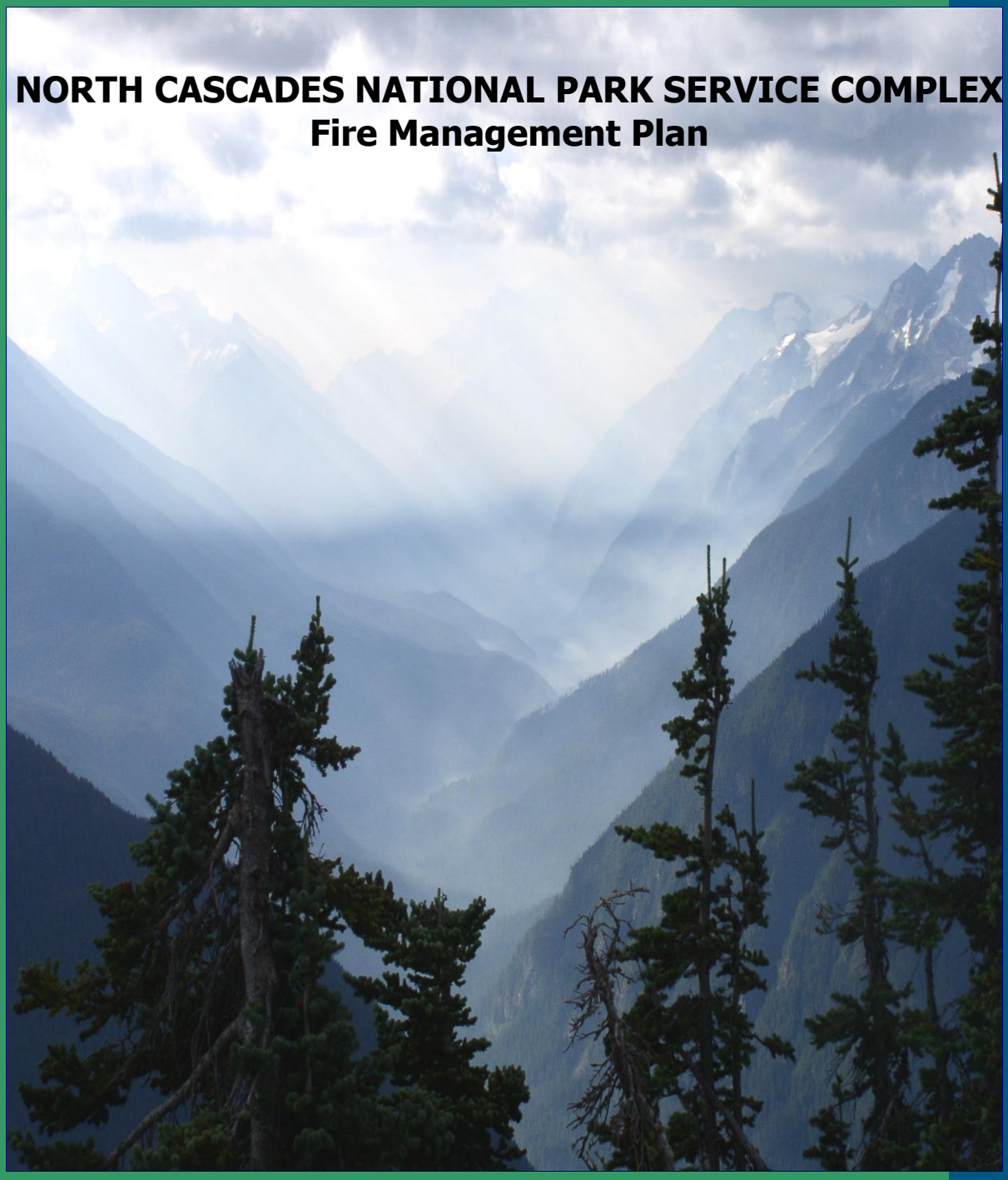
NORTH CASCADES NATIONAL PARK SERVICE COMPLEX
Fire Management Plan



Prepared by: NOCA Fire Management Team
October 2007

WILDLAND FIRE MANAGEMENT PLAN

North Cascades National Park Service Complex

October 2007
WFDSS Revisions April 2010

6/1/2010 Approved:

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Superintendent
North Cascades National Park Service Complex

Date

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I. Introduction

North Cascades National Park Service Complex (hereafter: the Complex) is located in the heart of the greater North Cascades ecosystem in northwestern Washington. The Complex is composed of three units that are managed as one: North Cascades National Park (504,600 acres), Ross Lake National Recreation Area (115,900 acres), and Lake Chelan National Recreation Area (61,300 acres). This document serves as the Fire Management Plan (Plan) for the Complex and, as such, provides guidance for fire managers at the local level while they implement national fire policy. It replaces the 1991 Wildland Fire Management Plan (1991 FMP) and the 1995 Stehekin Valley Forest Fuel Reduction/Firewood Management Plan (1995 Stehekin Plan).

The Updated Federal Wildland Fire Management Policy and Program Review (2001) requires development of a fire management plan for all federal lands subject to wildland fires. In addition, the Wildland and Prescribed Fire Management Policy and Implementation Procedures Reference Guide (2006) emphasize the importance of interagency collaboration in developing these plans. The reference guide notes that "joint planning efforts will enhance effective and efficient operations across administrative boundaries and improve agency capability to meet challenges posed by wildland fires" and that such collaboration "is prerequisite to successful program implementation as costs increase and workforces decrease."

According to this direction, this Plan includes cooperative planning for lands adjacent to the Complex including areas of the Okanogan-Wenatchee National Forest (OWNF) in the Chelan Fire Management Unit and the Skagit Fire Management Unit. Agreements between agencies in recent years have allowed for cross-jurisdictional use of fire suppression personnel as needed. However, no overall fire management plan existed until 2002 when National Park Service (NPS) and United States Forest Service (USFS) personnel collaborated to create a plan to co-manage fire response within the Chelan Fire Management Unit. This document includes that interagency plan.

An Environmental Assessment (EA) accompanies the Plan, as required by the National Environmental Policy Act (NEPA). The EA provided three alternatives for managing fire in the Complex; Alternative 1) to continue current management under the 1991 FMP and the 1995 Stehekin Plan, Alternative 2) increase the acreage of forest fuel reduction areas in Stehekin (outside of wilderness), and Alternative 3) increase the acreage of the forest fuel reduction areas in Stehekin, additional prescribed burning along Stehekin Valley walls and Hozomeen (including wilderness), and re-ignition of previously suppressed fires. Alternative 3 is the preferred and chosen alternative. Objectives and operational plans for prescribed fire, thinning, and community assistance projects are described for each alternative in the EA, and for the chosen alternative in this Plan. These objectives and operational plans will be developed to include further detail, and submitted as individual burn and project plans before they are implemented. All operational plans described in the EA and within this Plan comply with the requirements of the Endangered Species Act (ESA) and the National Historic Preservation Act (NHPA). This is a working document, which will be reviewed and updated as policy or management plans change.

II. Relationship to Fire Policy and Land Management Planning

A. Federal Fire Policy

The tragic events of the 1994 fire season created renewed concern among federal land management agencies for firefighter and public safety, the impacts of wildland fire, and the integration of fire and resource management. As a result of these concerns, and in response to recommendations outlined in the report of the South Canyon Fire Interagency Management Review Team (1995), the Federal Wildland Fire Management Policy and Program Review was completed in 1996 (also called the National Fire Plan). This review recommended policy changes intended to achieve a balance between suppression and fire use. In order to be successful, the Implementation Procedures Reference Guide states that, "agencies must ensure that wildland fire management is fully integrated into land management planning. Every agency administrator must ensure that these policies (safety, planning, protection, priorities, interagency cooperation, standardization, economic efficiency, wildland/urban interface, and administration and employee roles) are incorporated into all wildland fire management actions."

The National Fire Plan then was revisited and the most recent version is the *Update Federal Wildland Fire Management Policy and Review (2001)*. From this policy an implementation guide was put in place. This document is the *Interagency Strategy for the Implementation Federal Wildland Fire Management Policy* (2003) and the *Wildland Fire Use Implementation Procedures Reference Guide* (March/April 2006).

The following Fire Management plan was created in keeping with these federal policy and implementation strategies and guidelines.

B. National Park Service and Department of Interior Policy

The National Park Service, in recent years, has taken a lead role in considering fire as a fundamental force in perpetuating natural ecosystems. Park service fire management policy, expressed in Reference Manual (RM) 18, Wildland Fire Management Guidelines (NPS 2007) and Director's Order (DO) #18, and Wildland Fire Management (NPS 2007), clearly states that, "Fire is a powerful phenomenon with the potential to drastically alter the vegetative cover of any park. The presence or absence of natural fires within a given ecosystem is recognized as a potent factor stimulating, retarding, or eliminating various components of the ecosystem." More specifically the NPS mandates the use of Use of Wildland Fire by acknowledging that "most natural fires are lightning-caused and are recognized as natural phenomenon which must be permitted to continue to influence the ecosystem if truly natural systems are to be perpetuated."
The Department of Interior (DOI) Manual (DM 910 2007) supports NPS policy when it states that "the use of fire under carefully defined conditions is to be a valuable tool in wildland management." It also outlines the conditions under which suppression must occur:

"Wildfires 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" and underscores that the "highest priority" will be given to prevention of "a disaster fire."
hus, according to DOI and NPS fire management policy, wildfires may be managed to accomplish resource management goals provided the fires do not pose a threat to natural resources or compromise firefighter and public safety. At present, lightning fires are managed to meet multiple objectivesin the Complex when they occur in predetermined zones and within predefined parameters. Although the present goal is to maintain the natural role of fire to the greatest extent possible, fire managers recognize that there are many constraints that preclude the unrestricted use of fire. Constraints include the need for firefighter and public safety, protection of adjacent land values, compliance with air quality laws or regulations, protection of physical facilities, protection of threatened and endangered species and cultural sites, and availability of personnel and funds.

C. Enabling Legislation, Management Plans, and Local Factors

According to the enabling legislation (PL 90-54), North Cascades National Park was created "in order to preserve for the benefit, use, and inspiration of present and future generations certain majestic mountain scenery, snow fields, glaciers, alpine meadows and other unique natural features." The park also contains the highest concentration of glaciers in the lower forty eight states and contains valuable habitat for increasingly rare wildlife populations. The use of fire as a natural process, as described in this Plan, serves to maintain scenery, meadows, habitat, and natural features. Furthermore, fire management planning serves to protect natural features that otherwise may be threatened by wildfire.

The General Management Plan (GMP) for North Cascades National Park, Ross Lake National Recreation Area and Lake Chelan National Recreation Area (1988) complements NPS policy statements in its emphasis on the protection of "unique natural features, biological processes and cultural resources." The GMP states further that "by allowing natural processes to prevail, the greatest natural diversity in habitat will be maintained." Finally, the GMP highlights the importance of taking an ecosystem management approach and recognizes the need to evaluate, monitor, and mitigate environmental impacts related to human activities.

For the Lake Chelan National Recreation Area the GMP states more specifically that fire suppression, prescribed natural fire (now referred to as Use of Wildland Fire), management-ignited prescribed fire, and selective manual thinning would be used "to improve wildland fire protection for human life and property; to manage for late-succession stage in ponderosa pine/Douglas-fir forest."

Several local factors influence fire management within the Complex, including fire suppression and historical logging, vast tracts of designated Wilderness, and international and interagency boundaries.

The Stehekin valley's Douglas-fir/ponderosa pine forest shows characteristic signs of being at risk of a stand replacing fire: a dense understory of Douglas-fir pole and seedling trees overcrowding a weakening overstory that is succumbing to insects and disease. These conditions are common in forests of this type throughout the area. Historic levels of ponderosa pine have decreased as fire suppression and selective harvesting allowed the more shade tolerant Douglas-fir to shade the more fire dependent pine out (Ohlson and Schellhaas 1999). Another area of concern is the region that stretches from the US/Canada border near Hozomeen south to Lightning Creek along the Ross Lake Corridor where less fire dependent species are beginning to out compete a unique mix of ponderosa pine and lodgepole.

Fire management policies have changed significantly over the course of a century. Prior to the establishment of the Complex, the USFS suppressed all fires within the Complex and on surrounding lands. Suppression policies continued under NPS management until the 1970's, when the agency began to recognize the important role that fire plays in the ecosystem as well as in the preservation of wilderness values. Note that due to safety constraints and the high values to be protected, three areas of the Complex have been identified where all unplanned fires will be suppressed: the lower elevations of the Stehekin Valley, the Highway 20 corridor, and a buffer along the Canada border.

Ninety three percent of the Complex is designated as Stephen Mather Wilderness. Within wilderness, program objectives will be to permit lightning-caused fires to play, as nearly as possible, their natural ecological role while simultaneously reducing the risks and mitigating the consequences of wildfires that occur within, or escape from, designated wilderness areas.

The major land management agencies neighboring the Complex include: Mount Baker-Snoqualmie National Forest, Okanogan/Wenatchee National Forest, Washington Department of Natural Resources, British Columbia Forest Service, and British Columbia Parks. Many wildland fires that occur near the boundaries of the Complex are currently suppressed because neighboring agencies do not have approved fire management plans to allow joint management of natural fires. The fact that some natural fires will be suppressed or limited in size, over the course of a long time period, may alter fire cycles and vegetation dynamics. A Master Cooperative Fire Protection Agreement, signed October 1998 by seven federal and state agencies in Washington and Oregon, is expected to help bring the agencies into closer working relationships.

Based on appropriate planning and policy documents outlined above, fire management objectives and goals will include: to protect employee and public safety, as well as sensitive cultural and natural resources, developments and boundaries from wildland fire; to expand interagency and ecosystem planning; to maintain the natural role of fire to the maximum extent possible in designated zones; to suppress unplanned, human-caused ignitions; and to restore and maintain forest composition in selected areas where natural ecosystems have been altered by fire suppression and other human activities.

III. Wildland Fire Management Strategies

A. General Management Considerations

The range of fire management options to be applied include:

- Wildland Fire suppression
- Prescribed Fire
- Use of Wildland Fire
- Non-Fire Applications

1. Wildland Fire Suppression

Fire suppression may be utilized when there are threats to resources or boundaries. Resources that need protection could include: structures, data collection equipment, campgrounds or trail infrastructure, populated areas, highways, suppression zones (Canadian Boundary, Hwy 20 corridor, Stehekin Valley) or endangered Species habitat. Suppression could be utilized during wildfires orprescribed fires..

Suppression activities include: line construction, burning, pump and hoselay deployment, structure wrap, fuel treatment, or aerial application of water.

Most often the **tools** utilized will include: hand tools, chainsaws, engines, portable pumps and helicopters. In rare cases, fire retardant, foam or dozers could be used if outside wilderness in wildland urban interface areas or fires posing a threat to those areas.

2. Prescribed Fire

Prescribed fire is a management ignited fire during specified fuel and weather conditions, with a signed burn plan to pre-determined boundaries. It is used for hazard fuel reduction and/or ecosystem restoration. Prescribed burns have specific goals and objectives. Fire Managers at NOCA have been using prescribed fire since 1991 and will continue to do so where appropriate.

Future areas of prescribed fire include possible ignitions in all of North Cascades National Park Service Complex. In the Stehekin watershed, areas of helicopter sphere dispensing ignition devices would be utilized to ignite predetermined polygons. The north end of the Ross Lake NRA also contains units with predetermined boundaries between Hozomeen and Desolation peak. Polygons of areas planned for prescribed burning can be found in Chapter 4.

3. Use of Wildland Fire

Use of Wildland Fire for benefit to resources is an important component of fire management at North Cascades Complex. . North Cascades NPS Complex has had a plan in place since 1991 to allow fire to play a more historic role. Management constraints are decreasing and opportunities for use of wildland fire are increasing as per National Park Service and National Fire Plan directives. The National Fire Plan and implementation guide, provide guidelines and framework in which to utilize Wildland Fire along with the Wildland Fire Decision Support System.

The Chelan Basin Plan includes the Lake Chelan Fire Management Unit (FMU) on both NPS and USFS land. Fire Management Areas (FMA's) for implementation, were developed in concert with cooperating USFS partners. This plan was signed in April of 2001. This will allow Wildland fires to cross agency boundaries since beneficial fires should not be constrained by jurisdictional lines.

4. Non-Fire Applications

Non-Fire applications (i.e. thinning) would be utilized outside of wilderness in wildland urban interface areas. These treatment areas are identified in Chapter 4 of this plan. Specific planning is subject to review of the ID team at the Park. These treatments include thinning of understory or overstory trees to create defensible space around structures or to create shaded fuel breaks. Just like many places in the west, historic conditions of mixed conifer forests have been altered through the exclusion of fire (Hessburg et. al.1994). Thinning is utilized where fire alone is either too dangerous to utilize prior to burning, or restoration goals cannot be met without thinning first (Science Update PNW RS 2002).

Treatment of slash in these areas may include: chipping, piling and burning understory burning, or a combination of methods. Chipping or piling and burning will be more commonly utilized where there are char concerns on remnant trees (i.e. in close proximity to private property).

B. Wildland Fire Management Goals

There are a number of goals listed below for wildland fire management within the Complex. Each goal has specific objectives developed to meet the intent of the goal.

1. Goal 1: Ensure Firefighter and Public Safety

Protection of both firefighters and the public is the first priority in the Complex's fire management program and in every fire management activity.

Management Objectives:

- Plan and carry out all activities consistent with and subordinate to safety considerations by complying with OSHA regulations, NPS, and interagency safety policies
- Provide the fire management workforce with the training, equipment, operating procedures, safety measures, and information needed to manage risks and carry out their activities safely
- Inform and protect visitors and communities by providing information on fire locations, associated activities, and implementing closures or evacuations as needed
- Implement hazard fuel reduction treatments within the wildland urban interface with prescriptions that minimize impacts to ecological integrity
- Manage wildland and prescribed fires using the most current planning and risk assessment techniques available
- Establish a Wildland FireZone where wildland fire could be utilized to accomplish resource management goals without compromising firefighter and public safety or threatening property
- Establish a Suppression Response Zone where use of fire would have a high potential to compromise public safety or private property
- Utilize prescribed fire to protect communities and to reduce the need for suppression response to naturally ignited fire adjacent to these communities

2. Goal 2: Allow the Natural Process of Fire to Prevail in the Complex

It is recognized that natural interactions between fire and the environment influence the vegetation structure and biodiversity within the Complex. The role of fire should be maintained through the use of wildland fire in order to prevent the eventual impacts from fire exclusion to the ecosystems of the Complex. Furthermore, in areas showing adverse effects from fire suppression, restoration of forest structure and reduction of fuel loads will allow natural processes to resume and reduce the risk of unwanted, high-intensity wildland fires that might cause undesirable changes in forest type and threaten human lives or property.

Management Objectives:

- Manage ecosystems to preserve the natural range of variability in processes and structure
- Minimize adverse impacts to threatened, endangered, and sensitive species and their habitat
- Set strategies for fire management activities based on site-specific information or local research findings on departure from natural fire return intervals and fire regime characteristics

3. Goal 3: Use the Adaptive Management Process to Guide Future Management Actions

The adaptive management process incorporates scientific knowledge, monitoring and evaluation of results to provide a mechanism for feedback. The Complex will continue to use a five-year peer, academic and public review process. This review includes the

presentation of program goals and objectives, monitoring results, and photos and/or site visits, with opportunities for all participants to provide feedback on all elements of the plan. This feedback could be used to recommend future revisions to the fire management plan. A major revision of the plan would require additional environmental analysis.

Management Objectives:

- Encourage research to improve understanding of natural fire regimes in order to more effectively implement the fire management program and refine fire prescriptions.
- Monitor and evaluate fire management activities to assess their effects on natural and cultural resources
- Update thinning and prescribed fire prescriptions and treatment priorities as data and feedback suggest

4. Goal 4: Educate, Inform, Consult, and Collaborate with Local Communities; County, State, Federal and Canadian Stakeholders

Education and collaboration of fire management activities in fire dependent ecosystems are key to a successful fire management program because fire can span many jurisdictions.

Management Objectives:

- Conduct wildfire prevention education and provide fire information to communities within or nearby the Complex
- Collaborate with local communities, county, state, federal, and international agencies with fire management interests
- Develop interpretive displays, educational programs, and publications with Complex staff to foster understanding and acceptance of the fire management program

C. Fire History

Among the important considerations that go into determining wildland fire management strategies as well as into delineating fire management units is an understanding of the fire history of the area.

Fire has played a key role in forested landscapes and vegetation in the Pacific Northwest since the end of the last major glaciation 12,000 years ago. Analysis of burned areas throughout the Cascades shows similar patterns across the range over the past 600 years with widespread fires occurring from 1400 to 1650, reduced burning from 1650 to 1800, widespread fires again from 1801 to 1925, potentially related to European settlement, and finally fire suppression beginning to show its influence by 1950. These patterns can be attributed to interactions between human-caused changes, climate, and stand/fuel development. While scientists suspect that that all three factors have played a role in the dry forests on the eastside of the Complex, climate alone may have been the primary force in the subalpine, alpine, and low elevation westside forests.

Although the fire history of the Complex is not complete, substantial fire research projects have occurred in the Ross Lake area and Stehekin Valley, the two areas where

active fire management projects are proposed and or underway, and in the Thunder Creek Basin, a subalpine site representative of areas that would most benefit through the use of Wildland Fire.

1. Ross Lake

Tree ring analysis and historical records of the Desolation Peak area in Ross Lake National Recreation Area were used to calculate a natural fire rotation of 100 years from 1573 – 1985, indicating that over the course of 100 years an area the size of Desolation Peak would have burned. The study also suggested that smaller, less severe fires probably occurred more frequently than they appeared early in the record, a common downfall of fire histories based upon tree-ring records.

One large documented fire occurred in 1926, and burned over 40,000 acres after it was initiated by a lightning strike on the north slope of the Tenmile Shelter, burned out to the mouth of Big Beaver, and then swept north up the Skagit Valley. Another large documented fire burned extensively in the upper Skagit Valley in 1859.

It is not clear how many of the documented fires were human-caused. Evidence of human-caused burning has not been definitive, although indigenous tribes are known to have inhabited areas in the North Cascades for the past 8,400 years, and experts suspect that they may have used fire as a tool. In 1857, Henry Custer, one of the earliest white explorers of the Complex, described the "whole forest burned by late fires, ignited by persons recently encamped here." He further stated that "fires are very frequent during the summer season in these Mountain forests, and are often ignited purposely by some of the Indian hunting in these Mountain regions, to clear the woods from under brush and make travel easier."

One of the important findings in the fire history of the Desolation peak area pertains to the forest above Lightning Creek which contains a unique combination of species that is not typically found westside of the Cascades. The natural fire rotations for these communities—Douglas-fir with ponderosa pine and Douglas-fir with lodgepole pine—were calculated as 52 years and 76 years respectively. Evidently, this forest experienced a more frequent fire return interval than a typical westside forest. Although it is not certain whether this fire rotation was partially human-caused, it is clear that returning low severity fire to this area will be required to maintain the unique diversity of this fire-dependent community.

2. Stehekin Valley

Martin Gorman described a similar scenario east of the Cascade Pass in his survey of Lake Chelan and the Stehekin Valley in 1897.

> *Of the whole region traversed by our party during the season, a few small spots about the passes and a small tract on Bridge Creek were the only sections that showed no evidence of ever having been visited by fire. Even the*

> *moist valleys of Stehekin River, Early Winters Creek, and Railroad Creek gave ample proof of having been burned over seriously more than once.*
>
> *According to the testimony of settlers, some forest fires occur here every summer; for instance, during the present season, in addition to three simultaneous fires in the vicinity of Lake Chelan, there was also one on the Entiatqua divide and two in the Methow Valley. They further allege, apparently on good evidence, that this region had been burned over long before the coming of the first white settlers. This is well borne out by the scarred bases of the mature trees in the yellow pine belt, nearly all of which show traces of more than one forest fire.*

It is assumed that, since Gorman's time, fire suppression and other human activities (e.g. selective harvesting) have influenced the fire regimes in the Stehekin Valley. Although intensive research has not been done in the valley, analysis of 200 – 400 year long tree-ring records in dry Douglas-fir/ponderosa pine forests on the east side of the Cascades show that these forests, in general, have been significantly altered by settler activities, fire suppression, and climate change.

More recent stand examinations have noted unnatural fuels buildup, insects and disease in Stehekin. Surveys describe the regular occurrence of small fires and estimate that large fires occur approximately every 90 to 100 years, indicating that the valley is currently overdue for a stand replacing event.

In addition, recent surveys of the valley walls within the proposed Stehekin contours burn area found many young small-diameter trees with fewer widely spaced older trees, a pattern that is commonly found in moderate severity fire regimes. (For additional discussion of the Stehekin contours project see Chapter IV Section C of this Plan.) In moderate severity fire regimes, stand replacing events occur infrequently (approximately every 100 years), whereas low severity fires occur within 6 – 38 years. When these forests are not significantly altered, fires tend to burn in a combination of low, medium and high severity. More recent fire events near Stehekin, such as the 1994 Boulder Creek Fire, tend to be more homogenous high severity indicating that the regime is altered.

3. Thunder Creek Basin and Other Subalpine Forests

Although fire histories based upon tree-ring records work well for dry eastside forests, on alpine, subalpine, and low elevation westside forests long-term fire histories are more appropriate for analysis. The first fire such history research in the Complex was recently completed in a subalpine forest in the Thunder Creek basin. This study reconstructed fire events and vegetation for 10,500 years, documenting fire frequency fluctuations between 30 to 400 years. The findings showed extreme variation in fire size and frequency.

Recognizing that fire ecology in the North Cascades has historically depended upon complex interactions that science has yet to understand, the best approach to managing fire in most of the Complex is through use of wildland fire. This is the most ecologically sensible approach to managing forests such as the one in the Thunder Basin. It is not, however, recommended for areas with altered fire regimes. In order to allow use of

wildland fire to occur in areas close to communities at risk and/or within altered regimes with increased confidence, prescribed burning and fuels treatments can be used to create effective fuel breaks and to reduce fuel loads.

4. Recent Fire History 1973 – 2003

Ignition point and fire perimeter records were kept by the USFS before North Cascades National Park Service Complex was established. An effort to create a detailed fire atlas from these records is in progress. Completion of the fire history map and associated databases has been identified as a research need in Section VII of this Plan. Until this project is completed the fire records are only reliable from 1973 forward.

The past 31 years of ignition data for the Complex are shown in the following table. They are categorized by management strategy and annual acres burned as a result of each strategy.

Recent Fire History 1973 – 2003, by Management Strategy

Fires Suppressed		Fires Used		Other	
# fires	acres	# fires	acres	# fires	acres
5	3	1	0.1	0	0
4	1.3	2	2	0	0
5	0.5	1	0.1	0	0
2	0.2	0	0	0	0
10	185.9	0	0	0	0
22	1,854.5	25	56	0	0
14	3.2	1	0.1	0	0
12	7	2	20.1	0	0
12	6	2	0.2	0	0
2	0.2	1	1	0	0
7	1.6	11	27	0	0
3	2.1	2	132	0	0
6	0.6	2	1.6	0	0
5	6.1	6	0.6	0	0
6	0.7	2	0.2	0	0
6	4	0	0	1	0.4
10	2.2	0	0	5	0.5
21	27.5	0	0	17	289.4
11	2.9	1	0.2	1	0.1
12	1.7	1	0.1	8	12.7
0	0	0	0	0	0
19	4,118.4	0	0	4	0.5
1	0.2	1	0.3	0	0
3	0.4	0	0	0	0
7	5.7	2	37	4	320.5
4	4.7	0	0	2	0.2
12	17.6	1	175	2	0.8

Fires Suppressed		Fires Used		Other	
4	4.1	0	0	0	0
3	1.1	2	1.1	3	823.1
10	2.2	1	60	0	0
15	7	9	3,542.8	1	0.1
253	6,272.6	76	4,057.5	48	1,448.3
8.2	202.3	2.5	130.9	1.6	46.7

The recent history of the Complex reveals that there is an average of 12.3 fires per year. Three hundred and seventy-seven fires have been recorded since 1973, burning almost 12,000 acres. Three suppression fires burned 1,000 acres or more during this period. The relatively large size of these fires can be attributed to drought conditions, resource shortages, and the difficulty of suppression in steep and dangerous terrain. Only two use fires have burned over 1,000 acres.

