Mount Rainier National Park
Fire Management Plan

Redstone Fire, September 2003

FIRE MANAGEMENT PLAN
Mount Rainier National Park

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Annual Fire Management Plan Reviews

MOUNT RAINIER NATIONAL PARK

2006 Approved by: _____ _____
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FONSI and Regional concurrence letter

I. INTRODUCTION

This document is the Fire Management Plan (FMP) for Mount Rainier National Park (MORA). The FMP Environmental Assessment (EA) and Findings of No Significant Impact (FONSI) are attached as appendices. Upon issuance this plan will meet the requirements of the National Environmental Policy Act (NEPA). as well as. the National Historic Preservation Act (NHPA) and other federal laws.

Mount Rainier National Park encompasses 235,625 acres on the west side of the Cascade Range, about 65 miles southeast of Seattle and 65 miles west of Yakima. The park was established in 1899 ". . . for the benefit and enjoyment of the people. . " Regulations within the park were enacted to "provide for the preservation from injury or spoliation of all timber, mineral deposits, natural curiosities, or wonders within said park, and their retention in their natural condition" (Mount Rainier National Park Organic Act 1899).

The FMP delineates the operational processes that MORA managers will follow in the event of a wildland fire or in the proposal and implementation of prescribed fire projects as well as hazard fuel reduction projects within park boundaries. The plan defines levels of protection needed to insure personnel and public safety, protect facilities and resources, and restore and perpetuate natural processes, given current understanding of the complex relationships in natural ecosystems.

All decisions regarding wildland fire suppression and prescribed fire will consider environmental and cultural impacts. NPS staff and, as appropriate, the public will participate in the review process.

RM-18 Wildland Fire Management Guidelines requires that all parks with vegetation capable of sustaining wildland fire develop a fire management plan (FMP). (Director's Order #18, Wildland Fire Management, 12/01/97)

This plan is tiered to the MORA Resource Management Plan and has been developed to assist park management in achieving resource-based objectives identified in the MORA Resource Management Plan (RMP) and General Management Plan (GMP) (2001).

Mount Rainier National Park contains outstanding examples of diverse vegetation communities ranging from old growth forest to sub-alpine meadows and ancient alpine heather. The park is a remnant of the once widespread primeval Cascade ecosystem where fire is a rare but catastrophic agent of forest change. The wet climate of the Pacific Northwest results in a long fire cycle with relatively low natural fire incidence. Lightning is the primary source of historic fire ignition in the park. Some occurrence of fire associated with prehistoric occupation in the park and surrounding areas has also been noted but it is not well documented.

Since the early to mid-1900s widespread fire suppression has occurred in this eco-region. Even so, wildfires have been the most important agent of forest change in and near the park and have affected all but a small fraction of the forested area during the last 1,000 years (Franklin 1988). Studies of natural fire rotation (the time it takes for fire to burn over and reproduce an area) show approximately 465 years for the pre-European era in the park and 226 years for the post-European era. Because of the comparatively short period of human management of Mount Rainier National Park (just over 100 years), there has likely been only moderate change of the park's natural fire rotation cycle in forested areas.

The primary purpose of the Fire Management Plan is to return fire as a natural ecosystem process to Mount Rainier National Park. In fulfilling this purpose, the equally important considerations of protecting life and property are of utmost concern.

Without a currently approved fire management plan, Director's Order 18: Wildland Fire Management (NPS 1998), states that "park areas must take an aggressive suppression action on all wildland fires, taking into account firefighter and public safety and resources to be protected within and outside the park." Director's Order 18 and its accompanying Reference Manual (NPS 2001) of the same number and title reiterated the need for Fire Management Plans to meet new guidelines.

According to National Park Service Management Policies (NPS 2001:4:38), "all NPS Units with vegetation that can sustain fire must have a Fire Management Plan" to guide a fire program that responds to natural and cultural resources management objectives; provides for the safety of park visitors, employees, neighbors and developed facilities; and addresses potential impacts to adjacent public and private property.

Fire Management Plans are also dictated by the Department of Interior's *Departmental Manual* for all lands administered by the Department (USDI 1997).

For many decades, beginning with park establishment, all fires occurring in the park were suppressed. Despite the fact that future fire planning, [beginning with the revision of the Fire Control Plan (1979)] focused on returning the park to a natural fire regime, most fires occurring in the park continued to be suppressed and prescribed fire was not used.

Increased understanding of the role of fire, as a result of gathering scientific data, has led park managers to conclude that the total exclusion of natural, lightning-caused fires from the park ecosystem can cause very undesirable effects, including a loss of diversity or vigor in vegetation and wildlife. The National Park Service considers natural fire a viable ecosystem process that must be engaged in its natural role in parks if the agency is to fulfill its mission of preserving park resources and natural processes for future generations. Because fires have the potential to harm visitors, impact adjacent lands and to have significant short and long-term resource impacts, park managers need to ensure wildland fire management objectives are clearly stated and management processes are utilized that minimize risk to acceptable levels.

The primary goals of the Mount Rainier National Park Fire Management Plan are to protect life and property and to preserve sensitive natural and cultural resources, while ensuring the perpetuation of natural ecosystem processes. The plan incorporates a detailed operational program of actions to carry out the fire management policies and objectives stated herein.

Fire Management Plans are both planning and operational documents that ensure the protection of life and property and sensitive natural and cultural resources, while advocating the perpetuation of natural ecosystem processes.

Mount Rainier National Park's Fire Management Plan will:

- meet the requirements of NPS Management Policies (2001);
- fulfill the ecosystem management goals in the park General Management Plan (2001) and Natural and Cultural Resources Management Plan (1999);
- meet the requirements of the National Environmental Policy Act and other natural and cultural resources related laws; and
- Implement a strong fire management program for the park that will enable natural fires to approximate natural fire rotation in the park ecosystem.
- provide for safety considerations for park visitors, employees, neighbors, and developed facilities;
- Address potential impacts to public and private property adjacent to the park (Management Policies 2001, 4.5, 38).

Authorities

1) Fire Management

Authority for fire management is found in 16 USC Sec. 1 (August 25, 1916), which states that the agency's purpose:

..is to conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations."

This authority was clarified in the National Parks and Recreation Act of 1978:

Congress declares that...these areas, though distinct in character, are united...into one national park system....The authorization of activities shall be construed and the protection, management, and administration of these areas shall be conducted in light of the high public value and integrity of the National Park System and shall not be exercised in derogation of the values and purposes for which these various areas have been established, except as may have been or shall be directly and specifically provided by Congress."

2) Fire Management Funding

The authority for FIREPRO funding (Normal Fire Year Programming) and all emergency fire accounts is found in the following authorities:

Section 102 of the General Provisions of the Department of Interior's annual Appropriations Bill provides the authority under which appropriated monies can be expended or transferred to fund expenditures arising from the emergency prevention and suppression of wildland fire.

P.L. 101-121, Department of the Interior and Related Agencies Appropriation Act of 1990, established the funding mechanism for normal year expenditures of funds for fire management purposes.

31 US Code 665(E)(1)(B) provides the authority to exceed appropriations due to wildland fire management activities involving the safety of human life and protection of property.

3) Procurement /Administrative Activities
Authorities for procurement and administrative activities necessary to support wildland fire suppression missions are contained in the Interagency Fire Business Management Handbook.

4) Cooperative Agreements

Authorities to enter into agreements with other Federal bureaus and agencies; with state, county, and municipal governments; and with private companies, groups, corporations, and individuals are cited in DO-20 (Federal Assistance and Interagency Agreements). These include the Reciprocal Fire Protection Act of May 27, 1955 (42 USC 815a; 69Stat 66).

Authority for interagency agreements is found in Interagency Agreement between the Bureau of Land Management, Bureau of Indian Affairs, National Park Service, U.S. Fish and Wildlife Service of the United States Department of the Interior and the Forest Service of the United States Department of Agriculture, State of Oregon and the State of Washington (1998). Authority for rendering emergency fire or rescue assistance outside the National Park System is the Act of August 8, 1953 (16 USC 1b(1)) and the Departmental Manual (910 DM)(1.)

5) Fire Management Plan Implementation
Authorities for implementing this plan are identified in RM-18.

II. NATIONAL PARK SERVICE POLICY and RELATION TO OTHER PLANS

Authority for the Fire Management Plan is contained in the legislation creating Mount Rainier National Park. The park was established in 1899 " . . .*for the benefit and enjoyment of the people* . . . " The Act further directs the Secretary of Interior to establish regulations within the park to "*provide for the preservation from injury or spoliation of all timber, mineral deposits, natural curiosities, or wonders within said park, and their retention in their natural condition*" (Mount Rainier National Park Organic Act – Title 16, USC, Section 91, 30 Stat 993, March 2, 1899*).*

Subsequent congressional action set aside 216,855 acres or approximately 97 percent of the park's 235, 625 acres as Wilderness (Public Law 100-668, November 16, 1988). Later, in 1997, approximately three percent of the park (or 1,700 acres) encompassing most of the park's developed areas, roads, bridges and the Wonderland and Northern Loop trails were listed on the National Register of Historic Places as the Mount Rainier National Historic Landmark District (See Appendix 4). The National Historic Landmark District identifies the park as the *best and most complete example* of the conception and idea of the American national park as it was embodied and implemented through the NPS master planning effort of the early 20th century. Based on the Clean Air Act (1977), Mount Rainier National Park is in a mandatory class I air quality area. A class I designation allows very little additional deterioration of air quality. Surrounding wilderness areas, including the Goat Rocks Wilderness, the Alpine Lakes Wilderness and the William O. Douglas Wilderness are also mandatory class I areas.

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

> *Wildland fires, whether on lands administered by the Department or adjacent thereto, which threaten life, man-made structures, or are determined to be a threat to the natural resources or the facilities under the Department's jurisdiction, will be considered emergencies and their suppression given priority over normal Departmental programs.*
>
> *Bureaus will give the highest priority to preventing the disaster fire - the situation in which a wildfire causes damage of such magnitude as to impact management objectives and/or socio-economic conditions of an area. However, no wildland fire situation, with the possible exception of threat to human survival, requires the exposure of firefighters to life threatening situations.*
>
> *Within the framework of management objectives and plans, overall wildfire damage will be held to the minimum possible giving full consideration to:*
>
> *(1) an aggressive fire prevention program;*
> *(2) the least expenditure of public funds for effective suppression;*
> *(3) the methods of suppression least damaging to resources and the environment; and*
> *(4) the integration of cooperative suppression actions by agencies of the Department among themselves or with other qualified suppression organizations.*

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

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

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

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

> *The service will re-establish natural functions and processes in human disturbed natural systems in parks unless otherwise directed by Congress. Landscapes disturbed by natural phenomena, such as landslides, earthquakes, floods, hurricanes, tornadoes and fires, will be allowed to recover naturally unless manipulation is necessary to protect park developments or visitor safety. Impacts to natural systems resulting from human disturbance include. . . and the disruption of natural processes. The Service will seek to return human-disturbed areas to the natural conditions and processes characteristic of the ecological zone in which the damaged resources are situated. The Service will use the best available technology, within available resources, to restore the biological and physical components of these systems, accelerating both their recovery and the recovery of landscape and biological-community structure and function.*

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

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

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

With respect to wilderness, fire management in parks is to be carried out consistent with the "minimum requirement" concept defined in Director's Order #41: Wilderness Preservation and Management. In addition the overall goal, with respect to suppression activities in parks, is accomplishment in a way that minimizes impacts of the suppression action and the fire and which is commensurate with effective control, firefighter and public safety and the resource values to be protected.

NPS Management Policies are further clarified in Director's Orders (DO). DO #18: Wildland Fire Management (November 1998) sets the goals of fire management in the National Park System stating that the NPS will administer its fire management program in a way that will:

a. Achieve maximum overall benefits and minimize damages of wildland fire use within the framework of land use objectives and resource management plans while giving primary consideration to firefighter and public safety.

b. Educate employees and the public about the scope and effect of wildland fire management, including fuels management, resource protection, prevention, hazard/risk assessment, mitigation and rehabilitation, and fire's role in ecosystem management.

c. Stabilize and prevent further degradation of natural and cultural resources lost in and/or damaged by impacts of wildland fires and/or fire management activities.

d. Maintain the highest standards of professional and technical expertise in planning and safely implementing an effective wildland fire management program.

e. Integrate fire management with other aspects of park management.

f. Manage wildland fire incidents in accordance with accepted interagency standards, using appropriate management strategies and tactics and maximize efficiencies realized through interagency coordination and cooperation.

g. Scientifically manage wildland fire using best available technology as an essential ecological process to restore, preserve, or maintain ecosystems and use resource information gained through inventory and monitoring to evaluate and improve the program.

h. Protect life and property and accomplish resource management objectives, including restoration of the natural role of fire in fire-dependent ecosystems.

i. Effectively integrate the preservation of wilderness, including the application of "minimum requirement" techniques into all activities impacting this resource.

Operationally, DO – 18 directs the park to:

- make firefighter and public safety its first priority in all fire management activities;
- to ensure that fire personnel meet appropriate qualifications for incident assignments;
- to equip firefighters with appropriate personal protective equipment (PPE), based on incident assignments;
- to comply with the National Wildfire Coordinating Group (NWCG) and NPS fitness and other standards for park and other fire personnel;
- to implement core basic training requirements;
- to systematically analyze fire incidents that result in human entrapment, fatalities or serious injuries;
- to follow all established safety standards and risk management standards; and
- to use job hazard analyses for potentially hazardous fire management activities and out of the ordinary PPE use.

In addition, specific standards were set for Fire Management Plans; interagency coordination; training, qualifications and certification; preparedness, prescribed fire operations, burn plans, fire monitoring, fuels management, debris disposal, certification and evaluation and review; burned area emergency rehabilitation, research and fire funding/tracking (FIREPRO), business and personnel management.

Chapter 4 of the DO – 18 Reference Manual (RM – 18): *Wildland Fire Management* specifically identifies the components of fire management plans. Although the plans are considered operational in nature, they are public documents. By the same token, the plans are to be understood and carried out by NPS staff. Fire management plans must be directly related to Natural and Cultural Resource Management Plans and must, therefore, help to achieve resource management objectives.

A. LAWS THAT REGULATE FIRE MANAGEMENT PLANNING IN THE NPS INCLUDE:

- **Antiquities Act** (PL Chapter 3060, 34 Stat 225, 16 USC 431-433)

This act enforces the protection of archeological sites and objects under the jurisdiction of federal agencies.

- **Archaeological Resources Protection Act** (P.L. 96-95, Stat 721, 16 USC470aa-II)

Enacted to prevent the illegal excavation and possession of archeological resources located of federal, other public and Indian lands, this act recognized that the Antiquities Act was inadequate in both defining archeological resources and in establishing penalties.

- **Clean Air Act** (PL Chapter 360, 69 Stat 322, 42 USC 7401 *et seq*.)

The purpose of this act is to protect and enhance the nation's air quality to promote public health and welfare. It established a program to prevent significant deterioration of air quality in clean air regions of the U.S. This program established national standards "to preserve, protect and enhance the air quality in national parks, monuments, national seashores and other areas of special natural, regional, recreational, scenic or historic value."

- **Clean Water Act** (Federal Water Pollution Control Act) (PL 92-500, PL 100-433, 86 Stat 816, USC 9, sec. 1251 *et seq*., as amended, 33 USC sec. 1251-1376, and 1987 Federal Water Quality Act)

This act established federal regulation of the nation's waters and ensures that states set and enforce water quality standards to meet EPA minimum guidelines. It sets limitations for pollution, establishes a permit for discharge of dredged or fill material and authorized a National Wetlands Inventory.

- **Endangered Species Act** (PL 93-205, 87 Stat 884, 7 USC 136, as amended)

This act requires federal agencies to ensure that their activities (authorized, funded or implemented) will not jeopardize the existence of any endangered or threatened species or result in the destruction or adverse modification of critical habitat of such species.

- **National Environmental Policy Act** (PL 91-190, 42 USC 4321 *et seq*., 83 Stat 852, 42 USC 4332, as amended)

NEPA is the basic charter for national environmental protection. It sets national policy for environmental protection and requires federal agencies to ". . . plan and carry out their activities. . ." so as to protect and enhance the quality of the environment. NEPA requires an interdisciplinary approach to evaluate and publicly disclose the impacts of federal proposed actions.

- **National Historic Preservation Act** (PL 89-665, 80 Stat 915-919, 16 USC 470 *et seq*.)

This act established a federal historic preservation program, including the National Register of Historic Places. Section 106 of the act requires the evaluation of impacts to districts, sites, buildings, structures, and objects important in American history.

- **National Park Service Organic Act** (PL Chapter 408, 39 Stat 535 *et seq*., 16 USC 1)

This act established the National Park Service and declared its mission.

- **Redwood National Park Act** (PL 95-250, 92 Stat 163, as amended)

This act established consistency in the way in which all national parks are managed. The NPS is mandated to afford the highest standards of protection and care to park resources; no decision can compromise these resource values, except where specifically authorized by law.

- **Wilderness Act** (PL 88-577, 78 Stat 890, 16 USC 1131 *et seq*.)

This act established the National Wilderness Preservation System. Federal agencies are required to provide for their use now and in the future and to protect and preserve their wilderness character. Section 4 of the Wilderness Act, "Limitations of Use and Activities," defines prohibited uses and

special provisions. Section 4 (c) defines minimum requirements for the administration of wilderness including those involving emergencies: prohibiting the use of motorized equipment and allowing no landing of aircraft. Section 4 (d), "Special Provisions," provides for " . . . use of aircraft where . . . these uses have already become established…such measures may be taken as may be necessary in the control of fire."

In addition, the following Executive Order applies:

Protection of Wetlands (EO 11990, 1977 42 FR 26961, 3 CFR 121 (Supp 177), 42 USC 4321) This EO furthers NEPA policies by directing federal agencies to " . . .avoid to the extent possible the long and short term adverse impacts associated with the destruction or modification of wetlands and to avoid direct or indirect support of new construction in wetlands wherever there is a practicable alternative . . ."

B. ENVIRONMENTAL ASSESSMENT

The Environmental Assessment (Appendix 5) is prepared to satisfy the requirements of the National Environmental Policy Act (NEPA) (1969), as amended. This Act requires the documentation and evaluation of potential impacts resulting from federal actions on lands under federal jurisdiction. An Environmental Assessment discloses the potential environmental consequences of implementing the proposed action and other reasonable and feasible alternatives.

C. RELATIONSHIP TO OTHER PLANS

The General Management Plan, Natural and Cultural Resources Management Plan and Wilderness Management Plan all contain goals or objectives that relate to managing fire in the park.

The Mount Rainier *Draft General Management Plan* (December 2000) includes the following resource stewardship and protection goals.

- *Natural and cultural resources and associated values of Mount Rainier National Park are protected, restored and maintained in good condition and managed within their broader ecosystem and cultural context.*
- *Mount Rainier National Park contributes to knowledge about natural and cultural resources and associated values; management decisions are based on adequate scholarly and scientific information.*
- *Establish and maintain inventory and long-term monitoring programs for measuring the status and health of the park's natural, cultural and social resources.*
- *Plant communities and the processes governing them will continue unaltered in the majority of the park.*

The GMP also includes the following strategies to enhance ecosystem management (including re-establishment of the historic role of fire) beyond the park boundary.

- Cooperative agreements will continue to be sought with the U.S. Forest Service and other adjacent land management agencies to protect ecosystem habitat and wildlife corridors.
- The park will continue to develop cooperative agreements, partnerships and other feasible arrangements to set an example in resource conservation and innovation, and to facilitate research related to park resources and their management.

The *Natural and Cultural Resources Management Plan* (NCRMP) (1999) identifies fire management as an issue and within the context of project statements identifies proposed goals/objectives.

According to the NCRMP (Integrated Project Statement I-906.000: Conduct Natural Fire Management Program), wildfires have essentially been suppressed in and on lands surrounding the park since park establishment in 1899. These suppression practices have reduced the amount and extent of fire in a way not consistent with the historic role of fire. Suppression of all fires has altered the ability of the ecosystem to function naturally, leading to an increased probability of catastrophic fire over time. The plan recommends adopting a new Fire Management Plan consistent with meeting resource objectives and then implementing it.

The use of prescribed fires can enable the park to restore the historic role of fire. The use of prescribed fire is called for to accomplish resource objectives (while burning in a predetermined prescription). It also continues to call for using appropriate suppression strategies for fires that do not meet established criteria.

The exclusion of natural (lightning) fires from park ecosystems would cause unnatural effects as a result of increasing fuel accumulations. Eventually, loss of diversity in vegetation and wildlife and a degradation of ecosystem health may take place. To curtail these effects and continue a process of natural disturbance, the use of naturally ignited fires will contribute to the attainment of resource management objectives.

With respect to fire management in wilderness, the NCRMP calls for implementing a new Fire Management Plan, utilizing minimum fire suppression techniques where and when appropriate and for rehabilitation of areas impacted by fire suppression activities (Integrated Project Statement I-601.000: Manage Wilderness According to Park's Wilderness Management Plan).

D. FIRE MANAGEMENT PLANNING BACKGROUND 1979 TO PRESENT

The Fire Control Plan (1979) focused on ensuring reasonable protection of park structures and facilities and suppression of wildfires. The Fire Management Plan (1988) called for broader use of fire in an ecosystem (primeval wilderness character) context to return fire and fire effects to their natural role in the park. Its objectives included:

- enabling naturally occurring fires to burn within designated prescriptions,
- using prescribed fire as a tool to restore ecosystem processes,
- suppressing all human-caused fires and fires within established exclusion zones,
- expanding ongoing public education,
- mechanical removal of hazardous fuels near historic and administrative facilities,
- establishing and maintaining interagency cooperation,
- maintaining trained personnel; and
- systematizing fire procedures, standards and responsibilities in the park.

Under the previously selected alternative, the park was divided into three zones: a fire exclusion zone, a conditional zone and a prescribed natural fire zone. All naturally occurring fires within the conditional and prescribed natural fire zones were initially to be considered natural prescribed fires. From there, each ignition would be analyzed and declared either a prescribed natural fire or a wildfire.

A change in NPS fire management policy and revisions to key documents made the 1988 Fire Management Plan obsolete, pending a revision that incorporated these changes. This plan is that revision.

III. DESCRIPTION OF THE PARK AND REGION

A. MOUNT RAINIER NATIONAL PARK

Mount Rainier National Park was recognized as a significant area when the U.S. Congress established it as the nation's fifth national park in 1899. Tahoma Woods, the park's outlying administrative area was added in 1963.

As mentioned above, in 1988, the Mount Rainier Wilderness was designated by Congress and later, in 1997, the National Historic Landmark District was established. It encompassed and expanded the five previously designated historic districts (Longmire, Paradise, Nisqually, Sunrise, White River and Camp Muir).

The park is comprised of 235,625 acres in west central Washington, on the western slope of the Cascade Range. Eighty three percent (196,181 acres) of the park lies in Pierce County and 17 percent (39,444 acres) is in Lewis County. The park's northern boundary is approximately 65 miles southeast of the Seattle-Tacoma metropolitan area and 65 miles west of Yakima (see Park Vicinity and Adjacent Land Ownership maps). The elevations of the park range from about 1,700 feet above sea level to 14,411 feet at the summit of Mount Rainier.

The focal point of the park is the towering, snow and ice-covered volcano, a prominent landmark in the Pacific Northwest. The base of the volcano spreads over an area of about 100 square miles. Mount Rainier is the second most seismically active and most hazardous volcano in the Cascade Range. The 26 major glaciers that flank the upper mountain cover 35 square miles. Below, steep, glaciated valleys, and ice carved peaks dominate the park landscape. The Carbon, Mowich, White, West Fork White, Nisqually, South Puyallup, and North Puyallup rivers and their tributaries carry water from Mount Rainier to the Puget Sound and the Ohanapecosh flows into the Cowlitz River and on into the Columbia River. Over 470 mapped rivers and streams, 382 mapped lakes and ponds, and more than 2,500 acres of wetlands, numerous waterfalls and mineral springs characterize this park in the Cascades.

Mount Rainier's scenic landscapes – including the dense lower old-growth forests, the magnificent display of subalpine wildflowers, and the mountain itself – have attracted people for generations. The mountain is a destination for snow and ice climbers throughout the world. About 2.0 million people visit the park annually, with most visitation (75 percent) occurring between June and September.

Park vegetation is diverse, encompassing three ecological zones. Above 6,000 feet or tree line and comprising approximately 19 percent of the park is the alpine zone, generally consisting of snow, ice, rock and fragile alpine plants. From about 5,000 feet to tree line and covering about 23 percent of the park is the subalpine zone, characterized by scattered stands of sub alpine fir, and heather and grass meadows. Below the sub alpine lies the forest zone, occupying about 58 percent of the park and dominated by western hemlock, silver fir, Douglas fir and western red cedar and other species.

In addition to its natural wonders, the national park has a long history of human activities. The area was used by Native Americans for hunting and gathering, as well as for spiritual and ceremonial purposes. In the early 20th century miners, climbers, and tourists, among others, came into the area. The establishment of the park, and subsequent planning and development for visitor use and landscape protection constitutes an important chapter in the development of the American park idea. As a result, the park has rich and diverse cultural resources, including prehistoric and historic archeological resources, historic structures and cultural landscapes.

At least five federally recognized tribes have traditional association with Mount Rainier:

1) Muckleshoot Indian Tribe
2) Puyallup Tribe of Indians
3) Cowlitz Indian Tribe

4) Nisqually Indian Tribe
5) Confederated Tribes and Bands of the Yakama Nation
6) Squaxin Island Tribe

Important treaties include the Treaty with the Yakama (1855), the Treaty of Medicine Creek (1854), and the Treaty of Point Elliot (1855). Also of note is the presence of the Cowlitz Tribe at negotiations for the Chehalis River Treaty of 1855.

Ethnographic evidence demonstrates historical activity in the park, and current indicate ongoing contemporary uses of the park by Indian people. As the park broadens its research and collaborative efforts with tribal groups, it is likely that traditional Native American uses of Mount Rainier will become better understood. Partnerships provide an opportunity for native tribes and the park to cooperate in mutually beneficial efforts for the purpose of preserving the park's resources to their fullest extent and highest level of integrity (National Park Service 2001).

B. SURROUNDING LANDS

The park is bordered primarily by U.S. Forest Service land, including the

- Mt. Baker-Snoqualmie National Forest to the southwest, northwest and northeast
- Wenatchee National Forest to the east and southeast, and
- Gifford Pinchot National Forest to the south.

In addition, four U.S. Forest Service wilderness areas (managed by the above forests) share a common boundary with the park:

- Clearwater Wilderness (14,598 acres)
- William O. Douglas Wilderness (166,603 acres)
- Tatoosh Wilderness (15,700 acres)
- Glacier View Wilderness (3,080 acres)

These designated wilderness areas are also called "Congressionally Reserved Areas" under the *Northwest Forest Plan" (*USFS and BLM, 1994).

Most of the bordering non-wilderness forest lands are classified by the USFS as "late successional reserves", which are being managed over the long-term to protect and enhance late successional and old growth forest characteristics, including habitat for the northern spotted owl. Although thinning and silvicultural treatments are allowed in these reserves, they can only occur in stands up to 80 years of age and only if the treatment is determined to be beneficial to the creation and maintenance of late successional forest conditions.

Private lands are located along the park's western boundary in Pierce County. Rainier Timber Company, LLC (formerly International Paper and Champion Pacific Timberlands, Inc.) owns about 120,000 acres of land adjacent to the west park boundary and Plum Creek owns three sections of productive timberland adjacent to the northwest park boundary.

Lands adjacent to Mount Rainier National Park are comprised of private lands (13%), USFS lands (54%) and USFS Wilderness (33%). The perimeter of the parks is 85 miles, with private lands totaling 10.9 miles, USFS Late Successional Reserve and Matrix lands 27.9 miles, and USFS Wilderness 46.2 miles.

C. DESCRIPTION OF ADJACENT LANDS FIRE MANAGEMENT GOALS

A map of the area can be viewed on the linked web site: Adjacent Lands

- Mt. Baker-Snoqualmie National Forest to the southwest, northwest and northeast
- Wenatchee National Forest to the east and southeast, and
- Gifford Pinchot National Forest to the south.

The US Forest Services area bordering Mount Rainier NP are in the full suppression mode. They have not yet introduced the fire use concept in their wildernesses. They are not willing to accept MORA's fires and would aid in the suppression efforts to prevent a fire from entering their land management responsibilities.

- Clearwater Wilderness (14,598 acres)
- William O. Douglas Wilderness (166,603 acres)
- Tatoosh Wilderness (15,700 acres)
- Glacier View Wilderness (3,080 acres)

Private lands are located along the park's western boundary in Pierce County. Rainier Timber Company, LLC (formerly International Paper and Champion Pacific Timberlands, Inc.) owns about 120,000 acres of land adjacent to the west park boundary and Plum Creek owns three sections of productive timberland adjacent to the northwest park boundary.

All of the private land owners on the east boundary of MORA are also not willing to accept any type of fire onto their properties. Upon concurrence from the FS or private landholder, all efforts would be made to suppress a wildland fire that would leave the Park.

D. HISTORIC ROLE OF FIRE AT MOUNT RAINIER NATIONAL PARK

1. FIRE ECOLOGY

Maps of the area can be viewed by linking to the web: Recent Fire History

Fires tend to be infrequent in the forests and meadows of Mount Rainier. However infrequent, fires are by far the most important disturbance factor affecting forests on a wide scale in the park. Hemstrom and Franklin (1982) suggest a natural fire rotation of 465 years for the montane forests, with substantial variance in that figure from century to century. This long rotation period often allows forest succession to proceed to the climax forest condition. Below about 3,000 feet elevation, western hemlock (*Tsuga heterophylla*) is the dominant climax species. Above 3,000 feet elevation, it gives way to Pacific silver fir (*Abies amabilis*). In the mountain hemlock, extending to 6,500 feet, whitebark pine (*Pinus albicaulis*), subalpine fir (*Abies lasiocarpa*) and mountain hemlock (*Tsuga mertensiana*) are the persistent species in these zones.

In the *Western Hemlock Zone*, disturbance by fire kills most of the trees inside the fire boundary. Occasionally, scattered Douglas-fir (*Pseudotsuga menziesii*), markers of an earlier fire, survive. Douglas fir live up to 1000 years, and as an early seral species only reproduce in open conditions. After a fire, it usually dominates early successional stands, but later successional species such as western hemlock [and in the east, grand fir (*Abies grandis*)] are also present. Over centuries, these later successional species will replace Douglas-fir as individual Douglas-fir die; however, total replacement can take 700-1000 years.

Throughout much of the *Pacific Silver Fir Zone*, Douglas-fir shares early successional dominance with noble fir (*Abies procera*) and western white pine (*Pinus monticola*). The ages of these trees are often

used as indicators of a past disturbance. As stands grow older, Pacific silver fir assumes a more important role in the forest overstory and understory.

Successional dynamics at high elevations are difficult to determine. Harsh environments for tree regeneration often result in the conversion of forests to shrub and herbaceous environments for a century or more. The diversity of the landscape in the *Mountain Hemlock Zone* depends on the balance between forest and non-forest vegetation, and how fire affects that balance. Huff and Agee (1991) affirmed the importance of fire in maintaining mountain hemlock meadow ecosystems. Similar studies in the Olympic Mountains (Agee and Smith, 1984) suggest that post-fire forest recovery depend on good seed producing years in adjacent forest and mild, moist summers. Large burn areas remain meadows for over a century. Henderson (1973) shows a great diversity in pioneer communities and community routes, reflecting in part the wide diversity in meadow environments found at Mount Rainier.

In summary, fire has been a factor in plant community development at Mount Rainier for millennia. The character of both western hemlock and mountain hemlock forests reflects the influence of fire, although in some cases the stands have been undisturbed for many centuries. Continuation of the role of fire is essential if the natural diversity and structure of the park forests and meadows are to be maintained for future generations.

2. FIRE HISTORY

Maps of the area can be viewed on these linked web sites:
Fire Frequency
Fire Frequency and Forest Age
Fire Frequency/Natural Fire Rotation

Disturbance of park vegetation by fire is an important natural process that has played a prehistoric and historic role in forming the mosaic of vegetative communities at Mount Rainier National Park. "Natural stand replacement, on (western Cascade slope) forests, almost inevitably results from fire."
In a western hemlock/Douglas-fir forest the natural fire regime is one of infrequent crown and severe surface fires that usually result in total mortality of the trees in the stands (Agee 1981). These disturbances permit the establishment of even-aged classes of early seral stage conifers (Hemstrom and Franklin, 1982). All but a small fraction of the forest area has been affected during the last 1,000 years (Hemstrom and Franklin, 1979). Frequency of prehistoric fires must be determined from vegetation map patterns, aerial photos and fire scar analysis. From research, the natural fire rotation for Mount Rainier has been determined to be approximately 465 years (Franklin *et al.* 1988).

Huff and Agee (1991) state "We found fire to be a major disturbance factor in subalpine forests, similar to other forests..." "It is clear that subalpine fir forests in this region are linked to recurring fire. Many low elevation subalpine meadows and treed meadows would not exist in these areas without fire. The diversity and patchwork of meadows, tree clusters, and forests would be altered without fire. If global warming becomes a reality, fire will likely be a major initiator of new forest development patterns."

The park's fire history shows the largest recent human-caused fire within the park to have been a road clearing fire that escaped and burned 11,000 acres in the 1930s. Ancient fire history (Table 1), however, shows fire episodes (based on tree ring analysis and other factors) of up to 61,750 acres. Excepting that, large fires have been in the range of 2,500 to 11,000 acres, and most fires have been on the order of 1,000 acres or less. Finally, the most frequent fires are much smaller, on the order of 1-5 acres or less.

Early park documents (Allen 1922) also attest to burning of some park landscapes by Native Americans. Allen suggests that Mount Rainier lands were burned by Indian people to make them more accessible and to improve huckleberry and game habitat (*See also Fire History section below*).

Therefore, it is reasonable to assume that unless regional weather patterns precipitated extremely large catastrophic fires (that under any scenario would likely be difficult to contain or control), that the fire management strategies employed in this plan, including Fire Suppression, Wildland Fire Use, and Prescribed Fire, would primarily result in a large number of fires less than 5 acres, some fires up to 2,500 acres, and a few fires between 2,500 and 11,000 acres. The actual size and number of fires would depend on prevailing weather patterns, the location of lightning strikes, and the extent of fire spread before naturally extinguished (via weather conditions or fuel breaks or discontinuities) or suppressed.

Fire frequency varies with topographic position. Age of major fire episodes are shown along different slope aspects. For example, in the Ohanapecosh River valley, north and east facing slopes contain old growth forests of 700+ years. South and west facing slopes have stands 350 years old or less. The White, Cowlitz and Nisqually River drainage's have burned most frequently because of a general southerly aspect and lack of natural barriers to prevent disturbances outside the park from burning into the park (Hemstrom and Franklin, 1982 and Franklin *et al.* 1979).

Historical records from 1850 to 1915 are sketchy. Documentation of this period indicates less than 100 fires that were over 20 acres in size. The largest fires, however, were up to 2,500 acres. Miners, hunters and sheepherders were active in the area and fires were either documented by or attributed to their activities. In 1880, the greatest acreage (2,540 acres) burned from two ignitions. (Report from Chief Ranger's Office, 1953).

Historically, the sources of ignition have been lightning, aboriginal humans and modern humans. To what degree fires in the park had human origins is not yet clear, however one of the most specific references is from Forests of Mount Rainier National Park (G.F. Allen 1922) which contains the following description.

> "The old burns in the middle altitudes of the park occupy regions once frequented by the Klickitat Indians. Every summer parties of hunters and berry pickers from the sagebrush plains crossed the Cascades with their horses. They followed the high divides and open summits of the secondary ridges until they came around to the open parks about Mount Rainier where they turned their horses out to graze and made their summer camp. The women picked huckleberries and the men hunted deer and goats. They made great fires to dry their berries and kindled smudges to protect their horses from flies. It was also their custom to systematically set out fires as they returned. Burning made the country better for the Indians. The fires kept down the brush and made it more accessible. Deer could be more easily seen and tracked and the huckleberry patches spread more widely over the hills.
>
> No considerable part of the lower forests of the park has been burned. The principal danger is from lightning. However, few of the trees struck are ignited and these fires are usually extinguished by the rain. . ."

A more recent reference drawn from work that analyzed the Native American fire influence on the surrounding Mount Rainier Forest Reserve (some of which later became part of the park) states that of 32 fires that occurred in 1904-05, 16 were recorded to have been caused by American Indians (Mack 2003). Later the same article states:

> What we see here is a pattern of repeated fires set in areas where the tree cover is very light, either within or adjacent to existing larger burns. They were set at a time of year when either rain or snow could be counted on to extinguish them within a month's time. They could certainly be described as maintenance fires.

By only a few years later (1907) Mack (2003) states that only one of 22 fires was of Native American origin.

Native Americans may have set maintenance fires through the early part of the 20th century in old burns in the park and/or the Mount Rainier Forest Reserve (later national forest land) that continued to result in higher production of berry and/or ungulate forage (Allen 1904, Mack 2003) although the connection between increased berry production and increased fire frequency as studied by Minored *et al.* (1979) was inconclusive (Mack 2003). Anglo-Europeans were probably a significant influence in the mid-1800s, setting clearing fires that may have moved into the park. During the twentieth century, Anglo-Europeans have both set and suppressed fires in the park. Lightning has historically been the most important ignition factor, and will probably continue to be so.

The largest single fire in the park's history was 11,000+ acres (1930) at Sunset Park, on the park's west side. The cause was right-of-way burning for construction of the Westside Road (Superintendent's Annual Report, 1931). The most frequent natural fires have been small, less than 1 acre in size; and are ignited on upper slopes. Major fires are typically intense, catastrophic and stand replacing, but of low incidence.

Fire information for the recent ten-year period (1987-1997) shows a Normal Fire Year averaging eight starts. In 1990 there were at least 38 starts, 11 in 1991, and 11 in 1994. During this period, 83 total fires were reported. Of the 83 fires, 37 were lightning fires that were naturally extinguished. From 1930-1985 records, the frequency of human-caused fire accounts for 65 percent of all ignitions. These fires are concentrated near developed areas, allowing early detection and quick suppression.
(See map showing locations of fire starts over time)
In the past 10 years, the greatest number of recorded ignitions from lightning strikes for a single storm was 22 (1990); burning 8.4 acres. Records from 1928 to 1953 show 59 percent of recorded lightning fire starts occurred between 4,500 feet and 5,500 feet in elevation (Report from Chief Ranger's Office, 1953).

Historic records show a normal year having few natural fires and many years where none occur at all. Few historic fires consumed over 1,000 acres. This fact is important in fire management implications. Fires are ecologically important even though recorded fire size under suppression response has been small. Therefore, it may be that each natural fire start is highly significant environmental process acting on an ecosystem. As a result if continued suppression of naturally ignited wildland fires occurred, there could be significant changes over time to the successional conditions naturally occurring in the park. The past 100 years of fire suppression has likely already changed what would have been natural vegetation community characteristics in a landscape unaltered by direct fire suppression. To the extent that Native Americans used fire in the park and surrounding areas, these conditions have also likely been altered by fire suppression.

Table 1: Ancient Fire History

(Adapted from Franklin *et al.* 1988 (Table 17): Major fires, their correspondence to period of drought, and the present and reconstructed original extent of resulting seral forests at Mount Rainier National Park (after Hemstrom and Franklin 1982).

Episode date (A.D)	Present Forested Area		Reconstructed Forested Area		Drought Period
	Acres	Percent of Total	Acres	Percent of Total	
1230	15475	12	61750	47	
1303	35802	3	14820	11	1290-95[2]
1403	17068	13	33839	26	1406-13[2]
1503	11609	9	33790	26	1477-90[2]
1628	5198	21	31863	24	1627-33[2]
1688	2964	2	10893	8	1986[3]
1703	6669	5	12696	10	1700[3]
1803	5508	4	5508	4	1801[3]
1825	5928	5	6126	5	1826-26[3]
1856	1210	1	6916	5	1856[3]
1858	7509	6	9139	7	1856[3]
1872	1482	1	1482	1	1869-73[2]
1886	9386	7	10572	8	1888[3]
1934	1902	1	1902	1	1917-36[2]

[1]No climatic reconstruction available for dates before 1250 A.D.
[2]Keen (1937) first- or second-magnitude drought.
[3]Blasing and Fritts (1976) abnormally dry winter.

Ancient fire history maps of the area can be viewed on these linked web sites:

~1228
~1303
~1403
~1503
~1628
~1703
~1803
Since 1820

Table 2: Recent Fire History

(Adapted from Franklin *et al.* 1988 (Table 17): Major fires, their correspondence to period of drought, and the present and reconstructed original extent of resulting seral forests at Mount Rainier National Park (after Hemstrom and Franklin 1982).

Episode Date A.D.	Present Forested Area		Reconstructed Forest Area		Drought Period
	Acres	Percent of Total	Acres	Percent of Total	
1931 (3)	Unknown	< 1	Unknown	< 1	Unknown
1932 (4)	Unknown	< 1	Unknown	< 1	Unknown
1933 (8)	Unknown	< 1	Unknown	< 1	Unknown
1934 (6)	Unknown	< 1	Unknown	< 1	Unknown
1935 (2)	Unknown	< 1	Unknown	< 1	Unknown
1936 (4)	Unknown	< 1	Unknown	< 1	Unknown
1937 (9)	Unknown	< 1	Unknown	< 1	Unknown
1938 (5)	Unknown	< 1	Unknown	< 1	Unknown
1939 (4)	Unknown	< 1	Unknown	< 1	Unknown
1940 (7)	Unknown	< 1	Unknown	< 1	Unknown
1941 (22)	Unknown	< 1	Unknown	< 1	Unknown
1942 (4)	Unknown	< 1	Unknown	< 1	Unknown
1943 (2)	Unknown	< 1	Unknown	< 1	Unknown
1945 (3)	Unknown	< 1	Unknown	< 1	Unknown
1946 (7)	Unknown	< 1	Unknown	< 1	Unknown
1947 (1	Unknown	< 1	Unknown	< 1	Unknown
1948 (2)	Unknown	< 1	Unknown	< 1	Unknown
1949 (11)	Unknown	< 1	Unknown	< 1	Unknown
1950 (4)	Unknown	< 1	Unknown	< 1	Unknown
1951 (7)	Unknown	< 1	Unknown	< 1	Unknown
1952 (1)	Unknown	< 1	Unknown	< 1	Unknown
1953 (1)	Unknown	< 1	Unknown	< 1	Unknown
1956 (4)	Unknown	< 1	Unknown	< 1	Unknown
1958 (4)	Unknown	< 1	Unknown	< 1	Unknown
1959 (1)	Unknown	< 1	Unknown	< 1	Unknown
1960 (2)	Unknown	< 1	Unknown	< 1	Unknown
1963 (10)	Unknown	< 1	Unknown	< 1	Unknown
1965 (7)	Unknown	< 1	Unknown	< 1	Unknown
1966 (1)	Unknown	< 1	Unknown	< 1	Unknown
1967 (2)	Unknown	< 1	Unknown	< 1	Unknown
1970 (1)	Unknown	< 1	Unknown	< 1	Unknown
1977 (17)	Unknown	< 1	Unknown	< 1	Unknown
1979 (4)	Unknown	< 1	Unknown	< 1	Unknown
1981 (1)	Unknown	< 1	Unknown	< 1	Unknown
1982 (12)	Unknown	< 1	Unknown	< 1	Unknown
1983 (1)	Unknown	< 1	Unknown	< 1	Unknown
1984 (1)	Unknown	< 1	Unknown	< 1	Unknown
1985 (4)	Unknown	< 1	Unknown	< 1	Unknown
1986 (3)	Unknown	< 1	Unknown	< 1	Unknown
1987 (4)	Unknown	< 1	Unknown	< 1	Unknown
1988 (2)	Unknown	< 1	Unknown	< 1	Unknown
1989 (5)	Unknown	< 1	Unknown	< 1	Unknown

Table 2: Recent Fire History

	Present Forested Area		Reconstructed Forest Area		
Episode Date A.D.	Acres	Percent of Total	Acres	Percent of Total	Drought Period
1990 (38)	Unknown	< 1	Unknown	< 1	Unknown
1991 (11)	Unknown	< 1	Unknown	< 1	Unknown
1992 (8)	Unknown	< 1	Unknown	< 1	Unknown
1993 (1)	Unknown	< 1	Unknown	< 1	Unknown
1994 (13)	1.3	< 1	Unknown	< 1	Unknown
1994 (11)	Unknown	< 1	Unknown	< 1	Unknown
1995	Unknown	< 1	Unknown	< 1	Unknown
1997 (4)	0.8	< 1	Unknown	< 1	Unknown
1998 (7)	Unknown	< 1	Unknown	< 1	Unknown
1999 (4)	Unknown	< 1	Unknown	< 1	Unknown
2000 (3)	0.3	< 1	Unknown	< 1	Unknown
2001 (5)	0.5	< 1	Unknown	< 1	Unknown
2002 (8)	13.0	< 1	Unknown	< 1	Unknown
2003 (11)	391.6	< 1	Unknown	< 1	Unknown
2004 (9)	5.0	< 1	Unknown	< 1	Unknown

3. FIRE WEATHER HISTORY

The weather of the area is significant to fire management. Low lightning activity and significant rain have produced an ecosystem with a low fire incidence and a long fire cycle. Contributing to this phenomenon is high relative humidity and general low wind velocity, which helps keep fuel moisture high and the fire season short, typically from mid-June until mid-September.

Annual precipitation is high, ranging from about 60 inches at low elevations to over 100 inches at subalpine levels. Most winter precipitation is in the form of snow, accumulating in snow packs of 20 or more feet in depth. Paradise total annual average snowfall is approximately 675 inches or 56.5 feet. In the record year (1977-78), 1,122 inches or 93.5 feet of snow occurred. As a result, snow often remains on the ground until June or July at Paradise and sometimes does not dissipate entirely over the summer in other parts of the park (e.g., Cayuse Pass). In another example from early August 1999 Paradise still had a significant amount of snow on the ground. Winter storm winds are from the west and southwest forming a rain shadow on the eastern and northeastern sides of the park. Fog, wind, snow or rain may occur any day of the year.

Climate

The climate of Mount Rainier National Park exhibits climatic characteristics affected by both topography and its location on the west slope of the Cascades. Moderately cold winters with deep snow accumulations are often followed by mild, dry summers. Park weather is often dramatically different from that in the surrounding lowlands. Low lightning activity and significant amounts of rainfall have produced an ecosystem with a low fire incidence and a long fire cycle.

Annual precipitation is high, as discussed earlier. In late summer and fall, strong dry north to east winds may produce extreme fire dangers. Two weather types produce this fire behavior. One is a cold-front passage followed by a bulge of the Pacific High extending inland over the coast.

Northeasterly winds blowing down slope produce a warming and drying foehn wind. The second type follows when higher pressure develops east of the Cascades while a trough lies off the coast, resulting in dry easterly winds causing high fire danger on the west slopes of the Cascades. Airflow keeps the marine air offshore and results in adiabatic warming as the air flows from higher elevations down to sea level.

Precipitation
Orographic lifting on the western slopes of the Cascades from an influx of moist air from the Pacific Ocean results in some of the highest precipitation levels in North America, ranging from 60" at low elevations to over 100" at subalpine levels. Paradise, at 5,400 feet averages 126 inches of precipitation, with the total average snowfall at 682.3 inches, average snow depth of 80 inches and highest recorded snowfall at 1,122 inches in 1972 (a former world record bested by Mount Baker in 1998-1999). Longmire, at 2,761 feet averages 87 inches of rain per year and Ohanapecosh at 1,900 feet averages 75 inches. The driest areas in the park are on the east side of the mountain and are caused by the rain shadow effect wherein system lifting and cooling causes most of the precipitation to fall on the west side of the mountain as systems track from the west to the east. The summer-dominant Pacific high has a significant effect on regional fire weather and contributes to dry summer months with extended periods (often up to six weeks) of no precipitation. Mount Rainier National Park is in the North Pacific Coast fire climate region.

Temperature
The average maximum temperature for the warmest month, August, is 61.5 degrees Fahrenheit at Paradise. At Longmire, the average high temperature is in July at 75 degrees F and at Ohanapecosh in August at 81 degrees F. The average minimum temperature at Paradise is 20.3 degrees F in January. The average lows for Longmire and Ohanapecosh during the months of June through September is about 45 degrees F. Ambient temperatures are commensurate with environmental lapse rates, where temperature decreases proportionally with elevation.

Relative Humidity
Clouds often obscure Mount Rainier. The lower elevations are often cushioned by low level cloudiness. Occasionally, however, inversions will produce moist fog layers in low lying river valleys and forests below the park, while elevations from the subalpine on up will be bathed in sunshine. A similar occurrence occurs with some coastal fogs occurring during the summer which do not quite reach the west side of the park, often leaving the park in sunshine, while lower Puget Sound communities, often including Eatonville shrouded in fog.

4. FIRE SEASON

The normal fire season, derived from FIREPRO analysis, is June 21 through September 10, although lightning storms may extend from late May to late September. Major fires have occurred during prolonged drought (Franklin et al., 1979). The number of consecutive days without rainfall during the fire season, and the number of years with less than average precipitation, are important in determining fire frequency. Weather records from Longmire show a cycle of 4.2 peak wet years and 4.1 dry years. This cycle correlates to fire activity within the park (report from Chief Ranger's Office, 1953).

Lightning storms are generally infrequent in the vicinity of Mount Rainier. In the past 67 years (1930-1997), only 234 lightning ignitions have been recorded (Mount Rainier Fire Atlas 1930-1979, and 1980, FIREPRO 1979-1997). There were 22 lightning ignitions in 1990. Summer lightning storms most commonly come from the south or southeast. Typically, light to heavy rain occurs during and after storms, restricting the spread of ignitions. However, smoldering fires can spread if the lightning storm is followed by dry, warm days, especially in conjunction with east winds.

Conditions to be concerned about within the Park include, periods of mild snow accumulation or snowfall or rainfall (long and short term drought conditions) combined with a warmer than usual

summer, lightning strike weather conditions, and an east wind pattern.

Conditions to be concerned about within the park include:
- periods of mild snow accumulation
- snowfall or rainfall (including both long and short term drought conditions) combined with a warmer than usual summer
- lightning strike weather conditions
- east wind patterns
- large outbreaks of forest disease or insect infestations
- large areas of wind-thrown timber; or
- large areas of ice damaged trees

5. FIRE BEHAVIOR

The behavior of naturally occurring wildfires in Mount Rainier National Park is not well documented primarily because the interval between fires is great. In addition, documentation of fire behavior is a relatively recent strategy. Fire behavior is not uniform and may vary substantially from site to site as a function of weather, fuels, and topography. With a cool, moist environment, the park ecosystems are not conducive to frequent fire. As a result, there are few fires in modern times from which careful observations have been recorded. Fire behavior can be predicted from a variety of sources, including BEHAVE fire prediction software.

The best source of fire behavior information is Hemstrom and Franklin's (1982) "*Fire and other disturbances of the forests in Mount Rainier National Park*." Several fire behavior implications can be drawn from this largely ecologically based study. The first is that although fires tend to be infrequent they are usually of high severity (i.e., they kill most of the trees within the fire perimeter). This suggests that they are of moderate to high fire line intensity (rate of heat release). Many of the fires of the distant past are part of what Hemstrom and Franklin call "fire episodes", or one or more individual fire events occurring so close in time that they cannot be separated using the typical reconstruction method of forest age class analysis. These fire episodes suggest two important characteristics of fires in the park: (1) the episodes can cover large areas with multiple fires, and (2) these large fires either burned from inside the park to areas outside, or vice versa.

The techniques employed by Hemstrom and Franklin resulted in the "fire episode" being the primary focus of their study. Fires smaller than 250 ha (just over 615 acres) were largely ignored. However, smaller fires have occurred in the past, will continue to occur, and will continue to have a significant cumulative effect on ecosystems of the park.

Historically, the sources of ignition have been lightning, aboriginal humans and modern humans. Although there is no evidence that aboriginal humans were a major source of ignition, the Native American influence has never been quantified. Anglo-Europeans were probably a significant influence in the mid-1800s, setting clearing fires that may have moved into the park. During the twentieth century, Anglo-Europeans have both set and suppressed fires in the park. Lightning has historically been the most important ignition factor, and will probably continue to be so.

General factors affecting fire behavior include fuel moisture, wind, heat transfer methods (radiation, conduction and convection), and fuel type and arrangement. Conditions, which allow a lightning-set fire to grow to substantial size, have not been studied in the park to any extent. However, a study at Olympic National Park suggests that four factors are associated with fires exceeding 1 ha (2.47 acres) in size:
1) long-term drought (exceeding several months),
2) short-term drought (weeks),
3) ignition (lightning), and
4) occurrence of an east wind pattern (associated with low humidity and high wind velocity) before

significant precipitation falls. Such winds are most likely to blow from directions ranging from north to southeast.

The same regional patterns probably affect fires at Mount Rainier. Therefore, critical fire weather would tend to encourage fire in the northeast quadrant of the park to spread primarily into the park. On the southeast quadrant, valley winds might offset gradient winds at times, so that both up and down slope and up and down valley spread is likely. On the western half of the park, valley winds will typically be moving perpendicular to gradient winds, so that up and down slope spread will dominate over up and down valley fire spread (assuming that gradient winds are greater than valley winds or topographic effects).

Seasonal occurrence of fires will probably focus on June-September for montane zones and July-September for subalpine zones. Because of fuel lack of continuity, subalpine fires will generally be smaller than those in the montane zones will. Fires may be expected under unusual conditions outside of these periods. For example, in 1987, three subalpine fires occurred while snow was still on the ground in early May. This was attributed to the effects of very warm weather causing crown moisture stress in trees whose roots were in frozen soil and would not allow moisture transmission to replenish water lost from the crowns. In addition, there was a significant component of lichens in the crown that quickly responded to the low relative humidity and high ambient temperatures, becoming a very dry fine fuel bed. A lightning storm passed through and ignited the tree crowns. This type of fire, depending on location, could potentially spread into facilities and would be difficult for fire suppression crews to control.

Fires moving uphill tend to move faster due to the flames moving up and preheating the fuel ahead through convection. With less effective combustion due to heavy branches, water vapor of fuel loads, decreased consumption of organic matter may occur, resulting in a greater patchiness of fire effects in steep terrain.

Range of Potential Fire Behavior

A wide range of potential fire behavior has occurred within the park. Fires include slow or fast moving meadow fires, creeping duff fires, and rapidly moving, crowning fires with greater intensity, higher flame lengths and increased consumption of ground fuels. These types of fire behavior may all occur in the same fire event.

Historic weather data from the Ohanapecosh and Longmire weather stations was used to evaluate potential fire behavior. At Ohanapecosh, winds are generally out of the south and southwest with maximum-recorded wind speeds of 18 miles per hour. At Longmire, winds are out of the southeast and south with maximum-recorded wind speeds also of 18 miles per hour. The wind direction for the Longmire station likely reflects the prominent down canyon winds that occur in the afternoon at the time weather is taken. Fire behavior was calculated with BEHAVE, using weather conditions from the Ohanapecosh station. Fires typically smolder or burn slowly in moist fuels with many fires burning out before they reach 0.1 acre in size. Under moderate to high fire weather conditions, fires can burn rapidly (600 feet/hour) up south and southwest facing slopes where there is heavy fuel on the ground or in dry meadows. In much of the forest, where the surface fuels are relatively sparse, fire will burn slowly uphill, burning up to 200 feet in an hour. Under extreme conditions, crown fires, with spotting up to 0.5 mile ahead of the fire and spread faster than 0.25 miles in an hour are possible in areas with heavy fuels. Such extreme conditions, however, rarely occur in the park. On north and northeast slopes, fire will be relatively inactive due to shading, cool temperatures, and higher fuel moistures.

- Historically annual fire activity is infrequent and small in size, although recent human-caused fires in excess of 11,000 acres have occurred and the ancient fire history shows fires of more than 60,000 acres.
- Although infrequent, high intensity fires usually exhibit high severity, killing most of the trees within the fire boundary. Such fires are potentially extremely dangerous to monitoring or suppression personnel.

- Situations indicative of potentially severe fire activity (recent drought years, drought during current season, wildland fire ignitions with east winds and little precipitation) have been correlated with large fire incidence and will be monitored.
- Effects of the global warming theory on the natural fire cycle are unknown, but warrant consideration. Increased temperatures and reduced precipitation could accelerate the fire cycle and lead to more frequent and intense fire activity.

E. FUEL MODEL TYPES

A maps of these zones and overstory and understory forest habitat can be viewed by web link to Fire Fuel Model

Classifications of Franklin and Dyrness (1969) identify four vegetation communities presented by Franklin and Bishop (1969) for Mount Rainier National Park. See *The Forest Communities of Mount Rainier National Park* (Franklin *et al.* 1988) for a more complete discussion.

1. Western Hemlock (*Tsuga heterophylla*) Zone
This zone is characterized by stands of Douglas-fir (*Pseudotsuga menziesii*), western hemlock and western red cedar (*Thuja plicata*). Some of these stands are composed of trees that tower 250 feet or more and can measure 80-100 inches in diameter at breast height. Other typical species are Pacific yew (*Taxus brevifolia*) and vine maple (*Acer circinatum*).

Understory species include Oregon grape (*Berberis nervosa*), salal (*Gaultheria shallon*), and red huckleberry (*Vaccinium parvifolium*), blackberry (*Rubus ursinus*), twin flower (*Linnaea borealis var. longiflora*), trillium (*Trillium ovatum*), and western sword fern (*Polystichum munitum*).

Red alder (*Alnus rubra*), bigleaf maple (*Acer macrophyllum*) and grand fir (*Abies grandis*) are common along streams. A lush growth of lady fern (*Athyrium filix-femina*), devil's club (*Oplopanax horridium*) and deer fern (*Struthiopteris spicant*) also characterize moist sites.

This zone exists at lower elevations outside the park and extends into the park to about 2,800 feet in elevation. In the Sunrise Ridge area, on the northeastern slopes of the mountain, this zone extends to 3,800 feet.

Common Fuel Models Present

Fuel Model System		Description	Generalized Fire Behavior for NFFL Fuel Models
NFDRS #	NFFL #		
G		Dense conifer stands with heavy accumulations of litter and downed woody material	
	8	Closed timber litter	Slow-burning ground fires, with low flame lengths, can exhibit some flare-ups in heavy down fuels. Fuels pose fire hazards under severe weather conditions
	10	Timber, with heavy accumulation of downed material, duff and litter	Fire burn on the ground with higher intensities then the other timber fuel models. Due to the higher quantities of larger fuels, crowning out, spotting and torching of individual trees is more frequent creating control problems.

2. Pacific Silver Fir (*Abies amabilis*) Zone

This zone is the most extensive forested zone in the park. The most common species are Pacific silver fir, noble fir (*Abies procera*), western white pine (*Pinus monticola*), western hemlock and Douglas-fir. Engelmann spruce (*Picea engelmannii*) is found on the lower slopes and in the valleys of the White River drainage.

Typical understory plants include huckleberry species (*Vaccinium spp*.), bunchberry dogwood (*Cornus canadensis*), single-flowered clintonia (*Clintonia uniflora*), beargrass (*Xerophyllum tenax*), vanilla-leaf (*Achlys triphylla*), prince's pine (*Chimaphila umbellata*), twin flower, Oregon grape, and the moss *Rhytidiopis robusta*.

This zone's elevation ranges from about 2,800-4,500 feet and about 3,800-5,500 feet on the northeastern slopes of the mountain. Annual precipitation can range up to or over 100 inches, mostly falling as snow.

Common Fuel Models Present

Fuel Model System		Description	Generalized Fire Behavior for NFFL Fuel Models
NFDRS #	NFFL #		
G		Dense conifer stands with heavy accumulations of litter and downed woody material	
	8	Closed timber litter	Slow-burning ground fires, with low flame lengths, can exhibit some flare-ups in heavy down fuels. Fuels pose fire hazards under severe weather conditions
	10	Timber, with heavy accumulation of downed material, duff and litter	Fire burns on the ground with higher intensities then the other timber fuel models. Due to the higher quantities of larger fuels, crowning out, spotting and torching of individual trees is more frequent creating control problems.

3. Mountain Hemlock (*Tsuga mertensiana*) Zone

Above 4,500 feet, mountain hemlock becomes the forest dominant species. Other typical tree species are Pacific silver fir, subalpine fir (*Abies lasiocarpa*), Alaska cedar (*Chamaecyparis nootkatenis*), white bark pine (*Pinus albicaulis*) and Engelmann spruce.

This zone can be divided into two segments; a lower sub-zone of continuous closed forest and an upper sub-zone, which is a mosaic of forest patches, tree groups and subalpine meadows.

Understory forest species include beargrass, huckleberry, avalanche lily (*Erythronium montanum*), dwarf bramble (*Rubus lasiococcus*), Sitka valerian (*Valeriana sitchensis*) and broad-leaved arnica (*Arnica latifolia*).

Some of the more common meadow plants are avalanche lily, glacier lily (*Erythronium grandiflorum*), western anemone (*Anenome occidentalis*), red heather (*Phyllodoce empertriformis*), white heather (*Cassiope mertensiana*), mountain phlox (*Phlox diffusa*), lupines (*Lupinas spp*.), bistort (*Polygonum bistortoides*), cinquefoil (*Potentilla flabellifola*) and louseworts (*Pedicularis spp*.).

This zone's elevation range extends from about 4,500-6,200 feet. Precipitation is primarily in the form of snow.

Common Fuel Models Present

Fuel Model System		Description	Generalized Fire Behavior for NFFL Fuel Models
NFDRS #	NFFL #		
G		Dense conifer stands with heavy accumulations of litter and downed woody material	
H		Stands of short needled conifers, sparse undergrowth and thin layer of ground fuels	
	1	Short grass	Fire moves rapidly through cured grass and forbs
	3	Tall grass	High rates of spread, especially under the influence of wind or topography, most intense fires of the grass fuel types
	5	Brush approx. 2 feet tall	Fires generally not very intense, due to light surface fuel loading
	8	Closed timber litter	Slow-burning ground fires, with low flame lengths, can exhibit some flare-ups in heavy down fuels. Fuels pose fire hazards under severe weather conditions
	10	Timber, with heavy accumulation of downed material, duff and litter	Fire burn on the ground with higher intensities then the other timber fuel models. Due to the higher quantities of larger fuels, crowning out, spotting and torching of individual trees is more frequent creating control problems.

4. Subalpine Fir (*Abies lasiocarpa*) Zone

This zone is characterized by rugged mountainous terrain above 4,600 feet and is defined subjectively at the upper limits as the treeline and at the lower limit as the extent of the closed-canopy forests. Subalpine meadows are perhaps the most striking feature of this zone. The Cascade Range in Washington supports subalpine meadows that span elevation gradients larger than any other mountain range in North America (Franklin and Dyrness 1973).

The two main tree species are mountain hemlock (*Tsuga mertensiana*), found in cold, moist locations, and subalpine fir (*Abies lasiocarpa*), found in cold, dry locations in the zone. Other forest tree species include Engelman spruce (*Picea engelmannii*), Pacific Silver fir (*Abies amabilis*), and Alaska yellow-cedar (*Chamaecyparis nootkatensis).* Commonly associated shrub species are big huckleberry (*Vaccinium membranaceum*), *V. deliciosum* and *V. scoparium*.

Fuel Model System		Description	Generalized Fire Behavior for NFFL Fuel Models
NFDRS #	NFFL #		
G		Dense conifer stands with heavy accumulations of litter and downed woody material	
H		Stands of short needled conifers, sparse undergrowth and thin layer of ground fuels	
	1	Short grass	Fire moves rapidly through cured grass and forbs
	3	Tall grass	High rates of spread, especially under the influence of wind or topography, most intense fires of the grass fuel types
	5	Brush approx. 2 feet tall	Fires generally not very intense, due to light surface fuel loading
	8	Closed timber litter	Slow-burning ground fires, with low flame lengths, can exhibit some flare-ups in heavy down fuels. Fuels pose fire hazards under severe weather conditions
	10	Timber, with heavy accumulation of downed material, duff and litter	Fire burn on the ground with higher intensities then the other timber fuel models. Due to the higher quantities of larger fuels, crowning out, spotting and torching of individual trees is more frequent creating control problems.

