

U. S. DEPARTMENT OF THE INTERIOR

National Park Service

Final Environmental Impact Statement / Fire Management Plan

Golden Gate National Recreation Area

Marin, San Francisco and San Mateo Counties, California

RECORD OF DECISION

The Department of Interior, National Park Service has prepared this Record of Decision on the *Fire Management Plan/Final Environmental Impact Statement* (FMP FEIS) for Golden Gate National Recreation Area (GGNRA), Muir Woods National Monument, and Fort Point National Historic Site (collectively known as “the park” for purposes of this document). This document includes a description of the background for the project, a statement of the decision made, synopses of other alternatives considered, a description of the environmentally preferable alternative, the basis for the decision, findings on impairment of park resources and values, an appendix detailing measures to minimize environmental harm, and an overview of public involvement and agency consultation in the decision-making process.

Background of the Project

The legislated boundary of GGNRA consists of 74,816 acres in San Mateo, San Francisco, and Marin counties in California within which 15,700 acres are directly managed by GGNRA and comprise the planning area for the FMP FEIS. The planning area does not include the northern lands of GGNRA (approximately 18,000 acres) which are managed by Point Reyes National Seashore, or lands within the jurisdictional boundary of GGNRA that are not directly managed by the NPS.

The National Park Service (NPS) managed lands of GGNRA contain more than 1.7 million square feet of building space in both historic and non-historic structures. The park has roughly 59 miles of Pacific coast and San Francisco Bay shoreline and an estimated 40-mile long interface with developed lands, primarily residential communities. The parklands, part of the Golden Gate Biosphere Reserve, support 19 separate ecosystems and 12 distinct plant communities which together provide habitat for 25 federally-listed endangered or threatened plant and animal species and 52 additional species of concern. Within GGNRA are five National Historic Landmark Districts, 667 historic structures, and more than 350 known archeological sites. Each year, more than 16 million visitors come to the park from all over the world.

Fire management is an essential component of NPS operations and the GGNRA has been operating under a 1993 Fire Management Plan (FMP). Concerns about fire management in GGNRA are due to the fire hazards created from fuel buildup within parklands as a result of fire suppression efforts over the past century, the extension of residential development along much of the park boundary, and the spread of more flammable, non-native invasive plants within park lands, particularly along the boundary.

This revision of the GGNRA FMP was initiated in August 2003 in response to recent changes to NPS and federal fire management policies and the need to update the existing plan. The 1993 FMP focused primarily on fire ecology and natural resource management issues. The Federal Wildland Fire Management Policy (1995, 2000) reflects lessons learned from a catastrophic fire season in 2000.

Updated policies stress the need for land managers to reintroduce the role of fire into fire adaptive natural

systems, to use fire management principals to protect sensitive park resources, and to reduce fire risk along the wildland urban interface through the implementation of cooperative fuel reduction strategies with neighboring communities and agencies.

The purpose of this FMP FEIS is to provide a framework for fire management activities in a manner that helps achieve resource management objectives consistent with the park's cultural and natural resources, and land management plans; reduces risks to developed facilities and adjacent communities; and addresses safety considerations for park visitors, employees, and resources. The specific purposes of this FMP FEIS are:

- To prepare a new FMP that is consistent with Federal Wildland Fire Management Policy and conforms to agency guidelines for fire management plans and programs; and
- To help achieve resource management objectives consistent with the park's cultural, natural resource, and land management plans and be responsive to safety considerations for park visitors, employees, and resources.

A set of goals were developed by NPS staff during this FMP EIS planning process. The goals were derived from federal wildland fire management policy, NPS management policies, the 1980 GGNRA General Management Plan (GMP), and comments and concerns expressed by the public and agencies during the scoping period. Management objectives, detailed in section 1.4 Purpose and Need for Action of the FMP FEIS, were developed for each goal and describe what must be accomplished in order for the fire management program to be considered successful. The goals were then used in the formulation of the alternatives analyzed in the FEIS.

In addition to the FMP goals, the planning area's topography, hydrology, the results of fire hazard modeling, analysis of current development patterns, and the locations and types of significant park resources served to inform NPS staff as they developed Fire Management Units (FMU's) for the FMP. The FMU's were then used as a means to evaluate and analyze management alternatives. An FMU is any land management area that can be defined by management goals and constraints, topographic features, access corridors, values at risk or values to be protected, political boundaries, fuel types, or major fire regime groups that set it apart from management characteristics of an adjacent unit.

The 1993 FMP FMU's were based upon vegetation communities and are used in the current FMP FEIS in *Alternative A – 1993 FMP, No Action*. The FMU's used in the action alternatives (Alternative B and Alternative C) were based upon different inputs to conform to current federal wildland fire management policy. The new FMU's consist of the Wildland Urban Interface FMU for areas of the park adjacent to relatively dense suburban neighborhoods; the Park Interior FMU comprised of open, largely undisturbed lands that are relatively remote from developed areas whether on the park perimeter or interior; and the Muir Woods FMU for Muir Woods National Monument, reflecting the important natural resources combined with high visitor use in this special park unit.

Three alternatives are analyzed in the FMP FEIS. The alternatives meet the park's goals and objectives to an acceptably large degree, and are within constraints imposed by regulations and policies, by risks associated with the wildland urban interface, and by technical and funding limitations. The three alternatives involve different combinations of prescribed burning and mechanical treatments for achieving fire risk reduction and resource protection and rehabilitation objectives. In each alternative, an upper limit

has been set on the number of acres that would be treated in any one year. Then, the alternatives are differentiated by the annual maximum acreages allowed for each treatment type (mechanical treatment or prescribed burning) within the FMU's in the three counties. The variations in annual, permissible acreages are one means of distinguishing differences among the alternatives. Potential impacts and appropriate mitigation measures are assessed for each of the alternatives.

Decision (Selected Action)

The selected action, *Alternative C - Hazard Reduction and Resource Enhancement through Multiple Treatments*, is the preferred alternative from the FMP FEIS. Alternative C will allow for the greatest number of acres to be treated annually to achieve fire management and resource objectives through the use of a broad range of fire management strategies. As documented in the FEIS, Alternative C is also deemed to be the "Environmentally Preferred" Alternative.

Given favorable weather conditions and adequate project funding, Alternative C would permit up to 595 acres be treated per year using mechanical treatments and prescribed fire. If project funding is not optimum, the park would seek other funding from other divisions such as maintenance and natural resources for projects that would result in benefit meeting the objectives of those divisions as well as fire management. Approved projects that lack funding would roll over to the next fiscal year. Low funding for prescribed burning projects can be supplemented in Marin County by sharing staff and equipment resources with other fire and land management agencies. The acreage limit for annual treatments of 275 acres by mechanical treatment and 320 acres of prescribed burning were developed as reasonable targets that could be achieved annually rather than absolutes that must be achieved. The plan acknowledges that the level of funding available for fire management projects has varied from year to year; in addition, heavy fogs in late summer/early fall can shift the park's focus to achieving the mechanical treatment acreages and away from prescribed burning.

Under Alternative C, mechanical treatment and prescribed burning will be used to reduce fuel loading near developed areas and achieve resource enhancement goals. Mechanical treatments, complemented by prescribed fire, will be employed to assist with the restoration and maintenance of the park's natural and cultural resources. An expanded research program will examine the role of fire and mechanical treatments in enhancing natural resources and the specific impacts of fire on these resources. Research will also be used to adaptively guide the fire management program and help maximize the benefits to park resources. Natural and cultural resource goals and objectives will be integrated into the design and implementation of fuel reduction projects.

Several actions that are part of the current GGNRA fire management program will continue under Alternative C. Some of these current activities are considered "best management practices" and are used by many land management agencies and fire districts. These actions include roadside fuel reduction; maintenance of defensible space around structures; the provision of fire education materials and public outreach; the continued implementation of successful fire management programs such as the Wildland Urban Interface Initiative coordinated with neighboring fire departments and homeowners' associations; fire effects monitoring; suppression of all wildland fires; centralizing the park's fire cache in a new structure; fire management actions for GGNRA lands within the City and County of San Francisco; and the fire management approach for Muir Woods National Monument. The NPS has been implementing the 1993 FMP strategy for Muir Woods National Monument for over a decade and would continue to do

so. The strategy uses prescribed fire and mechanical fuel treatments to reduce invasive species and fuel loading, and to restore the role of fire in the old growth coast redwood forest.

Based on the FMP, an implementation plan will be developed by the park's fire and resource management staff. The implementation plan will outline fire management actions that would occur over a 5-year planning period. This plan would be updated and reviewed annually for consistency with the FMP.

Other Alternatives Considered

In addition to the Selected Action, the FMP FEIS analyzes two alternatives for managing fire in the park, including a No Action Alternative. Similar to Alternative C (Selected Action), these alternatives are based upon park values, effective fire management strategies, NPS policy, and applicable law. Two other alternatives which focused on fuel reduction rather than a combination of resource and fuel reduction benefits were considered but dismissed.

Alternative A (No Action) – 1993 FMP, No Action

This alternative would be an update to the park's 1993 FMP only to reflect changes to the park's boundary (e.g., addition of new lands since 1993) and current national fire management policies. The focus of the 1993 FMP program is on ecosystem management through the application of prescribed fire to perpetuate fire-adaptive natural systems. This alternative would rely on the continued implementation of the 1993 FMP and recent emphasis on mechanical fuel reduction along with prescribed fire.