Recent Fire History 1973 – 2003, by Cause

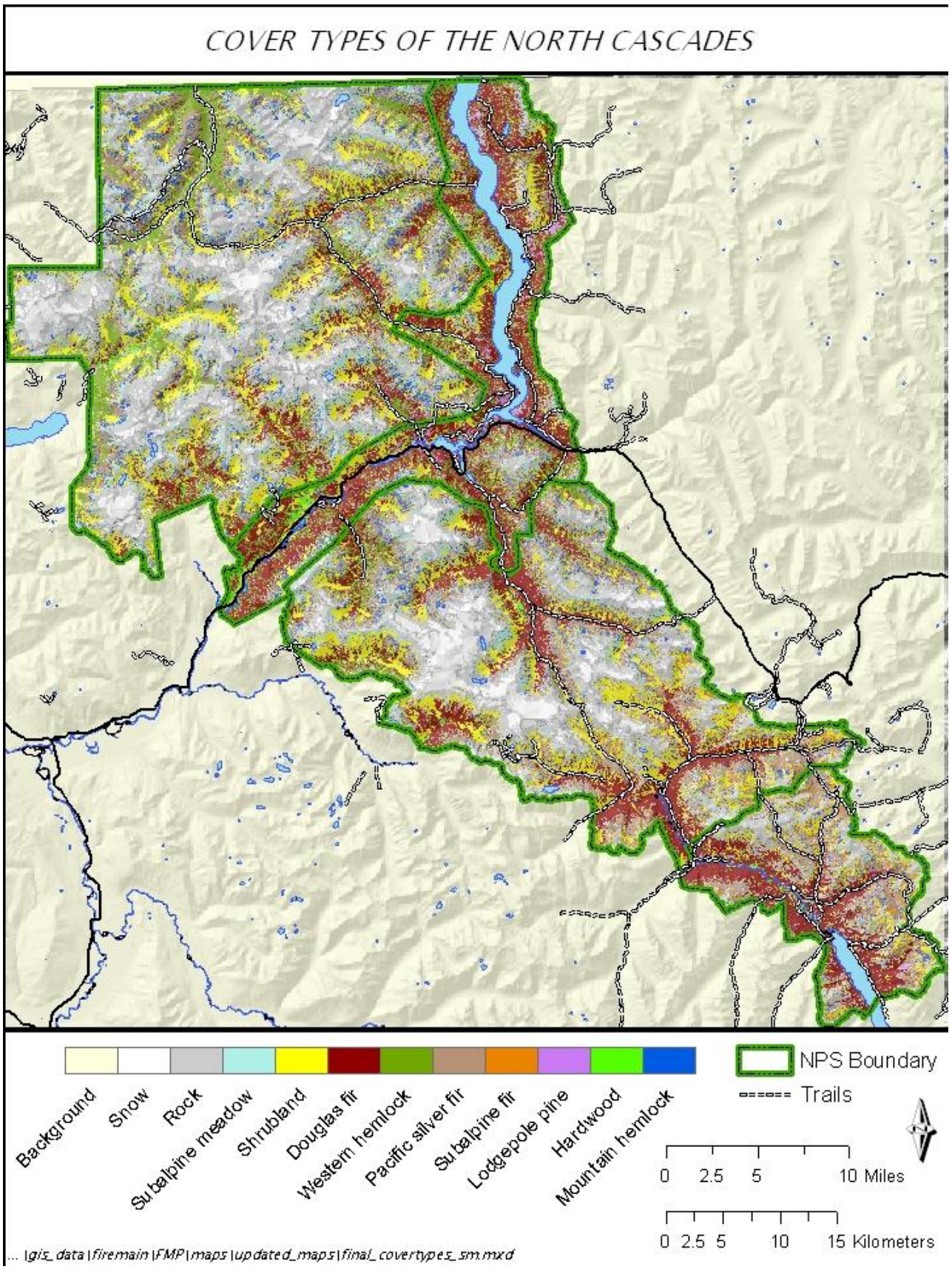
Human-Caused		Lightning-Caused	
# fires	acres	# fires	acres
5	2.6	1	0.5
4	1.3	2	2
0	0	6	0.6
1	0.1	1	0.1
5	0.6	5	185.3
5	5.4	42	1,905.1
1	0.1	14	3.2
11	6.9	3	20.2
4	5.2	10	1
3	1.2	0	0
5	1.4	13	27.2
2	1.1	3	133
6	0.6	2	1.6
5	5.9	6	0.8
6	0.7	2	0.2
6	3.3	1	1.1
3	0.3	12	2.4
1	0.1	37	316.8
7	0.7	6	2.5
3	0.3	18	14.2
0	0	0	0
5	0.5	18	4,118.4
1	0.2	1	0.3
3	0.4	0	0
2	0.2	11	362.9
4	4.7	2	0.2
3	0.3	12	193.1
0	0	4	4.1
3	1.1	5	824.2
5	60.4	6	1.8
4	0.6	21	3,549.3
113	106.2	264	11,672
3.7	3.4	8.5	376.5

The fire records from 1973 – present also document the cause of the fires that have occurred. The table below reveals that 70 percent of the ignitions in the Complex are due to lightning strikes rather than human causes. There are an average of 8.5 natural ignitions and 376.5 acres burned as a result of them per year.

5. Vegetation Covertypes

Patterns of vegetation and their associated fire regimes within the Complex are strongly influenced by extreme differences in the geology, topography, and climate of the North Cascades. These factors create a wide variety of vegetation that can be roughly divided into three categories: the westside subregion, the eastside subregion, and the east-west mix, which contains vegetation influenced by both the maritime and inland climates. The east-west mix has been identified as far west as the Copper River drainage, but is most well-developed in the Ross Lake area.

The following page shows a map of the vegetation cover types, the dominant species or groups of species that exist in the Complex as identified from one or both previous vegetation mapping efforts: a vegetation and fuels map created by Agee and Pickford in 1985, and a vegetation map created by Pacific Meridian in 1988.


COVER TYPES OF THE NORTH CASCADES
Background
Snow
Rock
Subalpine meadow
Shrubland
Douglas fir
Western hemlock
Pacific silver fir
Subalpine fir
Lodgepole pine
Hardwood
Mountain hemlock
NPS Boundary
Trails
0 2.5 5 10 Miles
0 2.5 5 10 15 Kilometers
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Cover Type	Acres (% total acres*)	Elev (ft)	Dominant Species	Minor Species	Plant Associations
Western hemlock	74,654 (11%)	3002	Western hemlock, Douglas fir, Western Red cedar	Mountain hemlock, Western white pine, Pacific Silver fir, Engelmann spruce	W. hemlock / Salal (*Gaultheria shallon*), W. hemlock / Mahonia (*Berberis nervosa*), W. hemlock / Oregon boxwood (*Pachistima myrsinites*), W. hemlock – W. Red Cedar / Oregon boxwood – Mahonia, W. hemlock / Blueberry (*Vaccinium sp*.), W. hemlock / Vine maple (*Acer circinatum*), W. hemlock / Sword fern (*Polystichum munitum*), W. hemlock / Devils club (*Oplopanax horridum*),
Hardwoods	5,102 (1%)	1513	Bigleaf maple, Black cottonwood, Red Alder	Paper birch, Pacific dogwood	
Douglas fir	115,514 (17%)	2963	Douglas fir, Western hemlock, Lodgepole pine	Subalpine fir, Engelmann spruce, Western Red cedar	Douglas fir / Blueberry, Douglas fir / Mahonia – Salal
			Douglas fir, Lodgepole pine, +/- Ponderosa pine	Grand fir, Pacific Silver fir	Douglas fir / Pine grass (*Calamagrostis rubescens*), Douglas fir / Bearberry (*Arctostaphylos uva-ursi*), Douglas fir / Oregon boxwood, Grand fir / Oregon boxwood, Douglas fir / Snowberry (*Symphoricarpos albus*), Douglas fir / Oceanspray (*Holodiscus discolor*) Ponderosa pine – Douglas fir / Bluebunch wheatgrass (*Agropyron spicatum*)
			Douglas fir, Ponderosa pine, +/- Lodgepole pine		
Lodgepole pine	6,506 (1%)	2868	Lodgepole pine	Douglas fir	Douglas fir – Lodgepole pine / Salal, Douglas fir – Lodgepole pine / Mahonia – White spirea (*Spiraea betulifolia*)
Pacific silver fir	87,541 (13%)	4586	Pacific silver fir	Mountain hemlock, Douglas – fir, Western hemlock	Pacific silver fir / Devil's club, Pacific silver fir / Thin-leaved huckleberry (*Vaccinium membranaceum*), Pacific silver fir / Oregon boxwood, Pacific silver fir / Alaska huckleberry (*V. alaskense*), Pacific Silver fir / Rhododendron albiflorum, Pacific Silver fir / Fool's huckleberry (*Menziesia ferruginea)*
Mountain Hemlock	106,125 (16%)	5026	Mountain hemlock	Pacific silver fir, Subalpine fir, Alaskan Yellow Cedar	Mtn. hemlock / Thin-leaved huckleberry, Mtn. hemlock / Rhododendron albiflorum, Mtn. hemlock / Alaskan huckleberry, Mtn. hemlock / Fool's huckleberry, Mtn. hemlock / Pink mountainheath (*Phyllodoce empetriformis)* – Blue-leaved huckleberry (*V. deliciosum*)
Shrubland	33,786 (5%)	4200	Vine maple (*A. circinatum*), Slide alder (*Alnus sinuata*), Willow (*Salix spp*.), Thimbleberry (*Rubus parviflorus*),		
Subalpine fir	16,399 (2%)	5660	Subalpine fir, Engelmann spruce	Pacific silver fir, Lodgepole pine, Western white pine, Douglas fir	Subalpine fir / Oregon boxwood (*Pachistima myrsinites*), Subalpine fir / Thin-leaved huckleberry, Subalpine fir / Pink mountainheath
			Subalpine fir, Whitebark Pine, Subalpine Larch		
Subalpine Meadow	44,043 (7%)	5351	Pink mountainheath, White mountain heather (*Cassiope mertensiana*), Blue-leaved huckleberry, Partridgefoot *(Luetkea pectinata*), Sedge (*Carex*), American bistort (*Polygonum bistortoides*), subalpine daisy (*Erigeron sp*.), Fescue (*Festuca sp.*)		

Dominant species and plant associations have been assigned to each vegetation zone and covertype in the North Cascades National Park Service Complex from Agee and Pickford (1995). Mean elevation (Elev) in feet, and number and relative cover of acres for each cover type has been assigned using Pacific Meridian data.

a. Western hemlock covertype

The western hemlock covertype thrives on the westside of the Cascades. These forests are low elevation (3,002 ft average) and contain a mix of western hemlock, Douglas-fir, and western red cedar, and usually include a small component of Western white pine, Pacific silver fir and Engelmann spruce. The western red cedar flats within this covertype have the highest number of large diameter trees per unit area. Within the Complex western hemlock-dominated sites are well developed in the watersheds of Baker River, Bacon Creek and Newhalem Creek The western hemlock and Douglas-fir covertype are interspersed in the east-west mix subregions along Ross Lake.

Plant associations that commonly occur on mesic to dry sites include W. hemlock / Salal, W. hemlock / Mahonia, W. hemlock / Oregon boxwood and W. hemlock – W. Red Cedar / Oregon boxwood – Mahonia at warm low elevation sites, and W. hemlock / Blueberry at cool high elevation sites. The W. hemlock / Vine maple plant association occurs on well drained slopes, and W. hemlock / Sword fern and W. hemlock / Devils club associations are prevalent in the moist valley bottoms.

b. Douglas-fir covertype

The Douglas-fir covertype is the most prevalent and widely distributed covertype in the Complex. It occupies 17 percent of the land base and is represented in westside, eastside and east-west forests. It is a low elevation forest type, averaging 2,963 feet, which parallels the western hemlock covertype. In the absence of disturbance it would eventually be replaced by western hemlock on the westside, whereas it is potentially dominant in eastside forests.

- **Westside: Douglas-fir - Western hemlock - Lodgepole pine**

  In westside forests this covertype occurs alongside the western hemlock covertype, occupying the southern aspects and more mesic sites. Of the Douglas-fir covertype, this assemblage, comprised of a mix of Douglas-fir with substantial amounts of western hemlock and other mixed conifers, is the moistest. The Douglas-fir / Blueberry plant association occurs on cooler sites, whereas the Douglas-fir / Mahonia – Salal plant association occupies warmer sites.

- **East-west mix: Douglas-fir - Lodgepole pine +/- Ponderosa pine**

  This covertype represents the dry to mesic east-west mix forest type that occurs at low to mid elevations in the Skagit Fire Management Unit (FMU), most frequently in the Ross Lake area. These forests are dominated by Douglas-fir in a mixed conifer assemblage that includes a large component of lodgepole pine. Grand fir is included in this covertype; whereas usually grand fir is prevalent enough to warrant its own covertype, it is not locally abundant. Douglas-fir cover averages 35 percent and is usually comprised of mature trees. Lodgepole pine cover averages 5 percent and is comprised of younger trees that have regenerated post-fire. At Desolation Peak this forest type occurs mostly on southwesterly exposures and fairly steep slopes at low to middle elevations. It is also found on very steep south-facing slopes above Lightning Creek.

  One of the more unique areas in the Complex occurs in this covertype north of Lightning Creek on the eastside of Ross Lake where there is an unexpected ponderosa

pine component. Ponderosa pine comprises 5 percent of the stand, mostly consisting of large trees with yellow-bark old-growth characteristics. This dry forest type is restricted to low elevations on southwesterly aspects within an area that is approximately 1,500 acres. There is a dense understory of shrubs, including many fire-adapted species such as the vigorous post-fire resprouting Snowbush. On very rocky sites the shrubs are replaced by drought resistant herbs such as Strawberry, Yarrow, Pine grass, and Hawkweed.

Plant associations within the covertype as a whole include Douglas-fir / Pine grass, Douglas-fir / Bearberry and Douglas-fir / Oceanspray on the driest sites, and Douglas-fir / Oregon boxwood, Grand fir / Oregon boxwood and Douglas-fir / Snowberry on the more mesic sites.

- **Eastside: Douglas-fir - Ponderosa pine +/- Lodgepole pine**

This, the warmest and driest cover type in the Complex, is found in the Stehekin Valley bottom and on the valley walls below 3,000 feet. In this cover type Douglas-fir is the dominant species, which occurs with ponderosa pine in all layers of the canopy. In the valley bottom the ratio of Douglas-fir to ponderosa pine is approximately 8:1. This cover type also contains isolated pockets that are dominated by ponderosa pine rather than Douglas-fir, although they make up less than 0.2 percent of the total cover. These ponderosa pine-dominated forests are found on open rocky slopes above the Stehekin Valley. Throughout this eastside Douglas-fir cover type ponderosa pine is much more frequent and evenly distributed in this cover type than lodgepole pine, although lodgepole pine is present at higher elevations.

In addition to the vegetation associations that occur in the understory of the Douglas-fir - Lodgepole pine +/- Ponderosa pine assemblages of the east-west mix, Ponderosa pine - Douglas-fir / Bluebunch wheatgrass occurs on the ponderosa pine dominated sites.

c. Hardwood cover type

Patches of hardwood-dominated cover type are common along river valley bottoms and at the bases of avalanche chutes in both the western hemlock and the Douglas-fir cover types. Bigleaf maple and black cottonwood dominate the valley bottoms while red alder and paper birch are more abundant on slopes. Hardwood stands also occur as an early successional stage following disturbances. For example, bigleaf maple stands commonly regenerate areas following fire and also fill in root-rot pockets. The hardwood cover type is common in the Baker, Big Beaver, Little Beaver, McMillan, Cascade, and Stehekin drainages.

d. Lodgepole pine cover type

The lodgepole pine cover type is comprised of relatively pure lodgepole pine stands. Lodgepole pine achieves its maximum importance in the 1,000 to 3,500 foot elevation range, and may be the climax species in this range along with Douglas-fir. These stands are primarily mature to over mature (usually greater than 80 years in age), and evidence of mountain pine beetle kill is apparent along Ross Lake. Lodgepole pine stands below Ross Lake Dam are predominantly comprised of westside species whereas a strong eastside element is evident in the Ross Lake Basin, particularly east of the lake. The

Douglas-fir – Lodgepole pine / Salal and Douglas-fir – Lodgepole pine / Mahonia – White spirea plant associations occur in this cover type.

e. Pacific silver fir cover type

This Pacific silver fir cover type is notable for having the densest stands of large trees in the Complex. It is comprised primarily of Pacific silver fir with western hemlock and Douglas-fir associates on lower elevation sites, and mountain hemlock, Alaska yellow cedar, subalpine fir and lodgepole pine on higher elevation sites. Pacific silver fir is the potential natural dominant tree species, although young stands are primarily established by more fire tolerant, and less shade dependent species such as Douglas-fir.

The Pacific silver fir cover type is in the montane region, with an average elevation of 4,586 feet, which is above the western hemlock and Douglas-fir cover types and below the subalpine forests. It is considerably cooler and wetter in the montane, with a short growing season and a significant winter snow pack. The Pacific silver fir cover type is most commonly associated with westside assemblages, although it is also found on north-facing slopes and moist mid-elevation valley bottoms in more easterly locations. Concentrations occur in the Cascade, Baker, and Chilliwack Rivers, and the upper reaches of Newhalem, Big Beaver, Little Beaver, and Thunder Creeks.

Plant associations found in this cover type include Pacific silver fir / Devil's club, Pacific silver fir / Thin-leaved huckleberry, Pacific silver fir / Oregon boxwood, Pacific silver fir / Alaska huckleberry, Pacific Silver fir and Pacific Silver fir / Fool's huckleberry.

f. Mountain hemlock cover type

The mountain hemlock cover type is the highest elevation cover type west of the Cascades, with an average elevation of 5,026 feet, and inhabits the coolest and wettest conditions in the Complex. The canopy is generally continuous at lower elevations and becomes more open at higher elevations. Mountain hemlock is the dominant tree species, although Pacific silver fir may be the potential natural dominant in the closed forest type where it comprises one-third of the basal area and dominates the understory. Other common tree species include Alaska yellow cedar on moist sites and Douglas-fir and subalpine fir on drier sites.

Plant associations found in this cover type include Mtn. hemlock / Thin-leaved huckleberry, Mtn. hemlock /Rhododendron, Mtn. hemlock / Alaskan huckleberry, Mtn. hemlock / Fool's huckleberry and Mtn. hemlock / Pink mountainheath - Blue-leaved huckleberry.

g. Subalpine fir cover type

The subalpine fir cover type is the eastside equivalent of the mountain hemlock cover type. Although it is not quite as moist as its coastal counterpart, it is the highest, coolest, and wettest zone east of the Cascades. As in the mountain hemlock cover type, there is both a closed forest type and an open parkland community.

Appropriately, subalpine fir is the dominant species. However, Engelmann spruce is also prominent in these stands along with Pacific silver fir and mountain hemlock. The open parklands in the subalpine fir cover type usually contain a number of whitebark pine and subalpine larch. These species often occur on ridgetops and in rocky basins. Whitebark

pine is most prevalent on the drier sites. Subalpine larch dominates higher elevations, the coldest treeline habitats in the Complex.

Plant associations in this cover type include the Subalpine fir / Oregon boxwood, Subalpine fir / Thin-leaved huckleberry, and Subalpine fir / Pink mountainheath.

h. Subalpine meadow cover type

Subalpine meadows are the coldest and highest elevation plant communities. They are located above treeline and alongside the scattered patches of trees in the subalpine areas throughout the Complex. These meadows are dominated by heather and vaccinium shrubs that share the drier areas with alpine fescues and the wetter areas with sedges.

i. Shrubland cover type

Shrubs are the dominant vegetation type on the steep, moist slopes of avalanche chutes. Sitka alder, willows, and vine maple dominate these sites. This covertype also occurs in wetlands, drainages, and in sites that have recently burned.

6. Fire Regimes, Fuel Models, and Condition Classes

Fire has had a profound influence on the age, structure, and composition of vegetation in the Pacific Northwest. The same qualities that fire influences in the vegetation community influence fire frequency and severity across the landscape. The fire regime is the interaction of fire and vegetation along with factors influencing them both including but not limited to climate, topography, soils, and historical land use.

The covertypes are classified by the historical fire regimes and condition classes (see tables below) according to the Interagency Fire Regime Condition Classes with respect to their estimated fire return intervals and other known disturbance factors. The condition classes are based upon the degree of departure from the historical natural fire regimes that vegetation communities in the Complex have experienced. The management strategies in this Plan are developed according to condition classes. Restorative thinning and prescribed burn treatments are proposed in condition classes 2 and 3, while use of wildland fire is proposed in condition class 1 areas.

a.Historical Natural Fire Regimes I -V

I	0 - 35 year frequency and low (surface fires most common) to mixed severity (less than 75% of the dominant overstory vegetation replaced)
II	0 - 35 year frequency and high (stand replacing) severity (greater than 75% of the dominant overstory vegetation replaced)
III	35-100+ year frequency and mixed severity (less than 75% of the dominant overstory vegetation replaced)
IV	35-100+ year frequency and high (stand replacement) severity (greater than 75% of the dominant overstory vegetation replaced)
V	200+ year frequency and high (stand replacement) severity

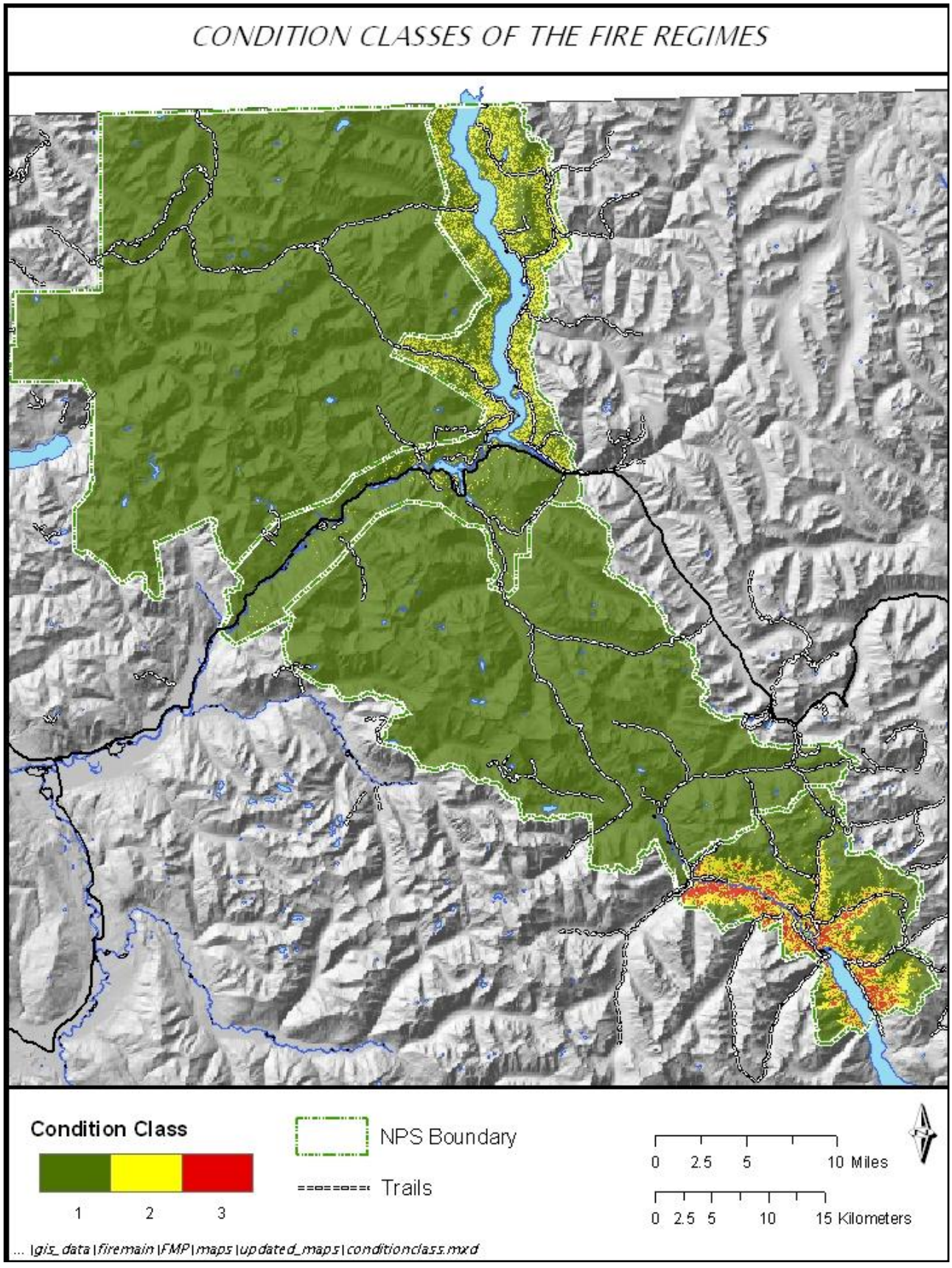
Historical natural fire regimes (Schmidt et al. 2002)

b. Condition Classes 1 -3

1	Within the natural (historical) range of variability of vegetation characteristics; fuel composition; fire frequency, severity and pattern; and other associated disturbances
2	Moderate departure from the natural (historical) regime of vegetation characteristics; fuel composition; fire frequency, severity and pattern; and other associated disturbances
3	High departure from the natural (historical) regime of vegetation characteristics; fuel composition; fire frequency, severity and pattern; and other associated disturbances

Condition Classes (Schmidt *et al.* 2002)

The map of the condition classes of the Complex on the following page shows that most of the Complex is within its historical range of fire intervals. Only the dry Douglas-fir forests of the Stehekin Valley have a high degree of departure from historical conditions (Condition Class 3). East-west mixed Douglas-fir forests and lodgepole pine forests are moderately altered due suppression, as well as due to the occurrence of insects and disease.


CONDITION CLASSES OF THE FIRE REGIMES
Condition Class
1
2
3
NPS Boundary
Trails
0 2.5 5 10 Miles
0 2.5 5 10 15 Kilometers
... \gis_data\firemain\FMP\maps\updated_maps\conditionclass.mxd

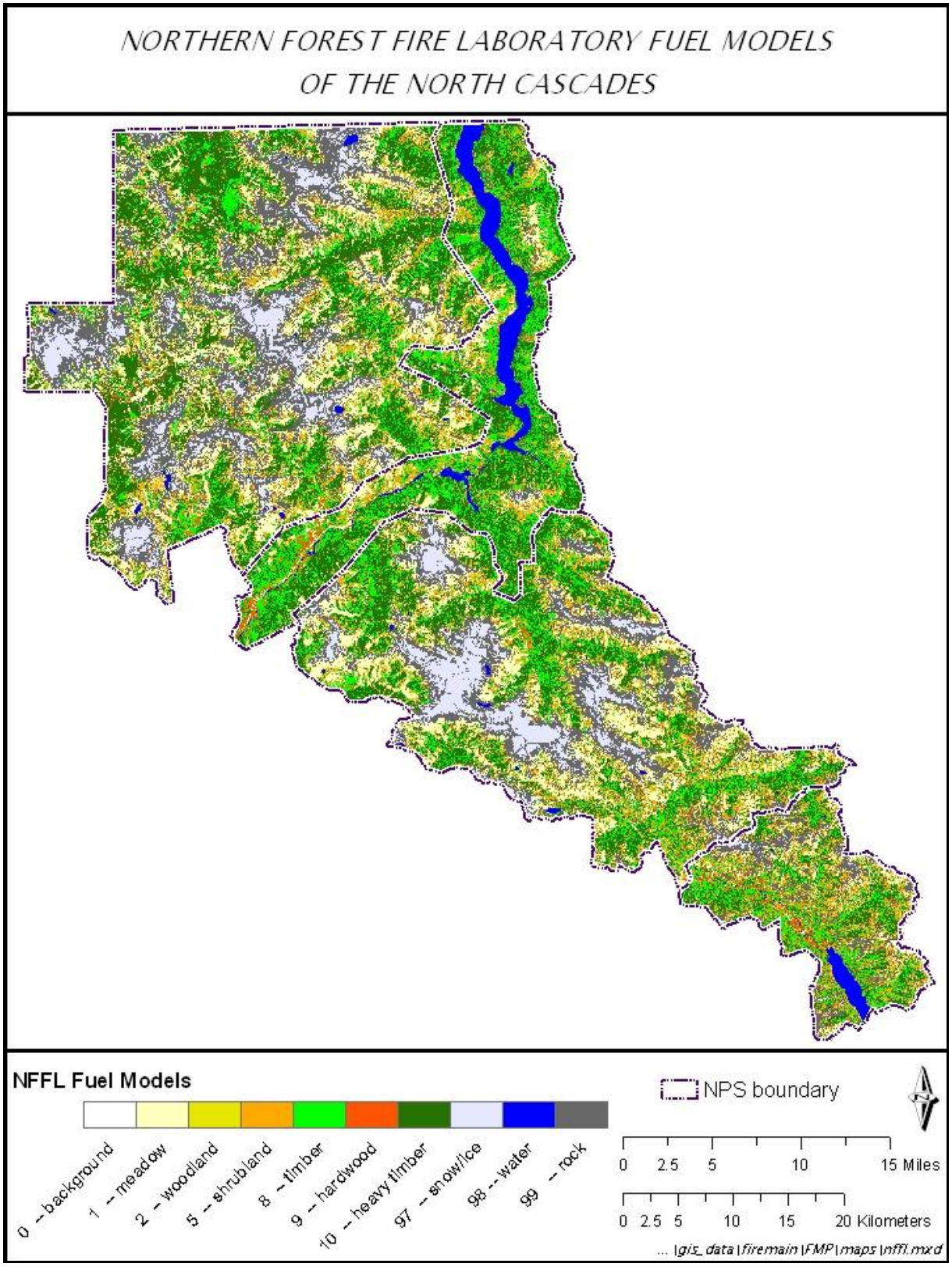
The Northern Forest Fire Laboratory (NFFL) fuel models are also considered during fire management planning efforts and activities. They are used to classify the vegetation by the amount of dead and downed fuels as well as by the density and diameter of living and dead trees in forested vegetation communities (see table below). The fuel model assignments and map are used to run RERAP (Rare Event Risk Analysis Program) to predict fire spread according to season, and FOFEM (First Order Fire Effects) to analyze smoke emissions within the Complex.

Fuel model	Typical fuel complex	1 hour (0 – ¼") tons/acre	10 hour (1/4 – 1") tons/acre	100 hour (1 – 3") tons/acre	Fuel depth (Ft)
1	Short grass (1 foot): *Meadow*	0.74	0.00	0.00	1.0
2	Timber (grass and understory): *Woodland*	2.00	1.00	0.50	1.0
5	Brush (2 feet): *Shrubland*	1.00	0.50	0.00	2.0
8	Closed timber litter: *Timber*	1.50	1.00	2.50	0.2
9	Hardwood litter: *Hardwood*	2.92	0.41	0.15	0.2
10	Timber (litter and understory): *Heavy Timber*	3.01	2.00	5.01	1.0

NFFL Fuel Models (Anderson 1982) with names used in the Complex in italics.

The table on the following page shows the condition class, fire regime and fuel model designations for the Complex. These designations are justified in the descriptions of the fire regimes of each covertype that follow. It is evident that most of the fire regimes of the Complex are of mixed or high (stand replacing) severity. Only the eastside Douglas-fir/ponderosa pine forests of Stehekin had a majority of frequent low severity fire events.

Condition Classes, Fire Regimes and NFFL Fuel models of the Covertypes				
Covertype	**Dominant Species**	**Condition Class**	**Historical Fire Regime**	**P: primary NFFL S: secondary NFFL**
Western hemlock	Western hemlock, Douglas-fir, Western Red cedar	1	V	P:8 S:10 (closed canopy, large diameter trees)
Hardwoods	Bigleaf maple, Black cottonwood, Red alder	1	II / III / V	P: 9 (Bigleaf maple, Red alder) S: 8 (Other hardwoods)
Douglas-fir	Douglas-fir, Western hemlock, Lodgepole pine	1	III	P:8 S:10 (closed canopy, large diameter trees)
	Douglas-fir, Lodgepole pine, Ponderosa pine	2	III	P:8 S:10 (closed canopy, large diameter trees)
	Douglas-fir, Ponderosa pine, Lodgepole pine	3	I	P:8 S:9 (open canopy, large diameter ponderosa pine) S:2 (open canopy, small diameter ponderosa pine)
Lodgepole pine	Lodgepole pine	2	IV	P:8 S:10 (closed canopy, large diameter trees)
Pacific silver fir	Pacific silver fir	1	V	P:8 S:10 (closed canopy, large diameter trees)
Mountain Hemlock	Mountain hemlock	1	V	P:8 S:10 (closed canopy, large diameter trees)
Shrubland	Vine maple, Slide alder, Willow, Thimbleberry	1	II / III / V	P: 5
Subalpine fir	Subalpine fir, Engelmann spruce	1	V	P: 10
	Subalpine fir, Whitebark Pine, Subalpine larch	1	IV	P: 8 (Subalpine larch and Whitebark pine) S: 10 (Subalpine fir)
Subalpine Meadow	Heather and Vaccinium	1	IV / V	P: 1


NORTHERN FOREST FIRE LABORATORY FUEL MODELS
OF THE NORTH CASCADES
NFFL Fuel Models
0 -- background
1 -- meadow
2 -- woodland
5 -- shrubland
8 -- timber
9 -- hardwood
10 -- heavy timber
97 -- snow/ice
98 -- water
99 -- rock
NPS boundary
0 2.5 5 10 15 Miles
0 2.5 5 10 15 20 Kilometers
... \gis_data\firemain\FMP\maps\nffl.mxd

c. Western Hemlock Fire Regime

The regional mean fire interval estimate for western hemlock forests is 230 years, although the estimations range from less than 100 years in the driest western hemlock forests of Oregon to well above 900 years in some moist coastal forests of the Olympics. The regional estimate is somewhat unreliable because the fire record is not long enough or regular enough to infer a pattern. More reliable, however, is that when the conditions for fire spread exist, the fires are usually of high intensity and severity. Western hemlock-dominated forests in the Complex typically have high severity fire events in which more than 75 percent of the vegetation is replaced at intervals of 100 to 400 years.