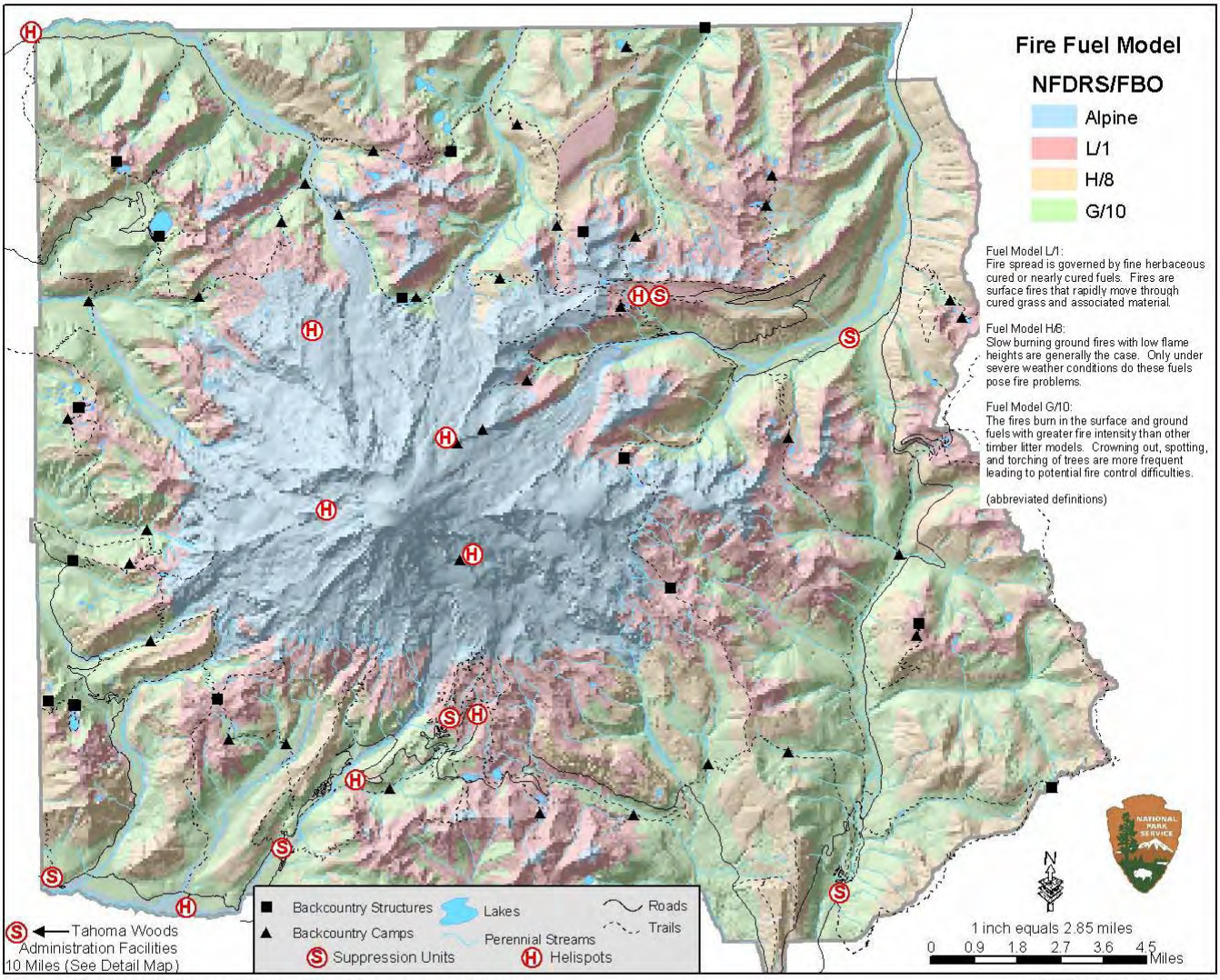
5. Alpine Zone

This park-like sub-zone of the subalpine zone grades gradually into the alpine zone. This zone is basically treeless except for Krummholz. Climate is extreme and fires rare.

Vascular plants are found between 6,000 and 11,000 feet, though glaciers, snowfields and rock surround the infrequent few occurring above 7,500 feet. Most plant species are like those of the lower subalpine meadows. Others include mountain buckwheat (Eriogonum pyrolaefolium), pussy paws (Spraguea umbellata), moss campion (Silene acaulis) and several species of grasses, sedges and rushes.

Some meadows, especially those facing S, SW or SE have been formed from prehistoric fires. Other meadows, mostly composed of heather, were formed, and remain fairly constant, due to snowpack.

Fuel Model System		Description	Generalized Fire Behavior for NFFL Fuel Models
NFDRS #	NFFL #		
	1	Short grass	Fire moves rapidly through cured grass and forbs



Mount Rainier National Park - Fire Management Plan **FIRE FUEL MODEL**

F. CULTURAL RESOURCES

1. Prehistoric and Historic Archeology

Only a small percentage of the park has been surveyed for archeological resources. As of the 2002 field season, the park had documented 40 prehistoric and multi-component (prehistoric and historic) sites, 29 prehistoric isolated finds, and 31 historic sites and isolated finds. Most documented archeological sites (74 percent) are found within subalpine communities, with approximately 16 percent in alpine habitats. The rest (10 percent) have been found in forested habitats, where more continuous vegetative cover and deposition, makes it difficult to detect archeological remains. Of these, 75 percent of sites are found on slopes of 5 degrees or less and 75 percent are within 300 feet of water. Archeological modeling predicts the greatest intensity of prehistoric use in subalpine communities and in the upper forest margins that would have supported similar communities as recently as the last "Little Ice Age" approximately 500-150 years ago.

The oldest confirmed dated deposits come from an estimated 3,500 years before the present. Other preserved stratigraphically dated profiles, indicate buried soil to 8,500 years ago. It is likely that the archeological record in the park will be extended to that period. Very early sites are difficult to locate, owing to burial 3-5 feet below the surface.

Prehistoric archeological evidence is dominated by low to moderate-density lithic scatters, most of which are exposed on the soil surface. Dominant materials are cryptocrystalline silicate rock, most of which originated outside the park. Because of the volcano's depositional history, a relatively small fraction of the total remainder of artifacts anticipated is found on the surface. As a result, most of the material is found under the surface, providing some protection from direct fire effects, but not from firefighting effects. Historic artifacts are more likely to contain wood components and would be the most vulnerable to fire.

The most intensive survey efforts have been associated with rehabilitation and construction related projects in the developed areas of the park (including trails and backcountry camps) during the last ten years. Less intensive reconnaissance efforts have focused on subalpine and alpine landscapes, and several forest settings. Other survey efforts have concentrated in areas where known archeological resources have been reported. Understanding of the park's prehistoric use patterns is based on the results of these surveys, on the archeological record in the vicinity of the park, and on environmentally-based models of human subsistence and settlement patterns in mountainous environments (Burtchard 1998). Knowledge of the historical archeological record also relies on these sources, plus written records, informant accounts and historic documents.

Fires would likely have greater impacts on historic archeological resources than on prehistoric archeological resources, due to the subsurface context of the greatest percentage of the latter and the wood content of the former. Because a relatively high percentage of the park's prehistoric archeological record is found in a subsurface context, heat damage from fires is not expected to be as great as occurs elsewhere in environments with lower natural deposition.

2. Historic Structures

There are approximately 167 historic resources in the park individually and collectively listed on the National Register of Historic Places. Many more sites, structures and objects are potentially eligible for the National Register. Prior to designation of the Mount Rainier National Historic Landmark District, as described below, six historic districts were designated in the park for their rustic architectural significance. These include:

- Nisqually Entrance Historic District
- Longmire Historic District
- Paradise Historic District

- Camp Muir Historic District
- White River Entrance Historic District
- Sunrise Developed Area Historic District

Each of these historic districts exhibits significant examples of NPS rustic architecture in the style of the period of its development. In addition, there are 5 National Historic Landmark buildings or building complexes that have been designated in the park. These represent the best designs of the period and in many cases, were used as models in other National Parks for similar structures. They include:

- Longmire Community Building,
- Longmire Administration Building,
- Longmire Service Station,
- Paradise Inn, and the
- Sunrise Blockhouses/Stockade Complex.

3. Cultural Landscapes/Mount Rainier National Historic Landmark District (NHLD)

The Mount Rainier National Historic Landmark District was designated in 1997. This large and exceptional District, now on the National Register of Historic Places (under landscape architecture), contains 107 historic buildings and 60 historic structures (including most of the park's road system and the Wonderland and Northern Loop trails) as well as 31 other listed features. Together, these resources are considered to be the best example of park master planning in the National Park System. Collectively, they represent an important stage in National Park development history. At Mount Rainier in the 1920s and 1930s, the NPS Landscape Planning Division invented and defined modern National Park planning. Consequently, the Master Plan for Mount Rainier, completed in 1929, was the first National Park master plan developed by the NPS and it was and is considered a model of NPS planning. The degree of conformance to the plan still present in the park is outstanding. As a whole, no other collection of park roads, bridges, developed areas and trails is more completely preserved as an intact example of National Park planning and design of the period (1904-1957). The goal, then as now, was to integrate all park systems and facilities in a unified plan that would ensure the best possible visitor experience while severely limiting how much development would be permitted in the park (Carr 1998). The master plan was executed in the rustic naturalistic style of architecture, using native materials and natural forms to blend constructed works with their environment.

The designation of a NHLD recognizes that the park does not simply contain individual historic resources, but is itself a historical park. The historic roads, trails, buildings and designed landscapes of the park together comprise a cultural landscape of national significance in American history. The significance of the NHLD is divided into the following size categories, which recognize contributing resources:

- Spatial organization – the composition and sequence of outdoor spaces within the district;
- Circulation – the means and patterns of movement through the district;
- Topography – the ways in which the landscape planning responds to the topographic features of the site and the modifications of that topography;
- Vegetation – the response of existing vegetation as well as the management of vegetation through pruning, removal or addition of trees and shrubs;
- Structures – all contributing structures, including roads, trails and other small scale features such as rock walls and culverts; and
- Buildings – structures intended to shelter a human activity.

Approximately one-third of the park's cultural landscapes have had Level I or Level II Cultural Landscape Inventories completed (i.e. 10 of 29). Another approximately 20 Cultural Landscape Inventories and 25 Cultural Landscape Reports are needed to document known cultural landscapes. Even so, there is a great deal of known information that has not yet been documented through these formal inventory processes. Three Cultural Landscape Reports and three Development Concept

Plans also document rehabilitation treatment for 6 cultural landscapes. These would also provide information about vegetation management issues with respect to potential fire effects.

4. Ethnography

Ethnographic resources are defined as landscapes, sites, structures, objects or natural resource features that have significance based on importance attached to them by members of a socio-cultural group associated with the park. At Mount Rainier, these resources are most closely associated with at least six contemporary Native American tribes – Nisqually, Muckleshoot, Puyallup, Yakama, Squaxin Island and Cowlitz.

Based on several investigations, into the archeology, history and ethnography of Mount Rainier National Park (Thompson 1981, Catton 1996, Carr 1997, Boxberger 1998, Smith 1964, Burtchard 1998), no specific Native American use of the park has been documented to date. For thousands of years, however, Mount Rainier has been an important place and a symbolic landmark for the Native Americans. In addition to ancestral use for hunting, archeological and ethnographic evidence suggests that prehistoric people used high elevation landscapes on Mount Rainier to gather a variety of economically important resources. Among other products, gathering beargrass and cedar splits for basketry and collecting plants for medicinal, ceremonial and religious uses has been documented through 1950 (Boxberger 1998). Similar uses continue through the present.

In the park's human history it is likely that Native Americans used fire to some advantage in increasing the yield of harvestable plants well adapted to fire. Native Americans are thought to have intentionally burned upper elevation forest and subalpine areas in the Cascades and other northwest mountainous areas to improve huckleberry productivity and ungulate forage. One of the most specific references is from Forests of Mount Rainier National Park (G.F. Allen 1916 and 1922), which contains the following description.

> "The old burns in the middle altitudes of the park occupy regions once frequented by the Klickitat Indians. Every summer parties of hunters and berry pickers from the sagebrush plains crossed the Cascades with their horses. They followed the high divides and open summits of the secondary ridges until they came around to the open parks about Mount Rainier where they turned their horses out to graze and made their summer camp. The women picked huckleberries and the men hunted deer and goats. They made great fires to dry their berries and kindled smudges to protect their horses from flies. It was also their custom to systematically set out fires as they returned. Burning made the country better for the Indians. The fires kept down the brush and made it more accessible. Deer could be more easily seen and tracked and the huckleberry patches spread more widely over the hills.
>
> No considerable part of the lower forests of the park has been burned. The principal danger is from lightning. However, few of the trees struck are ignited and these fires are usually extinguished by the rain. . ."

Over time, changes in the size, seasonally and frequency of fires have occurred as a result of human intervention, including by Native Americans. Interpretation of the extent and ecological impacts of these activities vary widely. Lightning has historically been the most important ignition factor, and will probably continue to be so.

Native American use of the park continues to this day, with some tribes possessing or negotiating agreements for the collection of specified quantities of native plants to continue cultural traditions. It is possible, perhaps probable, that significant, but undocumented, archeological and ethnographic resources, including ceremonial locations exist throughout the park in areas used by the current Native American Tribes and historic use by ancestors of these peoples. Other, less known use for ceremonial or spiritual purposes also occurs but has not been well documented.

Ongoing consultation with Native American Tribes regarding potential prescribed fire plans, as they are developed would ensure that the plans would reflect concerns of both the park and the tribes.

G. WILDERNESS

In 1988, Congress designated approximately 97 percent (228,480 acres) of Mount Rainier National Park as wilderness. Park wilderness includes a wide array of undisturbed lands encompassing ancient rainforest, pristine rivers and brilliant subalpine meadows. Park wilderness values include natural, ecological, geological, cultural, scenic, scientific and recreational opportunities. Natural quiet and natural darkness are also considered wilderness values. In the park, the wilderness boundary generally is located 200 feet on either side of the centerline of paved roads and 100 feet from the centerline of unpaved roads. In addition, the wilderness boundary skirts developed areas by about 200 feet.

Park wilderness offers a wide array of scenic, natural and ecological values. Park wilderness encompasses the full breadth of the diverse Mount Rainier landscape of glacial ice and snow, old growth forests, river headwaters, streams and waterfalls, abundant wetlands and through flower-filled subalpine meadows and rock scree slopes with perennial snow patches. Park wilderness is and has been an ongoing object of scientific study. As the highest active Cascade volcano, exhibiting near-record snowfall and the greatest single-peak glacial system in the continental United States, the Mountain offers outstanding opportunities to understand vegetation, wildlife, fire ecology, catastrophic geologic events – including lahars, glacial outburst floods and volcanic eruptions – snow, ice and other water resources. These resources afford excellent opportunities to study ecosystem structure, function, processes and components across the breadth of this volcanic landscape.
Park wilderness also offers a range of recreational experiences – including camping, hiking, mountain climbing, backpacking, photography, picnicking, and a host of winter activities, including snowshoeing, cross-country skiing, sliding and snowboarding. There remain, despite heavy seasonal visitation, outstanding opportunities for solitude.

Most wilderness use occurs from June through September. During other months (including the winter) and summer weekdays (except during August) few people, are encountered in the vast majority of the wilderness area (NPS 2001).

A map of the area can be viewed on the linked web site: Existing Conditions (Wilderness)

IV. SCOPE OF WILDLAND FIRE MANAGEMENT PROGRAM

A. Fire Management Goals and Objectives

1. Ensure that firefighter and public safety is the first priority in every fire management activity.

Initial Objectives:

- At all times, fire personnel will comply with National Wildfire Coordinating Group (NWCG) guidelines, agency fitness standards and wear personal protective equipment (PPE) appropriate to their assignment.
- Ensure all fire management activities sustain no injuries to the public, including injury from smoke. Limit the number of annual injuries to fire personnel to no more than 10% of the past five-year average.

(Basis: *Review and Update of the 1995 Federal Wildland Fire Management Policy* - page 21, Guiding Principle #1; *Management Policies 2001* - Sections 4.5 Fire Management, 8.2.5.1 Visitor Safety, 9.1.8 Fire suppression; *Director's Order #18: Wildland Fire Management (*NPS, 1998*)* - Section 5.1 Safety and Health.)

2. Restore and maintain natural fire regimes to the maximum extent practicable to ensure unimpaired natural ecosystem functioning.

Initial Objectives:

- On approval of the Fire Management Plan, using the most appropriate management response, allow 90 percent of natural fires in the non-suppression unit to burn in order to restore a normal distribution of historic fire frequencies
- For every wildland fire, conduct a WFIP "Wildland Fire Implementation Plan, Phase 1" within 8 hours of detection and size-up.
- Record major fire behavior and decisions, determine whether specific objectives are being met and assess fire effects of every wildland fire event.
- Conduct future research to enable the park to determine the role of fire in maintaining selected ecosystems.
- Every three years, if funding is provided, identify and evaluate the changes in landscape patterns in and adjacent to the Park that are the result of fires.

(Basis: *Review and Update of the 1995 Federal Wildland Fire Management Policy* - page 23, Policy Statement #4; *Management Policies 2001* - 4.1 General Management Concepts; *Director's Order #18: Wildland Fire Management* - Section 4 Operational Policies and Procedures.)

3. Protect Cultural Resources (including prehistoric sites, ethnographic resources, cultural landscapes, and historic structures) through the use of hazard fuel reduction, and prescribed fire.

Initial Objectives:

- If funding is provided, complete a needs assessment/survey of the fire hazards around the Park's developed areas upon approval of the Fire Management Plan.
- For every wildland fire and wildfire event, identify and implement appropriate management responses and strategies that address site specific cultural and natural resource management concerns.

- On approval of the Fire Management Plan create defensible space using an appropriate fuel reduction technique around vulnerable prehistoric and historic resources, (providing the project is funded.)
- On approval of the Fire Management Plan, in 80% of the park's developed zones, change ground fuel conditions so that the predicted flame lengths under extreme weather conditions will be less than four feet, (providing the project is funded.)

(Basis: *Review and Update of the 1995 Federal Wildland Fire Management Policy* – pages 22-23, Policy statements #3 and #7; *Management Policies 2001* - Section 5.3.1.2 Fire Detection, Fire suppression, and Post-fire Rehabilitation and Protection, and Section 9.1.8 Structural Fire Protection and Fire suppression; *Director's Order #18: Wildland Fire Management* - Section 4.4.c. Operational Policies and Procedures.)

4. Protect Natural Resources (including flora, fauna, air quality, geologic resources, aquatic resources and wilderness character) from adverse effects of unwanted wildland fires, fire suppression, use fire, prescribed fires, and manual/mechanical treatments.

Initial Objectives:
- For every fire management activity (suppression, prescribed fire, fire use and mechanical fuels reduction), identify and implement appropriate management responses and strategies that address site-specific cultural and natural resource management concerns.
- Annually update fire management program objectives and/or actions, based on the evaluations and results of fire effects monitoring information.
- Include documented mitigation measures to protect air quality values in prescribed burn plans.
- Consider air quality impacts for all wildland and prescribed fires within the go/no go decisions.
- Evaluate air quality impacts for all fire management activities (suppression, fire use, prescribe fire and hazard fuel reduction)

(Basis: *Review and Update of the 1995 Federal Wildland Fire Management Policy* - page 22, Policy statements # 2 and #3; *Management Policies 2001* - Section 4.1 General Management Concepts, Section 9.3.9 Wilderness Fire Management, and Section 4.5 Fire Management; *Director's Order #18: Wildland Fire Management* - Section 3 NPS Management Policies, Section 4.4.c. Operational Policies and Procedures, and Section 5.10 Debris Disposal.)

5. Reduce hazardous accumulations of fuels near structures, roadways and wildland-urban interface areas.

Initial Objectives:
- Complete a needs assessment/survey of the fire hazards around Park's historic and developed areas upon approval of the Fire Management Plan, pending the project is funded.
- On approval of the Fire Management Plan, once the project is funded, create defensible space using an appropriate fuel reduction technique around structures, roadways and wildland-urban interface areas.
- On approval of the Fire Management Plan, in 80% of the park's developed zones, change ground fuel conditions so that predicted flame lengths under extreme weather conditions will be less than four feet.

(Basis: *Review and Update of the 1995 Federal Wildland Fire Management Policy* – page 23, Policy statement #7; *Management Policies 2001* - Section 9.1.8 Structural Fire Protection and Fire suppression; and *Director's Order #18: Wildland Fire Management* - Section 5.9 Fuels Management)

6. Maintain preparedness for park, agency and interagency fire response.
Actively participate in regional and national wildland fire response, analysis and management.

Initial Objectives:

- On approval of the Fire Management Plan the park will have established qualifications and promote staff training to achieve a Type III fire management organization. This team, with the assistance of the surrounding Forests, would be available during fire season and be able to contain 90% of all unwanted fires in the park. Since Mount Rainier NP is not a fire pro park, this objective will need additional dollars allocated by Region in order to be achieved.
- Annually, support the regional and national fire organizations, by having employees on area committees or by hosting fire related training within the park.
- Support qualified employees to become members of local and national fire teams.
- Utilize developmental training opportunities in and outside the park yearly, to increase the skills of the staff.

(Basis: *Review and Update of the 1995 Federal Wildland Fire Management Policy* – page 24, Policy statement #10; and *Director's Order #18: Wildland Fire Management* - Section 5.5 Preparedness)

7. Maximize the efficiency of the fire management program by coordinating with other park divisions, neighboring agencies, Native American Tribes and private land owners. Promote educational awareness of the fire management program in park staff and the general public.

Initial Objectives:

- On an annual basis, review and revise the FMP with adjacent agencies, Tribes and the Puget Sound Interagency Communication Center (PSICC).
- Foster a public understanding of fire management objectives through interpretive and educational opportunities annually.
- When funding is available, jointly oversee the preparation, presentation of interpretive, educational programs and/or materials designed to foster understanding of the park fire management program.
- On approval of the Fire Management Plan, with the assistance of the interpretive division, develop and support an informal network of key local and public relation contacts to coordinate fire information in a timely manner.
- Annually review and revise, as needed, the “Public Fire Information Plan” and “Prevention Plan” and delineate a yearly implementation process.

(Basis: *Review and Update of the 1995 Federal Wildland Fire Management Policy* – page 24, Policy statement #14; *Management Policies 2001* - Section 2.3.1.9 Cooperative Planning, and Section 4.1.4 Partnerships; and *Director's Order #18: Wildland Fire Management* - Section 4.4 Operational Policies and Procedures)

8. Evaluate the costs and benefits of alternative fire management strategies to ensure that financial costs are commensurate with protection or enhancement of resource and wilderness values.

Initial Objectives:

- Annually, review, update and initiate cooperative agreements to assure that interagency approaches to managing wildland fires are implemented.

- Create and maintain annually, mutual support agreements with adjacent land management agencies to allow naturally ignited fires, burning within prescription, to enter or exit adjacent lands and wilderness.
- Meet annually, or as often as needed, with neighboring private landowners, to promote a partnership in managing fires on an ecosystem basis

(Basis: *Review and Update of the 1995 Federal Wildland Fire Management Policy* – page 22, Guiding principle #5, and page 24, Policy statements #10 and #11; and *Management Policies 2001* - Section 4.5 Fire Management)

9. Employ adaptive management strategies. Scientifically manage wildland fire using the best available technology. Use information gained through inventory and monitoring to evaluate and improve the program. Develop a better understanding of the role played by humans in historic and pre-historic fire regimes.

Initial Objectives:
- Annually support currently funded research regarding the role of fire in Cascades white bark pine communities.
- Develop research funding proposals for additional research needs, based on initial white bark pine study and other identified needs within the next eight years.
- Annually, use research to advance understanding of fire behavior, effects, ecology and management.
- Coordinate with Native American Tribes to compile ethnohistoric information on burning in the park and the surrounding national forests.

10. Integrate fire management with all other aspects of park management.

Initial Objectives:
- Maintain a team approach to fire management where all divisions or expertise within the park and available outside resources are represented and assist in the management of fire within the park.
- Use research to advance understanding of fire behavior, effects, ecology and management.
- Weather: Provide annual fire danger and situation information .

(Basis: *Review and Update of the 1995 Federal Wildland Fire Management Policy* - page 21 Guiding Principle #6; *Management Policies 2001* – Section 2.3.1.5 Science and Scholarship; and *Director's Order #18: Wildland Fire Management* – Section 4.4.g).

B. DESCRIPTIONS OF WILDLAND FIRE MANAGEMENT STRATEGIES

The following strategies and definitions are now recognized as standard National Park Service fire management policy and are described in Reference Manual 18 (RM – 18), an expansive technical manual to DO – 18: *Wildland Fire Management*. Those long familiar with NPS fire management will recognize some changes from past vernacular. In the Appendix, definitions and the information below is provided to illustrate some similarities with past fire management terminology and to provide definitions of some of the more common terms.

Proactive park fire management benefits resources, protects firefighter and public safety and can prevent undesirable human-caused fires from becoming conflagrations and wildfires from becoming unnaturally extensive as a result of fire suppression.

Using the following fire management strategies, wildland fires, for example, could be managed under a suppression strategy or under a wildland fire use for resource benefits strategy. In other words, the Park Superintendent could decide to immediately suppress the fire or could decide that it met the established conditions for wildland fire use. A suppression strategy could ensure that a fire does not spread beyond a designated fire perimeter, does not grow along a certain boundary or is limited to the minimum extent possible. Established before a fire starts, these criteria are designated with respect to fire fighting response, safety and resource protection issues.

In the same way, a wildland fire used for resource benefits strategy could be employed when a naturally started lightning, but not human-caused, fire occurs under favorable environmental and spatial conditions, creating specific desirable resource benefits for the life of the fire. If, however, the fire fails at any time to meet resource goals, it would be declared a wildfire and then the appropriate suppression response strategy would be employed.

By the same token, prescribed fire could be used, where appropriate, within the park boundary, or in conjunction with adjacent landowners or land managers. Prescribed fires, as with other types of fire, would include specific monitoring programs that record fire behavior, smoke behavior, fire decisions and fire effects and ensure that specified resource objectives are met.

The following fire management strategies will be used as described under the preferred alternative described in the accompanying Environmental Assessment.

WILDLAND FIRES (formerly fire, wildfire, prescribed natural fire)

A "wildland fire" is any non-structural fire, other than prescribed fire, that occurs in a park. This term encompasses fires previously called both wildfires and prescribed natural fires. Wildland fire may be used (as described below) to protect, maintain, and enhance resources and to function in its natural ecological role.

1. Appropriate Management Response

This is the specific management action taken to implement protection and fire use objectives in a Fire Management Unit on a *wildland* fire, regardless of the fire's ignition source or location. Management responses can vary by fire. Specific and direct action can be taken along the perimeter to stop local spread, or suppression intensity can be maximized across the entire perimeter of the fire.

The fire management strategies described below include: wildland fire suppression, wildland fire use for resource benefits, prescribed fire and hazard fuel reduction (mechanical and other). These may be used singularly or in combination, as appropriate, to best manage park resources. This plan calls for the use of each of these strategies in Mount Rainier National Park.

2. Wildland Fire Suppression

Wildland fire suppression is an appropriate management response to wildland fire that results in curtailment of fire spread and eliminates all identified threats from the particular fire. All wildland fire suppression activities provide for firefighter and public safety as the highest consideration, but minimize loss of resource values, economic expenditures, and/or the use of critical firefighting resources (NPS, et al., 1998).

A variety of fire suppression techniques are used to break the continuity of forest fuels, cool a fire, and slow the advance of a flaming front. Actions may include construction of fire lines; cutting of vegetation; application of water, foam or retardant; and the application of fire. Most park fires are small and can be suppressed using hand tools - sometimes supported with a chainsaw for cutting fuels, a fire engine or portable pump for delivering water; and/or a helicopter to transport water, supplies, and firefighters. Larger fires or fires with greater potential to spread may require the use of drip torches, fusees, fire line explosives, retardant-filled aircraft or extensive water drops.

3. Wildland Fire Use for Resource Benefits (WFURB)

(Formerly also prescribed natural fire and prescribed fire)
Wildland fire use is the management of *naturally ignited wildland fires* to accomplish specific pre-stated resource management objectives in pre-defined geographic areas as outlined in a fire management plan. Wildland fire use is contrasted with "fire use", which is a broader term encompassing more than just wildland fires, and is defined as the combination of wildland fire use and prescribed fire application to meet resource objectives.
For purposes of this Plan, the terms *Wildland Fire for Resource Benefits (WFURB)* and *wildland fire allowed to accomplish resource objectives* are similar. The WFURB applies to NPS lands, while the latter term applies to BLM-managed lands.

Wildland fire managed for resource benefits will usually result in a wide range of fire intensity and severity across the landscape. This diversity of fire behavior will result in the desired effect of vegetative mosaics, including varying composition and age classes in a park ecosystem. Wildlife habitat is created and benefits from this natural variation in the continuum from severely burned to unburned landscape and in the way it recovers naturally following succession.

To fulfill the purposes of this plan, wildland fire use for resource benefits may:

- assist in the management of park vegetation (enhance community health, insect and disease control, control exotics);
- enhance wildlife and plant species habitat;
- assist in the management of endangered/sensitive species;
- achieve specific cultural resources management objectives; and
- re-establish fire as a viable management tool to enable the park ecosystem to more closely mimic natural fire regimes.

4. Fuels Management

A map can viewed of this area by linking to web site:
Vegetation Species
Vegetation
Vegetation Zones

a. Prescribed Fire

Prescribed Fire is any fire ignited the direction of management actions to meet specific objectives. The fuels to be burned may be in either their natural or modified state. The prescribed burn would take place under specified environmental conditions (e.g. weather and fuel moisture); would be confined to a predetermined area with a pre-determined range of fire intensity and rate of spread. These would enable attainment of planned management objectives, including conformance with an approved prescribed fire plan that meets NEPA and NHPA requirements prior to ignition.

The "prescription" for a prescribed fire contains key weather and fire behavior parameters necessary to achieve desired fire behavior and results. For example, a prescription might specify that the air temperature must be between 50 and 75 degrees Fahrenheit; the relative humidity between 45 and 70 percent; the 20-foot wind speed between 5 and 25 miles per hour; wind direction from the west to southwest; and the flame length less than 4 feet. The actual prescription for a project would depend on site conditions and the objectives that are to be met. An approved prescribed fire plan is required for all prescribed fires prior to ignition.

As envisioned, Prescribed Fires could be used to:

- maintain scenic vistas;
- maintain fire dependent plant communities;
- maintain some boundary areas (where cross-boundary fire was unacceptable);
- manage sensitive resource areas that would need to have cooler fires with lower intensities to prevent damage to the resource at risk;
- restore historically documented cultural or traditional landscapes; and to
- reduce hazard fuel accumulations near developed areas, etc.

Prescribed Fires would include measurable criteria (the prescription) to define the specific environmental conditions under which park managers would ignite a fire. Prescription criteria include weather conditions (current and forecast), description of the prescribed fire project boundary, appropriate holding force availability, fire starting techniques and timing. These prescription criteria would help to ensure that the fire remained within a pre-designated perimeter without threatening life or property and met resource objectives. To the extent possible, Prescribed Fire (as well as Wildland Fire Use) implementation would:

- use natural barriers rather than constructed fire lines to prevent fire spread and to minimize consequent impacts to soils and other park resources;
- minimize up and down slope fireline construction;
- utilize controlled burn intensities to result in a fast-moving, lower temperature impact fire; and
- require post-fire rehabilitation of fire lines, including efforts to reduce compaction by scarifying the soil, and installing natural erosion barriers.

Although there are currently no plans to conduct Prescribed Fire within Mount Rainier National Park, under future implementation of the FMP, such a plan would be written and separate environmental analysis would be conducted for each series of proposed Prescribed Fires. The most likely areas that would be targeted for Prescribed Fire would be the white bark pine community and potential research burns in forested or subalpine communities. Other Prescribed Fire use might include establishing a very limited, but more frequent fire regime around developed areas where great concentrations of important historic structures are located, such as at Longmire and Paradise. Finally, Prescribed Fire might also be used to ensure that fire did not cross the park boundary where the adjacent landowner was unwilling to accept or unable to manage wildland fire.

Under future prescribed fire plans**,** burn objectives will reflect specific environmental conditions to be achieved for the fuel type involved. Ignition and burn patterns will vary temporally and spatially across the landscape in order to ensure diversity in future vegetative structure and composition.

The primary goal of the prescribed fire program under this Plan will be to restore fire as a natural ecological process. A secondary goal, in some areas, may be reducing hazard fuels concentrations (see below).

b. Hazard Fuel Reduction: Manual/Mechanical Treatment

Manual treatment is the use of hand-operated power tools and hand tools to cut, clear or prune herbaceous and woody species. It is a method of reducing hazardous accumulations of wildland fuels, and is often used to create defensible space near structures. In the park, manual treatment could be used 1) to remove excess woody debris from the ground; 2) to remove “ladder” fuels, such as low limbs and brush (which could carry fire from the forest floor into the crowns of trees); and 3) to thin dense stands of trees, near developed areas, to reduce the horizontal continuity of fuels. Occasionally, larger mechanized equipment (a boom truck and front end loader) would be used to move large boles, with the restriction that the equipment would not be driven off road or used outside of developed areas. Material cut or gathered through manual/ mechanical treatment would either be cast back on site, be disposed of by piling and burning: either on-site or at an established burn pit or depending on the size, quantity and location of woody materials, could be chipped or utilized .

Hazard fuel reduction is the use of either prescribed fire or mechanical treatment to reduce accumulations of fuel inconsistent with fire management goals. Hazard fuel reduction can be applied to developed or wildland areas and as with other fire management strategies is used to achieve specific resource protection objectives.

Hazard fuel reduction is often accomplished through a well-planned series of projects that includes both non-fire treatment (mechanical fuels reduction) and prescribed fire treatment. In hazard fuels reduction, many areas subject to initial treatment may require subsequent treatment(s) to achieve hazard fuels reduction objectives and to avoid the risks of costly escape and/or unacceptable resource damage.

Non fire hazard fuels reduction treatments may include, but are not limited to, pruning, thinning, lop/scatter, piling and burning, chipping/mulching, utilization for park needs and firewood removal by the public where authorized.

Mechanical fuels reduction is the use of mechanized equipment to reduce fuels in a specific area. It could range from the use of chainsaws to the use of heavy equipment, depending on the project location and objectives.

Overall, the beneficial outcome of hazard fuel reduction is that firefighter and public safety is enhanced and real property, natural and cultural resources are protected. In addition, potential suppression

costs are significantly reduced, and, when prescribed fire is used, the restoration of fire into fire-adapted landscapes is initiated. Often the primary objective of hazard fuels reduction may be to prepare a prescribed fire unit by establishing control lines, clearing around values at risk, or treating selective areas, where an unnatural buildup of fuel may threaten control lines or potentially result in an unwanted crown fire.

c. Hazard Fuel Reduction: Debris Burning

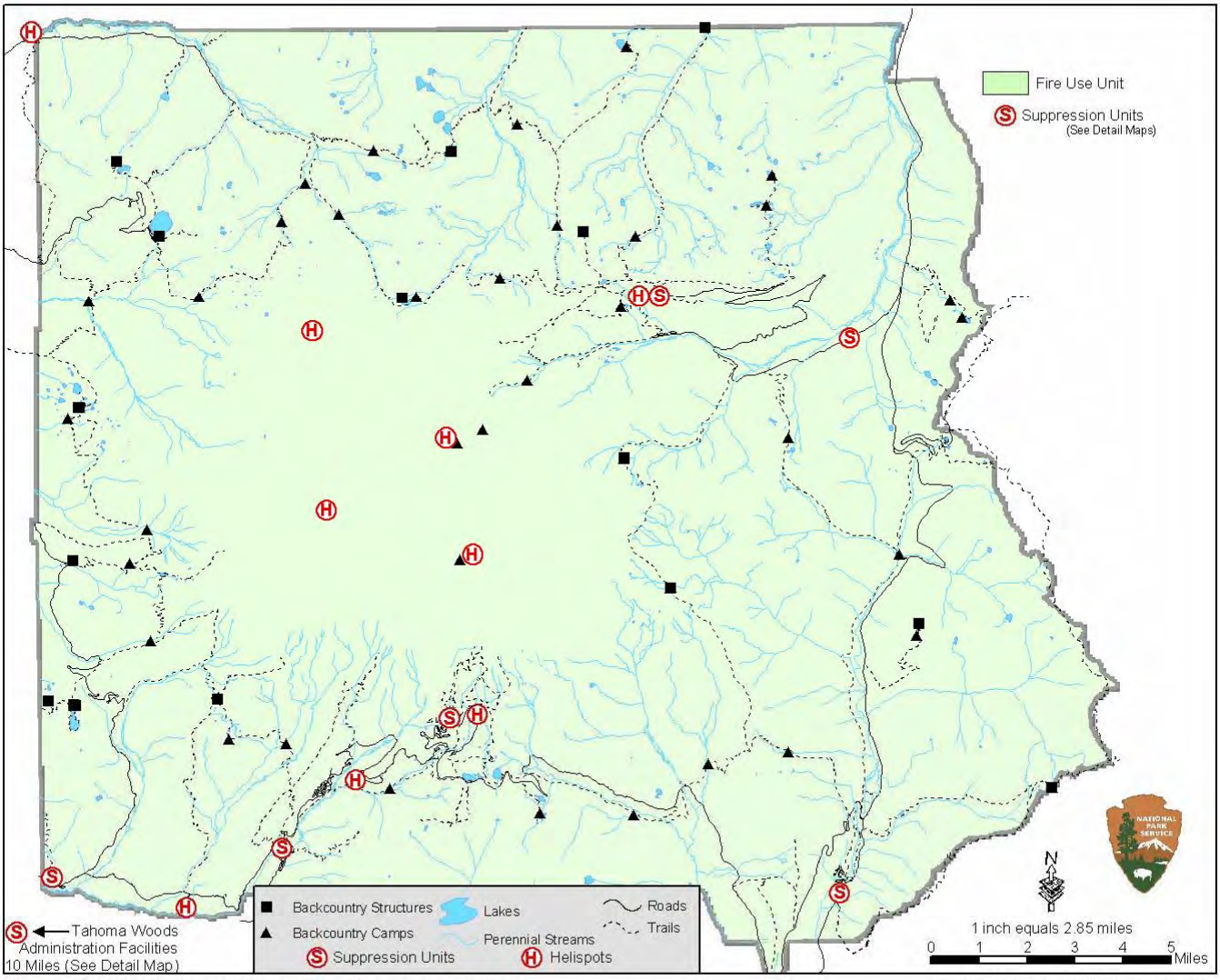
Debris disposal is burning of wildland fuels generated from maintenance activities (such as grass or brush mowing or clippings), hazard tree removal, or during construction activities. These materials must be deemed infeasible or impractical to mechanically remove and must be in a non-wildland fuel environment (parking lot, bone yard, gravel pit, etc.) Any material being burned for debris disposal must be classified as permissible to burn under applicable Federal, State, Tribal and Local regulations.

Debris burning (in small piles) is used to dispose of vegetative material that has been concentrated by manual or mechanical methods.

5. Ecosystem Management

This Plan meets park resource protection goals by incorporating a collaborative approach to fire that recognizes and includes fire management objectives by the park and the diverse public and private landowners along its boundary. To achieve these stated protection goals the GMP requires that a regional perspective be considered, including the recognition that actions taken on lands surrounding the park directly *and* indirectly affect the park. Many of the threats to park resources come from outside the park boundary, further increasing reliance on an ecosystem approach to understand and manage the park's natural resources.

Cooperative agreements now in place and those set up through this plan will ensure that park fire management adequately focuses on an ecosystem approach. Although agency goals may differ, allowing fire to cross land management boundaries will lead to better overall resource protection in the park. To the extent possible, that goal is part of this Plan.



Mount Rainier National Park - Fire Management Plan **FIRE MANAGEMENT UNITS**

C. FIRE MANAGEMENT UNITS

A map of the area can be viewed by linking to the web:
Fire Management Units
Forest Age
Suppression Zones

To enable fire management plans to be more effective, fire management units are designated. A fire management unit (FMU) is any land management area defined by common objectives, land features, access, values to be protected, political boundaries, fuel types, major fire regimes or agency designated special management areas (i.e. wilderness area). Each unit contains fire management strategies, including possible constraints that would accomplish pre-defined objectives.

Two fire management units have been established for Mount Rainier National Park:
1) *suppression* and
2) *wildland fire use* (see Fire Management Units Map).
In both units, all human-caused wildland fires would be suppressed and prescribed fire or hazard fuel reduction may be used to reduce unnatural fuel accumulations or to achieve management or resource objectives. In the wildland fire use unit, naturally ignited wildland fires may be permitted to burn or they may be suppressed depending on the results of fire analysis and the most appropriate management response.

Where suppression occurs, minimum impact suppression techniques (MIST) would be used to prevent or minimize the effects of suppression on park wilderness. Upon a possible future change in NPS/national wildland fire management policy appropriate human-caused fires possibly maybe considered for Wildland Fire Use.

Additional specific information needs to be developed for this Plan to include: vegetation, fuel models, fuel types, fire history, values at risk/or to be protected, including historic structures and landscapes, rare species habitat, aquatic resources, archeological resources, and other factors such as acceptable fire behavior and conditions.

1. FMU – 1: Suppression Unit

In this unit, the primary goal would be to prevent or minimize the loss of historic and administrative structures and the surrounding landscapes by aggressively suppressing fire as it occurs and by more intensively treating the edges of developed areas, while ensuring the preservation of resources, firefighter and public safety.

Fire Management Strategies

Hazard Fuel Reduction (including prescribed fire and Manual/Mechanical fuel reduction)
Where appropriate, prescribed fire and hazard fuel reduction including, Manual/Mechanical treatment to modify fire behavior through the alteration of fuel loads, thereby reducing the threat of fire by providing a defensible space around structures, would be used.

Wildland Fire Suppression
All wildland and human-caused fires would be controlled as quickly as possible. Containment or control actions will be executed in an economical and ecologically sensitive manner to minimize the impacts of suppression on park resources.

Strategic and Measurable Fire Management Objectives

Initial Objectives:
In addition to the objectives stated above, the following would be added:

- Facilitate the preservation of park historic buildings, structures and cultural landscapes in developed areas by conducting systematic Manual/Mechanical treatment of hazardous accumulations of fuel near these facilities. Treat 20 percent of the appropriate park area per year.
- Create defensible spaces, where possible, around developed areas to provide an additional measure of protection for facilities in these areas. Identify defensible spaces around National Historic Landmark District contributing structures.
- As structures are rehabilitated, increase the use of fire suppression systems and other structural improvements that meet the Secretary of Interior's Standards for Rehabilitation of Historic Structures, resulting in no adverse effect.

Management Considerations to Operational Implementation

In the Suppression Unit (FMU – 1):
- Values at risk are not located in wilderness.
- There are a significant number of historic buildings and structures and/or park developed area and administrative area infrastructure.
- This FMU is primarily comprised of the Mount Rainier National Historic Landmark District.
- There are high concentrations of staff and/or visitors in developed and administrative facilities.
- Due to the distance from fire fighting resources, structural fire fighting is essentially limited to building fire suppression systems.
- Fire is a threat to human safety, recreational and administrative facilities, natural, historical and cultural resources.

Park Operations and Visitor Services

There would be a wide range of impacts to park operations and visitor services. Under fire suppression or use management scenarios, these impacts would include changes in visitor services, redirection in park operations and potential human health and safety impacts.

For the most part, park fire operations are funded out of national sources and do not result in major impacts on park operations budgets. Although there would be some opportunity to "backfill" positions, for instance, where firefighters were called out of the park for long periods, many short-term call-outs would be absorbed by park operations. This could result in fewer staff available to manage a variety of park operations during periods of high national alert or extensive park fire management operations.

Firefighters come from within the organization as a whole, including administration, maintenance, law enforcement, resources, and interpretation staff. Trained firefighters are available to park, agency and interagency operations. During periods of high national alert or extensive park fire management operations, there could be fewer staff in visitor centers, reduced visitor center operations, cancellations in interpretive programs such as walks and talks, fewer patrols of park campgrounds, and other effects on visitor services. These impacts would be partially compensated for by the provision of increased fire information to visitors, the media and park staff.

As appropriate, park developed areas, such as Longmire, Paradise, Carbon River, Ohanapecosh and others would be used to stage fire operations, including personnel, fire camps, etc. In localized fire management efforts, portions of park campgrounds, even whole campgrounds, could be closed to visitor use, to provide for public safety or to facilitate fire suppression efforts. As a result, there could be a wide range of reduced visitor services, including negligible to moderate trail, road and area closures that would have concurrent changes in visitor services as well. These could result in loss of

concession revenue, interruptions in scientific studies, and changes in the way park visitors would access services and facilities. Loss of concession revenue would be compensated for (to the degree possible) by increased use of concession facilities to stage fire management operations out of. Closures in visitor use of these facilities would be limited to the degree possible since the experiences they provide would be protected in a similar manner to sensitive park resources and facilities. Increased air operations for fire monitoring or suppression or evacuations would result in increased noise and activity and could increase safety hazards for visitors and employees.

Physical and Biotic Characteristics

The Suppression Unit includes the majority of park administrative facilities, including access roads and developed visitor use areas at the Nisqually and White River entrances, and the administrative/visitor use facilities at Ohanapecosh, Longmire, Paradise and Sunrise. It does not include administrative facilities at the Carbon River Entrance and the Ipsut Cabin area. Other historic structures not included in this unit are included in the Wildland Fire Use FMU as discontinuous values at risk and would be protected to the degree possible from damage or destruction.

This FMU includes a broad range of low and high elevation forest and subalpine community types, including the western hemlock, mountain hemlock, pacific silver fir and subalpine fir zones. It does not, however, include the alpine zone. Specific characteristics of the various areas within this zone are described below.

Areas of Special Concern
The Suppression Unit (FMU –1) contains the following major park developed areas.

The following NHLD maps can be viewed by linking to the web:

Longmire
Nisqually Entrance
Ohanapecosh Campground
Paradise
Sunrise
Tahoma Woods
White River Entrance

Nisqually Entrance Administrative Area (Nisqually Suppression Map):

The Nisqually Entrance Administrative Area, located in the southwest corner of the park, in the western hemlock zone is easily accessed via State Route 706 East. Although this area is not as well developed as other park administrative areas, there are several significant historic structures, including the Oscar Brown Cabin and Nisqually Entrance Ranger Station, and several park residences.

Recently a 78,000-gallon water tank was installed to provide additional fire protection in this area. There are four fire hydrants and a maximum of 45 lbs. of pressure for firefighting. At the Nisqually Entrance, there are 10 structures [nine of which contribute to the Nisqually Entrance Historic District and the Mount Rainier National Historic Landmark District (NHLD)]. The Sunshine Point Campground, open year-round, has 18 campsites, includes picnicking and contains one restroom.

Longmire Administrative/Visitor Use Area (Longmire Suppression Map):

Longmire contains the greatest concentration of historic and residential buildings, cultural landscape and structures in the park. There are approximately 88 total structures, of which approximately 58 are historic, including three National Historic Landmark buildings (Longmire Administration Building, Longmire Service Station and Longmire Community Building).

Longmire is located approximately six miles east of the Nisqually Entrance on the Nisqually to Paradise Road in the western hemlock zone. There is also administrative/emergency access to Longmire via Forest Service Road 52 (Kernahan /Skate Creek Road) which enters the park from the south. Longmire has a year-round employee population (20 residents) and a seasonal (primarily May or June through September) resident population of 60 or more. Finally, There is a non-resident work population at Longmire (100+). Finally, Longmire contains the historic National Park Inn, with 25 guestrooms.

A small (formerly public) VIP campground and wastewater treatment plant is located across the Nisqually River from Longmire, near the Community Building. Longmire also contains a large potable water system, an historic museum, an inn and a front country nature trail (Trail of the Shadows).

Approximately two miles up the Nisqually to Paradise Road from Longmire is Cougar Rock Campground, with approximately 173 sites and six structures (restrooms and ranger station) and generally open from May until October, although some winter camping use also occurs. Longmire has 200,000 gallons of water storage capacity and approximately 90 lbs. per square inch available water pressure.

Paradise Administrative/Visitor Use Area (Paradise Suppression Map):

Paradise is approximately 15 miles east of the Nisqually Entrance on the Nisqually to Paradise Road. Paradise may also be accessed from May until October or November via the Stevens Canyon Road from State Route 123.

There is currently a one-way exit from Paradise via the Paradise Valley Road that ends at the Stevens Canyon Road. Paradise, located in the pacific silver fir zone, contains approximately 21 structures of which approximately seven contribute to the Paradise Historic District and the Mount Rainier NHLD, including the Paradise Inn National Historic Landmark Building, the Skyline Trail network and the Paradise Guide house.

Paradise is home to the approximately 40 seasonal residents and the seasonal Paradise Inn, with approximately 117 rooms. A major potable water system, wastewater treatment plant, large picnic area and the park's main visitor center are also located at Paradise. Based on parking, there are two distinct visitor access areas at Paradise – the upper and lower parking lots. The lower lot is not part of the NHLD. Paradise provides hiking and climbing access to the upper Mountain, especially Camp Muir. Paradise has 250,000 gallons of water storage and approximately 85 lbs. per square inch available water pressure.

White River Entrance Administrative Area (White River Suppression Map):

The White River Entrance provides public and administrative operations, including fee collection, public restroom facilities, wilderness information, backcountry ranger office, and maintenance and ranger housing. This historic entrance to the park was recognized in the White River Entrance National Historic Landmark District, which includes the Ranger Station, the men and women's comfort stations and the mess hall/dormitory.

The White River Ranger (Entrance) Station was built in 1929 by the NPS and the Mess Hall/Dormitory was built either for, and/or by the Civilian Conservation Corps in 1933. The White River fee booth was constructed much later. These facilities are essential to ensuring NPS administrative operations in the White River developed area of Mount Rainier National Park. Visitors using the White River facilities may be day-use visitors (White River/Sunrise Area), overnight backcountry visitors (Wonderland Trail, etc.) or overnight campers 112-site with restrooms White River Campground).

The White River area is located in the silver fir/mountain hemlock zone. Within this intermediate forest, the vegetation is dominated by the Silver fir (*Abies amabilis*)/Alaska huckleberry (*Vaccinium*

alaskaense) vegetation type. This vegetation association is the most extensive type in Mount Rainier National Park. The White River Entrance has approximately 20,000 gallons of water storage and approximately 10 lbs. per square inch available water pressure.

The silver fir/Alaska huckleberry vegetation type is the most extensive in the park. Mature forests of this type lack temperature and moisture extremes and are comprised primarily of western hemlock, silver fir and Douglas-fir.
Alaska yellow cedar (*Chamecyparis nootkatensis*) and noble fir (*Abies procera*) are also common. Common understory shrubs include huckleberry (*Vaccinium sp*.), Oregon grape (*Berberis nervosa*), salal (*Gaultheria sp*.), etc. Common forbs include vanilla leaf (*Achlys triphylla*), trillium (*Trillium ovatum*), wood sorrel (*Oxalis oregana*), false Solomon's seal (*Smilacina racemosa*), bead lily (*Clintonia uniflora*), anemone (*Anemone deltoidea*), etc. Common ferns include sword fern (*Polystichum munitum*), deer fern (*Blechnum spicant*) and others. As with any forested area in the northwest, a wide variety of mosses, fungi and lichens are also abundant.

Ohanapecosh Administrative/Visitor Use Area (Ohanapecosh Suppression Map):

Ohanapecosh has been proposed as an eligible site for listing on the National Register as a 150 acre historic district for association with the Mission 66 master plan and design style.

The Ohanapecosh area is located in the pacific silver fir/western hemlock zone and is dominated by the following tree associations at low elevations, such as are present in the Grove of the Patriarchs). Silver fir/devil's club, silver fir/Alaska huckleberry (including the Oregon grape phase), western hemlock/vanilla leaf, western hemlock/devil's club, and western hemlock/salal plant associations.

Ohanapecosh contains a visitor center, administrative facilities (including a ranger station, housing, and maintenance area), and a large campground with 205 sites and seven restrooms, including several historic restrooms. Ohanapecosh has 50,000 gallons of water storage and approximately 100 lbs. per square inch available water pressure.

The Grove of the Patriarchs is an excellent example of a streamside community long-protected from fire (Franklin *et al.* 1988). Some of the trees in the Grove and beyond near the confluence of Chinook Creek and the Ohanapecosh River, trees are estimated to be over 1000 years old. The largest trees are western red cedar, western hemlock and Douglas-fir.

In addition, this diverse forest contains subalpine fir (*Abies lasiocarpa*), Pacific silver fir (*Abies amabilis*), Alaska yellow cedar (*Chamaecyparis nootkatensis*) and red alder (*Alnus rubra*). Shrubs include vine maple (*Acer circinatum*), salal (*Gaultheria shallon*), elderberry (*Sambucus racemosa*), salmonberry (*Rubus spectabilis*), huckleberry (*Vaccinium sp.*), beaked or California hazelnut (*Corylus cornuta*), and thimbleberry (*Rubus parviflorus*), etc. Forbs include western tea-berry (*Gaultheria ovatifolia*), skunk cabbage (*Lysichiton americanum*), bead lily (*Clintonia uniflora*), vanilla leaf (*Achlys triphylla*), twinflower (*Linnaea borrealis*), violets (*Viola sp.*), five-leaved bramble or trailing raspberry (*Rubus pedatus*), foam flower (*Tiarella trifoliata*), miner's lettuce (*Claytonia perfoliata*), bleeding heart (*Dicentra formosa*), stinging nettles (*Urtica dioica*), pathfinder (*Adenocaulon bicolor*), trillium (*Trillium ovatum*), and wild ginger (*Asarum caudatum*), etc. Ferns include bracken fern (*Pteridium aquilinum*), lady fern (*Athyrium filix-femina*), oak fern (*Gymnocarpium dryopteris*), sword fern (*Polystichum munitum*), maidenhair fern (*Adiantum pedatum*), etc. There are also a wide variety of mosses, liverworts and lichens.

Sunrise Administrative/Visitor Use Area (Sunrise Suppression Map):

The Sunrise area, located within the subalpine fir zone, contains historic administrative and public use facilities, including approximately 15 historic structures and buildings including overlooks, a picnic area, the Sunrise Stockade Complex (also a NHL building), and the Sunrise Lodge. Sunrise also contains some park housing, a visitor center, a large septic system, a potable water system and a large generator. Sunrise has available water storage (Frozen Lake) ranging from a low of 500,000 gallons to a high of one million gallons and approximately 120 lbs. per square inch of available water pressure.

Sunrise vegetation is a mosaic of tree clumps and herbaceous meadows. Tree clumps are dominated by subalpine fir (*Abies lasiocarpa*), Engelmann spruce (*Picea engelmannii*) and white bark pine (*Pinus albicaulis*). Herbaceous meadows are composed of a mosaic of dry grass and heath-shrub vegetation communities (Henderson 1973). Dry grasses are the most common, and are dominated by green fescue (*Festuca viridula*), lupine (*Lupinus latifolius*), paintbrush (*Castilleja sp*.), and asters (including *Aster alpigenus* and *A. ledophyllus*). Heath-shrub vegetation is found in moister sites and is dominated by white heather (*Cassiope mertensiana*) and red heather (*Phyllodoce empetriformis*).

Tahoma Woods Administrative Headquarters Area (Tahoma Woods Suppression Map)

Tahoma Woods, located between Elbe and Ashford approximately 3 miles from each, is the park's administrative headquarters, containing administrative operations, including the office of the superintendent, budget, personnel and other administrators in one structure. Nearby are 15 (3-bedroom) houses, a greenhouse, a maintenance storage area, and an air quality monitoring station, two 8-unit apartment buildings and a future a education center.
Tahoma Woods has 150,000 gallons of water storage and approximately 45 lbs. per square inch of available water pressure.

Tahoma Woods is located in the western hemlock zone, which is characterized by thick forests of western hemlock, western red cedar and Douglas-fir. Deciduous species (usually along water courses) include: red alder (*Alnus rubra*), black cottonwood (*Populus trichocarpa*) and bigleaf maple (*Acer macrophyllum*). Common understory shrubs include: vine maple (*Acer circinatum*), Oregon grape (*Berberis sp*.), red huckleberry (*Vaccinium parvifolium*), devil's club (*Oplopanax horridum*), salal (*Gaultheria shallon*), red-flowering currant (*Ribes sanguineum*), etc. Common forbs include: vanilla leaf (*Achlys triphylla*), trillium (*Trillium ovatum*), wood sorrel (*Oxalis oregana*), false Solomon's seal (*Smilacina racemosa*), bead lily (*Clintonia uniflora*), spotted coralroot (*Corallorhiza maculata*), anemone (*Anemone deltoidea*), bunchberry dogwood (*Cornus canadensis*), miner's lettuce (*Montia sibirica*), inside-out flower (*Vancouveria hexandra*), etc.

Common ferns include sword fern (*Polystichum munitum*), deer fern (*Blechnum spicant*), bracken fern (*Pteridium aquilinum*), etc. As with any lowland forest, a wide variety of mosses, fungi and lichens are also abundant.

Despite the fact that Tahoma Woods is second growth (having been logged in the 1800s and 1960s while owned by Weyerhaeuser Company prior to its purchase by the National Park Service). The forest is relatively intact, containing a wide variety of understory species and a diverse array of wildflowers in season. Interspersed at Tahoma Woods is a cultivated lawn of perennial rye and red fescue bisected by gravel and asphalt driveways, roads and parking.

2. FMU 2— Wildland Fire Use Unit

The purpose of the wildland fire use unit is to encourage fire as a natural disturbance that results in a landscape mosaic of varying species composition and structure. Dependent on variable analysis at the time of fire occurrence, naturally ignited wildland fires could be allowed to burn as a wildland fire use project or confined, or suppressed. As with the Suppression Unit, all human-caused fires would be immediately suppressed. In addition, similar to the Suppression Unit, prescribed fire and hazard fuel reduction strategies would be used to sustain a natural fire regime or used as tools to achieve stated management or resource objectives.

Strategies

- Manage the FMU to maximize wildland fire presence to the fullest extent possible while protecting values at risk.
- All unwanted wildland fires would be suppressed using the appropriate fire suppression response options, determined by a Wildland Fire Situation Analysis (Appendix 20), supported by information from a Wildland Fire Implementation Plan (Stage I)
- All naturally occurring fires within this unit would be reviewed for appropriate classification and management response. A Wildland Fire Implementation Plan (Appendix 17)will be completed for each ignition and the fire will be declared either for Wildland Fire Use or appropriate suppression. Some fires may require suppression actions around the entire perimeter, while others may only be managed on a specified flank to limit spread into a certain area.
- Fires not suppressed and allowed to play out a natural role in the environment will be monitored daily to gain knowledge and data on fire behavior and ecological effects, as well as to keep a close watch on fire activity. A daily validation of current and expected fire behavior and analysis of the continuation of ongoing fire management strategies as part of the WFIP would be completed. If a natural wildland fire exceeds the prescription at any time it shall be declared a wildfire and appropriately suppressed.
- Where necessary to meet fuel reduction objectives, approved fuels management techniques, including prescribed fire would be used to modify localized fuel concentrations leading to fire behavior more conducive to successful wildland fire suppression tactics.

Management Considerations to Operational Implementation

- This FMU-2 is primarily comprised of wilderness.
- A number of backcountry historic buildings, including four fire lookouts, eight cabins, and three shelters, as well as, more than 50 historic structures are part of the National Historic Landmark District and are included in this FMU. The historic structures include bridges, overlooks, culverts, tunnels, most roads, the Wonderland and Northern Loop trails, monuments and dams.
- This FMU includes minor developed areas such as Mowich Lake, Carbon River Entrance, Ipsut Creek Campground, Reflection Lakes, Tipsoo Lake area, Box Canyon, Narada and Christine Falls, Ricksecker Loop Road, etc.
- Potable and non-potable water delivery systems, as well as other park utility systems, that service park developed areas are included in this unit.
- The Suppression Units are intermixed in this FMU and managed differently.
- There are several major roads that access various portions of this Unit; however, most access is via trail.
- There are a number of known and unknown rare, threatened and endangered species issues in this FMU.

Physical and Biotic Characteristics

Elevations range from 1,600 feet to 14,410 feet. The area above 7,000 feet, however, is primarily snow, rock and ice and is of little concern from a wildfire perspective. Topography ranges from low elevation river valleys to alpine areas, containing deep valleys and numerous peaks. Nine major rivers cut through or border this zone. Annual precipitation may be up to and over 100 inches, falling primarily as rain below 5,500 feet and as snow above. Historically, the highest incidence of recorded lightning fires has occurred in this unit between 4,500 and 5,500 feet.

This FMU includes a broad range of low and high elevation forest and subalpine community types, including the Western Hemlock, Mountain Hemlock, Pacific Silver Fir, Subalpine Fir, and Alpine generalized vegetation types.

Access to FMU – 2 is provided by State Highways 123 and 410, the Westside Road, Nisqually to Paradise Road, Stevens Canyon Road, White River-Sunrise Road, Carbon River Road, and the Mowich Lake Road but would primarily be accessed via designated trails and cross-country travel.

Areas of Special Concern

The Areas of Special Concern would echo the list of suppression units which is the Park's developed areas and historic structures. See earlier descriptions under Fire Management Suppression Units and the appendices that list the building within the Park.

Park Operations and Visitor Services

There would be a wide range of impacts to park operations and visitor services. Under fire suppression or use management scenarios, these impacts would include changes in visitor services, redirection in park operations and potential human health and safety impacts.

For the most part, park fire operations are funded out of national sources and do not result in major impacts on park operations budgets. Although there would be some opportunity to "backfill" positions, for instance, where firefighters were called out of the park for long periods, many short-term call-outs would be absorbed by park operations. This could result in fewer staff available to manage a variety of park operations during periods of high national alert or extensive park fire management operations. Firefighters come from within the organization as a whole, including administration, maintenance, law enforcement, resources, and interpretation staff.

Trained firefighters are available to park, agency and interagency operations. During periods of high national alert or extensive park fire management operations, there could be fewer staff in visitor centers, reduced visitor center operations, cancellations in interpretive programs such as walks and talks, fewer patrols of park campgrounds, and other effects on visitor services. These impacts would be partially compensated for by the provision of increased fire information to visitors, the media and park staff.

As appropriate, developed areas, such as Longmire, Paradise, Carbon River, Ohanapecosh and others would be used to stage fire operations, including personnel, fire camps, etc. In localized fire management efforts, portions of park campgrounds, even whole campgrounds, could be closed to visitor use, to provide for public safety or to facilitate fire suppression efforts. As a result, there could be a wide range of reduced visitor services, including negligible to moderate trail, road and area closures that would have concurrent changes in visitor services as well. These could result in loss of concession revenue, interruptions in scientific studies, and changes in the way park visitors would access services and facilities.

Loss of concession revenue would be compensated for (to the degree possible) by increased use of concession facilities to stage fire management operations out of. Closures in visitor use of these facilities would be limited to the degree possible since the experiences they provide would be protected in a similar manner to sensitive park resources and facilities.
Increased air operations for fire monitoring or suppression or evacuations would result in increased noise and activity and could increase safety hazards for visitors and employees.

As needed rehabilitation efforts to reopen closed portions of the park to visitor use would occur, including analysis of safety issues, such as the potential for hazards left from fire management operations, etc. Others would include repairs to existing roads, bridges or other damaged facilities; installation of water bars where increased runoff would be expected; culvert and roadside ditch cleaning or installation of racks or screens to facilitate potentially increased runoff, etc. There would also be a variety of ongoing post-fire monitoring to:

- assess fire effects on park resources;
- ensure that treatment or rehabilitation measures were working as designed;
- determine when the usefulness of rehabilitation measures has been exhausted; and to
- conduct condition assessments of fire damaged facilities, etc.