The six FMU's for Alternative A, derived from the 1993 FMP, are based upon vegetation communities. As shown in Table 1 below, a total of 210 acres could be treated by mechanical means and prescribed fire each year under this alternative. Nearly all of the projects would be in Marin County and account for 175 of the total 210 acres. An annual maximum of 110 acres for prescribed burning would be allowed; this total reflects what had been accomplished while the 1993 FMP was in full implementation in the 1990's. In practice, many fire management actions approved in recent years for GGNRA have been mechanical fuel reduction projects (e.g., mowing, cutting to remove nonnative shrubs and trees, and selective thinning in forested stands) as a result of the establishment of the Wildland Urban Interface Initiative. A combination of staff shortages, the requirement to develop a new FMP, and a year-long moratorium on prescribed burning has resulted in limited prescribed burning over the past five years.

Current research projects would continue and would focus on the role of fire to enhance natural resources and the effects of fire on key natural resources to determine the effectiveness of various fuel treatments. Prescribed burning would focus on resource management and research objectives with half of the annual acreage accounted for in projects within Muir Woods National Monument. Mechanical fuel reduction projects would focus on the park interface area in Marin County, consistent with projects funded in the past five years.

Alternative B – Hazard Reduction and Restricted Fire Use for Research and Resource Enhancement.

Under Alternative B, fire management actions would emphasize the use of mechanical methods to reduce fire hazards and fuel loads in areas with the highest risks. A total of 350 acres could be treated each year under this alternative – a maximum of 230 acres by mechanical means and a maximum of 120 acres through prescribed fire. Compared to Alternative A, Alternative B represents an increase in the number of acres mechanically treated each year. There would be a focus on the reduction of high fuel loads in the

Wildland Urban Interface FMU. Alternative B would permit the treatment of 50% fewer acres annually by mechanical treatment than the Selected Alternative. Limited use of prescribed fire could occur for research purposes within the park interior. Under Alternative B, prescribed burning is restricted to the Park Interior FMU in Marin County and Muir Woods FMU. No prescribed burning would occur in the San Mateo parklands. Research projects in Marin and San Mateo counties would examine the role of fire to enhance natural resources and the effects of fire on key natural resources to determine the effectiveness of various fuel treatments.

Table 1: Summary of Alternatives by Fire Management Unit (FMU) and Treatment Type

Treatment Type	County	Alternative A		Alternative B				Alternative C			
		All Fmu's ¹	Total	WUI FMU	Park Interior FMU	Muir Woods FMU	Total	WUI FMU	Park Interior FMU	Muir Woods FMU	Total
Mechanical Treatment (acres/yr)	Marin	75	100	130	45	5	230	130	90	5	275
	San Francisco	5		10	0	0		10	0	0	
	San Mateo	20		30	10	0		30	10	0	
	Total Acres	100		170	55	5		170	100	5	
Prescribed Burning (acres/yr)	Marin	100 ²	110	0	70	50	120	50	185	50	320
	San Francisco	<1		<1	NA	NA		<1	NA	NA	
	San Mateo	10		0	0	0		5	30	0	
	Total Acres	110		0	70	50		55	215	50	

Source: GGNRA Fire Management Office Data 2004.

Notes:

¹ Since 1993 FMP did not give number of acres per year for treatments by FMU, and since FMU's are by vegetation type and dispersed throughout park, total acreage is given by county only based upon projects cited in 1993 FMP and current practice.

² Includes 50 acres of prescribed burning in Muir Woods National Monument annually.

WUI = Wildland Urban Interface

NA = not applicable

Alternatives Considered for Inclusion in the EIS But Rejected

Two additional alternatives were considered for the GGNRA FMP but rejected as not meeting the purpose and need of the FMP. Developed in response to a suggestion during scoping, of the two alternatives proposed, one included no use of fire as a management tool and the second permitted fire to be used only in pile burning. Both alternatives focused on mechanical treatments to reduce fuels and fire hazard. The strategy for fire management at Muir Woods, which involves the reintroduction of fire into the ecosystem, could not be implemented under these alternatives. The first alternative, which did not permit pile burning, removed a very sustainable solution for disposing of cut vegetation. Often only part, and sometimes none, of the vegetation cut at a site can be chipped and broadcast in place; under this alternative all debris which could be chipped would have to be trucked to a legal disposal site. Chipping and broadcasting debris at a project site may be prohibited because it could alter favorable conditions for sensitive plant or animal species, involve the spread of invasive plant seeds or viable parts, suppress the native seed bank, or increase fire risk when if deposited overly thick. Pile burning is an important solution for vegetation harboring SOD, pitch pine canker, or other infectious diseases or pests that should neither be left onsite nor moved to another location.

After consideration, the alternatives were rejected as so many important FMP goals could not be achieved without some level of prescribed burning. Without the option of prescribed burning, there would be less opportunity to contribute to the enhancement and rehabilitation of cultural and natural resources through the use of prescribed burning. The park fire ecology and monitoring staff would not be able to build upon research and data derived first hand experience in the actual environment of GGNRA. The park fire staff would not expand their experience by planning and executing prescribed burns and the preferred strategy for reducing the potential for a high intensity wildland fire at Muir Woods could not be implemented being based on the reintroduction of fire into the Muir Woods ecosystem.

Environmentally Preferred Alternative

The analysis in the Final EIS determined that Alternative C is the environmentally preferred alternative. As described in the Final EIS, NPS and Section 101 NEPA criteria were used to make this determination. A summary of this analysis is as follows:

Alternative C will best achieve the purposes and goals of the plan by allowing for the use of a variety of management tools in order to achieve resource goals in balance with protection of visitors, life, and property. In comparison to Alternatives A and B, Alternative C's fire management treatment options provide the park with the flexibility to achieve, in a timely manner, a reduction in fire hazards that aid in the protection of human health, life, and property while also maximizing opportunities for restoring and maintaining ecological integrity, and protecting and enhancing the park's natural and cultural resources. Under Alternative C, the park's expedited implementation of fuel reduction projects in the urban interface areas would afford the greatest protection for park neighbors as well as the most sustainable approach to fire management. Alternative C presents the greatest potential for the control of stands of non-native evergreen forests within all of the FMU's which, once controlled, will require limited maintenance to discourage resprouting. With active restoration efforts from park staff and volunteer stewards, the areas that support stands of non-native evergreens should convert to native vegetation and require little maintenance in the long-term to maintain low fuel loading.

Alternatives A and B conform to FMP goals but would accrue benefits at much lower rates than Alternative C. Alternative A would achieve only one third the number of acreage for both prescribed burning and mechanical treatment than Alternative C. Alternative A, which continues the current resource-based FMP, would have a natural resource focus park-wide split into FMUs defined by vegetation type. Alternative A is not as closely allied to the life safety goal that is primary to current federal wildland fire policy. With the exception of specific WUI projects funding by the National Fire Plan, all project planning would continue to be natural resource based. Alternative B permits mechanical treatment at nearly the same level as Alternative C and would be nearly as effective in reducing excessive fuel loading as Alternative C. However, the amount of acreage of prescribed burning permitted annually is a third of that allowed in Alternative C and then only within the Interior FMU. No prescribed burning would occur in San Mateo County and no burns would be within the WUI FMU which often has the larger concentrations of escaped, invasive, non-native plants. Alternative B and C would permit similar annual achievements for mechanical treatment projects and both allow the greatest range of techniques to be used to treat cut vegetation based on environmental conditions. However, the higher annual acreage limits in Alternative C (at least 45 acres more annually of mechanical treatment and an additional 200 acres more of prescribed burning), with the ability to use prescribed burning throughout the park where warranted, results in a more proactive program that has the greatest potential to effectively reduce high fuel loading that currently threatens natural and built resources and public safety on both sides of the wildland urban interface.

Basis for Decision

After careful consideration of the alternatives presented, their environmental impacts, planning goals, and public comments received throughout the planning process, including comments on the Draft Fire Management Plan/Environmental Impact Statement, Alternative C has been selected for implementation. This alternative best accomplishes NPS and federal fire management policies, the legislated purpose of GGNRA, and the statutory mission of the NPS to provide long-term protection of park resources. The selected action best accomplishes the stated purposes of the Fire Management Plan as described in section 1.4, Purpose and Need for Action of the FMP FEIS. Alternative C offers the best combination of benefits with a high level of protection of life and property, and greater long- and short-term natural and cultural resource benefits than either Alternatives A or B.

A set of goals, developed and used in this planning process, were derived from guidance of the NPS Management Policies 2001 (NPS 2000) and NPS Director's Order and Resource Handbook 18, Wildland Fire Management (NPS 1999), in addition to federal policy and scoping input. The goals and subsequent management objectives describe what must be accomplished in order for the fire management program to be successful and were used to formulate the alternatives analyzed in this FMP FEIS. Of these goals, the first four are the criteria that were predominantly used to select Alternative C for implementation. Alternative C is the alternative which most successfully fulfills these goals, though each of the alternatives achieves the goals to a varying degree.

- 1. Ensure that firefighter and public safety is the highest priority for all fire management activities.*

This alternative would permit the broadest use of fire management strategies throughout the park (mechanical treatment, pile burns, and prescribed burning) to reduce fuel loading near developed areas

and resources. Alternative C permits a larger number of acres to be treated annually than the other alternatives considered and it will thus accelerate the reduction of fuels in areas that present wildland fire hazards to adjacent communities and to sensitive park resources. Under Alternative C, a greater amount of fuel reduction (total 595 acres) could be achieved by both mechanical treatment and prescribed burning in the planning area than either under Alternative A (total 210 acres) or Alternative B (total 350 acres).