In the closed canopy, total downed woody fuel loads are intermediate (between NFFL fuel models 8 and 10) with average fuel loadings greater than 6 tons per acre and fuel depths exceeding one foot. Small diameter fuels are scarce. Most of the tonnage is accumulated in jackpots of larger diameter fuels (> 3"). In the open, more shrub-dominated forests, NFFL fuel model 8 is most prevalent, although early regenerating stands with the least cover sometimes qualify as a NFFL model 5.

d. Hardwood and Shrubland Fire Regimes

The hardwood and shrubland cover types occur in various locations, and within multiple fire regimes in the Complex. When the hardwood or shrubland cover type is in a moist environment it often acts as a barrier to fire spread. However, when conditions are hot and dry, wildland fire is stand replacing. Red alder and Bigleaf maple fuel models are predominantly classified as NFFL model 9, in which fire moves quickly through the loosely packed leaf-litter. Other hardwood species are identified as NFFL model 8. The shrubland covertype is NFFL model 5.

e. Douglas-fir Fire Regimes

The fire regimes of the Douglas-fir cover type can be distinguished by the subregion (eastside, westside, or east-west mix) in which they occur, and can be categorized by the secondary dominant tree species in the area. Of these, western hemlock is the wettest and coolest, lodgepole pine is intermediate, and ponderosa pine is the hottest and driest.

Open and closed canopy stands in the Douglas-fir cover type are primarily classified as NFFL fuel model 8, although the densest stands of the largest diameter trees are NFFL fuel model 10. Although NFFL fuel model 10 does not indicate unnatural fuel buildup in the westside subregion containing western hemlock, it may indicate altered forest conditions in the dry eastside Douglas-fir forests. Altered fuel loadings and dense-stands not only increase fire potential, but the greater number of trees per area may also increase competition for soil moisture and create greater susceptibility to defoliation and bark beetle infestation.

- **Westside: Douglas-fir - Western Hemlock - Lodgepole Pine**

  The westside Douglas-fir covertype is classified as a fire regime III. The fire return interval is typically between 100 and 200 years with less than 75 percent of the dominant overstory vegetation replaced by fire. Consistent with this classification, a 137-year natural fire rotation was calculated for this cover type at Desolation Peak.

This fire regime is often referred to as "mixed severity" due to the interaction of low, medium, and high severity fire effects. These mixed effects ultimately influence the structure and composition in the post-fire stand. If lodgepole pine was present in a pre-fire stand, it may be more likely to dominate regeneration in the most severely burned patches, whereas the more shade-tolerant Douglas-fir will likely dominate in moderate and low severity patches where the canopy cover is greater. Finally, without fire, Douglas-fir and lodgepole pine lose dominance and are eventually replaced by western hemlock.

- **East-west Mix: Douglas-fir - Lodgepole Pine +/- Ponderosa Pine**

The east-west mix Douglas-fir cover type is also classified as a fire regime III, although the fire interval is shorter than in the westside subregion. The natural fire rotation calculated for Douglas-fir/lodgepole pine at Desolation Peak is 76 years. This estimate is consistent with findings of two to three fire scars per 115 years throughout the Ross Lake area. There are several mixed lodgepole pine/Douglas-fir stands with widely varied ages (e.g. 45 year old lodgepole pine and 400 year old Douglas-fir) suggesting that successive fire-killed generations of younger lodgepole pine and Douglas-fir occurred beneath the older Douglas-fir canopy.

In the unique Douglas-fir/ponderosa pine forest type above Lightning Creek the natural fire rotation was 52 years. This was the shortest fire rotation calculated in the 400-year fire history. In areas where ponderosa pine is the primary dominant the natural fire rotation was even shorter, calculated at 44 years. Fires in this type were of lower severity, as indicated by the large number of residual trees.

Although it is not clear whether the high fire frequency above Lightning Creek was partially the result of Native Americans or early settlers burning, it is clear that without low severity fire, the ponderosa pine will eventually be replaced by more shade tolerant species. This area is classified as a Condition Class 2 forest because it is assumed to have missed one fire rotation.

If fires continue to be suppressed in this area, the increase in fuel loading and development of shade-tolerant conifers in the understory will influence fire effects. Low severity ground fire favoring the maintenance of the existing ponderosa pine will likely be replaced by higher severity stand replacing fire that may favor lodgepole pine regeneration rather than ponderosa pine.

- **Eastside: Douglas-fir - Ponderosa Pine +/- Lodgepole Pine**

The eastside Douglas-fir covertype that occurs throughout the Stehekin Valley is the most xeric type on the Complex and is comparable to the dry Douglas-fir mixed conifer of the Rocky Mountains. It is best characterized by a fire regime I of mixed severity where stand replacing events occur infrequently (approximately every 100 years) and low severity fires occur more frequently. A survey of the Stehekin Valley confirmed that large stand replacing events occur at approximately 90 to 100-year intervals. However, since a long term fire history study has not been conducted in the Stehekin Valley, the overall fire frequency for low and high severity fire events must be based upon studies in dry Douglas-fir forests that have been conducted nearby.

A recent 433-year fire history study of the Teenaway River drainage in OWNF determined that the median fire interval varied within a range of seven to 43 years and that larger fires occurred at intervals of one to 37 years. Another fire history study in OWNF compared two 300-year long records in the Nile and Mud Creek watersheds, revealing a mean fire free interval (MFFI) of seven years at both sites during the pre-settlement period (1700/1750-1860), a MFFI of 7.1 and 10.6 years respectively during the settlement era (1860–1910), and a MFFI of 38.3 and 43.0 years respectively during the suppression era (1910-1996).

Mean fire intervals may have been longer (12 + years) in Stehekin because Douglas-fir typically dominates the overstory in Stehekin, indicating that fire free intervals were long enough to allow Douglas-fir to grow to ample size to survive low severity fire along with the more fire resistant ponderosa pine, whereas ponderosa pine was the dominant in the OWNF study areas.

The studies in the OWNF areas found fires historically to be variable in size and location. Small fires created gaps in the forest canopy that perpetuated a variety of fire effects; subsequent fires would burn up to, but not within, the perimeter of recently burned areas because the fuels were sparser in those areas. Larger fire events occurred in both study areas; however, historically these were not stand replacing fire events. High severity fires occurred at the stand scale (10-100 hectares) rather than at the landscape scale (>1000 hectares).

Both studies also found significantly longer fire free intervals in the suppression era. Fire suppression and/or other factors have increased ground fuels and understory regeneration beyond historic levels; forests of this type were fairly open, perhaps containing 50 trees per hectare and 15m^2 of basal area that was predominantly ponderosa pine, and having low levels of coarse woody debris.

Given the differences between Stehekin and OWNF, a cautious estimate of the number of fire returns that the Stehekin Valley has missed since 1910 is between two and four. The fire records database documents 117 fires that have been suppressed since 1958 in the Lake Chelan Recreation Area, and recent surveys have documented unnatural fuels buildup, insects, and disease as evidence of fire suppression. A heavy fuel loading average of 31.5 tons per acre total fuel loading (7.4 woody debris, 24.1 litter and duff) and greater than 250 trees per hectare (of overstory trees > 15 cm dbh) are currently found in the Stehekin Valley forest fuel reduction areas. These conditions are likely to create crown fires and high severity fire events. Due to these considerations, the eastside Douglas-fir/ponderosa pine forests are classified as Condition Class 3.

f. Lodgepole Pine Fire Regime

The lodgepole pine fire regime at the Complex is a mixed severity fire regime, which fits reasonably well in the fire regime IV category, in which high severity events where more than 75 percent of the stand is replaced occur at approximately 100-year intervals. There is typically a mix of low, moderate and high severity events, and fire frequency is not well documented. Due to widespread mountain pine beetle infestations in the lodgepole pine

stands throughout the Ross Lake area, Bridge creek, Rainbow creek and several areas in the Stehekin drainage , the heavy fuel loadings from dead or dying trees create the conditions most conducive to high severity fire events, especially if dry, hot, and windy conditions occur.

Lodgepole pine-dominated sites in the Complex appear to be perpetuated by high severity fire events; lodgepole pine is the most likely pioneer following stand replacing events, and its continued dominance is reliant upon these high severity fires reducing competition from more shade tolerant species. A study on the ecological role of lodgepole pine in the upper Skagit Valley notes that the ages of many of the lodgepole pine stands coincide with the major fire of 1859 that was reported in the upper Skagit River Valley or with the 1926 fire that originated at Big Beaver and burned over 40,000 acres. Similarly, the initiation of many lodgepole pine stands below Ross Dam correspond to the years 1890 and 1917 when large fires were reported in that area.

Fire regimes in the Douglas-fir/lodgepole pine and the lodgepole pine cover types are considered to be in Condition Class 2 because without the reintroduction of fire, the lodgepole pine and Douglas-fir will be replaced by more shade tolerant species.

g. Pacific Silver Fir Fire Regime

Fire return intervals recorded in the Complex for Pacific silver fir forests are shorter than in other Pacific silver forests of western Washington. For example, at Desolation Peak fire return intervals are between 100 and 200 years, whereas at Mt. Rainier there is a 300 to 535 year interval. This is primarily due to drier conditions exhibited in the surrounding forests.

Due to the low resistance to fire of Pacific silver fir and most of the conifers in this cover type (other than Douglas-fir), the majority of trees within the perimeter of a fire will die, and these stand replacing fire events will serve as primary sites for regeneration of fir, hemlock and lodgepole pine. The fire severity was predominantly stand replacing on a Pacific silver fir dominated site at Big Beaver that was managed for wildland fire use in 2003.

Consistent with its high basal area, the NFFL fuel model is intermediate between fuel models 8 and 10, as in the western hemlock cover type.

h. Subalpine Fire Regimes: Mountain Hemlock and Subalpine Fir

The fire regimes of the subalpine forest types, mountain hemlock and subalpine fir, are both classified as a fire regime V in which fire free intervals are greater than 200 years and where high fire severity fire creates stand replacement. The longest term fire history study (10,500 years) of a subalpine fire regime in the Complex was recently completed in a subalpine forest in the Thunder Creek basin. This reconstruction documents fire frequency fluctuations between 30 to 400 years throughout this time period.

Mountain hemlock and subalpine fir fuels are primarily NFFL fuel model 8 except for in open areas on ridgetops and near snowline that are NFFL fuel model 5 and on mountain slopes where heavy fuels accumulate in jackpots that are NFFL fuel model 10.

Fire intervals in whitebark pine/subalpine larch forests may be slightly shorter, and thus are classified in fire regime IV.

Whitebark pine/larch cover types are closest to models 8 and 1 although studies have found that both models overestimate fire behavior because fuel loadings are typically less than in model 8, and fuel moistures are typically greater than those of model 1 grasslands.

i. Subalpine meadow Fire Regime

The subalpine meadow fire regime is characterized by fire regime V. Fire events are infrequent because these meadows are typically moist from snowmelt and have very sparse ground fuels occurring around pioneer trees. Variable effects on heather and vaccinium recovery may be dependent upon the type of fire; a post-fire study on a fire at Sourdough ridge in the Complex found vaccinium to replace heather in burned areas, whereas a study of the Chimney Peak fire in the Olympics found red heather to sprout vigorously.

Drier eastside grass and sedge-dominated subalpine meadows may burn more frequently, as an abundance of charcoal has been found in the soil.

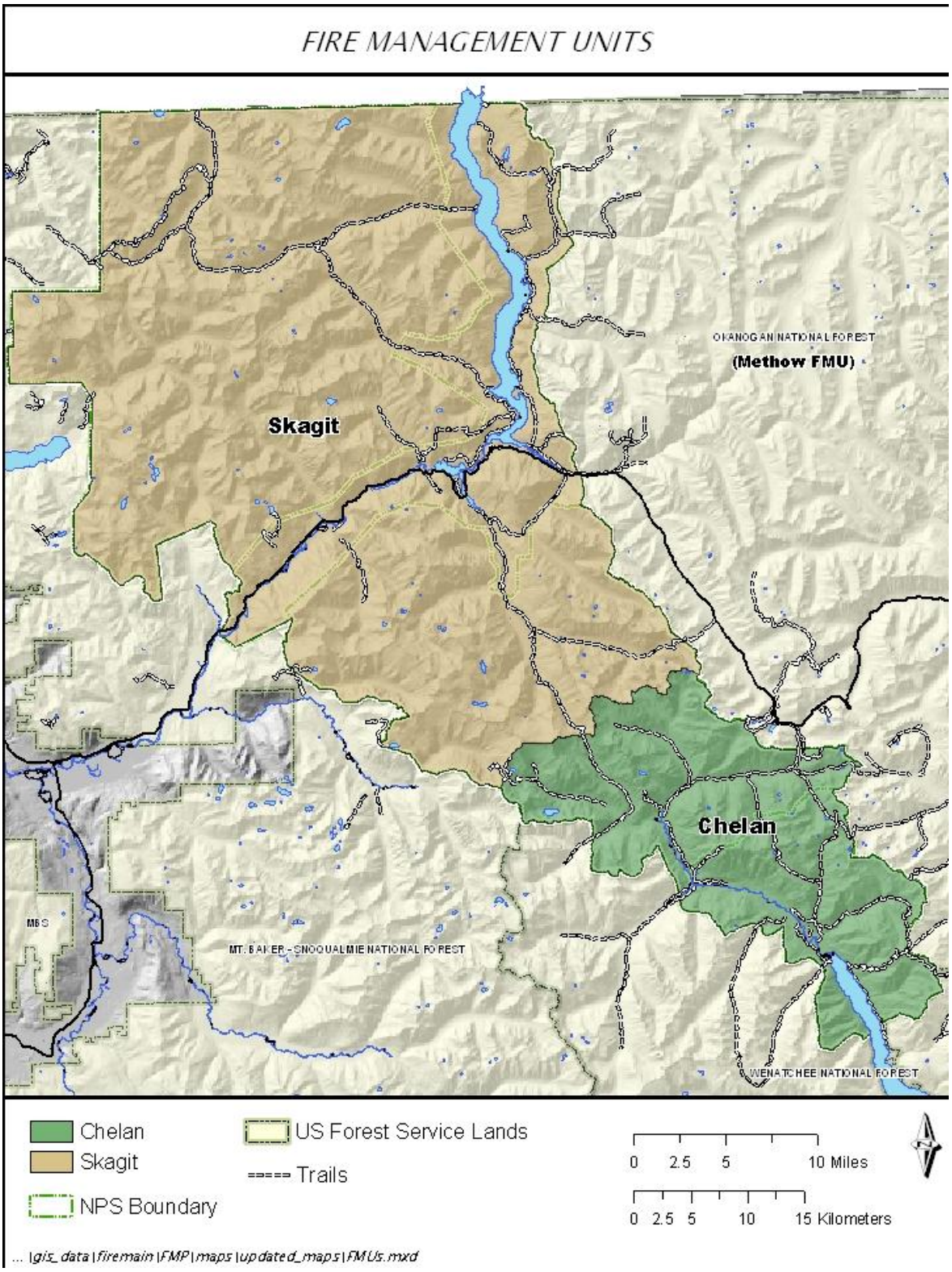
Shrub-dominated sites are an NFFL fuel model 5, and grass-dominated sites are an NFFL fuel model 1.

D. FMU Delineations

A Fire Management Unit or FMU is a land management area that is definable either by objectives, topographic influences, political boundaries, values to be protected, land management policies, access or fire regimes that sets itself apart from other FMU's.

North Cascades Complex is made up of two FMU's, a north (Skagit FMU) and a south unit (Chelan FMU). The south unit is shared with the surrounding Okanogan-Wenatchee forest and is a part of a joint Fire Management plan. The Complex does not share the Skagit FMU with Mount Baker-Snoqualmie National Forest, although this may occur in the future. The two units both have the potential for all the fire management strategies. Both FMU's within the NPS boundaries are managed by North Cascades National Park Service Complex.

The two units are however distinct in the watersheds where they are located, access routes into, fire regimes most prevalent, climate and weather patterns. Detailed descriptions of each FMU are in the next chapter.


FIRE MANAGEMENT UNITS
OKANOGAN NATIONAL FOREST
(Methow FMU)
Skagit
Chelan
MBS
MT. BAKER - SNOQUALMIE NATIONAL FOREST
WENATCHEE NATIONAL FOREST
Chelan
Skagit
NPS Boundary
US Forest Service Lands
Trails
0 2.5 5 10 Miles
0 2.5 5 10 15 Kilometers
... \gis_data\firemain\FMP\maps\updated_maps\FMUs.mxd

E. FMA Delineations

Fire management areas (FMA) are sections of the FMU that represent a predefined acceptable management area for a fire managed for resource benefits (Wildland and Prescribed Fire Management Policy – Implementation Procedures Reference Guide, 2001).

Fire management area boundaries for this Plan were determined primarily by the three fundamental characteristics that influence fire spread and fire severity: fuels, weather, and topography. Other considerations included: the North Cascades Complex Resource Management Plan (1999), land allocations and associated resource objectives, fire regimes, previous fire perimeters, land ownership patterns, and values at risk. While these considerations are important, ultimately wildland fire does not confine itself or take into account these other variables. "Fire knows no boundaries" other than those that naturally or artificially occur across the landscape creating breaks in fuel continuity.

Fire management area boundaries were delineated in areas where natural, existing or potential fuel breaks or control lines could be identified that would not likely be breached by a fire. This exercise involved extensive use of GIS, examination of the crown fire potential layer, orthophotos, topographic features, trail and road systems, rock and ice. Natural control lines typically included ridges of rock, snow and ice, or in some cases, major creeks and rivers. Existing control lines were identified along roads and some trails. Finally, potential control lines were identified in areas that offered an opportunity to improve a trail, construct hand line, create shaded fuel breaks, or utilize water dropping helicopters. Firefighter safety was considered when determining control lines.

1. Complexity

A fire complexity rating exercise was completed for each FMA. This exercise determines a complexity rating in relation to responses to wildland fire, not for prescribed fire. This analysis results in a numeric complexity value based on specific complexity elements that are weighted for their contribution to overall complexity. There are twelve complexity elements:

- Safety
- Threats to Boundaries
- Fuels and Fire Behavior
- Objectives
- Management Organization
- Improvements to be Protected
- Natural, Cultural, and Social Values to be Protected
- Air Quality Values to be Protected
- Logistics
- Political Concerns
- Tactical Concerns

- Interagency Coordination

The weighted value is multiplied by the numeric value to provide a total element rating. All total values are then added to generate the complexity numeric value. Breakpoint values are provided for low, moderate, and high complexity (Wildland and Prescribed Fire Management Policy - Implementation Procedures Reference Guide, 2001).

Even though some of the FMA were rated overall as "high complexity," this does not necessarily indicate that managing fire to meet multiple objectives should not be considered. It merely points out the need to be prepared to manage accordingly especially with regard to elements that received a high rating.

2. Suitability

Fire management areas are classified either suitable or not suitable for use of wildland fire based on social and political issues as they relate to the risk assessment (see below) and line officer discretion.

Once a fire is verified within a suitable FMA or suitable portion of an FMA, a WFDSS document will be completed. All fires within an unsuitable FMA or unsuitable portions of an FMA will be immediately suppressed. Any appropriate suppression response to a wildland fire occurring within a suitable FMA will be made at the discretion of the Fire Management Officer using WFDSS to document the decision.

32. Risk Assessment

This risk assessment is one tool to guide fire managers in determining the appropriate response to wildland fires. At the time of a fire report, the Duty Officer will assess potential impacts of the fire through a risk identification process. The following items are minimum considerations:

- 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 Agency Administrator?
- Is there other proximate fire activity that limits or precludes successful management of this fire?
- Are there other Agency Administrator issues that preclude use of wildland fire?
- Consider wildland fire compatibility and associated complexity rating for the affected FMA.

Rare Event Risk Assessment Process (RERAP) was used to assess long term fire risk for several locations within the FMU. This was a programmatic assessment to support future fire response decisions. This analysis is very gross in scale and meant to provide the

decision maker with information to make decisions.When a wildland fire occurs within the FMU, a more site-specific analysis needs to be performed.

Risk Assessment Zones (RAZ) were developed by a combination of contiguous FMA based on similar fuel, topography and weather for use in risk assessment.

a. RERAP Analysis

RERAP incorporates several computer software programs that allow the fire manager to quantify risk associated with rare but significant events and the uncertainty related to the length of a fire season. Estimates are developed for specific periods of time for given directions, usually dominated by wind events.

RERAP utilizes weather data prepared and analyzed by *FireFamily Plus*, the program used to process National Fire Danger Rating System (NFDRS) weather data files into indices and components used for analysis. *FireFamily Plus* is used to sort records, select weather records meeting specific criteria, plot data and create tables of fuel moistures and wind speed.

RERAP then develops a risk analysis based on the historic weather information retrieved in *FireFamily Plus*. Within RERAP are three distinct program modules—SPREAD, TERM, and RISK. SPREAD determines common daily spread, spread during rare-spread events, and the frequency of those rare-spread events. TERM evaluates season-ending dates and generates a waiting time distribution of these events. RISK combines the critical-spread waiting time distribution with the season-ending event distribution to estimate the probability that a critical-spread event will occur prior to the season-ending event.

Climatological weather is used in risk assessment rather than the short-range weather forecasts that are used in developing fire behavior predictions because it is more appropriate for statistical analysis.

b. Historical Weather

Weather records were obtained from the National Interagency Fire Management Information Database (NFMID) in Kansas City for appropriate remote automated weather stations (RAWS).

c. Weather Data Processing

The weather data was processed with *FireFamily Plus*. The *FireFamily Plus* program groups daily records by month, indices, components, wind direction, etc. For this analysis, fire season weather from June 1 thru October 30 was used.

FireFamily Plus was used to break the weather data into four classes of potential fire behavior characteristics: low, moderate, high, and extreme. For the purpose of this risk assessment, probabilities for each weather class were assigned using the standard spread component. Accordingly, three percent of the days between June 1 and October 30 can be expected to be in the extreme class, 7 percent in high, 75 percent in moderate, and 15 percent in low.

From these weather classes *FireFamily Plus* generates tables of fuel moistures and wind speeds that represent the median value in each weather class. These values are later used as inputs to BEHAVE (a fire behavior prediction program) to predict rate of spread of the fire within the SPREAD module of RERAP. *FireFamily Plus* also calculates the number of days in a sorted group as compared to the total days. The result is used later to compute the average daily spread.

d. Time Periods

Five time periods of potential fire spread were assessed:

- June 1-30
- July 1-31
- August 1-31
- September 1-30
- October 1-31

Probabilities were calculated based on the 15th of each month.

e. Energy Release Component

Energy release component (ERC) is a standard numerical rating used to determine the severity of a fire season. The rating is derived from fuel model information combined with weather station data. For the risk assessments, it was assumed that a normal fire season would divide into the standard proportion of low, moderate, high and extreme weather days as follows:

Low: 0.15	Moderate 0.75	High 0.07	Extreme 0.03

These ranges are determined based upon the percentage of the weather data set with lower or higher ERC values. For example, the low category represents days on which the ERC is lower than on 85 percent of all other days while the moderate category represents days on which the ERC is higher than on 75 percent of all other days. It is important to remember that these probabilities are subject to change as conditions change.

f. Topography

Topography information needed during spread determinations is taken from 1:24000 scale Geographic Information System (GIS) generated maps. Information on slope, aspect, elevation and distance was used.

g. Fuels

Accurate fuel model mapping is critical for fire spread determinations. See Chapter III. Section A for a detailed discussion of fuel models.

h. Season-Ending (Term) Event

The date for a probable season-ending or term event is determined by local knowledge of weather patterns that affect the potential for fires to spread significantly. District fire management officers recommended that the criterion for a season-ending event be set at three consecutive days of precipitation with a sum greater than 0.5 inches. Weather data and ERC charts were examined, and in cases where the above criterion was not met, dates were selected where trends towards lower ERC and higher humidities (greater than

50 percent) began. The probability of a season-ending event is crucial to the risk assessment.

i. Risk Estimates

Using the information from SPREAD and TERM, RISK the risk estimate calculates the probability that a critical-spread event will occur in a particular FMA prior to the season-ending event. These tables and graphs are included in the appendix for each FMU.

It is important to keep in mind that the use of risk estimates is just one of many tools supporting the decision making process. Local experience and knowledge as well as fire behavior variables observed on the fire line are equally important decision elements.

j. Calibration

Calibration will need to occur during an actual wildfire event. Calculations were very broad in nature and are not site specific.

F. Skagit Fire Management Unit

This portion of the plan for the Skagit FMU of the Complex and is integrated with the Methow Sub-Basin FMU of the Okanogan-Wenatchee National Forest Fire Management Plan. The strategies available within the FMU include: use of wildland fire, suppression, prescribed fire, thinning and burning, thinning and piling or thinning and chipping. A discussion of how each of these is used can be found in chapter 3—Wildland Fire Management Strategies section A with further details described in Chapter 4—Wildland Fire Management Program Components.

The following portions primarily focus on descriptions of FMU's and how Use of Wildland Fire is characterized and how relative risk to values is weighed when planning a response.

1. Description of Unit

The Skagit FMU contains 544,736 acres. It is characterized by the largest collection of glaciers in the lower 48 states with volcanic and uplifted peaks of almost 9,000 feet in elevation and river valleys of less than 1,200 feet in elevation. The FMU contains many creeks, rivers, and lakes and an extremely rich diversity of plant and wildlife species.

Skagit FMU environments are heavily influenced by maritime weather patterns. Marblemount to the west averages 84 inches of rain per year. Washington Pass on the southeast boundary averages 85 inches of rain per year, and Hozomeen on the east side of the Cascade crest on the northeast boundary averages 55 inches of rain per year. Up to 150 inches of precipitation can fall on the higher peaks annually. Fire is considered an infrequent visitor to the majority of the FMU with fire return intervals ranging between 50 and 400 years.

Over 99 percent of the FMU is managed by the Complex. Seattle City Light manages

1,229 acres along the Skagit river bottom including the towns of Diablo and Newhalem. One hundred forty six acres of mining claims represent the only private land managed within the FMU.

The FMU is located primarily on the west slope of the Cascades. It is bounded on the north by Manning Provincial Park in Canada and the Okanogan-Wenatchee National Forest (OWNF) to the east and south. To the west lies the Mt. Baker-Snoqualmie National Forest (MBSNF). The combination of glaciers, waterways, rock outcroppings and wilderness areas creates good opportunities for use of wildland fire.

The Complex shares three fire management areas with OWNF east of Ross Lake. This facilitates planning for appropriate responses there. The Mount Baker-Snoqualmie National Forest and Complex do not share fire management areas but do coordinate fire management responses. The Canada border is protected by a suppression response zone. There is no agreement in place allowing the use of natural fire to cross from the Complex into Canada.

2. Description of Fire Management Areas (FMA)

Eighteen FMA have been identified for the Skagit FMU ranging in size from 4,239 to 102,684 acres. They are defined by logical natural fire breaks including rock, glacier, meadow and watercourses in keeping with safe fire suppression tactics. Where no natural barriers are available, fuel breaks can be constructed and incorporated into the best available features. (Note that the MBSNF boundary is used on the west side of the Complex to delineate FMA. This boundary does not take into consideration safe suppression tactics.)

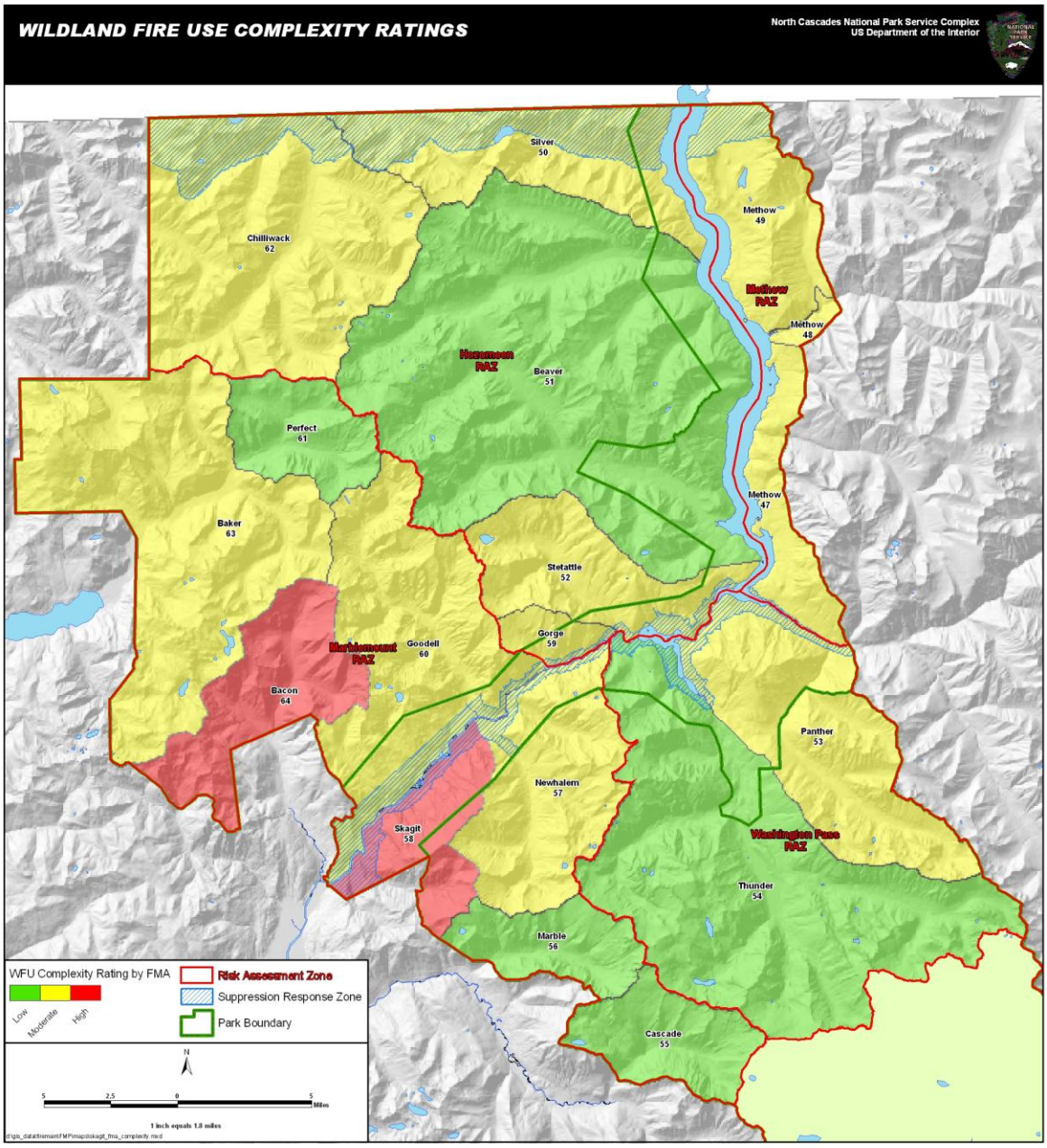
3. Complexity and Suitability

In order to achieve the goals of the Plan, individual FMA are rated in terms of complexity and suitability for use of wildland fire with a range of responses. They are also grouped into risk assessment zones (RAZ). For each FMA, the following table lists a complexity rating, suitability, and RAZ.