In addition to the effects of the above-described effects on ongoing park operations, there would be an increased potential for park staff and, in some cases, visitors, to be exposed to a wide variety of human health and safety effects. Most of these would relate to firefighters, including encountering steep slopes, uneven terrain, variable fire behavior, smoke emissions, proximity to flames, and other changing environmental conditions. Wildland firefighting and other fire operations require the use of sharp hand tools, power tools and aircraft, including small planes and helicopters.

A primary goal of fire management is to ensure safety for fire fighters, visitors, residents and park employees and to protect property and other values at risk. As a result, all management activities would be evaluated to determine risks to human health and safety. No action that threatens human safety would be taken, unless that threat can be mitigated using standard approved fire management techniques (such as guidelines for constructing fire line downhill, LCES (establishing lookouts, communications, escape routes and safety zones), and following the ten standard fire orders. All personnel on fires will have and use recommended PPE and will receive a briefing using the briefing checklist in the Incident Response Pocket Guide.

The risks of these operations would be managed through the use of established safety precautions, including those listed below.

- Use of safety guidelines in the Fireline Handbook (National Wildfire Coordinating Group Handbook 3, January 1998). These guidelines include, but are not limited to, use of personal protective equipment (PPE), standard fire orders, watch-out situations, and safety issues common to large fires.
- Job Hazard Analyses (JHAs) prepared to identify hazards and mitigation related to individual fire positions and activities.

- Qualifications standards. All personnel assigned to fires must meet NPS and interagency wildland fire qualification standards.
- Site Specific Plans (including Wildland Fire Situation Analyses, Prescribed Burn Plans, Hazard Fuel Reduction Project Plans, Incident Action Plans, and Wildland Fire Implementation Plans.

- Washington State Smoke Management Plan. All prescribed burning and debris disposal would comply with regulations contained in the Washington State Department of Natural Resources Smoke Management Plan. Small burn piles would range from 4 feet by 4 feet (4'x 4') to 10'x10', and would contain less than 100 tons (109,718 kilograms) of natural vegetation. (This meets the definition of small fires under the smoke management plan.)

- For prescribed fires that would consume 100 tons or more of material, the park would apply to Washington Department of Natural Resources, with consultation from the Department of Ecology. Burns would be timed to minimize smoke impacts on air quality and visibility utilizing favorable conditions of atmospheric stability, mixing height and transport winds. No piles would be ignited during smoke management burn bans or visibility protection periods (including from the 4th of July to Labor Day).

- Daily evaluation of fire danger ratings.
- Ongoing public and employee education.

- Campfire restrictions. During periods of high fire danger the Superintendent may restrict campfires to reduce the chance of escaped or unwanted fires: information about current fire restrictions is made available to the public through press releases; notices provided at ranger stations, visitor centers and trailheads; and visitor contacts. The Park should try and coordinate with neighboring agencies and the State to show consistence with the Public, when if comes to fire restrictions.

- Area closures: If wildland fires or wildland fire use pose an imminent threat to human health or safety, the park Superintendent may close all or a portion of the park, including trails and roads, based on recommendations from the Incident Management Team. Park personnel will notify visitors obtaining permits for backcountry use of the exact location of fire activity. Adjacent land management agencies and nearby residents would also be notified if any fire poses a possible threat outside the park.

MIST and best management practices not mentioned above that apply to reducing impacts to human health and safety include:

- Ensuring that safety is the first priority and primary concern of all firefighters
- Encouraging firefighters to routinely review and apply the 18 Watch Out Situations and 10 Standard Fire Orders during their incident tenure
- Posting lookouts
- Being cautious when felling or burning live or dead trees
- Not enabling wildlife accessibility to food
- Clarifying fire orders
- Maintaining adequate firefighter resources and following established work/rest guidelines
- Thoroughly analyzing fire behavior given predicted weather conditions
- Ensuring all required fire analyses are completed as required
- Wearing or using appropriate personal protective equipment (PPE)
- Using infrared devices to detect hot spots
- Aerial monitoring of fire
- Knowledge of terrain
- Well-trained staff

The MIST Implementation Checklist Guideline is found in the Appendix.

Smoke:
Impacts of smoke on public health would also occur, with negligible to minor impacts from small fires or suppression efforts and larger impacts when fires are more extensive or nearer populated areas, including when inversions hold smoke at lower elevations or air currents carry smoke down valley. Large or small fires could smolder for a few days to a few weeks or more. Smoke would be diluted to some degree by mixing and dispersion. The degree to which this would occur would depend on localized and regional weather patterns, topography and other factors.

Public information would be expanded when increased smoke management concerns are evident, enabling sensitive people to take appropriate measures to limit their exposure. Drift smoke from fires could affect area travel corridors, including park and other roads, resulting in reduced visibility for drivers, an increased need for traffic control and other effects.

A range of beneficial effects to park operations and visitor services could also result from the implementation of a sound fire management program. These would include better protection of park resources, including ecosystem processes, historic structures and administrative facilities. They would also include better training, including cross-training, of park staff, resulting in a better understanding of fire management and its importance to park resources, as well as skills that are readily transferable to other parks, agency and interagency fire management operations.

Backcountry Historic Structures and Utilities
The Park is encouraged to complete hazard fuel reduction around all backcountry historic structures and utilities before fire season.
If a fire is threatening a backcountry historic structure and/or utility, it will be evaluated and as long as conditions permit fire fighters to enter the area safely. An assessment will be completed and efforts will be made to preserve the area, with the Superintendents concurrence, in the most cost effective manner.

Socioeconomic
Each of the fire management strategies described herein would likely result in impacts to the local and regional economy, albeit regional economic effects would likely be indistinguishable in the absence of large catastrophic wildland fires. Firefighting, fire management operations and other aspects of the park fire management program described herein could result in a negligible to minor impact on area economies. The range of park operations that could result in local economic effects include the size of the fire management payroll, the amount of goods and services procured locally, and the impacts of fire operations and smoke or other fire effects on changing park visitation during localized or widespread fires.

Loss in tourism revenue could, in some cases, be compensated for by the presence of large wildland fires. This would be particularly true with respect to substituting revenues generated from wildland firefighting operations revenues typically generated by visitors (including meal preparation, the purchase of goods and services, and lodging). Similar impacts or benefits would result from the closure of park areas containing these concession services. And, the same is true of socioeconomic impacts related to park area, road or trail closures or widespread fire management activities.

Safety
The Incident Commander and on-scene personnel will take immediate steps necessary to secure the scene, protecting visitors, residents, non-incident employees and park resources. Assessment of safety issues (escape routes, safety zones and danger areas), origin and cause, size of the fire, length of the fire perimeter, location of the fire front, values threatened by the fire, weather conditions, fire behavior, fire intensity, fuel type, topography and time of day will be made.

Life threatening situations will be managed in the same manner as any other time critical emergency and will have priority over all other communications or fire actions.

Fast moving, high intensity fires may require evacuations. In these situations, the Incident Commander will coordinate the evacuation with the local LE agencies, Chief Ranger and FMO.

Small, low intensity fires may not pose any immediate threat to public safety, but action may be taken to promptly contact all staff and visitors in the fire area and to advise them of the fire situation,

potential safety considerations, communication procedures and safe travel routes.

For long-term incidents, additional precautions may need to be undertaken to resolve heavy smoke impact upon local communities. Normally, under these situations, a fire team will be in place, and they will formulate a smoke impact mitigation plan for impacted local communities, if needed. Areas to consider during the formulation of this mitigation plan would include roads, schools, nursing homes, airports, hospitals, and any high technology industries that may be located nearby. If the park staff is managing a fire that is having undo negative smoke impacts on a community or roadway, a park air quality advisor will be assigned to formulate and implement a smoke mitigation plan.

(See Fire Management Organization and Responsibilities and the Public Safety Plan listed towards the end of the Plan).

V. WILDLAND FIRE MANAGEMENT

This section addresses the five primary components of wildland fire management:
1) wildland fire suppression,
2) wildland fire use for resource benefits,
3) fuels management,
4) hazardous fuel reduction and debris burning, and
5) prescribe fire.

As described in the accompanying Environmental Assessment, Mount Rainier's Fire Management program will use the following fire management strategies:
Wildland Fire Suppression, Wildland Fire Use For Resource Benefits, Prescribed Fire And Hazard Fuel Reduction (Manual/Mechanical Fuel Reduction and Debris Burning)

A. Wildland Fire Suppression Program

The following section describes specific components of the park's wildland fire suppression program, including:
1) Wildland Fire Prevention Program
2) Fire Weather Forecasting
3) Pre-suppression Preparedness
4) Pre-attack Preparedness
5) Step Up Plan
6) Fire Detection
7) Fire Reporting Guidelines
8) Mobilization Plan
9) Initial Public Safety Plan
10) Determination of Fire Potential/Decision Flow Chart
11) Fire Monitoring Guidelines
12) Suppression Conditions
13) MIST Guidelines
14) Burned Area Emergency Rehabilitation
15) Fire Investigation
16) Fire Funding
17) Fire Records and Reports

1. Wildland Fire Prevention Program

The plan includes specific actions that will be undertaken by responsible staff upon the increased incidence of human-caused fires and/or a high fire danger rating. The plan will be reviewed annually and updated as changes occur. See Appendix 27.

The Fire Prevention Plan includes:

- Information disseminated to visitors via bulletin boards, news media and personal contacts.
- Increased staffing and patrols during high fire danger.
- Potential restriction of visitor activities, such as banning/restricting front country fires during very high or extreme fire danger.

Education emphasizes the need to inform the public of the importance of wildland fire prevention. Activities will include:

- Pertinent signs, posters, and notices will be posted on park bulletin boards, and at visitor centers, developed campsites and day use sites, and neighboring resorts.

- Pertinent messages will be included in park publications, such as the park folder and newspaper, camping and hiking brochures, nature trail guides, on the park website, and a site bulletin describing wildland fire management program, and news releases to local and regional media.
- Pertinent messages will be included in visitor center exhibits, lightning caused wildland fires (not including those managed for resource benefit) interpretative talks, and NPS and concession orientations for new and returning employees.
- Pertinent messages will be included in informal contacts between concession/commercial use license employees and park visitors and neighbors.
- Programs at local schools will emphasize fire's natural role in the park ecosystem and the prevention of human-caused wildland fires.

Enforcement of rules and regulations pertaining to fire will be aggressive enforced. Burning restrictions are coordinated with the other agencies through the use of standardized regulations found in Section 41 of the MNICS Mobilization Guide. Other enforcement activities include:

- Wood fires will be restricted to metal fire grills at developed campsites and day use sites.
- Prior to the opening of fishing season in mid-May, Maintenance personnel will clear the area around each fire grill of encroaching vegetation, and branches overhanging fire grills will be limbed.
- Patrols by park rangers, particularly during the evening, will enforce compliance with the policy of restricting wood fires to developed sites and with any open burning restrictions that may be in effect due to high fire danger.
- Local power companies will check power lines for tree clearance and will correct deficiencies.
- Any restrictions deemed necessary during periods of extreme fire danger will be publicized on radio, television, and in local newspapers.
- The Park's contracted inspector will conduct formal annual fire/safety building inspections. The Chief Park Ranger and the Facility Manager will clear up any hazards identified during such inspections, as soon as possible.

2. Fire Weather Forecasting

Fire weather forecasting is an important component of park fire management. Local weather and fire danger information is combined with park information to produce a park forecast during the fire season (May15 through October 30).

The National Fire Danger Rating System (NFDRS) indices and components are utilized and are computed through the Weather Information Management System (WIMS). A computer to access WIMS is maintained at the park Communications Center. Routine WIMS use is by Communications Center personnel under the direction of the FMO. Park fuel model and weather information is used to calculate the park fire danger rating.

Weather observations and situation reports are entered daily in accordance with published standards. The park maintains two fire weather stations. The Ohanapecosh station RAWS and the Sunrise area.

Location	Fuel Model	Station #	Elevation
Kautz Creek	G2 P3	45-1812	2275 ft
Ohanapecosh	H2 A3	45-1119	1925 ft
Sunrise	currently not set up for fire data		6400 ft

Fire weather data includes:
Fire weather is recorded once daily between 1300 and 1400 hours, or more frequently as directed by the FMO. WIMS indices are calculated from the data collected for each of these stations. The NFDRS fuel models (C, G, H, T) and NFFL Fuel Models (2, 5, 8, and 10) are used for the calculations. Outputs of fire weather and fire danger are retrieved and relayed to the field over the park's network computer system. A radio bulletin is also transmitted to inform field units of current conditions when Staffing Class IV (See Step-Up Plan) or a red flag warning is in effect. The Puget Sound Interagency Communications Center is notified daily of fire conditions in the park. On occasion, the Northwest Interagency Communications Center is also notified. End of the month records are kept in Park's Communication Center.

There are two Remote Access Weather Stations (RAWS) located in Ohana and Sunrise, but there is a need to switch all weather stations to this system by 2004.

3. Pre-suppression Preparedness

The FMO will annually (between April 1st and May 1st) complete a Readiness Checklist, a Pre-Season Risk Analysis, and a Pre-Attack Planning and report their status to the Chief Ranger and Superintendent. All of these documents are found in the appendix.

The minimum initial attack staffing level (MC-I) specified in the Step-Up Plan for the park will be available during fire season. The Annual Step up plan located in the appendix identifies actions to be taken on a month-by-month basis in the park.

The Park Communications Center will function as the initial fire information center until an expanded dispatch can be formed. Fire situations, fire danger, current staffing levels, and call-out information will be handled by the communication center. Fire personnel availability and resource orders will be maintained and organized by the comm center and/or ranger district clerk.

4. Pre-attack Preparedness

Pre-attack preparedness is to organize and assigning specific duties to park staff. These duties and responsibilities are generally outlined in the Fire Management Plan.

Currently, Mount Rainier does not have any qualified Type II Section Chiefs. We would rely on a local interagency IMT team to provide leadership if a moderate fire was to occur within the Park.
See pre-attack planning checklist in the Appendices.

5. Step-Up Plan

As fire danger increases, actions outlined in the following Step-up Plan will be taken to enhance fire detection and preparedness. This plan is an interim measure and contains inputs of observed Burning Index based upon park records versus the frequency distributions and seasonal graph for BI, which are contained in the fire data printouts.

Manning Class	Burning Index (BI) (Fuel model G)
I	0 – 2.47
II	2.48 – 4.94
III	4.95 – 9.90
IV	9.91 – 11.87 (90%)
V	11.88 – up (97%)

MORA's STEP UP PLAN

STAFFING CLASS	Burning Index (BI) FUEL MODEL G	STEP-UP ACTION
Manning Class MC-I LOW	0-10	Normal 5-day Tour of Duty (TOD) with no special provisions for firefighters on duty.
MC-II MODERATE	11-19	Normal 5-day TOD with at least two firefighters available within 12 hour call back but not necessarily on duty.
MC-III HIGH	20-31	**Submit for severity funding, since there are only collateral duty fire fighters at MORA** Normal 5-day TOD with one firefighter on duty and two firefighters available on 6-hour callback. If Lightning Activity Level (LAL) 4-5 is occurring, predicted for the day, or has occurred within the past 24 hours, or is a high visitor use period, move to MC-IV.
MC-IV VERY HIGH	32-54	If LAL 3-6 has occurred within past 24-48 hours or old sleeper fires are being located around the park at lower elevations, a fixed-wing detection patrol and/or staffing of lookouts will be utilized. Potential for extended shifts on a day-to-day basis, a six day work week, mobile patrols and/or an engine working mid morning to dust. Evaluate staffing the primary lookouts and/or coordinating with the USFS lookouts on the park's boundary.
MC-V EXTREME FIRE DANGER	55-up	All of the actions under MC-IV. Open fires will be prohibited in concert with surrounding agencies (USFS, DNR). Area closures or other restrictions on visitor activities may be implemented. Extend dispatch hours if a fire occurs and is actively staffed at night. Potential for extended shifts on a day-to-day basis, a seven day work week, mobile patrols and/or two engines patrolling mid morning to dust. Staff the primary lookouts and/or coordinating with the USFS lookouts on the park's boundary.

In the above plan, MC refers to Manning Class, Lightning Activity Level (LAL) and BI fuel model refers to Burning Index.

Wildland Fire Suppression Program

6. Fire Detection

All personnel will report any detected fires to the Communications Center, giving the location based on the Uniform Map Grid System, legal land description, geographic description or other best method. Communications Center personnel will convert to township/range/section or latitude/longitude for reporting to PSICC, the Chief Ranger and/or the FMO.

Visitor fire reports will be reported to the Communications Center and confirmed by NPS personnel who are trained in detection of wildland fires.

Fire lookouts located on Gobblers Knob, Tolmie Peak, Mount Fremont and Shriner Peak may be staffed when the *National Fire Danger Rating System* (NFDRS) reading taken at Kautz Creek, Ohanapecosh, Enumclaw, or Packwood is HIGH or greater, and/or as per the *Step-Up Plan* (under MC-IV and MC-V). When staffed, radio communication with the Communication Center will be established and any fires detected will be reported using the *Wildland Fire Observation and Summary Fire Behavior Report* (1202) located in the appendix. All of the Fire Lookouts would need water flown in or delivered for extended assignments.

Secondary lookouts may be established at areas not covered by staffed lookouts or when staffing of lookouts cannot be coordinated or is not logistically feasible. GPS or portable fire finders and a tripod will be used for accurate bearings when possible.

The Department of Natural Resources and U.S. Forest Service over flights may observe sections of the park during periods of high fire danger. Detection of fires within the park are relayed from the observing agency dispatcher to the Communications Center and relayed to the FMO, area District ranger and the park Chief Ranger.

Fixed-wing and helicopter equipment rental agreements or contracts will be kept current for detection and observation flights. The Office of Aircraft Services, Boise, Idaho, provides aircraft rental agreements for the Department of Interior. Resource orders will be placed through PSICC or the Northwest Area Coordination Center in Portland, (NWCC).

7. Fire Reporting

Fires are reported to the park Communications Center and relayed to the FMO and responsible area ranger for action via radio or phone. Initial reporting information should include: person reporting the fire, location of fire, best access, landowner, estimated size, descriptive rate of spread, winds, suspected cause, and values threatened and resources at risk. Initial information regarding the incident is as outlined in the mobilization plan.

Initial attack on new wildfires is the responsibility of the FMO, under the direction of the Chief Ranger, following procedures outlined in the Mobilization Plan. The response to new lightning fires depends on the location of the fire and initial *Wildland Fire Implementation Plan (WFIP)*. The Mobilization Plan (below) outlines the steps followed to determine the threat from wildland fires and how to initiate the analysis process to determine whether the fire is a candidate for wildland fire ‘use’ classification.

A good size up is the first objective on a fire. All wildland fires controlled by suppression forces undergo initial attack. The number and type of resources responding to initial attack varies depending upon fire danger, fuel type, values at risk and other factors. Nationwide about 95 percent of all wildland fires never exceed the initial attack level of complexity (Type IV) (NWCG Handbook 3 1989).

Fire Qualifications

Qualifications for all wildland fire management positions shall conform to guidelines set forth in the *Wildland and Prescribed Fire Incident Qualification System Guide. (IQCS)*

Fire qualifications are based on the National Interagency Fire Qualification System (NIFQS). All park fire assignments will be made on the basis of NIFQS qualification and ability as outlined in the Wildland Fire Qualification Subsystem Guide (PMS-310-1). Trainee assignments under the 310-1 system will be documented by the use of task books for the appropriate assignment. All park staff that are red-carded shall have their training and experience records maintained on the Wildland Fire Qualification and Certification System, which is, maintained and accessed through the NIFC IQCS computer. Task Books for each fire position are available from NIFC. Documentation of completion of Task Books shall be maintained in the IQCS computer and by the FMO.

Fire assignment policy is outlined in the Fire Mobilization Plan of this plan. Only personnel with current 310-1 qualifications will be dispatched to fires. Emergency firefighter personnel hired under AD rates must meet all of the training and physical fitness requirements for assignment to the fireline and must provide part of the required personal equipment (boots). Emergency hiring is subject to approval by the Fire Management Officer or the incident commander, and is strictly limited to actual emergency need. The Interagency Incident Business Management Handbook will be followed on all AD hiring.

8. Mobilization Plan & Communication

Upon discovery or report of a fire, all subsequent actions will be based on the following sequence.

After the Communications Center is informed of the fire by the individual or agency who discovers or receives the report of a fire, the Communications Center will immediately notify the FMO and appropriate area personnel.

If the fire is contained/extinguished immediately by reporting person(s) (such as abandoned campfires or beach log fires), the report to the fire management office may be by followed up by a phone call (voice mail) or electronic mail. Information required for the report is located below. Natural and Cultural Resources will be notified of all fires not related to visitor use in developed areas and/or greater than 0.25 acres. If a known impact on threatened or endangered species or a cultural site has happened or may occur, immediate notification will be made to NCR, regardless of the size of the fire.

For any fire occurring during staffing class I and II (low fire danger), located near a road, the Communications Center/FMO will immediately dispatch the appropriate engine or a minimum of two firefighters and one squad boss to immediately size up the fire. A qualified ICT4 or ICT5 will be dispatched to the scene on any moving fires (non-abandoned campfire or beach log fire).

For fires occurring during staffing class III (moderate fire danger), the Communications Center will immediately notify the FMO, Chief Ranger and initiate dispatch of firefighting personnel, an ICT4 or ICT5 (whichever is warranted) and the closest NPS, USFS or DNR engine (if the fire is near a roadway). The WFIP would set the stage for whether the fire is suppressed or managed as a 'use' fire. The WFIP Stage I is the initial size-up of the fire and if the GO/No Go decision is for a 'use' fire then the ensuing Stages II and III would happen. If the fire is contained or not spreading, the closest park qualified staff or engine will be dispatched to size up the incident and report to the Communication Center.

During staffing class IV or higher (high or extreme fire danger) fires, appropriate firefighters, an ICT4 and the closest NPS, USFS, DNR or fire district engine will be dispatched (if the fire is near a roadway). Consideration of automatic dispatch of a helicopter with bucket, a qualified helicopter manager and air tanker support, as well as additional ground support from adjoining areas will depend on fire location, and if structures are threatened, initial and predicted fire spread, and fire weather.

If the fire is a naturally occurring backcountry fire, FMU-2, then the fire office will execute the Wildland Fire Management Policy Flowchart to determine the appropriate management response if the fire is within FMU II. The course of action will be according to the decision tree. Initial size up should be completed by an ICT4 or higher qualified individual.

The FMO/Incident Commander will initiate Stage I of the *Wildland Fire Implementation Plan*. The FMO will assign the fire name, fire number and determine jurisdiction of the fire. The FMO will be responsible for completion of current and predicted fire weather information and relay this information to the Incident Commander as soon as the weather information is known. The FMO/Duty Officer will also be responsible for determining available firefighting resources.

The initial attack Incident Commander will ensure that the following is determined and relayed to FMO/Communications Center:

- Current Size
- Fire location - Latitude and longitude or azimuth and distance from known landmarks; elevation.
- Cause - Human or lightning (if a human caused fire, protect the fire scene for possible arson or intent)
- Fuel Model/Conditions – to include fuel loading
- Fire behavior and potential - Size-up information: Fuels, topography and on site weather data to permit prediction of fire behavior, size and complexity.
- Fuel type(s) and characteristics.
- Position of fire on slope and percent slope.
- Aspect (south facing, west facing, etc.)
- State of weather (rain, clear, etc).
- Temperature.
- Relative humidity.
- Wind speed and direction.
- Characteristics of smoke column (black, light gray, white)
- Observed fire behavior.
- Estimated fire size.
- Determine fire potential based on fire behavior and predicted weather.
- Request additional resource needs (personnel, helicopter or air tanker support), through the fire office. Helicopters may be procured through local contacts by the fire office and procurer, while medium helicopters and air tankers must be ordered through the Puget Sound Interagency Communications Center (PSICC) or Northwest CC.
- Threat to public safety: proximity of visitors, residents or non-incident employees in the immediate fire area and the degree of risk to such persons from the current fire situation.

If the fire exceeds class B size (greater than 50 acres) or the park's capability to manage, it is suggested that the management of the fire be turned over an Incident Management Team (IMT) of a size and capability commensurate to the complexity of the wildland fire. The FMO will ensure a qualified Incident Commander and fire organization commensurate to the complexity/potential of the fire is brought together to manage the fire.

Communications

The park Communications Center at Tahoma Woods (park headquarters) is the dispatch center for the park. During the fire season the Communications Center is normally staffed 14-16 hours each day. Telephone callers reporting fires may contact either Communications Center personnel or park rangers after normal business hours via the 911 phone system.

The park radio system consists of base stations at the Communications Center at Tahoma Woods, Longmire, Crystal Mountain and Paradise with repeaters and remote units at various locations. All ranger stations in areas accessible by paved road have phone lines. Radio repeaters are located on

Gobblers Knob, Crystal Mountain, Mt. Fremont, Tolmie Peak, Shriner Peak and Packwood. Any fixed base radio unit in the park and most mobile units can be contacted by the Communications Center's fire dispatcher.

All fires will be reported to the Communications Center. Dispatch personnel will maintain a radio log of fire activities on ICS form 214 Unit Log. When a fire occurs a daily situation report, 209, will be faxed to PSICC daily by 1800 hours. Fire weather data will be transmitted to PSICC as weather data is collected from Kautz and the Ohanapecosh fire weather stations.

When a fire occurs in the park and the Communications Center is advised of its presence, personnel will first advise the park FMO. The FMO and District Ranger, within whose area the fire is burning, will have the Communication Center contact an Incident Commander Type III or IV, a Crew Boss and necessary resources to manage the incident and lead the initial attack and/or monitoring. When possible, a fire will be reconnoitered by air prior to personnel arriving on the fire.

If a fire has occurred outside the park and park firefighters are asked to assist, the Communications Center will notify those persons designated on the current weekly PSICC resource list by their supervisors and reviewed by the FMO.
Supervisors of the personnel dispatched outside the park, will be notified by email or voice mail, by their employee, not by the park Communications Center. With a request on an "initial attack" fire moving into the park from an adjacent landowner, the Communication Center may contact any qualified fire fighter on the Park's overall list as the closest forces to assist with immediate suppression.

9. Initial Public Safety Plan

All fire management activities will be performed in strict adherence to National Park Service safety standards, including auxiliary functions in logistical and administrative support. The guidelines located in Directors Orders 18, under the heading of Program Requirements, Safety and Health are reproduced below and will be considered the minimum standards under which all activities outlined in this plan will be performed.

1. Firefighter and public safety is the first priority in all fire management activities.
2. Fire personnel will meet appropriate qualifications for incident assignments, including medical requirements.
3. Fire personnel will be equipped with personal protective equipment appropriate to their incident assignments.
4. Fire personnel, including cooperators, will comply with National Wildfire Coordinating Group (NWCG) and NPS fitness and personal protective equipment standards while assigned to fire incidents. Mutual aid cooperators, responding to NPS fires under Memoranda of Agreement, will meet their respective personal protective equipment and qualification standards during initial action operations. However, during project fire or extended operations, cooperators will meet NWCG equipment and qualifications standards.
5. Fire personnel assigned to fireline operations will complete a minimum of 32 hours of basic wildland fire training, and then annually a minimum of 8 hours of refresher safety training prior to incident assignments.
6. No "live fire" shelter training exercises will be conducted or condoned by the NPS.
7. All wildland fire incidents that result in human entrapment, fatalities, or serious injuries or result in incidents with potential for the above (see RM-18 for definition), will be reported and investigated. Pending initial assessment, those directly involved in the event to be investigated will be removed from fireline duties as soon as practical, and will be made available for interview by the investigation team. Peer Support and/or Critical Incident Stress Debriefings (CISD) will be provided as needed for any individuals. The CISD sessions provided will follow the MORA office order.
   Appropriate administrative actions will be taken subsequent to a full investigation.

8. All safety standards and guidelines identified within the Interagency Incident Business Management Handbook will be followed.
9. Management of all wildland fire incidents will comply with interagency risk management strategies.
10. The Job Hazard Analysis process will be used for potentially hazardous fire management activities, and for jobs, which require employee use of out-of-the-ordinary personal protective equipment. See Reference Manual 18 for Job Hazard Analysis process and format.

In addition, particular attention will be given during transportation of personnel in vehicles and aircraft.

1. Drivers of vehicles will observe all traffic signals, speed limits and safety rules when traveling to and from a fire. The use of red lights and sirens is prohibited while responding to a wildland fire, unless there is a threat to life or structures and then the use of these emergency vehicles warning devices will be in compliance with Directors Orders 9 and 18. Drivers will be properly licensed for the size class vehicle they are driving.

2. The Incident Commander or Helibase manager will insure that personal protective equipment and clothing is available and worn by all personnel while working on a wildland fire or being transported in aircraft in accordance with agency policy and OAS regulations. Further information on aircraft operations is located in the park's Aviation Management Plan, the Interagency Helicopter Operations Guide (IHOG) and the Departmental Aviation Manuals.

10. Determination of Wildland Fire Potential/Decision Flow Chart

When lightning fires do not require immediate suppression, the following decision flowchart will be used. Until then, such fires will be conservatively managed for potential resource benefit until an individual *Wildland Fire Situation Analysis* (WFSA) and *Wildland Fire Implementation Plan* (WFIP) can be completed and approved.

The FMO will complete the WFSA with input from dispatched personnel, the Chief Ranger and resource advisors and IDT team. They will develop a proposed course of action based on the following sequence:

1. Consider the planning criteria (time, location, topography, fuels, etc.) and *Wildland Fire Use Unit* prescriptions.
2. Using the information gathered by dispatched personnel and *National Fire Danger Rating System* (NFDRS) indices, complete a *Wildland Fire Implementation Plan* (WFIP) selecting the appropriate management response for the fire. A full explanation of the WFIP is located in the Appendix.
3. Plot predicted fire spread for an appropriate projection time (minimum of one burning period) on topographic maps featuring an overlay of the Fire Management Unit boundaries and location of values-at-risk (structures, administrative facilities, etc.). A copy of this map will be attached to the WFSA.
4. Estimate maximum fire potential, fire behavior and predicted weather forecast, selecting the appropriate management response for the fire.
5. Forward the completed WFSA to the Chief Ranger and Superintendent's staff for review. Final approval is by the Superintendent or designee or the IC of the Incident Management Team.

11. Suppression Conditions

A map of the area can be viewed by linking to the web:
Slope
Specimen Trees

Fires are reported to the Communications Center and relayed to the FMO and appropriate personnel for action in accordance with provisions of the *Mobilization Plan*. This plan is reviewed and revised annually to ensure compliance with the mobilization procedures of surrounding cooperating agencies and the

interagency mobilization guide prepared by the Puget Sound (PSICC) or Northwest Interagency Coordination Center (NWICC).

Personnel and equipment must be efficiently organized to suppress wildland fires effectively and safely. The FMO assumes a coordinator and/or incident commander function on major fires (Class C, 100 acres, or greater in size) or multiple fire situations (four or more Class A/B incidents), by setting priorities for the use of available resources and establishing an appropriate ICS organization for each incident. In the event that the FMO is out of the park, the Chief Ranger will assign an appropriate level Incident Commander to the incident or order the appropriate resources or fire team.

Some wildland fires may involve criminal activity. The Chief Ranger will be promptly notified by the FMO of incidents where determination of fire cause and liability should be initiated. LE investigation by a qualified arson investigator is recommended. Reference should be made to the *Fire Investigation* section (below).

FIRE SUPPRESSION CONDITIONS

Heavy fuels, rotten old growth snags, steep topography, difficult cross-country travel and logistical support problems increase the difficulty of suppressing wildland fires in Mount Rainier National Park. Ground forces with hand tools and air attack support are the primary suppression methods.

As described herein, limitations have been placed on the types of mechanized equipment, that may be used in the wilderness. See *Minimum Impact Suppression Tactics* (below and in Appendix 23).

On most wildland fires, direct attack using hand tools is the most effective containment method. However, fires, which escape initial attack, can create fire intensity levels too hazardous for direct attack, especially when heavy fuels on steep, rocky slopes hamper fireline construction. Indirect tactics or air attack is then utilized.

Water sources can be locally abundant and portable pumps and/or gravity socks with large progressive hose lays may be used in lieu of or to supplement constructed firelines. On front country roadside fires, engines are utilized whenever possible during initial attack. Park engines are designed to supply water and wet-water or high-expansion, environmentally friendly foam. Backcountry fires may involve helicopter support. Helicopter bucket drops and sling operations are sometimes required for suppression action, as ground access is limited. On some fires, aircraft may perform the majority of the suppression action. Air tanker drops of various short-term fire retardant are often effective in limiting fire spread during initial and extended attack.

Fireline explosives can be a rapid and effective method to construct minimum width firelines while overall minimizing environmental damage and exposure of personnel to hazards of terrain. Specially trained fireline explosives crews may be obtained from PSICC. If explosives are to be used, emergency consultation may be required, if there is a potential to impact rare, threatened or endangered species.

Natural fire barriers are often available as anchor points and may also be utilized with or without improvements as indirect firelines. Hazardous conditions can be created, however, when large amounts of fuel are left in unburned "islands" between the fire and indirect firelines. Burn out may be difficult and slow because of the heavy fuel loading and may increases the potential hazard. Cold-trailing, whenever and wherever possible, is preferred.

The best opportunities for containment occur on either end of the burning period. Fireline construction is usually not possible at night due to the terrain and the extensive chainsaw work required in these fuel types. Night shift activities are usually limited to patrol and holding activities, due to the danger associated with falling snags and the normally steep and hazardous terrain.

Complete mop-up can be critical in park fuel types and should be methodically planned and executed. Fires can burn deep into the heavy duff. Large, smoldering snags and windfalls may have to be felled or bucked to insure safety and complete extinguishment of the fire. Re-burn following containment to the extent that firelines are threatened, is rare. The usual precautions for line construction, holding and mop-up as with other western timber fuel types are recommended.

12. Minimum Impact Suppression Tactics (MIST)

The *Wilderness Act* defines Wilderness as an area "without permanent improvements or human habitation, which is protected and managed so as to preserve its natural conditions and which…generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable . . ." The goal of MIST is to minimize fire suppression impacts on the land while ensuring the fire management actions taken are safe, timely and effective. Strategies for suppression activities and tactical operations will be planned to have the least long-term impact to the resource.

The MIST Implementation Checklist Guideline is found in the Appendix.

All fire management activities within wilderness will therefore adhere to Minimum Impact Suppression Tactics (MIST), national and park aviation policies, and Burned Area Emergency Rehabilitation (BAER) guidelines. BAER guidelines include emergency treatments that are required immediately post-fire to prevent loss of life and/or property and reduce potential negative impacts to critical resources as a result of fire effects or the suppression of the fire. Therefore, the appropriate management response to naturally occurring fires in the wilderness will be to monitor and take other necessary contingency actions based on protection and fire use objectives. Structures within wilderness having historical value or administrative need will be evaluated and assigned an appropriate level of protection.

MIST and best management practices not mentioned above that apply to reducing impacts to human health and safety include:

- Ensuring that safety is the first priority and primary concern of all firefighters;
- Encouraging firefighters to routinely review and apply the 18 Watch Out Situations and 10 Standard Fire Orders during their incident tenure;
- Posting lookouts;
- Being cautious when felling or burning live or dead trees;
- Not enabling wildlife accessibility to food;
- Clarifying fire orders;
- Maintaining adequate firefighter resources and following established work/rest guidelines;
- Thoroughly analyzing fire behavior given predicted weather conditions;
- Ensuring all required fire analyses are completed as required;
- Wearing or using appropriate personal protective equipment (PPE);
- Using infrared devices to detect hot spots;
- Aerial monitoring of fire;
- Knowledge of terrain;
- Well-trained staff.

As appropriate, the following analyses will be used to upon determination of an appropriate management response that involves wildland fire suppression, wildland fire use or prescribed fire in wilderness: Minimum Tool Analysis is found in the appendix.

13. Burned Area Emergency Rehabilitation

On April 27, 1998, the Department of the Interior approved new policies for Burned Area Emergency Rehabilitation (BAER), that provide funding for mitigating a broad range of threats to natural and cultural resources, and that minimize threats to life and property as the result of actions related to managing an unplanned wildland fire.

Rehabilitation will not be performed on unsuppressed natural wildland fires where the preservation of natural features and the natural process is paramount. Where suppression actions have been taken, however, rehabilitation is sometimes appropriate.

Every effort will be made to prevent human-caused impacts during a suppression effort through careful planning and supervision, individual education and commitment, the use of minimum impact suppression techniques, and a concerted effort to preserve the wilderness character of the fire area (See MIST Implementation Guideline in Appendix).

When rehabilitation is necessary, efforts will be initiated by the Incident Commander while the fire is being suppressed and through mop-up. If performed after the incident, the Chief Ranger and NCR Chief will designate an employee, usually the park Plant Ecologist, to organize and direct rehab efforts following Burned Area Emergency Rehabilitation (BAER) standards directed toward minimizing or eliminating the adverse effects of the suppression effort with a special emphasis at preventing unacceptable soil erosion.

If re-vegetation or seeding is required, only native plant species will be utilized and the park Plant Ecologist will be consulted. Re-vegetation requires the prior written approval of the Regional Director, per NPS-18 (III: Chapter 8: p. 7).

Rehabilitation planning for each fire will be the responsibility of the Incident Commander in consultation with the resource advisor. Rehabilitation should be performed prior to complete demobilization. Only under unusual situations should rehabilitation be put off until the following spring.

14. Fire Investigation

The initial attack Incident Commander or initial LE Rangers in developed areas will protect the probable point of origin of all wildland fires and record pertinent information required determining fire cause. The IC will be alert for possible evidence, protect the scene and report any findings to the FMO. The FMO will promptly notify the Chief Ranger of all fires of unknown or suspicious origin, which require follow-up investigation.

Prompt and efficient investigation of all suspicious fires will be carried out. Fire management personnel, however, should not question suspects or pursue the preliminary fire investigation unless they hold a current law enforcement commission. Information gathered will be documented in the Case Incident or Criminal Case Incident Record.

If the park does not have a qualified investigator available, personnel of other agencies may be utilized to investigate wildfire arson or wildfire incidents involving structures or order through PSICC. The Chief Ranger, FMO and other staff as appropriate will coordinate investigations.

15. Fire Funding & Records

Mount Rainier is not a fire-pro funded Park. We receive limited funding for fire preparedness. Emergency fire suppression funds will be requested through the FMO as needed. The FMO or Budget Assistant will request an account number from the regional office, and notify necessary park staff of the account number to use.

All costs for monitoring unplanned and uncontrolled ignitions will come from base funding (FIREPRO or ONPS) or from emergency preparedness funds in accordance with guidelines found in NPS-18.

Fire Report Records

Each fire will be reported immediately to the Superintendent by name, location and size. An ICS-209 status report (Appendix 29) will be accomplished daily for extended fire situations. A *Wildland Fire Implementation Plan* will be prepared for all wildland fires used for resource benefit and all prescribed fires. Reports will be submitted to and/or signed by the Superintendent daily.

A complete accountability of fire costs will be maintained for each fire.

All wildland fires (natural and human ignited, natural out, and/or false alarms, monitored or suppressed), and resources dispatched to other agencies in support of wildland fire activities, will be documented an *Individual Fire Report*, DI-1202 found in the appendix.

Individual Fire Reports will be submitted to the FMO within 48 hours after the fire is declared out or the resource returns to the park. Within 10 days individual fire reports will be entered into the NPS *Wildland Fire Computer System* (SACS). A Case/Incident Record (Form 10-343) will be completed, with necessary attachments, to thoroughly document the fire and associated activities, if fire activities cannot be adequately documented on the space available on the DI-1202.

A wildland fire implementation Plan, (WFIP) Stage I is prepared for all fire use fires. A wildland fire situation analysis (WFSA) is prepared for wildland fires that have escaped initial attack suppression 'control' actions. The situation must be critically analyzed. The current fire activity should be accurately described at least once daily in the *Daily Fire Assessment.* The format and instructions of the WFSA is located in the appendix.

The WFSA will be prepared by the park for the incident management team and will be part of the Incident Management Team Briefing, a team briefing sample is found in the appendix.

All of the fire information from each section (Ops, Plans, Log, Finance) should be in the final fire packet accumulated by the outgoing fire team. A short narrative or summary of the fire's major significant incidents should be included in the fire packet. Maps, news releases, IAP's, other pertinent information should also be in the final packet presented back to the Park, at close-out.

Permanent Fire Incident Records to National Archives after 20 years

- Individual Fire Report DI-1202
- Wildland Fire Situation Analysis (WFSA) or
- Wildland Fire Implementation Plan (WFIP)
- Delegation of Authority
- Fire Behavior Analyst Report
- Incident Status Summary Report (ICS 209)
- Fire Narrative Report
- New Releases/Reports
- Daily Cost Estimates
- Fire Maps

FIRE RECORDS

Operational Fire Incident Management Records 7 Year Retention

- Incident Action Plans – IAPs
- Incident Briefings (ICS 201)
- Fire Behavior Message/Weather Forecast
- Unit Log (ICS 214)
- Planning Worksheets (ICS 215)
- Demobilization Plan (ICS 221)
- Raw Weather Data Files
- Air Operations/Helibase Records
- Safety Officer Reports/Accident Logs
- Resource Advisor Information
- Resource Orders (ROSS/MIRPS)
- Check-In List (ICS 211)
- Waybills
- Incident Communications Logs
- General Message Forms (ICS 213)
- T-Cards (ICS 219)
- Cache Issue Reports

Copies of Records Destroy when no longer needed for administrative purposes
Includes copies of records that are filed elsewhere, such as:

- Copies of Firefighter Time Reports
- Copies of Crew Time Reports
- Copies of Equipment Time Reports
- Copies of Contracts (including EERAs)
- Copies of Training Documentation
- Copies of Performance Evaluations

VI. Wildland Fire Use Program

A. DESCRIPTION

Naturally ignited wildland fires are those wildland fires that may contribute to the attainment of resource management objectives. Historical records and research indicate fire has played an important part in the maintenance of the diverse ecosystems of the park. Research further confirms that even small fires routinely experienced in the park play a significant role in diversity of meadow vegetation.

Natural Wildland fires require specific prescriptions that delineate the conditions under which the fires would be allowed to burn (See FMU descriptions). All fires not meeting the prescription or threatening human life, property, cultural resources, threatened or endangered species, including their habitat or recovery plans, as well as those fires threatening to escape over the park boundary, except where a General Agreement exists with another land management agency, will be classified as wildland fires and appropriately suppressed.

Within Mount Rainier National Park, certain lightning fires may qualify as wildland fires for resource benefit. These fires will be managed under the wildland fire for resource benefits strategy. Under this strategy, the management goal is to permit natural fires of all intensities to burn, subject to management constraints (including appropriate prescriptions). This will likely result in numerous small fires and occasionally large, high-intensity fires. Virtually any lightning fire in the Wildland Fire Use FMU may be considered suitable as a wildland fire for resource benefits. The fire, however, must meet the following criteria before being enabled to burn:

- It must help meet the park's pre-defined wilderness and resource management objectives; and
- It must be within the predetermined geographic boundaries of the Wildland Fire Use FMU-2; and
- It must fall into a pre-determined prescription.

Fires that do not meet these criteria will be managed under a suppression strategy. To determine the appropriate management response, a *Wildland Fire Situation Analysis* and *Wildland Fire Implementation Plan* will be completed. Both of these documents are located in the appendix.

The objectives for the use of wildland fire were described above under Section IV*: Scope of Wildland Fire Management Program.*

B. DECISION-MAKING AND MONITORING

Decisions regarding wildland fire use will be made based on specific criteria, including the time of year, the location of ignition, the expected weather conditions, the possibility of escape across the park boundary, smoke and health concerns and other criteria as described below. The factors influencing the decision to use or not use wildland fire will be monitored as follows (see also earlier sections on weather stations and monitoring):

The generalized decision process is based on the *Policy Implementation Procedures Reference Guide*. Information in the following paragraphs describes the actions necessary to safely manage wildland fires while considering resource and other values to be protected. The decision process to evaluate each new fire and assess ongoing wildland fires includes the following elements:

- Determine fire origin, location and cause
- Determine affected FMU
- Obtain current and predicted weather
- Determine immediate threats to life and property
- Consider smoke and health concerns
- Determine if necessary qualified personnel and fire management resources are available
- Is qualified manager for the fire available

- What are immediate and potential impacts to visitor use and local communities
- What is the projected fire growth under normal and drought conditions

Ultimate responsibility for all wildland fire management activity rests with the Superintendent of Mount Rainier National Park. For operational issues, the Fire Program manager is responsible for implementation.

C. FMU 2— Wildland Fire Use Unit

The purpose of the wildland fire use unit is to encourage fire as a natural disturbance that results in a landscape mosaic of varying species composition and structure. Dependent on variable analysis at the time of fire occurrence, naturally ignited wildland fires will be allowed to burn and be monitored for resource benefit. As with the Suppression Unit, all human-caused fires would be immediately suppressed. In addition, similar to the Suppression Unit, prescribed fire and hazard fuel reduction strategies would be used to sustain a natural fire regime.

Strategies

- Manage the FMU to maximize wildland fire presence to the fullest extent possible while protecting values at risk. This is completed through a WFIP, wildland fire implementation plan, stages I-III.
- All unwanted wildland fires would be contained, controlled and suppressed using the appropriate fire suppression response options.
- All naturally occurring fires within this unit would be reviewed for appropriate classification and management response. A WFSA would be completed for each ignition that escapes initial control suppression tactics. The fire-by-fire analysis and decision process gives managers a range of alternatives.
- Some fires may need to be suppressed, while others may only be managed on a specified flank to limit spread into a certain area. Fires not suppressed and allowed to play out a natural role in the environment will be monitored daily to gain knowledge and data on fire behavior and ecological effects, as well as to keep a close watch on fire activity. Fires in a “use” strategy would have the WFIP as a daily update process that validates the “use” fire is within it’s projected measures. If a natural wildland fire exceeds the prescription at any time it shall be declared a wildfire and appropriately suppressed.
- Where necessary to meet fuel reduction objectives, approved fuels management techniques, including prescribed fire would be used to reduce localized fuel concentration to a more natural range.

C. Management Considerations to Operational Implementation

- This FMU-2 is primarily comprised of wilderness.
- A number of backcountry historic buildings, including four fire lookouts, eight cabins, and three shelters, as well as more than 50 historic structures are part of the National Historic Landmark District and are included in this FMU. The historic structures include bridges, overlooks, culverts, tunnels, roads, trails, monuments and dams.
- This FMU includes minor developed areas such as Mowich Lake, Carbon River Entrance, Ipsut Creek Campground, Reflection Lakes, Tipsoo Lake, Box Canyon, Narada Falls, Ricksecker Loop Road, etc.
- Potable and non-potable water delivery systems, as well as other park utility systems, that service park developed areas are included in this unit.
- The islands of park developed areas that comprise FMU – 1, the Suppression Zone, are encompassed by this FMU.
- There are several major roads that access various portions of this Zone; however, most access is via trail.
- There are a number of known and unknown rare, threatened and endangered species issues in this FMU.

Physical and Biotic Characteristics

Elevations range from 1,600 feet to 14,410 feet. The area above 7,000 feet, however, is primarily snow, rock and ice and is of little concern from a wildfire perspective. Topography ranges from low elevation river valleys to alpine areas, containing deep valleys and numerous peaks. Nine major rivers cut through or border this zone. Annual precipitation may be up to and over 100 inches, falling primarily as rain below 5,500 feet and as snow above. Historically, the highest incidence of recorded lightning fires has occurred in this unit between 4,500 and 5,500 feet.

This FMU includes a broad range of low and high elevation forest and subalpine community types, including the Western Hemlock, Mountain Hemlock, Pacific Silver Fir, Subalpine Fir, and Alpine generalized vegetation types. Specific characteristics are described under each FMSU below.

Access to FMU – 2 is provided by State Highways 123 and 410, the Westside Road, Nisqually to Paradise Road, Stevens Canyon Road, White River-Sunrise Road, Carbon River Road, and the Mowich Lake Road but would primarily be accessed via designated trails and cross-country travel.

E. POTENIAL IMPACTS OF FIRE PLAN IMPLEMENTATION

Park operations and visitor services

There would be a wide range of impacts to park operations and visitor services. Under fire use management scenarios, these impacts would include changes in visitor services, redirection in park operations and potential human health and safety impacts.

For the most part, park fire operations are funded out of national sources and do not result in major impacts on park operations budgets. Although there would be some opportunity to "backfill" positions, for instance, where firefighters were called out of the park for long periods, many short-term call-outs would be absorbed by park operations. This could result in fewer staff available to manage a variety of park operations during periods of high national alert or extensive park fire management operations. Firefighters come from the within the organization as a whole, including administration, maintenance, law enforcement, resources, and interpretation staff. Trained firefighters are available to park, agency and interagency operations. During periods of high national alert or extensive park fire management operations, there could be fewer staff in visitor centers, reduced visitor center operations, cancellations in interpretive programs such as walks and talks, fewer patrols of park campgrounds, and other effects on visitor services.

These impacts would be partially compensated for by the provision of increased fire information to visitors, the media and park staff. As appropriate, major and minor park developed areas, such as Longmire, Paradise, Carbon River, Ohanapecosh and others would be used to stage fire operations, including personnel, fire camps, etc. In localized fire management efforts, portions of park campgrounds, even whole campgrounds, could be closed to visitor use, to provide for public safety or to facilitate fire suppression efforts.

As a result, there could be a wide range of reduced visitor services, including negligible to moderate trail, road and area closures that would have concurrent changes in visitor services as well. These could result in loss of concession revenue, interruptions in scientific studies, and changes in the way park visitors would access services and facilities. Loss of concession revenue would be compensated for (to the degree possible) by increased use of concession facilities to stage fire management operations out of.

Closures in visitor use of these facilities would be limited to the degree possible since the experiences they provide would be protected in a similar manner to sensitive park resources and facilities. Increased air operations for fire monitoring or suppression or evacuations would result in increased noise and activity and could increase safety hazards for visitors and employees.

E. PUBLIC SAFETY ISSUES AND PROCEDURES

Managing a total fire program is among the highest risk operations that any land management agency can undertake. The first priority consideration in any fire management action is firefighter and public safety. Safety of visitors, employees, families, and incident personnel will be the number one responsibility given to Type IV or Type III Incident Commanders, or Incident Management Teams.

Creation of defensible space as a safety-related action requires careful planning along with prudent applications of mechanical fuel reduction and debris burning. The same can be said for the fuels management program on agency lands where firefighter safety may be compromised during severity years when resistance to control is high to extreme.

Safety Issues and Concerns

- Conditions that pose an immediate threat to human life.
  Hazardous fuels accumulations around developed sites and visitor-use areas, combined with steep slopes, narrow access roads, and distance from mutual aid resources constitute a continuing threat to residents, visitors, and employees.
- Management of wildland fires and prescribed fires is becoming increasingly hazardous. Minimizing personnel exposure to hazards associated with suppression and other fire management operations requires training, effective communications, and on-site hazard analysis and mitigation measures.

Mitigating Actions

The following program elements will be followed, with the intention of mitigating concerns stated above.

♦ Fire personnel, including cooperators, will comply with NWCG and NPS personal protective equipment standards while assigned to fire incidents. Mutual aid cooperators, responding to NPS fires under a General Agreement or Memoranda of Understanding, will meet their respective personal protective equipment and qualification standards during initial action operations. However, during project fire or extended operations, cooperators will meet NWCG equipment and qualifications standards.

♦ No “live fire” shelter training exercises will be conducted or condoned within the NPS.

♦ All wildland fire incidents which result in entrapment, injuries or fatalities, or the potential for injury or fatality, will be reported and investigated and appropriate administrative follow up actions taken

♦ Implement, or continue implementation, of approved project-level plans designed to create fuels conditions that support defensible space and public safety protection objectives in the park

- All fire personnel shall meet appropriate qualifications, including physical fitness and medical requirements, for all fire assignments (per NPS *RM-18, DO-18* and BLM *Standards for Fire and Aviation*);
- Fire personnel shall be equipped with personal protective equipment appropriate to their incident assignments;
- All fire personnel and cooperators will comply with NPS fitness and personal protective equipment standards while assigned to fire incidents except for initial action by mutual aid cooperators;
- All safety standards and guidelines identified within the Interagency Incident Business Management Handbook and SWA guidelines will be followed; All wildland fire incidents will comply with interagency risk management standards.

G. Public Information and Interpretation

Public education and interpretation about fire ecology and National Park Service fire management issues are/will be provided in a variety of ways at Mount Rainier National Park. Although not identified as a primary interpretive theme at Mount Rainier, fire ecology is considered a secondary theme and is incorporated in interpretive programs, the park's education program, in publications and the park's website. Although Mount Rainier's typically heavy rain and snowfall prevent a heavily fire-reliant ecosystem, varying precipitation levels combined with heavy fuel loads have the potential to greatly increase fire danger during drought years. This is an especially important service-wide topic in light of recent high profile fires such as Cerro Grande (Bandelier NM) and the Outlet Fire (Grand Canyon) which have had tremendous influence on NPS fire management policy.

Fire ecology, both locally and nationally, will be incorporated into the park's developing education program. Students will learn about fire ecology and its importance in ecosystems, as well as learn how the National Park Service develops programs and policies, adapting and changing them to incorporate new scientific and experiential information. Fire related jobs in the National Park Service will be a part of the National Park Service career education curriculum being developed. In years of increased fire danger, there will be a greater emphasis on fire education. For example, in the spring of 2001 programs were presented on the National Park Service and Mount Rainier National Park fire management programs to schools studying fire this year because of the drought conditions and high fire danger throughout the state. Students researched fire, performed community service projects in their area, assisted local homeowners and citizens by clearing fire buffer zones around their homes, and educated their families and community members about fire safety. We will continue to take advantage of such opportunities through our developing education program in local and regional schools.

Interpretive programs, including walks, talks, and evening programs, include fire ecology in virtually any in-depth discussion of forest ecology, and this will continue. We will continue to take advantage of materials being developed by parks with more active fire programs and incorporate them into our interpretive training and public education efforts.

If funding is provided, a web site will be developed which will include information about the role of fire in Mount Rainier's ecology, and web updates will be provided regularly with current information any time a fire is burning in the park. Links will be provided to sites with more in-depth fire information, such as Firewise.

The park's Long Range Interpretive Plan (June, 2002) calls for a potential exhibit on fire ecology at the Mount Fremont Fire Lookout, a popular day hike to a historic fire lookout. Additional opportunities for incorporating fire ecology into interpretive exhibits as they are developed will be evaluated.

The objective of fire information/education program is to provide the public and employees with information concerning fire management goals for the park and to prevent human caused fires. Public education must be a continuing process to allow for acceptance of natural wildland fires and the role of lightning-caused fires in the ecosystem.

The goal is to obtain support from the public by providing accurate and timely information about the Fire Management Plan and fire management decisions which affect the park environment. To continue this effort, the following measures will be implemented:

The park information radio frequency (1610 AM) heard at entrance stations and Paradise will be used to inform park visitors of any significant fire activity or smoke that may impact their visit to the park.

Information explaining fire management programs will be incorporated into interpretive programs, exhibits, videos and nature walks as they are developed by the fire management office, or the Branch of Wildland Fire and Aviation. The pamphlet "Wildland Fire in National Parks", developed by NPS-

NIFC, will be made available to the public during high fire danger or when there are active fires burning in the park.

Articles for the summer addition of the park's visitor guide for Mount Rainier, the "Tahoma News" explaining fire management policies may be developed and made available for distribution.

To facilitate information dissemination on a regional and national level, PSICC, CCSO and NPS, Branch of Fire Management at the National Interagency Fire Center will receive situation reports of all wildland fire activity at Mount Rainier National Park.

The following chart lists responsible parties and specific actions with dates for completion for fire-related activities at the park.

ACTION	RESPONSIBLE PARTY	DUE DATE
Contact local news agencies.	Public Information Officer (PIO)	by June 1
Contact adjacent communities to explain the FMP	PIO Interpretation, and Rangers	continuous
Contact local news agencies and agency personnel when a fire is being managed under this plan.	PIO	as needed
Initiate direct mailings to key groups. Conduct informational training for park, interpreters, receptionists and other information personnel.	PIO, Interpretation, and Rangers	by June 1
Obtain signs for placement at appropriate locations for ongoing fires.	Interpretation, LE Rangers	by June 1
Post signs at trailheads as needed when a fire is burning.	Interpretation and L.E./backcountry rangers	as needed
Initiate a post-season news release	PIO	by Nov 30
Contact surrounding National Forests in preseason to explain program.	Ranger Division	by June
Contact neighboring agency at ignition for information and input.	Comm Center	as needed
Educate concessionaires.	Interpretation	preseason
Contact Regional Office and PSICC when fires occur.	Comm Center	as needed

NEWS RELEASES

Mount Rainier NP does not have a dedicated Information Officer, the Chief of Interpretation serve as the Park's public affairs liaison. Maps, narrative statements and photographs of the current fire situation and fire danger ratings will be posted in area ranger stations and visitor centers.

All verbal and written news releases will be made by the Office of the Superintendent unless delegated to an Incident Management team. The Regional Office will be kept informed of all fires and fire management activities daily. Fire situations will also be reported to surrounding public and private land management agencies.

INTERPRETIVE PLAN
On-site visitor interpretive assistance should be initiated on all large fires, which occur near populated or developed areas. A pamphlet, "Fire: in Pacific Northwest National Parks" is available for distribution.

Fire records, photographs, etc., are important to the fire management, interpretive and research programs, and will be collected and filed. Public reactions to fire management activities and interviews will be recorded and made part of the fire record.

H. RECORDS AND DOCUMENTATION FOR FINAL PACKET

This is a standard outline of contents for permanent project record for each wildland fire use application.

a. approved planning document
b. monitoring reports/findings summaries
c. revalidation/certification documents
d. funding codes/cost accounting
e. project maps
f. other info (photo points)
g. funding/fiscal tracking

Quality, long term documentation records for all actions taken on a wildland fire is critical. The following guidelines will be followed:

All decision documents, monitoring data, supporting documentation, and operational documents (incident action plans, maps, unit logs, etc.) will be assembled and organized during and following a wildland fire management action.

Specifically, the final fire packet and file should contain:

- Any written policies, guidelines or authority statements signed by the Superintendent
- A brief narrative summarizing the events of the fire and all IMT section involvement
- Copy of complete WFIP
- Copy of WFSA
- ICS-209's
- Copies of purchase orders, personnel request orders, etc. associated with fire
- All situation maps
- Personnel rosters, time sheets
- Press releases, clippings and video tapes
- Accident reports
- All monitoring data, spot weather forecasts, internet printouts
  Documentation of financial charges
  Narratives and unit logs
  Rehabilitation plans
  - Unit Logs- 214

It is particularly important to include Incident Commander narratives regarding effectiveness of planned strategies, trigger points, holding actions, and other pertinent factors encountered during the fire. In case of wildland fires across boundaries, copies will be made of the entire packet for each agency involved for records.

VII. FUELS MANAGEMENT PROGRAM

A. Hazard Fuels Management

Park areas have the responsibility to identify, manage and reduce if necessary, accumulations of hazardous fuels. Objectives of fuel treatment measures include protecting private property, administrative sites or facilities and other investments during prescribed fires or wildfires and to lessen the probability of an undesirable structural or human-caused fire escaping into adjacent park areas.

Fuel treatment measures that may be used to reduce the risk to protected areas include mechanical manipulation outside the wilderness boundary or wildland fire use or prescribed fire within the wilderness boundary when wilderness management objectives and conditions are not being met.

Hazard fuel treatment may include:

- constructing a clear zone around structures
- constructing fuel breaks where no natural barriers to fire exist
- using a combination of trimming and physical removal of downed accumulation to establish the clear zone (may be combined with debris burning)
- debris pile burning
- using a combination of mechanical fuel reduction and prescribed fire to reduce downed accumulations near sensitive historic or cultural resources
- chipping or reducing size or number of downed fuels
- roadside pruning
- roadside mowing during fire season to reduce accumulation of fine burnable fuels with low fuel moisture
- brush removal or pruning near structures
- removal of limbs overhanging structures

As described under FMU – 1, the primary areas of concern are the wildland/urban interface at the entrances at Nisqually, Carbon River and the north boundary on State Highway 410 and facilities at Longmire, Paradise, Ohanapecosh, White River and Sunrise. Preferred methods of modifying fuels in these areas will include physical removal of dead and downed debris, removal of ladder fuels adjacent to structures and thinning.

Wilderness backcountry structures of historical or administrative value with adjacent accumulations of hazardous fuels will be evaluated and be assigned specific protection criteria. Mitigation for preservation from damage due to wildland fires should include periodic removal of ladder fuels immediately adjacent to the structure and removal of debris from roofs. These measures should consider the wilderness character of the area around the structure and not compromise the aesthetic value of the landscape.

The structures listed in the appendix should be assigned a relative value of protection based on significance using computer programs such as FARSITE. Parameters for treatment of each structure will factor the fuel model, estimated fire intensity, crowning fire potential and overall fire potential. Trail structures such as bridges and other improvements may be protected by gravity socks and hoses. MIST guidelines will be used. Major vegetation modification will not be taken around wilderness structures.

The objective of these actions is to increase the probability of success of the program and to reduce the threat of escape from the area of concern or to allow significant damage to capital investments or areas of historical significance.

Debris created by fuel treatment practices will be disposed of based on the area being treated. The preferred method in developed areas will be to utilize a motorized chipper for the fuel less than 3 inches. The chips can be directed to fall in wooded areas as appropriate or into the bed of a dump truck for disposal at an approved site. Larger live or dead material will be scattered away from the structure to be protected at such a distance and in such a manner to reduce the treat from wildfires while maintaining an authentically pleasing landscape in developed areas. Wilderness fuel treatments will be accomplished with handsaws whenever possible with the resulting debris scattered the minimum distance to ensure adequate fire protection.

The following is a list of action items to be considered when developing project-level plans involving hazard fuel reduction (including mechanical treatment and prescribed fire).

- Develop project objectives and site-specific treatment methods to accomplish objectives.
- Preparation of an annual program priority lists and maps for archaeological/biological survey by the agency FMO prior to January 15 of each year. The lists should identify projects in priority order, and be submitted to the Superintendent for distribution to resource staff (current year proposals and one year in advance proposals).
- Field Surveys will be conducted based on individual project maps in accordance with Section 106 of the National Historic Preservation Act (NHPA), and Section 7 of the Endangered Species Act (ESA)(including any Biological Assessments associated with this plan) and internal agency policy.
- Upon completion of project surveys and clearances, written project approval, including any required mitigation is submitted to the FMO.
- Following mitigating actions, original copy of burn plan will be routed with attached clearances by the agency FMO/burn boss through agency-directed routing protocol to Superintendent or designee for approval.

B. MECHANICAL FUELS REDUCTION PROGRAM

Non-Fire Treatment

All human-caused ignitions in the park would be extinguished as quickly and efficiently as possible, given the constraints of safety, feasibility and minimum impact management, and using a combination of ground and aerial resources to contain the fire. Exceptions to immediate and direct fire suppression would be made on a case-by-case basis for reasons of inaccessibility, life/safety concerns for firefighters, or a lack of availability of suitable resources, personnel or equipment.

Depending on the location and projected fire behavior, ground and/or aerial fire fighting resources would be employed to contain the fire to its smallest possible size and ground or aerial monitoring would be conducted until the fire was mopped up (completely extinguished). All fire suppression in park wilderness would employ minimum impact suppression tactics (MIST) see the appendix.

Because of increased fuel loading not alleviated by fire, there would be increased potential to create catastrophic fires with potentially greater long-term impacts, including a greater volume of fuels burned, more smoke production (duration and particulate), and more widespread landscape changes, including to vegetation, wildlife, and cultural resources.

It is the goal of the FMP to restore and maintain natural fire regimes or perpetuating natural ecosystem processes. As a result if continued suppression of naturally ignited wildland fires occurred, there could be significant changes over time to the successional conditions naturally occurring in the park.

Detection of fire suppression impacts on park vegetation composition and distribution could go unnoticed by park managers as a result of the naturally long fire return intervals (465 years on the west side of the park, 200 years on the east side). Some changes in species distribution would take centuries to manifest themselves. The past 100 years of fire suppression has likely already changed

what would have been natural vegetation community characteristics in a landscape unaltered by direct fire suppression.