Under Alternative C, a maximum of 320 acres of prescribed burns and 275 acres of mechanical treatments could occur annually. This acreage cap grants the park the flexibility to take advantage of years with favorable weather conditions and funding availability. Though all of the alternatives depend on a range of variables for success, risks to firefighters and the public would be reduced at a more rapid rate under Alternative C.

The flexibility in treatment options provided under Alternative C, particularly in the Park Interior FMU, will allow the park to link together areas treated by prescribed burning or mowing with other areas of naturally-occurring light fuels. These linked zones of reduced fuels will then serve to slow the rate of fire spread in the event of a wildland fire, resulting in additional time for evacuation and response, and will provide relatively safe areas from which to stage firefighting efforts.

2. Reduce wildland fire risk to private and public property.

Full implementation of this alternative would allow for the greatest number of acres to be treated annually to achieve fire management objectives. Compared to Alternative A, Alternative C permits nearly three times as much mechanical fuel reduction and prescribed burning each year. The higher amount of acreage allowed to be treated annually produces the most accelerated progress towards reducing fuels in critical areas around the park; almost 1,375 acres could be mechanically treated over a five year implementation plan based on the annual allowable acreages. The greater acreage and full range of fuel management techniques permitted in the WUI FMU under Alternative C provides more opportunities to plan and annually implement joint projects with other agencies to strategically reduce fuels across jurisdictional boundaries. Similar to the other alternatives, the objective of fuel reduction projects under Alternative C would be to establish areas of reduced fuels to slow the rate of fire spread and facilitate fire suppression. However, given the flexibility in management tactics and the number of acres that could be treated annually, more could be accomplished in a shorter amount of time to reduce fire risk to private and public property under Alternative C.

3. Protect natural resources from adverse effects of fire and fire management activities, and use fire management wherever appropriate to sustain and restore natural resources.

Alternative C is the least constrained alternative in terms of the types of treatments that can be applied in individual areas. Treatments under Alternative C would pursue the enhancement of natural resources (e.g., increasing abundance or distribution of habitat for threatened and endangered species; reducing infestations of nonnative plants; increasing native plant cover; managing the rate of vegetation conversion, etc.) in addition to other management goals. The focus for prescribed burns under Alternative C would be in areas where NPS ecologists believe ecosystem health would be enhanced by burning and in areas where fuel accumulations create fire hazards. To the extent possible, prescribed burns would be conducted to approximate natural fire intensity and fire intervals. The intent would be to allow the process of fire to act on the landscape as it has for thousands of years, to the greatest extent possible, while

ensuring human safety and protecting property. Prescribed fire would be used to reduce infestations of highly nonnative plant species, restore native habitat, and rehabilitate cultural landscape settings. Only Alternative C would permit prescribed burning to be used in conjunction with mechanical treatments in the Wildland Urban Interface FMU, thus providing a range of strategies to effectively control infestations of invasive, non-native plants. In addition, only Alternative C permits mechanical treatment in combination with prescribed burning to be used in the Park Interior FMU's of both Marin and San Mateo counties. As such, Alternative C will provide more opportunities for vegetation management projects which focus on native plant community rehabilitation and the control of isolated, invasive plant populations in areas where fuel reduction may be a low priority.

4. Preserve historic structures, landscapes, and archeological resources from adverse effects of fire and fire management activities, and use fire management wherever appropriate to rehabilitate or restore these cultural resources.

Alternative C proposes use of a broad range of fire management strategies throughout the park – mechanical treatment, pile burning, and prescribed burning – as a means to reduce fuel loading near developed areas and achieve resource enhancement goals. Projects would focus on the protection and/or enhancement of cultural resource elements and values (e.g., burning would be used to reduce vegetation in areas that are identified as important historic viewsapes). Fire management activities, especially carefully applied prescribed fire and mechanical fuel reduction treatments, will be used to stabilize, preserve, maintain, and restore cultural resources. For example, mechanical thinning can effectively remove hazardous fuels from cultural resources and their vicinity, as well as restore, enhance, or maintain ethnographic resources and cultural landscapes in cases where the risk of direct effect from the application of fire is too high. Fire management activities will help to maintain and protect historic buildings by reducing fuels around these structures, both through prescribed burns and mechanical treatment. Historic field patterns may be restored in pastoral ranching landscapes where former grassland is being succeeded by scrub. In addition, the removal of dense ground cover may lead to the revelation of previously unknown archeological sites. Since this alternative allows for the greatest number of acres to be treated on an annual basis to achieve fire management objectives, it will therefore afford the greatest level of protection and enhancement of cultural resources.

Findings on Impairment of Park Resources and Values

The NPS has determined that implementation of Alternative C (Selected Action) will not constitute impairment to park resources and values. This conclusion is based on a thorough analysis of the environmental impacts described in the FEIS, the public comments received, relevant scientific studies, and the professional judgment of the decision-maker guided by the direction in NPS Management Policy. While the plan has some negative impacts, in all cases these adverse impacts are the result of actions to preserve and restore park resources and values. Overall, the Selected Action results in major benefits to park resources and values and it does not result in their impairment.

In determining whether impairment may occur, park managers consider the duration, severity, and magnitude of the impact; the resources and values affected; and direct, indirect, and cumulative effects of the action. According to NPS policy, "An impact would be more likely to constitute an impairment to the extent that it affects a resource or value whose conservation is: necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the park; key to the natural or cultural integrity

of the park or to opportunities for enjoyment of the park; or identified as a goal in the park's general management plan or other relevant NPS planning documents" (NPS Management Policies, 2001).

The non-impairment policy does not prohibit impacts to park resources and values. The NPS has the discretion to allow impacts to park resources and values when necessary and appropriate to fulfill the purposes of the park, so long as the impacts do not constitute impairment. Moreover, an impact is less likely to constitute impairment if it is an unavoidable result of an action necessary to preserve or restore the integrity of park resources or values.

The actions comprising Alternative C will achieve the goals of the Fire Management Plan in a comprehensive, integrated manner that reduces fire-related risks while also allowing fire to be used to achieve resource management objectives. The potential for high-intensity catastrophic fire that would put high-value resources at risk would be greatly reduced under the Selected Alternative. The combined use of mechanical treatment and prescribed burning throughout the park would allow NPS to reduce fuel loading and also achieve resource enhancement goals in a more timely and efficient manner than the other alternatives. Under Alternative C, the FMP goals would be achieved in a productive, effective, and sustainable manner through a broad scope of treatments and treatment areas. Strategic areas of high fuel loading on the park's urban interface would be treated and maintained over a shorter period of time than under Alternatives A and B. Likewise, areas of nonnative plants would be treated earlier in the implementation of Alternative C and would therefore be treated before populations of nonnative species could expand to affect larger areas.

In conclusion, the NPS has determined that the implementation of Alternative C will not result in impairment of resources and values in GGNRA. This conclusion is documented in the FMP FEIS.

Measures to Minimize Environmental Harm

The NPS has investigated all practical means to avoid or minimize environmental impacts that could result from implementation of the selected action. The measures have been incorporated into Alternative C and are presented in detail in the FMP FEIS. A set of mitigation measures will be applied consistently to actions to implement this plan through the park's internal compliance processes. (See Attachment 1 – Mitigation Measures). Fire effects monitoring by the fire management staff and the GGNRA cultural and natural resource management programs will be implemented to detect deleterious results. The results from this program will guide and assure compliance monitoring, biological and cultural resource protection, noxious weed control, visitor safety and fire education, endangered, threatened and special status species protection, and other mitigation. In addition, the NPS will prepare appropriate compliance reviews under the NEPA, the National Historic Preservation Act, and other relevant legislation for future actions not covered by this EIS.

Public and Interagency Involvement

Scoping for EIS

Public scoping for the FMP EIS was formally initiated on August 8, 2003, with publication in the Federal Register of the Notice of Intent to Prepare an Environmental Impact Statement for the GGNRA FMP. In addition to the Federal Register notice, the scoping period was publicized through a mailing to the public that included background information on the FMP and a notice of scoping workshops. Scoping

comments were solicited from August 8, 2003, to December 5, 2003. Three open house meetings were held for the scoping of the GGNRA FMP. These meetings featured displays and offered attendees the opportunity to discuss the planning process with staff. In addition, internal NPS scoping sessions were conducted to identify staff issues and concerns.

Among the major issues raised during the scoping meetings were the need for monitoring fire management activities and the use of wildland fire and pesticides as fire management tools. In addition, the development of an education component for fire hazard reduction in adjacent communities was mentioned. Other concerns raised at the meetings included ongoing changes in land use as they relate to fire; the potential for changes in wind patterns and wind strength due to tree removal; public access limitations; use of native plant species to restore habitat; potential changes to visitor experience and aesthetics; increased fire risk and life safety; and effects on cultural resources, vegetation, wildlife, hydrology, water quality, soils, and air quality.

Review of EIS

A Notice of Availability for the Draft EIS (FMP DEIS) was published by the NPS in the Federal Register on March 21, 2005. The NPS also provided the notice of availability of the FMP DEIS through a direct mailing and posting on the park's web site. The FMP DEIS was made available for review at park headquarters, park visitor centers, local and regional libraries, and on the park's website. The EPA's Federal Register March 18 notice of filing initiated a 60-day public comment period ending on May 17, 2005 which was extended to May 27, 2005 to ensure adequate review time. The NPS conducted two public presentations and workshops on the FMP DEIS. The first workshop was held in San Mateo County as part of a regularly scheduled Pacifica City Council meeting on April 11, 2005. The second workshop was on April 19, 2005 in Marin County at the San Francisco Bay Model in Sausalito and was part of the regularly-scheduled, GGNRA bi-monthly public meeting. The public was encouraged to submit comments on the DEIS via email, fax, or regular mail.