Area #	Name	Acres	Complexity Ratings	RAZ	RAZ
61	Perfect	12466	Low	2	Marblemount
51	Beaver	102684	Low	1	Hozomeen
54	Thunder	72980	Low	3	Washington Pass
55	Cascade	13607	Low	2	Marblemount
56	Marble	11564	Low	2	Marblemount
53	Panther	33699	Moderate	3	Washington Pass
50	Silver	27350	Moderate	1	Hozomeen
62	Chilliwack	53468	Moderate	1	Hozomeen
63	Baker	56989	Moderate	2	Marblemount
60	Goodell	39865	Moderate	2	Marblemount
59	Gorge	4081	Moderate	1	Hozomeen
52	Stetattle	20096	Moderate	1	Hozomeen
57	Newhalem	26595	Moderate	2	Marblemount
58	Skagit	12990	High	2	Marblemount
64	Bacon	20298	High	2	Marblemount
47	Methow	10699	Moderate	M1	Methow
48	Methow	4239	Moderate	M1	Methow
49	Methow	21066	Moderate	M1	Methow

a. Complexity

A complexity rating is assigned to each FMA to assist fire managers with the relative risk rating for use of wildland fire. (See Chapter III Section C for a detailed discussion of the WFDSS process). These ratings are based on the complexity guidelines in the Wildland and Prescribed Fire Management Policy - Implementation Procedures Reference Guide (2001). It is important to note that a "high complexity" rating does not exclude the possibility of gaining benefits from wildland fire in that FMA. It merely points out the need to be prepared to manage with caution especially with regard to elements that received a high rating.


WILDLAND FIRE USE COMPLEXITY RATINGS
North Cascades National Park Service Complex
US Department of the Interior
Silver 50
Chilliwack 62
Methow 49
Methow RAZ
Methow 48
Ruby Creek RAZ
Beaver 51
Perfect 61
Methow 47
Baker 63
Stetattle 52
Gorge 59
Goodell 60
Bacon 64
Panther 53
Newhalem 57
Skagit 58
Thunder 54
Marble 56
Cascade 55
WFU Complexity Rating by FMA
Low
Moderate
High
Risk Assessment Zone
Suppression Response Zone
Park Boundary
N
5 2.5 0 5 Miles
1 inch equals 1.8 miles

b. Suitability

Many factors were considered in determining suitability for use of wildland fire. Most of these factors show the capacity for use of wildland fire to be high in the Skagit FMU due to the remoteness combined with a high number of natural fuel breaks, the length of the primary fire season, and the results of the risk assessment modeled with RERAP. Although many of the FMA include small suppression zones in the Skagit Valley and along the Canada border, all FMA include portions that rate suitable outside of the suppression zone. This provides the decision maker with a full set of options, and considers the effect of maritime weather influences on managed fires, and the effect of such weather on an unnecessary suppression response in the suitable portion of the FMA adjacent to a suppression zone.

FMA suitability will be reconsidered annually by appropriate Complex staff including the Superintendent.

4. Risk Identification

a. Critical Areas

Fire exclusion and/or fire protection measures should be considered to protect critical areas within the FMU. Holding actions would be a necessary part of any risk assessment and fire management decision.Depending upon anticipated fire behavior, protection measures could include the following: wrapping signs, bridges, and/or structures with heat resistant fire protective material, removing or clearing burnable debris, installing sprinkler systems, constructing line, burning out, and/or using aerially delivered suppressants. Critical areas within the Skagit FMU include the following:

- Marblemount structures-all private and public
- Goodell campground
- Newhalem structures-all private and public
- Newhalem campground
- Diablo structures-all private and public
- Environmental Learning Center
- Colonial campground and facilities
- Diablo Overlook facilities
- Ross lake trailhead facilities
- Ross Lake Resort structures and facilities
- Canyon Creek Trailhead facilities
- Hozomeen structures and facilities-all public and private

Backcountry Shelters

- Indian Creek
- Greybeal
- Little Beaver
- Thunder Basin cabins

Lookouts
- Sourdough
- Desolation
- Copper

Trails, bridges, backcountry campsite improvements
- 79 major trail bridges
- 5400 linear feet of wooden trail improvements
- 99 developed campsites
- 167 wooden toilets

Cooperation and consultation with the Trails Foreman will be necessary to ensure protection or rehabilitation of these improvements.

Historic and Prehistoric Sites
Location of these sites is sensitive information available to fire managers in consultation with cultural resource staff.

Species of Concern
Spotted owl habitat and nest sites are identified. Other species of concern are listed in Chapter IV Section A of this Plan.

Note that all benefits of natural fire should be considered prior to choosing a fire exclusion tactic. For example, using prescribed fire as a surrogate to a high intensity fire near a raptor nesting area may improve habitat or provide habitat protection measures for long term vitality of the species/habitat.

b. Urban Wildland Interface

The Skagit FMU is bisected by Highway 20, which lies fully within the suppression response zone and is the primary road within the FMU. Two towns, Diablo and Newhalem, are accessed exclusively by Highway 20 and are constructed using ample defensible space. A rural fire department exists at Newhalem and responds to incidents along the highway. Fire hydrants can be found throughout each community. Smoke, which tends to settle in the Skagit Valley especially during atmospheric inversions, is one primary concern for fire managers in these communities.

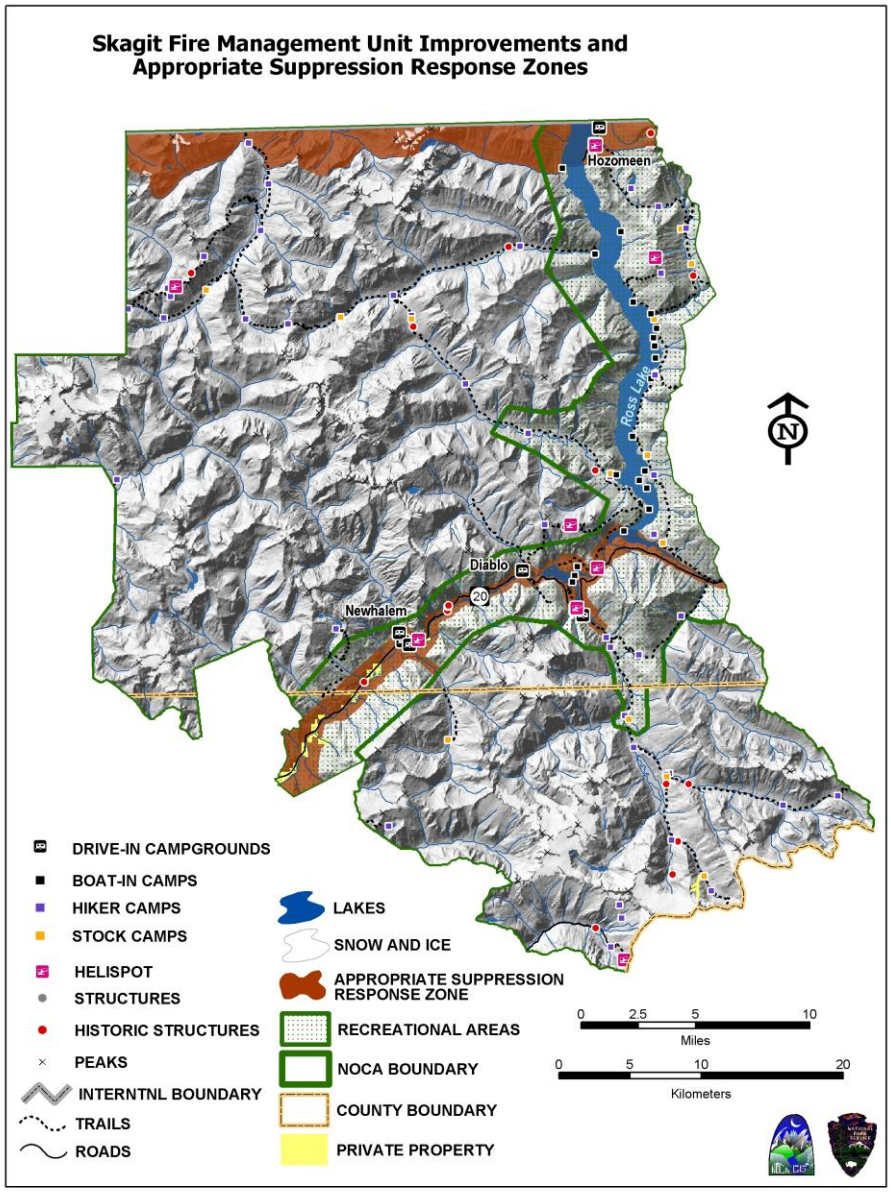
The Environmental Learning Center, located on the north shore of Diablo Lake, also lies fully within the suppression zone. Defensible space measures were incorporated in the planning for this center. Fire hydrants are also available here.

Campgrounds along Highway 20 are popular with tourists and are generally found along lakes and creeks, water sources that may aid suppression efforts.

Recent roadside thinning in Hozomeen is intended to provide a means of escape and facilitate safer suppression tactics near the Canada border.

c. Suppression Considerations

The logistics of supporting fire operations within the Skagit FMU need to be considered before implementing fire management strategies. Helicopters are vital to any response for personnel insertion and tactical support. Few road-accessible helicopter landing areas exist within the Complex. These are shown on the map below. Helibase opportunities exist near Marblemount through local landowner agreement and on the NPS compound. The Swamp Creek rock pit has also been used temporarily to support fire operations along Highway 20. Recent use of Manning Park in support of fire management in the Pasayten Wilderness may be considered at the north end of the FMU.



5. Risk Assessment

a. Introduction

As in Chelan Sub-Basin FMU, the Rare Event Risk Assessment Process (RERAP) was used to assess long-term fire risk for locations in the Skagit FMU. This is a programmatic assessment to support the decision to select the appropriate management response to natural ignitions. As previously noted, the analysis is very gross in scale and is a tool that can provide the decision maker with information to make an initial risk determination only. When a wildland fire occurs within the Skagit FMU, a more site-specific analysis may be desired to assist fire management planners with a more accurate risk assessment.

b. Team

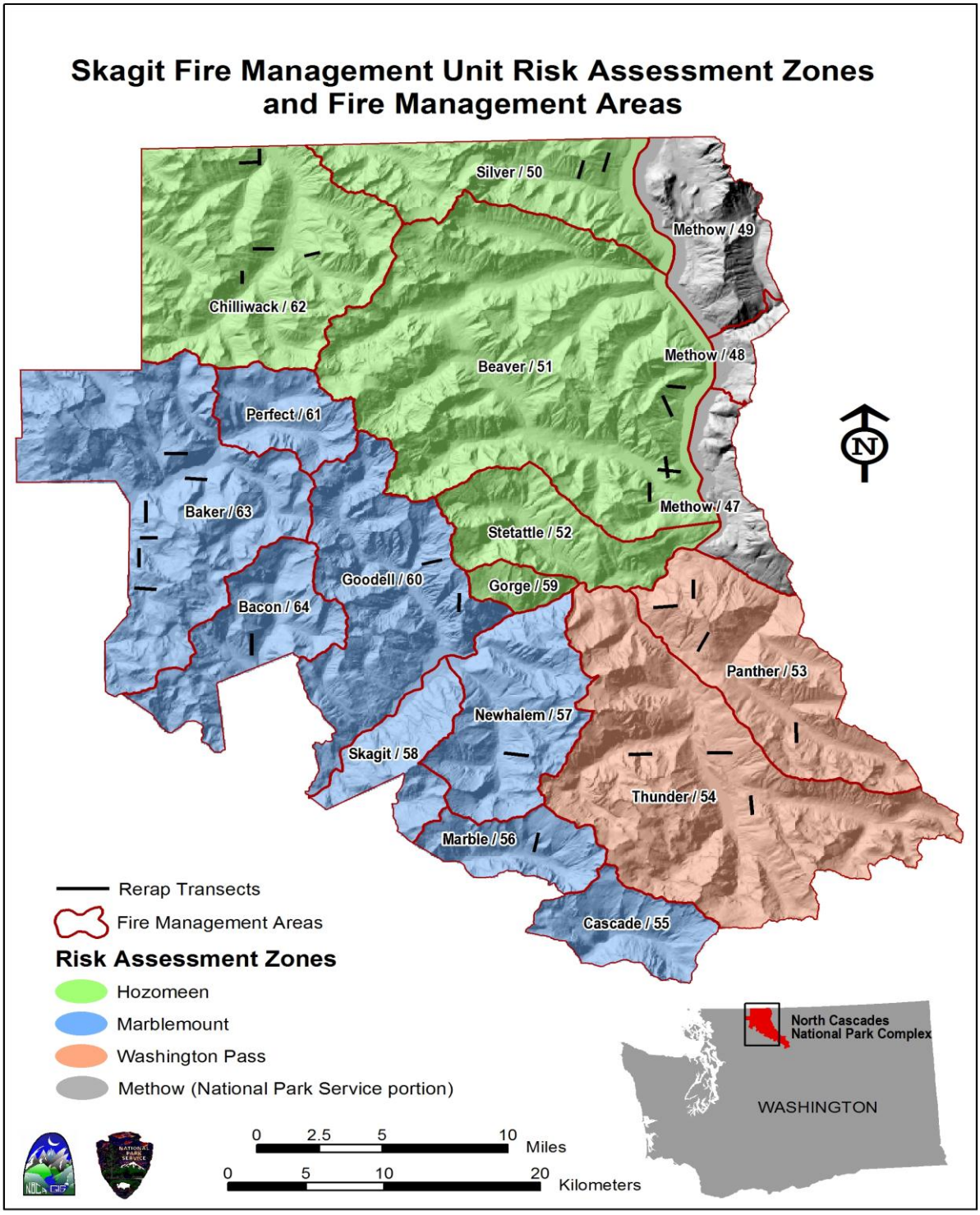
The risk assessment was completed using a team led by Tom Leuschen, Fire Vision Enterprise Team, and included Tod Johnson, Karen Kopper, Andris Vezis, and Loretta Duke. Jack Rainford of OWNF performed all risk assessment GIS work.

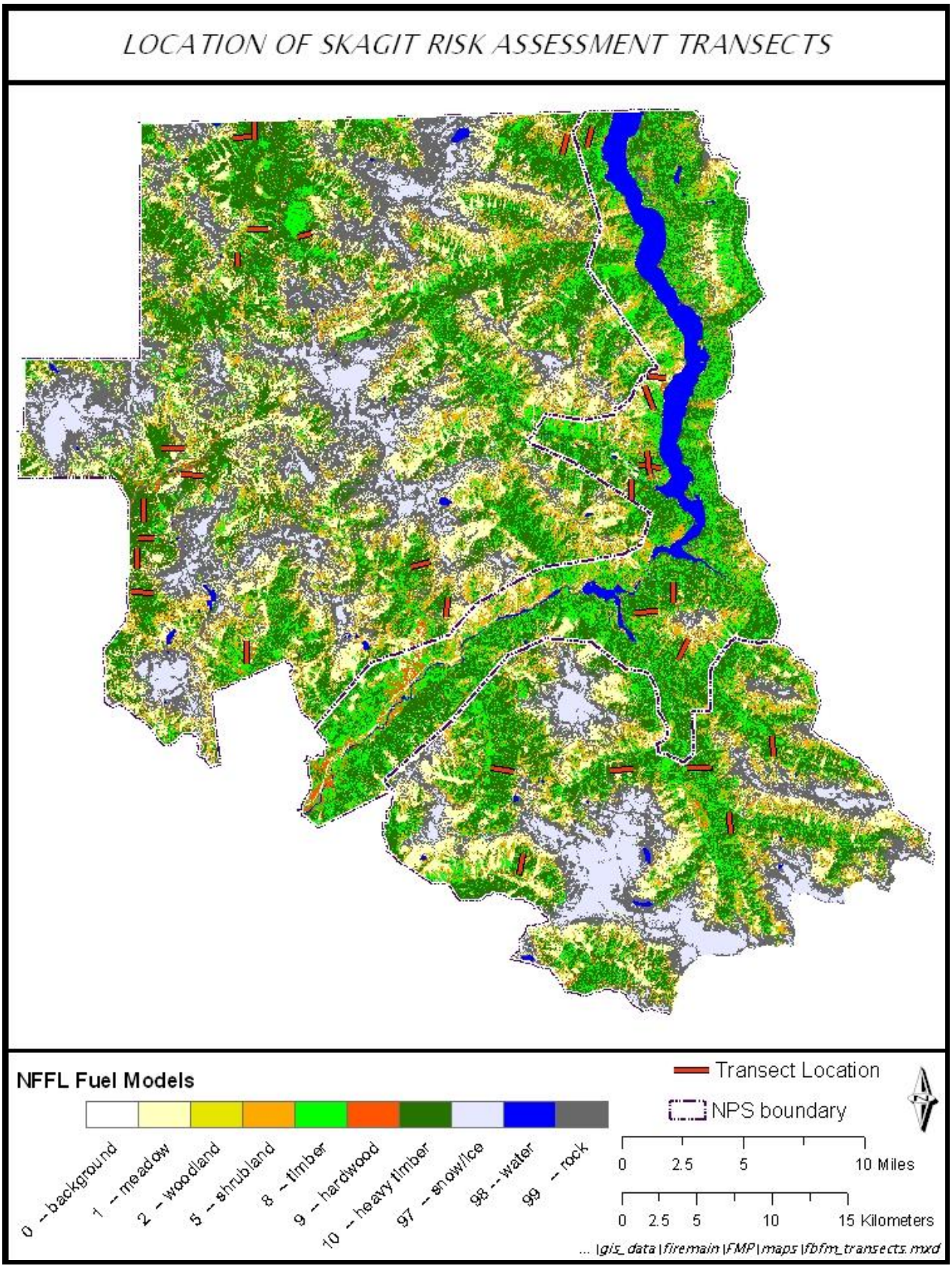
c. Risk Assessment Zones

Probabilities that a fire will reach a critical area before a season-ending event were calculated for four areas of the Skagit FMU. The team chose to use three risk assessment zones (RAZ) as boundaries. The OWNF analyzed a fourth area for risk when they completed their fire management plan for the Methow Sub-Basin. The results of that assessment are used for areas of the Complex east of Ross Lake so that a seamless interagency assessment can be developed. To make all areas compatible in this report, all four areas will be referred to as RAZ.

d. Fuel Models and Transects

For each RAZ the team examined the NFFL fuel model maps to determine areas that would have the best chances for fire spread without being stopped by natural fuel breaks. Sites were chosen to represent the point of a fire start. The team then ran projection lines from that point out to approximately 1 mile. An attempt was made to run the lines north, south, east and west. However, in some situations this was either contrary to the prevailing winds or lacked consistent fuels. Some of the projection lines had to be skewed to other bearings to fit the landscape situation. In situations where a projection line could not go in a specific direction due to a natural barrier, the team selected a projection line that could produce spread. Where there was a short section of rock or fire barrier, we modeled this as a fuel model 8 and continued the line. All projection lines were assessed in 40 chain (1/2 mile) increments up to 280 chains (3 ½ miles).

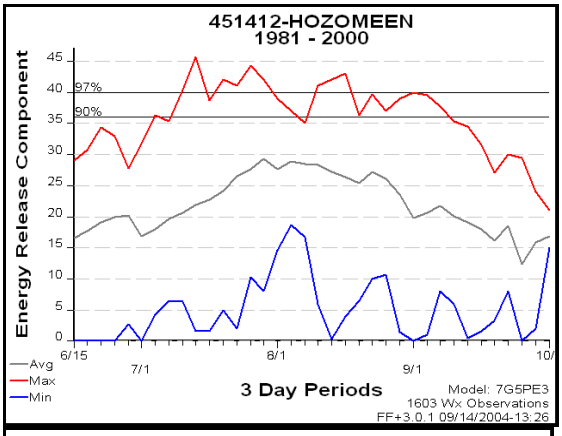

Skagit Fire Management Unit Risk Assessment Zones and Fire Management Areas
Silver / 50
Methow / 49
Chilliwack / 62
Beaver / 51
Methow / 48
Perfect / 61
Baker / 63
Methow / 47
Stetattle / 52
Goodell / 60
Gorge / 59
Bacon / 64
Panther / 53
Newhalem / 57
Skagit / 58
Thunder / 54
Marble / 56
Cascade / 55
N
Rerap Transects
Fire Management Areas
Risk Assessment Zones
Hozomeen
Marblemount
Washington Pass
Methow (National Park Service portion)
0 2.5 5 10 Miles
0 5 10 20 Kilometers
North Cascades National Park Complex
WASHINGTON

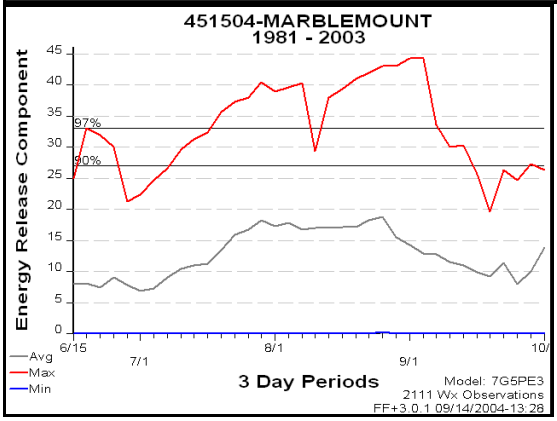

LOCATION OF SKAGIT RISK ASSESSMENT TRANSECTS
NFFL Fuel Models
0 -- background
1 -- meadow
2 -- woodland
5 -- shrubland
8 -- timber
9 -- hardwood
10 -- heavy timber
97 -- snow/ice
98 -- water
99 -- rock
Transect Location
NPS boundary
0 2.5 5 10 Miles
0 2.5 5 10 15 Kilometers
... \gis_data\firemain\FMP\maps\fbfm_transects.mxd

e. Fire Season Profile

The weather stations that best represent local conditions within each RAZ are as follows: RAZ 1 Hozomeen 451412, RAZ 2 Marblemount 451504, RAZ 3 and RAZ 4 Washington Pass 452033. The data from the weather station was used to estimate the season-ending event distribution and weather occurring during wind events from a particular direction.

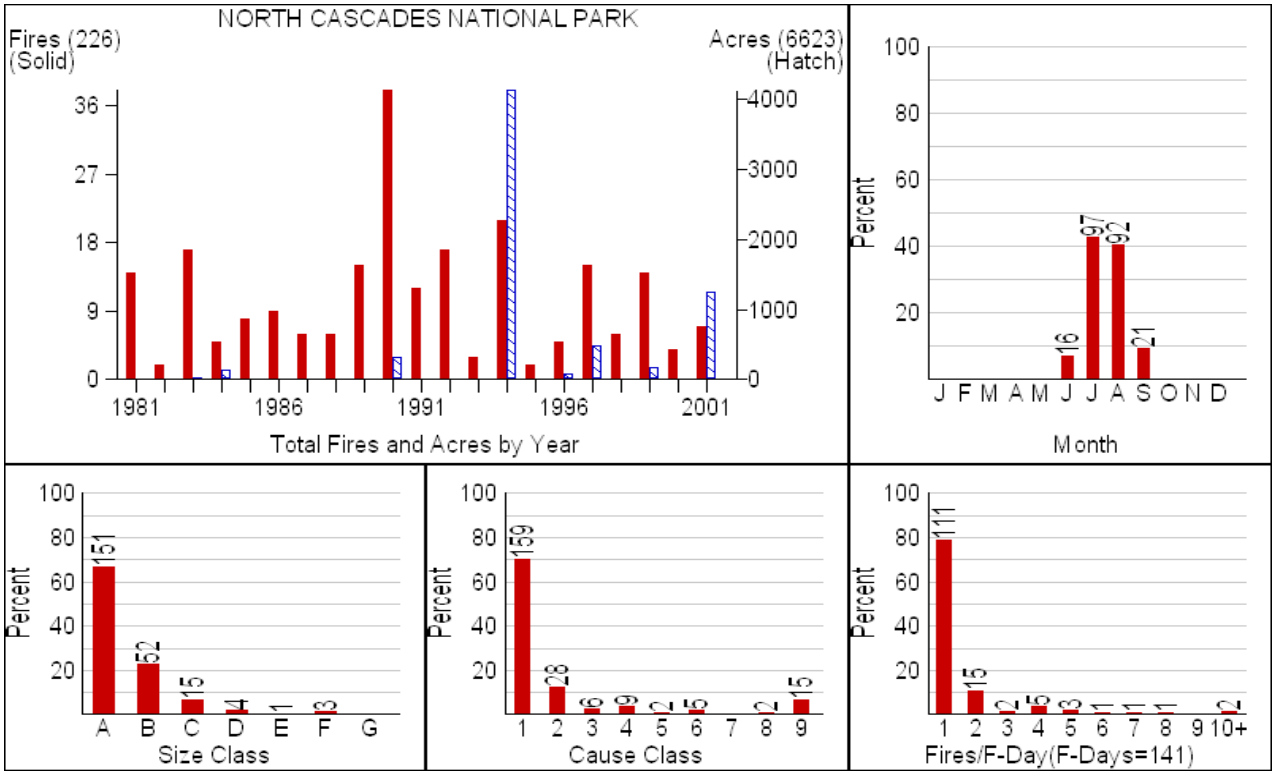
Fire managers at the Complex observed the energy release components (ERC) from two primary weather stations to represent the differences in seasonal trends in the Skagit FMU. Hozomeen represents the dry side of the FMU, as the north end of the east side of the Complex is protected from incoming Pacific storms much more than Marblemount, which represents the wet side of the FMU. In both instances, fire season does not typically start until late July, although early season lightning storms have ignited small and insignificant fires during June. Season-ending events typically occur in early October, although early season rainstorms cause ERCs to drop sharply after the first week in September. Most advanced fire behavior in the FMU occurs between the last two weeks in August and the first week in September.





f. Fire Occurrence Record

The fire history from the Complex database clearly shows the height of fire season in July and August with a few persistent fires in September. Wildland fires in the park have a reputation for quick growth when properly positioned on steep slope, aligned with sun and wind and in combination with very unstable atmospheric conditions.

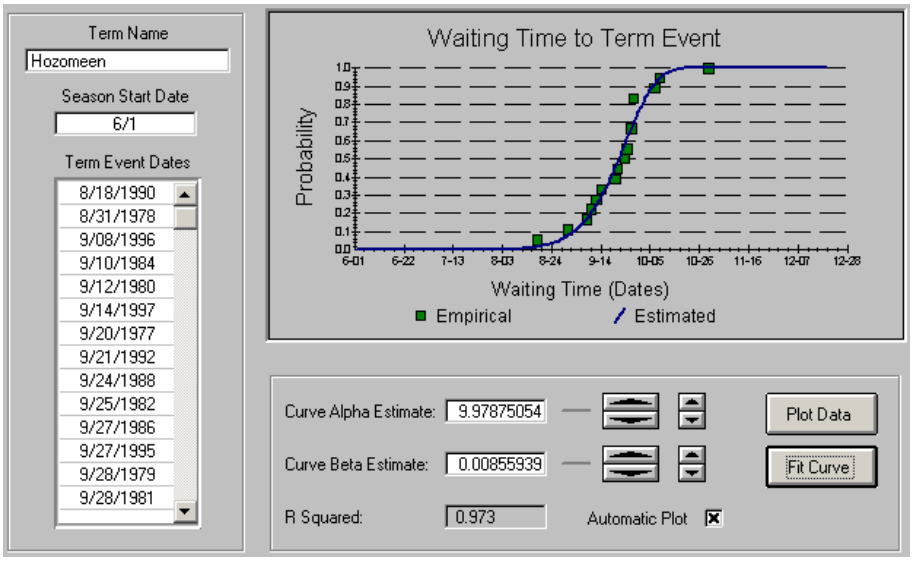


6. Probabilities of Season-Ending Events

Term Events: The weather stations were analyzed using the season-ending event criterion of 0.5 inches of rain within a three-day period. When that did not occur a date was subjectively selected based on a significant drop in the energy release component (ERC) accompanied by precipitation or a continual rise in relative humidity.

Hozomeen RAWS #451412, elevation 1615', data available 1979 – 2002

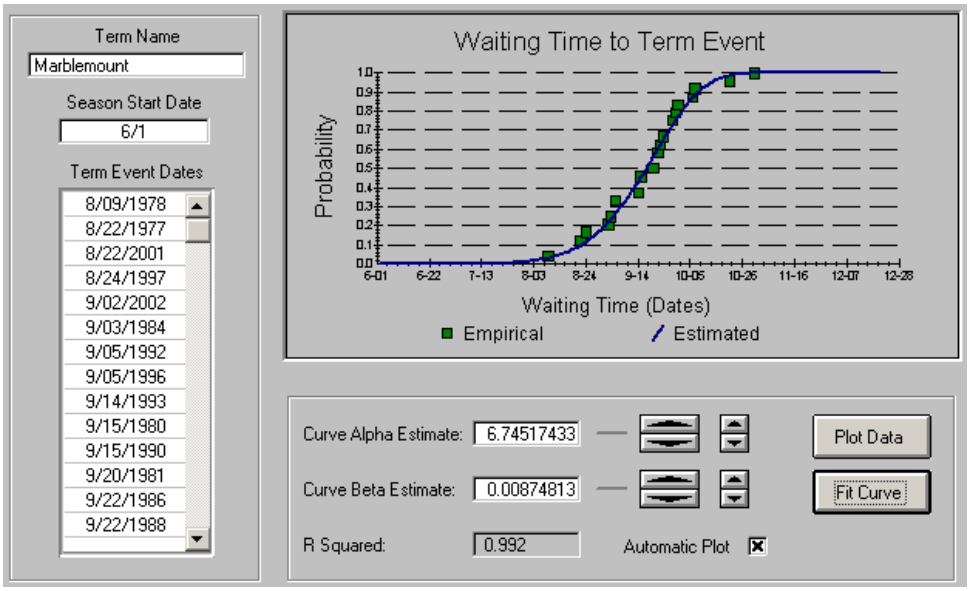
Term events in the vicinity of Hozomeen normally start occurring in the second week of September and continue to occur through the third week of October. The most likely events occur around the fourth week of September and the first week of October.