As a result, under establishment of long-term monitoring programs, fire related changes have been identified as a key issue to investigate. To the extent that Native Americans used fire in the park and surrounding areas, these conditions have also likely been altered by unnatural fire suppression. Without systematic treatment, accumulations of forest fuels in proximity to historic structures and major developed areas would continue to present a fire hazard.

C. HAZARD FUEL REDUCTION

Limited Manual/Mechanical Treatment

Manual/Mechanical Treatment would be implemented as it has been in the past in developed areas around structures and along park roads, using hand tools to periodically limb overhanging vegetation, selective removal of trees growing too close to structures, and roadside mowing/limbing and removal of fallen trees and limbs. Around structures, and along roads, the first priority would be to ensure administrative and visitor safety and protection of park resources. This includes maintaining the structural integrity of the buildings and the road prism and reducing fine fuels along roadsides to prevent fire spread, should a fire occur.

Manual/Mechanical treatment is also conducted in developed campgrounds to eliminate branches and other vegetation near fire pits. Non mechanical treatment to removed dead and downed materials in developed areas and along roadsides also occurs. Roadside mowing primarily focuses on increasing visibility along park roads, including sight distance, and on maintaining the parkway like character of some park roads, but also serves, as mentioned, to reduce fine fuels along roadsides. The maximum number of acres wherein Manual/Mechanical treatment of hazardous fuels would occur would be less than 800 acres or approximately 20 percent of the non-wilderness areas of the park per year (over five years). Treatment of this area, while it could be spread over the breadth would not be uniform.

Park visitor and administrative facilities, including buildings and structures necessarily occupy a large percentage of this space and therefore the treatment area is somewhat overstated. Excluded from this estimate is the non-wilderness area that would not be treated, including those areas south of the Nisqually to Paradise Road below Longmire (not adjacent to the road); Camp Muir; a small area north of the Carbon River Road (not adjacent to the road); as well as the Paradise and Sunrise meadows.

Under any projects or circumstances that would result in excess natural forest residue defined as limbs, slash, plants and logs, the preferred option is to leave these in place. Where the material cannot be left on the forest floor to undergo natural decomposition, it would be used in a variety of ways for park projects (compost, chipping, re-vegetation, and historic structure rehabilitation, trails maintenance, campfire programs, heating public buildings). Utilization of alternative technologies for disposal, including chipping of forest residue in place, for re-vegetation or native plant nursery, or haul to composting facility is also considered.

Trees and limbs that fall across roads and trails would be placed back in the forest whenever this can be accomplished in a way that makes them appear natural (as discussed in Office Order 88-1 Roadside Vegetation Management and subsequent updates). All limbs and brush cleared for health and safety reasons would be placed into the surrounding forest without further compromising safety or resource protection.

Overall, this alternative would result in the smallest expected degree of fire in the park in the short term, however in the long-term it could result in the most catastrophic fires. It would meet the goal of ensuring firefighter and public safety by keeping all fires as small as possible. The actual size and number of fires would depend on prevailing weather patterns, the location of lightning strikes, and the extent of fire spread before naturally extinguished (dependent on weather and fuel conditions) or

suppressed. Although it would provide some protection to resources not able to withstand fire, it could result in eventual catastrophic fire, which could result in the loss of important cultural resources, including buildings and structures listed on the National Register of Historic Places.

This alternative would not enable ecosystem processes to function as they have in the past since all fires would immediately be suppressed. Species dependent on more frequent fire would begin to diminish over time. This would likely go unnoticed by park managers because of the extremely long fire return intervals over much of the park. Reducing hazardous accumulations of fuel in developed areas would not be undertaken systematically. Most hazardous accumulations of fuel would not be treated.

Limited Debris Burning

There would continue to be very limited use of debris burning of forest residue generated as a result of Hazard Fuel Reduction or road and other maintenance activities to prevent accumulations of hazard fuels near historic and administrative structures. Such debris burning would continue under certain circumstances and only when the procedures outlined in the park's Office Order 83-2 (Disposal of Natural Forest Residue and Manufactured Lumber) or its subsequent updates are followed. Under Office Order 83-2, the park has designed some very specific procedures to limit the disposal of wood debris by burning. These guidelines were developed to comply with current regulations from the Puget Sound Clean Air Agency (for Pierce County), the Southwest Clean Air Agency (for Lewis County), and the Washington Department of Natural Resources, to meet Clean Air Act mandates and to ensure the highest degree of protection of park air quality (as required for Class I areas under the Clean Air Act).

If any of the above-described alternatives for disposal of materials from manual/mechanical treatment are not feasible burning of forest debris can be conducted. The maximum number of burn days that would occur under this option would be determined by air quality regulations, including the Washington State Visibility State Implementation Plan (SIP), staffing and weather conditions.

Mechanical treatment methods will be a primary tool for management to reduce [hazardous] fuels continuity and create defensible space around values at risk. Prescribed fire follow-up treatments may or may not be employed. Mechanical removal of fuels from roadsides and near park structures is needed to prevent human ignited fires and to protect historic structures. Hazard Fuels Project Requests will be submitted per NPS-18, Section IV, and Chapter 5, to remove these fuels.

Use of Fuel Breaks

Fuel break construction should be identified on an appropriate Geographic Information System (GIS)-compatible project location map (exact locations using GPS).Fuel break planning will consider the following guidelines (see also mitigation measures below):

- Some green-stripping to mask the thinning in areas used by visitors;
- Canopy thinned and feathered (or gradually opened) toward the area being defended against, with spacing necessary to prevent crown fire and/or "wind tunnel" effect;
- Retain a reasonable level of surface forbs and other plants to discourage exotic invasion.
- Fuel-break width is dependent on fuels conditions and other considerations.
- Consider key photo-points installed to monitor vegetative recovery, exotic invasion, etc. All burn preparations involving pre treatment with mechanical techniques will be outlined in a burn plan and given review by appropriate resource staff as necessary.

This may include but is not limited to:

- Snag felling, bucking in and around perimeter;
- Reducing tree densities along perimeter;

- Pruning individual trees and brush along perimeter;
- Bucking and removal of logs near the control line only (through bucking into short lengths, piling and burning on site)

Table A: Mount Rainier National Park
Treatment Categories For
Hazard Fuel Reduction and Cultural Resource Maintenance

Treatment Category	Type of Treatment (see discussion following table for detailed description of treatment)	Characteristics of Structures in this Category	Examples of Structures in this Category
A	No Treatment	Non-Wilderness or Wilderness setting: Small structures isolated from hazard by lawns or compounds. No historic significance.	Structures at Tahoma Woods headquarters
B	0-15 Feet Routine brushing, limbing to keep branches away from roof, gutters, doors.	Non-Wilderness or Wilderness Setting: Small, low value structures without historic significance; or historic materials such as fence lines.	Rustic outbuildings and entrance stations
C	0-30 Feet Intensive Mgmt.	Non-Wilderness: Low to moderate value structures without historic significance. Wilderness: Shelters, may have historic significance.	Campground restrooms, vault toilets, backcountry shelters.

Table A: Mount Rainier National Park
Treatment Categories For
Hazard Fuel Reduction and Cultural Resource Maintenance

Treatment Category	Type of Treatment (see discussion following table for detailed description)	Characteristics of Structures in this Category	Examples of Structures in this Category
D	0-30 feet Intensive Mgmt. 30-90 Feet Selective Mgmt.	Non Wilderness: Moderate value structures or higher value structures in areas of low fire potential. Wilderness: Isolated cabins. Structures may have historic significance.	Patrol Cabins
E	0-30 feet Intensive Mgmt. 30-90 feet Selective Mgmt. 90-150 feet: Remove Brush and Ladder Fuels	Non-Wilderness or Wilderness: Building complexes, or high value structures, or close to boundary or inholdings. Any projects undertaken in cooperative mgmt. with neighbors/inholders. Structures may have historic significance.	Park housing areas
F	0-30 feet Intensive Mgmt. 30-90 feet Selective Mgmt. 90-250 feet: Remove Brush and Ladder Fuels	Non-Wilderness: Structures close to a wildland-urban interface community.	Government structures and Housing areas
G	Treatment of structures as in F, plus manipulation of vegetation as necessary to maintain historic scene.	National Historic Landmark Districts (NHLD)	Longmire NHLD

2. Detailed Description of Treatments:

The zone concept is adapted from the pamphlet, "Defensible Space", 11/91, endorsed by the National Park Service, United States Forest Service, Bureau of Land Management, Bureau of Indian Affairs, Washington State Department of Natural Resources, and Oregon Department of Forestry. Produced in association with the Center for Urban Horticulture and College of Forest Resources, University of Washington, and the Pacific Northwest Interagency Fire Prevention Group representing Oregon and Washington. The document states :

> "Your home landscape needs three zones (lines of defense) against encroaching wildfire. Plants in each zone perform a distinct function. The transition between zones creates breaks in the path to slow advancing flames. Experience has revealed that a *minimum* distance of 100 to 150 feet around your home needs this comprehensive landscaping. Greater distances are necessary on steep sloes or windswept exposures."

The zone treatments outlined below for Mount Rainier National Park are somewhat less intensive than outlined in the Defensible Space pamphlet, to reduce impacts to the natural habitat and environment. All descriptions below reflect the *maximum* treatment that would occur. *Less* manipulation may be made depending on site characteristics and concerns, such as wilderness integrity, slope, neighboring fuels, access for emergency equipment, proximity of firefighters/engine, use of the area, sensitive resources, etc. An interdisciplinary team will help develop site specific hazard fuel reduction plans. A monitoring component will be part of the hazard fuel reduction program, to track the effectiveness of treatment and detect unplanned changes.

A No action.

B Zone 1

0-15 feet from structure: Low-growing, fire resistant plants resist catching fire and provide little fuel. This zone may contain occasional individual shrubs and trees located at least 10 feet from the house. Perform routine maintenance to keep brush away from roof, doors, gutters, and remove dead woody material on ground and in standing vegetation. Remove or prune trees that impinge on the building.

C Zone 1

0-15 feet from structure: Low-growing, fire resistant plants resist catching fire and provide little fuel. This zone may contain occasional individual shrubs and trees located at least 10 feet from the house. Perform routine maintenance to keep brush away from roof, doors, gutters, and remove dead woody material on ground and in standing vegetation. Remove or prune trees that impinge on the building.

15-30 feet from structure: To create a fire-resistant defensible space (and open the building to light and air), intensive management will remove dead and down fuels, brush and tree reproduction up to 24" dbh. Well spaced trees and shrubs may be retained, but dead limbs or limbs overhanging the structure will be removed. Ladder fuels will be removed to a height of 8-10 feet.

D Zone 1

0-15 feet from structure: Low-growing, fire resistant plants resist catching fire and provide little fuel. This zone may contain occasional individual shrubs and trees located at least 10 feet from the house. Perform routine maintenance to keep brush away from roof, doors, gutters, and remove dead woody material on ground and in standing vegetation. Remove or prune trees that impinge on the building.

15-30 feet from structure: To create a fire-resistant defensible space (and open the building to light and air), intensive management will remove dead and down fuels, brush and tree reproduction up to 24" dbh. Well spaced trees and shrubs may be retained, but dead limbs or limbs overhanging the structure will be removed. Ladder fuels will be removed to a height of 8-10 feet.

Zone 2

30-90 feet from structure: To reduce the rate of spread and intensity of fires approaching or leaving a structure (and maintain forest openings consistent with historic settings), tree reproduction and

second growth trees up to 24" dbh will be selectively thinned to create a crown spacing of at least 10 feet. Snags, dead and downed fuels, and ladder fuels will be removed. This zone will provide a transition between the intensively managed zone next to the structure, and the untreated forest surroundings.

E Zone 1

0-15 feet from structure: Low-growing, fire resistant plants resist catching fire and provide little fuel. This zone may contain occasional individual shrubs and trees located at least 10 feet from the house. Perform routine maintenance to keep brush away from roof, doors, gutters, and remove dead woody material on ground and in standing vegetation. Remove or prune trees that impinge on the building.

15-30 feet from structure: To create a fire-resistant defensible space (and open the building to light and air), intensive management will remove dead and down fuels, brush and tree reproduction up to 24" dbh. Well spaced trees and shrubs may be retained, but dead limbs or limbs overhanging the structure will be removed. Ladder fuels will be removed to a height of 8-10 feet.

Zone 2

30-90 feet from structure: To reduce the rate of spread and intensity of fires approaching or leaving a structure (and maintain forest openings consistent with historic settings), tree reproduction and second growth trees up to 24" dbh will be selectively thinned to create a crown spacing of at least 10 feet. Snags, dead and downed fuels, and ladder fuels will be removed. This zone will provide a transition between the intensively managed zone next to the structure, and Zone 3.

Zone 3

90-150 feet from structure: To reduce fire intensity and keep fires on the ground, brush and ladder fuels will be removed. Isolated dead and dying trees, or "leaners" will also be removed.

F Zone 1

0-15 feet from structure: Low-growing, fire resistant plants resist catching fire and provide little fuel. This zone may contain occasional individual shrubs and trees located at least 10 feet from the house. Perform routine maintenance to keep brush away from roof, doors, gutters, and remove dead woody material on ground and in standing vegetation. Remove or prune trees that impinge on the building.

15-30 feet from structure: To create a fire-resistant defensible space (and open the building to light and air), intensive management will remove dead and down fuels, brush and tree reproduction up to 24" dbh. Well spaced trees and shrubs may be retained, but dead limbs or limbs overhanging the structure will be removed. Ladder fuels will be removed to a height of 8-10 feet.

Zone 2

30-90 feet from structure: To reduce the rate of spread and intensity of fires approaching or leaving a structure (and maintain forest openings consistent with historic settings), tree reproduction and second growth trees up to 24" dbh will be selectively thinned to create a crown spacing of at least 10 feet. Snags, dead and downed fuels, and ladder fuels will be removed. This zone will provide a transition between the intensively managed zone next to the structure, and Zone 3.

Zone 3

90-250 feet from structure: To reduce fire intensity and keep fires on the ground, brush and ladder fuels will be removed. Isolated dead and dying trees or "leaners" will also be removed.

G Same as Treatment F, plus manipulation of vegetation as necessary to maintain historic scene in Historic Districts.

D. PRESCRIBED FIRE PROGRAM

Prescribed Fires are defined as all fires that are not management ignited wildland fires. These fires are planned, scheduled, organized and implemented according to a rigorous protocol. The purpose is safe accomplishment of approved resource objectives. Escaped prescribed fires as with wildland fires used for resource benefit, that exceed prescription will be managed under a suppression strategy, regardless of whether they go back into prescription. During each prescribed fire or wildland fire, there will be a qualified Incident Commander Type III crew pre-designated and available in the event of an escape.

1. Exceeding Existing Prescribed Fire Plan

When a prescribed fire is unsuccessful and threatens to escape its defined boundary or parameters, a Wildland Fire Situation Analysis will be developed and the fire declared a wildfire.

2. Air Quality and Smoke Management

Mount Rainier National Park is in a mandatory class I area under the Clean Air Act (1977). Class I areas are afforded the highest degree of protection under the Clean Air Act. This designation allows very little additional deterioration of air quality. The Clean Air Act states that park managers have an affirmative responsibility to protect park air quality related values (including visibility, plants, animals, soils, water quality, and cultural resources and visitor health) from adverse air pollution impacts. Special visibility protection provisions of the Clean Air Act also apply to class I areas, including new national rules to prevent and remedy regional haze affecting these areas. Under existing visibility protection regulations, the NPS identified "integral vistas" that are important to the visitor's visual experience in NPS class I areas, and it is NPS policy to protect these scenic views.

Visibility impacts confined to wilderness and due to naturally ignited wildland fires are generally more acceptable than impacts occurring outside of wilderness, especially when coupled with an interpretive program explaining the benefits of fire.

National Ambient Air Quality Standards (NAAQS) must be met. The federal Clean Air Act (as amended in 1990) required the Environmental Protection Agency (EPA) to identify NAAQS to protect public health and welfare. Standards have been set for six pollutants: ozone (O_3), carbon monoxide (CO), Nitrogen dioxide (NO_2), sulfur dioxide (SO_2), particulate matter less than 10 microns (PM_{10}), particulate matter less than 2.5 microns ($PM_{2.5}$) and lead (Pb).

An area where a standard is exceeded more than the allowable number of times over a three year period is classified as a non-attainment area and is subject to more stringent planning and pollution control requirements. The park is located in Pierce County, which is within the jurisdiction of the Puget Sound Clean Air Agency (PSCAA), and within Lewis County, which is within the jurisdiction of the Southwest Clean Air Agency (SWCAA). Additional air quality management responsibilities are afforded to the Washington State Department of Ecology, the Washington State Department of Natural Resources, and to the Environmental Protection Agency (Region 10).

Impacts of smoke on public health would also occur, with negligible to minor impacts from small fires or suppression efforts and larger impacts when fires are more extensive or nearer populated areas, including when inversions hold smoke at lower elevations or air currents carry smoke down valley. Large or small fires could smolder for a few days to a few weeks or more. Smoke would be diluted to some degree by mixing and dispersion. The degree to which this would occur would depend on localized and regional weather patterns, topography and other factors. Public information would be expanded when increased smoke management concerns are evident, enabling sensitive people to take appropriate measures to limit their exposure. Drift smoke from fires could affect area travel corridors, including park and other roads, resulting in reduced visibility for drivers, an increased need for traffic control and other effects.

Any impacts to air quality, therefore, are considered potentially detrimental. In contrast to surrounding metropolitan areas, air quality within the park is usually good; however, high ambient sulfate levels, low pH levels of airborne water droplets, and high ozone levels have all been documented. Campfires, generators, heating systems and the operation of motor vehicles and equipment all may cause local, temporary air quality degradation.

Surrounded by developed areas in King, Pierce, Lewis and Yakima counties, however, stationary and mobile emissions in the region are the major source of air pollution near the park. These include industrial developments, power plants (notably the Centralia Power Plant), slash burning, pulp and paper mills, etc. The Clean Air Act also requires consideration of the protection of air quality related values, such as visibility and scenic vistas that are occasionally significantly affected by non-attainment particulate concentrations in the surrounding areas.

All fire management activities at Mount Rainier National Park, which result in the discharge of air pollutants (e.g., smoke, carbon monoxide, and other pollutants from fires) are subject to, and must comply with, all applicable federal, state, interstate and local air pollution control requirements, as specified by Section 118 of the Clean Air Act. In addition, MORA will fully comply with the Washington State Smoke Management Plan.

- Full coordination and cooperation with the State of Washington Department of Ecology, Department of Natural Resources and cooperating agencies at the time of an unscheduled ignition is required. This cooperation is in reference to a decision to designate a “use” fire.

- In the fire prescription validation process, the park FMO will utilize the daily WIMS smoke management forecast and available computer modeling programs such as RERAP and PUFF. Smoke concerns will be considered in the initial Go/No Go decision making process. Mount Rainier National Park is a federally designated “Class 1” air shed, and as such is protected from human-caused pollution. Natural processes in Class 1 air sheds are protected by the Wilderness Act of 1964. As such, smoke from natural wildland fires is not “manmade” and is therefore not considered pollution, as defined in the federal Clean Air Act and the Washington Smoke Implementation Plan. Class 1 air sheds in the vicinity of the park also include the Goat Rocks Wilderness, the William O. Douglas Wilderness, the Glacier View Wilderness, the Clearwater Wilderness and the Tatoosh Wilderness. The closest non attainment area is Yakima 65 miles to the southeast. Smoke impacts from natural wildland fires will typically be of short duration, and temporary impacts to visibility and visitor enjoyment must be recognized, expected, and managed. The effects of smoke impacts to park visitors, concessions, park neighbors and air quality values will be carefully considered in the daily prescription validation process.

- Visual impacts from smoke on recreational or commercial users will be considered during the Go/No Go decision process, as will negative impacts to rare, threatened or endangered species, especially those areas containing nesting sites. Development of a natural wildland fire prescription will include the determination of unacceptable smoke impacts on sensitive areas. The prescription will include a process for monitoring impacts to sensitive areas. Descriptions of smoke plume size, direction of travel and other pertinent measurable information will be part of the criteria used in determining if the fire is in prescription.

- The complete fire case incident report, including daily records of verification of prescription, will be maintained in the park case incident records by the Communications Center.

When natural wildland fires are in progress, appropriate media releases will be prepared, and interpretive programs/walks and/or temporary signing will address or explain fire policy as needed.

E. WILDLAND FIRE IMPLEMENTATION PROCEDURES (PREPLANNED – PRESCRIBED FIRE)

This section refers to the use of prescribed fire to accomplish resource management objectives. Although there are no immediate plans to use prescribed fire in Mount Rainier National Park, the use of prescribed fire is considered an appropriate fire management strategy and is described below. When individual prescribed burn plans are created, prescribed fire implementation procedures will be developed.

Annual actions which should be considered by the FMO or assigned burn boss in implementing a project prescribed fire program include the following:

- Field reconnaissance (including GPS) and burn unit layout,
- Preparation for compliance work (involving resources staff as needed to identify values to be protected, etc)
- On-site documentation, fire effects monitoring plot layout, logistics, and identified mitigation work; complete complexity rating
- Job hazard analyses
- Analyze potential ignition patterns with prescriptions, weather, fuels, topography
- Coordination of all burns with media
- Identify air quality and smoke management considerations, including monitoring, modeling, consultation w/NMEID
- Personnel management, fiscal analyses
- Pre-burn notifications
- Briefings, logistics, contingencies
- Evaluation of go/no-go decision process
- Organization, implementation of logistics
- Follow-up coordination, evaluations, cost summaries, record keeping, reporting requirements (a DI-1202 will be completed for each burn and submitted via input through relevant agency channels within 10 working days after declared out date)
- Submit data for addition to GIS prescribed fire thematic map

All prescribed fires will be critiqued as deemed appropriate by the agency burn boss or FPM. Reviews can be convened by the NPS Superintendent (authority *RM-18*) or as directed in agency policies.

Reviews may be comprised of the following:

- Annual activities to prepare for and implement program
- Relate long-term prescribed fire strategy to each FMU/include planned burn units
- Identify the numbers and kinds of personnel to plan and execute the proposed annual prescribed burn plan
- Define the weather, fire behavior, fire effects monitoring (see more Chapter 4)
- Provide format for critiques of prescribed fire projects
- Describe reporting and documentation requirements

Prescribed Fires are planned, scheduled, organized and implemented according to a rigorous protocol. Their purpose is safe accomplishment of predefined resource benefit objectives. Escaped Prescribed Fire, as well as Wildland Fire Use that exceed appropriate prescriptions would be managed under a Fire Suppression strategy, regardless of whether they go back into prescription. Prescribed fire plans are now required to undergo agency peer review as well as individual environmental analysis (including public review). As prescribed fire plans are developed the park would likely conduct environmental analysis for a multi-year prescribed fire action plan, rather than assessing each prescribed fire separately.

As envisioned, Prescribed Fires could be used to:

- maintain scenic vistas;
- maintain fire dependent plant communities;
- maintain some boundary areas (where cross-boundary fire was unacceptable);
- manage sensitive resource areas that would need to have cooler fires with lower intensities to prevent damage to the resource at risk;
- restore cultural or ethnographic landscapes; and to
- reduce hazard fuel accumulations near developed areas, etc.

Prescribed Fires would include measurable criteria (the prescription) that define the specific environmental conditions under which park managers would ignite a fire. Prescription criteria include weather conditions (current and forecast), determination of a maximum manageable area, appropriate holding force availability, fire starting techniques and timing. These prescription criteria would ensure that the fire remained within a pre-designated perimeter without threatening life or property and met resource objectives. To the extent possible, Prescribed Fire (as well as Wildland Fire Use) implementation would:

- use natural barriers rather than constructed fire lines to prevent fire spread and to minimize consequent impacts to soils and other park resources;
- minimize up and down slope fireline construction;
- utilize controlled burn intensities to result in a fast-moving, lower temperature impact fire; and
- require post-fire rehabilitation of fire lines, including efforts to reduce compaction by scarifying the soil, and installing natural erosion barriers.

Although there are currently no plans to conduct Prescribed Fire within Mount Rainier National Park, under future implementation of the FMP, such a plan would be written and separate environmental analysis would be conducted for each proposed Prescribed Fire. The most likely areas that would be targeted for Prescribed Fire would be the white bark pine community and potential research burns in forested or subalpine communities.

Other Prescribed Fire use might include establishing a very limited, but more frequent fire regime around developed areas where great concentrations of important historic structures are located, such as at Longmire and Paradise. Finally, Prescribed Fire might be used to ensure that fire did not cross the park boundary where the adjacent landowner was unwilling to accept or unable to manage wildland fire.

VIII. FIRE MANAGEMENT ORGANIZATION AND RESPONSIBILITIES

A. FIRE MANAGEMENT ORGANIZATION & ROLES

The fire focused IDT, Interdisciplinary Team, should meet annually prior to the fire season no later than January 30th to discuss areas of responsibility, review, update the plan, and to discuss/evaluate fire decision capabilities.

Contingent upon fire complexity (fires involving more than 10 acres or more than 10 individual fires), the entire team or appropriate members thereof (minimum of Supt. or acting, FMO or acting, and Natural and Cultural Resources Division representative), will meet to review the decision process.

The IDT Team or their appointed staff member will consist of the following:

- Superintendent and Deputy
- Chief, Natural and Cultural Resources Division, recommended to serve a Chair
- Selected staff members of NCR (Natural and Cultural Resources Division)
- Chief Ranger
- Fire Management Officer
- Chief of Interpretation
- Wilderness Coordinator

Superintendent
The Superintendent has the ultimate responsibility for the execution of the fire management program at Mount Rainier National Park.

The Superintendent:

- Approves the park's Fire Management Plan and regular revisions.
- Approves the Delegation of Authority (example found in Appendix) in the event that an interagency incident or fire use team assignment.
- Approves the Go/No Go Decision
- Approves the Wildland Fire Implementation Plan (WFIP) and periodic assessments.
- Designates needed area closures.
- Reviews Fire Situation Analysis/Wildland Fire Situation Analysis (WFSA) and, based on advice of the FMO or other qualified persons, selects an appropriate management response to implement protection and fire use objectives.
- Daily revalidation of WFIP
- Evaluates the Fire Complexity Analysis in conjunction with the WFSA to determine if an Incident Management Team should be requested.
- Approves prescribed burn plans
- Agency liaison provides direction to Type I and Type II incident commanders working in the park, or designates a representative to do so.

Deputy or Acting Superintendent
Is delegated all decision making responsibility when the Superintendent is absent from the Park.

Visitor Services and Resource Protection Division
Chief Ranger

- Ensures that a comprehensive park fire management program is adequately funded and implemented.
- Manages wildland fire plan implementation, review, and revision.

- Designates a full time or collateral duty park Fire Management Officer (FMO).
- Ensures staff is trained to meet area needs.
- Ensures area equipment caches are maintained in a state of readiness.
- Recommends area closures to Superintendent
- Describes management options to Superintendent
- Provides fire detection within their areas.
- Carries out suppression activities called for in this plan or see that appropriate resources are ordered.
- Makes at least annual inspection, with the FMO, of fire suppression, detection, dispatch, and training facilities and procedures.
- Directs the park fire suppression and preparedness program
- Provides for the protection of developed areas.
- Evaluates both fire "use" and prescribe fire prescriptions.
- Prepares Incident Management Team briefing package.

Fire Management Officer
- Maintains qualification and training records.
- Establishes liaisons with cooperating agencies, and coordinates and maintains cooperative agreements.
- Serves as a park liaison with Incident Management Teams
- Coordinates park wide fire training and equipment acquisition.
- Maintains park wide fire crew lists and equipment records.
- Maintains Weather Information Management System (WIMS) and the NPS Wildland Fire Computer System IQCS data input.
- Advises the Communications Center supervisor on fire dispatch and reporting responsibilities.
- Coordinates annual review of the Fire Management Plan.
- Advises staff on fire management responsibilities.
- Coordinates preparation of WFIP and WFSA.
- Ensures fire reports (DI-1202) are properly prepared by the Incident Commander and/or entered into SACS.

Chief of Maintenance
The Chief of Maintenance or staff designee:
- Supports fire management by accomplishing related work orders, such as mechanical hazard fuel reduction, fire cache repair, equipment maintenance, etc.
- Provides appropriately trained personnel to assist the fire management program, including firefighters, logistics personnel, etc.
- Implements/assists with closures of trails, roads and facilities.

Administrative Officer
The Administrative Officer or staff designee:
- Provides financial advice and accounting information.
- Provides appropriately trained personnel to assist the fire management program, including firefighters, logistics and comps and claims, finance personnel, etc.

Chief of Interpretation
The Chief of Interpretation:
- Serves or designates a IO, information officer, for the initial attack stages of the fire.
- Includes fire ecology and fire prevention public education in park programs, as appropriate.
- Provides appropriately trained personnel to assist the fire management program, including firefighters, information officers, etc.

Chief of Natural and Cultural Resources
The Chief of Natural and Cultural Resources, or staff designee:

- Provides scientific expertise regarding:
  - Fire effects.
  - Maps/GIS, fuels, topography, and vegetation.
  - Management options.
  - Resource impacts/benefits.
  - Post season evaluation.
  - Rehab and BAER (Burned Area Emergency Rehab)
- Provides scientific review of the Fire Management Plans to ensure a sound ecological basis for management actions.
- Provides appropriately trained personnel to the fire management program, including firefighters, fire monitors, planning staff, resource advisors, etc.

Overall, park managers are responsible for revising responsibilities and assigning appropriate tasks to the most qualified staff as personnel relocate. The park will maintain qualified personnel to meet expected fire management needs. The Fire Staffing Plan is included in the Appendix.

Incident Commanders
A specific Limited Delegation of Authority will be provided to each Incident Commander prior to assuming responsibility for an incident. Major duties of the Incident Commander are given in the NWCG Fireline Handbook.

Incident Commanders:

- Brief subordinates, direct their actions and provide work tools.
- Ensure that safety standards identified in the Fire Orders and agency polices are followed at all times.
- Personally scout and communicate with others to increase knowledge of fire conditions, fire weather, tactical progress, safety concerns and hazards, condition of personnel, and needs for additional resources.
- Order resources to implement the management objectives for the fire, including supporting MORA fire fighter who wish to serve as trainees in specific functions .
- Inform appropriate dispatch of current situation and expected needs.
- Coordinate mobilization and demobilization with dispatch and FMO
- Perform administrative duties, i.e., approving work hours, completing fire reports for command period, maintaining property accountability, providing or obtaining medical treatment and evaluation performance of subordinates.

Initial Attack Teams
On most small fires, initial attack teams will consist of at least five red-carded firefighters and an IC Type III. IA teams will be prepared and equipped with hand and power tools as needed and will be dispatched with a day's supply of food and water so that they can continue work with 24 hours without additional support.

B. Incident Command System

All wildland fires will be managed under the Incident Command System (ICS). The FMO will ensure that each wildfire is assigned a fully qualified Incident Commander (IC) for the appropriate size and complexity of the fire. The FMO, if qualified, may serve as the IC or may designate a qualified IC who serves under the FMO. The IC manages all assigned resources, whether suppression or monitoring; implements the selected strategy from the WFIP or WFSA; and collects data to permit update of the

analysis as necessary. Fire suppression activities are non-routine in nature, cannot be scheduled in advance, and will be automatically approved. For wildland fire suppression activities, the IC will generally be the FMO or the other qualified staff.

The FMO and Park Fire Use group shall ensure that a Wildland Fire Implementation Plan (WFIP) is completed for each wildland fire for resource benefits. The stage (I, II, III) of the WFIP is dependent on the status of the fire management strategy – for instance, wildland fire use for resource benefits or suppression.

A Wildland Fire Situation Analysis (WFSA) is completed for each unsuccessful action on a wildland fire or for prescribed fire escapes. The WFSA provides the IC and park managers an analysis of alternatives to utilize. As needed the FMO will consult with resource advisors and other park management staff regarding the potential effects of contemplated actions on park resources. The WFSA is submitted to the FMO, and approved by the Superintendent.

1. INTERAGENCY INCIDIENT MANAGEMENT TEAM BRIEFINGS

The briefings with the Superintendent and the initial attack incident commander should take place as soon as the Incident Management Team arrives. All members of the team should be present at the briefing, but only one person should conduct the briefing (usually the IC or Planning Section Chief). Questions should be held until the end of the briefing.

There is a outline for this briefing in the Interagency Standards for Fire and Fire Aviation Operations, also known as the “Red Book”.

In addition to the information listed on this briefing form, a large map of the area and a complete list of resources will be needed. The agency dispatcher also needs to have a copy of all resources orders for the Supply Unit Leader and IAP a copy of the area map and fire map for each member of the team.

2. SUPERINTENDENT’S BRIEFING

General Information

- Overview
- Name and number of incident
- Approximate size and location
- Name of current Incident Commander
- General weather conditions
- Experienced fire behavior
- Fuel types
- Current tactics
- ICP and fire camp location and restrictions
- Written Delegation of Authority to incoming IC
- Status of Area Command
- Names of resource advisors assigned to incident.
- List of available park personnel and qualifications
- List of committed park personnel and position assigned to incident
- Local fire policy and guidelines
- Concerns relating to resource values, wilderness issues, cultural resources, threatened and endangered species
- News media procedures
- Political considerations
- Cooperative agreements
- Date and time of team transition

- Safety issues
- Planning
- Unusual fire behavior and/or fire history
- Legal considerations
- Pre-attack or resource protection plans
- Park needs for release of committed resources
- Incident Status Summary (ICS-209) reporting requirements
- Copy of Wildland Fire Implementation Plan
- Agency capabilities for team operations support
- Logistics
- Transportation routes
- Procurement unit in place or ordered
- Available facilities
- Medical
- Administrative
- ICP
- Air operations/airport
- Law enforcement agencies adjacent to park
- Finance
- Fiscal limitations and constraints
- Contracting officer assigned
- potential for claims
- current IAP

3. INCIDENT COMMANDER BRIEFING

- IC/Command Staff
- Incident map
- Fire Situation
- Discovery date/time
- Point of origin
- Legal description
- Current size
- Fuel types
- Topography
- Local hazards
- Fire behavior concerns
- Review Wildland Fire Implementation Plan
- Concerns relating to resource values, wilderness issues, cultural resources, threatened and endangered species

- Operations
- Current strategy
- Tactics to date
- Aircraft usage and availability
- Hand Crew operations
- Engine operations
- Helibase/helispot locations
- Smoke conditions and concerns
- Initial Attack responsibilities
- Planning
- Resources available
- Resources ordered

- Availability of maps, photos, GIS
- Water sites
- Weather forecasting resources
- Logistics
- ICP site
- Access routes to staging areas, drop points and fireline
- Communication Plan and resources
- Medical Plan
- Security issues
- Facilities available
- Transportation Plan and resources
- Traffic issues
- Finance
- Rental agreements in place
- Status of claims
- Status of payroll and time reports
- Incident costs to date

4. RESOURCES

A. Supplies and Equipment

The park maintains one wildland fire engine, Ford F600, Model 42 with a 280 gallon tank which is stationed on the east side of the Park.

Engine and heavy equipment use is limited to existing roads within the park, unless specific authorization is obtained from the Superintendent. Pumps, chainsaws and other portable mechanized equipment may be used with analysis of wilderness values and threatened and endangered species habitat.

A central fire cache is maintained at Longmire. This cache will provide all equipment and materials necessary to outfit at least 20 firefighters for an initial assignment inside or outside the park, and to supply other park caches. Other wildland fire caches are maintained to provide the basic equipment and supplies necessary for initial attack within the specific area of the park. The following caches are equipped for the numbers of firefighters as indicated:

Cache Location	# Firefighters
Longmire (central)	30
Ohanapecosh R.S.	10
White River R.S.	6
Carbon River R.S.	4

Additional equipment and supplies are available through cooperators and the interagency cache system. Requests for equipment from the cache system are made through the PSICC, Puget Sound Interagency Coordination Center, at 425-744-3550. These supplies come from the Region 6 Fire Cache, 1740 SE Ochcoc Way, Redmond, OR. 97756

B. Training

The park FMO will coordinate and document training, issue fire qualification cards and certify qualifying experience prior to entry in the SACS computer system. All NPS employees assigned to wildland fire management duties will meet the training and qualification standards set by the National Wildfire Coordinating Group, as defined by NWCG 310-1. NPS wildland fire qualifications standards for positions other than those defined in NWCG 310-1 will be defined and maintained on the DOI

Incident Qualification System.

Fire qualification cards are mandatory for personnel engaged in fire duties, as required in Director's Order 18. All wildland fires will be managed by an individual qualified and certified at the command level appropriate to the complexity level of the incident. Cards must be current and firefighters must have all required clothing, equipment and annual fire refresher before being dispatched to fires.

No employee will be accepted for wildland fire training or receive a fire qualification card until he or she has agreed to be available for a fire call, unless prevented by some other job responsibility or emergency. Employees must understand that such fire calls may keep them on fire duty for extended periods.

The park will provide the basic fire courses (S-130, S-190) as needed each summer, or coordinate such training through other agencies. Advanced training may be presented and made available to PNW agencies. The FMO, with assistance from qualified fire personnel, will be responsible for providing the annual fire refresher training and Pack Test.
Expertise from the entire park and region will be made available to the FMO for his/her training needs. Potential emergency hire personnel (SCAs, VIPs, etc.) will be encouraged and permitted to attend.

Fire training should include the following information:
1. Purpose and objectives of the fire management program.
2. Park ecosystem fire ecology.
3. Information regarding appropriate considerations and constraints to protect wilderness values and endangered species during suppression operations.
4. Identification of and impacts to cultural resources during firefighting operations.
5. Lessons learned from previous fire incidents.

The Fire Management Officer will also provide training to Communications Center personnel in fire dispatch procedures and WIMS terminal operation, as needed. The park supports the development of individual Type I and II overhead personnel from among qualified and experienced park staff for assignment to interagency overhead teams at the regional and national level.

Physical Fitness

Fire suppression is an arduous task in Mount Rainier National Park. Steep, rugged terrain may be mixed with heavy downed fuel loading. On prescribed fires, personnel may be required to shift from monitoring activities to suppression. Poor physical condition of crewmembers can endanger safety and lives of others during critical situations.

Personnel expected to perform fire management duties will maintain a high level of physical fitness. Testing, as a condition of employment or assignment, has been approved in the park. At present, the pack test is required. The pack test requires all arduous duty positions to walk three miles, with a 45-pound pack, on flat, level terrain, within a 45 minute time period. For positions requiring moderate fitness requirements, a person must be able to complete a two-mile hike, with a 25-pound pack, in 30 minutes. For light duty positions, person must complete a one-mile hike in 16 minutes, no pack is required. The Wildland Fire Qualification Subsystem Guide (PMS-310-1) describes the physical requirement levels of all red carded positions. All dedicated fire staff and park employees over the age of 35 must have a physical examination on file prior to testing for arduous positions, unless they have a regular, well-established personal fitness program. The physical examination requirement is every three years for firefighters. Fire physicals for Fire-pro funded positions shall be paid from the appropriate fire accounts, as per DO/RM-18.

All personnel who are expected to perform in arduous fire management duties are encouraged to take advantage of the 1/2 hour per day, three hour a week, of official time permitted for personal physical fitness exercise programs. Fire funded staff may be granted up to one hour each duty day to participate in a physical exercise program, as per DO/RM 18.

C. Communications

The park Communications Center at Tahoma Woods (park headquarters) is the dispatch center for the park. During the fire season the Communications Center is normally staffed 14-16 hours each day. Either Communications Center personnel or park rangers may be contacted after normal business hours via the 911 system by telephone callers reporting fires.

The park radio system consists of base stations at the Communications Center at Tahoma Woods, Longmire, Crystal Mountain and Paradise with repeaters and remote units at various locations. All ranger stations in areas accessible by paved road have phone lines. Radio repeaters are located on Gobblers Knob, Crystal Mountain, Mt. Fremont, Tolmie Peak, Shriner Peak and Packwood. Any fixed base radio unit in the park and most mobile units can be contacted by the Communications Center's fire dispatcher.

All fires will be reported to the Communications Center. Dispatch personnel will maintain a radio log of fire activities on ICS form 214 Unit Log. A daily situation report, 209, will be faxed to PSICC daily. Fire weather data will be transmitted to PSICC as weather data is collected from Longmire and the Ohanapecosh stations.

When a fire occurs in the park and the Communications Center is advised of its presence, personnel will first advise the park FMO. The FMO or their designee, should complete an aerial size up. The FMO and District Ranger, within whose area the fire is burning, will have the Communication Center contact an Incident Commander Type III or IV, a Crew Boss and necessary resources to manage the incident and lead the initial attack. It is recommended that the fire be evaluated from the air, before resources are placed on the ground.

If a fire has occurred outside the park and park firefighters are asked to assist, the Communications Center will notify those persons designated on the current weekly PSICC resource list by the FMO.

The Chief Ranger and other supervisors of personnel dispatched outside the park, will be notified by the park Communications Center.

D. Response

The December 1995 *Federal Wildland Fire Management Policy and Program Review* recommended that federal "guiding principles" should include several key elements. Highlighted in the review is that firefighter and public safety is the first priority. Additionally, fires are to be suppressed at minimum cost, considering firefighter and public safety, benefits, and values at risk. The appropriate management response to an incident will consider a full range of alternatives. These include, but are not limited to;

- Monitor the fire
- Allow the fire to burn to natural barriers
- Use cold trail, wet line, or a combination
- Utilize roads and trails as a fireline
- Use low impact tools

Fire management strategies for suppression will consider the full range of alternatives to include;

- Direct attack
- Indirect attack
- Parallel attack
- Other strategies as appropriate

The conditions for suppression are stated in the Wildland Fire Implementation Process Flow Chart in the appendix, discovery of a fire, all subsequent actions will be based on the following sequence:

1. Provide for safety of the public and agency personnel.
2. Determine whether the fire is human-caused or natural if possible. Fires in remote, trail-less areas will be assumed to have been caused by natural means until determined to be otherwise. Fires along trails or near camps will be suspected of human involvement. Determination of the cause will be made by aerial observations and, if necessary, by an initial attack crew. Human-caused fires will be investigated by law enforcement personnel with wildland fire arson investigation training.
3. Regardless if the fire is designated as a suppression fire or fire "use", efforts will be initiated by dispatching an initial attack group to the fire, with a qualified incident commander.
4. If the natural ignition is a Wildland Fire for Resource Benefit, a qualified monitor along with an initial attack group will be dispatched to it, with actions pending the final determination of classification as either a suppression or natural wildland fire.
5. Considering resources availability, current and predicted fire conditions and the assessment by the suppression team at the fire, the Incident Commander should estimate the likely spread of the fire and decide whether additional resources will be needed.
6. On the recommendation of the Chief Ranger and FMO, the Superintendent decides on the involvement of IMT and other agencies in suppression efforts within the park.

C. COOPERATORS

Mount Rainier National Park cooperates with neighboring agencies in suppressing fires on adjoining lands. Cooperative Agreements exist with the U. S. Forest Service and the Washington State Department of Natural Resources. Mutual aid agreements are in place with neighboring fire districts for structural fire response and urban interface fire suppression. If assistance is required, it is requested from adjacent cooperators through an established dispatch procedure. Mount Rainier National Park will comply with the National Interagency Mobilization Guide in all applicable aspects for wildland fire management.

In general, park personnel are used for initial attach of fires within or adjoining the park boundary. If assistance is requested, it is requested from adjacent cooperators under reciprocal agreements. The "closest" forces concept" shall be used whenever possible. In some cases, the cooperating agency crews will suppress small fires close to or straddling the boundary or which threaten adjacent lands. Likewise, park personnel occasionally suppress fires on forest, state and private lands. Any initial attack of a fire on another agency lands will promptly be followed up with notification to the agency, to insure that proper management activities are taking place. Park fires that escape initial attack and an incident management team will manage all project fires. This may include the park's own overhead resources for smaller fires or an interagency incident management team for larger fires.

In some cases, the cooperating agency's crews will suppress small fires close to or straddling the boundary or which threaten adjacent lands. Likewise, park personnel occasionally suppress fires on forest, state and private lands. Any initial attack of a fire on another agency's lands will promptly be followed up with notification to the agency, to insure that proper management activities are taking place. Park fires that escape initial attack and an incident management team will manage all project fires. This may include the park's own overhead resources for smaller fires or an interagency incident management team for larger fires.

Daily verification of available resources will be accomplished through NPS participation with the Puget Sound Interagency Communications Center. A daily and forecasted preparedness level will be determined by PSICC as outlined in the PNW Interagency Preparedness Plan.

Interagency Incident Management teams may be called upon to manage or assist the park with fires,

which escape initial attack.

The FMO and the Chief Ranger are responsible for ensuring that interagency agreements are reviewed annually and will schedule pre-season meetings with cooperators as required. Cooperative or interagency agreements facilitate the furnishing of nearby crews for firefighting and incident management.

The following agreements are with Mount Rainier NP, some need revision or updating.

- MOU between Pierce County District 23 fire and rescue and NPS/MORA, 2002
- MOA between US Army Reserve Command Ft. McPherson, GA (for Ft Lewis, WA)& MORA, 2004
- National Interagency Agreement for Fire Management between Puget Sound Interagency Coordination Center and MORA, updated 2005
- Pacific NW Wildfire Coordinating Group MOU, 1998
- Interagency Agreement for Fire Management between BLM, BIA, NPS USFW, and USFS, 2004
- Draft of Fire, Aviation and Emergency Response in the Pacific NW, 1999
- MOU for Fire Protection Services Operating Plan between the following agencies: BIA, BLM, DNR, FWS, NPS and USFS, 2002

D. ADMINISTRATIVE PROCEDURES

Financial management for the program outlined in this plan will be in accordance with Directors Order 18: Wildland Fire Management Guideline. The Fire Management Officer is responsible for the administrative procedures for all phases of the program.

Accurate and complete records are a vital part of any management program. The following permanent records and reports have been established and will be maintained at park headquarters.

1. Individual Fire Reports, DI-1202
2. Fire Atlas (including GIS data)
3. Fire Weather Records (maintained in WIMS computer system)
4. Historical Records (photographs, maps, etc., particularly of vegetative changes due to fire)
5. Fire Qualification and Training Records (maintained in SACS)
6. Fire Equipment Inventories
7. Cooperative Agreements and Memoranda of Understanding
8. Prescribed Fire Monitoring Data and Analysis.

The Fire Management Officer is responsible for maintaining permanent fire records.

Fire reports (DI-1202) will be submitted within seven days after the fire is declared out to the Boise office, by means of the SACS computer system. A case report, 10-343, will be completed for all arson or suspicious fires. Arson and suspicious cause fires
'will be reported to the Communications Center, for law enforcement follow-up. If a fire related 10-343 is sent directly to the Communications Center, a copy will be forwarded to the Fire Management Office.

All fire management activities involving the recruitment of personnel, timekeeping, procurement and property management will comply with the policies and guidelines specified in Directors Order 18 and Reference Manual 18, as well as the Interagency Fire Business Management Handbook.

E. AIRCRAFT OPERATIONS

Maps of the area can be viewed by linking to the web:
Hydrology
Perennial Lake Depths
Landing Zones

Because 97 percent of the park is designated wilderness, park policy limits the use of aircraft to activities involving life or health threatening emergencies, the administration and/or protection of wilderness resources and for individually approved special purpose missions that meet the criteria defined in the Wilderness Act. Park aviation activity as it pertains to fire suppression shall be performed in accordance with applicable FAA regulations, DOI Aviation Policy (350-354 DM), Director's Order 60: Aviation Management, Aviation Policy and the Interagency Helicopter Operations Guide (IHOG).

Fixed-wing aircraft are used for detection, patrol, and observation, as well as, occasionally serving as a radio relay link between ground crews and the park's communication center during non-fire emergencies. Aircraft are obtained through commercial vendors operating under Office of Aircraft Services (OAS) or US Forest Service contracted aircraft rental agreements.

A variety of retardant aircraft are available from bases throughout the Pacific Northwest. These shared suppression resources are ordered through the PSICC, Puget Sound Interagency Coordination Center. Airtankers should normally be dispatched with a lead plane, due to the steep, mountainous terrain. Ferry and turn-around times for retardant aircraft can be lengthy and their use requires careful planning. The closest current air tanker bases are located in Redmond, OR at Moses Lake, WA.

Helicopters are used for reconnaissance, water bucket drops, and transportation of personnel on initial attack on lightning fires and shutting equipment. OAS and USFS aircraft rental agreements and contracts are maintained with commercial operators on the Olympic Peninsula, in the greater Seattle area and throughout the rest of Washington and Oregon. Type III helicopters are the most commonly used helicopter for initial attack and recon of fires.

Military aircraft are not normally used for fire management activities. There maybe an except when emergency medical evacuation is needed and the hoist capabilities of military helicopters are required, or when there is such large fire activity within the Pacific Northwest that no commercial aircraft are available. Military medical response helicopters are obtained under a regional MAST program. MORA's communication system would dispatch these resources. Military aircraft, both helicopter and air tanker, can be utilized under special agreement with the National Interagency Fire Center during extreme fire seasons.

Because most of the park is wilderness, clearing of new helispots or improvement of natural openings is held to an absolute minimum and requires Superintendent's approval, except in life threatening situations. A location map and descriptive listing of all known improved helispots and those unimproved helispots that are utilized shall be maintained in the fire management office. Information will include a brief description of known hazards, approaches, descriptive location or nearest landmark, size, latitude and longitude and last year known utilization occurred. If at all possible, the park's wilderness values will take precedence over improving helispots. Helispots improved for an incident will be rehabilitated following the fire.

Aircraft may be used for emergency fire management purposes without prior approval from the Superintendent's office. Emergency consultation concerning impacts on threatened and endangered species may be required. As in all fire management activities, safety is a primary consideration. Qualified helicopter support personnel will be assigned to all flight operations. All employees utilizing helicopters

will receive basic ground safety briefings/training, be dressed in PPE, and orientation to the aircraft. Retardant and foam use from aircraft should be limited if at all possible, due to potential impacts on the environment. A careful balance needs to be achieved between the potential impacts and the gains as a firefighting tool.

Additional information on aircraft operations and specific procedures is contained in the aircraft section of the Fire Mobilization Plan of this plan and in the park's Aviation Management Plan.

All fire-related aircraft services should be requested through the FMO/Aviation Officer. PSICC has been granted the authority to order all aircraft for wildland fire activities.

For Type III fires, the FMO/Aviation Officer and the Comm Center will be notified by the IC that an aircraft has been ordered. Before the conclusion of the fire, the IC will forward all aviation documentation to the FMO/Aviation Officer, a DI-1 and completed OAS-23 form to the Procurement Office.

Type I and II IMT fire teams will follow their standard operating procedures and go through expanded fire dispatch.

Temporary Flight Restrictions (TFR's) are ordered through the Park's Communications Center or PSICC. The Park Aviation Officer, FMO and Chief Ranger should be notified, so as other project helicopters in the Park are not in conflict with the TFR.

Wilderness helicopter landing zones have been designated on a map which is located in the Communication Center and can be distributed to vendors. Where helispots are needed, natural openings or previously constructed locations will be used to the extent possible. Park designated helibase include: Kautz Creek, Fourth Crossing, and Ranger Field (Mount Baker-Snoqualmie National Forest).

The minimum personnel for conducting aviation fire suppression activities in the park will consist of a Helibase Manager, Helicopter Manager and Helicopter Crew Person. All personnel in helicopter and helibase management positions must meet all prerequisite training and experience standards as per Chapter 2 of IHOG.

1. Water Use in Aircraft Operations

Water is integral to all park ecosystems. Park water resources are diverse and include alpine lakes, waterfalls, glacially fed rivers, and mineral springs. The streams and rivers of Mount Rainier National Park**,** which have been altered very little by humans**,** represent outstanding examples of the original pristine aquatic ecosystems of North America. Their unique characteristics make them valuable recreational resources; but more important is the fact that these rivers and streams may serve as benchmarks for identifying changes in area environmental conditions and natural resources. The history of natural disturbance and the complex mosaics of riverine landforms have strongly shaped the development and composition of stream ecosystems emerging from the slopes of Mount Rainier.

Both glacial and non-glacial drainages originate on the slopes of Mount Rainier. The mountain has 26 major glaciers, covering 35 square miles, the largest single mountain glacial system in the contiguous 48 states. For the purposes of managing water resources of the park, nine major watersheds have been delineated. With the exception of Huckleberry Creek and a portion of the Ohanapecosh River, park rivers originate from glacial melt water. Drainage area ranges from 13,320 acres in the Puyallup watershed to 41,398 acres in the Ohanapecosh drainage.

With some exceptions (including the northern watershed of the Carbon River, southern watershed of the Nisqually River, Berry Creek, and some tributaries to Chenuis Creek) all surface waters of the park originate inside the boundary. Approximately 470 rivers and streams within Mount Rainier National

Park are shown on USGS 7.5 minute quadrangles (scale 1:24,000); 383 are perennial and 84 are intermittent. Mineral geothermal springs are found on the summit of Mount Rainier, at Longmire, and at Ohanapecosh. Cold springs also occur throughout the park.

A total of 405 lakes are shown within the park on USGS 7.5-minute quadrangles. Of these, 310 are permanent lakes, the remainder are intermittent. At approximately 123 acres and 57 feet deep, the exceptionally clear Mowich Lake is the largest and deepest lake in the park.

Ponds and their dependent organisms (amphibians, invertebrates) are the most sensitive to water level changes. Additionally, aquatic systems in MORA are naturally very low in nutrients, primarily nitrate and phosphorus compounds.

Use of helicopter bucket operations in wildland fire suppression will depend on variables such as; fire size and location, bucket capacity and helicopter capabilities and limitations. Use of fire retardant and surfactants or buckets that have been dipped in them will not be permitted. Buckets dipped in water sources outside MORA boundaries may not be dipped or discharged in sources within MORA during the same operational period in order to avoid contamination of MORA hydrologic systems.

Potential water sources will be evaluated prior to the normal fire season by NCR subject matter specialists using the best and most current information available and subject to review as conditions change throughout the fire season. The Fire Management Team will decide which sources can be utilized for the incident being evaluated. The attached map identifies potential water sources in the park.

Water from surface water sources (lakes, ponds, and streams) will be used only after evaluating potential affects to aquatic organisms. No aerial dipping from streams will be conducted since streams are often too shallow and these actions may affect listed T&E Species. Lakes and ponds may be used as aerial dipping water sources only under the following criteria:

- Lake depth must be a minimum of 7 meters.
- The aerial bucket does not contain any fire retardant (outside or inside the bucket)
- No Species of Concern or listed T&E Species are present (as noted by past amphibian or invertebrate surveys. This generally includes Cascade Frog, Western Toad, Red-legged Frog, Fenders Stonily and California Floater).

IX. FIRE RESEARCH & MONITORING

This fire monitoring program allows the national Park Service to document basic information, to detect trends, and to ensure that parks meet their fire and resource management objectives. From identified trends, park staff can articulate concerns, develop hypotheses, and identify specific research projects to develop solutions to problems. The goals of the program described here are to:

- Document basic information for all wildland fires, regardless of management strategy
- Document fire behavior to allow managers to take appropriate action on all fires that either:
  - ♦ Have the potential to threaten resource values
  - ♦ Are being managed under specific constraints, such as a prescribed fire or fire use
- Document and analyze both short-term and long-term prescribed fire effects on vegetation
- Establish a recommended standard for data collection and analysis techniques to facilitate the sharing of monitoring data
- Follow trends in plant communities where fire effects literature exists, or research has been conducted
- Identify areas where additional research is needed

This Fire Monitoring Handbook (FMH) describes the procedures for this program in National Park Service units.

Table I. Wildland fire management strategies and Recommended Standard (RS) monitoring levels

Management Strategy	RS Level
Suppression: All management actions are intended to extinguish or limit the growth of the fire.	1. Environmental 2. Fire Observation -Reconnaissance -Fire Conditions
Wildland Fire Use: Management allows a fire started by a natural source to burn as long as it meets prescription standards.	1. Environmental 2. Fire Observation -Reconnaissance -Fire Conditions
Prescribed Fire: Management uses intentionally set fires as a management tool to met management objectives.	1. Environmental 2. Fire Observation -Reconnaissance -Fire Conditions 3. Short-term Change 4. Long-term change

Environmental monitoring provides the basic background information needed for decision-making. Parks may require unique types of environmental data due to the differences in management objectives and/or their fire environments. The following types of environmental data can be collected:

- Weather
- Fire Danger Rating

- Fuel Conditions
- Resource Availability
- Concerns and Values to be Protected
- Other Biological, Geographical or Sociological Data

Reconnaissance monitoring provides a basic overview of the physical aspects of a fire event. On some wildland fires this may be the only level 2 data collected. Collect data on the following variable on all fires.

- Fire Cause (Origin) and Ignition Point
- Fire Location, and Size
- Logistical Information
- Fuels and Vegetation Description
- Current and Predicted Fire Behavior
- Potential for Further Spread
- Current and Forecasted Weather
- Resources or Safety Threats and Constraints
- Smoke Volume and Movement

The second portion on Level 2 monitoring documents fire conditions. Data on the following variables can be collected for all fires. The park's fire management staff should select appropriate variables, establish frequencies for their collection, and document these standards in your burn plan or Wildland Fire Implementation Plan-Stage II: Short-term Implementation Action and Wildland Fire Implementation Plan-Stage III: Long-term Implementation Actions.

- Topographical Variables
- Ambient Conditions
- Fuel Model
- Fire Characteristics
- Smoke Characteristics
- Holding Options
- Resource Advisor Concerns

DIRECT

1	FUEL MODEL	2	TIMBER (GRASS AND UNDERSTORY)					
2	1-HR FUEL MOSTURE, %	5.0	7.0	9.0	11.0	13.0	15.0	17.0
3	10-HR FUEL MOISTURE, %	10.0	15.0	20.0				
4	100-HR FUEL MOISTURE, %	10.0	15.0	20.0				
5	LIVE HERBACEOUS MOISTURE, %	80.0	130.0	180.0				
7	MIDFLAME WINDSPEED, MI/H	2.0	3.0	10.0	14.0	18.0		
8	TERAIN SLOPE, %	.0	20.0	40.0	60.0	80.0		
9	DIRECTION OF WIND VECTOR DEGREES CLOCKWISE FROM UPHILL	.0						
10	DIRECTION OF SPREAD CALCULATIONS DEGRESS CLOCKWISE FROM UPHILL	.0	(DIRECTION OF MAX SPREAD)					

DIRECT

1	FUEL MODEL	2	TIMBER (GRASS AND UNDERSTORY)			
2	1-HR FUEL MOSTURE, %	7.0				
3	10-HR FUEL MOISTURE, %	9.0				
4	100-HR FUEL MOISTURE, %	10.0				
5	LIVE HERBACEOUS MOISTURE, %	80.0				
7	MIDFLAME WINDSPEED, MI/H	2.0	6.0	10.0	14.0	18.0
8	TERAIN SLOPE, %	.0	20.0	40.0	60.0	80.0
9	DIRECTION OF WIND VECTOR DEGREES CLOCKWISE FROM UPHILL	.0				
10	DIRECTION OF SPREAD CALCULATIONS DEGRESS CLOCKWISE FROM UPHILL	.0	(DIRECTION OF MAX SPREAD)			

FM2
High to Extreme Conditions

RATE OF SPREAD, CH/H (V4.4)

MIDFLAME WIND (MI/H)	TERRAIN SLOPE, %				
	.0	20.0	40.0	60.0	80.0
2.0	9.	11.	18.	29.	45.
6.0	50.	52.	59.	70.	86.
10.0	123.	125.	132.	143.	159.
14.0	225.	228.	235.	246.	262.
18.0	356.	358.	365.	376.	392.

DIRECT

1	FUEL MODEL	8	CLOSED TIMBER LITTER			
2	1-HR FUEL MOSTURE, %	7.0				
3	10-HR FUEL MOISTURE, %	9.0				
4	100-HR FUEL MOISTURE, %	10.0				
7	MIDFLAME WINDSPEED, MI/H	2.0	6.0	10.0	14.0	18.0
8	TERAIN SLOPE, %	.0	20.0	40.0	60.0	80.0
9	DIRECTION OF WIND VECTOR DEGREES CLOCKWISE FROM UPHILL	.0				
10	DIRECTION OF SPREAD CALCULATIONS DEGRESS CLOCKWISE FROM UPHILL	.0	(DIRECTION OF MAX SPREAD)			

Fuel Model 8
High to Extreme Conditions

RATE OF SPREAD, CH/H (V4.4)

MIDFLAME WIND (MI/H)	TERRAIN SLOPE, %				
	.0	20.0	40.0	60.0	80.0
2.0	1.	1.	1.	2.	3.
6.0	2.	3.	3.	4.	4.*
10.0	4.*	4.*	4.*	4.*	4.*
14.0	4.*	4.*	4.*	4.*	4.*
18.0	4.*	4.*	4.*	4.*	4.*

* MEANS YOU HIT THE WIND LIMIT.

DIRECT

1	FUEL MODEL	10	TIMBER (LITTER AND UNDERSTORY)			
2	1-HR FUEL MOSTURE, %	7.0				
3	10-HR FUEL MOISTURE, %	9.0				
4	100-HR FUEL MOISTURE, %	10.0				
6	LIVE WOODY MOISTURE, %	100.0				
7	MIDFLAME WINDSPEED, MI/H	2.0	6.0	10.0	14.0	18.0
8	TERAIN SLOPE, %	.0	20.0	40.0	60.0	80.0
9	DIRECTION OF WIND VECTOR DEGREES CLOCKWISE FROM UPHILL	.0				
10	DIRECTION OF SPREAD CALCULATIONS DEGRESS CLOCKWISE FROM UPHILL	.0	(DIRECTION OF MAX SPREAD)			

FM10
High to Extreme Conditions

RATE OF SPREAD, CH/H					(V4.4)
MIDFLAME WIND (MI/H)	TERRAIN SLOPE, %				
	.0	20.0	40.0	60.0	80.0
2.0	3.	3.	5.	8.	11.
6.0	10.	11.	12.	15.	19.
10.0	21.	21.	23.	25.	29.
14.0	33.	33.	35.	38.	41.
18.0	47.	47.	49.	52.	55.

DIRECT

1	FUEL MODEL	5	BRUSH, 2 FT (60 CM)
2	1-HR FUEL MOSTURE, %	7.0	
3	10-HR FUEL MOISTURE, %	9.0	
6	LIVE WOODY MOISTURE, %	100.0	
7	MIDFLAME WINDSPEED, MI/H	2.0	6.0 10.0 14.0 18.0
8	TERAIN SLOPE, %	.0	20. 40.0 60.0 80.0 0
9	DIRECTION OF WIND VECTOR DEGREES CLOCKWISE FROM UPHILL	.0	
10	DIRECTION OF SPREAD CALCULATIONS DEGRESS CLOCKWISE FROM UPHILL	.0	(DIRECTION OF MAX SPREAD)

Fuel Model 5
High to Extreme Conditions

RATE OF SPREAD, CH/H					(V4.4)
MIDFLAME WIND (MI/H)	TERRAIN SLOPE, %				
	.0	20.0	40.0	60.0	80.0
2.0	6.	7.	10.	16.	23.
6.0	24.	25.	28.	34.	41.
10.0	48.	49.	52.	57.	65.
14.0	75.	77.	80.	85.	93.
18.0	107.	108.	111.	117.	124.