Twelve comment letters were received (see Appendix H of the FEIS). Agencies commenting were the US Environmental Protection Agency, the State Clearinghouse, the State Department of Forestry and Fire Protection, the Marin County Community Development Agency, the San Mateo County Department Parks and Recreation, the Land and the Resources Division of the San Francisco PUC. Two members of the Pacifica City Council submitted comments as well as 3 members of the public. The EPA provided comments as required in their role of statutory administrator of NEPA, the Council on Environmental Quality implementing regulations and the Clean Air Act.

All comment letters are reprinted in Appendix H to the FMP FEIS and each letter is followed by the NPS response to the letter's comments. The major issues raised during the public comment period included: smoke management, clarification of the text on conformance with air quality regulations and the State Implementation Plan, herbicide use, protection of riparian and wetland areas, range of alternatives considered, effects on Monarch butterfly habitat, and the need and benefits from interagency cooperation. On February 10, 2006 the EPA published their notice that the FEIS is "complete and fully adequate" in the Federal Register.

The NPS's Notice of Availability for the FMP FEIS was published in the Federal Register on December 28, 2005. Following the EPA's notice of filing published in the FR on December 23, 2005 the waiting period for preparation of the Record of Decision ended on January 23, 2006. The FMP FEIS was posted on the NPS park planning website and a postcard notification of its availability was mailed to 1,400 interested parties, including agencies and organizations which had requested information on the FMP FEIS or were on the park's planning office mailing list. Forty-seven individuals, organizations, and agencies that had received a copy of the FMP DEIS in either printed or CD format or had since requested a copy were sent the FMP FEIS in the format requested. The FMP FEIS was distributed to the GGNRA Visitor Centers and twenty-four libraries in Marin, San Francisco, San Mateo and Alameda counties.

Following distribution of the FEIS, the park received several requests from the public and agencies for copies of the document, and a private citizen request for additional information on the use of herbicides and fire retardant chemicals in the Muir Beach and Redwood Creek vicinity. The park responded that the park's preference is to use no retardants for suppression wherever possible and particularly in the vicinity of Redwood Creek, which provides habitat for listed salmonids. The Marin County Fire Department, as a CDF contract agency, has agreed to consult with the NPS before using retardants in the Redwood Creek drainage. It is mutually agreed that the protection of life and safety is the number one priority in any fire suppression effort and the use of retardants may be necessary where these threats are present. No herbicides have been used at the Golden Gate Dairy in conjunction with eucalyptus removal nor is any planned for this area or for work along Muir Woods Road. In conformance with the Endangered Species Act consultations undertaken for the FMP, direct applications to the cut stumps of eucalyptus, acacias or other readily resprouting non-native trees, is allowed in riparian or wetland habitats supporting special status species during the dry season (roughly July 1 through November 15), never within the wetted channel of the drainage and only when conditions meet the requirements of mitigation measures VEG-8 to prevent wind drift of herbicide.

Agency Consultation and Coordination

Advisory Council on Historic Preservation. The National Historic Preservation Act (NHPA) requires agencies to take into account the effects of their actions on properties listed in or eligible for listing in the National Register of Historic Places. The Advisory Council on Historic Preservation has developed implementing regulations (36 CFR 800) that allow agencies to develop agreements for consideration of these historic properties. The NPS, in consultation with the California State Historic Preservation Officer (SHPO), developed a Programmatic Agreement for the FMP based upon an existing draft Department of the Interior Fire Management Plan Programmatic Agreement. The NPS invited the participation of the Advisory Council, affected American Indian tribes, and the public in this consultation process. This Programmatic Agreement provides a process for compliance with the NHPA and includes stipulations for identification, evaluation, treatment, and mitigation of adverse effects for actions affecting historic properties. The NPS initiated consultation on the GGNRA FMP by letter to the SHPO dated May 23, 2003. Consultation was completed with the signing of the Programmatic Agreement on September 30, 2005. The Programmatic Agreement for Fire Management Activities is included as Appendix J in the FMP FEIS.

U.S. Fish and Wildlife Service and National Marine Fisheries Service (NMFS). The Endangered Species Act (ESA) protects threatened and endangered species, as listed by the U.S. Fish and Wildlife Service (USFWS), from unauthorized take, and directs federal agencies to ensure that their actions do not

jeopardize the continued existence of listed species. Section 7 of the ESA defines federal agency responsibilities for consultation with the USFWS and National Oceanic and Atmospheric Administration National Marine Fisheries Service (NMFS) and requires preparation of a Biological Assessment to identify any threatened or endangered species that are likely to be affected by the proposed action.

The NPS initiated informal consultation with the USFWS on June 18, 2003. Upon request, the USFWS sent the NPS a species list for the GGNRA FMP EIS covering Marin, San Francisco, and San Mateo counties, as well as for the specific United States Geological Survey (USGS) quads within those counties in which NPS fire management activities will take place.

The NPS sent a biological assessment to the USFWS on March 16, 2005 to determine if formal consultation under Section 7 of the Endangered Species Act would be required for the GGNRA FMP. The NPS requested formal consultation with NMFS Fisheries Service on potential effects on listed salmonids and Essential Fish Habitat in a letter dated March 21, 2005.

USFWS issued a Final Biological Opinion on the GGNRA FMP EIS on October 7, 2005 (see Appendix K of the FMP FEIS). The Final Biological Opinion lays out the USFWS conclusions regarding the numerous listed wildlife and plant species within the FMP FEIS planning area and proposes several mitigation measures to assure protection of the species. All recommendations of the USFWS have been incorporated into the listing of mitigation measures included in Chapter 2 of the FMP FEIS and Attachment 1 to this ROD. The USFWS conclusions regarding implementation of Alternative C, the Preferred Alternative are:

1. Implementation of the FMP is not likely to jeopardize the continued existence of the mission blue butterfly, California red-legged frog, the San Francisco garter snake, Raven's manzanita, San Francisco lessingia, Presidio clarkia, and the Marin dwarf flax nor is it likely to destroy or adversely modify proposed California red-legged frog critical habitat. Critical habitat has not been designated or proposed for mission blue butterfly, San Francisco garter snake, Raven's manzanita, San Francisco lessingia, Presidio clarkia, and the Marin dwarf flax, therefore, none will be affected.
2. Implementation of the FMP is anticipated to result in incidental take of the mission blue butterfly, California red-legged frog, and the San Francisco garter snake. The nondiscretionary conservation measures proposed by the NPS and described in the FEIS and ROD will substantially reduce but do not eliminate the potential for incidental taking of these listed species. The USFWS has determined that the level of anticipated take is not likely to result in jeopardy to the three listed wildlife species and proposed critical habitat of the red-legged frog.
3. Implementation of the FMP is not likely to adversely affect the San Bruno elfin butterfly, the salt marsh harvest mouse, tidewater goby, California brown pelican and the Pacific Coast population of the western snowy plover because of the avoidance measures included in the proposed project, actions proposed are either outside the range of the listed species or the action area does not contain suitable habitat for the taxa.
4. The USFWS concurs that Alternative C is not likely to adversely affect the northern spotted owl because of the specific measures for owl protection that will be implemented with the FMP regarding the siting and timing of project actions in relation to owl activity sites, limits on tree

and understory canopy modification near owl activity sites, avoiding disturbance of woodrat nests, limiting removal of larger diameter trees, and conducting post-project monitoring.

5. The USFWS concurs with the determination that the proposed project is not likely to adversely affect the marbled murrelet because of specific avoidance measures that will be implemented with the FMP regarding timing and siting of project actions, and avoidance the felling trees of larger diameter trees.

NMFS issued a Biological Opinion on the FMP FEIS on February 8, 2006 addressing potential effects of the FMP on the Central California Coast coho salmon (*Oncorhynchus kisutch*), an Evolutionary Significant Unit (ESU) and the Central California Coast steelhead (*Oncorhynchus mykiss*), designated a Distinct Population Segment.

The Magnuson-Stevens Fishery Conservation and Management Act, as amended by the Sustainable Fisheries Act of 1996 (PL 104-267), requires all federal agencies to consult with NMFS Fisheries on all actions or proposed actions permitted, funded, or undertaken by the agency that may adversely affect Essential Fish Habitat (EFH). NMFS provides recommendations to agencies through the Section 7 Consultation process to conserve EFH when agency activities may adversely affect EFH. Critical habitat has been designated for coho salmon and steelhead and includes streams and riparian areas within the FMP action area, triggering conformance with the Magnuson-Stevens Act.

After review of the biological assessment, best available scientific and commercial information, current status of the listed species, information on the environmental baseline of the action area, the anticipated effects of implementation of the FMP and cumulative actions, NMFS concluded that the FMP is unlikely to jeopardize the continued existence of the Central California Coast coho salmon or steelhead and unlikely to adversely modify their designated critical habitats. After review of the mitigation measures proposed for the control of erosion and protection of salmonids, NMFS recommended an additional conservation measure, taken directly from wording within the FEIS, be included to protect salmonid habitat from effects of herbicide use (see VEG-8 in Attachment 1). Modifications to two FMP mitigation measures (SS-12 and SS-13) were also requested. The issuance of an incidental take statement for the programmatic FMP was not required by NMFS.