Season Ending Event Dates	Cumulative Probability
September 2	10%
September 9	20%
September 13	30%
September 17	40%
September 21	50%
September 24	60%
September 27	70%
October 1	80%
October 7	90%

a. Marblemount RAWS #451504, elevation 357', data available 1979 – 2002

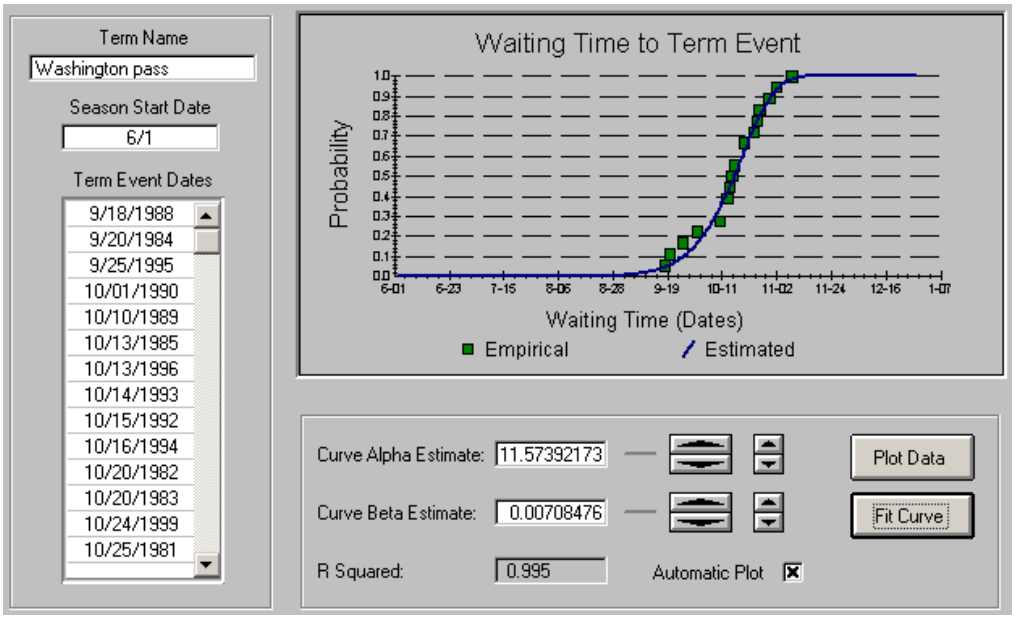
Term events in the vicinity of Marblemount normally start occurring in the third week of August and continue to occur into October. The most likely events occur about the fourth week of September and the first week of October.



Season Ending Event Dates	Cumulative Probability
August 22	10%
August 31	20%
September 6	30%
September 11	40%
September 16	50%
September 21	60%
September 26	70%
October 1	80%
October 8	90%

b. Washington Pass
RAWS #452033, elevation 5620', data available 1981 – 2002

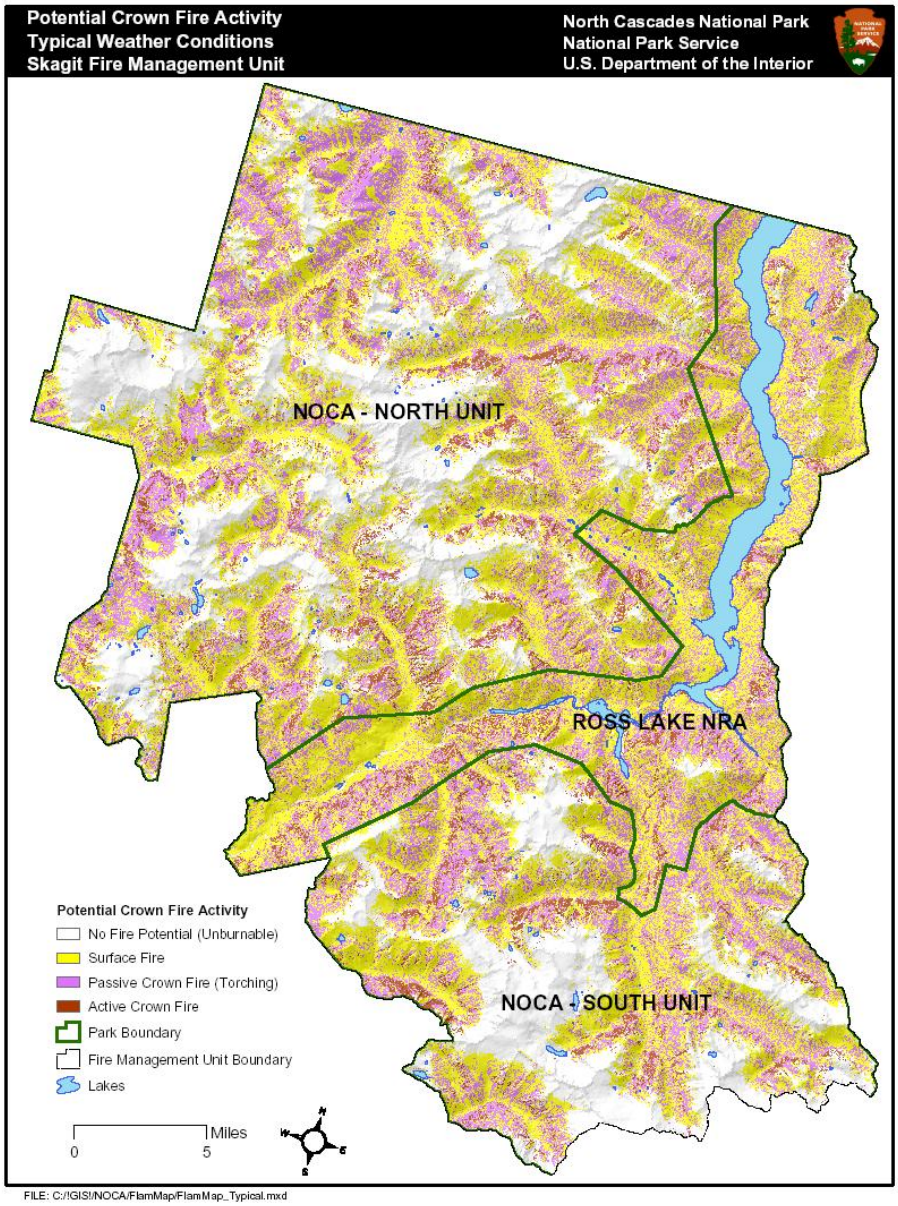
Term events in the Skagit FMU in the Washington Pass area normally start occurring in the fourth week of September and continue to occur through October. The most likely events occur about the third week of October.



Season Ending Event Dates	Cumulative Probability
September 25	10%
October 2	20%
October 7	30%
October 11	40%
October 15	50%
October 18	60%
October 22	70%
October 25	80%
October 30	90%

7. Range of Potential Fire Behavior

Fire Behavior predictions can be displayed spatially through the use of FlamMap. This provides the opportunity to see where the most extreme fire behavior may occur. In this case, the Hozomeen weather station represents the lowest elevation and driest conditions in the FMU. It was, therefore, used to represent a worst-case scenario for drought during peak burning conditions. The following figure displays the potential for crown fire.



There is a lot of passive crown fire (single and multiple tree torching) expected throughout the Skagit FMU during typical weather conditions. Hand crews will not be effective in areas where passive or active crown fire occurs. There are also large areas of active crown fire

expected. This is the result of extremely difficult terrain combined with heavy multi-canopied forests which quickly turn surface fire to crown fire most often during the peak of the burning period. Burning conditions are exacerbated by unstable atmosphere combined with wind and sun alignment on these steep and heavily fueled mountainsides. Suppression plans should include use of aircraft to assist in any strategies during peak burning conditions. Hand crews may only be effective when conditions moderate, probably at night or early morning. Appropriate escape routes and safety zones must be determined prior to engaging any fire in the Skagit FMU.

Fire spread direction is typically to the northeast as the predominant southwest wind aligns with primary drainages. Without wind, fire typically burns directly upslope making high intensity runs to natural fuel breaks. Gravity carries fire to burn down slope as rolling debris ignites the unburned fuels below, after which short runs of passive or active crown fire can be anticipated.

All suppression strategies should make use of ample natural fuel breaks throughout the Skagit FMU. The preferred management strategy in the Skagit FMU is a combination of use of fire and confinement where suppression is necessary.

8. Fire Spread Projections

As in Chelan FMU, a RERAP analysis was performed to create fire spread projections for separate RAZ. To properly assess fire spread, the area between the fire's leading edge and the geographical points of concern are evaluated. For risk assessment this involves locating transects from the fire to the areas of concern. These lines are then subdivided into segments based on fuel models, slope, and aspect. For this assessment these inputs were generated electronically in GIS. For additional discussion of methodology, see Chapter III Section E of this Plan.

a. Results

The results of the RERAP Risk Assessment indicate that large fires with rapid spread are unlikely in most of the Skagit FMU. There are many opportunities to consider the use of fire due to the low rates of spread. RAZ 3 and 4 have the most potential for rapid spread, and that spread will be to the east. The response in many cases can consider confinement or a range of responses during wildland fires. The interpretation of the data follows for each RAZ.

Note that variances in data suggest a wide range of values were used to develop the average. A fire manager may use these average values, but must understand that, depending on location of the fire, rate of spread may be dramatically different from the average.

b. Skagit FMU RAZ 1

Fires in RAZ 1 can be expected to burn most actively to the east. Fires will be slow moving in general in all directions.

Fires spreading **north** in RAZ 1 have greater than 50 percent chance of spreading up to ½ mile when they start in June. All other north spread has less than 36 percent probability of reaching ½ mile or more. There is some variability in the results for north spread in June and July. Due to this variability, these results should be used cautiously, and incident specific assessments should be run as soon as possible. North spread offers good opportunities to consider use of fire if there are no critical areas within ½ mile of the fire start.

Fires, which are spreading **south** or **west** in RAZ 1, have less than 24 percent chance of spreading up to ½ mile. There is very little variability in these results; fire managers can consider them to be reliable. South spread offers good opportunities to consider use of fire in all months.

Fires, which are spreading **east** in RAZ 1, have greater than 36 percent chance of spreading up to 2 miles when they start in June, and more than 38 percent chance of spreading east up to 1 mile when they start in July. There is considerable variability in the results of the assessment for East Spread in June and July; fire managers should use these results cautiously. East spread offers good opportunities to consider use of fire if there are no critical areas within ½ mile of the fire start in June or July.

c. Skagit FMU RAZ 2

Fires in RAZ 2 can be expected to burn most actively to the north and east. Fires will be slow moving when spreading to the south or west.

Fires spreading **north** and **east** in RAZ 2 have greater than 47 percent chance of spreading up to two miles when they start in June and July, and greater than 37 percent probability of spreading up to three miles. Fire starts in August also have more than a 41 percent probability of spreading north and east 1 ½ miles. All other north and east spread has less than 28 percent probability of reaching ½ mile or more. There is considerable variability in the results of the assessment for north and east spread in June, July, and August; fire managers should use these results cautiously, and run incident specific assessments as soon as possible. North and east spread offers good opportunities to consider use of fire in August, September, and October if there are no critical areas within ½ mile of the fire start.

Fires spreading **south** or **west** in RAZ 2 have less than 19 percent chance of spreading up to ½ mile. There is very little variability in the results of the assessment for south and west spread; fire managers can consider these results reliable. South spread offers good opportunities to consider use of fire in all months.

d. Skagit FMU RAZ 3

Fires in RAZ 3 will spread most rapidly in an easterly direction. There is greater than 76 percent probability that fires starting from June through September will spread east more than 3 ½ miles. Rapid spread remainsconsistent into October. Wildland fire starts with critical areas of concern within 5 miles to the east should receive a suppression response. Fires spreading to the north will also spread actively up to 2 miles, especially in June and July. West spread is less likely, and little spread will occur to the south.

Fires spreading **north** in RAZ 3 have greater than 51 percent chance of spreading up to two miles when they start in June and greater than 46 percent chance of spreading north 1 ½ miles when they start in July. Fire starts in August, September and October have less than 26 percent chance of spreading north 1 mile. In August, however, they have a 93 percent chance of spreading north ½ mile. There is considerable variability in the results of the assessment for north spread in June, July, and August; fire managers should use these results cautiously and run incident specific assessments. North and east spread offers good opportunities to consider use of wildland fire in August, September, and October if there are no critical areas within ½ mile of the fire start. Fires in June and July also offer good opportunitiesfor use of fire if critical areas are more than 2 miles north of the start.

Fires spreading **south** in RAZ 3 have greater than 72 percent chance of spreading up to ½ mile when they start in June or July. All other starts in June and July, and those spreading up to ½ mile in August, September, and October have less than a 16 percent probability of reaching a critical area. Fire managers can consider these results to be reliable. There are good opportunities to use wildland fire with spread to the south.

Fires spreading **east** in RAZ 3 have greater than 76 percent probability of spreading more than 3 ½ miles from June through September. That is, fires in RAZ 3 are likely to spread aggressively to the east. There is little variability in these results; fire managers can consider them to be reliable. Fires starting in any month with critical areas to the east should not be considered for using wildland fire for benefits and have an emphasis placed on a suppression response. If critical areas are more than 5 miles away, use of fire may be considered, but further risk assessments will be required for site-specific conditions.

Fires spreading **west** in RAZ 3 have less than 44 percent chance of spreading from ½ mile up to 2 ½ miles when they start in June through October There is considerable variability in the results for the months of June, July, and August; fire managers should use these results cautiously and run incident specific assessments. West spread offers good opportunities to consider using fire as a benefit.

e. Methow FMU RAZ 4

Fires in RAZ 4 will spread most rapidly in an easterly direction. There is greater than 74 percent probability that fires starting in June or July will spread east more than 2 miles. Spread remains consistent through August. Wildland fires with critical areas of concern to the east should not be considered beneficial unless they start in September or October. Fires spreading to the north will also spread actively up to 2 miles, especially with starts in June and July. Fire managers need to consider this assessment when considering potential impacts to the Canada border. South and west spread are less likely.

Fires spreading **north** in RAZ 4 have greater than 41 percent chance of spreading up to 2 miles when they start in June and July, but less than 43 percent chance of spreading 2 ½ miles in these months. Fire starts in August, September and October have less than 32 percent chance of spreading north more than ½ mile. There is little variability in these results; fire managers can consider them to be reliable. North spread offers good opportunities to consider beneficial use of fire from August, September, and October starts.

Fires spreading **south** and **west** in RAZ 4 have less than 35 percent chance of spreading more than ½ mile when they start in any month. Critical areas to the south and west of any fire start in this zone are least likely to be threatened by the fire. Fire managers can consider these results to be reliable. There are good opportunities for fire with critical areas to the south and west of the fire.

Fires spreading **east** in RAZ 4 have greater than 44 percent probability of spreading more than 3 ½ miles when they start in June or July. Fire starts in August have greater than 71 percent chance of spreading east one mile, and greater than a 36 percent probability of spreading east 2 ½ miles. Starts in September and October have less than a 32 percent probability of spreading more than ½ mile. There is some variability in these results; fire managers should use them cautiously and run incident-specific assessments. Fires starting in June, July, or August are not a good risk for use of fire unless areas of concern to the east are more than 5 miles away.

9. Smoke Management

A detailed description of air resources for the Complex is included in Chapter IV section D. Prescribed Fire. The following is a table of smoke receptors adjacent to the Skagit FMU.

Class I Airsheds	**Distance from center of FMU**
Pasayten Wilderness	10 miles east
Glacier Peak Wilderness	30 miles southwest
Chelan Sawtooth Wilderness	35 miles southeast
Mt. Baker Wilderness	15 miles west
Manning Provincial Park	15 miles north
Sensitive Receptors	**Location Description**
L. Chelan NRA (Class II airshed) including the community of Stehekin	South FMU of NOCA Complex—30 miles south of center of north FMU
Marblemount (rural community)	10 mi. west of park entrance on hwy 20
Concrete (rural community)	25 mi. west on hwy 20
Newhalem (Seattle City Light employee town and NOCA Visitor center)	On hwy 20 bordering NOCA complex
Diablo (Seattle City Light employee town and Environmental Learning Center)	On hwy 20 bordering NOCA complex
Methow Valley (tourist area and 4 towns)	60 miles east

Chilliwack (tourist area and rural community in Canada)	25 miles north
Bellingham (metropolitan area)	60 miles west

10. Communication and Contacts

This section of the Skagit FMU plan discusses how the agencies will communicate with the public, tribal, commercial, and political interests potentially affected by fire management activities. Objectives include educating the public about fire ecology and fire management, obtaining public feedback, and developing and retaining public support.

a. Information and Involvement

The following chart identifies points in the fire planning process at which some form of communication with the public is advisable.

Trigger Point	Action	Who Does It
Finalization of Plan	News Released to Skagit County media	Information Officer
	Article posted Park website and in Cascade Lookout	Information Officer
	Article placed into annual NOCA newspaper	Information Officer
	Letter to Congressional Delegation and state/local representatives	Superintendent
	Letter to Tribal Governments	Superintendent
Beginning of Fire Season (June)	Inform workforce of potential use of fire under Plan at seasonal orientation	Fire Management Officer
	Prepare signage to use at trailheads. Contact with Methow Information for interagency signs	Fire Management Officer and Interpretation
Upon Approval of Use of Wildland fire	Digital photos of fire taken	FMO or IC
	Notification of media, using Appropriate key messages	Park Information Officer or IIO
	Photos posted on websites	Park Information Officer or IIO

Trigger Point	Action	Who Does It
	Develop specific talking points from list enclosed	Incident Commander and IIO
Upon Approval to Use Wildland Fire (cont'd)	Initiate info log and media trapline Post fire info at trailheads Inform interpretive staff about fire locations/closures Brief appropriate political contacts as needed: BC Forest Service and Manning Park Keep all appropriate internal/external personnel informed	Incident Commander and IIO IIO, NPS Interpretive staff IIO, Fire management Officer Superintendent Park Information Officer or IIO
If Fire Requires strategy change	Inform Superintendent of strategy change Revises key messages as needed Inform media (if necessary) Inform necessary political interests	IC or Fire Management Officer IC or IIO IC or IIO IIO, Superintendent
After Fire Season (October/November)	Review Season's information dissemination effort Make Changes in key messages, plans, etc	Park Information Officer with interpretive staff and Fire management officer Park Information Officer

Note that all information generated regarding incidents should include a notice of website address where photos of incident may be viewed.

b. Important Communication Contacts

Methow/Northern Okanogan county:
Methow Valley Ranger District & Visitor Center, Twisp and Winthrop chamber of commerce

Marblemount/ Upper Skagit:
NPS District Office, NPS Wilderness Information Center, North Cascades Visitor Center, Seattle City Light, Newhalem General Store, Ross Lake Resort

Media:
Skagit Valley Herald and the Courier Times

Cooperators:
Mount Baker Snoqualmie NF North Zone FMO, Mount Baker Snoqualmie NF Fire Staff, DNR Northwest, Darrington Ranger District,

Environmental Community:
Northwest Ecosystems Alliance, North Cascades Conservation Council

Political Contacts:
District 2 Congressman: Rick Larsen, District 4 Congressman: Doc Hasting, District 5 Congressman: George Nethercutt, Senator: Patty Murray

Canada:
BC Forest Service, Manning Park

c. Frequently-needed Phone Numbers

SKAGIT FIRE MANAGEMENT UNIT KEY CONTACTS

Methow District Ranger	509 996-4027
Methow Fire	509 996-4020
Methow Duty Officer	509 996-4034
Puget Sound Interagency Coordination Center	425 744-3550
Seattle City Light Skagit Project Manager	206 386-4481
FAA Seattle	206 227-1999
Whatcom County Department of Emergency Management	360 676-6681
Skagit County Department of Emergency Management	360 428-3250
North Zone (Mount Baker Snoqualmie) FMO	360 436-1155
Mount Baker-Snoqualmie Fire Staff	425 744-3510
Mount Baker-Snoqualmie District Ranger	360 856-5700
Department of Natural Resources (Dispatch)	360 856-3500
Canada Dispatch BC Forestry, Chilliwack	604 702-5700
Canada Dispatch Pacific Region Fire Center	251 951-4222
Ross Lake Resort (Jim)	206 517-4634
Seattle Fire Weather	206 526-6095
National Interagency Fire Center	208 387-5200
Pacific West Region FMO	510 817-1371
Pacific West Region Deputy FMO	510 817-1370
District 2 Congressman (Larsen)	202 225-2605
District 5 Congressman (Nethercutt)	202 225-2006
District 4 Congressman (Hastings)	202 225-5816
Northwest Air Pollution Authority	360 428-1617
Washington State Smoke Management	360 902-1318

Washington State DOT	360 428-1386
Fish and Wildlife Service (Olympia)	360 753-5826
Washington State Patrol	800 283-7807
Skagit County Sheriff's Department	360 336-9450
Okanogan-Wenatchee National Forest Fire Staff	509 664-9333
North Cascades Smoke Jumper Base	509 997-9750
Wenatchee Rappellers	509 884-2492
Chelan Fire Management Officer	509 682-2576
Chelan District Ranger	509 682-2576
Methow FMO	509 996-4015
Methow District Ranger	509 996-4027
Chelan County Department of Emergency Management	509 667-6863
Department of Natural Resources (SE)	509 925-8510
Lake Chelan Boat Company	509 682-4584
Chelan Airways	509 682-5555
Chelan County Sheriff's Department	509 667-6400

G. Chelan Sub-Basin Fire Management Unit

This document serves as the fire management plan for the Chelan Sub-Basin of the Okanogan/Wenatchee National Forest and amends the North Cascades Complex Fire Management Plan (1991) for the south unit of the Complex.

Interagency planning for the Chelan Fire Management Unit (FMU) was completed in April of 2001. The primary focus of the planning was to enable or to use fire within the Chelan watershed chiefly on designated wilderness lands where the NPS and the USFS share common boundaries. It enables a common goal of allowing acceptable natural ignitions to play their natural role without regard to jurisdiction between the two agencies. To that end, the following discussion provides direction for interagency management through agreement of processes including risk assessments, location of fire management areas, complexity for managing fires, and processes for notification and approval. It also provides direction as to where immediate suppression actions are required to protect values at risk.

The two strategies of fire management, fire suppression and use of fire will be employed throughout the Chelan FMU. Implementation of either strategy is guided through the Wildland and Prescribed Fire Management Policy (2001) and managed specifically through the locally coordinated agency fire management plans.

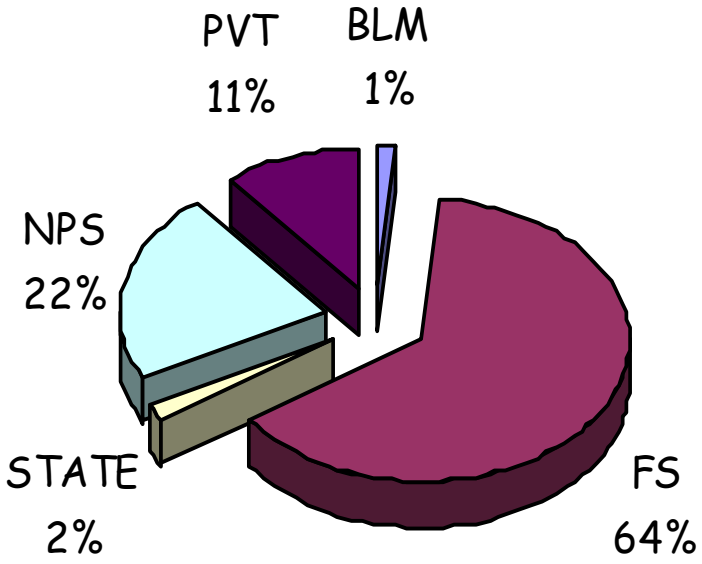
Note that prescribed fire and thinning activities for the Chelan FMU are not coordinated between the two agencies in this plan. This is primarily due to how the two agencies differ in meeting the requirements of the National Environmental Policy Act (NEPA). The NPS requires disclosure of the full fire management program for each individual park, whereas the USFS fire management programs for each forest are disclosed through their individual forest plans.

Site specific plans for thinning and prescribed fire for community protection and ecosystem restoration in the Complex are located in Chapter IV Section C of this Plan.

This chapter primarily focuses on descriptions of the FMU and how the use of fire is characterized relative to risk of values. This portion is also used in decisions about how to manage fires utilizing natural barriers to assist in suppressing fires when a no/go decision is made and initial attack is unsuccessful.

1. Description of the Unit

The Chelan Sub-Basin is located along the eastern slopes of the Cascade Mountains in north-central Washington. The watershed is oriented primarily in a northwest to southeast direction along the deeply glaciated valley. Lake Chelan comprises approximately 50 miles of the 75-mile long river basin and is considered a unique geologic feature of North America.



The drainage area is approximately 647,325 acres in size with 64 percent OWNF, 22 percent North Cascades Complex and Lake Chelan National Recreation Area, 11 percent in private ownership, 2 percent Washington State, and 1 percent BLM.

Precipitation ranges from 150 inches annually near the Cascade Crest to 10 inches annually at the Columbia River.

Elevation ranges from over 9,000 feet at the Cascade Crest, the surface of Lake Chelan is at 1,100 feet, and the Columbia River lies at 700 feet.

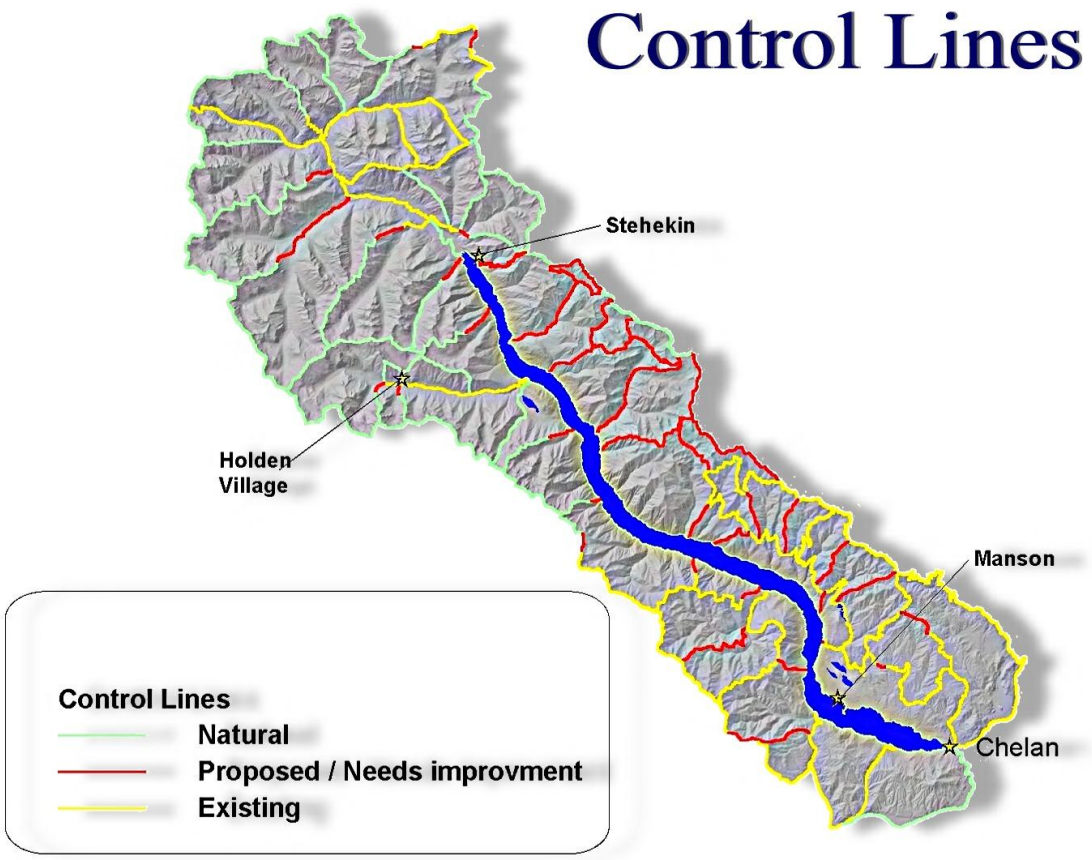
2. Description of Fire Management Areas (FMA)

Fifty-three FMA have been identified for the Chelan FMU ranging in size from 1,392 to 27,576 acres. The FMA were developed with the primary concern of safely managing fire A risk and complexity rating was developed for each FMA.

Some FMA are rated high complexity, primarily due to the fact that no natural fire breaks are available where wilderness meets communities at risk, potentially impacting the safety and livelihood of community members and visitors with unwanted fire and jeopardizing the success of programs for both agencies.

The FMA for Chelan FMU are shown on the map on the following page.

Natural barriers were recommended by the local fire managers as the best opportunities to provide a defensible space in which to attempt to contain wildland fires. The most useful became FMA boundaries. Other existing and proposed fuel breaks are also identified below.