DIRECT

1	FUEL MODEL	5	BRUSH, 2 FT (60 CM)				
2	1-HR FUEL MOSTURE, %	10.					
3	10-HR FUEL MOISTURE, %	11.					
6	LIVE WOODY MOISTURE, %	100.0					
7	MIDFLAME WINDSPEED, MI/H	2.0	6.0	10.0	14.0	18.0	
8	TERAIN SLOPE, %	.0	20.0	40.0	60.0	80.0	
9	DIRECTION OF WIND VECTOR DEGREES CLOCKWISE FROM UPHILL	.0					
10	DIRECTION OF SPREAD CALCULATIONS DEGRESS CLOCKWISE FROM UPHILL	.0	(DIRECTION OF MAX SPREAD)				

FM 5
Moderate, "average"

TERRAIN SLOPE (%)	RATE OF SPREAD (CH/H)	HEAT PER UNIT AREA (BTU/SQFT)	FIRELINE INTENSITY (BTU/FT/S)	FLAME LENGTH (FT)	REACTION INTENSITY (BTU/SQT/M)	EFFECT WIND (MI/H)
.0	11.	226.	44.	2.6	990.	6.0
20.0	11.	226.	46.	2.6	990.	6.2
40.0	13.	226.	52.	2.8	990.	6.8
60.0	15.	226.	62.	3.0	990.	7.8
80.0	19.	226.	77.	3.3	990.	9.0

DIRECT

1	FUEL MODEL	2	TIMBER (GRASS AND UNDERSTORY)				
2	1-HR FUEL MOSTURE, %	10.0					
3	10-HR FUEL MOISTURE, %	11.0					
4	100-HR FUEL MOISTURE, %	12.0					
5	LIVE HERBACEOUS MOISTURE, %	80.0					
7	MIDFLAME WINDSPEED, MI/H	6.0					
8	TERAIN SLOPE, %	.0	20.0	40.0	60.0	80.0	
9	DIRECTION OF WIND VECTOR DEGREES CLOCKWISE FROM UPHILL	.0					
10	DIRECTION OF SPREAD CALCULATIONS DEGRESS CLOCKWISE FROM UPHILL	.0	(DIRECTION OF MAX SPREAD)				

Fuel Model 2
Moderate

TERRAIN SLOPE (%)	RATE OF SPREAD (CH/H)	HEAT PER UNIT AREA (BTU/SQFT)	FIRELINE INTENSITY (BTU/FT/S)	FLAME LENGTH (FT)	REACTION INTENSITY (BTU/SQT/M)	EFFECT WIND (MI/H)
.0	42.	430.	332.	6.5	3118.	6.0
20.0	44.	430.	348.	6.6	3118.	6.2
40.0	50.	430.	394.	7.0	3118.	6.6
60.0	60.	430.	471.	7.6	3118.	7.3
80.0	73.	430.	578.	8.4	3118.	8.2

DIRECT

1	FUEL MODEL	8	CLOSED TIMBER LITTER
2	1-HR FUEL MOSTURE, %	10.0	
3	10-HR FUEL MOISTURE, %	11.0	
4	100-HR FUEL MOISTURE, %	12.0	
7	MIDFLAME WINDSPEED, MI/H	6.0	
8	TERAIN SLOPE, %	.0	20.0 40.0 60.0 80.0
9	DIRECTION OF WIND VECTOR DEGREES CLOCKWISE FROM UPHILL	.0	
10	DIRECTION OF SPREAD CALCULATIONS DEGRESS CLOCKWISE FROM UPHILL	.0	(DIRECTION OF MAX SPREAD)

FM 8
Moderate

TERRAIN SLOPE (%)	RATE OF SPREAD (CH/H)	HEAT PER UNIT AREA (BTU/SQFT)	FIRELINE INTENSITY (BTU/FT/S)	FLAME LENGTH (FT)	REACTION INTENSITY (BTU/SQT/M)	EFFECT WIND (MI/H)
.0	2.	165.	6.	1.0	810.	6.0
20.0	2.	165.	6.	1.0	810.	6.2
40.0	2.	165.	7.	1.1	810.	6.9
60.0	2.	165.	9.	1.2	810.	8.0
80.0	3.	165.	9.	1.3	810.	8.3*

* MEANS YOU HIT THE WIND LIMIT

FM 8 DIRECT

1	FUEL MODEL	8	CLOSED TIMBER LITTER
2	1-HR FUEL MOSTURE, %	10.0	
3	10-HR FUEL MOISTURE, %	11.0	
4	100-HR FUEL MOISTURE, %	12.0	
6	LIVE WOODY MOISTURE, %	100.0	
7	MIDFLAME WINDSPEED, MI/H	6.0	
8	TERAIN SLOPE, %	.0	20. 40.0 60.0 80.0 0
9	DIRECTION OF WIND VECTOR DEGREES CLOCKWISE FROM UPHILL	.0	
10	DIRECTION OF SPREAD CALCULATIONS DEGRESS CLOCKWISE FROM UPHILL	.0	(DIRECTION OF MAX SPREAD)

FM 10
Moderate

TERRAIN SLOPE (%)	RATE OF SPREAD (CH/H)	HEAT PER UNIT AREA (BTU/SQFT)	FIRELINE INTENSITY (BTU/FT/S)	FLAME LENGTH (FT)	REACTION INTENSITY (BTU/SQT/M)	EFFECT WIND (MI/H)
.0	9.	1159.	199.	5.1	5326.	6.0
20.0	10.	1159.	210.	5.3	5326.	6.2
40.0	11.	1159.	241.	5.6	5326.	6.9
60.0	14.	1159.	293.	6.1	5326.	8.0
80.0	17.	1159.	366.	6.8	5326.	9.4

Some fire-related and forest ecology research has been compiled on Mount Rainier National Park. C.F. Brockman , in a M.S. Thesis in 1931, wrote *Forests and timber types of Mount Rainier National Park*, which was expanded by Jerry F. Franklin, *et al*, in the 1979 work *The Forest Communities of Mount Rainier National Park*. J. A. Henderson compiled research for his PhD thesis on the park's subalpine meadows and in 1973 published *Composition, distribution, and succession of subalpine meadows in Mount Rainier National Park* .
The most comprehensive study on park-wide fire effects is found in *Fire and Other Disturbances of the Forests in Mount Rainier National Park*, published in 1982 by Miles Hemstrom and Jerry Franklin, which documents fire disturbances dating back to 1200 A. D.

Information was lacking on fire history and fire effects in the subalpine zone, as was noted by James Agee in his 1981 24 page paper *Fire Research Needs in National Park System Areas of Oregon and Washington*. Agee suggested that a high priority should be placed on monitoring effects of fire in the subalpine zone. In 1989, Mark H. Huff, then a Post-doctoral Research Associate at the University of Washington, along with University Of Washington Professor James Agee and Michael Gracz and Mark Finney, Graduate Research Assistants, wrote *Fuel and fire Behavior Predictions in Subalpine Forests of Pacific Northwest National Parks*. As part of NPS Cooperative Agreement CA-9000-8-007, of which the earlier work was a part, Huff and Agee in 1991 published *Subalpine Forest Dynamics After Fire in the Pacific Northwest National Parks*, which expanded on Huff's 1988 research in the park which produced *Mount Rainier: Fire and Ice*, published in *Park Science* 8 (3).

The information, data and results of these works have been incorporated in the Fire Management Plan, and will be used in preparedness planning, monitoring activities, setting prescription limits and determining appropriate management responses to wildland fire incidents.

- The Chief of Natural and Cultural Resources will coordinate relevant research requests, or results, to address fire management issues on which to base fire management decisions.

- Fire records will be made available to researchers to assist their studies.

- Researchers may be permitted to participate in fire management activities provided they are adequately trained, equipped, and physically fit to insure their personal safety.

- Short/Long term monitoring programs to assess accomplishments and to determine effect of management activities on cultural/natural resources.
- Monitoring protocols (similar to NPS Fire Monitoring Handbook)
- Fire Monitoring Plan (RM18, Chapter 11)

DECISION TO MONITOR

The Superintendent's decision to monitor a prescribed fire or wildland fire used for resource benefits will be based on work sheets found in the *Wildland Fire Implementation Plan* (WFIP), in particular the *Decision Criteria Checklist*, in the *Complexity Analysis* and in the *Periodic Fire Assessment* (samples of all documents are located in the appenidx) and a recommendation by the FMO.

PURPOSE OF MONITORING

The primary responsibility of the monitoring team is to gather, document and assess fire weather parameters, fire behavior and fire effects. Information is then transferred to the Prescribed Fire Boss to analyze the situation, inform management, implement management actions, and to track prescription achievement.

Daily verification that the natural wildland fire is within prescription will be documented on the *Fire Situation Analysis* and *Fire Decision Record* (both part of the WFIP signed by the Superintendent. This daily review will include analysis of contingency reserves for suppression efforts, if required. If the current situation exceeds any of the prescription limits, the wildland fire use status will be converted to a wildland fire and an appropriate management (suppression) response will be taken.

Monitoring of wildland fires at Mount Rainier National Park is intended to provide information for quantifying and predicting fire behavior and its ecological effects on park resources while building an historical record. Monitoring measures the parameters common to all fires: fuels, topography, weather and fire behavior. This information will be very useful later in fine-tuning the prescribed fire program, and monitoring natural successional stages of naturally ignited wildland fires.

Fires that do not meet the objectives of the fire management program and incident objectives are suppressed. Even here, observation of fire behavior and fire effects may be appropriate and potentially valuable in mapping and documenting the growth of the fire with present and expected fire behavior information. Monitoring can serve as a precursor to invoking appropriate management response by determining if the fire is in prescription and assessing protection and fire use objectives.

During the life of a prescribe or wildland fire (whether under a suppression response, wildland fire use), monitoring provides for mapping, weather, site and fuel measurements and direct observation of fire characteristics such as flame length, rate of spread and intensity. Operational monitoring provides a check to ensure that the fire remains in prescription and serves as a basis for evaluation and comparison of management actions in response to measured, changing fire conditions, and changes such as fuel conditions species composition, slope and weather.

All fires will be staff and observed to some degree regardless of size. The Chief Ranger/FMO will establish specific fire information guidelines to update intelligence about each fire.

The Chief Ranger/FMO will ensure that qualified personnel are dispatched to monitor fires. Personnel will be dispatched for the length of time there is a need for on-site information on the fire's status. The most efficient utilization of personnel is to combine specifically trained monitoring personnel with experienced fire suppression personnel.

FIRE MONITORING GUIDELINES

The NPS *Fire Monitoring Handbook* will be the source document for monitoring procedures. Monitoring protocols must be reviewed and approved at the regional office level before receiving funding.

The monitoring team will consist of a minimum of two persons. One member will be minimally qualified as a Fire Weather/Behavior Specialist II. The other member will have had Basic Fire Fighting and Fire Behavior training and experience in operation of monitoring equipment. Protocol will be based on that in the *Western Region Fire Monitoring Handbook* and the *NPS Fire Monitoring Handbook.*

Documentation in writing and photographs of fire parameters, as outlined in NPS-18, will be taken a minimum of once per day at 1400 PDT. More frequent documentation may be required, dependent upon individual fire situations. When aerial monitoring is selected, the on-site standards may be adjusted appropriately.

The *Fire Monitoring Guide* specifies the variables to be measured, the methods to be used, the equipment required and the organization and responsibilities of the monitoring team.

X. PUBLIC SAFETY

Firefighter and pubic safety is the first priority in all fire management activities.

Natural wildland fire prescription limits are designed to insure public safety.

Safety of visitors, employees, families and incident personnel will be the number one responsibility given to all Incident commanders, or Incident Management Teams, (IMT).

Superintendent may close all of the park or portions of it, (including roads and trails) when either wildfire or prescribe natural fire poses an imminent threat to public safety.

The park will implement a notification system to inform visitors and residents of all fire activities on a daily basis through normal communication channels. Fire activities report will be updated daily or when significant changes warrant in order to inform park personnel of any potential threat.

Areas of fire activity will be clearly signed at trailheads and along roadways, and backcountry personnel will inform visitors obtaining permits for backcountry use of the exact location of fire activities.

Law enforcement personnel, of any fire, which poses the threat of burning outside the parks boundaries, will immediately notify residents adjacent to the park.

Signs warning of possible smoke on the road will be placed on the Parks roads if smoke produced during wildland fires creates a safety concern. Roads maybe closed and escorts/conveys established if visibility on the highways or park roads is significantly impaired. Efforts need to be coordinated with State and local law enforcement jurisdictions and the DOT if applicable.

XI. PROTECTION OF SENSITIVE RESOURCES

A. National Historic Landmark District (NHLD)
The following infrastructures would require protection, especially in the NHLD's, there are 59 contributing structures Park wide. See appendix for details.

LOCATION	**NUMBER OF BUILDINGS**
Nisqually	14
Kautz Creek	2
Longmire	56
Paradise	11
Ohanapecosh	5
White River	6
Sunrise	11
Carbon River	3

B. Threatened and Endangered Species
Mount Rainier NP conducted formal consultation with the F&W in 2004-05. The findings of the Biological Assessment and Biological Opinion are attached with the appendices.

Mount Rainier National Park
Fire Mgmt Plan Mitigation Strategies for NSO & Murrelets for Wildland Fire Use

	Early Season NSO Mar. 15- Aug. 1	**Late Season NSO Aug. 2 - Sep. 30**	**Non-nesting Season NSO Oct 1-Mar 14.**
.22 mi radius circle (100 acre) CORE TERR. **Below 4500 ft**	-NO fires, all territories -Use non-motorized suppression techniques (hand tools, etc. low noise disturbance)	-Less than 10% area affected by ground fire -No stand replacement fire	-Less than 10% area affected by ground fire -No stand replacement fire
0.7 mi radius circle (984 ac. minus 100 acres) OCCUPIED TERR. (non-nesting adults) **Below 4500 ft** ---------- **0.7 mi radius circle** ACTIVE NESTS (breeding owls) **Below 4500 ft**	-No intended stand replacement fires -Ground fire OK up to 10% (100 acres) NO fire, all territories	-All fires acceptable -Must maintain 75% suitable habitat (up to 25% stand replacement OK in entirely suitable habitat) -All fires acceptable -Must maintain 75% suitable habitat (up to 25% stand replacement OK in entirely suitable habitat)	-All fires acceptable -Must maintain 75% suitable habitat (up to 25% stand replacement OK in entirely suitable habitat) -All fires acceptable -Must maintain 75% suitable habitat (up to 25% stand replacement OK in entirely suitable habitat)
0.7 to 1.8 mi radius circle (6,510 acres minus 984 acres) OCCUPIED TERR. (non-nesting adults) And ACTIVE NESTS **Below 4500 ft**	-All fires acceptable -Maintain 55% suitable habitat (up to 45% stand replacement fire OK in entirely suitable habitat)	-All fires acceptable -Maintain 55% suitable habitat (up to 45% stand replacement fire OK in entirely suitable habitat)	-All fires acceptable -Maintain 55% suitable habitat (up to 45% stand replacement fire OK in entirely suitable habitat)
Unsurveyed NSO habitat **Below 4500 ft**	NO fire	Up to 5-year total of 927 acres	Up to 5-year total of 927 acres
MURRELETS	**Early Season April 1 – Aug 5**	**Late Season Aug 6- Sept 15**	**Non-nesting season, Sept 16- March 30**
UNOCCUPIED Murrelet habitat **Below 3800 ft**	Up to 5 year total of 927 acres	Up to 5 year total of 927 acres	Up to 5 year total of 927 acres
OCCUPIED Murrelet habitat **Below 3800 ft**	NO fire	Up to 45 acres of stand replacement fire over 5 years	Up to 45 acres of stand replacement fire over 5 years

XII. FIRE CRITIQUES AND ANNUAL PLAN REVIEW

The Management Team, coordinated by the Chief Ranger or FMO, will conduct a critique of each fire or fire episode (multiple fires at the same time) in accordance with NPS-18. An interagency investigation team will review all entrapments and fire shelter deployments. All personnel assigned to any wildland fire will receive a performance evaluation. The evaluation can be verbal or written commensurate with the complexity of the incident. Critique reports will be filed with the fire record.

The Chief Ranger will be responsible for completing an annual fire summary report. The report will contain the number of fires by type, acres burned by fuel type, cost summary (prescribed burns and wildland fires) personnel utilized, and fire effects.

The FMO will coordinate an annual review of the Fire Management Plan and associated procedures, agreements, etc. The review will be initiated January 1st and revisions will be coordinated and implemented by May 1st.

XIII. CONSULTATION AND COORDINATION

This plan was and will continue to be, coordinated with the following park divisions, tribal, state and federal agencies:

National Park Service, Mount Rainier National Park (MORA)

Superintendent's Office
Jonathan Jarvis, former Superintendent, current Regional Director
Dave Uberuaga, current Superintendent
Randy King, Deputy Superintendent
Donna Rahier, Superintendent Secretary

Natural and Cultural Resources
Roger Andrascik, Chief
Jim Schaberl, Wildlife Biologist
Greg Burtchard, Archeologist/Cultural Resources Specialist
Rose Rumball-Petre, former Environmental Protection Specialist
Larry Miranda, Environmental Protection Specialist
Susan Dolan, Historical Landscape Architect
Julie Hover, Restoration Technician
Laurie Kurth, Plant Ecologist
Ellen Myers, Wildlife Biotech
Jim Petterson, former Wildlife Ecologist
Ellen Gage, Historical Architect
Darin Swinney, Geographic Information Specialist
Barbara Samora, Biologist

Maintenance
Dan Blackwell, former Chief
Eric Walkinshaw, Project Manager

Visitor Use and Resource Protection
Jill Hawk, Chief
Alison Robb, Supervisory Ranger / Fire and Aviation Officer
Steve Klump, Supervisory Park Ranger, Wilderness Coordinator
Cori Conner, Park Ranger, Staff Assistant

Lea Asman, Park Ranger, Staff Assistant
Emily Pechia, Staff Assistant
Jill Testerman, Staff Assistant
Uwe Nehring Supervisory Park Ranger, East District Supervisor
Dave Langley (former Park Ranger and Fire Management Officer)

MORA Interpretation and Education
Maria Gillett, (former Chief)
Sheri Forbes, Chief
Anne Doherty, Education Specialist
Patti Wold, Interpretive Specialist

National Park Service, Pacific West Region
Sue Husari, FMO
Rick Smedley, Regional Fire Planner
John Kraushaar, retired Deputy FMO
Allan Schmierer, NPS Regional Solicitor

National Park Service, Intermountain Region
Adrienne A. Anderson, Denver Service Center
Brian Mitchell, Environmental Specialist, Air Resources

Washington State Historic Preservation Office
Steve Mathison
Dr. Allyson Brooks

U.S. Fish and Wildlife Service
Pam Repp, District Supervisor
Mark Whistler, Branch Supervisor
Patty Walcott, Biologist
Carolyn Scafidi, Biologist

National Marine Fisheries Service
Chris Clemons (former NMFS biologist)
Matt Logenbaugh

Washington State Department of Natural Resources
Chuck Frame, South Puget Sound Region Fire Operation Manager
Washington State Department of Ecology

Gifford Pinchot National Forest
Mike Matarrese, Fire Staff Officer and FMO

Mount Baker-Snoqualmie National Forest
Dave Johnson, FMO
Gary Castellane, (former Staff Officer and South Zone FMO)
John Heckman, Fire Planner

Okanogan- Wenatchee National Forest
Gary Jennings, FMO
Jim Bailey, Fire Planner

Puget Sound Inter Agency Communications Center (PSICC)
Bob Reese, Emergency Operation Center Supervisor

TRIBAL CONTACTS

Near Mount Rainier National Park

Tribe	Contact	Address	Telephone	Facsimile
Muckleshoot Indian Tribe	John Daniels, Jr., Chairman	39015-172nd Ave., SE, Auburn, WA 98092-9763	(253) 939-3311	(253) 939-5311
	Melissa Calvert, Director Muckleshoot Wildlife & Cultural Resource Programs	39015 172nd Ave SE Auburn, WA. 98092	(253) 939-3311 ext. 3266	(253) 876-3312
Puyallup Tribe of Indians	Bill Sterud, Chairman	1850 Alexander Avenue Tacoma, WA 98421	(253) 572-7800	
	Judy C. Wright Tribal Historian	2002 East 28th Street Tacoma WA 98404	(253) 573-7898	(253) 573-7887
	Bill Sullivan Natural Resources Director	1850 Alexander Avenue Tacoma, WA 98421	(253) 572-7800	
	Jeffrey Thomas Resources and Cultural Program *jthomas20@mindspring.com*	6824 Pioneer Way Puyallup, WA 98371	(253) 845-9225	(253) 848-7341
Nisqually Indian Tribe	Mr. Dorian Sanchez, Chairman	4820 She-Nah-Num Dr. SE, Olympia, WA 98513	(360) 456-5221	(360) 438-8618
	Leonard Squally Historical Committee Chair	4820 She-Nah-Num Dr. SE, Olympia, WA 98513	(360) 456-5221	(360) 438-8618
	Georgianna Kautz, Director Natural Resources Division	12501 Yelm Highway SE Olympia, WA 98513	(360) 438-8687	(360) 438-8742
Confederated Tribes and Bands of the Yakama Nation	Jerry Meninick, Chairman	P.O. Box 151, Toppenish, WA 98948-0151	(509) 865-5121	(509) 865-5528
	Carroll Palmer, Director Division of Natural Resources *cpalmer@yakama.com*	P.O. Box 151, Toppenish, WA 98948-0151	(509) 865-5121	(509) 865-6850
	Johnson Meninick, Director Cultural Resource Division	P.O. Box 151, Toppenish, WA 98948-0151	(509) 865-5121	(509) 865-4664
Squaxin Island Tribe	David Lopeman, Chairman	SE 70, Squaxin Lane, Shelton, WA 98584-9200	(360) 426-9781	(360) 426-6577
	Ronda Foster, Director Heritage & Culture Committee Larry Ross	SE 70, Squaxin Lane, Shelton, WA 98584-9200	(360)426-9781 ext. 3504	
Cowlitz Indian Tribe	John Barnett, Chairman	P.O. Box 2547 Longview, WA 98632	(360) 577-8140	
	Talyor Aalvik Natural Resources Manager	P.O. Box 2547 Longview, WA 98632	(360) 577-8140	
	Dave Burlingame Cultural Committee Chairman *kinswa@hotmail.com*	P.O. Box 114 Salkum, WA 98582-0114	(360) 985-2052	

APPENDICES

MOUNT RAINIER NATIONAL PARK
FIRE MANAGEMENT PLAN

Attached Separately:
Mount Rainier NP, Environmental Assessment (EA) and Errata
Mount Rainier NP, Biological Assessment (BA)
US Fish and Wildlife Biological Opinion (BO) and revisions
FONSI and Regional concurrence letter

APPENDIX 1
REFERENCES CITED

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APPENDIX 2
DEFINITIONS

AFFIRMS – Administrative and Forest Fire Management and Retrieval System. A user-oriented, interactive computer program.

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

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

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

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

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

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

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

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

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

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

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

FARSITE – **F**ire **Ar**ea **S**timulator, the word FARSITE is a trade name taken from the letters in bold. It is a GIS based long range fire simulator model.

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

DEFINIATIONS

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

Definitions:

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

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

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

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

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

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

MIST – Minimum Impact Suppression Tactics

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

MORA – Mount Rainier National Park

NHLD – National Historic Landmark District

Potential for Blow-up Conditions – Any combination of fuels, weather and topography excessively endangering personnel.

DEFINIATIONS

Preparedness – Activities that lead to a safe, effective, and cost effective fire management program in support of land and resource management objectives through appropriate planning and coordination. This term replaces pre-suppression.

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

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

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

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

RERAP – Rare Event Risk Assessment Process, this process is used to predict long range probablities for a fire season ending ran event(s).

SACS – Shared Application Computer System, a national data base for wildland fire and budgeting, admininstered out of the Boise fire center.

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

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

Wildfire – An unwanted wildland fire.

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

Wildland Fire Implementation Plan (WFIP) – A progressively developed assessment and operational management plan that documents the analysis and selection of strategies and describes the appropriate management response to a wildland fire. A full WFIP consists of three stages. Different levels of completion may occur for differing management strategies (i.e., fires managed for resource benefits will have two-three stages of the WFIP completed while some fires that receive a suppression response may have only a portion of Stage I completed.)

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

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

DEFINATIONS

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

Many traditional terms have either been omitted or made obsolete by new policy. The following terms are not recommended for use and are not included in policy implementation procedures.

Confine/Contain/Control – These terms, when used in the context of suppression strategies, are confusing since they also have tactical meanings. Containment and control will continue to be used to represent the status of a particular fire for reporting purposes (i.e., a controlled fire, date of control, date of containment, etc.) and not to represent a type of management strategy.

Escaped Fire Situation Analysis – This term is replaced by Wildland Fire Situation Analysis.

Management Ignited Prescribed Fire – This term is replaced by Prescribed Fire.

Prescribed Natural Fire –This term no longer represents a type of fire and has no further use other than historical descriptions. No replacement term exists.

Pre-suppression – This term has been replaced by the term “preparedness”.

APPENDIX 3
SPECIAL STATUS SPECIES LIST

INCLUDING FEDERAL AND STATE LISTED SPECIES

SPECIES	STATUS FWS	STATUS WA	HABITAT NEEDS/OCCURRENCE
BIRDS			
Northern spotted owl (*Strix occidentalis caurina*)	FT	SE	The northern spotted owl is a medium sized, nocturnal owl that preys primarily on small mammals. The owl is strongly associated with mature or old growth forests that are structurally complex — they contain trees of several species, sizes, and ages, contain standing and down dead trees, and have multistoried canopies. Moreover, the birds require large amounts of such habitat. Median home range sizes are typically on the order of 3,000 to 5,000 acres per pair. Spotted owl's nest in cavities or platforms in trees and, in good habitat, pairs are typically spaced about 1–2 miles apart. Spotted owls are long-lived, territorial birds, often spending their entire adult life in the same territory. Habitat degradation and loss threaten this species with extinction. Much of the remaining habitat is highly fragmented. In addition, barred owls *(Strix varia)* have invaded much of the range of the northern spotted owl during the last 30 years and have displaced and hybridized with spotted owls (Dunbar et al. 1991, Thomas et al. 1993, Hamer et al. 1994). Since listing, Anderson and Burnham (1992) indicate northern spotted owl populations are continuing to decline throughout their range and this decline may be accelerating. Large scale analysis of the northern spotted owl over 23 percent of its range, including Mount Rainier National Park, indicated that populations were either relatively stable or were experiencing a decline (3.9 percent annually for female owls) (Franklin *et al.* 1999). Critical habitat for the species has been designated within Lewis and Pierce Counties, but the designation does not include lands within Mount Rainier National Park. The northern spotted owl is an uncommon year-round resident of the park (breeding between March and September), and the entire park is a congressionally reserved area for spotted owl habitat. Essentially, any forested habitat up to 4,800 feet is considered northern spotted owl habitat. In the park 68,000 acres are suitable habitat. Approximately 85 % of that suitable habitat was surveyed between 1997 and 1998. A total of 13 pairs of adult owls, nine activity sites with at least

SPECIES	STATUS FWS	STATUS WA	HABITAT NEEDS/OCCURRENCE
			one adult and seven fledglings were documented. In addition, six nest locations were identified and 29 birds were banded. Many known locations for spotted owls are within 1 to 2 miles of the park boundaries. They have been reported in forests along Westside Road, near the Longmire complex, at Ohanapecosh, near the Sunrise complex, along the SR 410 corridor, and along the Carbon River road. Numerous nest activity sites have been found located in the park.
Marbled murrelet (*Brachyramphus marmoratus marmoratus*)	FT	ST	The marbled murrelet is a small seabird that feeds on fish in ocean waters within 1 mile of the shore. Due to their secretive nature and cryptic coloration, information on the distribution and abundance of marbled murrelet in Washington has been difficult to gather (NPS 1996c). Marbled murrelets nest in forested areas up to 50 miles from their saltwater foraging areas. Nest trees need to be in a stand that is open enough for them to fly through, yet the canopy must have enough cover to hide the nests from predators. Typically such conditions have only been found in old growth or later seral stands, however some younger stands with a high degree of structural diversity and limb-malforming infestations (i.e. mistletoe) may also be suitable. The marbled murrelets' threatened status is thought to be principally due to a loss of nesting habitat due to commercial timber harvesting. Forest fragmentation also may be making nests near forest edges vulnerable to predation by other birds, such as jays, crows, ravens, and great-horned owls. In addition, increased human activities in forests, such as picnic grounds, can attract corvids and thus increase the chances of predation (USFWS 1991, USFWS 1992). Critical habitat for the species has been designated within Lewis and Pierce Counties, but the designation does not include lands within Mount Rainier National Park. Potential marbled murrelet habitat is distributed throughout the park, especially along major river corridors below 3,500 feet. Confirmed nesting occurs in the northwest corner of the park in the Carbon River and Mowich River drainages, and murrelets have been detected along the Nisqually River within the park. Approximately 22,000 acres of the park are considered suitable nesting habitat. The best nesting habitat is in lower old-growth forests below 750 meters. Mid-level forests (750-1450 m) have some suitable nesting habitat. The old growth forests in the park's western river

SPECIES	STATUS FWS	STATUS WA	HABITAT NEEDS/OCCURRENCE
			valleys may be some of the best remaining nesting habitat in the southern Puget Sound area because they support large, intact stands of old-growth forest within 40 miles of the birds' marine foraging area. Limited non-systematic inventories for murrelets were conducted from 1995-1997, primarily in the northwestern portion of the park. A total of 891 murrelet detentions were made in 1995, 92 in 1996 and 220 in 1997. These detections represent an unknown number of murrelets since an individual bird may be detected numerous times over the course of the monitoring season. A portion of these detections, however, were identified as an indication of nesting occupancy based on observations of bird behavior on 42 occasions in 1995, 3 in 1996 and 69 in 1997. In addition, four other suspected nesting areas, based on repeated observations of murrelets exhibiting nesting behavior, and were identified in 1997.
Bald eagle[1] (*Haliaeetus leucocephalus*)	FT	ST	Bald eagles primarily occur along Washington's coast, rivers, and large lakes and reservoirs. Wintering bald eagles may occur in the vicinity of Mount Rainier from October 31 through March 31. It is possible that bald eagles enter the park during the summer months to fish the subalpine lakes; however, there is no record of bald eagles nesting in the park. Known nesting, occurs 15 miles outside the park's western boundary
Northern goshawk (*Accipiter gentilis*)	FSC	SC	Generally, goshawks nest in trees in mature or old growth coniferous forests. Goshawks have been observed in Mount Rainier regularly by visitors and biologists.
Olive-sided flycatcher (*Contopus cooperi)*	FSC	_	This flycatcher prefers forest edges adjacent to open areas, such as burns, montane meadows, and sub alpine parklands. This species breeds in the park.
Oregon vesper sparrow (*Pooectetes gramineus affinis*)	FSC	SC	This species does not occur in the park.
Peregrine falcon *(Falco peregrinus)*	FSC	SE	Peregrine falcons nest mainly on cliffs along rivers or near lakes. In the spring and fall, migrant peregrine falcons may be present near the park for short periods. Nesting peregrines occur in the vicinity of Tum Peak on the park's west side.
Ferruginous hawk *(Buteo regalis)*	--	ST	Nests in cliffs or trees; frequents arid plains and open rangeland. Ferruginous hawks are a migrant species in Mount Rainier.

SPECIES	STATUS FWS	STATUS WA	HABITAT NEEDS/OCCURRENCE
MAMMALS			
Gray wolf (*Canis lupis*)	FE	SE	Gray wolves are wide-ranging carnivores that inhabit forests and open tundra. Hunting and other human activities eliminated the gray wolf from Washington by the early 20th century. However, wolves appear to be naturally recolonizing Washington, especially northern Washington, from Canada. Mount Rainier contains ample habitat for gray wolves and abundant prey. Historically, the gray wolf was found in the park. Taylor and Shaw (1927) cite numerous observations of wolves from the late 1800s into the 1920s. There are 26 wolf sightings in the park's computerized database, which dates back to 1980; however, no observations have been verified by biologists in the last 80 years as a wolf No systematic surveys, however, have been conducted in the park.
Canada lynx (*Lynx canadensis*)	FT	ST	In the Cascade Mountains, lynx live in the spruce-fir forests of the high mountains. Older, mature forests with downed trees and windfalls provide cover for denning sites, escape, and protection from severe weather. The distribution and abundance of lynx tend to be tied to that of its primary prey, the snowshoe hare. Canada lynx likely have never been abundant in the lower 48 states due to a lack of lynx and snowshoe hare habitat. Their numbers also declined due to overtrapping in the 1980s, and a loss of forest habitat caused by development and urbanization, forest fire suppression, and unsuitable types of forest management. Bobcats and coyotes also have spread into lynx habitats, due to packed snow trails created by recreational activities, and have outcompeted the lynx for food and space. Although Mount Rainier has suitable habitat for lynx and snowshoe hare in sub alpine forests and alpine areas below treelike, there are no confirmed reports of the species in the park since Taylor and Shaw (1927) documented lynx in the 1920s. No systematic surveys, however, have been conducted in the park.
Grizzly bear *(Ursus arctos)*	FT	SE	Grizzly bears are omnivores that inhabit semi-open country, usually in mountain areas. They require large home ranges from 30 to 100 square miles in size (Van Gelder 1982). The park contains suitable grizzly bear habitat, but there have never been confirmed sightings of grizzlies in the park.
California wolverine	FSC	SC	The California wolverine is a resident of high

SPECIES	STATUS FWS	STATUS WA	HABITAT NEEDS/OCCURRENCE
(Gulo gulo luteus)			elevation coniferous forests and sub alpine areas. Wolverines utilize vast areas for hunting, sometimes as much as 100 square miles (Van Gelder 1982). Though noted as a potential inhabitant of Mount Rainier by the U.S. Fish and Wildlife Service, and thought likely to be present, the California wolverine has not been documented in the park since 1933.
Pacific fisher (*Martes pennanti pacifica*)	FSC	SE	Pacific fishers prefer dense forests with extensive, continuous canopies and complex forest floor structure, and they are often associated with wetland forests and riparian areas. Fisher populations have declined throughout much of their range during the last half of the 19th century and the early part of this century, and may be on the verge of extinction in Washington. Mount Rainier contains suitable habitat for fishers, including large forage areas away from human influences, but there have been no confirmed sightings. Jones and Raphael (1995) conducted a systematic study on the abundance and habits of fishers in the southeastern corner of the park but did not detect them. Pacific fishers have not been documented in the park since 1947.
Western gray squirrel (*Sciurus griseus*)	_	ST	This species does not occur in the park.
Long-eared myotis *(Myotis evotis)*	FSC	_	This species typically prefers forestlands and heavy chaparral. (Sumner and Dixon 1953). A nursing colony has been documented at Longmire.
Long-legged myotis *(Myotis volans)*	FSC	_	This bat forages over ponds, streams, open meadows, and forest clearings. Night roosts are usually in caves or mines (BOR 1996). It has been identified as being present in Mount Rainier.
Pacific Townsend's big-eared bat *(Plecotus townsendii townsendii)*	FSC	SC	Townsend's big-eared bats hibernate in caves and use caves, lava tubes, and abandoned buildings for breeding and roosting sites. Nursery colonies are extremely sensitive to human activity, and sites are readily abandoned if disturbed. The bat has not been confirmed in the park.
FISH			
Chinook salmon (Puget Sound "ESU") *(Oncorhynchus tshawytscha)*	FT	SC	Chinook are easily the largest of any salmon, with adults often exceeding 40 pounds. Chinook use a variety of freshwater habitats, but it is more common to see them spawn in larger main stem rivers or tributaries. In Mount Rainier, likely habitat for Chinook salmon includes the Carbon, White, Mowich, and Puyallup Rivers, and the West Fork of the White River, and

SPECIES	STATUS FWS	STATUS WA	HABITAT NEEDS/OCCURRENCE
			Huckleberry Creek. In the past Chinook salmon have been documented in the Carbon River just outside the park boundary (D. Nauer, Washington Dept. of Fish and Wildlife, pers. com.). Salmon are likely present in small numbers in the park, although they have not been documented as being present or spawning by park staff.
Bull trout (Salvelinus confluentus)	FT	SC	Bull trout habitat is characterized by clear cold water, silt-free rocky substrate in riffle run areas, well-vegetated stream banks, abundant in stream cover, deep pools, relatively stable flow regime and stream banks, and productive fish and aquatic insect populations. Historically, they were found in most major river systems in the Pacific Northwest. In Mount Rainier bull trout are present in the White, West Fork, Carbon, and Puyallup Rivers and their tributaries.
Coho salmon (Oncorhynchus kisuytch)	FPROP	--	Coho were historically found in the White, Carbon, North and South Puyallup and Mowich rivers. No recent surveys have been conducted to determine their current presence in the park. It is likely, however that they are present in small numbers in these rivers today.
Coastal cutthroat trout (*Oncorhynchus clarki clarki*)	FPROP FT	_	The eastern Cascades portion of the coastal cutthroat was listed as threatened in April 1999, by the USFWS. Coastal cutthroats on the west side of the Cascades were found not warranted for listing at the same time. Coastal cutthroat have been documented in the park, however, this documentation suggests that this species was introduced on the east side and was not historically present in park waters there.
River lamprey *(Lampetra ayresi*)	FSC	SC	This species does not occur in the park.
Pacific lamprey (Entosphenus tridentata)	FSC	_	This species does not occur in the park.
REPTILES/AMPHIBIANS			
Northwestern pond turtle (*Clemmys marmorata)*	FSC	SE	This species does not occur in the park.
Oregon spotted frog (*Rana pretiosa)*	FC	SE	This species does not occur in the park.
Red-legged frog[2] (*Rana aurora)*	_	_	The red-legged frog occurs in park low elevation (below 4,000 feet) wetlands.
Tailed frog[2] (*Ascaphus treui)*	_	_	Tailed frogs inhabit many of the park's clear, fast flowing streams.
Cascades frog *(Rana cascadae)*	FSC	_	Cascade frogs are a montane species, primarily occurring above 800 meters in montane meadows, marshes, and ponds (NFS 1995). Distribution of the Cascades frog in the park is not

SPECIES	STATUS FWS	STATUS WA	HABITAT NEEDS/OCCURRENCE
			well known. Surveys have documented these amphibians in the northeast sector: Huckleberry; Carbon, Mowich; Puyallup, Nisqually, Cowlitz, Ohanapecosh, and White River.
Western toad (*Bufo boreas)*	FSC	SC	Western toads were formerly more abundant, but have recently been found only in a few montane lakes and wetlands in the park.
Columbia torrent salamander (*Rhyacotriton kezeri*)	FSC	SC	This species does not occur in the park.
Larch Mountain salamander *(Plethodon larselli)*	FSC	SS	Larch mountain salamanders are found in forested and talus environments that provide cool, moist conditions under wood or rock substrates. The salamander has been found near the park boundary and in the park.
Van Dyke's salamander *(Plethodon vandykei)*	FSC	SC	Van Dyke's salamander is found in a variety of habitats, including stream banks, upland forests, talus, and seeps, at a large range of elevations. Salamanders have been documented in the Mowich drainage and just outside the park boundary near Longmire.
MOLLUSKS			
California floater (mussel) *(Anodonta californiensis)*	_	SC	Freshwater mollusks can inhabit permanent water bodies of all sizes. Mussels may also be found in sand-gravel substrates that are stable. The California floater is expected to occur in the park, but has not yet been documented.
INSECTS			
Valley silverspot (Speyeria zerene bremeri)	FSC	SC	No records of this species within the park have been identified, but they may occur within the park.
Whulge (Edith's) checkerspot (*Euphydryas editha taylori)*	FSC	SC	No records of this species within the park have been identified, but they may occur within the park.
Fender's soliperlan stonefly (*Soliperla fenderi)*	FSC	_	This species has been identified on three occasions near Westside Road.

PLANTS			
Water howellia (*Howellia aquatilis*)	FT	_	Surveys in potential habitat have not identified this species, and it is believed not to occur in the park.
Kincaid's lupine (*Lupinus sulphureus kincaidii*)	FP	_	This species and its habitat do not occur in the park.

Obscure Indian paintbrush *(Castilleja crypantha)*	_	SS	This small (6 to 12 inches), multi-stemmed, perennial, plant is endemic to Mount Rainier National Park. The plant is known to exist at 25 sites in Mount Rainier and two sites immediately adjacent to the park's border. Populations are located in moist, well-drained meadows in the northern portion of the park. Surveys showed that individual populations often had numerous stems/individuals but no seedlings. Based on surveys, there is apparently great variability in population trends among locations and between years.
Pale larkspur (*Delphinium leucophaeum*)	FSC	_	This species and its habitat do not occur in the park.
Mount Rainier lousewort (*Pedicularis rainierensis*)	_	SS	This plant species has been observed in 34 locations in the park. It occurs in subalpine meadows throughout the park.
Lance-leaved grapefern (*Botrychium lanceolatum*)	_	SS	This plant species has been observed in three locations in the park; however, no additional information is available on locations of occurrence or habitat.
Common moonwort *(B. lunaria)*	_	SS	No additional information is available on locations of occurrence or habitat**,** although one voucher specimen of this species is present in the park herbarium.
Northern moonwort *(B. pinnatum)*	_	SS	There are two voucher specimens (1888, c. 1960) of this plant from unspecified in the park; no additional information is available on locations of occurrence or habitat.
Northern microseris *(Microseris borealis)*	_	SS	This plant species has been observed in four locations in the park; however, no additional information is available on locations of occurrence or habitat.
Wheeler Bluegrass (*Poa nervosa*)	_	SS	Surveys for this species have not been completed. Based on habitat availability, it is expected to occur in the park.
Crested Wood-fern (Dryopteris cristata)	_	SS	Surveys for this species have not been completed. Based on habitat availability, it is expected to occur in the park.
Curved woodrush *(Luzula arcuata)*	_	SS	This plant species has been observed in one location in the park; however, no additional information is available on locations of occurrence or habitat.
Northern wild licorice *(Galium kamtschaticum)*	_	SS	This plant species has been observed in the park; however, no additional information is available on locations of occurrence or habitat.
Skunky Jacob's-ladder *(Polemonium viscosum)*	_	SS	There is one voucher specimen (1896) of this species in the park herbarium. **N**o additional information is available on locations of occurrence or habitat.

Brook saxifrage (*Saxifraga rivularis*)	_	SS	There is one voucher specimen (1895) of this species in the park herbarium. **N**o additional information is available on locations of occurrence or habitat.
Blackened Sedge (*Carex atrosquama*)	_	SS	There is one voucher specimen (1895) of this species in the park herbarium. **N**o additional information is available on locations of occurrence or habitat.
Tall agoseris (*Agoseris elata*)	_	SS	Surveys for this species have not been completed. Based on habitat availability, it is expected to occur in the park.

Table 7 Notes:

1. Bald eagles were proposed for delisting on July 6, 2000. Delisting is expected to occur in October 2000. They will remain fully protected species.
2. The red-legged frog and tailed frog have been on many USFWS service lists and so they remain on this list, although not included in the recent June 7, 2000 letter from the USFWS.
3. The peregrine falcon was delisted in ?spring 1999. Peregrines remain fully protected species and are state listed.

FE = Federally Endangered: Listed by the U.S. Fish and Wildlife Service as a species that is in danger of extinction throughout all or a significant portion of its range.

FT = Federally Threatened: Listed by the U.S. Fish and Wildlife Service as a species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

FPROP = Federal Proposed: Species for which the USFWS has proposed in the Federal Register listing as threatened or endangered.

FC = Federal Candidate: Species for which the U.S. Fish and Wildlife Service has sufficient information to propose for listing as threatened or endangered.

FSC = Federal Species of Concern: Species whose conservation standing is of concern to the U.S. Fish and Wildlife Service, but for which status information is still needed.

SE = Washington State Endangered: Any species native to the state of Washington that is seriously threatened with extinction throughout all or a significant portion of its range within the state.

ST = Washington State Threatened: Any species native to the state of Washington that is likely to become an endangered species within the foreseeable future throughout a significant portion of its range within the state without cooperative management or removal of threats.

SC = Washington State Candidate: Includes species that the Department will review for possible listing as state endangered, threatened, or Sensitive. A species will be considered for designation as a state candidate if sufficient evidence suggests that its status may meet the listing criteria defined for state endangered, threatened, or sensitive.

SS = Washington State Sensitive: Any species native to the state of Washington that is vulnerable or declining and is likely to become endangered or threatened throughout a significant portion of its range within the state without cooperative management or removal of threats.

APPENDIX 4
ADMINISTRATIVE AND CULTURAL FACILITIES
CONTRIBUTING STRUCTURES

Mount Rainier National Historic Landmark District

NHL #	BUILDING/STRUCTURE NAME	DATE	MAT'L
CS30	Comfort Station, Cul-de-sac road		
CS31	Entrance Arch	1911	Log
CB1	Oscar Brown Cabin (N-103)	1908	Log/Timber
CB2	Ranger's Residence (N-102)	1915	Wd Frame
CB3	Superintendent's Residence (N-101)	1915	Timber Fr
CB4	Ranger Checking Station & Residence (N-001)	1926	Log Frame
CB5	Equipment Building (N-201)	1934	Wd Frame
CB6	Men's Comfort Station/Storage (N-301)	1927	Wd Frame
CB7	Women's Comfort Station/Storage (N-302)	1927	Wd Frame
CS39	Nisqually River Suspension Bridge	1924/51	Log/Timber
CB8	Longmire Cabin (L-004)	1888	Log Frame
CB9	Longmire Library (L-005)	1910	Timber Fr
CB10	Dormitory (L-101)	1913/29	Timber Fr
CB11	Administration Building (L-001)	1928	Conc & Fr
CB12	Museum and Visitor Center (L-002)	1916	Timber Fr
CB13	Comfort Station (L-003)	1926	Timber Fr
CB14	Community Building (L-006)	1927	Timber Fr
CB15	Employee Garage (L-107)	1927	Wd Frame
CB16	Residence (L-108)	1923	Wd Frame
CB17	Employee Residence (L-109)	1932	Wd Frame
CB18	Employee Residence (L-110)	1923	Wd Frame
CB19	Employee Residence (L-111)	1932	Wd Frame
CB20	Employee Residence (L-112)	1923	Wd Frame
CB21	Employee Residence (L-113)	1928	Wd Frame
CB22	Employee Residence (L-114)	1926	Wd Frame
CB23	Employee Residence (L-115)	1928	Wd Frame
CB24	Employee Residence (L-116)	1931	Wd Frame
CB25	Employee Residence (L-117)	1929	Wd Frame
CB26	Employee Residence (L-118)	1928	Wd Frame
CB27	Employee Residence (L-119)	1931	Wd Frame
CB28	Employee Residence (L-120)	1937	Wd Frame
CB29	Employee Residence (L-121)	1937	Wd Frame
CB30	Employee Residence (L-122)	1937	Wd Frame
CB31	Employee Residence (L-123)	1936	Wd Frame
CB32	Employee Residence (L-124)	1937	Wd Frame
CB33	Employee Residence (L-125)	1937	Wd Frame
CB34	Employee Residence (L-126)	1938	Wd Frame

Mount Rainier National Historic Landmark District

NHL #	BUILDING/STRUCTURE NAME	DATE	MAT'L
CB35	Employee Residence (L-127)	1938	Wd Frame
CB36	Employee Residence (L-128)	1939	Wd Frame
CB37	Employee Residence (L-129)	1939	Wd Frame
CB38	Employee Residence (L-130)	1941	Wd Frame
CB39	Employee Residence (L-131)	1941	Wd Frame
CB40	Employee Residence (L-132)	1941	Wd Frame
CB41	Apartment Building (L-135)	1928	Wd Frame
CB42	Employee Garage (L-137)	1928	Wd Frame
CB43	Woodshed-Garage (L-150)	20-30s	Wd Frame
CB44	Garage (L-151)	~1928	Wd Frame
CB45	Garage (L-152)	1931	Wd Frame
CB46	Garage (L-153)	~1929	Wd Frame
CB47	Employee Garage (L-154)	~1928	Wd Frame
CB48	Garage (L-155)	~1931	Wd Frame
CB49	Woodshed (L-157)	~1928	Wd Frame
CB50	Garage (L-158)	~1926	Wd Frame
CB51	Community Building Garage (L-160)	1927	Timber Fr
CB52	Tool Shed (L-165)	~1930	Timber Fr
CB53	Tool Shed (L-166)	~1930	Timber Fr
CB54	Warehouse Building (L-201)	1929	Timber Fr
CB55	Oil House (L-202)	1942	Conc/Timber
CB56	Equipment Building (L-208)	1929	Timber Fr
CB57	Repair Shop (L-209)	1927	Timber Fr
CB58	Mess Hall (L-212)	1933/47	Timber Fr
CB59	Carpentry & Repair Shop (L-214)	1933	Timber Fr
CB60	Campground Comfort Station (L-302)	1930	Timber Fr
CB61	Campground Comfort Station (L-303)	1934	Timber Fr
CB62	Campground Comfort Station (L-305)	935	Timber Fr
CB63	Hiker's Center/Gift Shop (L-501)	1911	Log
CB64	National Park Inn (L-600)	1917	Timber Fr
CB65	Service Station (L-620)	1929	Conc/Timber
CS43	Ski-Tow Power House (P-514)	1937	Timber Fr
CS44	Chlorination House (Edith Creek)	~1930	Conc
CB66	Ranger Station (P-001)	1921	Stone/Tmbr
CB67	Comfort Station (P-304)	1928-29	Reinf Conc
CB68	Paradise Inn (P-600)	1917	Tmbr/Log Fr
CB69	Annex to Paradise Inn (P-601)	1920	Timber Fr
CB70	Paradise Guide House (P-602)	~1920	Timber Fr
CS46	Stockade (S-006)	~1944	Log
CS48	Power House (S-201)	1932	Conc
CB71	South Blockhouse (S-001)	1930	Stone/Tmbr
CB72	North Blockhouse (S-002)	1944	Stone/Tmbr
CB73	Visitors Center (S-003)	1943	Log

Mount Rainier National Historic Landmark District

NHL #	BUILDING/STRUCTURE NAME	DATE	MAT'L
CB74	Comfort Station (S-310)	~1930	Stone/Log
CB75	Service Station (S-602)	1931	Conc/wood
CB76	Sunrise Lodge (S-601)	1931	Timber Fr
CB77	Camp Muir Public Shelter (P-051)	1921	Stone
CB78	Guide Shelter (P-053)	1916	Stone
CB79	Outhouse/Storage Shed (PX-302; P-052)	~1936	Stone
CB80	White River Ranger Station (W-001)	1929-31	Log Frame
CB81	Men's Comfort Station (W-002)	1931	Wd Frame
CB82	Women's Comfort Station (W-003)	1931	Wd Frame
CB83	Mess Hall & Dormitory (W-207)	1933	Wd Frame
CB84	Comfort Station (P-010)	1942	Stone/Tmbr
CB85	White River Patrol Cabin (W-051)	1927	Wd/Log Fr
CB86	Indian Henry's Patrol Cabin (N-106)	1915-16	Log Frame
CB87	Huckleberry Creek Patrol Cabin (S-050)	~1934	Log
CB88	Indian Bar Trail Shelter (O-054)	1940	Log/Stone
CB89	Summerland Trail Shelter (W-057)	1934	Stone
CB90	Ipsut Creek Ranger Cabin (C-250)	1933	Log Frame
CB91	Mowich Lake Patrol Cabin (C-252)	1922	Log Frame
CB93	Sunset Park Patrol Cabin (N-105)	1922	Log Frame
CB95	St. Andrews Patrol Cabin (N-104)	1922	Log Frame
CB96	Three Lakes Patrol Cabin (O-053)	1934	Log Frame
CB97	Lake George Patrol Cabin (N-107)	1934	Wd Frame
CS57	Gobbler's Knob Fire Lookout (N-111)	1933	Wd Frame
CS58	Mt. Fremont Fire Lookout (S-053)	1934	Timber Fr
CS59	Shriner Peak Fire Lookout (O-052)	1932	Timber Fr
CS60	Tolmie Peak Fire Lookout (C-251)	1933	Timber Fr

These structures were considered "Contributing" to the districts in which they reside under the 1991 National Register Multi-Property Nomination:

Sunrise Comfort Station (S-005)	1932	Stone/Tmbr
Tipsoo Lake Comfort Station (O-060)	1933-34	Stone/Log
Tahoma Vista Comfort Station (N-110)	1931	Stone/Log
Comfort Stations, Ohanapecosh CG "B"(O-302)	1935	Stone/Log
Comfort Stations, Ohanapecosh CG "C" (O-303)	1935	Stone/Log

APPENDIX 5
NEPA/NHPA COMPLIANCE

The underlying concepts for these operations are routine application of the minimum requirement, while providing for firefighter safety and minimizing risk of escape.

Specific mitigation techniques may include:

- Utilizing existing or planned right of way construction lanes for fuel-breaks;
- Considering a contract chipping unit for woody debris generated where fuelwooding is not feasible;
- Consider lop-and-scatter techniques;
- Consider species-specific, approved biocide treatments under direction of appropriate agency resource staff.

APPENDIX 6
Mount Rainier NP Fire Call Up List

Mount Rainier's list of available and currently carded fire fighters is located in several places.

- The Park's communication center has a fire fighter data base with all the qualifications and personnel information listed for immediate access. This is an independent "in-house" system duplicating information from the ROSS and IQCS systems. It is solely for Park use and a tool for passing the list of available fire fighters on to PSICC (Puget Sound Interagency Communication Center), who is the Park's main fire dispatch center.

- The employees in the Park's Communication Center, the FMO and Chief Rangers Office have access to the data base.

- The fire call up list is also available from the FMO office and is keep current for responses. It is the responsibility of the FMO to ensure the data base is current.

The list of qualifications and experience is also entered and updated by the FMO in IQCS.

The information for this data base is generated by the FMO after the required doctor physical and annual fire refreshers/work capacity tests are passed. Updates to this call up list are completed weekly in the spring as seasonals are hired and training requirements are meet.

Since the park does not have any dedicated fire staff, the supervisor of the qualified fire fighter places that employee on the availability list, by communicating with the Park's communication center.

APPENDIX 7
Annual Fire Program Outline

The following outline details fire management program activities for the calendar year for Mount Rainier National Park and the System Support Office (SSO).

January

a) Permanent employees take physical fitness exams.
b) Permanent employee's physical fitness scores due.
c) Update the fire call-out list.
d) Update fire experience and training records for red carded personnel.
e) Submit updated red-carded personnel records and physical fitness scores to MORA FMO.
f) Archive training and experience records of seasonal personnel.

February

a) Meetings with cooperators; final review and revision of interagency agreements.
b) Meeting of Park Interdisciplinary Fire Team (IDT) to review approved Fire Management Plan revisions, hazard fuel reduction, and plan prescribed burn activities.
c) Check established procedure for utilizing suppression and emergency preparedness accounts with Regional Fire Support Office.
d) Coordinate emergency dispatch procedures with Puget Sound Interagency Communication Center, (PSICC).
e) Inventory fire cache; all tools, equipment, kits and supplies are ready; order needed personal protective equipment and tools.
f) Semi-annual service of power saws, pumps, and other equipment.
g) Prepare prescriptions and burn plans for prescribed fires.

March

a) Meeting with state agencies regarding smoke management.
b) Meeting or discussion with Regional FMO to review plans and current program.
c) Submit proposed revisions of Fire Management Plan to Superintendent and Regional FMO for review and approval.
d) Meeting with cooperators to review approved Fire Management Plan revisions.
e) Distribution of Fire Management Plan to cooperators.
f) Preseason planning completed; all cooperative agreements revised and in effect.
g) Issue red cards to permanent personnel.
h) Implement Step-Up Plan; adjust level of readiness in response to fire danger levels.

April

a) Instruct Fire Refresher
b) Maintain fire contacts with nearby agency FMO's and cooperators.
c) Continue planning for prescribed fire program and hazard fuel reduction.
d) Make Resources available for out of park assignments.

APPENDIX 7
Annual Fire Program Outline

continued

May

a) Maintain fire contacts with Regional FMO, nearby agency FMOs, and cooperators.
b) Continue planning for prescribed fire program and hazard fuel reduction.
c) Draft non-FIREPRO budget request and submit to Region
d) Probable beginning of fire season.
e) Physical fitness testing for seasonal personnel.
f) Issue personal protective equipment to seasonal personnel, if necessary.
g) Issue red-cards to seasonal personnel and instruct fire refresher.
h) Issue updated fire call-out list to the PSICC.

June

a) Conduct semi-annual service of power saws and other fire equipment.
b) Host training course to upgrade employee's qualification.
c) Assist at Graham DNR S-130/190 Guard School.
d) Update fire call-out list.

July, August, September

a) Make resources available for fire assignments.
b) Coordination of correspondence with PSICC
c) Hire and train extra firefighters if severity funding is approved.

October

a) Review Interagency Agreements, draft revisions as necessary, and submit to the Superintendent for approval.
b) Probable end of fire season (locally).

November

a) Inventory fire cache and requisition replacement equipment and supplies to maintain approved levels.
b) Submit proposals for annual training to Superintendent for review.
a) Forward nominations for interagency fire training to the Regional FMO.

December

a) Meetings of Interdisciplinary Fire Team (IDT) to review fire season and formulate program changes.
b) Compile 1202 and Fire Atlas for completed season from fire log
c) Prepare annual summary report and forward outstanding fire reports to Regional FMO.

APPENDIX 8
STAFFING PLAN

Mount Rainier's proposed fire management staffing for Initial Attack (IA) and Stage I and II of Fire Use/ WFIP should include at least:

FIELD OPERATIONS

2 Type IV Incident Commanders
2 Type III Incident Commanders
1 Type III Safety Officer
1 Single Resource Boss, Engine
2 Single Resource Boss, Crews
6 Squad Boss, Firefighter Type I
20 Fire Fighter Type II
1 Class C faller
2 Helicopter crew members
1 Helicopter Manger

SUPPORT:

2 Fire Behavior Analyst
2 Resource Advisor
1 Resource Unit Leader
1 Public Information Officer
1 Cost Unit Leader
1 Personnel Time Recorders
I Facilities Unit Leader
1 Procurement Unit Leader
2 Dispatch Recorders

Each Division will provide a proportionate number (based on FY FTEs updated annually) of qualified personnel to meet the above requirements and interagency dispatch commitments:

Division	% FTE	# Fire Staff
Management and Administration:		
Visitor Protection:		
Maintenance:		
Interpretation:		
Natural and Cultural Resources:		

Division Chiefs are responsible for insuring adequate staff are trained, Red Carded, and prepared for fire duty.

APPENDIX 9
INTERAGENCY AGREEMENTS

Mount Rainier National Park and the National Park Service follow all the established Agreements listed in the Interagency Stardards for Fire and Fire Aviation Operations also known as the “Red Book”, most recently adopted by the NPS in 2003. See Chapter 3, titled Interagency Coordination and Cooperation.

There are numerous agreements being revised as of November 2003. Once approved and signed, these documents will be on file with the Fire Management Officer/Chief Rangers Office and referenced in the fire plan.

The Cooperators Agreement for PSICC, Puget Sound Interagency Communication Center is signed and coordinated at the Regional level. A copy of the agreement is filed in the Fire Management Office.

APPENDIX 10

DELEGATION OF AUTHORITY

This is one example of a delegation of authority, other can be found in the Red Book.

SAMPLE

_____is assigned as Incident Commander on the _____ (incident) _____ (date). You have full authority and responsibility for managing the _____ activities within the framework of law, Service policy, and direction provided in the attached Briefing and Guidelines.

Your primary responsibility is to organize and direct your assigned resources towards the efficient and cost effective management of this incident. You are accountable to me, the Park Superintendent, or my designated representative as described below.

Specific direction for the _____ incident, describing management and environmental concerns are as follows:

PRIORITIES FOR APPROPRIATE ACTION:

PRIMARY SPECIFIC CONSTRAINTS (Political, Legal, Resource, Private Landowner, Other Agency, Land Use, etc.)

SAFETY OF EMPLOYEES AND VISITORS IS THE FIRST PRIORITY

1. Heavy equipment such as dozers shall not be used unless there is serious life hazard.
2. I would like the fire suppressed, but with as little environmental damage as possible, utilizing minimum impact suppression tactics (MIST)
3. Burned acreage is much preferred to suppression scars. This direction should be weighed carefully in your tactical application.
4. Suppression scars should be kept to a minimum. I would prefer that they not be visible from any visitor use area.
5. You may use the _____ section of the campground if needed, but it should be left as found.
6. All meadows are environmentally fragile.
7. Efforts should be made to protect all lakes and streams from suppression affects.

8. Trails in the fire area could be closed to the public, if necessary, but would prefer to keep traffic flowing on the _____ road.
9. I do not want to disrupt park visitor travel on roads and trails unless absolutely necessary.
10. My resource representative will be _____, who will be your resource advisor.
Keep my staff informed of the resources at risk and how the fire effects them.
11. Confine staging areas to established visitor use areas.
12. Prevent fire from crossing major public use roads.
13. Policy for aircraft use in this park is that which has been developed by the Office of Aircraft Services (OAS). Please adhere to it. Make no exceptions that can reduce safety to crews or overhead.
14. There are no known cultural or archeological resources in the fire path. Or the nearest resource concerns are_____
15. All press releases are to receive my approval.
16. The ICP and fire camp area is designed as:_____
17. You have the authority to use the following buildings and Park equipment _____

_____ will represent me on any occasion that I am not immediately available.

Office Phone _____ Home Phone _____.

Signed: Park Superintendent

_____

_____

Date_____

APPENDIX 11

DISPATCH PROCEDURES FOR OUT OF PARK FIRES

Policy for Wildland Fire Management, found in 910 DM 1, requires all parks to "…work closely with the NPS Branch of Fire and Aviation and their regional dispatch coordinators to ensure that those qualified personnel are furnished in a timely manner".

Mount Rainier's dispatch coordinator is the Puget Sound Interagency Coordination Center (PSICC) located at Payne Field, 3509 109th Street SW, Building 211, Everett, WA. 98204 (425)-744-3550

All resource orders originate from and are coordinated through this center. The Mobilization Guide provided by PSICC annually contains useful information on their scope of operation, which should be reviewed prior to the start of the fire season.

Availability:
Providing PSICC with a roster of qualified fire fighters and overhead personnel is the responsibility of the Park's Communication Center (Comm Cnt). This list is provided to the Comm Cnt by the FMO or their designee, during the FMO's absence. This roster will list all qualified employees, their specific qualifications, trainee assignment needs and social security numbers. From this roster of employees, supervisors will designate which person(s) will be available for out of area dispatch each week or if the employee is available for the entire month.

Prior to the beginning of a week, no later than Friday, the Comm Cnt will compile a list of fire personnel and fax it to PSICC.
When a resource order is initiated and filled by PSICC, Comm Center will contact and dispatch the requested resource(s).

Fire fighters are not to leave for the assignment until the following are in place:

- The Resource Order has been received by the Comm Cnt.
- A travel authorization is issued by the Comm Cnt or their divisional timekeeper
- The mode of travel have been established, (ie) Govt owned vehicle, POV or rental car approved by the incident

In the event the primary qualified person can not be reached for a callout, an inquiry for a trainee to fill the slot should be pursued with PSICC.

There may be a Type I or II Team member call-out, which could come verbally from PSICC. It is permissible that this individual may leave the park before their resource order is faxed to the Park. This should only be occurring with established Team members and not single fire fighters.

The supervisor of the affected employee(s) understands that no further approval is required of him/her and once the employees name is make available, it is assumed that they have permission to be dispatched to a fire.
* * * It is the fire fighters responsibility to notify their supervisor that they have been dispatched.

Later notification by the Comm Cnt, to the employee's direct supervisor will be accomplished, when practical, by E-mail, telephone or voice mail. This information will include the employee's name, fire assignment, destination and any other pertinent information.

DISPATCH PROCEDURES FOR OUT OF PARK FIRES

Continued

Status of Resources Report:
The Comm Center will fax to PSICC daily or (depending on the season) at a minimum weekly, a list indicating the number of available firefighters and overhead resources.

Mutual aid and in-park availability will be determined by a number equal to 75% of the total number of red carded firefighters. A new report must be sent if there are any significant changes in the status of availability.

All reports of smoke, ignition of lightning strikes, debris burning, wildfires, prescribed fires and "fire use" fires will be reported to the Park's FMO and Chief Ranger immediately. If the Park can not internally resource the initial attack/size up crew, a resource request for fire fighters should be sent to PSICC.

Resource Orders:

1. ***Orders for resources originate from Portland NWCC, or national interagency coordination centers through PSICC. The duty officer at PSICC will contact the park and give/fax on a ROSS sheet the following information;***

   A. Position(s) requested and resource order number
   B. Location of fire
   C. Date and time they are needed
   D. Travel method
   E. Special logistical considerations
   F. Name and number of requester

2. ***Notification:***
   A. The Park Comm Center should be notified of any fire call-out during regular duty hours, and will determine if additional travel arrangements are needed to facilitate mobilization of personnel.
   B. Fire Management Officer- The FMO will be notified to assist with mobilization of a 20 person crew request.
   If the Comm Cnt is having difficulties or involved in another major Park emergency incident, the FMO can assist with gathering resources, drivers, vehicles and equipment requested on the resource order
   C. District Clerks – The District Clerks can be notified of any fire call-outs, and can facilitate mobilization of crew personnel, drivers, and vehicles.