As a condition supporting the issuance of their findings on the FMP, NMFS requires that the NPS provide them annually with information on the proposed implementation efforts for the upcoming fiscal year. Information will include a map of the project area, a project description and an assessment of potential effect on coho salmon and steelhead. NMFS will respond to the annual project report in writing within set time periods and inform the park whether the proposals may be appended or tiered from the programmatic biological opinion or whether project modifications, additional information or a separate consultation will be required.

California Coastal Commission. The Coastal Zone Management Act protects coastal environments. While the act transferred regulatory authority to the states and excluded federal installations from the definition of the "coastal zone," it requires that federal actions be consistent with state coastal management plans. Activities taking place within the coastal zone under the definition established by the California Coastal Management Plan (CCMP) require a federal consistency determination. The FMP FEIS was submitted to the California Coastal Commission for federal consistency determination. In a letter dated February 10, 2006, the Coastal Commission determined that the programmatic FEIS would

2/22/2006

not adversely impact coastal resources and would meet the requirements for a negative determination with the adoption of a requirement for the NPS to provide the CCC Executive Director annually with an implementation plan. The Executive Director requested that NPS staff meet annually with CCC staff to discuss how implementation of the annual work plan and mitigation measures will ensure protection of sensitive coastal resources. The NPS will submit additional consistency and/or negative determinations to the Commission for any future FMP projects within GGNRA that hold the potential to adversely affect resources within the coastal zone.

Changes Made for the Final EIS

A number of minor changes were made in the FEIS based on public comment received during the review period for the DEIS.

- A tenth FMP goal, accompanied by two objectives, to address smoke management and protection of air quality was added to the list of FMP goals in Chapter 1
- Figures 2-7, Fire Roads North Lands, and 2-8, Fire Roads South Lands were removed from the document and text edits were made to clarify which road-related functions at GGNRA are the responsibility of fire management staff (and are within the scope of the FMP FEIS) and which are the responsibility of other NPS divisions.
- Additional information was provided on herbicide use in conjunction with mechanical fuel removal as requested by the U.S. Environmental Protection Agency (EPA). This includes information on the park's common herbicide used, the review and approval process, regulatory conformance, protections for sensitive resources, the public and firefighters.
- Changes were made to the Mitigation Measures for Air Quality and Special Status Species in response to a comment from the EPA. As a result of the consultation between the NPS and the U.S. Fish and Wildlife Service (USFWS), two new Special Status Species mitigation measures were added. NMFS requested that a paragraph from FEIS Chapter 4 regarding herbicide application be added to the list of mitigation measures and that text modifications be made to two Special Status Species mitigation measures addressing protection of salmonids.
- On the recommendation of the EPA, changes were made to the Impacts on Air Quality section to clarify the relationship between BAAQMD's smoke management plan (SMP) and the State Implementation Plan (SIP). Text was added to address whether the three FMP alternatives would trigger a conformity analysis with the SIP; new text and a new table were also added to explain and state the *de minimus* levels for criteria pollutants with which the Air Basin is in nonattainment or maintenance status; and Table 3-4 was updated to reflect the current attainment status of criteria pollutants for the Bay Area Air Basin.
- In response to the EPA's request for more information regarding smoke management practice, a new appendix was added that lists smoke management techniques and non-burning alternatives that GGNRA could incorporate into a smoke management plan and/or that BAAQMD could require as part of the smoke management plan approval process. The referenced appendix is Appendix I – Non-burning Alternatives and Air Emissions Reduction Techniques for Fuel Reduction and Resource Benefiting Prescribed Burns in GGNRA.

Conclusion

Alternative C provides the most comprehensive and effective method among the alternatives considered for meeting the NPS purposes, goals, and objectives for managing fire and fire risks in GGNRA and for meeting national environmental and fire policy goals. The selection of Alternative C, as reflected in the *Final Fire Management Plan/Environmental Impact Statement* would not result in the impairment of park resources and would allow the NPS to conserve park resources and provide for their enjoyment by visitors.

Approved:

[Signed by Jon Jarvis on 2/23/06]

Jonathan B. Jarvis, Regional Director

Date

Pacific West Region, National Park Service

Attachment 1 – FMP Mitigation Measures

The NPS will implement the following mitigation measures in implementing the Selected Alternative of the FMP FEIS. The measures are designed to minimize or avoid the potential environmental impacts of the actions to be implemented under the FMP FEIS or to create a beneficial effect. These measures would not be fully applicable in the event of a catastrophic fire. The NPS will regularly evaluate and monitor the mitigation measures during implementation to determine their continued effectiveness in reducing impacts. The NPS, as Lead Agency, will have primary and full responsibility for coordinating the specific elements of each mitigation measure and will be responsible for ensuring that each mitigation measure has been implemented as specified in this document.

General FMP Mitigation Measures

- FMP-1(a)** To ensure that GGNRA fire management actions are in conformance with NEPA, the Record of Decision on the Final EIS, and NPS policy, individual fire management projects and modifications to the GGNRA five-year implementation plan will be subject to the GGNRA project review. Through the project review process, an interdisciplinary team will evaluate whether the potential effects of a proposed action or five-year plan, including appropriate mitigation measures, are adequately addressed by the Final EIS and reflect NPS management policies. If it is determined that the project has the potential for new environmental effects not addressed in this EIS or effects greater than those described in this EIS, a separate environmental process will be conducted.
- FMP-1(b)** To ensure compliance with 36 CFR 800, the regulations for implementing the NHPA, the Programmatic Agreement that will be developed specific to this park's fire management program will stipulate that each five-year implementation plan will be made available to the State Historic Preservation Officer, the Advisory Council on Historic Preservation, and the public for comment.
- FMP-2** GGNRA staff will meet with representatives of local fire agencies that could respond to wildfires in GGNRA lands in Marin, San Francisco, and San Mateo counties. The purpose of the meeting will be to provide information to fire agencies on the location and preferred strategies for suppression actions that will minimize damage or afford protection to important park resources in the event of a wildfire. The information exchanged between the NPS and local fire agencies will include notification procedures, new or modified facilities in the park, updated information on cultural and natural resources, low-impact suppression techniques, or potential protection techniques for certain locales in GGNRA.
- FMP-3** GGNRA cultural and natural resources staff will work with the fire management staff in preparing and updating maps and other data sources showing areas of the park with sensitive resources such as National Register properties; archaeological sensitivity; cultural landscapes; plant communities of special management concern (e.g., wetlands, riparian areas, dunes, and Special Ecological Areas identified in the park's Natural Resource Management Plan); habitat of federal, state, and locally listed species; and other important natural and cultural resources.

- FMP-4** GGNRA staff will conduct a training session for all contractor crews at the beginning of new fuel reduction projects to familiarize the crews with sensitive resources at the project site and review project conditions. Training sessions may include identification of NPS staff resource contacts; special status plants, wildlife, or other sensitive resources in the work area; identification and specific removal techniques to protect cultural resources from disturbance or prevent resprouting of nonnative plants; markings for the limit line of disturbance; thresholds that trigger a change in implementation techniques or require a halt in project implementation; proper disposal of food waste and garbage to discourage feeding by vectors and corvids; daily close-up of the project site to assure public safety; and information for public contacts during project implementation.
- FMP-5** An education program for field personnel involved with implementation of FMP projects will be conducted prior to the initiation of field activities. The program may include a brief presentation on any listed species at the work area, including a description of the species and its ecology, habitat needs, legal status, and protection afforded to the species. Cultural resource issues may include the type of artifacts or soils that could indicate the presence of subsurface cultural resources, the presence of known resources at the site, and important elements of the cultural landscape that must be left undisturbed, among other issues.
- FMP-6** The superintendent of GGNRA will appoint members of GGNRA staff to act as resource specialists to consult with operations crews in the event of wildland fire and during planning and execution of prescribed fire. The resource specialists will meet with local fire agencies likely to command wildland fire suppression actions on GGNRA lands and develop strategies for implementing flexible suppression to protect important resources.
- FMP-7** Natural and cultural resources staff will be notified of wildland fires as soon as possible so that appropriate staff can advise the lead fire agency on the location of sensitive resources and preferred suppression techniques and begin planning for rehabilitation of the burned area. Natural and cultural resource advisors will be assigned to the incident as needed.
- FMP-8** For any multi-day fire suppression event, a local or regional Burned Area Emergency Response team will be requested to facilitate development, in conjunction with park staff, of the emergency suppression stabilization and rehabilitation proposals.

Air Quality Mitigation Measures

- AIR-1** If recommended by BAAQMD, smoke management plans submitted by the NPS for BAAQMD review can be modified to reduce production of pollutants by reducing the amount of fuels available for burning. Options for reducing the amount of fuels available and emissions produced include reducing the area to be burned, reducing fuel loading (e.g., mowing and understory thinning), managing the rate of fuel consumption, and redistributing the emissions. Treatments to reduce overall air emissions from prescribed burns will be based on current smoke management techniques such as those listed in the Western Regional Air Partnership publication “Non-burning Alternatives to Prescribed Fire on Wildlands” (Jones and Stokes, 2004) and those listed in Appendix I of this FEIS.