3. Complexity and Suitability

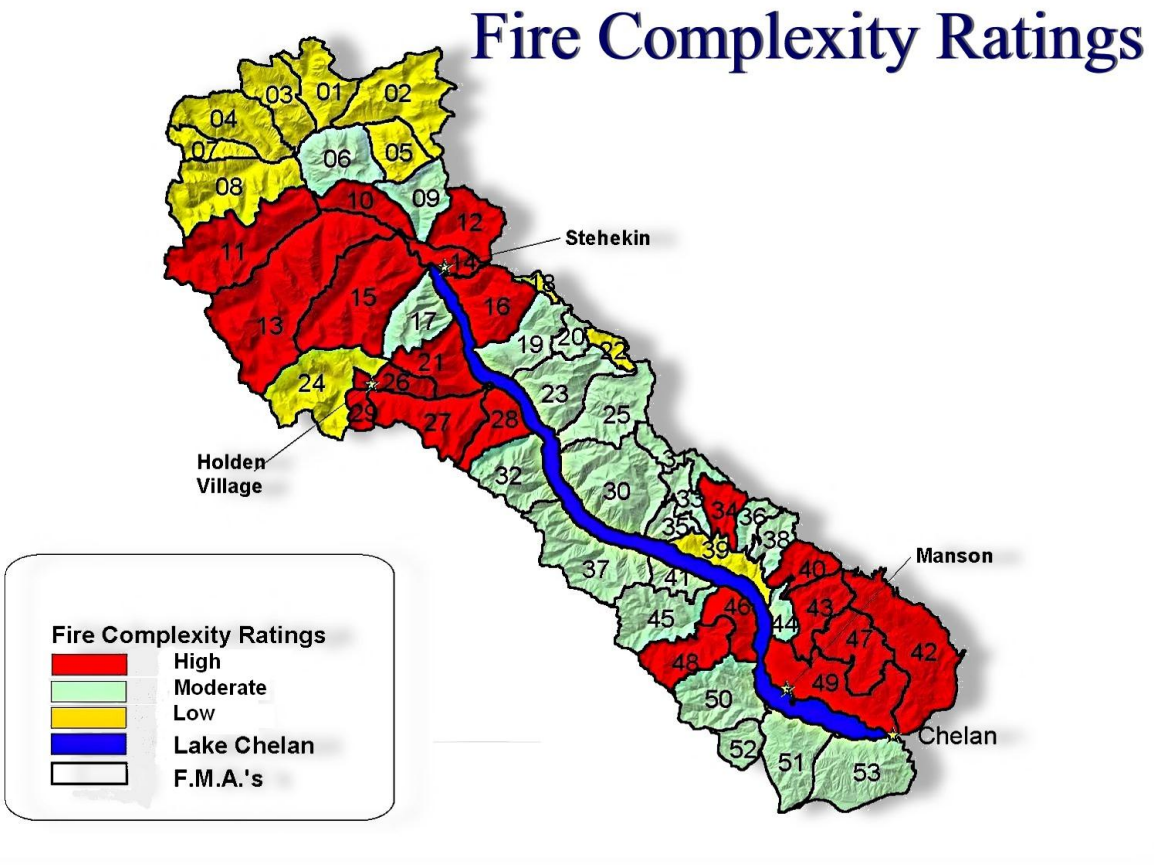
Individual FMA are rated in terms of both complexity and suitability for use of wildland fire. They are also grouped into risk assessment zones (RAZ). For each FMA, the following table lists a complexity rating,use of fire suitability, and RAZ.

Area #	Name	Acres	Complexity Ratings	RAZ	RAZ
01	Last Chance Pass	10,661	Low	3	Upper North
02	State Creek	19,168	Low	3	Upper North
03	Memalosse Ridge	11,230	Low	3	Upper North
04	Booker Mountain	14,526	Low	3	Upper North
05	Kettling Lake	7,949	Low	3	Upper North
06	Winddell Lake	12,912	Moderate	3	Upper North
07	Trapper Lake	5,426	Low	3	Upper North
08	Flat Creek	20,821	Low	3	Upper North
09	Rainbow Creek	9,252	Moderate	3	Upper North
10	Bullion	7,752	High	4	Upper South
11	West Agnes Creek	23,845	High	4	Upper South
12	Boulder Creek	10,557	High	3	Upper North
13	South Fork Agnes Creek	40,661	High	4	Upper South
14	Purple Creek	5,009	High	3	Upper North
15	Devore Creek	27,576	High	4	Upper South
16	Flick Creek	13,533	High	3	Upper North
17	Flora Mtn	10,294	Moderate	4	Upper South
18	Battle Mtn	1,392	Low	3	Upper North
19	Round Mtn	11,476	Moderate	2	Middle North
20	Baldy Mtn	3,525	Moderate	2	Middle North
21	Lightning Ridge	10,710	High	5	Middle South
22	Bernice Lake	2,967	Low	2	Middle North
23	Skookum Puss Mt	14,175	Moderate	2	Middle North
24	Hart Lake	18,954	Low	4	Upper South
25	Devil Kichen	14,274	Moderate	2	Middle North
26	Holden	5,099	High	5	Middle South
27	Railrood Creek	14,991	High	5	Middle South
28	Domke Lake	7,722	High	5	Middle South
29	Copper Mtn	2,867	High	5	Middle South
30	Safty Harbor Creek	22,569	Moderate	2	Middle North
31	South Navarre	5,670	Moderate	2	Middle North
32	Bear	12,836	Moderate	5	Middle South
33	Coyote Falls High	4,818	Moderate	2	Middle North
34	Grade Creek	6,017	High	2	Middle North

Area #	Name	Acres	Complexity Ratings	RAZ	RAZ
35	Coyote Falls Low	3,983	Moderate	2	Middle North
36	Poison Creek	4,086	Moderate	2	Middle North
37	Big Hill	19,016	Moderate	5	Middle South
38	Upper Gold Creek	5,492	Moderate	2	Middle North
39	Camp 4	7,324	Low	2	Middle North
40	Mitchell Creek	6,549	High	2	Middle North
41	Box Canyon	4,143	Moderate	5	Middle South
42	Washington	25,544	High	1	Lower North
43	Joe - Johnson Creek	9,223	High	1	Lower North
44	4th of July Mt	3,639	Moderate	1	Lower North
45	Lone Peak	13,776	Moderate	5	Middle South
46	Slide Ridge	7,196	High	5	Middle South
47	Echo Valley	11,984	High	1	Lower North
48	Twenty Five Mile Creek	10,918	High	5	Middle South
49	Chelan-Manson rural	19,021	High	1	Lower North
50	Stormy Mt	14,849	Moderate	6	Lower South
51	Bear Mt.	13,629	Moderate	6	Lower South
52	Forest Mt	5,059	Moderate	6	Lower South
53	Chelan Butte	18,036	Moderate	6	Lower South
		614,701			

a. Complexity

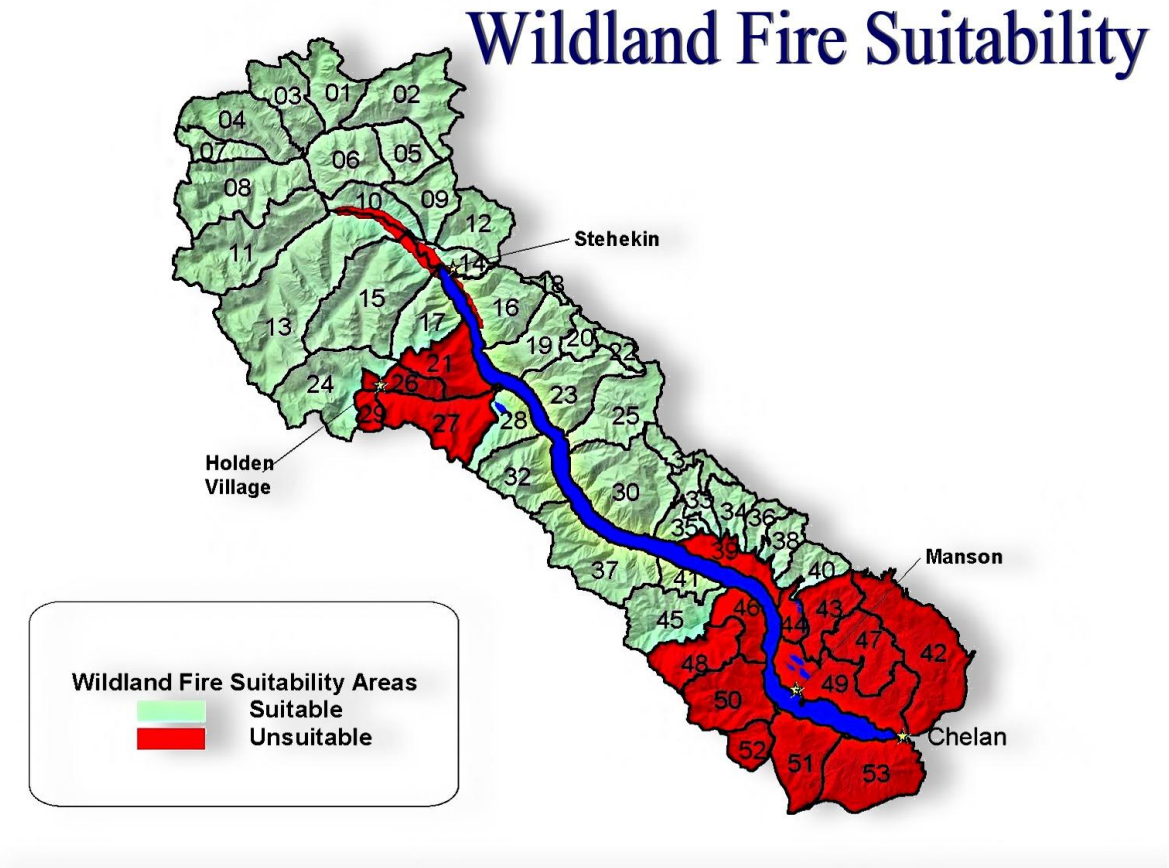
A complexity rating is assigned to each FMA to assist fire managers with the relative risk rating. These ratings are based on the complexity guidelines in the Wildland and Prescribed Fire Management Policy - Implementation Procedures Reference Guide (2001). Yellow indicates "Low" complexity. Green indicates "Moderate" complexity. Red indicates "High" Complexity.



b. Suitability

Many factors were considered in determining suitability for use of wildland fire. Most of these factors show the capacity for use of fire to be suitable over the more than ½ of the Chelan FMU due to the high number of natural fuel breaks, and the results of the risk assessment modeled with RERAP. This provides the decision maker with a full set of options.

FMA wildland fire use suitability will be reconsidered as needed by North Cascades and Chelan District fire staff.



4. Risk Identification

a. Critical Areas

A number of critical areas with the Chelan FMU warrant wildland fire exclusion and/or fire protection measures. Fire managers will implement holding action to maintain and protect existing facilities, improvements, wildlife habitat, ecosystem restoration efforts, cultural resource sites, domestic water sources, private land and structures.

Protection measures may include wrapping signs, bridges and buildings with fire protective material, clearing away flammable fuels, applying foam, installing sprinkler systems, constructing line and burning out, and aerial- delivered retardant and/or foam. The following lists detail critical areas warranting wildland fire exclusion and protection. These areas are also identified in the "Critical Areas" map below.

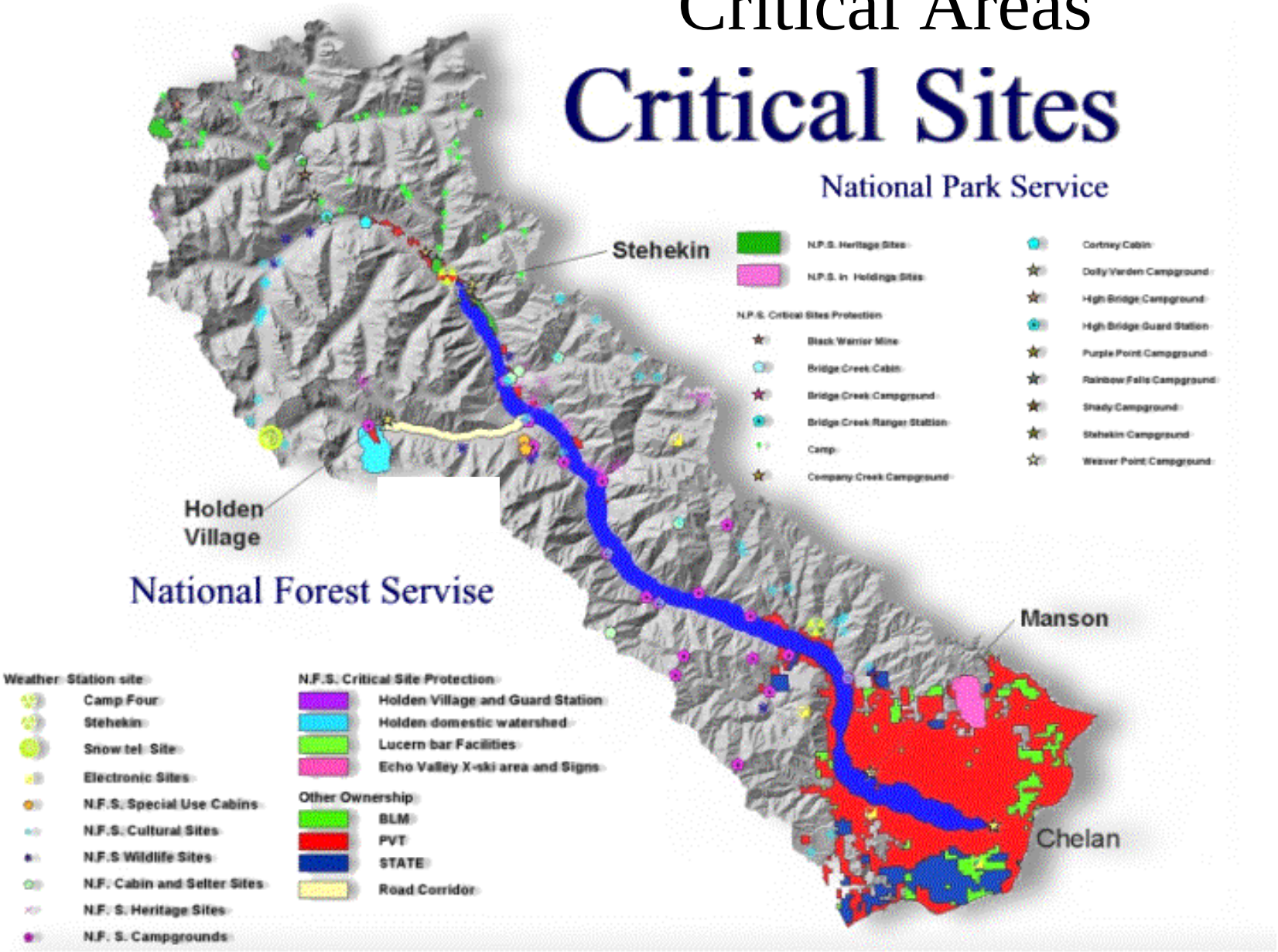
Critical Areas on USFS land:

- PUD Snotel site in vicinity of Lyman Lake
- Trail signs and bridges on Pacific Crest Trail and on other hiking trails.
- Holden domestic watershed – Copper Creek
- Domke Lake Resort
- All facilities at Lucerne
- Holden Village and Holden Guard Station
- Heritage resource sites
- Habitat protection areas
- Crow Cabin structure
- Range improvements - guzzlers
- Water improvements
- Recreation facilities at Antillon Lake, Sno-berry, and all uplake campgrounds.
- Signs at Echo Ridge cross country ski area
- Flume
- Bear Mt. Communication site
- Slide Ridge & Old Maid repeater sites
- Private property and homes

Critical Areas within North Cascades Complex:

- MacGregor radio repeater site
- Stehekin Valley Bottom – below 1460 feet in elevation
- Bridge Creek cabin and ranger station
- See Critical Areas map for national heritage polygons
- Private property and homes

Critical Areas



c. Critical Areas to be Considered During Fires

Many locations identified for protection efforts may be considered for use of fire to reduce future fire susceptibility.

The following lists identify areas that fire managers need to consider while managing awildland fire . This information is mapped in detail and filed with implementation procedure documentation at the Chelan ranger district office and the Marblemount ranger station.

Critical areas to consider on USFS land

- Pacific Crest Trail corridor
- Road corridor from Lucerne to Holden Village
- Crupina population location – minimize suppression efforts/effects
- Heritage Resource sites
- Mining claims
- Spotted owl nest stands and vicinity
- Repeater location vicinity
- Telecommunication site vicinity on Slide Ridge
- Crow Cabin area
- Antillon Lake, Snoberry and all other campground vicinities
- Lone Peak seed orchard
- Echo Ridge cross country ski area vicinity
- Wildlife habitat in vicinity of Pot Peak, Grade, Camas and Lightning Creek

Critical areas to consider within North Cascades Complex

- Foot and stock bridges
- Raptor activity centers
- Mining claims

Improvements

- Remove equipment boxes (consult North Cascades map for exact locations)
- Old Fireweed Cabin Site (2)
- McAlester Pass (5)
- Rainbow Meadow (6)
- Twisp Pass (2)
- Rainbow Lake (6)
- Juanita Lake (12)

Backcountry Camps
Consult Marblemount visitor center for visitor log for backcountry visitor permits and use.
Consult North Cascades map for camp locations.

Stehekin Valley Road Camps

- Cottonwood Campground (4)
- Park Creek Campground (8)
- Tumwater Campground (10)
- Shady Campground (6)
- Flat Creek Campground (8)
- Bridge Creek Campground (6)
- High Bridge Camp (2)
- Harlequin (6)
- Bullion (2)
- Purple Point (6)

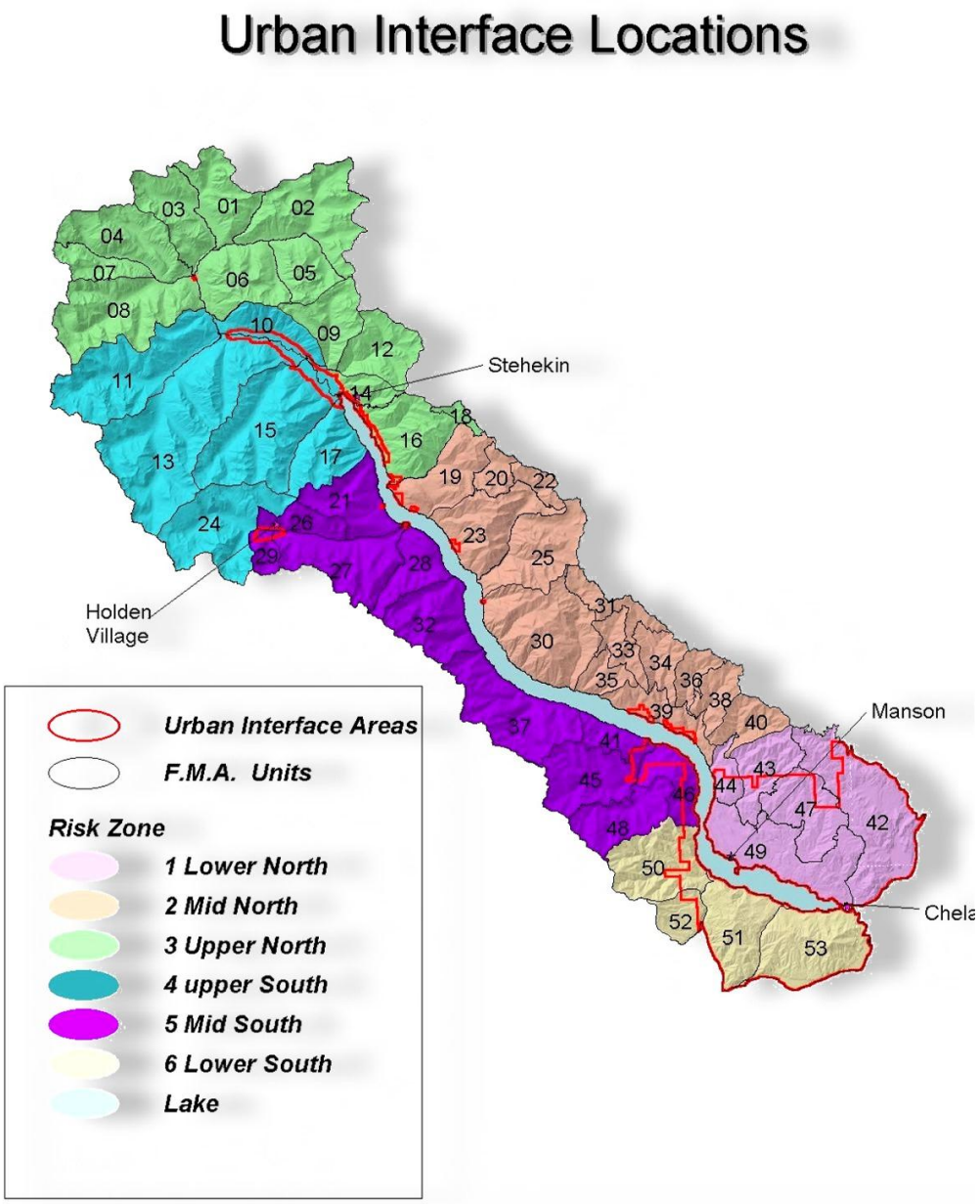
Boat-In Camps (on Lake Chelan)

- Manly Wham Camp (21)
- Flick Creek Camp (16)
- Weaver Point (15)

d. Urban Wildland Interface

Approximately 17 percent of the Chelan FMU is classified as urban wildland interface, defined as an area where structures and other human development meet or intermingle with undeveloped wildland. Urban wildland interface areas exist in the Lower North and Lower South RAZ on the southern end of Lake Chelan and in the Upper North and Upper South RAZ in the Stehekin area. Areas of greatest concern for damage or loss of life or property include the following population centers: Chelan, Chelan Butte, and along the south shore; First Creek, Navarre Coulee and Twenty Five Mile Creek. On the north shore the population centers are Manson, Emerson Acres, Swanson, Bergman and Purtteman Gultches, Union Valley, Washington and Antoine Creeks. Further up Lake Chelan are Holden Village, Stehekin and Lucerne. Furthermore, several developments are located along the lakeshore that could be at risk from fire. Historically, fire has damaged structures or improvements in several locations, mainly in the lower third of the sub-basin.

The Stehekin Valley has many important urban wildland interface considerations. The structures, roads, and utility infrastructure of the Stehekin community reflect the vested interests of private property owners, various businesses, Chelan County Public Utility District (PUD), NPS, and the NPS concessionaire. Approximately 300 improved properties, including fifteen historic structures require fire protection. In addition, residents and visitors require an emergency evacuation plan since this area is extremely isolated. No roads lead into the valley. Escape options from the Stehekin Valley, in the event of catastrophic fire, are by boat on Lake Chelan, by foot on hiking trails, or by air.



e. Suppression Considerations

The logistics of supporting a wildland fire in this FMU need to be considered before implementing fire management strategies. Aircraft and boats/barges are the most practical methods of moving personnel and supplies up Lake Chelan. These forms of transportation can often be unreliable as conditions change. The management of wildland fire will require air resources as a tactical and supply tool. Since no jet A fuel is available in Stehekin or Lucerne, barges will be required to support any helibase operation located at the north end of Lake Chelan. About seven hours will be required to barge fuel from the town of Chelan to Lucerne/Stehekin. Because of this, fire managers will want to consider more practical means of supporting aircraft such as staging aircraft at the North Cascades Smokejumper Base or

utilizing landing sites at Swamp creek landing on Highway 20, and at the head of the Twisp River near War Creek. Established helibases are located at Twenty Five Mile Creek and the Chelan Airport.

Communications in the upper valley requires the use of repeaters and separate radio frequencies to be effective. No permanent means of communication exists between the upper end of the Stehekin Valley and the Chelan Ranger Station. The use of North Cascades Complex frequencies over the McGregor repeater for extended periods of time interrupts other Complex communications on the repeater. Radio technicians will be needed to develop plans and to set up means to communicate on committed frequencies during any fire incident.

5. Risk Assessment

a. Introduction

At the time that each wildland fire ignition is evaluated, there is considerable uncertainty regarding the fire's potential spread rate and direction, timing of major fire movement and fire intensity, and the potential composition and timing of smoke produced. These and many other concerns must be evaluated within very tight time constraints. It is very important that managers be able to determine with advanced knowledge the potential risks to values that lie in the path of the wildland fire so that they can make informed decisions to either suppress unwanted fires or allow fires to play their natural role within the wilderness. This is where the Rare Event Risk Assessment Program (RERAP) is tremendously helpful. Outputs in RERAP provide instant quantitative assessments of how far and in what direction a fire will burn given average and/or rare weather events. These assessments provide one more piece of the information puzzle required before an informed decision can be made.

For example, if a lightning strike ignites a fire in the Flat Creek drainage on August 20, the RERAP modelling will at a glance provide a rapid assessment of the probability that the fire will spread into an area of concern such as the Stehekin Valley before typical fall rain or snow can naturally extinguish the fire. If the probability is high the fire will affect the area of concern the fire may need to be suppressed. On the other hand, a low probability may warrant a decision to manage the fire that would ultimately benefit the wilderness resource.

The Rare Event Risk Assessment Process (RERAP) was used to assess long-term fire risk for locations in the Chelan FMU. As previously noted, it is important to remember that RERAP analysis is very gross in scale and is a tool that can provide the decision maker with information to make an initial risk determination only. When a wildland fire occurs within the Chelan Sub-Bain, a more site specific analysis may be desired to assist fire management planners with a more accurate risk assessment.

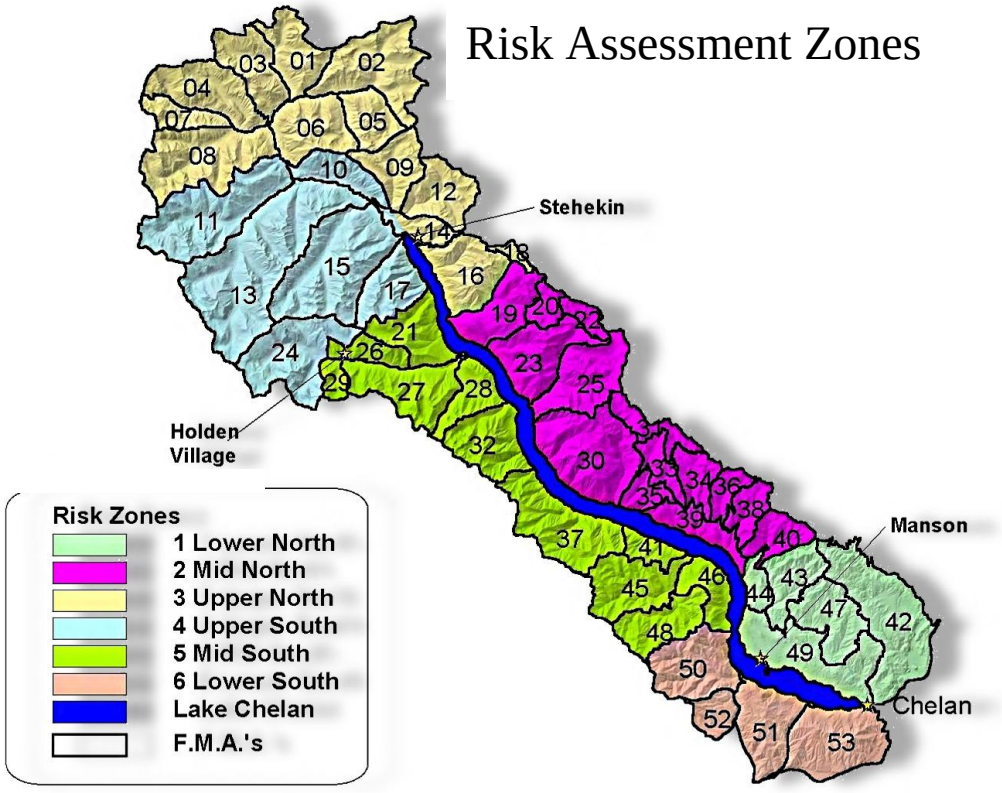
b. Team

The risk assessment was completed by an interagency team lead by Tom Leuschen and included Jim Burdick (OWNF), Janeen Tervo (Chelan Ranger District), Tod Johnson (North Cascades Complex), and Keith Satterfield (Little Pend Oreille Wildlife Area). All the risk assessment GIS work was done by Jack Rainford (Chelan Ranger District).

c. Risk Assessment Zones

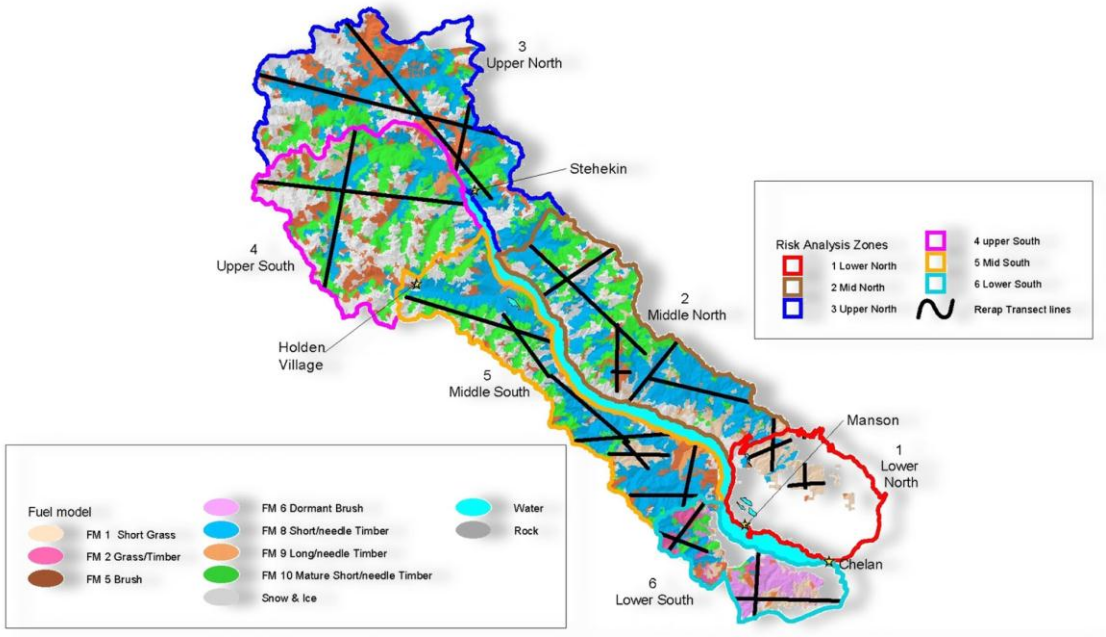
Probabilities that the fire will reach an area of concern before a season ending event were calculated for six areas of the Chelan FMU. The team chose to develop the areas by combining FMA as follows:

RAZ 1: Lower North consisting of FMA 17 and 18
RAZ 2: Middle North, consisting of FMA 7, 9, 13, 14, 15, and 16
RAZ 3: Upper North, consisting of FMA 1, 2, 3 north of the Stehekin River, and 6
RAZ 4: Upper South consisting of FMA 3 south of the Stehekin River, FMA 5, and 10
RAZ 5: Middle South consisting of FMA 8, 11, 12, and 19
RAZ 6: Lower South consisting of FMA 21.



d. Fuel Model and Transects

For each area, the team examined Northern Forest Fire Lab (NFFL) fuel model maps to determine sites from which fire might spread to the boundaries without being stopped by natural fuel breaks. For the calculations, these sites represent the point of a potential fire start. The team then ran projection lines from that point until they hit the RAZ boundary, a natural barrier, or a significant fuel model change. An attempt was made to run the lines north, south, east and west. However, in some situations this was either contrary to the prevailing winds or lacked consistent fuels. Some of the projection lines had to be skewed to other bearings to fit the landscape situation. In situations where a projection line could not go in a specific direction due to a natural barrier, the team selected a projection line that could produce spread. Where there was a short section of rock, we modeled this as a fuel model 8 and continued the line. All projection lines were assessed in 40 chain (1/2 mile) increments up to 280 chains.