3. ***Filling of resource order;***
   A. Any person listed as available on the Comm Cnt list can be contacted directly. If that person cannot be contacted by telephone, radio or messenger in a brief time frame, an alternate person will be contacted and offered the assignment.
   B. If all lists of available personnel are exhausted without filling the order, qualified personnel can be contacted after first obtaining permission from the employee's direct supervisor.

DISPATCH PROCEDURES FOR OUT OF PARK FIRES

4. Notification to PSICC of fill or turn back;

A. When the park notifies PSICC that the order can be filled, PSICC will fax the resource order to the Comm Center.
B. The resource order number will be filed in the fire log book in the Comm Cnt
C. It is important that the Comm Cnt staff examine the Resource Order closely; many fires are planning ahead and order fire fighters days in advance. Thus not all Resource Orders have short turn around times in order to fill the assignment.

5. Transportation;

A. If personnel are to be flown to the fire, any employee listed on the current year's "drivers list" can be contacted to drive to the airport on fire overtime. Any driver must have a valid State driver's license.

B. If the resource order calls for a squad of 10-20 firefighters and a dedicated van is available for the duration of the fire, the "Chief of Party" can designate any crew person with a valid state license to operate the vehicle(s).

C. All work/rest guidelines will be followed. Duty day limitations will be the key factor in determining if the driver(s) are able to safely operate a motor vehicle.

- Flight arrangements are usually done by PSICC and then faxed to the comm center.

6. Travel authorization;

During regular business hours, the Comm Cnt or any District Clerk can assign a TA number. Firefighters need to check in with Comm center once they have safely arrive on the fire.

8. Chief of Party Leader;

A party leader or firefighter with squad boss or higher qualification will be dispatched with each squad, or when more than one single resource is requested for the same fire to be sent out of the park. The following paperwork will be given to the party leader, some of which will be presented to the appropriate supervisor or personnel at the incident.

A. Copy of the Travel Authorizations
B. Two completed *Emergency Firefighter Time Reports* for each individual
C. A completed *Manifest* form
D. A copy of the *Resource Order*
E. Park/FMO phone numbers and contact procedures for emergencies
F. Vehicle travel's log will be kept by firefighters
G. A manifest will be prepared listing all names, weights and SSN's of personnel dispatched out of the park.

10. Notification messages. The following individuals will be notified by E-mail, telephone message or in person by the Park's communication center of who went on an incident,

- FMO
- Division timekeepers
- When time permits the Comm Cnt staff: the immediate supervisor of personnel sent on the incident. Immediate supervisors are responsible for notifying their Division Chiefs.

11. Upon return from assignment, fire fighters will complete the following:

A. Original 288 fire time report, (Red Dog) will be turned into their timekeeper
B. Travel's log will be turned into their timekeeper
C. Vehicles used for fire assignments will be cleaned and fueled before employees go off duty
D. Report any damaged or broken equipment to the FMO
E. Notify the Park's communication center and the direct supervisor of their return home

APPENDIX 12

READINESS CHECKLIST

KEY CODE: A = Above Average; S = Satisfactory; NI = Needs Improvement; NR = Not Reviewed

CODE		DESCRIPTION	REMARKS
	1	**GENERAL** **Helibase Location appropriate**	
	2	**HELIBASE LOCATION & LANDING AREA** **Wind Indicator(s) properly placed**	
	3	**Foreign object damage avoidance and dust control measures in place**	
	4	**Warning signs posted appropriately**	
	5	**Proper fueling procedures followed**	
	6	**Ramp security adequate**	
	7	**Crash rescue kit(s) available for each pad**	
	8	**First aid kits available and maintained**	
	9	**Adequate lighting for night use available**	
	10	**Extinguishers of proper type available at each pad and inspected**	
	11	**BASE FACILITIES & COMMUNICATIONS** **A local area communication plan is posted in office with frequency list**	
	12	**Base has VHF-AM equipment**	
	13	**Telephone system adequate for intended activity**	
	14	**Appropriate phone numbers (dispatch, crash rescue, etc.) clearly posted**	
	15	**Office equipment and furniture in acceptable condition**	
	16	**Base office has adequate space for the number of personnel working there and for intended operations**	
	17	**Office materials and referenced accessible and labeled**	
	18	**PLANNING AND ADMINISTRATION** **The helicopter/helibase operation plan current and available**	
	19	**The operations plan depicts or discusses all key points in the IHOG and 350-354 DM**	
	20	**Timekeeping procedures have been established, reviewed with personnel and air crews, and are adequate**	
	21	**Aircraft payment forms available and completed correctly**	
	22	**The annual helibase directory had been**	

completed and updated

23 **SAFETY AND TRAINING**
The frequency of safety meetings is adequate and are documented

24 **Safety bulletin board is established and has current information posted**

KEY CODE: A = Above Average; S = Satisfactory; NI = Needs Improvement; NR = Not Reviewed

CODE	DESCRIPTION	REMARKS
25	**Incident/hazards are being properly recorded and submitted**	
26	**A crew training plan has been developed to meet agency handbook and interagency guide requirements**	
27	**Training has been conducted in the transport of hazardous materials**	
28	**A local map of known flight hazards is posted and available to flight crew and personnel and updated as necessary with date of last revision**	
29	**A safety briefing is conducted pre-flight with air crew concerning local hazards**	
30	**A smaller scale hazard map is available for flight use**	
31	**PREFLIGHT PLANNING** **Air crews and helicopter personnel are familiar with the helicopter flight planning sections of the interagency helicopter operations guide and agency handbook flight planning requirements**	
32	**Load calculations and manifest are being completed properly for all mission flights**	
33	**The base has a plan for flight dispatch flight plans and flight following**	
34	**Flight following procedures meet safety requirements**	
35	**CRASH RESCUE** **Appropriate helibase personnel have received training in crash-rescue procedures and use of extinguishers**	
36	**Personnel assignments have been made in the event of a crash at the helibase**	
37	**A crash rescue drill has been completed or scheduled**	

38 **The aircraft emergency response plan is clearly posted and/or accessible at the helibase and comm center**

39 **Helicopter accessory/helicopter equipment storage is adequate**

40 **Adequate equipment is available for the various missions (fire, SAR,trails)**

41 **Condition of stored equipment and accessories is adequate and per policy**

REVIEWED BY: DATE:

APPENDIX **12**

READINESS CHECKLIST

FIRE MANAGEMENT OVERVIEW CHECKLIST **MORA**

KEY CODE: A = Above Average; S = Satisfactory; NI = Needs Improvement; NR = Not Reviewed

CODE		DESCRIPTION	REMARKS
	1	**All fire supervisors are fully qualified as per agency standards**	
	2	**Written delegation of authority that provides an adequate level of operational authority exists**	
	3	**Fire management objectives, protection standards, and suppression activity constraints are in compliance with agency fire policies and do not compromise firefighter or public safety**	
	4	**The unit includes a review of fire and aviation policies and safety procedures during management team meetings prior to fire season on a regular basis**	
	5	**A system is in place to provide timely follow-up to program reviews, fire readiness inspections, fire critiques, and post season reviews**	
	6	**The fire management plan is approved and in place**	
	7	**Fire and aviation readiness reviews are conducted on all units each year and documented**	
	8	**Personnel are available for fire assignments and a system is in place for utilization**	
	9	**A system is in place to maintain daily awareness of fire activity, burning conditions, and weather forecast and is communicated to fire managers and agency administrators**	
	10	**Meetings with cooperators to review interagency agreements and MOU's for effectiveness and efficiency are conducted annually and documented**	
	11	**Management creates, instills, and maintains a doctrine of fire and aviation safety**	
	12	**Hazard analysis for fire and aviation activities are completed and mitigation measures are taken to reduce risk for all personnel**	
	13	**A system is in place for the take over and release of incident management teams**	
	14	**Procedures, responsibility and authority are identified for fire operations in the wildland-urban interface**	
	15	**Fire season severity predictions, fire behavior, and fire activity levels are monitored and appropriate action is taken to make needed adjustments to provide for safe, effective, and efficient suppression actions**	

REVIEWED BY: DATE:

Appendix 12
READINESS CHECKLIST

SAFETY

KEY CODE: A = Above Average; S = Satisfactory; NI = Needs Improvement; NR = Not Reviewed

CODE		DESCRIPTION	REMARKS
	1	**Park safety plan /implemented**	
	2	**Health & safety standards/inspections completed**	
	3	**Safety equipment/devices provided**	
	4	**Accident notification procedures known**	
	5	**First aid kits available**	
	6	**Fire extinguishers tagged/in place**	
	7	**Job hazard analysis complete as required**	
	8	**MSDS list posted**	
	9	**Other environmental hazard information available**	

REVIEWED BY: DATE:

FISCAL REVIEW
MORA

KEY CODE: A = Above Average; S = Satisfactory; NI = Needs Improvement; NR = Not Reviewed

CODE		DESCRIPTION	REMARKS
	1	**Appropriate charge code system established**	
	2	**Names, offices, and home phone numbers of agency contacts for incident business functions are available**	
	3	**Incident management team briefing package complete**	
	4	**Local agency cooperative and mutual aid agreements/contacts approved and in place**	
	5	**Property management guidelines available**	

REVIEWED BY: DATE:

Appendix 12
READINESS CHECKLIST
FIRE TRAINING
MORA

KEY CODE: A = Above Average; S = Satisfactory; NI = Needs Improvement; NR = Not Reviewed

CODE		DESCRIPTION	REMARKS
	1	**Basic fire suppression training complete**	
	2	**Refresher training completed for returnees**	
	3	**Individual training plans complete/up to date**	
	4	**Firefighter survival course complete/implemented**	
	5	**Fire shelter training complete/implemented**	
	6	**Fire shelter drills regularly scheduled**	
	7	**Adequate crew knowledge of 10 standard orders and 18 situations that shout " WATCH OUT"**	
	8	**Training library/materials available**	
	9	**Agency fire management policy available**	
	10	**LCES training complete**	

REVIEWED BY: DATE:

FIRE EQUIPMENT
MORA

KEY CODE: A = Above Average; S = Satisfactory; NI = Needs Improvement; NR = Not Reviewed

CODE		DESCRIPTION	REMARKS
	1	**Personnel protective equipment issued and available**	
	2	**Fire shelters available, serviceable**	
	3	**Fire shelter training complete/documented**	
	4	**Fire shelter drills conducted/documented**	
	5	**Radio communications checked/serviced**	
	6	**Radio call plan posted**	
	7	**Radio communications available on all levels**	
	8	**Agency inspection record is complete**	
	9	**Appearance of equipment is adequate**	
	10	**Inventory of equipment is adequate**	
	11	**First aid equipment is available/inspected and dated**	
	12	**Appropriate headgear is available**	

13 Fire extinguishers are charged and tagged
14 All containers inspected and tagged (water, fuel, oil, etc.)

REVIEWED BY: DATE:

Appendix 12

READINESS CHECKLIST

KEY CODE: A = Above Average; S = Satisfactory; NI = Needs Improvement; NR = Not Reviewed

CODE	DESCRIPTION	REMARKS
1	**Fire caches adequate for assigned mission**	
2	**Fire caches meet approved inventories**	
3	**Fire tools meet maintenance standards**	
4	**Inventory and use records available**	
5	**Procedures for use and availability of tools**	
6	**Tools properly marked and stored**	
7	**Rations inspected and adequately stored**	
8	**Facility meets needs of personnel/equipment**	
9	**Housekeeping standards set**	
10	**Facility security adequate**	
11	**Facility site adequate for fire suppression mission**	
12	**Facility meets the Fire Management Plan needs**	
13	**Adequate space available for training functions**	
14	**Storage of flammable/hazardous materials adequate**	
15	**Fire apparatus adequately sheltered**	

REVIEWED BY: DATE:

APPENDIX 13

PRE-ATTACK PLANNING CHECKLIST

COMMAND
- Pre-attack WFSA
- Pre-positioning needs and resources
- Draft delegation of authority
- Management constraints
- Interagency agreements
- Evacuation procedures
- Identified values at risk
- Closure procedures

LOGISTICS
- ICP, base, camp locations
- Roads, trails with limitations
- Utilities
- Medical facilities
- Stores, restaurants, service stations
- Transportation resources location
- Rental equipment sources and local contracts
- Construction contractors
- Sanitary facilities
- Police, fire departments
- Portable water sources

OPERATIONS
- Helispot, helibase locations
- Flight routes, restrictions
- Control line locations with MMA's (Maximum Management Areas)atural barriers
- Staging areas
- Structural protection needs
- Resources available from MORA
- Resources available from PSICC
- Tentative trigger points
- Weather forecast (long range)

PLANNING
- Park base maps
- Topographic maps
- Infrared imagery – aerial photography
- GIS maps- archeological, T & E species, cultural resources, etc.
- Hazard locations
- Special use areas
- FMP updated with current signatures
- Number of operational periods

FISCAL
- Cost estimates (projected)
- Comp and claims
- Time keeping
- Aviation and contracting costs

Appendix 14

PRE-SEASON RISK ANALYSIS

FACTOR	CURRENT LEVEL	HISTORIC AVERAGE
Temperature levels		
Precipitation levels		
Humidity levels		
Palmer drought index		
Keetch-Byram drought index		
1000 hour fuel moisture		
Vegetation moisture levels		
Episodic wind events (moisture drying days)		
Unusual weather events (killing frosts, blowdowns)		
Fires to date		

This form can be filled out _____. If our area were to go to a Level 4, it should be taken daily.

CLASS OF FIRE (as to size of wildland fire)

Class A – 3 acres or less
Class B – more than 3 acres, but less than 10 acres
Class C – 10 acres to 100 acres
Class D – 100-300 acres
Class E – 300 –1,000 acres
Class F – 1,000 – 5,000 acres
Class G – 5,000 acres or more

APPENDIX 15
FIRE MONITORING GUIDE

Fire Variables

Location

The location of the fire is accurately located on 7-1/2 or 15" USGS quadrangles and the probable point of origin is determined and plotted using latitude and longitude. Information is gathered to prepare a large -scale map of the fire area. Important features and landmarks are illustrated using standard ICS fire map symbols. The fire perimeter is plotted daily (or as often as aerial recons are performed) and final fire area determined prior to leaving the fire. The fire data will also be plotted on the park GIS database, as time permits.

Topography

(1) Elevation of the point of origin is determined using topographic maps or altimeter.
(2) The percent of slope of the fire area is measured with a clinometer. The maximum and minimum values as well as the average are recorded.
(3) The aspect of the far site is determined by compass and recorded in degrees of true azimuth.
(4) Location of the point of origin is described (ridge, top, mid-slope, valley, etc.).

Vegetation

(1) Using a worksheet, the composition, relative abundance and distribution of the vegetation of the fire site is recorded.
(2) Cover- The amount of overstory and resulting shading of the ground is estimated.
(3) Species- The vegetation within or adjacent to the fire is described and classified by species, size, class, type (trees, saplings, shrubs, grasses and forbs, etc) and actual samples collected is positive identification cannot be determined.
(4) Distribution- The vegetation of the site is described in terms of spatial distribution (dispersed, clumped, etc.) and horizontal and vertical continuity.

At points established for measurement of fuel loading, average basal area of standing trees will be tallied with hand held prisms and dbh measured or estimated.

Weather

At a minimum, fire weather should be measured at 1300 hours daily. More frequent measurements may be necessary on significant fires.
(1) Temperature- Dry bulb temperature will be measured with a thermometer.
(2) Relative humidity will be measured with a hygrometer or sling psychrometer.
(3) Wind speed- A hand held anemometer will be used to measure wind speed at mid-flame height. Maximum, minimum and average speed will be recorded.
(4) Wind direction will be determined using a compass and recorded in a cardinal direction (N, NW, etc.). Wind characteristics will be noted (up valley, down slope, etc.).
(5) State of Weather- a subjective estimate on the cloud cover will be recorded.
(6) Precipitation- the amount of precipitation will be measured using a standard rain gauge. The duration of any precipitation will be estimated.

Fuels

An assessment of fuels involves two parts:
(1) Describing the fuels of the site in genera terms, and
(2) Measuring elements of the fuels actually carrying the fire or available to it.

FIRE MONITORING GUIDE

Fuels Model- Using a comparison photo series and narrative descriptions, the monitors will classify the fire site vegetation by NFFL fuel models.

Fuel Quantity- At points established around the fire perimeter, a tally of the number of intersections of downed woody fuels within defined size classes will be made along 50 foot transects. The depth of the downed woody fuels will be measured, as will the depth of the duff and litter layer. Permanent reference markers may be established at sample points.

Fuel Moisture- Samples of foliage, litter and woody materials in the defined size classes may be collected at the sample points and placed in marked plastic bags for transport and later drying.

On large fires a set of seasoned fuel moisture sticks will be exposed and weighed during the daily weather observations at 1400 hours or a portable RAWS (Remote Access Weather Station) may be set up to aid in determining fuel moisture.

Fire Behavior

- *Fire Type*- The nature of the fire will be recorded (spot, head fire, backing fire, etc.) and unusual fire behavior recorded (running, crowning, spotting, etc.)
- *Flame Length***-** An estimate of flame length will be recorded at regular intervals.
- *Rate of Spread*- The interval of time required for the fire to travel a measured distance will be recorded. It is desirable that this measurement be made in the vicinity of fuel sample transects.
- *Residence Time*- An estimate of the depth of the flaming zone at the head of the fire will be recorded.
- *Scorch/Char Height and Depth of Char*- An estimate of the scorch and char heights on standing trees and depth of char in duff layers will be recorded.

Fire Effects

Operational monitoring offers only limited opportunities to assess the effects of a fire on the site.

- *Soil*- A soil sample will be obtained adjacent to the fuel transects and transported out for analysis.
- *Air Quality*- Information on the nature of the smoke column, its trajectory and dispersion will be recorded.
- *Threatened and Endangered Species*- The monitoring team will be alert and record the presence of rare, sensitive, threatened or endangered species as identified in the appendix.

Monitoring Team Qualifications/Assignments

The Fire Management Office will dispatch monitoring teams, as necessary. Minimum team size will be two persons. The minimum fire qualification for team members is Firefighter-Initial Attack. The Team Leader should be Incident Commander Single Resource (ICT 4 or 5) qualified and recommended to be Field Observer and should have fire experience in park fuel types. If the fire is a wildland fire use, one team member should be a qualified Fire Behavior Weather Specialist II. Personnel without specialized training may be assigned to monitoring teams provided the Team Leader has the required training and experience to conduct the monitoring. Additional monitors and personnel will be assigned as necessary.

Teams will be fully equipped with all necessary supplies and equipment required for assignment to a backcountry project. Fire tools will be available.

FIRE MONITORING GUIDE

Upon assignment to the fire, the Team Leader will maintain a chronological record of all actions and observations. Photographs and/or videos of the fire, fuels and topography should be taken.

The Team Leader will provide frequent status reports to the Fire Management Officer. Much of the data collected by the team will be relayed by radio so that it can be utilized in calculating rate of spread and used in planning purposes.

The Team Leader must determine the priorities for completing data collection and balance carefully the need to sample fuels and data collection in detail to that of making more general observations of fire behavior. A systematic approach to the monitoring task is encouraged, and consultation with fire management staff to alter the work program and adapt it to the actual fire conditions may be necessary.

Safety is of the utmost importance and will not be compromised to accomplish a monitoring objective. The Team Leader must adopt a “heads-up” attitude and exercise prudent judgment when adjacent to fast moving fires in difficult terrain. Monitoring activities will adhere to the basic standards of fire safety at all times.

The monitoring team must be prepared to take suppression action on the fire if so directed by the Fire Management Office.

AERIAL MONITORING

The Fire Management Team can base its appropriate management response from aerial observations made on location, spread potential, number of fires, or other considerations that do not warrant on-site monitoring. This decision must have approval of the Superintendent.

Like on-site monitoring, the number of flights is dependent upon fire danger and fire potential. A minimum of one flight per day at 1400 PDT should be contracted or coordinated with DNR or USFS aerial observation flights.

Aerial observations will document:

- Fire size
- Estimate rate of spread
- Estimate wind speed
- Character of fire
- Wind direction
- Slope degree
- Position on slope
- Aspect
- Elevation
- Fuel type and pattern
- Fuel model
- Smoke plume color and height
- Natural barriers
- Possible hazards

APPENDIX **16**

(Fire Report Form, DI-1202)

NATIONAL PARK SERVICE EDITED VERSION
UNITED STATES DEPARTMENT OF THE INTERIOR
DI-1202, INDIVIDUAL FIRE REPORT

1. STATUS CODE ____ 2. REPORTING AGENCY ____ 3c. YEAR ___ ___ ___ ___ 3d. FIRE NUMBER ___ ___ ___ ___ ___ ___

4. FIRE TYPE ____ PROTECTION TYPE ____ 5. GENERAL CAUSE ____ SPECIFIC CAUSE ____ ____ 6. PEOPLE ____

8. STATISTICAL DATA

	8a. STATE	8b. OWNER	8c. VEGETATION	8d. ACRES BURNED	
	____ ____	_____	_____	___ ___ ___ ___ ___ ___ ___ . ___	
	____ ____	_____	_____	___ ___ ___ ___ ___ ___ ___ . ___	
	____ ____	_____	_____	___ ___ ___ ___ ___ ___ ___ . ___	
	____ ____	_____	_____	___ ___ ___ ___ ___ ___ ___ . ___	
	____ ____	_____	_____	___ ___ ___ ___ ___ ___ ___ . ___	
	____ ____	_____	_____	___ ___ ___ ___ ___ ___ ___ . ___	
	____ ____	_____	_____	___ ___ ___ ___ ___ ___ ___ . ___	
	____ ____	_____	_____	___ ___ ___ ___ ___ ___ ___ . ___	

9. AGENCY DATA

9a. FIRE NAME ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___
9b. AREA NAME ___ ___ ___ ___
9f. OWNER ___
9g. FY. YR. ___
9h. FISCAL DATA ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___
9j. PROBLEM CLASS ___

9k. COMPLETE 1 OF 3 (L/L; T/R/S; or UTM)
LATITUDE ____ ____: ____ ____: ____ ____
LONGITUDE ____ ____ ____: ____ ____: ____ ____
TWNSHP ____ ____ ____ ____ RANGE ____ ____ ____ ____
SECTION ____ ____ MERIDIAN ____ ____
UTM Z ___ ___ E ___ ___ ___-___ ___ N ___ ___ ___ ___-___ ___

10. SUPPRESSION DATA

	DATE	TIME	TYPE	AMOUNT	ACRES
10a. DISCOVERY/START	__ __ __ __	__ __ __ __	__		___ ___ ___ ___ ___ ___ ___ . ___
10b. INITIAL ATTACK	__ __ __ __	__ __ __ __	1 2 3 4 __ __ __ __	1 2 3 4 _ _ _ _ _ _ _	___ ___ ___ ___ ___ ___ ___ . ___
10c. CONTROL/COMPLETE	__ __ __ __	__ __ __ __			___ ___ ___ ___ ___ ___ ___ . ___
10d. DECLARED OUT	__ __ __ __				

11. SITE DATA

11a. TOPOGRAPHY ____	11d. ELEVATION ___	11h. BURNING INDEX ___ ___ ___
11b. ASPECT ____	11e. STATION ___ ___ ___ ___ ___ ___	11i. ADJ CLASS ___
11c. SLOPE ____	11f. MSGC ___ ___ ___ ___	

12. PREVENTION DATA

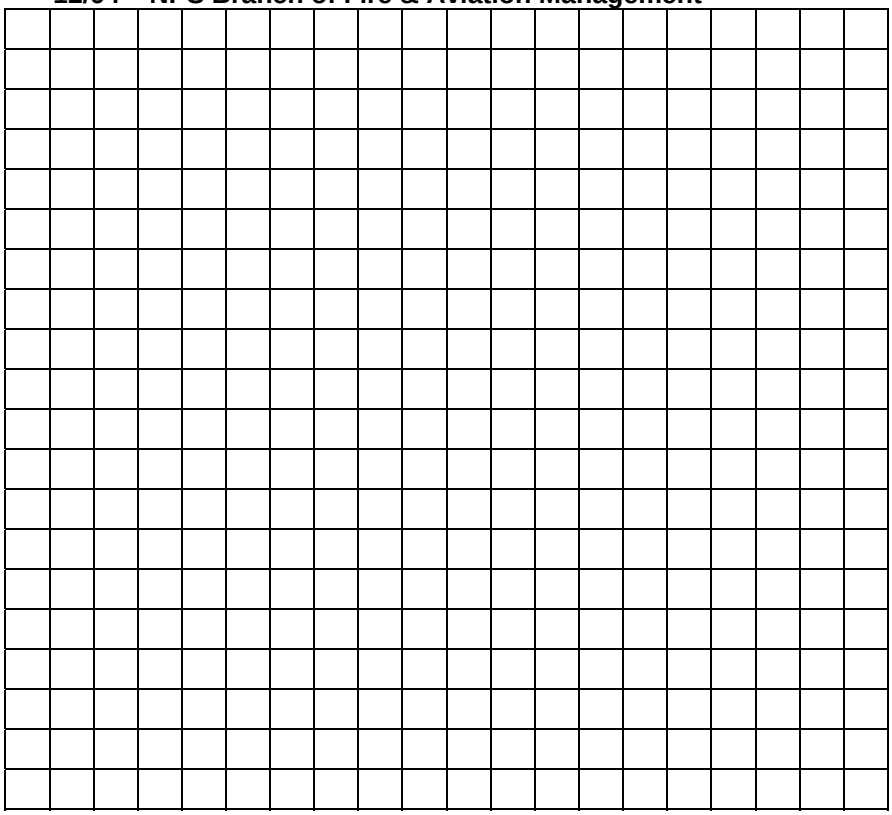
12k. DAY OF WEEK ____ 12l. WAS FIRE INVESTIGATED (Y/N) ____ 12m. FIRE CAUSE SUSPECT, KNOWN OR UNKNOWN (K/U) ___
12n. SUSPECT = RESIDENT, TRANSIENT, OR UNKNOWN (R/T/U) ___
NOTE: If you use 2 through 9 for "General Cause" and 30 for "specific cause" in Block #5, please explain the cause in general terms in the "Remarks" section.

13. PRESCRIBED FIRE DATA

13c. PLOT OBJ. ___ ___	13f. FUEL MODEL ____ ____	13m. PNF COMPLEXITY
13d. FIRING TYPE ___ ___	____ ____	ESCAPE _____ DURATION ____
13e. COST/ACRE	13l. PROJECT # ___ ___ ___ ___	VALUES _____ AIR QUAL. ____
___ ___ ___ ___ . ___ ___		FUELS/BEHAV. _____

Appendix 16
(Fire Report Form, DI-1202)

12/94 – NPS Branch of Fire & Aviation Management



LOCATION PLAT

SCALE

= 1 MILE

Mark point of origin with red "X"

Remarks:

Submitted by (Signature)		Approved by (Signature)	
Title	Date	Title	Date

APPENDIX 17

WILDLAND FIRE IMPLEMENTATION PLAN (WFIP)

Wildland Fire Assessment, Implementation, and Documentation Process

Initial Decision Process. This stage involves collection of necessary information with which to select an AMR strategy. The process shall include at least the following:

STAGE I. Initial Assessment and Strategy Selection
Responsibility: Fire Management Officer

Table1: Stage I Decision-making, the tasks are the following:

- **Initial Assessment**
  The data on the Fire Situation Form are routinely collected by the Initial Response Incident Commander on-site as soon as possible following ignition. This information will be recorded and can be transferred, as needed, to later planning stages or to the Wildland Fire Situation Analysis.
- **Go/No-Go Decision and Strategy Selection**
  The "go-no go" decision process (i.e., suppression or fire use strategy) for all wildland fires is based on completion of responses on a Decision Criteria Checklist1. The FMO completes this list in consultation with the Superintendent or designee and IDT.
    - Assessment of degree of risk of identified threats to life, property, and resources. If threats cannot adequately be mitigated, managing the fire for resource benefits may have undesirable outcomes.
    - Relate potential effects on cultural and natural resources to the range of acceptable effects; consult with NCR specialist(s) to determine specific effects and identify mitigating measures.
    - Are the risk assessment results unacceptable? A qualitative assessment chart (**Wildland Fire Relative Risk Rating Chart**) provides the FMO and Superintendent or designee with a picture of risk relative to time of season, fire danger, fire size, and potential complexity.
    - The "Potential Complexity" assessment portion of the Chart originates with the **Complexity Rating Worksheet** that assesses 12 elements, each with a weighing factor and complexity value that yields a point value. Note: Potential Complexity can be estimated for purposes of the Chart if time does not allow for completion of the Complexity Rating Worksheet.
    - The "Fire Danger Indicator" portion of the Chart (from daily NFDRS readouts).
    - Proximate fire activity – are Park or other available resources capable of safely managing current fire activity with appropriate skill positions and local resources?
    - Provides the Superintendent discretion based on issue external to the fire management program as to allowing for fire use.

  Once the **Decision Criteria Checklist** is complete, the FMO can determine whether to initiate actions to manage the fire for resource benefits ("go") or to initiate a suppression response ("no-go"). This checklist (Record of Decision) is signed by the Superintendent or designee and dated. This completes Stage I.

  A two-hour time period is allowed from the fire size-up initiation point to the initial decision process. Expeditious and accurate information exchange is critical during Stage I.

TABLE 1
Stage I Decision Making

COMPONENT	INPUTS	COMPLETION TIMEFRAME	REQUIRED OUTPUT (MINIMUM)
INITIAL ASSESSMENT	FIRE SITUATION FORM	ASAP FOLLOWING IGNITION	COMPLETED FORM BY INITIAL RESPONSE IC
DECISION CRITERIA CHECKLIST	• DEGREE OF RISK ASSESSMENT • POTENTIAL EFFECTS ON RESOURCES • RELATIVE RISK RATING CHART • PROXIMATE FIRE ACTIVITY • SUPERINTENDENT DISCRETION		COMPLETED CHECKLIST BY DUTY FPM FOLLOWING CONSULTATIONS SIGNED BY THE SUPERINTENDENT OR DESIGNEE
"GO/NO-GO" DECISION	(FROM ABOVE)	2 HOURS FOLLOWING INITIATION OF SIZE-UP (AERIAL OR GROUND)	(SEE ABOVE)

Suppression Response

A suppression response will be initiated for all wildland fires that:

- A "no-go" determination has been made from the Decision Criteria Checklist.
- Are human-caused.
- Are within the suppression zone.

All wildland fires receiving a suppression response will be accomplished commensurate with values-to-be-protected, firefighter and public safety, and cost efficiency.

Table 2
Stage II Decision Making
Wildland Fire Implementation Plan (WFIP)

COMPONENT	*INPUTS*	*COMPLETION TIMEFRAME*	*REQUIRED OUTPUT (MINIMUM)*
SHORT-TERM FIRE BEHAVIOR PREDICTION	BEHAVE	WITHIN 24 HRS. OF STAGE I COMPLETION	COMPLETE FORM INITIAL RESPONSE IC
RISK ASSESSMENT	RELATIVE RISK CHART (FARSITE RUN, ETC)		RE RELATIVE RISK CHART OUTPUTS
SHORT-TERM IMPLEMENTATION ACTION	FIRE BEHAVIOR PREDICTIONS, RISK ASSESSMENT, OBJECTIVES, STAFF INPUT, FMU, OTHER		SHORT-TERM IMPLEMENTATION ACTION – SIGNED BY NPS SUPERINTENDENT BEHAVE RUNS
COMPLEXITY ANALYSIS	STAFF INPUT		COMPLEXITY RATING WORKSHEET
PERIODIC ASSESSMENT PART I – RE-VALIDATION	STAGE I And II WFIP, STAFF INPUT	COMPLETED IMMEDIATELY AFTER STAGE I WFIP COMPLETED; REVIEW FREQUENCY AS DETERMINED BY FIRE ACTIVITY OR TRIGGERED BY “YES”	FY RE-VALIDATION SHEETS COMPLETED (INITIAL + ADDITIONAL SHEETS TRIGGERED BY “YES” RESPONSE
PERIODIC ASSESSMENT PART II – STAGE III NEED ASSESSMENT CHART	STAGE I AND II DOCUMENTS AND STAFF INPUT	INITIATED ASAP FOLLOWING STAGE I COMPLETION; FREQUENCY DETERMINED BY FIRE ACTIVITY	STAGE III NEED ASSESSMENT CHART
PERIODIC ASSESSMENT SIGNATURE PAGE	RE-VALIDATION SHEET; STAGE III NEED ASSESSMENT CHART	INITIATED ASAP FOLLOWING STAGE I COMPLETION; FREQUENCY DETERMINED BY FIRE ACTIVITY	PERIODIC ASSESSMENT SIGNATURE PAGE SIGNED BY SUPERINTENDENT

Appendix 17 WFIP

Short Term Implementation Action Form Contents
- Objectives and Desired Effects for the fire.
- Safety Considerations.
- External Concerns (public information, media coordination, air quality regulators, etc)
- Environmental Concerns (air quality, wilderness values, cultural and natural resources, MMA boundary, developed sites and sensitive areas, etc)
- Short-term actions described.
- Estimated Costs.
- Signature, titles, and dates.

If not completed in Stage I, complete the **Wildland and Prescribed Fire Complexity Rating Worksheet**.

Completion of a **Stage III Need Assessment Chart** that considers relative risk, time of season, complexity, and documented or potential fire behavior. This Chart provides the Superintendent with an aid to determine if the Stage III actions need to be developed, documented, and implemented immediately, or if the fire can be managed through the established short-term actions developed above.

If Stage II actions continue, the **Periodic Fire Assessment** will determine if and when Stage III WFIP will be prepared. Completion of the Needs Assessment Chart will also determine the need to initiate Stage III Implementation Actions and identify the completion of Stage II actions.

Information sources used to evaluate the fire are:
- Fire monitoring information
- Risk assessment results (from RERAP, FARSITE, BEHAVE or combination)
- Current fire activity, predicted weather and fire behavior
- Fire location and size
- Maximum Manageable Area, derived from staff inputs, objectives, ground and aerial observation, and monitoring information.
- Fire danger indicators (for representative fuel model(s)
- Time of fire season
- Staff input.

MAXIMUM MANAGEABLE AREA (MMA)
Once identified and approved in the WFIP, the MMA should not be subject to change. Usually highly defensible barriers (natural and/or human made) bound MMA to fire spread, or by potential for successful holding actions (i.e., indirect attack tactics).

Mitigation actions which optimize MMA defensibility and firefighter safety are:
- mechanical and physical non-fire tactics
- specific fire applications
- limited suppression actions (including but not limited to line construction, reduce fuels concentrations, reduce vertical fuel continuity, create fuel breaks/barriers around values to be protected, blacklining/burnout, and directly limit fire spread.

In the case of longer range spotting from the fire over the MMA, it shall be treated as a separate fire, and appropriate management response determined based on criteria specific to the new fire

STAGE III. Long-term Implementation Actions (WFIP)

Actions described here assists the FPM in evaluating local resource capability to manage the fire for

resource benefits, determine if the fire is escalating in complexity, and provide the Superintendent and key management staff with a long-term strategy for fire use (WFURB). Refer to Table 3 below.

TABLE 3
STAGE III DECISION MAKING
LONG TERM COMPONENTS OF WILDLAND FIRE IMPLEMENTATION PLAN.

COMPONENT	*INPUTS*	*COMPLETION TIMEFRAME*	*REQUIRED OUTPUT (MINIMUM)*
MMA DEFINITION	STAFF INPUTS BASED ON OBJECTIVES, RECON/MONITORING, RISK ASSESSMENTS, FIRE DANGER, LONG-TERM PREDICTIONS, EXTERNALS	WITHIN 24 HOURS OF STAGE II COMPLETION OR UNTIL ASSESSMENTS COMPLETED	MMA MAP, ACREAGE IN LONG-TERM IMPLEMENTATION ACTION (STAGE III WFIP)
FIRE BEHAVIOR PREDICTIONS	BEHAVE, FARSITE, OR RERAP		PREDICTION PROGRAM RUNS
LONG-TERM RISK ASSESSMENT	(SEE ABOVE)		COMPONENT OF LONG-TERM IMPLEMENTATION ACTION
LONG-TERM IMPLEMENTATION ACTIONS	STAFF INPUT, LONG RANGE PREDICTIONS, OBJECTIVES, RISK ASSESSMENTS		LONG-TERM IMPLEMENTATION ACTION SIGNED BY SUPERINTENDENT
PERIODIC ASSESSMENT and RE-VALIDATION	STAGE I, II, and III DOCUMENTATION, STAGE III NEED ASSESSMENT,STAFF INPUT	COMPLETED ASAP FOLLOWING STAGE I; FREQUENCY DETERMINED BY FIRE ACTIVITY OR CHANGE IN RESPONSE	COMPLETED RE-VALIDATION SHEETS + ADDITIONAL TRIGGERED BY "YES" RESPONSE
PERIODIC ASSESSMENT SIGNATURE PAGE	RE-VALIDATION PAGE	INITIATED ASAP FOLLOWING STAGE I COMPLETION AND REPEATED AS FIRE ACTIVITY DICTATES	PERIODIC ASSESSMENT SIGNATURE PAGE SIGNED BY FMO- IF WFIP APPROVED AND NO PLANNING CHANGES

This process assists the FPM in providing the Superintendent with a long-term management strategy for the fire. However, this step need not occur until a threshold **(Threshold Conditions)** is reached, or the periodic fire assessment process (see below) indicates the need.

The **Periodic Fire Assessment** is completed by the FMO and consists of three parts:

- Part 1, Re-Validation Checklist.
- Part 2, Stage III Need Assessment Chart (discussed above)
- Signature page; as long as the approved WFIP is followed and no changes in planning for the incident is required, the FMO or Incident Commander will be delegated the responsibility of validating the plan.

*Note: When completing Part I of the Periodic Fire Assessment, a "yes" answer to one or more decision elements indicates inability to continue management within current limits. This triggers preparation of a **Wildland Fire Situation Analysis**.

The Wildland Fire Situation Analysis (WFSA)
Responsibility: Superintendent

The WFSA is a decision making process in which the Superintendent and the Fire Team (or designee) describes the situation, compares strategy alternatives, evaluates expected effects of each alternative, establishes objectives and management constraints, selects the preferred alternative, and documents the decision. It serves as a contingency to undesirable outcomes. If the selected alternative does not accomplish objectives, the WFSA can be amended.

A WFSA is developed when conditions in Table 4 below are met.

The Superintendent (or designee) and the FMO and/or Incident Commander prepare the WFSA.

Required elements to be addressed in the WFSA:

- Current Situation
- Evaluation Criteria
- Alternatives
- Analysis of Effects
- Record of Decision
- Review/Evaluation/Update
- Probability of Success
- Consequences of Failure

TABLE 4: WILDLAND FIRE SITUATIONS AND WFSA PREPARATION CONSIDERATIONS, ALL FIRE MANAGEMENT UNITS.

SITUATION	WFSA CONSIDERATIONS	
	Protection	Protection + Resource Benefits
Human-caused fire (unwanted fire)	X	
Periodic Fire Assessment indicates that the fire is a "no-go" (i.e., one or more elements of Decision Criteria Checklist is not being met)	X	
Fire exceeds extended suppression action = unwanted fire	X	
Fire Exceeds WFIP, completely breaches established MMA (unwanted fire)	X	
Fire Exceeds prescribed fire plan in all FMU (unwanted fire)	X	
Fire remains consistent with WFIP and MMA but external concerns and/or Superintendent will not approve WFIP	X	
Fire exceeds WFIP, partially breaches MMA; fire in original MMA still achieving benefits while fire outside MMA is unwanted		X
Fire projected to leave the park, and the adjoining jurisdiction(s) will not/cannot accept management of the fire	X	

The format for the WFSA can be found in the Appendix of the *Wildland Fire Implementation Reference Guide* or accessed online at the NPS Wildland Fire Website (http://www.nps.gov/fire).

Staff positions (FUMA, RXFA)/relationship to step-up plan/prescribed fire implementation procedures/go-no go checklist

Wildland Fire Implementation Plan

Fire Name	
Fire Number	

Documentation Product

	Product ***Completed***		***Product Needed***	
WFIP - Stage I: Initial Fire Assessment				
Fire Situation		☐		☐
Initial GO/NO-GO Decision		☐		☐
WFIP - Stage II: Short-Term Implementation Actions				
Short-Term Fire Behavior Predictions And Risk Assessment	☐		☐	
Short-term Implementation Actions		☐		☐
Complexity Analysis		☐		☐
Stage III Need Assessment Chart		☐		☐
WFIP - Stage III: Long-Term Implementation Actions	☐		☐	
Periodic Fire Assessment				
Part 1, Re-validation		☐		☐
Part 2, Stage III Need Assessment		☐		☐
Wildland Fire Situation Analysis		☐		☐

FIRE SITUATION

Fire Name	
Fire Number	
Jurisidiction(s)	
Administrative Unit(s)	
FMP Unit(s)	
Geographic Area	
Management Code	
Start Date/Time	
Discovery Date/Time	
Current Date/Time	
Current Size	
Location: Legal Description(s)	**T. R. Sec. Sub.**
Latitude	
Longitude	
UTM:	
County:	
Local Description	
Cause	

Fuel Model/ Conditions	

Appendix 17
FIRE SITUATION, continued

Weather: **Current**	
Predicted	
Fire Behavior: **Current**	
Predicted	
Availability of Resources	

DECISION CRITERIA CHECKLIST

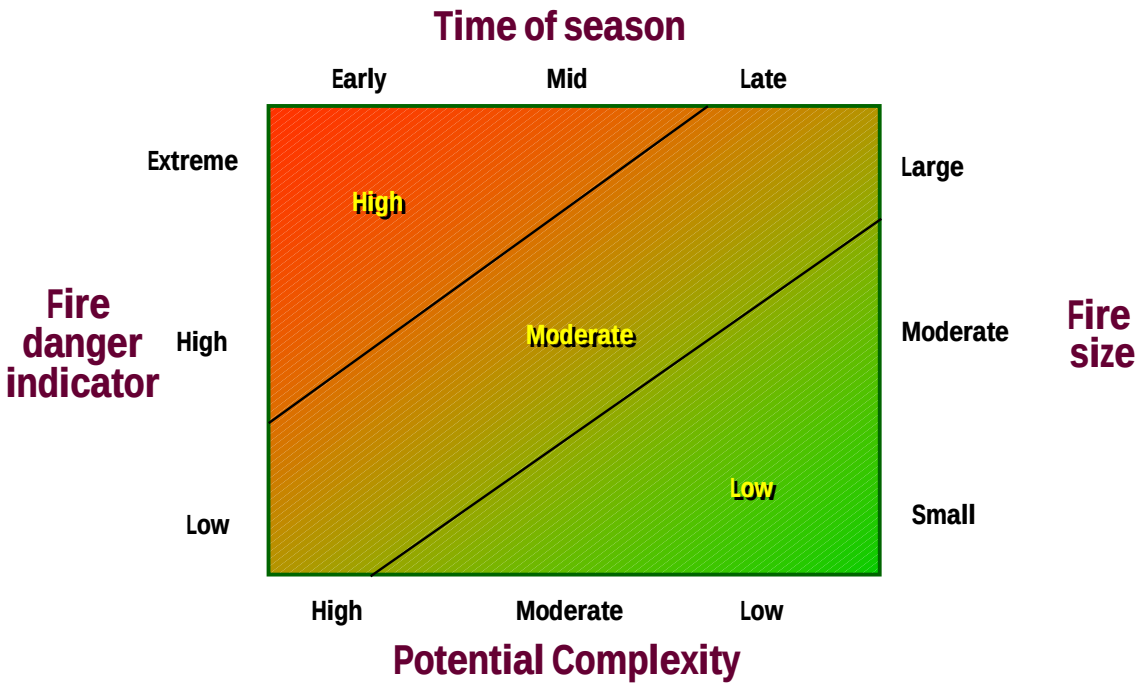
Decision Element	Yes	No
Is there a threat to life, property, or resources that cannot be mitigated?		
Are potential effects on cultural and natural resources outside the range of acceptable effects?		
Are relative risk indicators and/or risk assessment results unacceptable to the appropriate Superintendent?		
Is there other proximate fire activity that limits or precludes successful management of this fire?		
Is there other Superintendent issue that precludes wildland fire use?		

The Decision Criteria Checklist is a process to assess whether or not the situation warrants continued wildland fire use implementation. A "Yes" response to any element on the checklist indicates that the appropriate management response should be suppression-oriented.

Recommended Response Action (check appropriate box)	**NO-GO (Initial attack/suppression action)**	
	GO (Other appropriate management response)	

Signature _____ **Date** _____

Wildland Fire Relative Risk Rating



Determination of Relative Risk Rating for Wildland Fires. To obtain relative risk, connect lines between the top and bottom variables and the left and right hand variables. Where these lines cross represents the relative risk for this specific fire.

Appendix 17

SHORT-TERM IMPLEMENTATION ACTIONS

Attach Stage I Information

Action Items	**Information specific to this fire**
Objectives and Desired Effects	
Safety Considerations	
External Concerns	
Environmental Concerns	

Threats	

SHORT-TERM IMPLEMENTATION ACTIONS, continued

Short-Term Actions (describe)	
Estimated Costs	
Signature	
Title/date	

APPENDIX 18
WILDLAND AND PRESCRIBED FIRE COMPLEXITY RATING WORKSHEET

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

Total complexity points

Complexity Rating (circle) **L** **M** **H**

Complexity Value Breakpoints:

Low	***40– 90***
Moderate	***91–140***
High	***141– 200***

The Wildland and Prescribed Fire Complexity Analysis provides a method to assess the complexity of both wildland and prescribed fires. The analysis incorporates an assigned numeric rating complexity value for specific complexity elements that are weighted in their contribution to overall complexity. The weighted value is multiplied times the numeric rating value to provide a value for that item. Then all values are added to generate the total complexity value. Breakpoint values are provided for low, moderate, and high complexity values.

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

Wildland and Prescribed Fire Complexity Rating Worksheet
Numeric Rating Guide

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

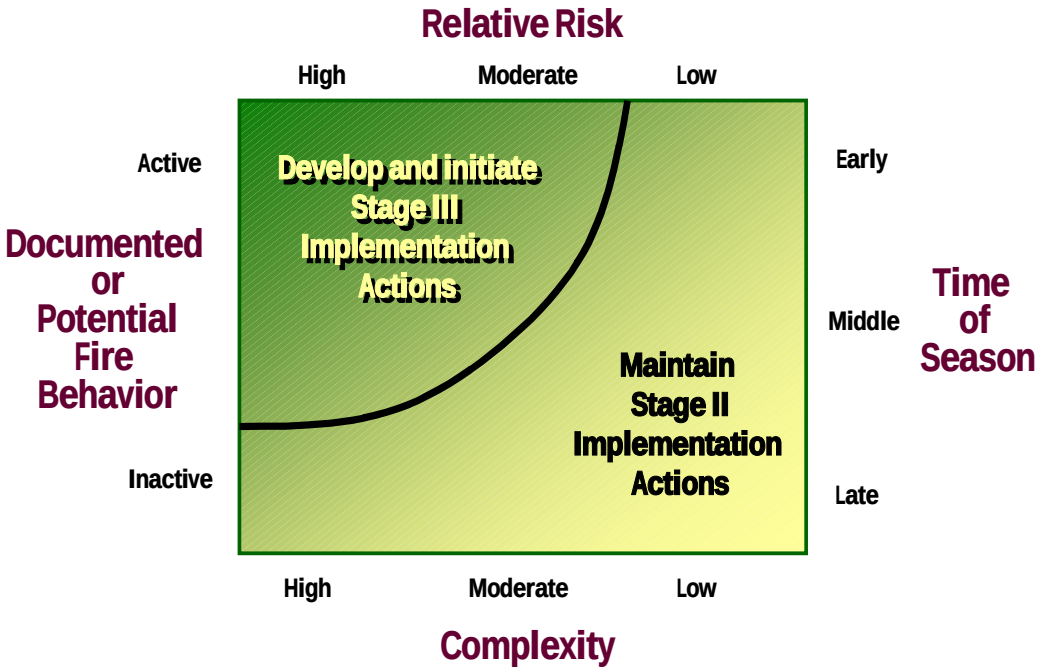
COMPLEXITY ELEMENT	GUIDE TO NUMERIC RATING		
	1	3	5
Objectives	• Maintenance objectives • Prescriptions broad • Easily achieved objectives	• Restoration objectives • Reduction of both live and dead fuels • Moderate to substantial changes in two or more strata of vegetation • Objectives judged to be moderately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

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

APPENDIX 18

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

Stage III Need Assessment Chart



To obtain the need indication, connect the top and bottom variables with a single line and then connect the left and right variables with a single line. Where the line crosses indicates the need for

WFIP Stage III. The appropriate need is read directly off the chart.

APPENDIX 18

Stage III: Long-Term Implementation Actions

Attach Stage I and Stage II information. Update and/or revise Stage I and II as necessary.

Objectives and Risk Assessment Considerations

Natural and Cultural Resource Objectives and Constraints/ Considerations	

Maximum Manageable Area (MMA)

Acres in MMA: **Attach Map of MMA**	

Fire Projections, Weather, and Map

Projected Fire Area Under *Expected* Weather Conditions	**For date:** **Area:**
Projected Fire Area Under Experienced *Severe* Weather Conditions	**For date:** **Area:**

Weather Season/Drought: Discussion and Prognosis	

Long-Term Risk Assessment and Map (if applicable)

Risk Assessment (Describe techniques utilized and outputs, include maps as appropriate)	

Probability of Success

Describe Probability of Success	

Stage III: Long-Term Implementation Actions, continued

Threats

Threats to MMA	
Threats to Public Use and Firefighter Safety	
Smoke Dispersion and Effects	
Other	

Monitoring Actions

Describe Monitoring Actions, Frequency, Duration

Holding Actions

Describe Holding Actions, Management Action Points that initiate these actions, and Key to Map if necessary

Stage III: Long-Term Implementation Actions, Continued

Resources Needed to Manage the Fire

Describe resources necessary to accomplish ignition, holding, and monitoring actions

Estimated Costs of Managing the Fire

Describes costs in terms of resources needed, projected duration, etc.

Contingency Actions

Describe Contingency actions, management action points that initiate them, resources needed, etc.

Stage III: Long-Term Implementation Actions, Continued

Information Plan

Describe Information Plan, Contacts, Responsibilities, etc.

Post-burn Evaluation

Describe post-burn evaluation procedures, resource requirements, costs, duration, etc.

Signatures

Include signatures/titles/ dates for preparing, approving, and any concurring individuals

APPENDIX 19

PERIODIC FIRE ASSESSMENT INSTRUCTIONS

The Periodic Fire Assessment is a process to prevent the unchecked escalation of an individual fire situation or the total fire management situation without evaluation and adequate planning.

Part 1 evaluates the capability to continue implementation of the appropriate management response to this fire for achieving resource benefits for a specified period following the assessment i.e., the next 24 hour period or longer, depending upon fire weather and fire behavior forecasts or other anticipated conditions. This assessment will be completed and periodically reviewed for validity. The “assessment frequency” box on page 1 specifies the frequency of assessing the particular fire. Assessment frequencies will be set by the local unit but are recommended to range from every day to every ten (10) days depending on the fuel type and geographic location of the fire. Recommendations for minimum assessment frequency include the following: Grass fuel types = daily; shrub and timber fuel types = every 1 – 5 days; Alaska = every 1 – 10 days.

The “valid date(s)’ box is inclusive of those dates where the assessment remains valid, as indicated by the dated signature. When any decision elements change from “No” to “Yes”, a new checklist must be completed for documentation purposes. A “Yes” response to any element on the Part 1checklist indicates that the selected appropriate management response is not accomplishing or will not accomplish desired objectives and that a new strategic alternative should be developed immediately through the use of a Wildland Fire Situation Analysis (WFSA).

The Periodic Fire Assessment, Part 2 is a process that must be completed periodically for all wildland fires managed for resource benefits that do not have a completed WFIP Stage III. For isolated ignitions in fuel-limited situations, Part 2 does not have to be completed. When completing Part 2 of this checklist, if the chart indicates that WFIP Stage III is needed, it must be prepared within 24 hours.

When units establish monitoring and assessment frequency, it may be appropriate to develop a "step-up" system based on fire size or levels of fire activity. Then, as an individual fire gets larger or becomes more active, the monitoring and assessment frequency can correspondingly increase. Conversely, as fire activity lessens and fire size increases become less common, monitoring and assessment can "step-down" and become less frequent. **Units must identify standards and rationale for establishing assessment frequency, especially "step-up" and "step-down" actions.** If fire size is used as a determinant, then past burning rates should be used to formulate standards. If fire activity is used, then levels of burning (acres per day, etc.) must be definable and justifiable.

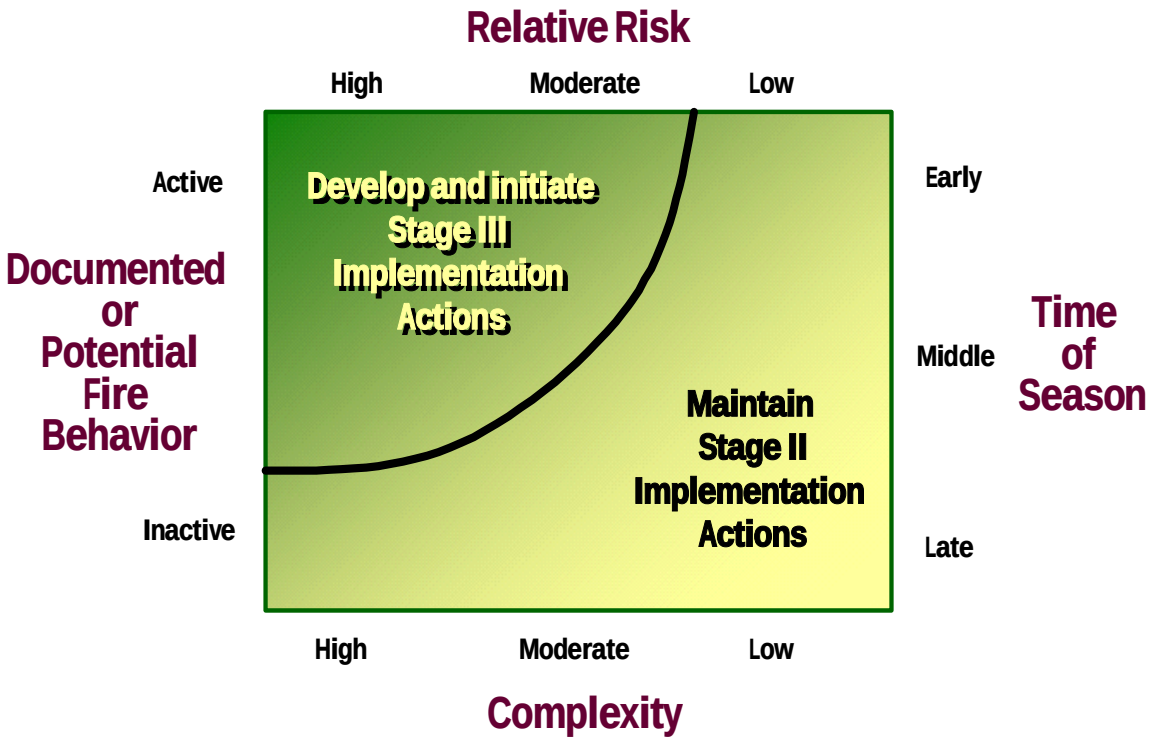
The Superintendent or delegated individual must sign the Signature Page on the specified assessment frequency.

PERIODIC FIRE ASSESSMENT

PART 1: RE-VALIDATION CHECKLIST

Decision Element	Yes	No
Is there a threat to life, property, or resources that cannot be mitigated?		
Are potential effects on cultural and natural resources outside the range of acceptable effects?		
Are relative risk indicators and/or risk assessment results unacceptable to the appropriate Superintendent?		
Is there other proximate fire activity that limits or precludes successful management of this fire?		
Are there other Superintendent issues that preclude wildland fire use?		
Do expected management needs for this fire exceed known capabilities?		

Stage III Need Assessment Chart



PERIODIC FIRE ASSESSMENT

SIGNATURE TABLE

		Fire can continue to be managed for resource benefits (wildland fire use action).	*Fire can continue to be managed under the short-term Implementation Action.*
Assessment Frequency			
Valid Date(s)			
Name/Title	***Date***	***Y/N***	***Y/N/NA***

APPENDIX 20

WILDLAND FIRE SITUATION ANALYSIS (WFSA)

This program can be found at http://www.fs.fed/fire/wfsa

Wildland Fire Situation Analysis (WFSA) is a decision-making process in which the Superintendent or representative describes the situation, establishes objectives and constraints for the management of the fire, compares multiple strategic wildland fire management alternatives, evaluates the expected effects of the alternatives, selects the preferred alternative, and documents the decision. The format and level of detail required is dependent on the specific incident and its complexity. The key is to document the decision.

WFSA INITIATION

FIRE NAME	
JURISDICTION(S)	
DATE AND TIME INITIATED	

WFSA COMPLETION/FINAL REVIEW

THE SELECTED ALTERNATIVE ACHIEVED DESIRED OBJECTIVES ON (DATE/TIME):	
THE SELECTED ALTERNATIVE DID NOT ACHIEVE THE DESIRED OBJECTIVES AND A NEW WFSA WAS PREPARED ON (DATE/TIME):	
SUPERINTENDENT OR REPRESENTATIVE SIGNATURE:	

WFSA INSTRUCTIONS

Section I. WFSA Information Page

The Superintendent completes this page.

I.A. **Jurisdiction(s):** Assign the agency that have or could have fire protection responsibility, e.g., USFWS, Forest Service, BLM, etc.

I.B. **Geographic Area:** Assign the recognized "Geographic Coordination Area" in which the fire is located, e.g., Northwest, Northern Rockies, etc.

I.C. **Unit:** Designate the local administrative unit, e.g., Hart Mountain Refuge Area, Flathead Indian Reservation, etc.

I.D. **WFSA #:** Identify the number assigned to the most recent WFSA for this fire.

I.E. **Fire Name:** Self-explanatory.

I.F. **Incident Number:** Identify the agency number assigned to the fire, e.g., BOD 296, BNF 001.

I.G. **Accounting Code:** Insert the local unit's accounting code.

I.H. **Date/Time Prepared:** Self-explanatory.

I.I. **Attachments:** Check here to designate attachments used in the completion of the WFSA. "Other" could include data or models used in the development of the WFSA. Briefly describe the "other" items used.

I. WILDLAND FIRE SITUATION ANALYSIS	
A. JURISDICTION(S):	**B. GEOGRAPHIC AREA:**
C. UNIT(S):	**D. WFSA #:**
E. FIRE NAME:	**F. INCIDENT #:**
G. ACCOUNTING CODE:	
H. DATE/TIME PREPARED:	

I. ATTACHMENTS:

- ☐ **COMPLEXITY MATRIX/ANALYSIS[1]**
- ☐ **RISK ASSESSMENT[1]**
- ☐ **PROBABILITY OF SUCCESS1**
- ☐ **CONSEQUENCES OF FAILURE[1]**
- ☐ **MAPS[1]**
- ☐ **DECISION TREE[2]**
- ☐ **FIRE BEHAVIOR PROJECTIONS[1]**
- ☐ **CALCULATIONS OF RESOURCE REQUIREMENTS[1]**
- ☐ **OTHER (SPECIFY)**

[1] Required
[2] Required by the USFS

Section II. Objectives and Constraints

The Superintendent completes this page.

II.A. Objectives: Specify criteria that should be considered in the development of alternatives.

Safety objectives for firefighters, aviation, and public must receive the highest priority, Suppression objectives must relate to resource management objectives in the unit resource management plan.

Economic objectives could include closure of all portions of an area, thus impacting the public, or impacts to transportation, communication and resource values.

Environmental objectives could include management objectives for airshed, water quality, wildlife, etc.

Social objectives could include any local attitudes toward fire or smoke that might affect decisions on the fire, safety, etc.

Other objectives might include legal or administrative constraints, which would have to be considered in the analysis of the fire situation, such as the need to keep the fire off other agency lands, etc.

II.B. Constraints: List constraints on wildland fire action. These could include constraints to designated wilderness, wilderness study areas, environmentally or culturally sensitive areas, irreparable damage to resources or smoke management/air quality concerns. Economic constraints such as public and Agency cost could be considered here.

II. OBJECTIVES AND CONSTRAINTS

A. OBJECTIVES (must be specific and measurable):

1. SAFETY:

Public

Firefighter

2. ECONOMIC:

3. ENVIRONMENTAL:

4. SOCIAL:

5. OTHER:

B. CONSTRAINTS:

Section III. Alternatives

The FIRE MANAGER/and or INCIDENT COMMANDER complete(s) this page.

III.A. Wildland Fire Management Strategy: Briefly describe the general wildland fire strategies for each alternative. Alternatives must meet resource management plan objectives.

III.B. Narrative: Briefly describe each alternative with geographic names, locations, etc. that would be used when implementing a wildland fire strategy. For example, "Contain within the Starvation Meadows' watershed by the first burning period."

III.C. Resources Needed: Resources listed must be reasonable to accomplish the tasks described in Section III.B. It is critical to also look at the reality of the availability of these needed resources.

III.D. Estimated Final Fire Size: Estimated final size for each alternative at time of containment.

III.E. Estimated Contain/Control Date: Estimates for each alternative shall be made based on predicted weather, fire behavior, resource availability and the effects of wildland fire management efforts.

III.F. Cost: Estimate all fire costs for each alternative. Consider mop-up, rehabilitation, and other costs as necessary.

III.G. Risk Assessment: Probability of success/Consequences of failure: Describe probability as a % and associated consequences for success and failure. Develop this information from models, practical experience or other acceptable means. Consequences described will include fire size, days to contain, days to control, costs and other information such as park closures and effect on critical habitat. Include fire behavior and long-term fire weather forecasts to derive this information.

III.H. Complexity: Assign the complexity rating calculated in the Guide for Assessing Fire Complexity.

III.G. Maps: A map for each alternative must be prepared. The map shall be based on the "Probability of success/Consequences of Failure" and include other ~~relative~~ relevant? Information.

III. ALTERNATIVES			
	A	*B*	*C*
A. WILDLAND FIRE STRATEGY:			
B. NARRATIVE:			
C. RESOURCES NEEDED:			
HANDCREWS			
ENGINES			
DOZERS			
AIRTANKERS			
HELICOPTERS			
D. ESTIMATED FINAL FIRE SIZE:			
E. ESTIMATED CONTAIN/ CONTROL DATE			
F. COSTS:			
G. RISK ASSESSMENT: PROBABILITY OF SUCCESS/ **CONSEQUENCES OF FAILURE**			
H. COMPLEXITY:			
I. ATTACH MAPS FOR EACH ALTERNATIVE			

Section IV. Evaluation of Alternatives

The Superintendent(s), FMO and/or Incident Commander(s) complete this page.

IV.A. Evaluation Process: Conduct an analysis for each element of each objective and each alternative. Objective shall match those identified in section II.A. Use the best estimates available and quantify whenever possible. Provide ratings for each alternative and corresponding objective element. Fire effects may be negative, cause no change or may be positive. Examples are: 1) a system which employs a "–" for negative effect, a "0" for no change, and a "+" for positive effect; 2) a system which uses a numeric factor for importance of the consideration (soils, watershed, political, etc.) and assigns values (such as –1 to +1, –100 to +100, etc.) to each consideration, then arrives at a weighted average. If you have the ability to estimate dollar amounts for natural resource and cultural values this data is preferred. Use those methods, which are most useful to managers and most appropriate for the situation and agency. To be able to evaluate positive fire effects, the area must be included in the resource management plan and be consistent with prescriptions and objectives of the Fire Management Plan.