- AIR-2** The NPS will develop a Smoke Communication Strategy to guide management of smoke events during prescribed fires, managed wildland fires, suppression actions, and fires occurring outside the park. Notification of proposed burns will be disseminated locally to provide adequate advance notice to persons with sensitivities to smoke.
- AIR-3** To reduce smoke and pollutant generation during the prescribed burning season, efforts will be made to burn fuel concentrations, piles, landings, and jackpots at other times of the year.
- AIR-4** To reduce impacts on visibility in the national park, burning will be avoided on holidays or other periods when recreational visitation is typically high.
- AIR-5** To avoid public health and nuisance impacts on neighboring communities, information about upcoming prescribed burns, including guidance for those who are sensitive to smoke, will be provided to park visitors, park employees, and park partners. Prescribed burns will be conducted under meteorological conditions that best avoid smoke drift into nearby residential areas and roadways.
- AIR-6** The NPS will arrange in advance with other parks that routinely monitor air quality (i.e., Yosemite National Park or Sequoia National Park) to monitor particulate levels during larger prescribed burns in GGNRA provided the necessary staff and equipment can be made available for GGNRA use.

Soils and Water Quality Mitigation Measures

- SW-1** Planned and unplanned fire actions will include strategies to minimize impacts from erosion, such as avoiding steep slopes and highly erosive soils, timing burns to minimize erosion potential, avoiding scraping or burning to bare mineral soil (layer below duff), or using erosion control techniques during or after burns. Subject matter experts will ensure that the erosion control plan for each action is sufficient to prevent long-term moderate or major impacts on the rate of soil erosion. Sites with identified high potential for soil erosion will be monitored.
- SW-2** Following a prescribed fire or wildland fire, visual monitoring will be conducted downslope of the area burned and at down-gradient water bodies (including ditches, streams, and wetlands) for evidence of increased soil erosion or increased sedimentation. Additional erosion control/sediment control measures will be applied where warranted.
- SW-3** Following wildland fires or prescribed burning, all fire lines (both hand and dozer lines) or other areas disturbed by equipment or vehicles will be rehabilitated as quickly as possible to prevent erosion, discourage the spread of nonnative plants and address soil compaction. Burned area rehabilitation techniques, including recontouring, soil stabilization, and removal and monitoring of nonnative plants, will be used for rehabilitation efforts.
- SW-4** Unless no feasible alternative is available, heavy equipment working on fire management actions (excluding suppression) will not be used in areas with soils that are undisturbed, saturated, or subject to extensive compaction. Where staging of heavy equipment, vehicles, or stockpiling is unavoidable, the limit of allowable disturbance will be clearly demarcated by

staking, flagging, or fencing. Following the end of work, surface soils will be scarified to retard runoff and promote revegetation.

- SW-5** During implementation of prescribed burns, some of the available coarse, woody debris will be left on the site to foster nutrient recycling and mycorrhizal function and other natural resource benefits.
- SW-6** Mechanical regrading and rehabilitation of fire roads will be conducted to specifications identified in the GGNRA Trails Inventory and Condition Assessment and the Memorandum of Understanding for Maintenance and Management of Dirt Roads with adjacent land management agencies.
- SW-7** After tree felling, stumps will be left in place in areas with highly erosive soils or on steep slopes.
- SW-8** Where surface soils supporting native vegetation will be disturbed as part of fire management actions, the topsoil layer will be excavated and stockpiled separately from other fill and replaced as topsoil at the end of the action.
- SW-9** Erosion and sediment control measures will be implemented as prescribed where project actions could leave soils exposed to runoff prior to revegetation.
- SW-10** Where multiple burn piles are created on undisturbed soils, the size of the piles will be kept small with sufficient distance between piles to minimize impacts on soils from high-intensity fires and to facilitate reestablishment of mycorrhizal fungi and soil microorganisms from adjacent unburned land.
- SW-11** A post-project site stabilization plan will be developed and implemented for all fire management projects.

Wetland Mitigation Measures

- WET-1** Fires will be allowed to back into, around, or through wetlands and meadows to avoid suppression damage. Wetlands will be avoided to the greatest extent possible while constructing fire lines and breaks during wildfire suppression. Where wetlands are used as a natural boundary to help contain a fire, the control line will be sited outside the wetland area. Trample lines (rather than dug lines) may be used if it is necessary to site the control line in the wetland.
- WET-2** Foams, saltwater or other fire retardants will not be used on or near wetlands to the greatest extent possible.

Vegetation Mitigation Measures

- VEG-1** Prescribed burns will be conducted at a time of year when introduction or spread of nonnative plants will be minimized and mortality of nonnative plant species will be maximized.

- VEG-2** Soil disturbance during mechanical treatments, prescribed burns, and suppression fires will be minimized to the greatest extent possible to reduce the potential for introduction or spread of nonnative plant species, to protect topsoil resources, and to reduce available habitat for new nonnative plant species.
- VEG-3** Areas subject to fire management treatments will be monitored periodically for the presence of nonnative plant species; if such species become established or spread as a result of such activities, the nonnative, nonhistoric plants will be removed.
- VEG-4** All vegetation management actions under the FMP will conform to federal and state regulations governing interstate and intrastate restrictions (respectively) adopted to prevent the artificial spread of Sudden Oak Death (*Phytophthora ramorum*) beyond the currently affected area. It will be the responsibility of the natural resources division chief to ensure that current guidelines and regulations are circulated to GGNRA staff involved in fire management actions. Relevant regulations are the Code of Federal Regulations, Title 7, Section 301.92 (updated 9/27/04) and California Code of Regulations, Title 3, Section 3700 (updated 9/2/04). Current regulations do not permit the movement of plant species and associated material listed in 3700(c) outside of the regulated quarantine area (defined in 3700(b)), which includes all three GGNRA counties.
- VEG-5** All FMP projects will incorporate techniques that control existing populations of weed species at the project site and incorporate practices to reduce the potential spread of weed species to noninfested areas of the park. Practices to reduce the spread of weed species include the following:
- Movement or deposition of fill, rock, or other materials containing weed seed or viable plant cuttings to areas relatively free of weeds will be restricted.
 - Where feasible based on the density of the weed population present, the fire management project manager will survey the road shoulders of the routes that provide project access for nonnative plant species and coordinate removal of those plants that could be disturbed by passing vehicles.
 - When project vehicles are required to move from off-road use in weed-infested areas to relatively weed-free areas, and water lines and water tenders are available for use, the tires and body of heavy equipment and vehicles will be hosed down before each transit to the relatively weed-free area.
- VEG-6** All herbicide use will be administered through the park's integrated pest management (IPM) coordinator, and only licensed personnel will be allowed to apply pesticides. All herbicide use for fire management actions will be reported monthly to the IPM coordinator.
- VEG-7** No herbicide foliar spraying or direct stump applications will be allowed in riparian or wetland habitats supporting special status species except in the dry season (roughly July 1 through November 15 of each year).

VEG-8 In addition to restrictions for riparian and wetland areas, foliar herbicide will not be applied where saturated soils are present, at wind speeds over 5 miles per hour, or when weather conditions facilitate herbicide movement toward drainages. To limit the potential for wind drift, herbicide application will be limited to backpack sprayers.

Special Status Species Mitigation Measures

SS-1 When emergency actions must be taken to prevent imminent loss of human life or property and these actions would result in a taking of listed species or adverse modification of critical habitat not covered under existing FMP biological opinion, the NPS will respond to the situation in an expedient manner to protect human health and safety. After the incident is under control, the NPS will initiate emergency consultation procedures with the appropriate agency(ies).

SS-2 The fire management project manager will ensure that contractor crews working in areas designated as habitat of listed species are monitored by a qualified biological monitor to ensure that project actions conform to restrictions developed for species protection.

SS-3 All fire management actions will operate under a policy of No Net Loss of Endangered Species Habitat, which applies to all species federally listed as threatened or endangered or proposed for listing. The project review process will be used to document the no net loss finding through the conformance assessment conducted for each FMP action proposed for listed species habitat.

SS-4 To avoid the spread of highly nonnative animal species (e.g., bullfrogs) and protect the habitat of federally listed threatened or endangered species, GGNRA resource advisors and fire management staff will advise local fire agencies responding to wildland fires in the park and vicinity of the following guidance:

- Drawing water from freshwater bodies in GGNRA and Rodeo Lagoon should be avoided unless there are no alternative sources available. If freshwater is drawn or scooped from water bodies in the park, it should be used on wildfires within the same watershed whenever possible.
- Ocean and bay waters are preferred water sources for fighting wildfires in the park and vicinity. Habitats of sensitive aquatic species and mission blue butterflies should be avoided when saltwater is used.

SS-5 An education program for the field personnel involved with the FMP shall be conducted prior to the initiation of field activities. The program shall consist of a brief presentation by a person(s) knowledgeable in the California red-legged frog, San Francisco garter snake, mission blue butterfly, and other appropriate listed species. The program shall include the following: a description of these species, their ecology, and habitat needs; an explanation of their legal status and their protection under the Act; and an explanation of the measures being taken to avoid or reduce effects to these species during implementation of the FMP. The

education may be conducted in an informal manner (e.g., ranger and field personnel in a field setting).

- SS-6** If a California red-legged frog(s), San Francisco garter snake, or early stages of the mission blue butterfly are observed in the work/burn areas, a qualified biologist or an individual trained in the biology and ecology of these listed animals and designated by the NPS shall capture it and move the animal(s) to an appropriate aquatic or upland location outside of the work area.