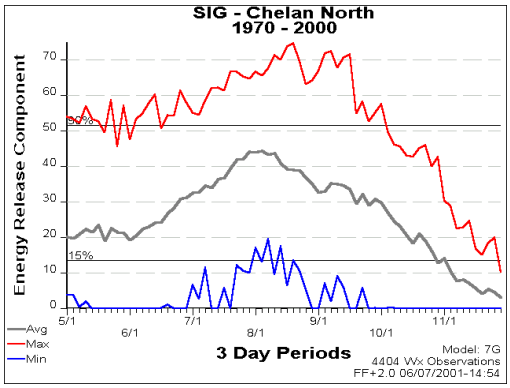


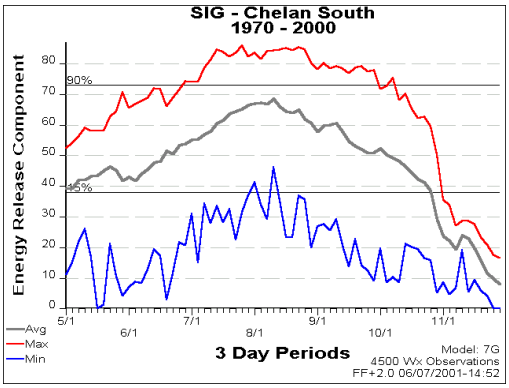
The weather stations that best represent the transects are as follows:

Washington Pass: 1, 2a
Stehekin Landing: 2b, 3, 4, 15a, 18, and all of the L transects in RAZ 3 Upper North
Camp4: 5, 6, 7, 8, 9, 10, 12, 13, 14, 15b, 15c, 16, 17, 19, 21a, and 21b
Old Entiat: 11, 22a, 22b, and 22c.

Data from these weather stations was used to estimate season-ending event distribution, weather occurring during wind events from a particular direction, and current and historical energy release component (ERC).

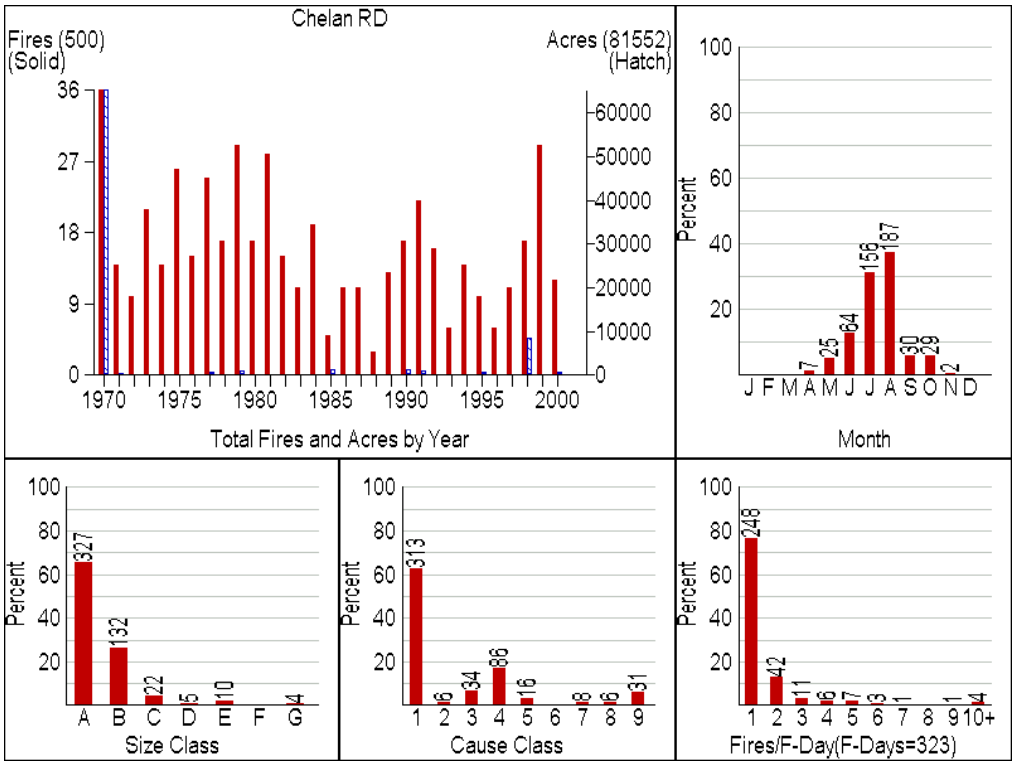
e. Fire Season Profile





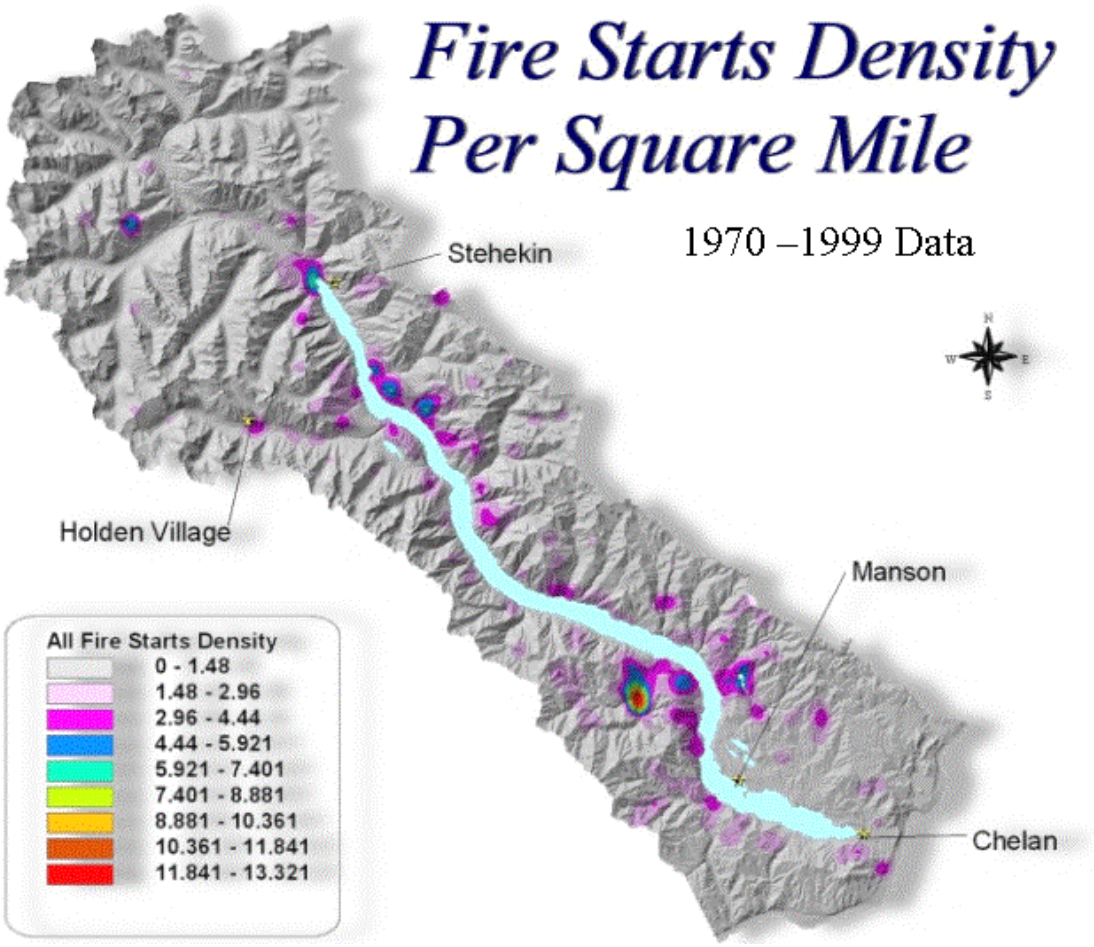
A Chelan North and a Chelan South Special Interest Group (SIG) were created to determine fire season profile for the Chelan FMU. Chelan North SIG uses the Washington Pass and the Stehekin Landing weather stations to represent the wetter weather conditions that occur on the north end of Lake Chelan. Chelan South SIG uses the Camp4 and Old Entiat weather stations to represent the drier conditions at the south end of the lake. In both SIG, the fire season begins a drying trend in June, reaching a peak around the first of August, and then growing progressively wetter until the season-ending event. The most obvious difference between the SIG is the much slower decline of fire season in Chelan South SIG. There the highest ERC readings, suggesting the highest fire danger, tend to remain around the first of October, whereas the Chelan North SIG data show a more rapid decline.

The fire history data from the Chelan Ranger District, displayed in the following graph, clearly show the height of fire season occurring in July and August, with persistent fires in September and October.

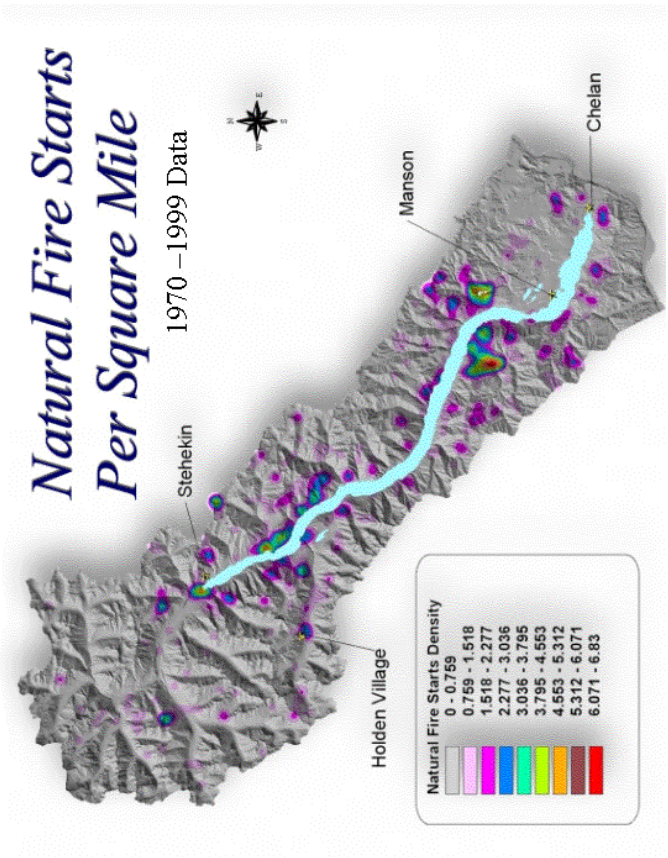


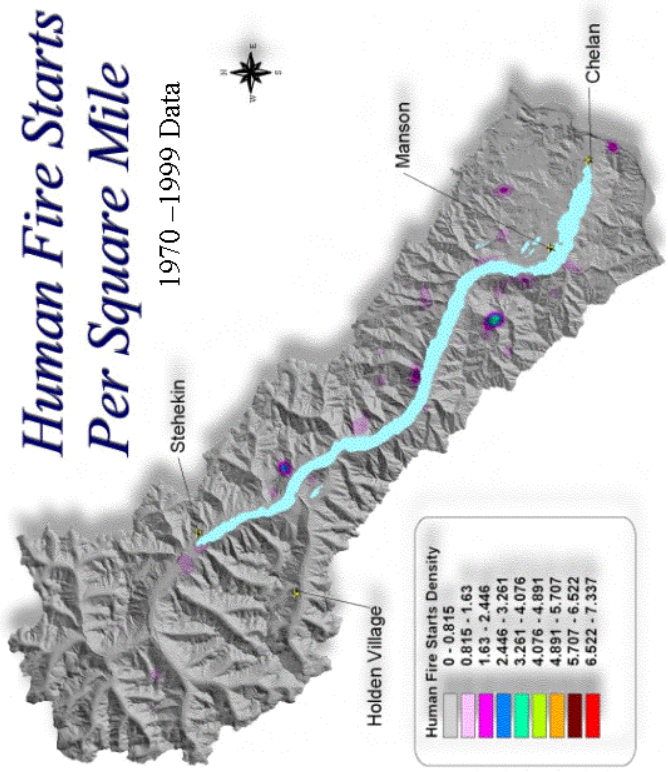
f. Fire Occurrence Record

Fires have been suppressed in the Chelan FMU since the early 1900's. Efforts to reduce human-caused fires through information, education and permit systems were in place by 1916. This practice of suppressing wildland fires, both natural and human caused has disrupted the historical occurrence of frequent low severity fires, which had periodically removed flammable undergrowth without significantly damaging larger trees. Because this normal cycle of fire was disrupted, high levels of fuel have accumulated which can lead to high intensity wildland fires.

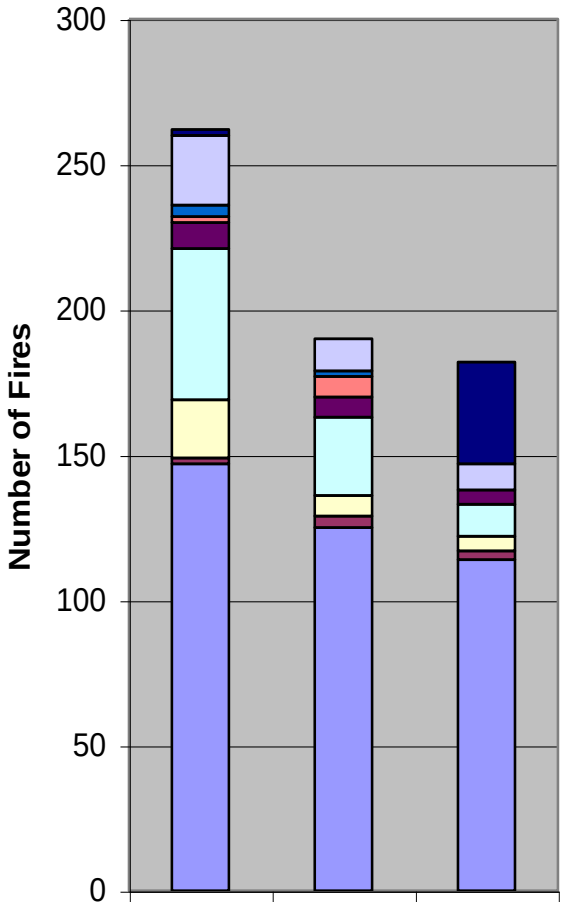


The fire occurrence density maps display hot spots where the most fires occurred per square mile from 1970 through 1999. When ignitions from all causes are considered, several areas appear to have a higher frequency than others. Twenty-Five Mile Creek has historically been the most active area, followed by the region across the lake to the north near Antillon Lake and Mitchell Creek, then by the area on the north side of the lake in the general vicinity of Moore Point and Cascade Creek, and finally by Stehekin. Most fires in these areas have been lightning-caused. However, human-caused fires do occur, and normally are significant due to their location on the lower portions of the slopes during hot and dry weather.


Natural Fire Starts
Per Square Mile
1970 –1999 Data
Stehekin
Holden Village
Manson
Chelan
Natural Fire Starts Density
0 - 0.759
0.759 - 1.518
1.518 - 2.277
2.277 - 3.036
3.036 - 3.795
3.795 - 4.553
4.553 - 5.312
5.312 - 6.071
6.071 - 6.83


Human Fire Starts
Per Square Mile
1970 –1999 Data
Stehekin
Holden Village
Manson
Chelan
Human Fire Starts Density
0 - 0.815
0.815 - 1.63
1.63 - 2.446
2.446 - 3.261
3.261 - 4.076
4.076 - 4.891
4.891 - 5.707
5.707 - 6.522
6.522 - 7.337

1970-1999 Fire Cause by Decade



	1970	1980	1990
unknown	2	0	35
9-Misc	24	11	9
8-Children	4	2	0
7-Arson	2	7	0
5-Debris Burn	9	7	5
4-Campfire	52	27	11
3-Smoking	20	7	5
2-Equipment Use	2	4	3
1-Lightning	147	125	114

Research in the Entiat watershed on the Wenatchee National Forest has determined that from 1700 through 1860, the period defined as presettlement, nearly 100 percent of the 40,000-acre watershed was burned every decade in dry site habitats. From 1860 to 1910, or the settlement period, approximately 80 percent of the watershed was burned every decade. During the fire suppression years of 1910 to present, only 4 percent of the watershed has burned per decade.

The same pattern is assumed to have occurred on the OWNF and in the Stehekin Valley. This means that fire regimes with less than 35 year fire return intervals burned every decade. Since 1970 fires have increased in size in spite of our best suppression efforts. This can be attributed to the increase in biomass and ladder fuels in the understory, which increases stand density and susceptibility to crown fires. This trend is expected to continue until the stand densities are reduced in fire regimes with fire return intervals less than 35 years. Fire maintains the early seral, fire resistant species in these communities and is necessary to maintain ecosystem stability. If these dry climate stands continue on their present course without the influence of fire, the early seral species will be virtually eliminated from the landscape within 100 years.

Fire size and intensity will continue to increase making it difficult to provide fire protection both on and off forestlands. Risks to firefighters attempting to suppress these fires and the associated suppression costs will also continue to rise.

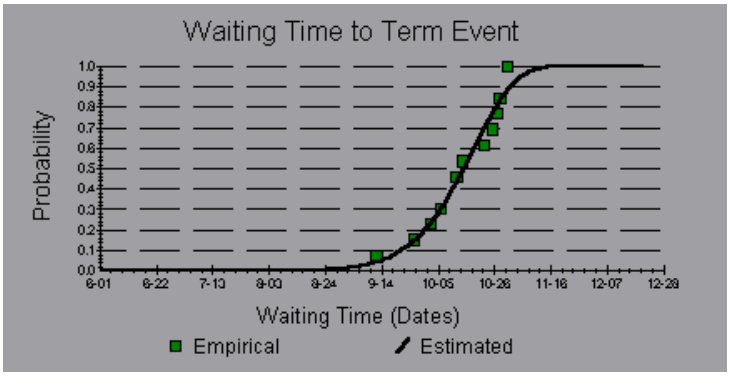
6. Probabilities of Season-Ending Events

a. Interpretation of Weather

Washington Pass, Stehekin Landing, Camp4, and Old Entiat weather station data was analyzed using the season-ending event criteria of 0.5 inches of rain within a three-day period. When that did not occur a date was subjectively selected based on a significant drop in the ERC charts and either precipitation events or a continual rise in relative humidity.

- **Washington Pass** RAWS 452033, elevation 5620', 1984 – 1999
-
- **Stehekin** 452121, elevation 1196', 1970 –1999 (Note that data is available from 1964 – 1999, but this subset seemed most accurate.)
-
- **Camp4** RAWS 452132, elevation 3773', 1981 – 1999
-
- **Entiat** 452106, elevation 796', 1970 – 1999 (Note that data is available from 1961 – 1998, but only data from 1970 – 1999 was used.)

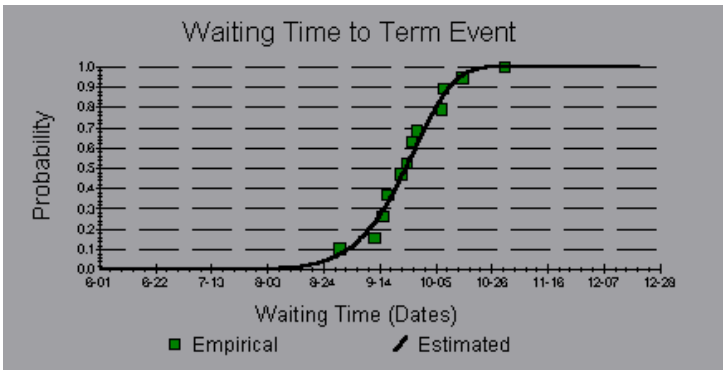
The following graphs show the term events and probability of season-ending events for Camp4 and Stehekin. Term events can occur in Stehekin beginning in the first week of September, but do not exceed a 50 percent probability of occurring until after September 24. On the same date, there is only a 10 percent probability of term events occurring at Camp4. Thus, the term event at Camp4 is likely to occur about two to three weeks after the term event at Stehekin. (Note that additional term event results are displayed in the Chelan Sub-Basin Appendix).



Camp4 Term Event

Season Ending Event Dates	Cumulative Probability
September 21	10%
September 29	20%
October 5	30%
October 10	40%
October 14	50%
October 18	60%
October 22	70%
October 26	80%
October 31	90%

Camp4



Stehekin Term Event

Season Ending Event Dates	Cumulative Probability
September 1	10%
September 9	20%
September 15	30%
September 19	40%
September 23	50%
September 27	60%
September 30	70%
October 4	80%
October 10	90%

Stehekin

7. Range of Potential Fire Behavior

a. Surface fire

The outputs below predict the type of surface fire behavior that managers may encounter in Chelan Sub-Basin during much of the fire season. In grassy fuels, surface fire may spread quickly but will not produce high heat or intensity. In brush and timber, a surface fire may produce high intensity but will not be expected to spread quickly.

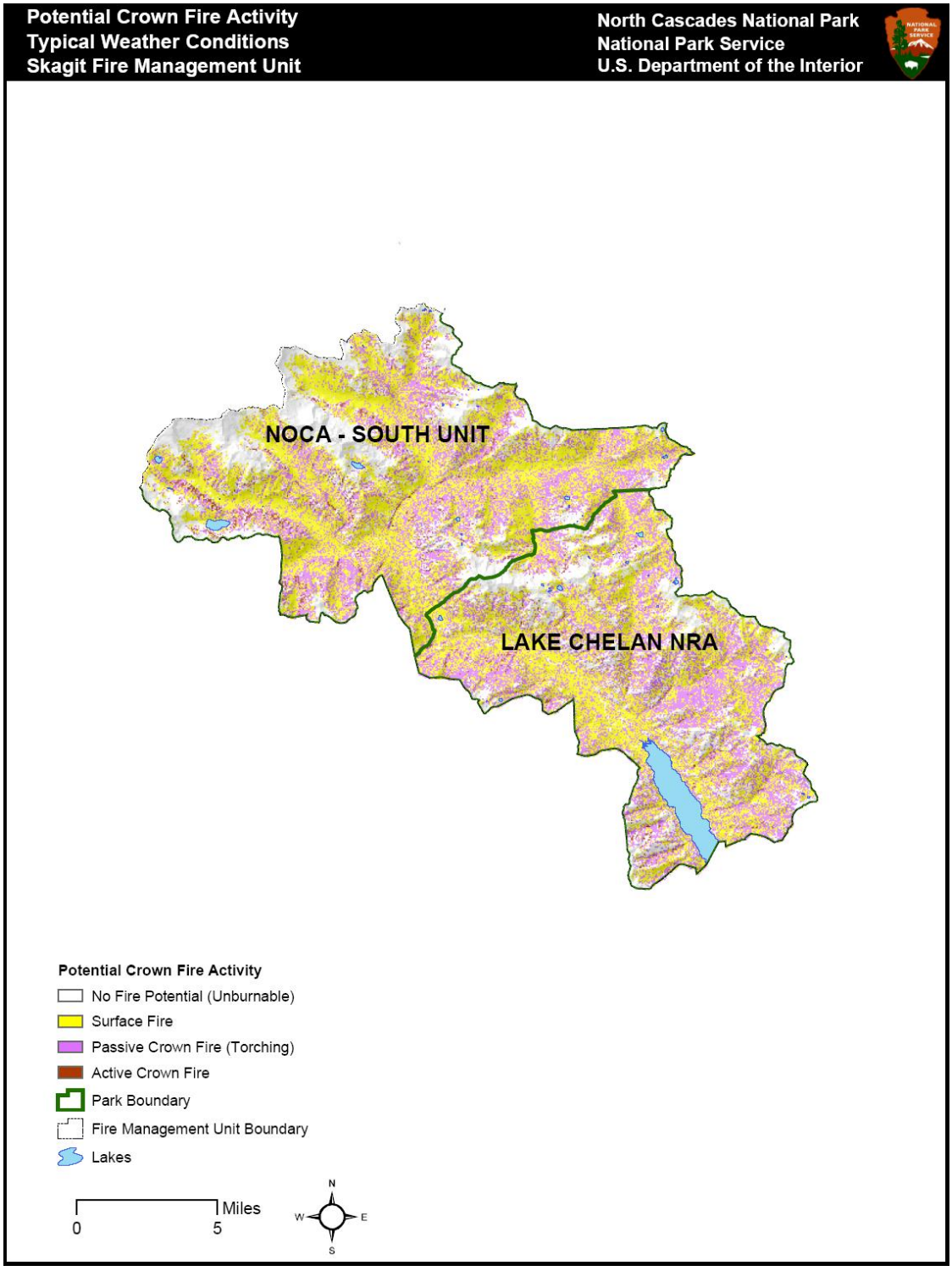
The range was developed using 75th and 97th percentile weather condition data encountered in Stehekin. For this exercise, slope was maintained at 50 percent throughout, and mid-flame wind speed of 5 miles per hour was used with the 97th percentile fuel moistures.

	Model 1 Short Grass	**Model 2 Trees and Grass**	**Model 5 Short Brush**	**Model 6 Dormant Brush**
Rate of Spread ch/hr	42-96	20-52	15-117	13-36
Heat per unit area BTU/ft2	84-92	470-518	679-1029	435-495
Fireline intensity BTU/ft/sec	64-163	170-496	190-2198	104-328
Reaction Intensity BTU/ft2/sec	764-843	3405-3757	2976-4509	1771-2014
Flame Length (feet)	3.1-4.7	4.8-7.8	5.0-15.5	3.8-6.5

	Model 8 Closed Timber Litter	**Model 9 Long Needle Pine Litter**	**Model 10 Timber and Heavy Litter**	**Model 11 Light Thinning Slash**
Rate of Spread ch/hr	1-2	3-9	4-22	2-6
Heat per unit area BTU/ft2	173-198	343-390	1278-1570	727-779
Fireline intensity BTU/ft/sec	2-8	18-67	104-642	33-93
Reaction Intensity BTU/ft2/sec	851-976	2220-2524	5871-7215	2236-2397
Flame Length (feet)	0.7-1.2	1.7-3.1	3.8-8.8	2.3-3.6

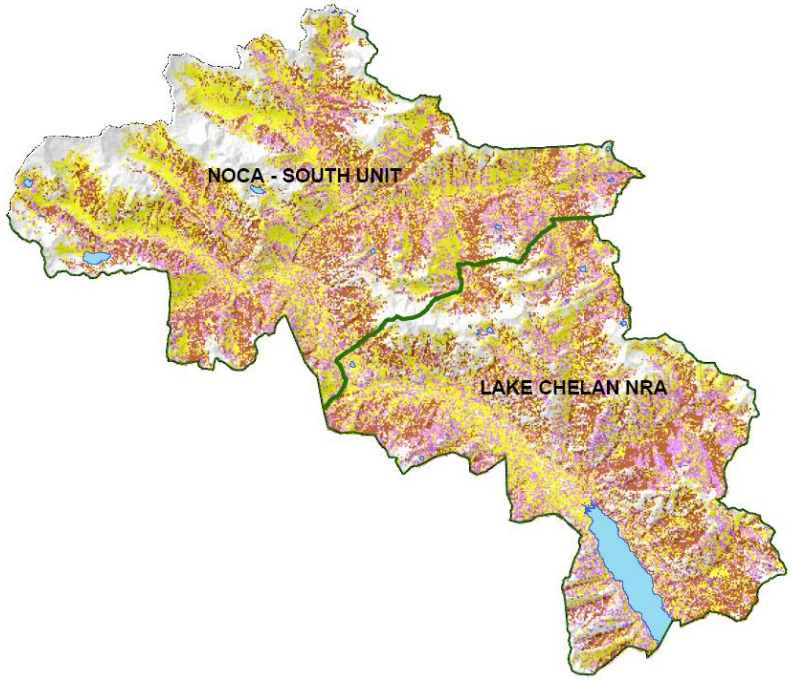
b. Crown Fire Potential

If surface fire develops into crown fire—fire that moves from the crown of one tree to another or from many trees to many more trees—it becomes more difficult to manage and/or suppress. The maps below show the potential for crown fire on NPS land within the Chelan Sub-Basin FMU. Both passive (single or multiple-tree torching) and active crown fire can be expected during typical weather conditions. Hand crews will not be effective under these conditions because of the dense multi-canopied forest, extremely steep terrain, and unstable atmospheric conditions. Because of this, suppression plans should include use of aircraft to assist during peak burning conditions.


Potential Crown Fire Activity
Typical Weather Conditions
Skagit Fire Management Unit
North Cascades National Park
National Park Service
U.S. Department of the Interior
NOCA - SOUTH UNIT
LAKE CHELAN NRA
Potential Crown Fire Activity
No Fire Potential (Unburnable)
Surface Fire
Passive Crown Fire (Torching)
Active Crown Fire
Park Boundary
Fire Management Unit Boundary
Lakes
Miles
0
5
N
W
E
S

Potential Crown Fire Activity
Drought Weather Condition
Chelan Fire Management Unit

North Cascades National Park
National Park Service
U.S. Department of the Interior



Potential Crown Fire Activity
- No Fire Potential (Unburnable)
- Surface Fire
- Passive Crown Fire (Torching)
- Active Crown Fire
- Park Boundary
- Fire Management Unit Boundary
- Lakes

0 5 Miles

N W E S

8. Fire Spread Projections

a. Methodology

Fire spread can be evaluated using techniques taught in Advanced Wildland Fire Behavior Calculations (S-490). For risk assessment this involves locating transects from the fire's leading edge to the areas of concern. These lines are then divided into segments based on fuel models, slope, and aspect. For this assessment these inputs were generated electronically in GIS. When the results of this process were reviewed, the team found that the number of unique segments often exceeded the ten maximum segments allowed by the RERAP program. To adjust to this limitation the original fuel model map was filtered to exclude any polygon less than fifty acres. Slope classes were broken into 0-25 percent, 26-40 percent, 41-55 percent, and greater than 55 percent as shown in the spread tables in the Fire Behavior Field Reference Guide. One-thousand foot elevation bands were used as were aspects of north, south, east, and west. The aspect data was also used to determine if the fire spread was moving up or down slope so that the appropriate slope percent would be used. Once these steps were completed the data was consolidated and found to meet the requirements of the RERAP program. Each of these segments was processed in SPREAD using fuel moisture and wind speed information for each weather class. SPREAD summarizes this information in tabular form.

SPREAD summarizes the data into daily spread rates by multiplying the hours of spread per day times the hourly spread per day. Marshall Haskins of Chelan ranger district provided information on hourly spread per day. The following values were used:

North Shore	Low	Medium	High	Extreme
June	2	3	5	6
July	2	4	8	10
August	2	4	8	10
September	2	3	8	8
October	2	3	5	6

South Shore	Low	Medium	High	Extreme
June	1	2	3	4
July	1	3	6	8
August	1	3	6	8
September	1	2	4	6
October	1	2	3	4

Common and rare events are determined by observing the highest rates of spread and delineating them from the common or lower rates of spread. By doing this, SPREAD generates the average common daily spread, the spread from rare and significant events and the rare event frequency. These values are used in RISK to generate the waiting time distribution for the critical spread event.

b. Results

The results of the RERAP Risk Assessment indicate that large fires will have primarily moderate rates of spread but during wind events can display high rates of spread and can reach areas of concern if fires start in the early to mid-summer in most RAZ. The appropriate response can consider confinement or the use of wildland fire as long as protection of critical areas is performed. The interpretation of the data follows for each RAZ.

