environmental Action Committee of West Marin, "After the Vision Fire," prepared by the Phoenix Team, documented many of the projects that have subsequently been funded and implemented on private and federal lands with Wildland Urban Interface funding.

The EAC Phoenix Report (1996) recognizes that the most fundamental line of defense to increase public safety is to promote conformance with code requirements for defensible space and reduced fuels around homes and along streets providing emergency ingress and egress.

The WUI program money has been used by the park and other agencies to clear fuel or thin brush from subdivision roads and complete fire hazard assessments. The next round will focus on creating fuel breaks between open space lands and residential areas. Actions in this FMP in the Inverness Ridge, Limantour, Palomarin, and Olema FMUs would improve safety to responding firefighters, reduce fuels along existing fire roads, and create zones of reduced fuels to impede fire spread.

The principal effect of FMP activities on public health is generation of smoke, especially particulate matter, from prescribed fires and unintended wildland fire. Particulate matter, found in the air-liquid droplets and small solid particles of minerals and soot, can penetrate deep into the lungs. In smoke, roughly 80% of the particulate matter is smaller than 2.5 micrometers in diameter.

Healthy adults are not usually at risk from particulate matter; they may experience runny noses and coughing but these symptoms usually subside as the smoke disperses. People with heart or lung diseases, such as congestive heart disease, chronic obstructive pulmonary disease, emphysema or asthma, can be at risk. People with these conditions may find it difficult to breathe, may cough or feel short of breath. Children and the elderly are generally more susceptible to the harmful effects of smoke (CARB, 2003).

The actions in all alternatives would have direct adverse, short-term and minor impacts upon the health and safety of both the public and firefighters, except during large, high severity fire events, when the proximity of people to smoke and flame would result in major, short-term, and unavoidable adverse impacts.

Alternative A minimizes smoke impacts in the short-term, but offers no more than negligible benefits in addressing the continued accumulation of fuels that is a wildfire risk to adjacent communities. These benefits would increase to moderate and long-term in Alternatives B and C from the reduction of fuels through both prescribed fire and mechanical thinning and reduction in the risk of catastrophic fire would occur.

Public education, fire research, and fire cache construction would provide minor benefits by informing the public of prescribed burns and by reducing response time and increasing response effectiveness.

Socioeconomics

Point Reyes National Seashore received 2.35 million visitors in 2000 accounting for 930 travel party days/nights in the area. An average visitor party spends $94 per party per night in the local area ($109 if locals excluded). Total visitor spending was $87 million in 2000, $80 million excluding local visitors. This spending of visitors from outside the local region generates $69 million in sales by local tourism businesses, yielding $25.6 million in direct income and supporting 1,100 jobs. Each dollar of tourism spending yields another $.63 in sales through the circulation of spending within the local economy. Including these secondary effects, the total economic impact of the park on the local economy is $113 million in sales, $42 million in wages and salaries, and 1,800 jobs (Michigan State University, 2001).

The park has not received complaints from visitors during past prescribed fires in the park (pers. comm. Neubacher, 2003). Park visitation dropped dramatically for the first few months after the 1995 Vision Fire, but returned to normal within six months.

Under all alternatives, direct fire funding and staffing would have long-term, beneficial impacts compared to dollars and staff positions generated from tourism in the local economy. These benefits would be minor in Alternatives A and B, and moderate in Alternative C.

In any alternative, the prescribed burn program is not expected to result in more than very short-term closures of small areas, with no or negligible adverse impacts on tourism and the local

economy. Areas may be closed during mechanical treatment, which because it lasts longer, may result in negligible to minor short-term impacts to tourism and the local economy.

In past years, average sized unplanned ignitions have not impacted the regional economy or the visitor population of the park. However, there have been short-term, negligible impacts to the local economy due to minor closures of areas during suppression for short periods (less than one day). This would continue under any of the alternatives.

Additional building and other projects in the Seashore would have a minor beneficial cumulative effect on the local economy. Cumulative effects from a larger wildfire, should it occur, could be major and both adverse and beneficial. Adverse impacts would result from the loss of property and money spent to suppress the fire, but benefits would also result from rebuilding and the influx of federal money.

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