Special Status Plants

- SS-7** Potential impacts associated with tree removal in the vicinity of the Raven's manzanita, San Francisco lessingia, and Marin dwarf-flax will be evaluated in consultation with the USFWS.
- SS-8** To address fire actions occurring within special status plant species populations, site- and/or species-specific rehabilitation plans will be developed to minimize or avoid impacts on the greatest extent possible.
- SS-9** When FMP actions disturb the habitat of special status plant species, revegetation and weeding plans will be developed in conjunction with project planning.
- SS-10** The potential for research burning and/or mechanical fuel treatments to enhance federally listed threatened or endangered plant habitat will be investigated. Burning in these habitats will be limited to carefully prescribed research burns, designed in conjunction with USFWS staff consultation and in accordance with established recovery plan objectives. Experimental treatments will be scientifically designed with replicate controls and a commitment to post-treatment monitoring.

Salmonids

- SS-11** Except in emergency situations, water drafting from park streams and creeks that support salmonids must be halted when water levels drop to a level that could result in disconnected pools of water in the channel. Any water pumping from salmonid streams will require measures to prevent injury to fish, such as using offstream sumps, restricting approach velocities to less than 0.8 foot per second, and screening at intake with openings no greater than 0.25 inch.
- SS-12** A buffer will be maintained around riparian areas where fire management activities will be restricted. Staging, fire line construction, and vehicle and heavy equipment use will occur outside the buffer area, and any activities such as nonnative vegetation removal and limited prescribed burning will occur under tightly controlled conditions. Any impacts that occur in the buffer area must be correctable by site-specific actions, and must be confined to short-term, minor (or less) adverse effects. In riparian areas directly adjacent to salmonids streams, mechanical FMP projects will be limited to an annual treatment of less than 10 acres and prescribed burning will require additional consultation.

SS-13 The fire management officer will consult with natural resources subject matter experts to identify rehabilitation and revegetation strategies where fuel reduction projects require bank stabilization in riparian areas. Rehabilitation in riparian areas will be accomplished by hand treatment techniques, using erosion control materials if treatment areas are bare prior to rains, revegetating where needed, and where possible, returning native woody material (large woody debris) to stream banks. If removal of vegetation critical to channel shading is planned or work is proposed for the wetted channel of salmonids streams, additional consultation will be needed.

Northern Spotted Owl

SS-14 Treatment activities described in the FMP or any noise generation above ambient noise levels will not occur within 0.40 kilometer (0.25 mile) of a known occupied or previously used northern spotted owl nest site, or within potential spotted owl habitat between February 1 and July 31 (breeding season), or until such date as surveys conforming to accepted protocol have determined that the site is unoccupied or nonnesting or nest failure is confirmed.

SS-15 Mechanical fuel reduction activities in suitable spotted owl habitat, known or potential, will not substantially alter the percent cover of canopy overstory and will preserve multilayered structure. When shaded fuel break features in suitable northern spotted owl habitat are constructed, the resulting multilayered canopy will only be reduced to a height of 6 to 8 feet, or along roadways as needed for emergency vehicle clearance.

SS-16 Prior to fire management activities, project areas will be surveyed for the presence of dusky footed woodrat nests. If feasible, woodrat nests will be protected.

SS-17 Within northern spotted owl habitat, the cutting of native trees greater than 10 inches diameter at breast height (dbh) will be avoided unless a determination is made that the native tree presents a clear hazard in the event of a fire or cutting is the only option to reduce high fuel loading.

SS-18 The fire management officer will arrange for qualified biologists to conduct post-project monitoring to determine short- and long-term effects of fire management actions on spotted owl activity centers if resources are available.

San Francisco Garter Snake

SS-19 No heavy equipment will be used off of existing fire roads or developed features in areas of known San Francisco garter snake habitat. If use of heavy equipment and trucks is required during emergency situations or for work that would improve San Francisco garter snake habitat, mitigation measures to avoid mortality will be incorporated into the project schedule. Measures to avoid mortality include hand-clearing areas prior to fire management activities, hand-excavating all burrows, trapping snakes out of the excavation area, using monitors to prevent equipment from injuring listed species, and training workers on identification and avoidance of listed species. Work will be conducted by biologists with a valid 10(a)(1)(A) permit and any collected San Francisco garter snakes will be relocated outside affected areas.

Marbled Murrelet

- SS-20** Where marbled murrelet habitat overlaps northern spotted owl habitat, the restrictions on noise generation in spotted owl habitat above the level of ambient noise will be to August 5. Further, from August 6 through September 30, noise generation will be limited to ambient noise levels from two hours before sunset to two hours after sunrise to protect any nesting marbled murrelets that have not been noted during surveys (USFWS letter to NPS dated April 13, 1994).
- SS-21** In marbled murrelet habitat, felling of very large Douglas-fir or coast redwood trees will be avoided and the fire perimeter will be established at a distance that will preclude the need to fell large trees.

Mission Blue Butterfly

See also Mitigation Measure SS-4 regarding use of ocean and bay waters for suppression actions.

- SS-22** Fire management activities will not occur within or immediately adjacent to existing or potential mission blue butterfly habitat during the flight period of the butterfly from February 15 through July 4.
- SS-23** Pile burning will only be permitted on barren, disturbed soils in mission blue butterfly habitat.
- SS-24** During the information meeting with local fire agencies, the location of mission blue butterfly habitat will be identified. During this meeting and when providing information at an active wildland fire as a resource advisor, natural resources staff will advise the local fire agency of the following guidelines:
- Avoid staging fire suppression actions in or directly adjacent to mission blue butterfly habitat;
 - Construct fire lines outside of mission blue butterfly habitat to the greatest extent possible;
 - Use wet lines wherever feasible, or narrow, hand-constructed fire lines where water is not available to help contain the spread of the fire; and
 - Avoid using saltwater or retardant on habitat of the mission blue butterfly.
- SS-25** The potential for research burning and/or mechanical fuel treatments to enhance butterfly habitat will be investigated. Burning in mission blue butterfly habitat will be limited to carefully prescribed research burns. Experimental treatments will be scientifically designed with replicate controls and a commitment to post-treatment monitoring. No more than five percent of existing mission blue butterfly habitat in each county will be treated experimentally each year.

- SS-26** Where possible, maintain a 100-foot-wide buffer between fire management activities and mission blue butterfly habitat except when fires are being conducted for research purposes. For habitat enhancement projects, additional measures will include establishment of buffer areas, flagging of *Lupinus albifrons* in the vicinity of activities, installation of temporary fencing, dust control, and worker education (USFWS Biological Opinion for the Fort Baker Plan/EIS, September 29, 1999).
- SS-27** The fire management officer will arrange for the removal of nonnative plants within and adjacent to mission blue butterfly habitat following fire management actions, including fire suppression.

San Bruno Elfin Butterfly

- SS-28** No planned fire management actions will occur in San Bruno elfin butterfly habitat. Proposed project areas in San Mateo County will be assessed to determine the potential for occurrence of San Bruno elfin butterfly habitat.
- SS-29** A 100-foot-wide buffer will be maintained between fire management activities and potential San Bruno elfin butterfly habitat.
- SS-30** During the information meeting with local fire agencies, the location of San Bruno elfin butterfly habitat will be identified. During the meeting and when advisors are called to provide information at an active wildland fire, natural resources staff will advise the local fire agency of the following guidelines:
- Avoid staging fire suppression actions in or directly adjacent to San Bruno elfin butterfly habitat;
 - Construct fire lines outside of San Bruno elfin butterfly habitat to the greatest extent possible;
 - Use wet lines wherever feasible, or narrow, hand-constructed fire lines where water is not available to help contain the spread of the fire; and
 - Avoid the use of saltwater or retardant drops on San Bruno elfin butterfly habitat.
- SS-31** Conduct fire management activities in areas directly adjacent to San Bruno elfin butterfly habitat outside the flight period of the butterfly, which is from February 1 through May 15.

Tidewater Goby

See also Mitigation Measure SS-4 regarding scooping of Rodeo Lagoon water for use in suppression actions.

- SS-32** During information meetings with local fire agencies (see Mitigation Measure NR-1), and on the scene of active suppression actions, natural resource advisors will inform responding fire agencies that Rodeo Lagoon shall not be used for water drafting unless needed to protect life and property and no other feasible water source is available.

California Red-Legged Frog

See also Mitigation Measure SS-4 regarding use of freshwater ponds as a water source for suppression actions and areas of the park sensitive to the use of ocean and bay waters for suppression actions.

- SS-33** All suitable habitat within areas proposed for fire management activities will be surveyed and flagged by a qualified biologist to determine whether the site supports suitable breeding or nonbreeding areas for the California red-legged frog.
- SS-34** To prevent direct injury to California red-legged frogs, removal of vegetation within suitable frog habitat will be accomplished by a progressive cutting of vegetation from the overstory level to ground level to allow frogs to move out of the treatment area.
- SS-35** If likely habitat is identified at the project site, a qualified and permitted biologist will follow accepted protocol and collect and relocate any individual red-legged frogs to nearby suitable habitat, in accordance with the biological opinion from the USFWS.

Western Snowy Plover

- SS-35** Where fire management actions involve operation of vehicles or heavy equipment on the beach, the fire management officer or the resource advisor (in the case of a wildfire) will ensure that vehicles will be driven at slow speeds (15 miles per hour maximum) over the wet sand portion of the beach and that natural wave-cast debris will be left on the beach to provide foraging habitat for the western snowy plover.
- SS-37** To avoid disturbance of western snowy plovers, aircraft assisting the NPS in the implementation of FMP projects will avoid flying directly over and parallel to the beach to the greatest extent possible.