Sum of Economic Values: Calculate for each element the net effect of the rating system used for each alternative. This could include the balance of: pluses (+) and minuses (–), numerical rating (–3 and +3), or natural and cultural resource values in dollar amounts. (Again resource benefits may be used as part of the analysis process when the wildland fire is within a prescription consistent with approved Fire Management Plans and in support of the unit's Resource Management Plan.)

IV. EVALUATION OF ALTERNATIVES			
A. EVALUATION PROCESS	A	B	C
SAFETY			
Firefighter			
Aviation			
Public			
Sum of Safety Values			
ECONOMIC			
Forage			
Improvements			
Recreation			
Timber			
Water			
Wilderness			
Wildlife			
Other (specify)			
Sum of Economic Values			
ENVIRONMENTAL			
Air			
Visual			
Fuels			
T & E Species			
Other (specify)			
Sum of Environmental Values			
SOCIAL			
Employment			
Public Concern			
Cultural			
Other (Specify)			
Sum of Social Values			
OTHER			

APPENDIX 20

Section V. Analysis Summary

The Superintendent(s), FMO and/or Incident Commander(s) complete this page.

V.A. Compliance with Objectives: Prepare narratives that summarize each alternative's effectiveness in meeting each objective. Alternatives that do not comply with objectives are not acceptable. Narratives could be based on effectiveness and efficiency. For example: "most effective and least efficient", "least effective and most efficient", "or "effective and efficient". Or answers could be based on a two-tiered rating system such as "complies with objective" and "fully complies with or exceeds objective". Use a system that best fits the manager's needs.

V.B. Pertinent Data: Data for this section has already been presented and is duplicated here to help the Superintendent(s) confirm their selection of an alternative. Final Fire Size is displayed on page three, section III.D. Complexity is calculated in the attachments and displayed on page three, section III.H. Costs are displayed on page three, section III.F. Economic Values have been calculated and displayed on page four. Probability of Success/Consequences of Failure are calculated in the attachments and displayed on page three, section III.G.

V.C. External and Internal Influences: Assign information and data occurring at the time the WFSA is signed. Identify the Preparedness Index (1 through 5) for the National and Geographic levels. If available, indicate the Incident Priority assigned by the MAC group. Designate the Resource Availability status. This information is available at the Geographic Coordination Center and needed to select a viable alternative. Designate "yes" indicating an up-to-date weather forecast has been provided to, and used by, the Superintendent(s) to evaluate each alternative. Assign information to the "other" category as needed by the Superintendent(s).

Section VI. Decision

Identify the alternative selected. Must have clear and concise rationale for the decision, and a signature with date and time. **Superintendent(s) signature is mandatory.**

V. ANALYSIS SUMMARY			
ALTERNATIVES	A	B	C
A. COMPLIANCE WITH OBJECTIVES: ***SAFETY*** ***ECONOMIC*** ***ENVIRONMENTAL*** ***SOCIAL*** ***OTHER***			
B. PERTINENT DATA:			
FINAL FIRE SIZE			
COMPLEXITY			
COST			
RESOURCE VALUES			
PROBABILITY OF SUCCESS			
CONSEQUENCES OF FAILURE			
C. EXTERNAL/INTERNAL INFLUENCES: ***NATIONAL AND GEOGRAPHIC PREPAREDNESS LEVEL*** ***INCIDENT PRIORITY*** ***RESOURCE AVAILABILITY*** ***WEATHER FORECAST (LONG-RANGE)*** ***FIRE BEHAVIOR PROJECTIONS***			

VI. DECISION
The selected alternative is: **RATIONALE:**

SUPERINTENDENT SIGNATURE _____

DATE/TIME _____

Section VII. Daily Review

The Superintendent(s), or designate complete(s) this page.

The date, time and signature of reviewing officials are reported in each column for each day of the Incident. The status of Preparedness Level, Incident Priority, Resource Availability, Weather Forecast, and WFSA Validity is completed for each day reviewed. Ratings for the Preparedness Level, Incident Priority, Resource Availability, Fire Behavior, and Weather Forecast are addressed on page five, section V.C. Assign a "yes" under "WFSA Valid" to continue use of this WFSA. A "no" indicates this WFSA is no longer valid and another WFSA must be prepared or the original revised.

VII. DAILY REVIEW								
SELECTED ALTERNATIVE TO BE REVIEWED DAILY TO DETERMINE IF STILL VALID UNTIL CONTAINMENT OR CONTROL								
			PREPAREDNESS LEVEL	INCIDENT PRIORITY	RESOURCE AVAILABILITY	WEATHER FORECAST	FIRE BEHAVIOR PROJECTIONS	WFSA VALID
DATE	TIME	BY						
IF WFSA IS NO LONGER VALID, A NEW WFSA WILL BE COMPLETED								

APPENDIX 21

A GUIDE FOR ASSESSING FIRE COMPLEXITY

The following questions are presented as a guide to assist the Superintendent and staff in analyzing the complexity or predicted complexity of a fire situation. Because of the time required to assemble or move an Incident Management Team to a fire, this checklist should be completed when a fire escapes initial attack and be kept as part of the fire records. This document is prepared concurrently with the preparation of and attached to a new or revised Wildland Fire Situation Analysis. It must be emphasized that this analysis should, where possible, be based on predications to allow adequate time for assembling and transporting the ordered resources.

Use of the Guide:

1. Analyze each element and check the response yes or no.

2. If positive responses exceed, or are equal to, negative responses within any primary factor (A through G), the primary factor should be considered as a positive response.

3. If any three of the primary factors (A through G) are positive response, this indicates the fire situation is or is predicted to be Type I.

4. Factor H should be considered after all above steps. If more than two of these items are answered yes, and three or more of the other primary factors are positive responses, a Type I team should be considered. If the composites of H are negative, and there are fewer than three positive responses in the primary factors (A-G) a Type II team should be considered. If the answers to all questions in H are negative, it may be advisable to allow the existing overhead to continue action on the Fire.

FIRE COMPLEXITY ANALYSIS Yes/No

A. FIRE BEHAVIOR: Observed or Predicted

1. Burning Index (from on-site measurement of weather conditions). Predicted to be above the 90% level using the major fuel model in which the fire is burning. ___ ___
2. Potential exists for "blowup" conditions (fuel moisture, winds, etc). ___ ___
3. Crowning, profuse or long-range spotting. ___ ___
4. Weather forecast indicating no significant relief or worsening conditions. ___ ___

Total . . . . . ___ ___

B. RESOURCES COMMITTED:

1. 200 or more personnel assigned. ___ ___
2. Three or more divisions. ___ ___
3. Wide variety of special support personnel. ___ ___
4. Substantial air operation which is not properly staffed. ___ ___
5. Majority of initial attack resources committed. ___ ___

Total . . . . . ___ ___

C. RESOURCES THREATENED:

1. Urban interface.	___ ___
2. Developments and facilities.	___ ___
3. Restricted, threatened or endangered species habitat.	___ ___
4. Cultural sites.	___ ___
5. Unique natural resources, special designation zones or wilderness.	___ ___
6. Other special resources.	___ ___
Total	___ ___

E. OWNERSHIP:

	Yes/No
1. Fire burning or threatening more than one jurisdiction.	___ ___
2. Potential for claims (damages).	___ ___
3. Different or conflicting management objectives.	___ ___
4. Dispute over fire management responsibility.	___ ___
5. Potential for unified command.	___ ___
Total	___ ___

F. EXTERNAL INFLUENCES:

1. Controversial wildland fire management policy.	___ ___
2. Pre-existing controversies/relationships.	___ ___
3. Sensitive media relationships.	___ ___
4. Smoke management problems.	___ ___
5. Sensitive political interests.	___ ___
6. Other external influences.	___ ___
Total	___ ___

G. CHANGE IN STRATEGY

1. Change in strategy (from lower to higher intensity management).	___ ___
2. Large amounts of unburned fuel within planned perimeter.	___ ___
3. WFSA invalid or requires updating.	___ ___
Total	___ ___

H. EXISTING OVERHEAD:

1. Worked two operational periods without achieving initial objectives.	___ ___
2. Existing management organization ineffective.	___ ___
3. Overhead/IMT overextended mentally and/or physically.	___ ___
4. Incident actions plans, briefings, etc., missing or poorly prepared.	___ ___
Total	___ ___

Signature

Date Time

APPENDIX 22

WILDLAND FIRE OBSERVATION AND SUMMARY FIRE BEHAVIOR REPORT

Fire Name _____ Geographic Location
Observer (s) _____ Date _____ Time
UTM _____ E _____ N Lat._____ Long._____

FIRE BEHAVIOR INFORMATION

A. Character of Fire

1. Smoldering
2. Creeping
3. Running
4. Crowning
5. Spotting

B. Estimated Size

1. Spot
2. 0.25-0.5
3. 0.5-1
4. 1-5
5. 5-10
6. 10+

C. Estimated Wind Speed – mph

1. Calm
2. 1-5
3. 5-20
4. 20+

D. Wind Direction

1. Down canyon
2. Up canyon
3. Down slope
4. Up slope
5. North
6. South
7. East
8. West

E. Equipment Needs

1. Personnel (number
2. Engine
3. Helicopter w/ bucket
4. Chainsaw
5. Portable pump(s)/hose

F. Fuel Model

1. Model 5
2. Model 8
3. Model 10
4. Other

G. Adjacent Fuel

1. Grass
2. Brush
3. Mixed conifer
4. Heavy timber

H. Aspect

1. North
2. South
3. East
4. West

I. Slope

1. Flat
2. 1-20%
3. 20-40%
4. 40+%

J. Position on Slope

1. Top
2. Upper 1/3
3. Middle 1/3
4. Lower 1/3
5. Bottom

L. Elevation

1. 2,000-4,500’
2. 4,500-6,000’
3. 6,000+’

APPENDIX 23

Prescribed Burn Plan Format

Mount Rainier National Park

Project Name Here

Approval Signatures:

Prepared by: _____ Date: _____

Prescribed Fire Specialist

Reviewed by: _____ Date: _____

Fire Management Officer

Reviewed by: _____ Date: _____

Chief Ranger

_____ Date: _____

Resource Specialist

Approved by: _____ Date: _____

Superintendent

ON FIRST DAY OF IGNITION:

Accepted by: _____ Date: _____

Burn Boss

Description of the Prescribed fire area

DESCRIPTION OF SPECIFIC UNIT

Include a description of the unit being burned.

The monument is a Class II air shed. Smoke effects need to be considered for the nearby communities.
Table 1 lists physical characteristics of the unit.

Figure 1: Map of burn unit

Table 1: Physical description of burn unit

Location:
Size:
ELEVATION RANGE:
SLOPE RANGE:
ASPECT(S):
DESCRIPTION OF BOUNDARIES:

Goals and objectives

The purpose of this burn is to restore fire as a natural process to the sagebrush-dominated ecosystem at Hagerman Fossil Beds NM (HAFO). Research and historical documentation indicates an overall increase in sagebrush and a decrease in abundance of native bunchgrass.

This burn plan is compliant with the Fire Management Plan and Environmental Assessment for HAFO, _____
Date: _____

The specific objectives for this burn are to:

1)

Range of acceptable results

Acceptable results for this burn include meeting these resources objectives while doing the following:

1) Ensure safety for the public and personnel associated with the fire.
2) Protect fossil resources.
3) Eliminate natural and cultural resource damage.
4) Limit smoke impacts to neighboring communities.
5) Increase public education regarding the role of fire in these ecosystems.

Project assessment

Complexity

Table 2 Lists the calculated Complexity rating for the burn. This complexity analysis provides a method to assess the complexity of both wildland and prescribed fires. The analysis incorporates an assigned numeric rating value for specific complexity elements that are weighted in their contribution to overall complexity. The weighted value is multiplied times the numeric rating to provide a value for that item. Then all values are added to generate the total complexity value. Breakpoint values are provided for low, moderate, and high complexity values.

Complexity ratings for each category range from 1 (low complexity) to 5 (high complexity). Descriptions of complexity level ratings can be found in the Fire Management Plan. Weighting values are shown in the table.

Complexity Rating (circle)	Low	40-90
	Moderate	91-140
	High	140-200

Table 2: Complexity Rating

Complexity Element	Weighting Element	Complexity Value	Total Points
Safety	5		
Threats to boundaries	5		
Fuels and fire behavior	5		
Objectives	4		
Management Organization	4		
Improvements	3		
Natural, cultural, social values	3		
Air quality values	3		
Logistics	3		
Political concerns	2		
Tactical operations	2		
Interagency coordination	1		
TOTAL COMPLEXITY POINTS			

PRESCRIBED FIRE RISK ASSESSMENT APPENDIX

INSERT RISK ASSESSMENT FOR THE PROJECT HERE

Prescribed fire implementation actions

Pre-burn Considerations

The following will be completed prior to ignition:

1) Ensure protection of visitors, employees, and the public. Local media will be informed of the burn prior to ignition.
2) The burn boss will be responsible for any holding actions deemed necessary at the time of ignition. Resource advisors will be involved with the construction of any fire line.
3) Layout of ignition areas will be precise prior to ignition. Maps will be prepared and be readily available to all personnel. NO ONE will be allowed inside the burn unit area without a proper briefing and PPE.
4) Helispots will be identified and marked for use as necessary.
5) On site weather and spot weather forecasts will be available prior to ignition. These data will assist in all aspects of the burn and will aid in ensuring firefighter safety. This is the burn boss' responsibility.

Briefing

A briefing will be conducted for all fire personnel. This briefing will include distribution of a staffing plan and maps to all individuals working on the fire. Elements of the briefing should include safety, personnel assignments, communications, ignition and holding plans, and description of the contingency plan.

Test Fire

A test fire will be ignited prior to ignition of the entire unit. At the discretion of the burn boss, this test fire may occur as part of the stated ignition sequence. If this test fire is deemed to be burning within prescription, the ignition sequence may continue.

Prescribed Fire Prescription

Table 3 lists the range of acceptable values for key variable in the prescription. Appendix B contains the BEHAVE runs validating these ranges.

Table 3: Prescription parameters

	Day 1		Day 2	
	Acceptable Range	Desired	Acceptable Range	Desired
Fuel Model				
Temperature				
RH				
Mid-Flame Wind Speed				
Slope				
Wind Direction				
1 hr fuel moisture				
10 hr fuel moisture				

100 hr fuel moisture				
Live fuel moisture				
Rate of Spread				
Flame length				
Scorch height				
Spotting distance				

Special Conditions, Public and Personnel Safety

All standard wildland firefighter safety rules will be strictly enforced. Project personnel will wear appropriate personal protective equipment (PPE) during all phases of the project. No person will be allowed into the project area during preparation or execution without the appropriate PPE.

A daily safety briefing will be held prior to work on the project during each phase of the project (see briefing section).

The burn boss and prescribed fire management team will analyze safety concerns such as smoke on main roads, potential health impacts to visitors, and other issues. The burn boss will be responsible for resolving these issues, as appropriate.

The Burn Boss will work with and through appropriate line supervisors to institute any corrective safety measures associated with this project. If a serious safety issue cannot be resolved prior to ignition of any portion of this project, ignition will not take place. If the issue occurs during the execution of the project it will be mitigated with the most reasonable measures possible that will provide for the safety of the public and employees. If necessary, the project will be shut down. The FMO, burn boss, Chief Ranger, Prescribed Fire Specialist, and Superintendent have the authority to shut down operations on this project.

APPENDIX 23

Prescribed Burn Organization
Required positions for this burn include:

1 **LIST POSITIONS HERE**

_____ _____ _____ _____ _____ _____
_____ _____ _____ _____ _____ _____
_____ _____ _____ _____ _____ _____

Multiple positions may be filled by 1 person where appropriate (e.g., burn boss and ignition specialist). All persons filling the se positions must be NWCG qualified. The Burn boss has the discretion to increase the number of personnel on the fire, as deemed necessary.

Ignition Plan

The proposed ignition for this burn is **(GIVE SEASON)**_____. Burn duration is expected to be _____**(NUMBER OF)** days.

The burn will NOT be conducted if any of the following conditions exist:

1) Out of prescription dates or conditions of project plan are not met.
2) Emergency shutdown necessary.
3) Management concerns preclude ignition.
4) Local, regional, or national preparedness levels preclude new ignitions.

Firing methods will consist of **(DETAIL IGNITION METHOD AND TECHNIQUE)**.

All decisions regarding ignitions may be changed on-site, without revision of the burn plan, as long as prescription parameters are met. Topography, fuels, and weather conditions will drive firing techniques that will be employed on a given day. The Burn Boss, Ignition specialist, and Holding specialist will jointly determine techniques to be used.

Holding Plan

The holding specialist and/or burn boss will recommend holding actions for this burn.

No fire line will be constructed without consultation with a resource advisor, where feasible. All efforts will be made to control any slop over or spots with minimal amounts of ground-disturbing activity.

Aircraft may be used to hold portions of the project when holding capabilities are exceeded. No retardant shall be used within the HAFO boundaries without the approval of the Superintendent or designate.

Mop-up will be conducted **LIST SPECIFICS**.

The holding specialist and burn boss may set up portable water sources, as necessary. Patrols of the fire perimeter will be conducted as determined by the holding specialist and burn boss.

The burn boss, prescribed fire specialist, and superintendent have the right to declare the prescribed fire a wildland fire, should conditions warrant.

Cooperation

Resources from other Federal Agencies may assist in the planning and implementation of this burn.

Contingency Plan

During the life of any portion of this project, prescribed fire activity may threaten the planned fire perimeter through spot fires or slopovers. These types of occurrences are planned for and will not cause the fire to be declared a wildland fire unless the fire activity exceeds the control of the forces available.

Means of attack on slopovers or spots within the contingency area may include (but are not limited to) the use of burnout activities, water from pumps or helicopters, etc. If line building is deemed necessary within the monument boundaries, a resource advisor must be consulted.

The holding specialist will supervise all initial attack activities outside the burn perimeter and contingency boundaries. The holding specialist will make recommendations to the burn boss regarding the ability of the forces at hand to suppress these spots and slopovers. If additional holding forces are not readily available and the spots or slopovers threaten life or values at risk, the burn boss, prescribed fire specialist, or superintendent may declare the escape a wildland fire.

Should the fire burn onto private land, the private landowner will be immediately notified. Should the private landowner have a burn permit and appropriate line constructed, the state will be notified that these conditions exist. If the private landowner does not have the required documentation or is not prepared, the state will be notified and the fire will be declared a wildland fire and appropriately suppressed.

Upon conversion to a wildland fire, the Burn boss will notify all personnel on the burn and the IC (as identified in the staffing plan; may be the burn boss if so qualified) will assume control of the fire. Dispatch will be notified immediately of the conversion and appropriate resources will be ordered.

The burn boss will be responsible for ensuring that, when necessary, additional contingency resources are available on the day of the burn or place on standby. This will be based on seasonality of the burn, fuel conditions, and ambient weather conditions.

Smoke Management

Mount Rainier National Park is a federally designated Class I air shed, and as such is protected from human caused pollutants.

Smoke will be managed following guidelines outlined in the Fire Management Plan including meeting state regulations, monitoring smoke column height and duration, and recording any complaints received by the local community.

APPENDIX 23

Monitoring

Monitoring for the fire behavior and effects for this burn will be determined by the fire weather, rate of spread, flame lengths, available resources, staffing levels and other fire considerations will be made by a qualified fire behavior monitor.

Monitoring plots will be established in the burn unit prior to the burn. A map of these plots will be attached to the burn plan.

STATE POSITION OF MONITORS DURING THE BURN.

The fire monitor(s) will be directly supervised by the burn boss and will abide by all decisions made by the burn boss.

Post-fire monitoring will be completed as soon as conditions in the burn unit have been determined to be safe.

Post-burn Activities

Patrols will be established by the burn boss and/or holding specialist, as necessary. The burn boss has the responsibility of declaring the fire out.

The staff will be responsible for continued public education and interpretation regarding the burn. Notices and press releases will be prepared after the completion of the burn.

Monitoring of the burn will continue following monitoring guidelines stated previously and in the Fire Management Plan.

APPENDIX 24
PARAMETERS FOR CONDUCTIONG PRESCRIBED FIRES
(Prescribed Fire Prescription Limits)

1. SAFETY
    - Safety overrides all other considerations. Fires will not be permitted to burn if they threaten the safety of park visitors, residents, or employees.

2. ADMINISTRATIVE CONCERNS
    - Funding is available at the park level or from Emergency Preparedness funding.
    - A qualified monitor is immediately available, a Prescribed Fire Monitor or Prescribed Burn Boss is available within 12 hours, and an initial attack group of at least 5 firefighters and a Initial Attack Incident Commander are immediately available.
    - The Puget Sound or Northwest Interagency Coordination Center's Preparedness Level projection does not exceed level 3 based on a 3 day outlook as outlined in the Pacific Northwest Interagency Preparedness Plan.
    - Availability of suppression forces as noted by the PSICC or NWICC. Forces needed will be analyzed daily.

3. LEGAL CONCERNS
    - Air quality shall be kept within acceptable levels of the revised Washington State Visibility Plan as described under 2d, smoke management.
    - Threatened and endangered species shall be protected from adverse impacts.
    - The fire must not threaten cultural or historical resources.
    - Interagency mutual agreements must be adhered to.

4. GEOGRAPHIC CONSIDERATIONS
    - Any single fire must not exceed 5,000 acres.
    - Based upon a historical climatology and forecasted values, the probability of exceeding 5,000 acres or the Wildland Fire Use unit perimeter must not be greater than 30%.
    - No fire may cross any of the 9 major drainage basins or park roads.
    - No more than 2 active natural wildland fires in a single major drainage basin during the declared fire season.
    - No more than 1 natural wildland fire in subdrainage.

5. DROUGHT INDICATIONS
    - The Energy Release Component must not exceed the 95% level. If there is an ongoing natural wildland fire, new starts must be classed wildfires if the Energy Release Component exceeds the 85% level.
    - The 1000-hour timelag fuel moisture content is not less than 17%.

6. ENVIRONMENTAL CONSIDERATIONS
    - If a Red Flag Warning is projected based upon the 3 day forecast, no new wildland fires will be declared.
    - If easterly winds are forecasted to occur within a three day forecast, no new natural wildland fire will be declared.

7. FIRE BEHAVIOR
    - If the probability of ignition exceeds 45% in the 3-day forecast, no new natural wildland fire will be declared.
    - The projected long range spotting distance must not exceed one half of the major drainage basin or the Wildland Fire Use unit.

APPENDIX 25

Go/ No-Go Checklist

	YES (your initials)	NO (your initials)
Is the burn plan complete and approved?		
Are all fire specifications met?		
Is the current and projected fire weather forecast favorable?		
Are all personnel required in the burn plan on site?		
Have all personnel been briefed on the plan requirements?		
Have all the personnel been briefed on safety hazards, escape routes, and safety zones?		
Is all of the required equipment in place and in working order?		
Are available resources available as backup for containment under worst case conditions?		
Have all pre-burn telephone calls and public safety concerns been met?		
Have all mitigation measures for protected resources (threatened and endangered species, smoke management, etc.) been met?		
Are all smoke management prescriptions met?		
Are all air quality considerations met?		
Is all equipment in place and in working order?		
In your opinion, can the burn be carried out according to plan and will it meet the objectives?		
Are you comfortable with the contingency plan?		

If there is a NO response to any of the above questions, the burn will not occur until the problem is solved.

This is a required form and must be completed prior to ignition.

_____ _____ _____

Signature of burn boss Date Time

APPENDIX 26

FIRE PREVENTION PLAN

GENERAL ACTIONS

While Mount Rainier National Park experiences a low incidence of human-caused fires, the following general action items are part of the wildland fire prevention program and are designed to address the most probable sources of wildfire which include power lines, campfires and smokers.

1. All remaining overhead power lines in the park are to be converted to underground by the year 2000.
Responsible person: Chief of Maintenance

2. The current fire danger rating is posted at park entrance stations during the fire season.
Responsible person: Fee Supervisor

3. "Fireworks Prohibited" signs are posted at park entrance stations and campgrounds during the July 4th holiday period. ***Responsible person: Fee Supervisor***

4. "Campfires Prohibited" message which is incorporated within Wilderness regulation signs are posted at all park trailheads. ***Responsible person: District Rangers***

5. "Campfires Prohibited" educational message is provided in person with each backcountry permit issued at the park's Hiker Centers. ***Responsible person: Wilderness DR***

6. A human-caused fire prevention poster will be procured for use on general public information bulletin boards and other appropriate locations. ***Responsible person: Fire Management Officer***

7. The park Step-Up Plan for wildland fire calls for increased staffing and patrols during periods of high fire danger. ***Responsible person: Fire Management Officer***

8. A press release will be issued for public notification during periods of high fire danger.
Responsible person: Public Affairs Officer

9. A fire prevention message will be presented at all visitor centers, and scheduled naturalist programs during periods of high fire danger. ***Responsible person: Chief Naturalist***

10. A fire prevention message will be included on the park's AM radio Tourist Information System broadcast during periods of high fire danger.
Responsible person: Communications Center Supervisor

11. Park operations and visitor activities may be restricted during periods of high fire danger.
Responsible person: Superintendent

12. A fire prevention message will be developed and included in the summer edition of the park's newspaper during years with a severe fire season forecasted.
Responsible persons: Fire Management Officer, Assistant Chief Naturalist

Appendix 27

Incident Intelligence Report (ICS 209)

The ICS-209 is now a web based program after a decision made by the NWCG (National Wildfire Coordinating Group). The 209 gives the National Fire Center information so as it can be complied for the entire nation and assists the MAC groups in allocation of national resources.
See sample 209 on next page.

Use the internet sites listed below to enter and send the data. The information is due daily at 1700 hours.

If you have problems the help desk can be reached at 1-800-253-5559 or by calling Boise during business hours,
Or you can email the help desk at fire_help@dms.nwcg.gov

The Puget Sound Interagency Communication Center (PSICC) has also been helpful, and works closely with Mount Rainier National Park.
PSICC can be reached at 425 -744-3550.

Other areas for reference can be found at:
www.fs.fed.us/r1/fire/nrcc
www.famweb.nwcg.gov
http://famweb.nwcg.gov

- user name = ops$nps9511 for suppression fire or
- 9518 for fire use

- password = nwteams or nrteams

Incident Intelligence Summary (ICS-209)

Date	Time	Initial | | Update | | Final | |	Incident Number	Incident Name

Incident Type	Start Date/Time	Cause	Incident Commander	IMT Type	State/Unit

County:	Lat/Long or TRS	Short Location Description (in reference to nearest town):

Current Situation

Size/Area Involved **See remarks**	**% Contained or MMA**	**Expected Containment Date: Time:**	**Line to Build (# chains)**	**($) Costs to Date**	**Declared Controlled Date: Time:**

Injuries Today	Fatalities

Structure Information		
Type of Structure	**# Threatened**	**# Destroyed**

Threat to Human Life/Safety:	Fuels Involved	Resources threatened (kind(s) and value/significance):

Current Weather Conditions
Wind Speed: **Temperature:**
Wind Direction: **Relative Humidity:**

Today's observed fire behavior (leave blank for non-fire events)**:**

Significant events today (closures, evacuations, significant progress made, etc.)**:**

Committed Resources

Agency	CRW1	CRW2	HEL1	HEL2	HEL3	ENGS	OVHD	DOZR	WTDR	OTHER	Total Personnel
USFS											
BLM											
NPS											
FWS											
BIA											
State											
Private											
Other											
Total											

Prepared by:	Approved by:	Sent to: by:

		Date:	**Time:**

Outlook			
Estimated Control **Date:** **Time:**	**Projected Final Size**	**Estimated Final Cost**	**Tomorrow's Forecasted Weather** **Wind Speed:** **Gusts** **Temperature:** **Wind Direction:** **Relative Humidity:**

Critical Resource Needs (kind & amount, in priority order)**:**

Priority	**Resource Kind**	**Amount**

Actions planned for next operational period:

Projected incident movement/spread during next operational period (leave blank for non-fire incidents)**:**

Major problems and concerns (control problems, social/political/economic concerns or impacts, etc.) Relate critical resource needs identified above to the Incident Action Plan.

For fire incidents, describe resistance to control in terms of:

How likely is it that containment/control targets will be met, given the current resources and suppression strategy?

Projected Demob Start (date and time)**:**

Remarks:
Acreage

Prepared by:	**Approved by:**	**Sent to**: **by:** **Date:** **Time:**

APPENDIX 28

Records and Reports

Permanent Park Records
The following will be held as permanent historic resource records:

- Fire reports (DI-1202, supplementary reports, ICS forms).
- Fire weather records.
- Historic records of the park, including photos or maps showing vegetative cover, etc.
- Monthly reports or other records which document fire occurrence or behavior.
- Maps or records pertinent to fire management.
- I.A.P. Incident Action Plans or 203 briefing

REPORTS NEEDED:

Wildland Fire Suppression
Wildland Fire Situation Analysis (WFSA)
Case/Incident Record (Form 10-343)
Fire Complexity Analysis
Individual Fire Report (DI-1202)
Incident Intelligence Summary (ICS 209)

Wildland Fire Use for Resource Benefit
Wildland Fire Situation Analysis (WFSA)
Wildland Fire Implementation Plan (WFIP)
Case/Incident Record (Form 10-343)
Fire Complexity Analysis
Individual Fire Report (DI-1202)
Incident Intelligence Summary (ICS 209)

Prescribed Fires
Wildland Fire Situation Analysis (WFSA)
Wildland Fire Implementation Plan (WFIP)
Case/Incident Record (Form 10-343)
Fire Complexity Analysis
Individual Fire Report (DI-1202)
Incident Intelligence Summary (ICS 209)

Hazard Fuel Reduction
Wildland Fire Situation Analysis (WFSA)
Wildland Fire Implementation Plan (WFIP)
Case/Incident Record (Form 10-343)
Fire Complexity Analysis
Permit from DNR

Situation Reports - 209
Situation reports contain current information about fire danger, fire status, and resource availability. Parks prepare daily situation reports when (1) fire danger is very high or extreme, (2) when a fire has occurred or is in progress, (3) or when required. Situation reports are prepared and transmitted on-line via the NPS wildland fire management computer system (SACS). Since situation reports are used in the FIREPRO needs analysis, it is important that daily entries be made for all fires by 1700 hrs.

APPENDIX 29

Mount Rainier National Park

YR_____#_____

Minimum Requirement / Minimum Tool Analysis

Completed By Project / SUP Manager:

1) One time project? Yes / No Recurring? (how often) _____

2) Project/Action Location and Description:

3) Mechanized equipment requested? No _____

Chain Saw _____	Power Tools _____	Helicopter_____	(A70 # _____)
Rock Drill _____	Generator _____	Fixed Wing_____	(A70 # _____)
Explosives _____	Snowmobile _____	Other _____	

4) Date(s) of Action: _____ Duration: _____

5) Describe alternative(s) on how task would be accomplished without use of mechanized equipment and/or less intrusive actions:

6) Describe impacts to wilderness resource/values of above alternative(s):

7) Describe impacts to visitor use of above alternative(s):

Signature_____ Date_____

Project Manager

Minimum Requirement / Minimum Tool Analysis

Completed By Wilderness Coordinator:

7) Minimum Requirement Analysis: Is the project or activity consistent with, or necessary to meet the minimum requirements for the administration of the area?

8) Minimum Tool Analysis: Will the selected tool or method used to complete the project result in the least overall impact to the Wilderness resource and values?

9) Describe the beneficial and detrimental effects on Wilderness values if the selected alternative is accomplished.

Recommendation: _____

Signature _____ Date_____
Wilderness Coordinator

****

APPROVED _____ DO NOT APPROVE _____

_____ Date _____
Superintendent

Comments:

APPENDIX 30

APPROVED WATER SOURCES

HELICOPTER DIPPING SITES

The attached list of lakes should be deep enough to dip the bucket without significant effects on physical, chemical and biological characteristics of the aquatic system. Generally they should be at least 15 ft. deep (or 4.5 m).

None of the park lakes have native fish populations. About 30 park lakes have reproducing populations of introduced fish. Most of the lakes have at least one, if not two amphibian species of concern, but dipping with the fire bucket towards the center, and deeper part of the lake should reduce impacts on these species.

Fire retardants should not be used near lakes and buckets used for dipping should be free of any fire retardant residue. All buckets should be washed before with a mild bleach and water solution if they came from a contaminated source.

Streams are generally not suitable for bucket dips. Depths and bottom substrate vary significantly. In addition, bull trout (listed threatened species) are found throughout streams in the White, West Fork, Mowich and Carbon watersheds (possibly Huckleberry as well). Bull trout in the White River and West Fork begin spawning during the summer with Carbon and Mowich a little later.
At least one amphibian Species of Concern is found in most park streams.

==========

KEY FOR LAKE DEPTHS

Each lake has an assigned hydrography code as most of the lakes are unnamed on USGS topo maps. Generally they should be at least 15 ft. deep (or 4.5 m).
Depths are in meters.

The L stands for lake, the next letter references the watershed
c = Carbon,
f = West Fork;
h= Huckleberry,
w = White;
o = Ohanapecosh;
z = Muddy Fork of Cowlitz;
n = Nisqually;
p = Puyallup;
m = Mowich

The numbers are the assigned numbers within that watershed.

APPENDIX 30

APPROVED WATER SOURCES

Hydrography code	Name (if named)	Survey Date	Depth (m)
lz10	lz10	8/31/1998	4.30
LM26	LM26	8/13/1996	4.70
LW18	LW18	10/19/1999	4.90
LW28	LW28	8/31/1999	4.90
LC31	CHENUIS	9/7/1993	5.00
LW16	LW16	10/18/1999	5.00
LW38	SHADOW	9/2/1999	5.00
LP18	LP18	8/20/1996	5.10
LW40	LW40	8/23/1999	5.20
LP22	KENWORTHY	7/26/1992	5.60
LN26	LN26	8/9/1999	5.70
lo09	lo09	9/14/1998	5.70
LW02	LW02	8/20/1995	5.70
LH12	LOWER PALISADES	9/1/1993	5.90
LM23	LM23	9/24/1996	6.00
lw37	SHADOW	9/6/1995	6.30
LW03	LW03	7/17/1995	6.40
LW09	HIDDEN	7/13/1994	7.00
LW26	SUNRISE	8/24/1988	7.00
LN03	ALLEN	7/22/1996	7.20
LF03	MARJORIE	8/6/1989	8.00
LW48	LW48(EMMONS PO)	8/3/1992	8.00
LZ32	CLIFF	7/28/1992	8.00
lz31	CLIFF (1370)	8/22/1996	8.30
LH18	LH18	8/29/1994	8.90
LM30	LM30	7/30/1996	9.00
LM32	LM32	7/30/1996	9.00
LW29	CRYSTAL	8/15/1989	9.20
LH15	LH15(GREEN PK)	7/27/1993	10.00
lz35	lz35	8/18/1998	10.50
LZ29	SNOW	7/11/1996	10.70
LZ27	BENCH	7/11/1995	11.00
LN19	REFLECTION	8/7/1995	11.50
LM11	LM11	8/19/1991	11.60
LP19	LP19	8/20/1996	12.00

Mount Rainier N. P.
APPROVED WATER
SOURCES

LC28	CHENUIS	9/7/1993	14.20
LW20	CLOVER	8/21/1995	14.20
LH14	UPPER PALISADES	7/24/1991	15.30
LH02	ELEANOR	7/14/1993	16.00
LZ21	LOUISE	8/3/1993	17.20
LM01	EUNICE	8/18/1992	20.00
LF02	OLIVER	8/6/1989	21.00
LF05	JAMES	8/28/1989	23.00
LM17	LM17	7/31/1996	24.00
LC07	GREEN	8/17/1992	29.00
lc35	CRESCENT	8/17/1995	29.00
LF04	ETHEL	9/1/1992	29.50
LN02	GEORGE	6/29/1993	42.50
lm04	lm04	8/25/1999	60.00

KEY FOR LAKE DEPTHS

Each lake has an assigned hydrography code as most of the lakes are unnamed on USGS topo maps. Generally they should be at least 15 ft. deep (or 4.5 m).
Depths are in meters.

The L stands for lake, the next letter references the watershed
c = Carbon,
f = West Fork;
h= Huckleberry,
w = White;
o = Ohanapecosh;
z = Muddy Fork of Cowlitz;
n = Nisqually;
p = Puyallup;
m = Mowich

The numbers are the assigned numbers within that watershed.

APPENDIX 31

STANDARD FIRE ORDERS

F Fight fire aggressively but provide for safety first.
I Initiate all actions based on current and expected fire behavior.
R Recognize current weather conditions and obtain forecast.
E Ensure instructions are given and understood.

O Obtain current information on fire status.
R Remain in communication with crew members, your supervisor, and adjoining forces.
D Determine safety zones and escape routes.
E Establish lookouts in potentially hazardous situations.
R Retain control at all times.
S Stay alert, keep calm, think clearly, act decisively.

WATCH OUT SITUATIONS

1. Fire not scouted and sized up.
2. In country not seen in daylight.
3. Safety zones and escape routes not identified.
4. Unfamiliar with weather and local factors influencing fire behavior.
5. Uninformed on strategy, tactics and hazards.
6. Instructions and assignments not clear.
7. No communication link with crew members/supervisor.
8. Constructing fireline without safe anchor point.
9. Building fireline downhill with fire below.
10. Attempting frontal assault on fire.
11. Unburned fuel between you and the fire.
12. Cannot see main fire, not in contact with anyone who can.
13. On a hillside where rolling material can ignite fuel below.
14. Weather is getting hotter and drier.
15. Wind increases and/or changes direction.
16. Getting frequent spot fires across line.
17. Terrain and fuels make escape to safety zone difficult.

Appendix 32
Key Fire Agency Contact List

Mount Rainier National Park

Park Headquarters (Tahoma Woods)	(360) 569-2211 ex 2334
Paradise Visitor Center	(360) 569-2211 ex 2328
Longmire Museum	(360) 569-2211 ex 3314
Ohanapecosh Visitor Center	(360) 494-2229
Sunrise Visitor Center	(360) 663-2425
Carbon River Ranger Station	(360) 829-9639
White River Ranger Station	(360) 663-2273
Longmire WIC	(360) 569-2211 ex 3317
Old Station (Upper Mtn) Paradise	(360) 569-2211 ex 2314
Wilkenson Ranger Station	(360) 829-9639

National Park Service

Allan Schmierer
NPS Regional Solicitor
1111 Jackson Street, Suite 700
Oakland, CA. 94607

Elizebeth Waddell
NPS - Air Resource Specialist (206)220-4287
Colmbia Cascades Support Office
Seattle, WA 98104

Brian Mitchell (303)969-2819
NPS Air Resources Division
Box 25287
Denver, CO 80225-0287

Washington State Agencies

Department of Natural Resources wwww.wa.gov/dnr

Region Manager, Southwest Region (360) 577-2025
Raymond Lasmanis (800) 527-3305
601 Bond Rd (360) 274-4196 FAX
PO Box 280
Castle Rock, WA 98611-0280
ray.lasmanis@wadnr.gov

Region Manager, South Puget Sound Region (360) 825-1631
950 Farman Ave N (360) 825-1672 FAX
Enumclaw, WA 98022-9282 (253) 383-7418 Pager

Chuck Frame
South Puget Sound Region, FMO (360) 825-1631
950 Farman St N (800) 527-3305
PO Box 68 (800) 562-6010 FIRE
Enumclaw, WA 98022-0068 (360) 825-1672 FAX

Mark Gray, DNR
1111 Washington ST SE
PO Box 47001 (360)-902-1000
Olympia, WA 98540-7000 (360)-902-1775

Don Naver (253) 863-7979
WA Dept of Fish and Wildlife
3808 122nd Ave E
Edgewood, WA 98372

Debbie Carnevali (253) 863-2600
WA Dept of Fish and Wildlife
3808 122nd Ave E
Edgewood, WA 98372

Washington State Historic Preservation Office (360) 407-0768
Allyson Brooks (contact Steve Matheson)
Community Preservation and Development Division
Department of Community Development
111 West 21st Avenue SW or P.O. Box 48343
Olympia, Washington 98504-8343

Department of Ecology
Visibility Program Manager
Frank Van Haren (360)-407-6000
Box 47600
Olympia, WA 98504-7600

David A. Grant
Smoke & Fuels Management Specialist
DNR, Resource Protection
1111 Washington St SE
Mailstop 47037
Olympia, WA. 98504-7037

USFS - Gifford Pinchot National Forest

GP Forest Supervisor - Claire Lavendel clavendel@fs.fed.us
Deputy Forest Supervisor - Lynn Burditt lburditt@fs.fed.us
10600 NE 51st Circle (360) 891-5000
Vancouver, WA 98682 (360) 750-5045 FAX

Fire Staff Office & FMO
Mike Matarrese (360) 891-5146
6926 E Fourth Plain Blvd, PO Box 8944
Vancouver, WA 98668-8944

Dave McCullough
Packwood Ranger District (360) 494-1177
13068 US Hwy 12 (360) 494-0621 FAX
Packwod, WA 98361

Fire Assistant and Planning Assistant

Dale Meyer or Fred Noack (360) 497-1133 Cowlitz
Valley Ranger District (360) 497-1102 FAX
10024 US Hwy 12, PO Box 670
Randell, WA 98377

Andrea Ruchty (360) 497-1136
Biologist (360) 497-1102 FAX
Cowlitz Valley (Randell) Ranger District
10024 US Hwy 12 or PO Box 670
Randell, WA 98377

Tom Kogut (360) 497-1131
Wildlife Biologist (360) 497-1102 FAX
Cowlitz Valley (Randell) Ranger District
Randell, WA 98377

NW Fire Prevention & Education Team
Alice J. Turner (360) 891-5226
10600 NE 51st Circle (360) 891-5228 FAX
Vancouver, WA 98682
nwfirepreventionteam@yahoo.com

USFS - Mt Baker-Snoqualmie National Forest

Forest Supervisor
John Phipps (425) 744-3390
21905 64th Ave W (425) 744-3255
Mountlake Terrace, WA 98403 jphipps@fs.fed.us

USFS – Okanogan/Wenatchee National Forest

Forest Supervisor - Sonny O'Neal Soneal@fs.fed.us
Deputy Forest Supervisor - Alan Quan Aquan@fs.fed.us
215 Melody Lane (509) 662-4335
Wenatchee, WA 98801-5933 (509) 662-4368 FAX

Jim Bailey (509) 653-2205 ex 248
AFMO Fire and Fuels Planner (509) 653-2638 FAX
Naches Ranger District Jwbailey@fs.fed.us
10061 US Highway 12
Naches, WA 98937

Other Cooperating Associations

Puget Sound Interagency Communication Center (425) 744-3550

Laurie Perrett (503) 808-2145
Director of Fire and Aviation Management, USFS (503) 808-2586 FAX
PNW Regional Office lperrett@fs.fed.us

PO Box 3623 or 333 SW First Ave
Portland, OR 97208-3623

NOAA National Weather Service Office — (206) 526-6095
Ted Buehner — (206) 526- 6095 ex223
7600 Sand Point Way NE,
Seattle, WA 98115-0700 — fax 526-6094

Gary Olson, Fire Chief — (360) 569-2752 Fax(360) 569-2036
Pierce 23 Fire & Rescue
PO Box 842 or 18109 541st E
Elbe, WA. 98330

U.S. Army Corps of Engineers — (206) 764-6904
Susan Glenn
P.O. Box 3755
Seattle, WA 98124-2255

U.S. Fish and Wildlife Service — (360) 753-4068
Ken Berg
510 Desmond Drive SE, Suite 102
Lacey, WA 98503

National Marine Fisheries Service
Tom Hooper/Matt Logenbaugh
510 Desmond Drive SE, Suite 108
Lacey, WA 98503

U.S. Environmental Protection Agency — (206) 553-6522
Richard Clark
300 Desmond Drive SE, Suite 102
Lacey, WA 98503

continued

Appendix 32
Key Agency Fire Contacts

TRIBAL CONTACTS

Near Mount Rainier National Park

Tribe	Contact	Address	Telephone	Facsimile
Muckleshoot Indian Tribe	John Daniels, Jr., Chairman	39015-172nd Ave., SE, Auburn, WA 98092-9763	(253) 939-3311	(253) 939-5311
	Melissa Calvert, Director Muckleshoot Wildlife & Cultural Resource Programs	39015 172nd Ave SE Auburn, WA. 98092	(253) 939-3311 ext. 3266	(253) 876-3312
Puyallup Tribe of Indians	Bill Sterud, Chairman	1850 Alexander Avenue Tacoma, WA 98421	(253) 572-7800	
	Judy C. Wright Tribal Historian	2002 East 28th Street Tacoma WA 98404	(253) 573-7898	(253) 573-7887
	Bill Sullivan Natural Resources Director	1850 Alexander Avenue Tacoma, WA 98421	(253) 572-7800	
	Jeffrey Thomas Resources and Cultural Program *jthomas20@mindspring.com*	6824 Pioneer Way Puyallup, WA 98371	(253) 845-9225	(253) 848-7341
Nisqually Indian Tribe	Mr. Dorian Sanchez, Chairman	4820 She-Nah-Num Dr. SE, Olympia, WA 98513	(360) 456-5221	(360) 438-8618
	Leonard Squally Historical Committee Chair	4820 She-Nah-Num Dr. SE, Olympia, WA 98513	(360) 456-5221	(360) 438-8618
	Georgianna Kautz, Director Natural Resources Division	12501 Yelm Highway SE Olympia, WA 98513	(360) 438-8687	(360) 438-8742
Confederated Tribes and Bands of the Yakama Nation	Jerry Meninick, Chairman	P.O. Box 151, Toppenish, WA 98948-0151	(509) 865-5121	(509) 865-5528
	Carroll Palmer, Director Division of Natural Resources *cpalmer@yakama.com*	P.O. Box 151, Toppenish, WA 98948-0151	(509) 865-5121	(509) 865-6850
	Johnson Meninick, Director Cultural Resource Division	P.O. Box 151, Toppenish, WA 98948-0151	(509) 865-5121	(509) 865-4664
Squaxin Island Tribe	David Lopeman, Chairman	SE 70, Squaxin Lane, Shelton, WA 98584-9200	(360) 426-9781	(360) 426-6577
	Ronda Foster, Director Heritage & Culture Committee	SE 70, Squaxin Lane, Shelton, WA 98584-9200	(360)426-9781 ext. 3504	
Cowlitz Indian Tribe	John Barnett, Chairman	P.O. Box 2547 Longview, WA 98632	(360) 577-8140	
	Talyor Aalvik Natural Resources Manager	P.O. Box 2547 Longview, WA 98632	(360) 577-8140	
	Dave Burlingame Cultural Committee Chairman *kinswa@hotmail.com*	P.O. Box 114 Salkum, WA 98582-0114	(360) 985-2052	

Appendix 33

Mount Rainier National Park

FIRE RELATED WEB SITES

OPERATIONS

www.Fire.blm.gov/Standard/redbook.htm
http://famweb.nwcg.gov/ ERC pocket cards, 209, sit report
www.fire.org
www.fs.fed.us/fire/planning/nist/
www.nps.gov/fire/fire/fir_wil_planningandpolicy.html
www.nwccweb.us NW Interagency Coordination Center in Portland

WEATHER

www.nifc.gov/news/pred.serviceMain_page.htm
www.fs.fed.us/fire/wfsa WFSA Wild land fire situational analysis
www.wrh.noaa.gov/seattle/fireweather spot weather forecast
www.fs.fed.us/fire/planning/nist Fire family plus
208-387-5290, help desk 1-800-253-5559
www.nws.noaa.gov/organization.php
http://fire.org
www.frames.gov/tools Fire research and management exchange system
http://famweb.nwcg.gov Weather info management system (WIMS)
http://famweb.nwcg.gov/pocketcards/standard.htm

AVIATION

www.safecom.gov
www.aff.gov flight following
www.fs.fed.us/r6/fire/aviation
www.oas.gov
www.fs.fed.us/fire/av_safety
www.aviation.blm.gov
www.nifc.gov/ihog

TRAINING

http://iat.nifc.gov aviation training
www.nationalfiretraining.net

INTERAGENCY FIRE PROGRAM MANAGEMENT

www.ifpm.nifc.gov/
http://www.ut.blm.gov/FIRE/IFPM.htm has more links once you're on the site.
www.opm.gov

Mount Rainier National Park

FIRE RELATED WEB SITES

SAFETY

www.fs.fed.us/fire/safety/safenet/safenet.html
www.safecom.gov/
www.fireleadership.gov
www.fs.fed.us/fire/safety
www.nifc.gov/fire
www.nifc.gov/sixminutes/dsp_sixminutes.php

BUDGET

http://fpa.nifc.gov fire program analysis
www.blm.gov/Standards/BLM_Fire_SEVERITY_FUNDING-REQUEST.htm
www.fs.fed.us/rm/fire foam

FIRE POLICY AND PLANNNING

http://www.nifc/fire_policy
www.nwcg.gov/pms/taskbooks taskbooks
www.frames.gov
http://fire.org/
www.nps.gov/fire
http://www.fire.blm.gov/standards/FIRE_AVIATION_PREPAREDNESS_PREVIEW_GUIDE.htm
Preparedness reviews
www.nwcg.gov Terminology and definitions
www.nps.gov/fire/fire/fir_wil_pla_reference18.html

HAZ MAT FUELS

http://www.firewise.org
www.nps.gov/fire

NATIONAL RESPONSE PLAN

Homeland security
www.dhs.gov/dhspublic/interopp/editorial/editorial_0566.xml

Appendix 34

MOUNT RAINIER NATIONAL PARK
MINIMUM IMPACT SUPPRESSION TACTICS (MIST) GUIDELINES

(Rev. 7/20/05)

MINIMUM IMPACT SUPPRESSION TACTICS (MIST) GUIDELINES

NPS Guidelines, Plus Additional Recommendations for Mount Rainier National Park

I. CONCEPT

The concept of Minimum Impact Suppression Tactics (MIST) is to use the minimum amount of forces necessary to effectively achieve the fire management protection objectives consistent with land and resource management objectives. It implies a greater sensitivity to the impacts of fire tactics (both suppression and fire use) and their long-term effects when determining how to implement an appropriate suppression response. In some cases, MIST may indicate cold trailing or wet line may be more appropriate than constructed hand line. Individual determinations will be dependent on the specific situation and circumstances of each fire.

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

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

Actions on all wildfires within land management agencies protected wilderness areas will be those having a minimum impact on the physical resources associated with each site. In so doing, the principle of fighting fire aggressively but providing for safety first, will not be compromised.

MIST is not intended to represent a separate or distinct classification of firefighting tactics but rather a mind set of how to manage a wildfire while minimizing the long-term effects of the suppression and holding actions. When the term MIST is used in this document it reflects the above principle.

The key challenge to the line officer, fire manager and firefighter is to be able to select the wildfire tactics that are appropriate given the fire’s probable or potential behavior. The guiding principle is always least cost plus loss while meeting land and resource management objectives. It is the second part of this statement which must be recognized more than it has in the past. Appreciations of the values associated with wilderness have been more difficult to articulate but, nevertheless, are important. As this recognition emerges, actions must be modified to accommodate a new awareness of them.

These actions, or MIST, may result in an increase in the amount of time spent watching, rather than disturbing, a dying fire to insure it does not rise again. They may also involve additional rehabilitation measures on the site that were not previously carried out.

When selecting an appropriate management response, firefighter safety must remain the highest concern. In addition, fire managers must be assured the planned actions will be effective and will remain effective over the expected duration of the fire.

II. GOALS

The goal of MIST is to halt, herd or delay fire spread in order to maintain the fire within predetermined parameters while producing the least possible impact on the resource being protected, in the safest manner. These parameters are represented by the initial attack incident commander's size-up of the situation in the case of a new start or by the escaped fire situation analysis (EFSA) in case of an escaped fire.

It is important to consider probable rehabilitation need as a part of selecting the appropriate suppression response. Tactics that reduce the need for rehab are preferred whenever feasible.

III. RESPONSIBILITY

As stated previously, safety is the highest priority. All action will be anchored to the standard fire orders and watch out situations. Safety will remain the responsibility of each person involved with the incident.

The intent of this guide is to serve as a checklist for the Incident Commander (IC), Section Chiefs, and all field supervisors/firefighters. Accomplishment of minimum impact suppression techniques originates with instructions that are understandable, stated in measurable terms, and communicated both verbally and in writing. Evaluation of these tactics both during and after implementation will further the understanding and achievement of good land stewardship ethics during fire management activities.

The following responsibilities and guidelines are for park Superintendents, IMT (incident management teams), and firefighters to consider. Some or all of the items may apply, depending upon the situation.

A. Park Superintendent / or appointed Agency Liaison Responsibilities

1. To transmit and define the land management objectives of the fire area to a fire team or persons managing the fire. This can be accomplished through a delegation of authority. It is recommended that a park Agency Liaison be assigned on all incidents to assist the fire team or IC.
2. The Superintendent or their acting designee shall sign and review the WFSA/WFIP for compliance. (Wildland fire situation analysis, WFSA or wildland fire implementation plan, WFIP).

B. Resource Advisor (READ) Responsibilities

This position should be filled by a qualified park employee or trainee. Their responsibility is to insure the interpretation and implementation of WFSA/WFIP and other oral or written line officer direction is adequately carried out.

1. Provide specific direction and guidelines as needed.
2. Consult with fisheries and wildlife biologists, cultural resource staff, wilderness staff, and other specialists as needed.
3. Participate at fire team planning sessions, provide input, review IAP (incident action plan) and attend daily briefings to emphasize resource concerns and Park management's expectations.
4. Provide assistance in updating WFSA/WFIP, when necessary.
5. Conduct site visits on the fire, as necessary, due to resource concerns or as requested by the Superintendent or fire team.
6. Participate in incident management team debriefing and assist in evaluation of team performance related to MIST.

C. IMT Fire Team Responsibilities

<u>IC, Command and General Staff Responsibilities:</u>
The IC, Command and General Staff should consider the following:

1. Evaluate tactics during planning and strategy sessions to see that they meet Superintendent's objectives, T&E conservation measures and MIST, both verbally and through the EFSA/WFSA/WFIP.
2. Establish and nurture a dialogue with the resource advisor and/or agency liaison assigned to the fire team.
3. Notify Superintendent or agency liaison if T&E conservation measures are impacted.
4. Discuss MIST with field supervisors during overhead briefings to gain full understanding of tactics.
5. Ensure MIST techniques are implemented during line construction, as well as, other resource disturbing activities.
6. Review actions on site and evaluate for compliance with Superintendent's direction/delegation and tactical effectiveness in achieving fire management protection objectives.

<u>Planning Section Responsibilities:</u>
The Planning Section should consider the following:

1. Use resource advisor(s) to evaluate that management tactics are commensurate with land/resource objectives and incident objectives. Involve the resource advisor in the development and updating of the daily of the WFSA/WFIP.
2. Ensure that documentation and signatures are obtained on the WFSA/WFIP.
3. Use an assessment team to get a different perspective of the situation.
4. Use additional consultation from "publics" or someone outside the agency, especially if the fire has been or is expected to be burning for an extended period of time.

5. Ensure that instructions for MIST are listed in the IAP (incident action plan) and relayed to field personnel.

Operations Section, including field Supervisor's Responsibilities:

The Operations Section should consider the following:

1. Adjust line production rates to reflect the MIST, while placing fire fighter safety first.
2. Emphasize MIST techniques during each operational period briefing and explain conservation measures expectations for instructions listed in incident action plan.
3. Anticipate fire behavior and ensure all instructions can be implemented safely
4. Minimize or avoid stream course disturbance, sedimentation, and actions that will result in increased water temperature.
5. Maintain minimum no-touch buffer within established area of fish-bearing streams. This could include up to 300 feet within the area of these streams and is dependent on site specific prescriptions currently being developed.
6. If helicopters are involved, use long line remote hook in lieu of constructing helispots to deliver/retrieve gear.
7. Brief helibase personnel on the park's designated water source/dip sites; provide pilots with maps of lakes.
8. Consider use of helicopter bucket drops and water/foam before calling for an air tanker or retardant.
9. Avoid cutting/falling old growth trees; work with agency liaison and READ.
10. Consider coyote camps versus fixed campsite in sensitive areas. See Logistic section on the following pages.
11. If a dozer is necessary (near park boundaries or developed areas) use a brush blade for line building.
12. Detail objectives for extent of mop-up necessary, for instance: "_____ distance within perimeter boundary."
13. Monitor suppression tactics/conditions.

Chemical Fire Retardant, Foam and Fuel

1. Wherever possible, avoid using chemicals when there is a potential for contamination of waterways (based on proximity, wind direction, wind speed, size and frequency of loads, etc.). Avoid use of retardant or foam within 300 feet of streams or within designated critical habitat. Use of retardant should also be avoided in areas with lakes, bogs, or swamps as effects on aquatic biota may be prolonged. Consult with resource advisors.
2. Do not pump directly from streams if chemical products are going to be injected into the pump or pumping system. If chemicals are needed, use a fold-a-tank from which to pump water.
3. If possible, do not dip helicopter buckets from streams where juvenile or adult salmon may be present. Mount Rainier National Park biologists will provide a list of these waterways. (Firefighter and public safety will always take precedence, and if helicopter drops are needed, they will be utilized.)
4. Use of helicopter buckets will occur only after chemical injection systems (storage containers) have been removed from the bucket or helicopter.

5. Keep refueling, fuel storage, and fuel trucks outside designated critical habitat, or utilize spill pads and/or containment units.
6. Use spill pads under portable pumps and fuel cans/fuel lines connected to pumps.
7. Report any chemical spill or contamination to the Agency Liaison or Superintendent.

Field Supervisors (DIVS, STRC, CRBW, module leaders, etc.) Responsibilities:
The field supervisors should consider the following:

1. Ensure that crew superintendents, dozer, falling bosses and single resource bosses understand what is expected.
2. Discuss minimum impact tactics with field personnel and monitor results.
3. Report any loss of T&E habitat in conjunction with the listed conservation measure objectives.
4. If helicopters are involved, use natural openings as much as possible; minimize cutting only to allow safe operations. Avoid construction of landing areas in high visitor use areas.
5. Provide feedback on implementation of tactics; were they successful in halting fire spread, what revisions are necessary?
6. Look for opportunities to further minimize impact to land and resources during the suppression and mop-up phase.
7. Document and report any hazardous fuel spills.

Fire Fighter Personal Camp Conduct

1. Use "leave no trace" camping techniques.
2. Minimize disturbance to land when preparing bedding site. Do not clear vegetation or trench to create bedding sites.
3. Use stoves for cooking.
4. Don't burn plastics or aluminum, "pack it out" with other garbage.
5. Keep a clean camp and store food and garbage so it is unavailable to all animals. Ensure items such as empty food containers are clean and odor free, never bury them.
6. Select travel routes between camp and fire and define clearly.
7. Carry water and bathe away from lakes and streams. Personnel must not introduce soaps, shampoos or other personal grooming chemicals into waterways.

Logistics Section Responsibilities:
The Logistic Section should consider the following:
Campsites Considerations and Personal Conduct

1. Ensure actions performed around areas other than Incident Base, (i.e.) dumpsites, camps, staging areas, helibases, etc., results in minimum impact upon the environment.
2. In sensitive area, consider use of portable facilities (heat/cook units, latrines).
3. Educate fire fighters on proper food storage practices. Garbage and food items will be handled appropriately by firefighters to minimize attraction of wildlife. Consider the use of bear containers for food storage.
4. Consider impacts on both present and future users. An agency commitment to wilderness values will promote those values to the public.

5. Locate facilities outside of wilderness whenever possible.
6. Use existing campsites if available. Lay out the camp components carefully from the start. Define cooking, sleeping, latrine, and water supply.
7. Coordinate with the Resource Advisor in choosing a site with the most reasonable qualities of resource protection and safety concerns.
8. If existing campsites are not available, select campsites that isn't unlikely to be observed by visitors/users.
9. Camps, staging areas, and base heliports will be located outside designated habitat, if at all possible, and will be identified on a map prior to implementation.
10. Change camp location if ground vegetation in and around the camp shows signs of excessive use.
11. Do minimal disturbance to land in preparing bedding and campfire sites. Do not clear vegetation or do trenching to create bedding sites.
12. Minimize the number of trails and ensure adequate marking. Select alternate travel routes between camp and fire if trail becomes excessive.
13. Evaluate short-term low impact camps such as coyote or spike versus use of longer-term higher impact camps.
14. New site locations should be on impact resistant and naturally draining areas such as rocky or sandy soils, or openings with heavy timber.
15. Avoid camps in meadows, along streams or on lakeshores. Located at least 200 feet from lakes, streams, trails, or other sensitive areas.
16. Do not use nails in trees.
17. Consider fabric ground cloth for protection in high use areas such as around cooking facilities.
18. Latrine sites should be a minimum of 300 feet from water sources.
19. Consider the use of portable vault toilets in spike camps. If not, waste cat holes should be dug 6 to 8 inches deep, with toilet paper packed out.

IV. IMPLEMENTATION GUIDELINES

Minimum impact management is an increased emphasis to do the job of managing a fire while maintaining a high standard of caring for the land. Actual fire conditions and good judgment will dictate the actions. Consider what is necessary to monitor fire spread and ensure it is contained within the fire line or designated perimeter boundary.

Where large fire affect more than about 10% of a Section 7 watershed, it is recommended that a scientific group of experts be convened to prepare a peer reviewed assessment or analysis of the short and long term effects from the wildfire, suppression actions and rehabilitation. The assessment should also recommend actions, (if there are any) that may be appropriate for the burned or unburned areas with the watershed.

A. Safety

- Safety and communications is of utmost importance.
- Ensuring that safety is the first priority and primary concern of all firefighters

- Encouraging firefighters to routinely review LCES and apply the 18 Watch Out Situations and 10 Standard Fire Orders during their incident tenure
- Be particularly cautious with: aerial hazards, unburned fuel between personnel and the fire, burning or partially burning live and dead trees
- Be constantly aware of the surroundings, of expected fire behavior, and possible future fire perimeter (one or two days hence).

B. Conservation Measures

When used in the context of the Endangered Species Act (16 U.S.C. 1531 *et seq*.) (Act), "conservation measures" represent actions proposed by the Federal agency that are intended to further the recovery of and/or to minimize or compensate for project effects on the species under review. The following conservation measures were agreed to by the Park and U.S. Fish and Wildlife Service biologists as required measures to minimize adverse impacts to listed species and their habitats.

Northern Spotted Owl and Marbled Murrelet

1. No stand replacing fires will be allowed to burn in a spotted owl 100-acre core area at any time.
2. Only non-motorized suppression techniques will be used in the 100- acre core area of spotted owl territories during the early nesting season
3. Ground fires will be allowed to burn up to 10 percent of a spotted owl 100-acre core area beginning August 1
4. Spotted owl territories will be maintained with at least 55 percent of the 1.8-mile circle and 75 percent of the 0.7-mile circle in suitable habitat.
5. All fires that occur in unsurveyed suitable spotted owl habitat or within active nesting territories of the 0.7-mile circle before August 1 will be suppressed.
6. All fires that occur in occupied marbled murrelet habitat before August 6 will be suppressed.
7. No more than 45 acres of stand replacing fires will occur in occupied marbled murrelet habitat within five year period.
8. No more than 927 acres of stand replacing fires will occur in suitable spotted owl habitat or unoccupied murrelet habitat within five year period.
9. Hazard fuels treatments will occur after August 5.
10. Retardants will be used outside of suitable spotted owl and murrelet habitat. If retardants need to be used in suitable spotted owl or murrelet habitat, it will be addressed under future emergency consultation.
11. From March 15 to July 31, ground fires are permitted up to 10 percent of the 0.7 mile circle in non-nesting owl territories.

Terrestrial

1. A qualified resource advisor will be assigned to fires as needed to minimize impacts to threatened and endangered species.