California Brown Pelican

- SS-38** To avoid disturbance to the California brown pelican from late spring to early winter:
- Avoid operating aircraft below and within 500 feet of Rodeo Lagoon, Bird Island, and Bolinas Lagoon to the greatest extent possible.
 - Avoid drafting water from Rodeo Lagoon, the ocean near Bird Island, or Bolinas Lagoon.

Monarch Butterfly

- SS-39** All known clustering sites of monarch butterflies will be considered for protection from fire management actions.

Wildlife and Important Habitat Mitigation Measures

- WIL-1** Prescribed burns, mechanical treatments, and mowing of shrubs and grasses taller than 8 inches will not be conducted during the bird-nesting season, from March 1 through July 31, unless a qualified biologist conducts a pre-project survey for nesting birds and determines that birds are not nesting within the project area. To the greatest extent possible, these activities will be planned and conducted outside bird-nesting season. In intensively managed landscapes where mowing is justified for fuel reduction, vegetation will be maintained at a

height of less than 8 inches throughout the nesting season (March 1 through July 31) to discourage the nesting of ground-dwelling bird species.

- WIL-2** In addition to WIL-1, in order to protect nesting raptors, trees shall not be removed between January 1 and March 1 unless qualified personnel conduct a pre-project survey for nesting birds and determine that birds are not nesting within the project area. If nesting raptors are detected, a qualified biologist will delineate a suitable buffer.
- WIL-3** Subject to project review conditions, fire management actions proposed for areas of the park that provide only limited habitat (such as areas dominated by broom or ivy species) may be conducted at any time
- WIL-4** Since older burn piles could provide wildlife habitat, the piles will be spread out (to move out animals) as much as possible before burning. If moving the piles is not feasible, the fire management project manager will ensure that piles are lit from one side only (with firefighters on the ignition side), so that any wildlife in the pile can run out.
- WIL-5** For prescribed fire projects proposed in the Muir Woods FMU, the fire management officer will arrange for a qualified biologist to conduct bat surveys of the tree hollows within the burn unit to identify potential maternity colonies. Measures will be implemented to protect active maternity roosts.

Cultural Resources Mitigation Measures

- CUL-1** *Project Preparation Phase.* To assure that cultural resources are considered early in the fire management planning process and afforded the utmost protection, the following preparatory actions will be undertaken:
- Computer and other databases containing cultural resources data will be maintained by cultural resource staff in coordination with the needs of fire management activities.
 - Appropriate cultural resources monitoring protocols will be established by cultural resources staff and applied to fire management practices as warranted.
 - Potential research opportunities to study the effects of fire management actions on cultural resources will be identified by cultural resources staff.
 - Cultural resources specialists from adjacent land management agencies will be consulted by NPS staff, as appropriate, in order to coordinate mitigation efforts prior to fire management actions.
 - Indigenous archeological sites, spiritual sites, and important plant communities will be identified and appropriately managed for preservation, maintenance, and/or enhancement by park cultural resources staff. Consultation with local Native American communities will, where pertinent, continue to occur in the context of fire management actions.

- Fire management personnel and other staff will receive annual training in cultural resources in relation to fire management activities.

CUL-2 *Project Planning Phase.* All areas slated for fire management activities will be considered for pre-action field surveys, based on the recommendations of cultural resource specialists and the need to identify cultural resources in proposed project areas. This includes areas likely to be disturbed during future wildfire suppression activity, such as helispots, staging areas, and spike camps. Site-specific information gathering may include the following:

1. In cultural landscape areas, parameters for identifying vegetation for removal or retention will be incorporated into project planning.
2. Evaluation of the relative hazards of fuel loads in proposed project areas will address the protection of cultural resource values, including:
 - 2(a) Maintenance of light fuel loads on and in close proximity to cultural resources;
 - 2(b) Benefits gained from reduced fuel loads in relation to the need to avoid or minimize adverse effects on cultural resources;
 - 2(c) Opportunities to restore or enhance the historic character of cultural landscapes;
 - 2(d) In developing burn plans, assessment of the potential effects of heat intensity and duration above, at, and below the surface in relation to cultural resources; and
 - 2(e) For projects with the potential for accelerating the rates of erosion, potential effects of erosion on cultural resources.

CUL-3 *Project Implementation.* Adverse effects on known and unknown cultural resources will be avoided or minimized during the implementation of fire management projects. A variety of treatments and techniques, as detailed in the project planning and preparation phase for individual projects, will be used for the protection of cultural landscape features during implementation of both prescribed fire and mechanical treatment activities, as follows:

1. A cultural resource specialist or resource advisor will:
 - 1(a) Be present during fire management actions, as stipulated, where recorded and suspected but not-yet-recorded historic or prehistoric resources are considered at risk;
 - 1(b) Deliver a pre-project briefing to fire management staff as necessary; and
 - 1(c) Share data with fire management personnel as needed to avoid or minimize adverse effects.

2. Vegetation will be flagged, or otherwise identified, in order to properly carry out project planning stipulations for:
 - 2(a) Retention, based upon age determination or diameter thresholds as previously agreed upon;
 - 2(b) Raising the skirts on landmark trees and other tree pruning;
 - 2(c) Flush-cutting trees removed from cultural resource areas unless otherwise stipulated; and
 - 2(d) Brush removal within agreed-upon boundaries.
3. Fences may be a character-defining feature of historic properties. In such cases:
 - 3(a) Avoid fences with heavy equipment;
 - 3(b) Remove brush and scrub only by hand or with hand-tools in a 10-foot-wide buffer zone along fence lines;
 - 3(c) Provide vehicle access at gates where necessary; and
 - 3(d) Cut other openings, if necessary, between fence posts.
4. Field patterns may be a character-defining feature of historic properties. In such cases:
 - 4(a) Use prescribed burn to restore field patterns;
 - 4(b) Protect fences by not using heavy equipment within a 10-foot-wide buffer zone, and instead using less damaging methods to lessen fire danger, such as watering, hand removal, and hand tools; and
 - 4(c) Use hand removal of noncontributing vegetation near or in historic vegetation.
5. Structures and small-scale features may contribute, or be themselves, historic properties. In such cases:
 - 5(a) Remove brush approximately 30 feet from burnable structures, depending on slope, with hand tools being the default method; and
 - 5(b) If there are foundation plantings, create defensible space outside ornamental edge plantings wherever possible.
6. Some areas may be sensitive for archeological resources on or near the surface. In such cases:
 - 6(a) Do not drag cut vegetation;
 - 6(b) Do not use rakes;

- 6(c) Use no burning when surface or subsurface resources are sensitive to heat; and
- 6(d) Avoid using surface scarification to retard runoff in archeological sites.
- 7. Erosion will be minimized to the extent possible, by methods such as:
 - 7(a) Constructing control lines perpendicular to the slope;
 - 7(b) Using the existing road network;
 - 7(c) Keeping heavy equipment off paths and trails;
 - 7(d) Keeping heavy equipment away from areas adjacent to ponds and riparian corridors; and
 - 7(e) Avoiding these and other areas marked by flagging.

CUL-4 *Post-Project Phase.* Adverse effects on known and suspected cultural resources will continue to be avoided or minimized through careful consideration of actions during the post-action phase of mechanical treatment, prescribed fire, and fire suppression activities.

- 1. The post-action condition of all recorded cultural resources will be assessed, as necessary.
 - 1(a) Post-action surveys may be conducted both in previously surveyed areas and in unsurveyed areas.
 - 1(b) Previously unrecorded cultural resources will be assessed for condition, and stabilization and other protection needs.
- 2. Stabilization and other treatment needs of cultural resources will be addressed in the development and implementation of Emergency Stabilization Plans and Burned Area Restoration Plans, and in the development of funding requests for these and other post-fire programs as needed.
- 3. Monitoring and research data will be compiled, evaluated, and used to help refine cultural resource compliance for future fire management actions and objectives.

Visitor Use and Visitor Experience Mitigation Measures

VUE-1 Project work hours will normally be limited to normal work hours (8 A.M. to 5 P.M.) to minimize potential noise impacts on nearby residents and park visitors. Exceptions may occur outside of normal work hours where warranted, for example to take advantage of windows of favorable weather or to allow for project completion before wildlife breeding period restrictions begin.

VUE-2 Where noise levels from project operations could be intrusive to adjacent residents or park trail users, all efforts will be made during project planning to site project staging areas in order to optimize the noise level reduction gained from natural barriers and screening

vegetation. Staging areas will be sited to minimize noise levels for sensitive receptors to the extent feasible without causing adverse environmental effects on park resources, values, or public access.

- VUE-3** Park fire staff will avoid temporary closures of areas of the park during fuel reduction projects if spotters can be available to escort the public safely through the work area.
- VUE-4** To the extent feasible while protecting public health and safety, fire management officer will instruct contractors or NPS crews to secure work sites at the end of the work day so that closures around a project site can be lifted prior to and after working hours during weekdays and all day on weekends.
- VUE-5** The fire management office will develop and implement an education and communication plan for all site-specific fire management implementation projects. For large scale fuel reduction projects (more than 1 acre) that could affect mid- to close-range viewsheds for residents on the park boundary, park staff will arrange a meeting with the community to present the scope of work and provide an opportunity for public comment. Communication plans for projects may include information such as the project scope, schedule, and alternative trail routes, where needed, to be posted in the project vicinity.

Public Health and Safety Mitigation Measures

- PHS-1** Site plans for tree removal projects will be reviewed by the project review committee for potential safety hazards from windthrow and wind pattern change as a result of implementation.