2. Information regarding location of sensitive wildlife resources will be provided to the Incident Commander for consideration in planning fire activities.
3. As much as possible, disturbance to known owl nests will be minimized by following USFWS guidance on disturbance distance thresholds during fire suppression and fire use operations. (See chart)
4. When possible, crews will hike into and out from a fire rather than flying.
5. When possible, hand tools will be used rather than power equipment.
6. When possible, helicopters will fly from nearby airports and helibases, rather than staging within threatened and endangered species habitat *in* the park.
7. When possible, helicopter operations in the park will be staged at Kautz Creek or at sites > 4500 rather than other forested areas of the park.
8. When possible, helicopters will fly greater than 120 yards above the tree canopy, or greater than 550 feet above ground level (AGL) over threatened and endangered species habitat.
9. Removal of mature coniferous trees will be minimized.
10. Garbage and food items will be handled appropriately by firefighters to minimize attraction of corvids.
11. Over sensitive areas, flights and other noise producing activities will be limited within 2 hours of sunrise and sunset, when possible.
12. Whenever possible, planned activities (such as hazard fuel reduction) within suitable habitat will be conducted outside of the breeding seasons for listed bird species (or as late as possible in the breeding season) unless site-specific protocol surveys conducted prior to fire management activities document no use of the area by the species.

Aquatic Resources

Fire Suppression (Retardants, Foams, and Water Withdrawals)

1. A qualified resource advisor will be consulted on fires greater than 0.25 acres regarding the presence of federally listed fish species.
2. Evaluate suppression of fires in riparian habitat within bull trout watersheds to minimize impacts to bull trout. The Resource Advisor can provide maps of these areas.
3. Avoid using retardants, foams, and surfactants near lakes or flowing streams (e.g. not to be applied within 300 feet of waterway with listed fish species).
4. Avoid water withdrawals from fish bearing streams whenever possible (See Map).
5. Direct the spraying of foam away from waterways whenever possible.
6. Avoid back flushing pumps and charged hoses into lakes or flowing streams. Utilize check bleeder valves whenever possible. Direct flow away from water sources when draining pumps or charged hoses.
7. Stream profile will be restored in areas where check dams were constructed.
8. If tactically possible, use of foam or retardant will be limited to upslope areas. Helicopter bucket dipping from streams in or adjacent to spawning should be avoided, including inlet streams to lakes.

9. Helicopter bucket dipping should be conducted only after chemical injection systems have been removed, disconnected or rinsed clean if foam is not needed for that fire

suppression activity. If foam application is necessary, crews will consider whether to use a remote dip tank away from water sources.

10. Pump intakes placed in fish bearing lakes or streams will be covered with 1/8 inch or less screened material.
11. Avoid the use of riparian areas (300 feet from flowing water) as landing areas and refueling areas for helicopter operations whenever possible.
12. Locate fire camps away from riparian areas whenever possible.

Sediment Control

1. Limit fire lines to three feet in width, construct erosion control structures, and rehabilitate them to minimize sediment delivery to streams whenever possible.
2. To protect fisheries resources, stream disturbing activities shall generally occur during the dry season from July 15 through August 15.
3. Erosion control methods shall be used to prevent silt-laden water from entering the stream whenever deemed necessary. On larger fires, Federal Burned Area Emergency Rehabilitation (BAER) Standards may be utilized.
4. Wastewater from project activities and water removed from within the work area will be routed to an area landward of the ordinary high water line to allow for removal of fine sediment and other contaminants prior to being discharged to the stream. Sediment entering the stream channel may affect spawning gravels, substrate embeddedness, pool frequency/quality and development of large pools. Chemical contaminants may have a negative biological affect on many forms of aquatic life including salmonids and macroinvertebrates.

Water Quality

1. In the event of a hazardous fuel spill, MORA will adhere to the Spill Prevention Control and Countermeasures Plan. On larger pumping and helicopter operations, minimal spill prevention kits will be available onsite. The desired outcome is to control, absorb, or contain the spill for clean-up and disposal.
2. Any machinery maintenance involving potential contaminants (fuel, oil, hydraulic fluid, etc) will occur outside the riparian area whenever possible
3. Prior to starting work each day, all machinery will be inspected for leaks (fuel, oil, hydraulic fluid, etc) and all necessary repairs will be made before the commencement of work.
4. Minimize the amount of time that heavy equipment is in riparian areas or stream channels.
5. Removal of mature coniferous and deciduous trees within 300 ft. of a wetland, stream, or river will be minimized. The crew will directionally fall trees towards the waterway.
6. Helicopter landings in stream and river channels will occur outside the active channel whenever possible.
7. Any hazmat spill will be reported to the resource advisor and documented
8. Not altering water courses to fight fire and limiting the use of chemical retardant, foam and gasoline (without secondary containment) near water resources.

B. Best Management Practices and Other Mitigation Strategies

General Strategies (affecting multiple resources)

1. Increase communication, cooperation and coordination with other park divisions, neighboring agencies, Native American Tribes, and private landowners.
2. Comply with all federal and state regulations governing air pollution and smoke management standards
3. Comply with all applicable NPS policy and guidelines related to wild land fire management and ecosystem health.
4. Utilize controlled burn intensities to result in a fast-moving, lower temperature impact fire.
5. Require post-fire rehabilitation of fire lines, including efforts to reduce compaction by scarifying the soil, and installing natural erosion barriers.

Air Resources

The Superintendent will comply with all federal and state regulations governing air pollution and smoke management standards and all applicable NPS policy and guidelines related to wild land fire management and ecosystem health.

1. No burning would be conducted when air regulatory agencies declare air pollution episodes and impaired air conditions for Pierce or Lewis County.
2. Park personnel would obtain updated burning information (1-800-323-BURN) on the day of the burn and follow the instructions that apply for the day and location of the proposed burning.
3. To limit impacts to visitor use, no burning is permitted during weekends.
4. All materials earmarked for burning would be placed in clearly marked piles at designated burn areas, such as the Kautz Creek maintenance area or Ohanapecosh Wastewater Treatment Plant. Proper signage to identify and describe what materials are placed there for burning is necessary.
5. Burn piles would be located at least 50 feet from structures.
6. As appropriate, flammable debris would be cleared from the area.
7. Burning would only be conducted during periods when adjacent fuel moisture was high (with an ignition component of less than 50 percent) and winds were calm or light.
8. Adequate suppression equipment and personnel would be on hand (a connected water hose, or at least five gallons of water and a shovel available nearby).
9. To limit impacts to visitor use, no burning is permitted during weekends.
10. Washington State Smoke Management Plan. All prescribed burning and debris disposal would comply with regulations contained in the Washington State Department of Natural Resources Smoke Management Plan. Small burn piles up to about six feet in diameter and would contain less than 100 tons (109,718 kilograms) of natural vegetation. (This meets the definition of small fires under the smoke management plan.) For prescribed fires that would consume 100 tons or more of material, the park would apply to Washington Department of Natural Resources, including the Department of Ecology for smoke management approval. Burns would be timed to minimize smoke impacts on air quality and visibility utilizing favorable

conditions of atmospheric stability, mixing height and transport winds. No piles would be ignited during smoke management burn bans or *visibility protection periods* (including from about Memorial Day to Labor Day).

11. Limiting the number of acres and amount of fuel burned, assessing timing and method of ignition.
12. Determining the fuel moisture content of fuel.
13. Coordinating with other agencies and land owners to limit the number of fires occurring simultaneously.

Soils

1. Selecting procedures, tools and equipment with the least possible impact to the Environment.
2. Implementing the use of water (bucket drops or wet-lining) as a fire suppression Technique.
3. Ensuring that firefighting equipment is well maintained to prevent spills of lubricants, fuels or other materials (as well as using ground cloths beneath such equipment to prevent accidental releases).
4. Allowing the fire to burn to a natural barrier.
5. Using the minimum necessary depth and width on fire line construction.
6. Covering fire lines with organic material as part of the rehabilitation process;
7. Installing water bars or other silt protection measures in sensitive areas;
8. Minimizing the felling of trees and bucking of downed logs along the fire line and within the perimeter of the fire.
9. Minimizing the limbing of vegetation adjacent to the fire line.
10. Removing or cutting vegetation only as necessary to prevent fire spread.
11. Limiting the locations of fire camps, helispots, hand lines, intensive mop-up and other concentrated fire activities to non-sensitive sites.
12. Leaving standing dead trees (snags).
13. Using native materials for sediment traps.
14. Using existing spike camps or camping in resilient areas (rocky or sandy soils) showing signs of recent human disturbance (while avoiding wet meadows, water shorelines and other sensitive areas).
15. Avoiding the use of rehabilitated fire line as a travel corridor to minimize soil compaction.
16. Lessening soil disturbance by ensuring that hot spots and smoldering fires are out;
17. Refraining from creating piles of debris to burn or excessively spreading burning fuels, letting fuels burn out naturally.
18. Using mulch or soil netting, as appropriate, to minimize or prevent erosion.

Water Resources

1. Establishing spike camps at least 200 feet from water sources.
2. Disposing of human waste either by removing it entirely from the site (preferred) or via a 6-8 inch deep dispersed “cat-hole:”
3. Capturing and transporting fire camp gray water to acceptable dump sites.

4. Using biodegradable soap and containing wastewater associated with its use.
5. Removal of all garbage, including food scraps regularly.
6. Rehabilitation of fire lines, including implementing erosion control measures that decrease sedimentation.
7. Using mulching or check dams, as appropriate, to prevent or minimize sedimentation;
8. Not altering water courses to fight fire.
9. Prohibiting the use of chemical retardant, foam and gasoline (without secondary containment) near water resources and avoiding the use of retardant and foam elsewhere.
10. Dipping from only from approved water sources under established conditions (regarding water depth, sensitive resources and method).
11. Avoiding fire line construction along steep hillsides above park waters.

Vegetation

1. Ensuring that firefighting equipment or supplies are not contaminated with noxious weed seeds (consider steam-cleaning equipment, as appropriate prior to transport into park or use in sensitive areas).
2. According to the Mount Rainier Restoration Handbook (1990), the following actions would be used to limit the effects of fire lines on vegetation. Constructed fire lines would be rehabilitated when the fire is out and the fireline is no longer needed for control actions. A rehabilitation plan would be written prior to action. If necessary, fire lines would be filled to grade to prevent channeling of water and attendant erosion. Upon filling to grade, restoration would include replanting with salvaged vegetation or covering with duff and excelsior, as needed. Scattering brush, dead limbs or rocks randomly along the trail could also help to impede water erosion and to camouflage the lines.
3. Dependent on the type of terrain, the following minimum standards for fire line rehabilitation from the Wildland Fire Resource Advisor's Task Book (NPS 1992) would be used:

<u>Flat or Gentle Slopes</u>

a. Recontour line to match surrounding terrain by pulling soil, litter, duff and rocks back over line.
b. Remove/recontour trenches.
c. Scatter piles of slash near and over line.
d. Flush cut stumps.

<u>Steep Slopes</u>

a. Rake along contour to create small, shallow trenches across fall line
b. Recontour line as above to match surrounding terrain by pulling 2-4 inches of litter and duff back over line.
c. Remove/recontour trenches.

d. Place rock (with previously exposed lichen side up) and logs randomly on fall line to intercept adjacent runoff.
e. Scatter piles of adjacent slash near and over line.
f. Flush cut stumps.
g. Trees to be felled and left on site would not be bucked or limbed, except in developed areas or along designated trails.
h. Reseeding, which has largely proven unsuccessful, unless native species are used, would not be undertaken.
i. When possible, construction of fire lines would not be undertaken in sensitive subalpine areas.
j. Fire camps and other operations assemblages would take place in developed areas or areas where clear indications of recent human disturbance (bare ground) are present.
k. Fire lines of the minimum possible depth and width would be used.
l. Care would be taken to select suppression tactics, procedures, tools and equipment with the least possible impact to the environment.
m. Equipment used in firefighting would be cleaned prior to use in park firefighting efforts.
n. Mulches or other rehabilitation treatments, including straw bales would come only from sources approved by the park plant ecologist.

Wildlife

1. Use of developed areas or areas extensively disturbed by human impacts for staging fire suppression activities.
2. Limiting the types of activities that would be performed at dawn, dusk or night as appropriate to minimize impacts to threatened and endangered species.
3. Relying on existing trails to the extent possible to access fires.
4. Relying to the extent possible on water sources outside the park for firefighting efforts.
5. Minimizing the use of fire retardant or foams in suppression efforts.
6. Ensuring that firefighting equipment was in good condition and using best management practices to ensure that spills of lubricants, fuels or other chemicals does not occur.

Rare, Threatened, and Endangered Species and Habitats

1. The park would continue to build its inventory and monitoring program for rare, threatened and endangered species and habitats, including conducting surveys to USFWS protocol as needed to cover future actions proposed by this plan. To the extent practicable, Prescribed Fire, under future environmental analysis, would either avoid nesting or spawning seasons or would not be conducted in areas where analysis of rare species and habitat had not been made.
2. For naturally occurring Wildland Fire (lightning strikes) and potential future Prescribed Fires, documentation of immediate post-fire threats to rare, threatened and endangered species and habitats and actions to prevent further degradation of these would occur immediately following fire use or suppression activities.
3. To the degree possible, direct, fire-related mortality of rare species, including known habitat or activity sites, would be avoided.

4. Suppression activities, fire effects monitoring and smoke production would be carefully monitored in the vicinity of known habitat in the decision process with respect to all fires (including suppression and use).
5. To the degree possible, construction of fire lines would avoid known rare, threatened or endangered species habitat.
6. During future Prescribed Fires, in known rare, threatened or endangered bird habitat post nesting season, cooler burn prescriptions would be used and some degree of hazard fuel removal could be used to limit the potential for crown fires.
7. Hazard fuel reduction will not remove any nest trees or other specific habitat for rare species.
8. In areas below 4,500 feet, Type III helicopters used in wildland fire suppression efforts would fly greater than 120 yards above the tree canopy, or greater than 550 feet above ground level (AGL) during the early nesting season (March 15 - August 5)] for both northern spotted owls and marbled murrelets.
9. Type III helicopters would be staged, to the degree possible, during nesting season fire suppression efforts above the elevation of northern spotted owl (4,500 feet) and marbled murrelet (3,800 feet) nesting habitat (e.g. Fourth Crossing rather than Kautz Creek).

Prehistoric and Historic Archeology

1. The park would continue to build its inventory and monitoring program for archeological resources, including conducting surface and subsurface testing as necessary to document the potential for archeological resources or to understand the extent of archeological resources found.
2. Prior to the development of Prescribed Fire plans (and subsequent environmental analysis), areas proposed for fires would be surveyed for the presence of archeological resources.
3. Heavy equipment or other ground disturbing activities would not be used in known sensitive archeological resources sites
4. The location and extent of known sensitive archeological resources would be considered in the decision to use wild land or prescribed fire.
5. Inclusion of park archeologist in the planning and suppression process
6. There would be no fire line construction in the vicinity of known archeological resources.
7. As appropriate during archeological assessment and monitoring there would be surface or subsurface surveys accompanied by screening of sediments as necessary to determine the presence or significance of archeological resources.
8. If prehistoric or historic archeological resources were discovered during any portion of a proposed action under the implementation of the alternatives that follow, work in the area associated with the find would cease until evaluated by the park archeologist or designated representative. If necessary or possible, relocation of the work to a non-sensitive area may be required to enable completion of additional site testing and documentation. Every effort would be made to avoid further disturbance to the site.
9. In the event of a significant find, consultation with the Washington State Historic Preservation Office and Native American tribes would occur and recommendations would be sought for appropriate treatment of the resources located.

10. Increased law enforcement patrols in known archeological sites following fires that removed surface vegetation obscuring sites
11. Confinement of mop-up activities to smaller areas to allow archeologists more lead time to examine the ground surface before crews complete their work.

Historic Structures

1. The park would continue to build its inventory and monitoring program for historic resources.
2. Facilitate the preservation of park historic buildings, structures and cultural landscapes in developed areas by conducting systematic Manual/Mechanical treatment of hazardous accumulations of fuel near these facilities. Treat 20 percent of the park per year.
3. Create defensible spaces, where possible, around developed areas to provide an additional measure of protection for facilities in these areas. By 2006, identify defensible spaces around National Historic Landmark District contributing structures.
4. As structures are rehabilitated, increase the use of fire suppression systems and other structural improvements that meet the Secretary of Interior's Standards for Rehabilitation of Historic Structures, resulting in no adverse effect. Prior to the development of Prescribed Fire plans (and subsequent environmental analysis), areas proposed for fires would be surveyed for the presence of historic resources.
5. Heavy equipment or other ground disturbing activities would not be used in known sensitive archeological resources sites.
6. The location and extent of known sensitive or significant historic resources would be considered in the decision to use wild land or prescribed fire.
7. Inclusion of park historical architect and historical landscape architect in the planning and suppression process
8. There would be no fire line construction in the vicinity of known historic resources.
9. If historic resources were discovered or affected during any portion of a proposed action under the implementation of the alternatives that follow, consultation with the State Historic Preservation Office would occur. If necessary or possible, relocation of the work to a non-sensitive area may be required to enable completion of consultation and documentation. Every effort would be made to avoid further disturbance to the site.
10. Increased law enforcement patrols near affected resources following fires.
11. Confinement of mop-up activities to smaller areas to allow historic resources professionals more lead time to understand fire effects to historic resources.
12. Structural inspections (post-fire condition assessment) of historic structures damaged by fire, including immediate mitigation measures such as bracing or weatherproofing.

Wilderness

1. Administrative use of aircraft would be permitted in accordance with Office Order 97-1: Safety Orientation for New Employees and 79-8: Aircraft Use Request and subsequent updates. Permission to use helicopters in wilderness is granted by the Superintendent. Helicopter use in wilderness (for other than emergencies) would generally not be approved between July 1 and Labor Day and use is restricted to

weekdays. Approval for helicopter use in non-emergency situations would be granted only if it has been determined to be the minimum tool to achieve the purposes of the area for protection of wilderness values.

2. There are no existing, constructed helicopter landing zones in wilderness. Natural openings would be used if approved under the minimum requirement for helicopter landing as detailed in the FMP. Minimal clearing would be used in an emergency if other safe alternatives have been ruled out. Site restoration would occur following this use.
3. Fixed wing and other aircraft use would conform to FAA regulations and mitigation to minimize or eliminate impacts to endangered species.
4. As detailed in the Wilderness Management Plan (1988), temporary work crew camps may be established within trailside camps or other resilient zones as approved by the superintendent (not within view or ¼ mile of established trail). Cache boxes, equipment and supplies would be kept out of sight as possible and removed when no longer needed and restoration would occur upon cessation of use.
5. Park use of power equipment is dictated by Office Order 87-1: NPS Use of Mechanized Equipment and Stock for Administrative Activities Otherwise Not Permitted and the Wilderness Management Plan. The use of Manual/Mechanical equipment is constrained by the Wilderness Act and NPS policy. In determining the appropriate minimum tool for use in wilderness, consideration is given to effects on visitor experience, public safety and wilderness values. Resource protection and safety concerns would take precedence over economic considerations. Alternative methods to power tools would be considered based on the project objectives and minimum tool concerns. Use of power tools in wilderness would be confined, as much as possible, to the period prior to July 1 and after August 31. Depending on the size of the fire, the minimum tool could be the use of helicopters, chainsaws, portable pumps and air tankers. This would be determined on a case-by-case basis, considering numerous factors as noted above.
6. As discussed in the Wilderness Management Plan, the use of the minimum requirement/minimum tool concept would be employed for fires in wilderness. Specific emphasis would be on the natural role of fire in the park ecosystem and the need to modify fire use and fire suppression responses (as appropriate) to minimize their effects. Suppression standards, both tactical and strategic would be used to minimize the environmental effects of suppression activities. Rehabilitation of fire suppression impacts to park resources would occur as part of and immediately following mop-up.

V. FIRE LINE PROCEDURES

- Select procedures, tools, and equipment that least impact the environment.
- Give serious consideration to use of water as a fireline tactic (fireline constructed with nozzle pressure, wet lining)
- If the use of dozers or heavy equipment is being used to protecting developed areas or along the park boundary, avoid the use in riparian areas

- Avoid increasing fire intensities within critical habitat during burnout or backfire operations.

A. Hot-Line/Ground Fuels

a) Allow fire to burn to natural barriers, use barriers to aid line construction
b) Use cold-trail, wet line or combination when appropriate.
c) If constructed fireline is necessary, use only width and depth to check fire spread.
d) Consider use of fireline explosives for line construction.
e) Burn out and use low impact tools like swatter or 'gunny' sack.
f) Minimize bucking and cutting of trees to establish fireline; build line around logs when possible.
g) When called for use alternative mechanized equipment such as excavators, rubber tired skidders, etc. rather than tracked vehicles.
h) Use high pressure type sprayers on equipment prior to assigning to incident to help prevent spread of noxious weeds.
i) Dip from only from approved water sources under established conditions (regarding water depth, sensitive resources and method).
j) Avoiding fire line construction along steep hillsides above park waters.

B. Hot-Line/Aerial Fuels

1. Limb vegetation adjacent to fireline only as needed to prevent additional fire spread.
2. During fireline construction, cut shrubs or small trees only when necessary. Make all cuts flush with the ground.
3. Minimize felling of trees and snags unless they threaten the fireline or seriously endanger workers. In lieu of felling, identify hazard trees with a lookout or flagging.
4. Scrape around tree bases near fireline if it is likely they will ignite.
5. Use fireline explosives for felling when possible to meet the need for more natural appearing stumps.
6. Inside fireline: remove or limb only those fuels which if ignited will have potential to spread fire outside the fireline.
7. When using indirect attack:
8. Do not fall snags on the intended unburned side of the constructed fireline, unless they are an obvious safety hazard to crews working in the vicinity
9. On the intended burnout side of the line, fall only those snags that will reach the fireline should they burn and fall over. Consider alternative means to falling, (i.e.) fireline explosives, bucket drops.
10. TREES: burned trees and snags:
    a. MINIMIZE cutting of trees, burned trees, and snags. If possible, do not fell trees within designated critical habitat. If old growth is involved, have the Resource Advisor part of the decision process.
    b. Live trees will not be cut, unless determined they will cause fire spread across the fireline or seriously endangers workers. If tree cutting occurs, cut stumps flush with the ground and if possible, directionally fall trees near waterways towards any large stream or river.

c. Scrape around tree bases near fireline if hot and likely to cause fire spread.
d. Identify hazard trees with either an observer, flagging and/or glow-sticks.
e. Consider the option not cutting the tree and constructing in-direct line to encompass the height of the tree, if it were to fall.

C. Mop-up Ground Fuels

a) Consider using "hot-spot" detection devices along perimeter (aerial or hand-held).
b) Cold-trail areas adjacent to unburned fuels
c) Do minimal spading; restrict spading to hot areas near fireline.
d) Cold-trail charred logs near fireline; do minimal tool scarring.
e) Minimize bucking of logs to extinguish fire or to check for hotspots; roll the logs instead if possible.
f) Return logs to original position after checking and when ground is cool.
g) Refrain from making bone yards; burned and partially burned fuels that were moved should be returned to a natural arrangement.
h) Consider allowing large logs to burnout. Use a lever rather than bucking to manage large logs which must be extinguished.
i) Use gravity socks in stream sources and/or a combination of water blivits and fold-a-tanks to minimize impacts to streams.
j) Consider using infrared detection devices along perimeter to reduce risk.
k) Personnel should avoid using rehabilitated firelines as travel corridors whenever possible because of potential soil compaction and possible detrimental impacts to rehab work, i.e. water bars.
l) Refraining from creating piles of debris to burn or excessively spreading burning fuels, letting fuels burn out naturally.
m) Using mulch or soil netting, as appropriate, to minimize or prevent erosion.

D. Mop up/Aerial Fuels

1. Burning trees and snags:
2. First consideration is to allow burning tree/snag to burn out or down (Ensure adequate safety measures are communicated).
3. Identify hazard trees with an observer, flagging, and/or glow-sticks.
4. If burning trees/snags pose serious threat of spreading firebrands, extinguish fire with water, bucket drops or dirt. Use FELLING by chainsaw as a secondary means.
5. Consider falling by blasting, if available.
6. Remove or limb only those fuels which if ignited have potential to spread fire outside the fireline.
7. Before felling consider allowing ignited tree/snag to burn out. Ensure adequate safety measures are communicated if this option is chosen.
8. Identify hazard trees with a lookout or flagging.

9. If burning trees/snag poses a serious threat of spreading fire brands, extinguish fire with water or dirt whenever possible. Consider felling by blasting when feasible. Felling by crosscut or chainsaw should be the last resort.
10. Align saw cuts to minimize visual impacts from more heavily traveled corridors. Slope cut away from line of sight when possible.

VI. AVIATION MANAGEMENT

One of the goals of Park and wilderness managers is to minimize the disturbance caused by air operations during an incident.

A. Aviation Use Guidelines

1. Maximize back haul flights as much as possible.
2. Use long line remote hook in lieu of constructed helispots for delivery or retrieval of supplies and gear
3. Use established water source/dip site map obtained from resource advisor
4. Take precautions to insure noxious weeds are not inadvertently spread through the deployment of cargo nets, buckets and other external loads.
5. Use natural openings for helispots and para-cargo landing zones as far as practical. If construction is necessary, avoid high visitor use areas.
6. Obtain the parks list of known helispots; consider maintenance of Park's existing helispots over creating new sites.
7. Obtain specific instructions for appropriate helispot construction prior to the commencement of any ground work.
8. Consider directional falling of trees and snags so they will be in a natural appearing arrangement. Avoid permanent marking/painting to visibly label the helispot.
9. Buck and limb only what is necessary to achieve safe/practical operating space in and around the landing pad area.
10. When possible, helicopters will fly greater than 120 yards above the tree canopy, or greater than 550 feet above ground level (AGL) over threatened and endangered species habitat.
11. In areas below 4,500 feet, Type III helicopters used in wildland fire suppression efforts would fly greater than 120 yards above the tree canopy, or greater than 550 feet above ground level (AGL) during the early nesting season (March 15 - August 5)] for both northern spotted owls and marbled murrelets.
12. Type III helicopters would be staged, to the degree possible, during nesting season fire suppression efforts above the elevation of northern spotted owl (4,500 feet) and marbled murrelet (3,800 feet) nesting habitat (e.g. Fourth Crossing rather than Kautz Creek).

B. Retardant Use

1. During initial attack, fire managers must weigh the non-use of retardant with the probability of initial attack crews being able to successfully control or contain a wildfire.
2. If it is determined that use of retardant may prevent a larger, more damaging wildfire, then the manager might consider retardant use even in sensitive areas. This decision must take into account all values at risk and the consequences of larger firefighting forces impact on the land.
3. Retardants are permitted outside of suitable spotted owl and murrelet habitat. If retardants need to be used in suitable spotted owl or murrelet habitat, it will be addressed under emergency consultation. Between the years of 2005-2009, the use of up to two retardant drops over T&E territories can happen, but notification to USFWS and documentation after the drop(s) must occur.
4. Consider impacts of water drops versus use of foam/retardant (ground versus aerial and effectiveness versus toxicity of available products).

VII. HAZARDOUS MATERIALS

A. Flammable/Combustible Liquids

- Store and dispense aircraft and equipment fuels in accordance with National Fire Protection Association (NFPA) and Health and Safety Handbook requirements.
- Avoid spilling or leakage of oil or fuel, from sources such as portable pumps, into water sources or soils.
- Store any liquid petroleum gas (propane) downhill and downwind from firecamps and away from ignition sources.

B. Flammable Solids

- Pick up residual fusees debris from the fireline and dispose of properly.

C. Fire Retardant/Foaming Agents

- Do not drop retardant or other suppressants near surface waters. Minimizing the use of fire retardant or foams in suppression efforts.
- After retardant drops in the backcountry, consult USFWS and document event.
- Use caution when operating pumps or engines with foaming agents to avoid contamination of water sources.

D. Fireline Explosives

- Near T&E species territories, the use of two blasts up to ½ mile long, equal to or greater than a 2 pound charge can be used.

- Remove all un-detonated fireline explosives from storage areas and fireline at the conclusion of the incident and dispose of according to Bureau of Alcohol, Tobacco, and Firearms (BATF) and Fireline Blaster Handbook requirements. Properly dispose of all packaging materials.

VIII. FIRE REHABILITATION

Rehabilitation is a critical need. This need arises primarily because of the impacts associated with fire suppression and the logistics that support it. The process of constructing control lines, transport of personnel and materials, providing food and shelter for personnel, and other suppression activities has a significant impact on sensitive resources regardless of the mitigating measures used. Therefore, rehabilitation must be undertaken in a timely, professional manner.

During implementation, the resource advisor should be available for expert advice and support of personnel doing this work as well as quality control.

A. Rehabilitation Guidelines

1. A fire pan should be use, but if not, clean the fire pit of unburned materials and fill back in.
2. Pick up and remove all flagging, garbage, litter, and equipment. Dispose of trash appropriately.
3. After fire spread is secured, fill in deep and wide firelines, and cut trenches.
4. If cultural and natural resource advisors recommend seeding, firelines may be fertilized and seeded with an approved seed mix.
5. Water bar, as necessary, to prevent erosion, or use wood material to act as sediment dams. Water bars or drain dips should be constructed at a 30 to 45 degree angle to the fireline. A berm height is not to exceed six inches in height. Assure down slope end of water bar is open and has adequate length to prevent runoff from reentering the line below.
6. If impacted trails have developed on slopes greater than six percent, construct waterbars according to the following waterbar spacing guide:

Trail Percent Grade	Maximum Spacing Ft.
6-9	400
10-15	200
15-25	100
25+	50

7. Where soil has been exposed and compacted, such as in camps, on user-trails, at helispots and pump sites, scarify the top 2-4 inches and scatter with needles, twigs, rocks, and dead branches. It is unlikely that seed and fertilizer for barren areas will be

appropriate, in order to maintain the genetic integrity of the area. It may be possible, depending on the time of year and/or possibility of a rainy period, to harvest and scatter nearby seed, or to transplant certain native vegetation.

8. Blend campsites with natural surroundings, by filling in and covering latrine with soil, rocks, and other natural material.
9. Cut stumps flush with ground, scatter limbs and boles, out of sight in unburned area. "Wilderness cut" stumps by chopping up the surface with an axe or pulaski, to make it jagged and rough will speed natural decomposition.
10. Drag highly visible woody debris created during the suppression effort into timbered areas and disburse.
11. Consider using explosives on some stumps and cut faces of the bolewood for a more natural appearance.
12. Tear out sumps or dams, where they have been used, and return site to natural condition. Replace any displaced rocks or streambed material that has been moved. Reclaim streambed to its original state, when appropriate.

B. Vegetation

1. Ensuring that firefighting equipment or supplies are not contaminated with noxious weed seeds (consider steam-cleaning equipment, as appropriate prior to transport into park or use in sensitive areas).
2. According to the Mount Rainier Restoration Handbook (1990), the following actions will be used to limit the effects of fire lines on vegetation. A rehabilitation plan will be written prior to action. If necessary, fire lines will be filled to grade to prevent channeling of water and attendant erosion.
3. Scattering brush, dead limbs or rocks randomly along the fire line could also help to impede water erosion and to camouflage the lines.
4. Equipment used in firefighting will be cleaned/containment free, prior to use in park firefighting efforts.
5. Mulches or other rehabilitation treatments, including straw bales will come only from sources approved by the park plant ecologist.
6. Walk through adjacent undisturbed area and take a look at your rehab efforts to determine your success at returning the area to as natural a state as possible. Good examples should be documented and shared with others!

C. Restoration of Fire Suppression Activities

Tractor/dozer lines and man made Safety Zones:

1. Tractors and dozers are not used in fire suppression in Mount Rainier National Park. If an emergency circumstance required an exception, the following rehabilitation measures will be recommended:
2. Water bars should be constructed at a 30 to 45 degree angle. Height of water bars should not exceed 18 inches. Space 50 feet apart on slopes greater than 30% and 100 feet apart on slopes between 10 and 30 percent. The down slope side of the water bar needs to be opened and of adequate length to allow free flow of water off the tractor line.

3. Breakup and pull all berms, tractor piles and windrows. Lop and scatter slash on disturbed areas to achieve 50% percent ground cover on disturbed sites.
4. If cultural and natural resource advisors recommend seeding, impacted areas may be fertilized and seeded with an approved seed mix. Heavily compacted soils may need to be ripped prior to application of seed and fertilizer.
5. For any non-system roads: implement erosion control standards and restore the road to a pattern of use prior to its fire suppression usage.

IX. Burned Area Emergency Rehabilitation

1. A Burned Area Emergency Rehabilitation (BAER) team will be assigned to fires over 100 acres in size, if deemed necessary by the cultural and natural resources management staff.
2. The BAER Team should inter face with the Resource advisor and include park biologists.
3. After a fire is declared out, a park biologist should review the suppression and rehabilitation efforts to see if conservation measures were successfully implemented.
4. Where large fires affect more than about ten percent of a Section 7 watershed, it is recommended that a scientific group of experts be convened to prepare a peer reviewed assessment or analysis of the short term and long term effects from the wildfire, suppression actions, and rehabilitation. The assessment should also recommend actions (if there are any) that may be appropriate for the burned or unburned areas within the watershed.

X. REFERENCE MATERIALS

A. Toxicity Fire Retardants and Foams

Fire retardants and suppressants are used extensively in North America and are often applied in environmentally sensitive areas that may contain threatened fish species.

Generally, the relative effects and pathways for contamination of retardants and foams are related to the mechanism used to deliver the chemicals. For instance, fire fighters using pumps to apply foam have more directional control during application when compared to broadscale and less precise application during aerial drops. Pathways for contamination include direct application to a waterway via aerial drops from planes or helicopters. Additionally, there may be accidental discharge into streams by firefighters using hoses and residual foam associated with helicopter bucket drops during refilling from a water source. These effects may be localized or occur throughout an entire stream network.

The risk of toxicological effects of chemicals on salmonids is greatest when chemicals are

applied directly to surface waters or reach surface waters by wind drift (Spence et al. 1996). All life history stages (eggs to adults) of listed fish may be affected. Fire-fighting chemicals are toxic to early life history stages of fish. Early life stages of fathead minnow (Pimephales promelas), rainbow trout (Oncorynchus mykiss) and chinook salmon (Oncorhynchus tshawytscha) were examined for acute toxicity to three fire retardants, Phos-Chek D75-F, Fire-Trol GTS-R and Fire-Trol LCG-R and two foams, Phos-Chek WD-881 and Silv-Ex (Gaikowski et al. 1996a; 1996b).

The two foams were 10 times more toxic for rainbow trout and Chinook salmon, and 10 to 258 times more toxic for fathead minnow, than the fire retardants tested. The life stage of the exposed salmonids and minnows had a significant impact on the toxicity of the formulation. Eggs and eyed-eggs were almost always more resilient than later life stages, and fry which were actively swimming in search of food were the most sensitive (Gaikowski et al. 1996a; 1996b).

The following was taken directly from Gaikowski et al. (1998) to evaluate acute toxicities on fish species. Laboratory studies of five early life stages of rainbow trout were conducted to determine the acute toxicities of five fire-fighting chemical formulations in standardized soft and hard water. Eyed egg, embryo-larvae, swim-up fry, 60- and 90-day post-hatch juveniles were exposed to three fire retardants (Fire-Trol LCG-R, Fire-Trol GTS-R, and Phos-Chek D75-F), and two fire-suppressant foams (Phos-Chek WD-881 and Silv-Ex). Swim-up fry of rainbow trout were generally the most sensitive life stage, whereas the eyed-egg life stage was the least sensitive.

Toxicity of fire-fighting formulations was greater in hard water than soft water for all life stages tested with Fire-Trol GTS-R and Silv-Ex, and 90-day old juveniles tested with Fire-Trol LCG-R. Fire-suppressant foams were more toxic than the fire retardants. The 96-h LC50s were rank ordered from the most toxic to the least toxic formulation as follows: Phos-Chek WD-881 (11 - 44 mg/L) > Silv-Ex (11 - 78 mg/L) > Phos-Chek D75-F (218 - >3,600 mg/L) > Fire-Trol GTS-R (207 - >6,000 mg/L) > Fire-Trol LCG-R (872 - >10,000 mg/L); (ranges are the lowest and highest 96-h LC50 calculated for each formulation).

Gaikowski, M. P., Hamilton, S. J., Buhl, K. J., McDonald, S. F. and Summers, C. (1996a). Acute toxicity of three fire-retardant and two fire-suppressant foam formulations to the early life stages of rainbow trout (Oncorynchus mykiss). Environmental Toxicology and Chemistry 15, 1365-1374.

Gaikowski, M. P., Hamilton, S. J., Buhl, K. J., McDonald, S. F. and Summers, C. (1996b). Acute toxicity of firefighting chemical formulations to four life stages of fathead minnow. Ecotoxicology and Environmental Safety 34, 252-263.

Hamilton, Steve, Diane Larson, Susan Finger, Barry Poulton, Nimish Vyas, and Elwood Hill. Ecological effects of fire retardant chemicals and fire suppressant foams. Jamestown, ND: Northern Prairie Wildlife Research Center Home Page. http://www.npwrc.usgs.gov/resource/othrdata/fireweb/fireweb.htm (version 02MAR98).

Foams and retardants known to be used in fire suppression (taken directly from Hamilton et al. 1998)

B. Fire Retardant and Form Products

Phos Chek (G75-F; Phos-Chek D75-F, Phos-Chek WD-881; Phos-Chek 259F): Phos-Chek G75-F is a proprietary formulation composed of monoammonium phosphate and ammonium sulfate, fugitive coloring agent, and small amounts of gum-thickener, bactericide, and corrosion inhibitor (National Wildfire Coordinating Group, Fire Equipment Working Team 1991). Phos-Chek is typically applied from helicopter bucket or ground tanker in advance of a fire; other retardants with higher viscosity are applied from fixed-wing aircraft. The ammonium salts retard fire by chemically combining with cellulose as fuels are heated, as well as through evaporative cooling of the fuels. Phos-Chek is supplied by the manufacturer as a powder, which is mixed with water to the desired concentration before application.

Phos-Chek D75-F is a proprietary mixture of ammonium sulfate, ammonium phosphate, guar gum thickener, corrosion inhibitor, and orange coloring agent (F=fugitive coloring agent, i.e., color disappears in 2 to 3 days after exposure to sun light) (Monsanto, Ontario, CA). It functions as a long-term fire retardant that forms a combustion barrier after the evaporation of the water carrier. Formulation effectiveness depends on the amount of salt applied per unit surface area. Phos-Chef D75-F is usually applied by aerial tanker. It is supplied by the manufacturer as a powder concentrate, and is prepared for field use by mixing 1.2 pounds per gallon to produce 1.069 gallons of slurry, which is equivalent to 143.8 gram/liter. Retardant use ranges from 0.41 liter/square meter (1 gallon/100 square feet) for fires in annual and perennial grasses or tundra to >2.44 liter/square meter (>6 gallon/100 square feet) for fires in mixed chaparral or heavy slash.

Phos-Chek WD-881 is a proprietary mixture of anionic surfactants, foam stabilizers, and solvents including hexylene glycol (Monsanto, Ontario, CA). It functions as a short-term fire suppressant that enhances the ability of water to penetrate fuel sources, thus reducing the ability of the fuel to ignite. These formulations also act by slowing the evaporation of water, increasing water retention on fuel sources, and reducing air contact with the fuel by insulating the fuel source from the heat of the fire. Phos-Chek WD-881 is usually applied by ground operated units mounted on trunks or portable trailers. It is supplied by the manufacturer as a liquid concentrate, and is prepared for field use by mixing 1 gallon per 100 gallon, which is then highly aerated to produce huge volumes of foam. Mixtures can range from 0.1 to 1% concentrate, which is equivalent to 1 to 10 gram/liter.

Phos-Chek 259F is a proprietary mixture of diammonium phosphate, guar gum thickener, other additives, and reddish coloring agent to mark aerial drop sites (Monsanto Company, Ontario, CA). The Material Safety Data Sheet states ammonia and phosphoric acid (when heated to approximately 200°F [93°C]) are hazardous decomposition products. Phos-Chek 259F functions as a long-term fire retardant that forms a combustion barrier after the evaporation of the water carrier. Formulation effectiveness depends on the amount of salt applied per unit surface area. Phos-Chek 259F is applied by aerial tanker. It is supplied by the manufacturer as a powder, and is prepared for field use by mixing 1.14 pounds per 1 gallon of water to produce slurry, which is equivalent to 136.6 gram/liter. Retardant use ranges from

0.41 liter/square meter (1 gallon/100 square feet) for fires in annual and perennial grasses or tundra to >2.44 liter/square meter (>6 gallon/100 square feet) for fires in mixed chaparral or heavy slash.

Silv-Ex.: Silv-Ex concentrate is a proprietary mixture of sodium and ammonium salts of fatty alcohol ether sulfates, higher alcohols, and water, as well as butyl carbitol and ethyl alcohol (Ansul, Incorporated 1994). It functions as a surfactant (i.e. detergent), allowing water to penetrate and expand over the surface of fuels to both cool and smother the fire. Silv-Ex, like other Class A foams, is applied operationally either from ground tankers or helicopters. Silv-Ex is supplied by the manufacturer as a liquid concentrate, which is mixed with water to the desired concentration before application.

Fire-Trol (GTS-R; LCA-F; LCM-R; FireFoam 103B; FireFoam 104): Fire-Trol GTS-R is a proprietary mixture of ammonium sulfate, diammonium phosphate, guar gum thickener, spoilage inhibitor, corrosion inhibitor, and iron oxide as a coloring agent to mark aerial drop sites (Chemonics, Inc., Phoenix, AZ). It functions as a long-term fire retardant that forms a combustion barrier after the evaporation of the water carrier. Formulation effectiveness depends on the amount *r* unit surface area. Fire-Trol GTS-R is usually applied by aerial tanker. It is supplied by the manufacturer as a powder concentrate, and is prepared for field use by mixing 1.66 pounds per gallon to produce 1.1 gallons of slurry, which is equivalent to 198.93 gram/liter. Retardant use ranges from 0.41 liter/square meter (1 gallon/100 square feet) for fires in annual and perennial grasses or tundra to >2.44 liter/square meter (>6 gallon/100 square feet) for fires in mixed chaparral or heavy slash.

Fire-Trol LCA-F is a proprietary mixture of ammonium polyphosphate, attapulgite clay thickener, corrosion inhibitor, and orange coloring agent to mark aerial drop sites (Chemonics, Industries, Inc., Phoenix, AZ). The Material Safety Data Sheet states ammonia and sodium cyanide are hazardous decomposition products. Fire-Trol LCA-F functions as a long-term fire retardant that forms a combustion barrier after the evaporation of the water carrier. Formulation effectiveness depends on the amount of salt applied per unit surface area. Fire-Trol LCA-F is applied by aerial tanker. It is supplied by the manufacturer as a liquid concentrate, and is prepared for field use by mixing 1 gallon of concentrate per 5 gallons of water to produce slurry, which is equivalent to 287.6 gram/liter. Retardant use ranges from 0.41 liter/square meter (1 gallon/100 square feet) for fires in annual and perennial grasses or tundra to >2.44 liter/square meter (>6 gallon/100 square feet) for fires in mixed chaparral or heavy slash.

Fire-Trol LCM-R is a proprietary mixture of ammonium polyphosphate, attapulgite clay thickener, corrosion inhibitor, and red coloring agent to mark aerial drop sites (Chemonics, Industries, Inc., Phoenix, AZ). The Material Safety Data Sheet states ammonia and sodium cyanide are hazardous decomposition products. Fire-Trol LCM-R functions as a long-term fire retardant that forms a combustion barrier after the evaporation of the water carrier. Formulation effectiveness depends on the amount of salt applied per unit surface area. Fire-Trol LCM-R is applied by aerial tanker. It is supplied by the manufacturer as a liquid concentrate, and is prepared for field use by mixing 1 gallon of concentrate per 4.25 gallons of water to produce slurry, which is equivalent to 344 gram/liter. Retardant use ranges from 0.41 liter/square meter (1 gallon/100 square feet) for fires in annual and perennial grasses or

tundra to >2.44 liter/square meter (>6 gallon/100 square feet) for fires in mixed chaparral or heavy slash.

Fire-Trol FireFoam 103B is a proprietary mixture of anionic surfactants, foam stabilizers, and inhibiting agent (hexylene glycol) (Chemonics Industries, Inc., Phoenix, AZ). The Material Safety Data Sheet states that there are no hazardous decomposition products. Fire-Trol FireFoam 103B functions as a short-term fire suppressant that enhances the ability of water to penetrate fuel sources, thus reducing the ability of the fuel to ignite. These formulations also act by slowing the evaporation of water, increasing water retention on fuel sources, and reducing air contact with the fuel by insulating the fuel source from the heat of the fire. Fire-Trol FireFoam 103B is usually applied by ground operated units mounted on trucks or portable trailers. It is supplied by the manufacturer as a liquid concentrate, and is prepared for field use by mixing 1 gallon of concentrate per 100 gallons of water, which is then aerated to produce huge volumes of foam. Mixtures can range from 0.1 to 1% concentrate, which is equivalent to 1 to 10 gram/liter.

Fire-Trol FireFoam 104 is a proprietary mixture of anionic surfactants, foam stabilizers, inhibitors, and solvents (hexylene glycol, n-butyl alcohol, and butanol) (Chemonics Industries, Inc., Phoenix, AZ). The Material Safety Data Sheet states that there are no hazardous decomposition products. Fire-Trol FireFoam 104 functions as a short-term fire suppressant that enhances the ability of water to penetrate fuel sources, thus reducing the ability of the fuel to ignite. These formulations also act by slowing the evaporation of water, increasing water retention on fuel sources, and reducing air contact with the fuel by insulating the fuel source from the heat of the fire. Fire-Trol FireFoam 104 is usually applied by ground operated units mounted on trucks or portable trailers. It is supplied by the manufacturer as a liquid concentrate, and is prepared for field use by mixing 1 gallon of concentrate per 100 gallons of water, which is then aerated to produce huge volumes of foam. Mixtures can range from 0.1 to 1% concentrate, which is equivalent to 1 to 10 gram/liter.

Fire Quench: Fire Quench is a proprietary mixture of anionic surfactants, foam stabilizers, inhibitors, and solvents (Texas Department of Corrections, Sugarland, TX). The Material Safety Data Sheet states that some oxides of sulfur are hazardous decomposition products. Fire Quench functions as a short-term fire suppressant that enhances the ability of water to penetrate fuel sources, thus reducing the ability of the fuel to ignite. This formulation also act by slowing the evaporation of water, increasing water retention on fuel sources, and reducing air contact with the fuel by insulating the fuel source from the heat of the fire. Fire Quench is usually applied by ground operated units mounted on trucks or portable trailers. It is supplied by the manufacturer as a liquid concentrate, and is prepared for field use by mixing 1 gallon of concentrate per 100 gallons of water, which is then aerated to produce huge volumes of foam. Mixtures can range from 0.1 to 1% concentrate, which is equivalent to 1 to 10 gram/liter.

ForExpan S: ForExpan S is a proprietary mixture of ammonium deceth 2, 2 sulfate, 2(2-butoxyethoxy) ethanol, ethanol, sodium myriteth 3 sulfate, myriteth-3, and 1-dodecanol (Angus FireArmourLtd., Toronto, Ontario). The Material Safety Data Sheet states that some oxides of sulfur and nitrogen are hazardous decomposition products. ForExpan S functions as a short-term fire suppressant that enhances the ability of water to penetrate fuel sources, thus

reducing the ability of the fuel to ignite. This formulation also act by slowing the evaporation of water, increasing water retention on fuel sources, and reducing air contact with the fuel by insulating the fuel source from the heat of the fire. ForExpan S is usually applied by ground operated units mounted on trucks or portable trailers. It is supplied by the manufacturer as a liquid concentrate, and is prepared for field use by mixing 1 gallon of concentrate per 100 gallons of water, which is then aerated to produce huge volumes of foam. Mixtures can range from 0.1 to 1% concentrate, which is equivalent to 1 to 10 gram/liter.

APPENDIX 1-MIST

Mount Rainier National Park
Fire Mgmt Plan Mitigation Strategies for NSO & Murrelets for Wildland Fire Use

4/13/04	**Early Season NSO Mar. 15- July 31**	**Late Season NSO Aug. 1 - Sep. 30**	**Non-nesting Season NSO Oct 1-Mar 14.**
.22 mi radius circle (100 acre) CORE TERR. **Below 4500 ft**	-NO fires, all territories -Use non-motorized suppression techniques (hand tools, etc. low noise disturbance)	-Less than 10% area affected by ground fire -No stand replacement fire	-Less than 10% area affected by ground fire -No stand replacement fire
0.7 mi radius circle (984 ac. minus 100 acres) OCCUPIED TERR. (non-nesting adults) **Below 4500 ft** ---------- **0.7 mi radius circle** ACTIVE NESTS (breeding owls) **Below 4500 ft**	-No intended stand replacement fires -Ground fire OK up to 10% (100 acres) ---------- NO fire, all territories	-All fires acceptable -Must maintain 75% suitable habitat (up to 25% stand replacement OK in entirely suitable habitat) ---------- -All fires acceptable -Must maintain 75% suitable habitat (up to 25% stand replacement OK in entirely suitable habitat)	-All fires acceptable -Must maintain 75% suitable habitat (up to 25% stand replacement OK in entirely suitable habitat) ---------- -All fires acceptable -Must maintain 75% suitable habitat (up to 25% stand replacement OK in entirely suitable habitat)
0.7 to 1.8 mi radius circle (6,510 acres minus 984 acres) OCCUPIED TERR. (non-nesting adults) And ACTIVE NESTS **Below 4500 ft**	-All fires acceptable -Maintain 55% suitable habitat (up to 45% stand replacement fire OK in entirely suitable habitat)	-All fires acceptable -Maintain 55% suitable habitat (up to 45% stand replacement fire OK in entirely suitable habitat)	-All fires acceptable -Maintain 55% suitable habitat (up to 45% stand replacement fire OK in entirely suitable habitat)
Unsurveyed NSO habitat **Below 4500 ft**	NO fire	Up to 5-year total of 927 acres	Up to 5-year total of 927 acres
MURRELETS	**Early Season April 1 – Aug 5**	**Late Season Aug 6- Sept 15**	**Non-nesting season, Sept 16- March 30**
UNOCCUPIED Murrelet habitat **Below 3800 ft**	Up to 5 year total of 927 acres	Up to 5 year total of 927 acres	Up to 5 year total of 927 acres
OCCUPIED Murrelet habitat **Below 3800 ft**	NO fire	Up to 45 acres of stand replacement fire over 5 years	Up to 45 acres of stand replacement fire over 5 years

APPENDIX 2- National MIST

NWCG Guidance on Minimum Impact Suppression Tactics

In Response To the

10-YEAR IMPLEMENTATION PLAN FOR REDUCING WILDLAND FIRE RISKS TO COMMUNITIES AND THE ENVIRONMENT

TASK: Prepare awareness and training information on the use of minimum impact suppression activities and deliver through standard firefighting training program.

MINIMUM IMPACT SUPPRESSION TACTICS (MIST) ACTION ITEMS

ACTION ITEMS 1 & 2: *Critically review MIST policies, determine need to increase awareness of MIST, and recommend changes to policies and guidelines.*

POLICY

The change from **fire control** to **fire management** has added a new perspective to the role of fire manager and the firefighter. Traditional thinking that "the only safe fire is a fire without a trace of smoke" is no longer valid. Fire Management now means managing fire "with time" as opposed to "against time." The objective of putting the fire dead out by a certain time has been replaced by the need to make unique decisions with each fire start to consider the land, resource and incident objectives, and to decide the appropriate management response and tactics which result in minimum costs and minimum resource damage.

This change in thinking and way of doing business involves not just firefighters. It involves all levels of management. Fire management requires the fire manager and firefighter to select management tactics commensurate with the fire's potential or existing behavior while producing the least possible impact on the resource being protected. The term used to describe these tactics is "Minimum Impact Suppression Tactics", commonly called MIST. Simply put: MIST is a 'do least damage' philosophy.

MIST is not intended to represent a separate or distinct classification of firefighting tactics but rather a mind set - how to suppress a wildfire while minimizing the long-term effects of the suppression action. MIST is the concept of using the minimum tool to safely and effectively accomplish the task. MIST should be considered for application on all fires in all types of land management.

While MIST emphasizes suppressing wildland fire with the least impact to the land, actual fire conditions and good judgment will dictate the actions taken. Consider what is necessary to halt fire spread and containment within the fireline or designated perimeter boundary, while safely managing the incident.

Use of MIST **will not** compromise firefighter safety or the effectiveness of suppression efforts. Safety zones and escape routes will be a factor in determining fireline location

Accomplishments of minimum impact fire management techniques originate with instructions that are understandable, stated in measurable terms, and communicated both verbally and in writing. They are ensured by monitoring results on the ground. Evaluation of these tactics both during and after implementation will further the understanding and achievement of good land stewardship ethics during fire management activities.

GUIDELINES

The intent of this guide is to serve as a checklist for all fire management personnel.
Be creative and seek new ways to implement MIST

INCIDENT MANAGEMENT CONSIDERATIONS

Fire managers and firefighters select tactics that have minimal impact to values at risk. These values are identified in approved Land or Resource Management Plans. Standards and guidelines are then tied to implementation practices which result from approved Fire Management Plans.

- Firefighter and public safety cannot be compromised.
- Evaluate suppression tactics during planning and strategy sessions to ensure they meet agency administrator objectives and MIST. Include agency Resource Advisor and/or designated representative.
- Communicate MIST where applicable during briefings and implement during all phases of operations.
- Evaluate the feasibility of Wildland Fire Use in conjunction with MIST when appropriate for achieving resource benefits.

RESPONSIBILITIES

Agency Administrator or Designee

- Ensure agency personnel are provided with appropriate MIST training and informational/educational materials at all levels.
- Communicate land and fire management objectives to Incident Commander.
- Periodically monitor incident to ensure resource objectives are met.
- Participate in incident debriefing and assist in evaluation of performance related to MIST.

Incident Commander

- Communicate land and fire management objectives to general staff.
- Evaluate suppression tactics during planning and strategy sessions to see that they meet the Agency Administrator's objectives and MIST guidelines.
- Monitor operations to ensure MIST is implemented during line construction as well as other resource disturbing activities.
- Include agency Resource Advisor and/or local representative during planning, strategy, and debriefing sessions.

Resource Advisor

- Ensure interpretation and implementation of WFSA/WFIP and other oral or written line officer direction is adequately carried out.
- Participate in planning/strategy sessions and attend daily briefings to communicate resource concerns and management expectations.
- Review Incident Action Plans (IAP) and provide specific direction and guidelines as needed.
- Monitor on the ground applications of MIST.
- Provide assistance in updating WFSA/WFIP when necessary.
- Participate in debriefing and assist in evaluation of performance related to MIST.

Planning Section

- Use Resource Advisor to help assess that management tactics are commensurate with land/resource and incident objectives.
- Ensure that instructions and specifications for MIST are communicated clearly in the IAP.
- Anticipate fire behavior and ensure all instructions can be implemented safely.

Logistics Section

- Ensure actions performed around Incident Command Post (ICP), staging areas, camps, helibases, and helispots result in minimum impact on the environment.

Operations Section

- Evaluate MIST objectives to incorporate into daily operations and IAP.
- Monitor effectiveness of suppression tactics in minimizing impacts to resources and recommend necessary changes during planning/strategy sessions.
- Communicate MIST to Division Supervisors and Air Ops/Support during each operational period briefing. Explain expectations for instructions listed in Incident Action Plan.
- Participate in incident debriefing and assist in evaluation of performance related to MIST.

Division/Group Supervisor and Strike Team/Task Force Leader

- Communicate MIST objectives and tactics to single resource bosses.
- Recommend specific tasks on divisions to implement MIST.
- Monitor effectiveness of suppression tactics in minimizing impacts to resources and recommend necessary changes to Operations Section Chief.

Single Resource Bosses

- Communicate MIST objectives to crew members.
- Monitor work to ensure that crews are adhering to MIST guidelines and specific incident objectives.
- Provide feedback to supervisor on implementation of MIST.

NWCG Guidance on Minimum Impact Suppression Tactics

IMPLEMENTATION

Keep this question in mind: What creates the greater impact, the fire suppression effort or the fire?

Safety

- Apply principles of LCES to all planned actions.
- Constantly review and apply the 18 Watch Out Situations and 10 Standard Fire Orders.
- Be particularly cautious with:
  - Burning snags allowed to burn.
  - Burning or partially burned live and dead trees.
  - Unburned fuel between you and the fire.

Escape Routes and Safety Zones

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

General Considerations

- Consider the potential for introduction of noxious weeds and mitigate by removing weed seed from vehicles, personal gear, cargo nets, etc.
- Consider impacts to riparian areas when placing water handling operations.
  - Use longer draft hoses to place pumps out of sensitive riparian areas.
  - Plan travel routes for filling bladder bags to avoid sensitive riparian areas.
- Ensure adequate spill containment at fuel transfer sites and pump locations. Stage spill containment kits at the incident.

Fire Lining Phase

- Select tactics, tools, and equipment that least impact the environment.
- Give serious consideration to use of water or foam as a fire lining tactic.
- Use alternative mechanized equipment such as excavators and rubber tired skidders rather than bulldozers when constructing mechanical line.
- Allow fire to burn to natural barriers and existing roads and trails.
- Monitor and patrol firelines to ensure continued effectiveness.

Ground Fuels

- Use cold-trail, wet line or combination when appropriate. If constructed fireline is necessary, use minimum width and depth to stop fire spread.
- Consider the use of fireline explosives (FLE) for line construction and snag falling to create more natural appearing firelines and stumps.
- Burn out and use low impact tools like swatters and gunny sacks

- Minimize bucking to establish fireline: preferably move or roll downed material out of the intended constructed fireline area. If moving or rolling out is not possible, or the downed log/bole is already on fire, build line around it and let the material be consumed.

Aerial fuels–brush, trees, and snags:

- Adjacent to fireline: limb only enough to prevent additional fire spread.
- Inside fireline: remove or limb only those fuels which would have potential to spread fire outside the fireline.
- Cut brush or small trees necessary for fireline construction flush to the ground.
- Trees, burned trees, and snags:
  - Minimize cutting of trees, burned trees, and snags.
  - Do not cut live trees unless it is determined they will cause fire spread across the fireline or seriously endanger workers. Cut stumps flush with the ground.
  - Scrape around tree bases near fireline if hot and likely to cause fire spread.
  - Identify hazard trees with flagging, glowsticks, or a lookout.
- When using indirect attack:
  - Do not fall snags on the intended unburned side of the constructed fireline unless they are an obvious safety hazard to crews.
  - Fall only those snags on the intended burn-out side of the line that would reach the fireline should they burn and fall over.

Mopup Phase

- Consider using "hot-spot" detection devices along perimeter (aerial or hand-held).
- Use extensive cold-trailing to detect hot areas.
- Cold-trail charred logs near fireline: do minimal scraping or tool scarring. Restrict spading to hot areas near fireline.
- Minimize bucking of logs to check for hot spots or extinguish fire: preferably roll the logs and extinguish the fire.
- When ground is cool return logs to original position after checking.
- Refrain from piling: burned/partially burned fuels that were moved should be arranged in natural positions as much as possible.
- Consider allowing larger logs near the fireline to burn out instead of bucking into manageable lengths. Use a lever, etc. to move large logs.
- Use gravity socks in stream sources and/or combination of water blivets and fold-a-tanks to minimize impacts to streams.
- Personnel should avoid using rehabilitated firelines as travel corridors whenever possible because of potential soil compaction and possible detrimental impacts to rehab work.
- Avoid use of non-native materials for sediment traps in streams.
- Aerial fuels (brush, small trees, and limbs): remove or limb only those fuels which if ignited have potential to spread fire outside the fireline.

- Burning trees and snags:
  - *Be particularly cautious when working near snags (*ensure adequate safety measures are communicated).
  - The first consideration is to allow a burning tree/snag to burn itself out or down.
  - Identify hazard trees with flagging , glow-sticks or a lookout.
  - If there is a serious threat of spreading firebrands, extinguish with water or dirt.
  - Consider felling by blasting, if available.

Aviation Management

Minimize the impacts of air operations by incorporating MIST in conjunction with the standard aviation risk assessment process.

- Possible aviation related impacts include:
  - Damage to soils and vegetation resulting from heavy vehicle traffic, noxious weed transport, and/or extensive modification of landing sites.
  - Impacts to soil, fish and wildlife habitat, and water quality from hazardous material spills.
  - Chemical contamination from use of retardant and foam agents.
  - Biological contamination to water sources, e.g., whirling disease.
  - Safety and noise issues associated with operations in proximity to populated areas, livestock interests, urban interface, and incident camps and staging areas.

- Helispot Planning
  - When planning for helispots determine the primary function of each helispot, e.g., crew transport or logistical support.
  - Consider using long-line remote hook in lieu of constructing a helispot.
  - Consult Resource Advisors in the selection and construction of helispots during incident planning.
  - Estimate the amount and type of use a helispot will receive and adapt features as needed.
- Balance aircraft size and efficiency against the impacts of helispot construction.
- Use natural openings as much as possible. If tree felling is necessary, avoid high visitor use locations unless the modifications can be rehabilitated. Fall, buck, and limb only what is necessary to achieve a safe and practical operating space.

NWCG Guidance on Minimum Impact Suppression Tactics

Retardant, Foam, and Water Bucket Use

- Assess risks to sensitive watersheds from chemical retardants and foam. Communicate specific drop zones to air attack and pilots, including areas to be avoided.
- Fire managers should weigh use of retardant with the probability of success by unsupported ground force. Retardant may be considered for sensitive areas when benefits will exceed the overall impact. This decision must take into account values at risk and consequences of expanded fire response and impact on the land.
- Consider biological and/or chemical contamination impacts when transporting water.
- Limited water sources expended during aerial suppression efforts should be replaced. Consult Resource Advisors prior to extended water use beyond initial attack.

Logistics, Camp Sites, and Personal Conduct

- Consider impacts on present and future visitors.
- Provide portable toilets at areas where crews are staged.
- Good campsites are found, not made. If existing campsites are not available, select campsites not likely to be observed by visitors
- Select impact-resistant sites such as rocky or sandy soil, or openings within heavy timber. Avoid camping in meadows and along streams or shores.
- When there is a small group try to disperse use. In the case of larger camps: concentrate, mitigate, and rehabilitate.
- Lay out camp components carefully from the start. Define cooking, sleeping, latrine, and water supplies.
- Prepare bedding and campfire sites with minimal disturbance to vegetation and ground.

- Personal Sanitation:
  - Designate a common area for personnel to wash up. Provide fresh water and biodegradable soap.
  - Do not introduce soap, shampoo or other chemicals into waterways.
  - Dispose of wastewater at least 200 feet from water sources.
  - Toilet sites should be located a minimum of 200 feet from water sources. Holes should be dug 6-8 inches deep.
  - If more than 1 crew is camped at a site strongly consider portable toilets and remove waste.
- Store food so that it is not accessible to wildlife, away from camp and in animal resistant containers.
- Do not let garbage and food scraps accumulate in camp.
- Monitor travel routes for damage and mitigate by:
  - Dispersing on alternate routes or
  - Concentrating travel on one route and rehabilitate at end of use.

- If a campfire is built, leave no trace of it and avoid using rock rings. Use dead and down wood for the fire and scatter any unused firewood. Do not burn plastics or metal.

Restoration and Rehabilitation

- Firelines:
  - After fire spread has stopped and lines are secured, fill in deep and wide firelines and cup trenches and obliterate any berms.
  - Use water bars to prevent erosion, or use woody material to act as sediment dams.

Maximum Waterbar Spacing	
Percent Grade	Maximum Spacing, Feet
< 9	400
10 – 15	200
15 – 25	100
25 +	50

Table 1, Maximum Waterbar spacing.

  - Ensure stumps are cut flush with ground.
  - Camouflage cut stumps by flush-cutting, chopping, covering, or using FLE to create more natural appearing stumps.
  - Any trees or large size brush cut during fireline construction should be scattered to appear natural.
  - Discourage the use of newly created firelines and trails by blocking with brush, limbs, poles, and logs in a naturally appearing arrangement.
- Camps:
  - Restore campsite to natural conditions.
  - Scatter fireplace rocks and charcoal from fire, cover fire ring with soil, and blend area with natural cover.
  - Pack out all garbage.
- General:
  - Remove all signs of human activity.
  - Restore helicopter landing sites.
  - Fill in and cover latrine sites.
- Walk through adjacent undisturbed areas and take a look at your rehab efforts to determine your success at returning the area to as natural a state as possible.