Note that variances in data suggest a wide range of values were used to develop the average. A fire manager may use these average values, but must understand that, depending on location of the fire, rate of spread may be dramatically different from the average.

c. Chelan RAZ 1 Lower North

Fires, which start in June, July, or August and are spreading **north** or **south** in RAZ 1 will reach any areas of concern within 3 miles distance or more. In September north spread is still likely to reach all areas within three miles, but south spread probability drops below 50 percent at three miles. In October the probability drops to moderate with north spread, and ½ mile with south spread. All other distances have low probability of being reached by fire with north or south spread.

Fires spreading to the **east** have high probability of reaching areas of concern within ½ mile in June, but low probability for all other distances and months, while fires spreading to the west have moderate probability of reaching ½ mile distance in June and July, but low probability for all other distances and months.

Most of the datasets in this RAZ did not display very much **variability**. The exceptions are west spread in June and July for up to 1½ miles and south spread in August and September.

d. Chelan RAZ 2 Middle North

Fires, which start in June, July, or August and are spreading **east** or **west** in RAZ 2, will reach any areas of concern within 3 miles. In September there is 43 - 55 percent probability of fire reaching all areas of concern within 3 miles to the west. East spread probability stays moderate until it reaches 2 miles, then drops to low for all other distances. In October the probability drops to low for all distances with fire spread to the east or west.

Fires spreading to the **south** have high probability of reaching concerns within ½ mile in June, but only moderate probability of spreading 2½ miles. By July south spread is moderate to 2 miles but remains low for all other distances and months.

Fires spreading to the **north** have moderate probability of reaching concerns within 3½ miles in June and July, and 2½ miles in August, but low probability for all other distances and months.

North and south spread datasets in this RAZ displayed quite a bit of **variability** until October. There is little variability in spread to the east or west in June or July.

e. Chelan RAZ 3 Upper North

Fires spreading **east** in RAZ 3 have high probability of reaching any areas of concern within 1½ miles distance in June and 1 mile in July. A moderate probability of east spread from 2 to over 3 ½ miles in June drops to 1 ½ - 3 miles in July, and ½ - 1 ½ miles in August. All remaining distances with east spread have low probability of reaching areas of concern.

Fires spreading to the **south** are similar to those spreading east with high probability of reaching ½ mile in both June and July. There are moderate probabilities of fire spreading south 1 - 3 miles in June, 1 – 3 miles in July, and up to 1 mile in August. Spread to the south all other distances in all months have low probability of reaching areas of concern.

Fires spreading to the **north** have high probability of reaching concerns within ½ mile in June and July, and moderate probability of spreading ½ to 1 mile in June. North fire spread at all other distances has low probability of reaching areas of concern.

East and west spread datasets in this RAZ displayed **variability** until September. There is little variability in the dataset for north or south.

f. Chelan RAZ 4 Upper South

Fires spreading **east** in RAZ 4 have high probability of reaching any areas of concern within ½ mile distance in June. There is moderate probability of fire spread from ½ to 1 mile in June, and up to 1 mile in July. All remaining distances with east spread have low probability of reaching areas of concern.

Fires spreading to the **north** are similar to **west** spread with moderate probability of reaching ½ mile in June. Spreads to the **south** in all distances in all months have low probability of reaching areas of concern. All datasets in this RAZ displayed very little variability in all months.

g. Chelan RAZ 5 Middle South

Fires spreading **north** in RAZ 5 have high probability of reaching any areas of concern within ½ mile in June. There is moderate probability of fire spread from ½ to over 3 ½ miles in June and within 3 miles in July and August. All remaining distances and months with north spread have a low probability of reaching areas of concern.

Fires spreading **south** have moderate probability of reaching up to 3 ½ miles in both June and July, and up to 1 ½ miles in August. Spread to the south all other distances in all months have low probability of reaching areas of concern.

Fires spreading to the **east** have moderate probability of spreading up to 1 ½ miles in June, and up to 1 mile in July. East fire spread at all other distances and months has low probability of reaching areas of concern.

Fires spreading **west** in RAZ 5 have high probability of reaching any areas of concern within 2 miles distance in June, and 1 ½ miles in July. There moderate probability of fire spread from 2 ½ - >3 ½ miles in June, from 2 - >3 ½ miles in July, and up to 2 miles in August. All remaining distances and months with north spread have low probability of reaching areas of concern.

All spread datasets in this RAZ displayed quite a bit of **variability** until September. There is little variability in spread to the east or south in September and all directions in October.

h. Chelan RAZ 6 Lower South

Fires spreading north in RAZ 6 have high probability of reaching any areas of concern within 3 ½ miles in June, July, and August, and up to 1 ½ miles in September. There is moderate probability of fire spread from 2 - >3 ½ miles in September, and within ½ mile in October. All remaining distances and months with north spread have low probability of reaching areas of concern.

Fires spreading south have high probability of reaching any areas of concern within 3 ½ miles in June and July, and up to 3 miles in August. Fires spreading to the south have moderate probability of reaching over 3 miles in August and from 1 ½ - 2 miles by September. Spread to the south all other distances in all months have low probability of reaching areas of concern.

Fires spreading east have high probability of reaching any areas of concern within 3½ miles in June, and up to 2 miles in July. Fires spreading to the east have moderate probability of spreading from 2½ - 3½ miles or more in July, up to 3 miles in August, and up to 1 mile in September. East fire spread at all other distances and months has low probability of reaching areas of concern.

Fires spreading west in RAZ 6 have high probability of reaching any areas of concern within 3½ miles in June and July, up to 2 miles in August, and up to ½ mile in September. There is moderate probability of fire spread from 2½ - >3½ miles in June, from 2 - >3 ½ miles in August, and from 1 - 1½ miles in September. All remaining distances and months with have low probability of reaching areas of concern.

East and west spread datasets in this RAZ displayed quite a bit of variability until October when they show little. There is little variability in data for spread to the north or south in all months with the exception of September when north spread datasets exhibit some variability.

9. Smoke Management

a. Historical Considerations

Many historical accounts refer to the presence of smoke in the interior Columbia Basin, however levels of smoke declined as fire was excluded from forests, particularly after the advent of organized fire suppression in the 1930's.

As the demand for lumber soared in the 1950's so did the amount of smoke in the air from burning slash. Smoke from forest slash remained common into the mid-1980's. As timber harvesting slowed, so did the amount of smoke in the basin. From 1985 to 1998 the annual emissions of PM_{10} (particulate matter 10 micrometers in diameter and smaller,

considered dangerous because it can be inhaled into and accumulate in the human respiratory system) on the eastside of Washington dropped from 21,308 tons to 4,961 tons, a 77 percent reduction.

Air quality in the lower Chelan Sub-Basin is affected minimally by various factors. Dust, pollen, and sprays from apple orchards are common. Orchardists often burn apple woodpiles in the spring and fall. This affects the air quality only if an inversion settles in while the piles burn. The closest prescribed USFS fires have been on slopes covered with bitterbrush or in pine stands with a high bitterbrush component. Fires in these light fuels have not produced enough smoke to reach sensitive areas.

The National Ambient Air Quality Standards (NAAQS) lists the daily level of PM_{10} above which sensitive populations—asthmatics, children, and the elderly—need to take precaution at 150 micrograms per cubic meter (mg/m^3). By this standard, background concentrations of PM_{10} in the Chelan Sub-Basin are acceptably low. In Wenatchee, the highest summer levels of PM_{10} are typically close to 25 mg/m^3. In Twisp, background PM_{10} levels are 3 – 15 mg/m^3. In Chelan, an air quality monitor during the summer of 1998 found background concentrations of PM_{10} to be 10 – 15 mg/m^3.

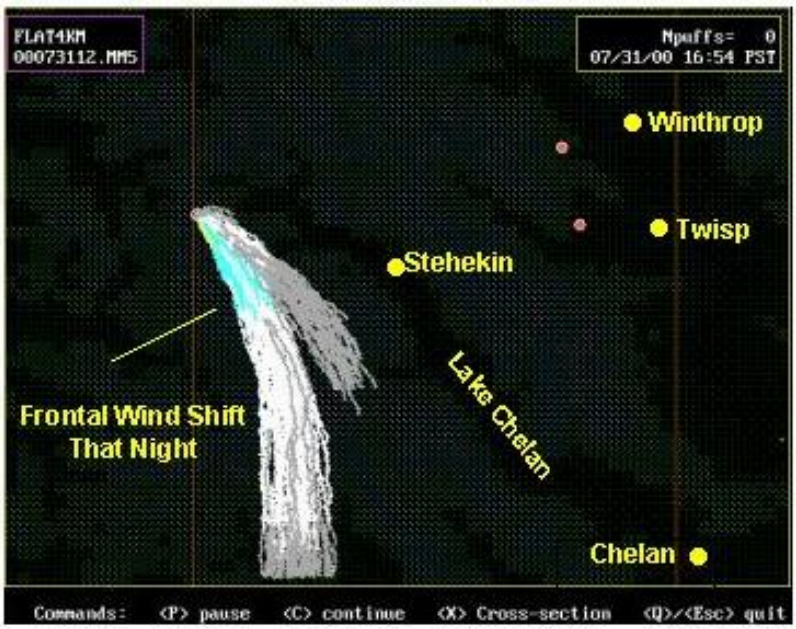
Only very large wildland fires occasionally affect air quality enough to cause hazardous health conditions in the Chelan Sub-Basin. During the catastrophic 1994 fires, the Chelan Valley was covered by thick smoke for weeks. At that time the high volume particulate matter monitor in Wenatchee measured a PM_{10} concentration of 361 mg/m^3, and doctors in Chelan reported an increase in respiratory complaints. Many residents and most tourists left the area until the smoke cleared. The loss of tourist income had a major impact on local businesses.

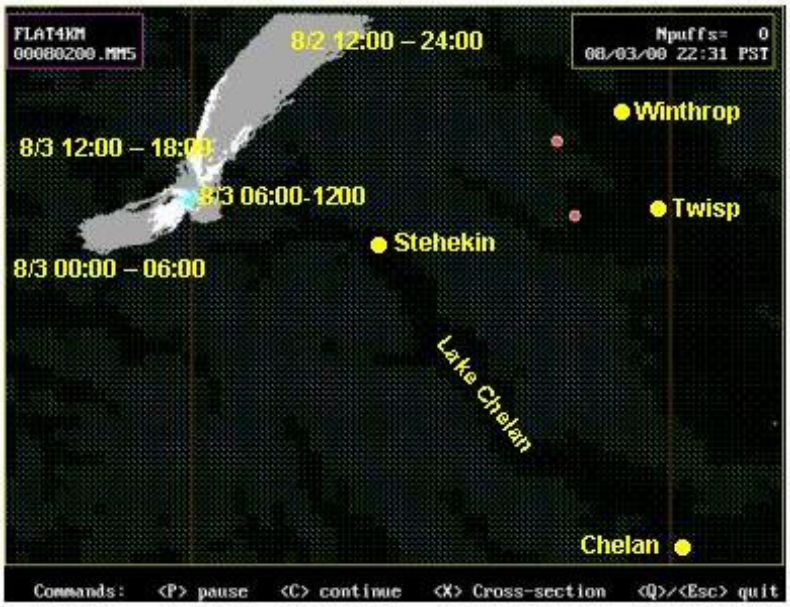
An environmental analysis for implementing the Dry Site Strategy in the Twenty Five Mile Creek Drainage was completed in 1997. This analysis included alternatives with as much as 7,800 acres burned over a five-year period and used a smoke dispersal model (NFSPUFF) to model worse-case scenarios for particulates. The resulting prediction for total particulate concentrations, including PM_{10}, was less than 0.1 mg/m^3 per day, far below the 150 mg/m^3 standard.

During the 1998 North Fork Twenty Five Mile Creek wildland fire (8,500 acres), smoke from the initial one-day blow up traveled as far away as the Methow and Okanogan valleys. As a result Washington State Department of Ecology brought air quality monitoring equipment to Chelan that measured only low levels of smoke after the first day. However, one night a large burn-out operation in lower North Fork Twenty Five Mile Creek concentrated smoke at Twenty Five Mile Creek State Park at average concentrations of 1400 mg/m^3. Fortunately, the state park had been evacuated and a health advisory for residents in the area was broadcasted. The next day the air cleared, and concentrations at Twenty Five Mile Creek State Park dropped. The fire continued for weeks after, but smoke was confined to the vicinity of the fire.

During the Flat Creek Fire 2000 the smoke column traveled away from sensitive receptor sites within and adjacent to the FMU. Smoke was dispersed prior to entering populated areas. The model below displays this pattern.

Flat Creek Fire – 07/31/00 12:00 – 18:00





b. Sensitive Receptors Within Chelan FMU

Note that designated Class I Areas are those requiring the most stringent air quality protections as dictated by the federal Clear Air Act.

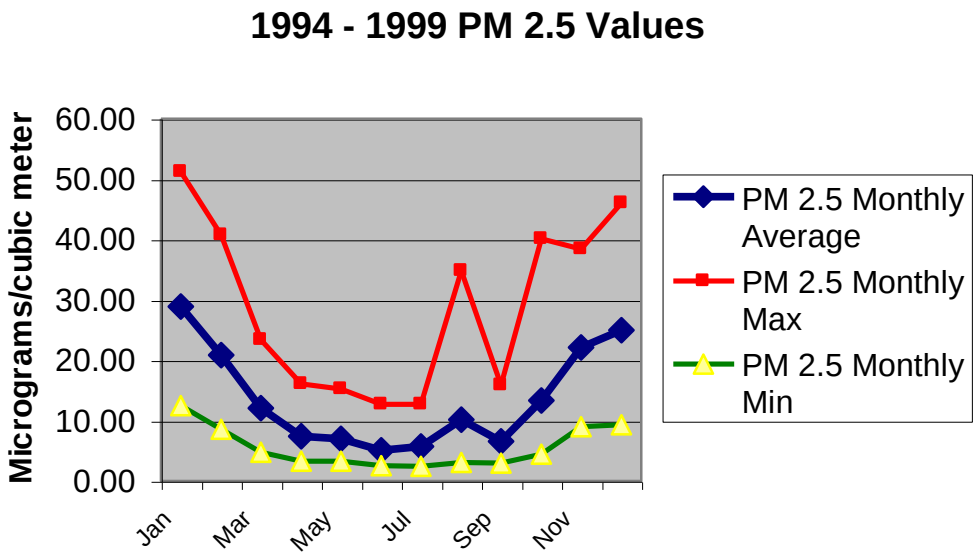
Sensitive Receptors	Location Description
State Highway 20 and Scenic Corridor	Northern most edge of sub basin in the head of Bridge Creek. Part of "Upper Basin"
Steven Mather Wilderness (Class I Area)	Northern most end of the basin. Part of the "Upper Basin"
Glacier Peak Wilderness (Class I Area)	From the southern edge of the Complex and west of Lake Chelan down to Bear Cat Ridge. Part of the "Upper Basin"
Lake Chelan National Recreation Area, including the Stehekin Valley (a Class II area including a community and residential area, resorts, public ferry landing, tourism, campgrounds)	Northern most end of Lake Chelan. Part of the "Upper Basin"
Holden Village (a Class II area, including a community and residential area, resort, tourism, campground)	12 miles west of Lake Chelan about ¾ of the way up the lake. Part of "Upper Basin"
Lucerne and Domke Lake (public ferry landing, campgrounds and resorts)	West of Lake Chelan about ¾ of the way up the lake. Part of "Upper Basin"
South Shore (two state parks, resorts, public ferry boat landing, tourism, two state highways, residential area)	South of Lake Chelan between Twenty Five Mile Creek and Chelan. Part of the "Lower Basin"
North Shore (community of Manson, residential area, orchards, resorts, tourism, campgrounds, state highway)	North of Lake Chelan between Antillon Lake and Chelan. Part of the "Lower Basin"
Chelan (incorporated town, resorts, public ferry boat landing, campgrounds, tourism, orchards, two state highways, community of Chelan Falls)	At the southeastern end of Lake Chelan. Part of the "Lower Basin"

Sensitive Receptor	Distance From Center of Chelan Sub Basin	Direction from Center of Chelan Sub Basin
Pasayten Wilderness (Class I)	60 miles	North
Methow Valley, Winthrop to Methow (four communities, orchards, resorts, tourism, campgrounds, state park, state highway, orchards	30 - 40 miles	Northeast
North Columbia Valley, Pateros to Omak, (five communities, two state parks, three state highways, tourism, orchards	45 – 75 miles	Northeast
Grand Coulee (three communities, national recreation area, state park, resorts, tourism)	114 miles	East
Spokane (metropolitan area)	230	East
Ephrata – Mosses Lake, (four communities, orchards, four state highways, one interstate highway)	120 – 150 miles	Southeast
South Columbia Valley, Entiat to East Wenatchee (four communities, four state parks, two state highways, orchards)	55 – 80 miles	South
Wenatchee River Valley, Cashmere to Leavenworth, (four communities, orchards, resorts, campgrounds, tourism, three state highways)	60 – 70 miles	South
Alpine Lake Wilderness (Class I)	60 miles	Southwest

c. Existing and Future Air Quality Monitoring

Wenatchee – In 1988, the Washington State Department of Natural Resources set up a PM_{10} high-volume air quality monitor at Wenatchee Valley College. Prior to the wildland fires in August 1994, the highest daily average reading was 73 mg/m^3. The most significant regular source of PM_{10} is residential wood stoves used for heating in the winter. High PM_{10} levels in summer are typically closer to 25 mg/m^3 except in the event of wildland fires. During the fires of 1994, this monitor posted readings of 361 mg/m^3 on July 31 and 248 mg/m^3 on August 2.

Twisp – In August of 1994, a nephelometer (a particulate air quality monitor) was installed at the Twisp Ranger Station. In addition, a camera photo-point was installed on a mountain slope east of Twisp. This camera views Twisp, the Methow Valley, and the North Cascade Mountains west of Twisp. This is a significant location for a monitor for the Chelan Sub-basin because Twisp lies downwind of the prevailing southwest winds. The chart below summarizes the data collected there since August 1994:



The concentrations recorded on this chart are $PM_{2.5}$ which is, in addition to PM_{10}, the new NAAQS measure of particulates. Eighty to 90 percent of PM_{10} is made up of $PM_{2.5}$, particles 2.5 micrometers in diameter and smaller. The NAAQS daily standard for $PM_{2.5}$ is 65 mg/m^3. The normal background concentration range for Twisp from April thru September is 2-15 mg/m^3 with an average of 5 or 6 mg/m^3. The highest August reading is from the 1994 fires. Other years, such as 1998, show higher values in August as well, presumably as a result of other smaller wildland fires such as the 1998 North Fork Twenty Five Mile Creek fire. As in Wenatchee, the highest concentrations of particulates occurs in winter due to residential wood stove use.

An e-BAM (beta attenuation monitor) is scheduled to be installed in Stehekin to continuously measure particulate, volatile organic compounds, and nitrites.

10. Communication and Contacts

This section of the Chelan FMU fire management plan describes how the agencies will communicate with the public, as well as with tribal, commercial and political interests potentially affected by fire management activities. Objectives include educating the public about fire ecology and fire management, obtaining public feedback, and developing and retaining public support.

a. Information and Involvement

The chart on the following page identifies points in the fire planning process at which some form of communication with the public is advisable.

Trigger Point	Action	Who Does It
Finalization of Plan	News Release to following media: Wenatchee, Skagit County, Chelan, Stehekin, Methow Area	OWNF/Complex Information Officers (IO)
	Article posted on OWNF and COMPLEX website and in Cascade Lookout	OWNF/Complex IO
	Article placed into annual North Cascades newspaper	Complex IO
	Review of Plan placed on Provincial Advisory Committee meeting agenda	OWNF IO
	Letter to Congressional Delegation and state/local representatives	Complex Superintendent and OWNF Supervisor
	Letter to Tribal Governments	Complex Superintendent and OWNF Supervisor
Beginning of Fire Season (June)	Inform workforce of potential use of fire under FMP at seasonal orientation	OWNF/Complex IO
	Integrate fire information into OWNF IIO guide	OWNF IO
	Create/maintain list of Tribal Governments and permittees potentially affected by FMP (Include Fire District 10, businesses and permittees in Stehekin and community residents in Holden and Stehekin)	Lake Chelan National Recreation Area Management Assistant and Chelan District Ranger
	Prepare signage to use at trailheads	Chelan Ranger District Information Assistant and Complex Information Assistant
	Prepare fact sheet explaining use of fire.	Chelan Ranger District Information Assistant
	Contact key local officials and stake holders and provide information on fire plan	OWNF Information Assistant

Trigger Point	Action	Who Does It
Upon Approval to use fire	Take digital photos of fire	Fire Management Officer or Incident Commander (IC)
	Notify Fire District 10	OWNF/Complex IO and Cultural Resource Specialists
	Notify tribal governments	OWNF/Complex IO
	Notify media using key messages	OWNF/Complex IO
	Photos posted on websites	IC/Incident Information Officer (IIO)
	Develop specific talking points from list enclosed	IC/IIO
	Initiate info log and media trapline	IIO, Interpretive Staff
	Post fire info at trailheads	OWNF/Complex IO
	Place fire info in recreation reports	Complex Superintendent and OWNF Supervisor
	Brief appropriate political contacts	District Rangers/Unit Information Officers
	Keep all appropriate internal/external personnel informed on fire	
If Fire Exceeds Prescription	Inform public affairs at time of decision	IC and IIO
	Inform superintendent and chief interpreter at time of decision	IC and IIO
	Revises key messages as needed	IC and IIO
	Inform tribal government	IC and IIO
	Inform media (if necessary)	IC and IIO
	Inform congressional representatives	Complex Superintendent and OWNF Supervisor
After Fire Season (October)	Review season information dissemination effort	Chelan Ranger District Information Assistant OWNF/Complex IO
	Make changes in key messages, plans	Chelan Ranger District Information Assistant OWNF/Complex IO

Note that all information generated regarding fire incidents should include a notice of website address where photos of incident may be viewed.

b. Important Communication Contacts:

Stehekin
Courtneys, Jack Raines, Stehekin School, Chelan Airways, Stehekin Post Office, hikers, outfitter/guides, NPS interpreters (via District interpreter), Stehekin Choice (on-line newspaper published by Kim Scutt).

Marblemount
NPS District office, NPS Info Center, North Cascades Visitor Center (Newhalem), Seattle City Light General Store (Newhalem), Skagit Valley Herald and The Courier-Times (Sedro-Woolley).

Upper Methow/Northern Okanogan County
Methow Valley Ranger District& Visitor Center, Pateros/Brewster Chamber of Commerce or Mayor

Lake Chelan/Manson/Chelan
Lake Chelan Boat Company, Holden Village, Sid Burns, KOZI, Lake Chelan Mirror, Chelan County Commissioner, L.C. Chamber of Commerce, L.C. Boating Club, outfitter/guides, Alta Lake

Wenatchee
Wenatchee World, KPQ, Wenatchee NF Recreation Report, KVLR (Twisp Radio)

Political Contacts
Maria Cantwell, Patty Murray, Doc Hastings, Clyde Ballard, Linda Evans Parlette, Mike Armstrong/Davis, Chelan County Commission, Rick Larsen Congressional Seat.

Environmental Community
Northwest Ecosystem Alliance, Save Chelan Alliance, North Cascades Conservation Council (N3C)

Cooperators
Northeast and Southeast Washington DNR, Chelan County Fire Districts 5 and 7, Fire Districts (Brewster/Mansfield, Pateros), Fire District 10 (Stehekin)

North Cascades Complex retains responsibility for keeping the communities of Stehekin, Marblemount and Sedro-Woolley informed about fires. The IIO and the Chief of Interpretation must coordinate closely to keep lines of communication open.

Tribal Governments
Confederated Tribes of the Colville Reservation:
Tribal Chair – Colleen Cawston, THPO – Adeline Fredin
Confederated Tribes and Bands of the Yakima Indian Nation of the Yakima Reservation:
Chair – Lonnie Selan, Sr.
Cultural Committee Chair – William Yallup, Sr.

H. Appendices to Fire Management Units

1. Skagit FMU Risk Assessment

a. Hours of Spread Calculated in RERAP by RAZ and Month

DRY Site	**Hozomeen RAZ 1**			
	low	**Med**	**high**	**ext**
June	**1**	**2**	**3**	**4**
July	**1**	**3**	**6**	**8**
Aug	**1**	**4**	**7**	**9**
Sept	**1**	**3**	**6**	**8**
Oct	**1**	**2**	**3**	**4**

Wet Site	**Marblemount RAZ 2**			
	low	**Med**	**high**	**ext**
June	**1**	**2**	**3**	**4**
July	**1**	**2**	**5**	**8**
Aug	**1**	**4**	**6**	**9**
Sept	**1**	**3**	**5**	**8**
Oct	**1**	**2**	**3**	**4**

Mesic	**Washington Pass RAZ 3**			
	low	**Med**	**high**	**ext**
June	**1**	**2**	**3**	**4**
July	**1**	**3**	**5**	**8**
Aug	**1**	**4**	**6**	**9**
Sept	**1**	**3**	**5**	**8**
Oct	**1**	**2**	**3**	**4**

Mesic	**Washington Pass RAZ 4**			
	low	**Med**	**high**	**ext**
June	**2**	**3**	**4**	**5**
July	**2**	**4**	**7**	**9**
Aug	**2**	**4**	**7**	**9**
Sept	**2**	**3**	**5**	**7**
Oct	**2**	**3**	**4**	**5**

b. Skagit FMU Probability of Directional Spread by Month

NCNP Zone 1 | <34% = Low | 34 - 66% = Mod | 67 - 100% = High

North Spread — Average Probability

Distance	15-Jun	15-Jul	15-Aug	15-Sep	15-Oct
1/2 mile	56%	36%	22%	3%	1%
1 mile	33%	26%	7%	3%	1%
1 1/2 mile	24%	17%	2%	3%	0%
2 miles	13%	3%	1%	1%	0%
2 1/2 miles	6%	3%	0%	0%	0%
3 miles	3%	2%	0%	0%	0%
3 1/2 miles	1%	0%	0%	0%	0%

North Spread — Maximum Probability

Distance	15-Jun	15-Jul	15-Aug	15-Sep	15-Oct
1/2 mile	100%	100%	82%	7%	1%
1 mile	100%	95%	21%	7%	1%
1 1/2 mile	97%	43%	11%	7%	0%
2 miles	61%	11%	3%	3%	0%
2 1/2 miles	19%	9%	3%	0%	0%
3 miles	11%	9%	2%	0%	0%
3 1/2 miles	5%	2%	0%	0%	0%

North Spread — Minimum Probability

Distance	15-Jun	15-Jul	15-Aug	15-Sep	15-Oct
1/2 mile	18%	12%	7%	1%	0%
1 mile	3%	2%	1%	1%	0%
1 1/2 mile	2%	1%	0%	0%	0%
2 miles	0%	0%	0%	0%	0%
2 1/2 miles	0%	0%	0%	0%	0%
3 miles	0%	0%	0%	0%	0%
3 1/2 miles	0%	0%	0%	0%	0%

South Spread

Distance	15-Jun	15-Jul	15-Aug	15-Sep	15-Oct
1/2 mile	19%	15%	9%	2%	0%
1 mile	11%	10%	6%	1%	0%
1 1/2 mile	5%	4%	2%	1%	0%
2 miles	4%	4%	2%	0%	0%
2 1/2 miles	1%	2%	1%	0%	0%
3 miles	1%	0%	0%	0%	0%
3 1/2 miles	1%	0%	0%	0%	0%

South Spread — Maximum Probability

Distance	15-Jun	15-Jul	15-Aug	15-Sep	15-Oct
1/2 mile	45%	34%	21%	7%	2%
1 mile	32%	34%	21%	5%	0%
1 1/2 mile	22%	20%	12%	5%	0%
2 miles	16%	20%	12%	0%	0%
2 1/2 miles	4%	11%	7%	0%	0%
3 miles	4%	2%	1%	0%	0%
3 1/2 miles	4%	2%	1%	0%	0%

South Spread — Minimum Probability

Distance	15-Jun	15-Jul	15-Aug	15-Sep	15-Oct
1/2 mile	6%	6%	4%	0%	0%
1 mile	0%	0%	0%	0%	0%
1 1/2 mile	0%	0%	0%	0%	0%
2 miles	0%	0%	0%	0%	0%
2 1/2 miles	0%	0%	0%	0%	0%
3 miles	0%	0%	0%	0%	0%
3 1/2 miles	0%	0%	0%	0%	0%

East Spread

Distance	15-Jun	15-Jul	15-Aug	15-Sep	15-Oct
1/2 mile	44%	39%	24%	4%	0%
1 mile	43%	38%	13%	2%	0%
1 1/2 mile	42%	32%	12%	1%	0%
2 miles	36%	32%	10%	1%	0%
2 1/2 miles	27%	29%	8%	1%	0%
3 miles	19%	21%	2%	1%	0%
3 1/2 miles	17%	11%	2%	0%	0%

East Spread — Maximum Probability

Distance	15-Jun	15-Jul	15-Aug	15-Sep	15-Oct
1/2 mile	100%	100%	76%	6%	1%
1 mile	100%	94%	36%	5%	0%
1 1/2 mile	97%	67%	36%	3%	0%
2 miles	75%	67%	36%	3%	0%
2 1/2 miles	62%	67%	36%	3%	0%
3 miles	67%	60%	10%	3%	0%
3 1/2 miles	57%	33%	8%	0%	0%

East Spread — Minimum Probability

Distance	15-Jun	15-Jul	15-Aug	15-Sep	15-Oct
1/2 mile	11%	7%	4%	1%	0%
1 mile	8%	7%	2%	0%	0%
1 1/2 mile	7%	7%	1%	0%	0%
2 miles	2%	6%	0%	0%	0%
2 1/2 miles	1%	3%	0%	0%	0%
3 miles	1%	0%	0%	0%	0%
3 1/2 miles	0%	0%	0%	0%	0%

West Spread

Distance	15-Jun	15-Jul	15-Aug	15-Sep	15-Oct
1/2 mile	24%	19%	10%	3%	1%
1 mile	19%	18%	10%	3%	1%
1 1/2 mile	14%	16%	8%	2%	0%
2 miles	8%	8%	5%	1%	0%
2 1/2 miles	6%	5%	5%	1%	0%
3 miles	3%	4%	2%	0%	0%
3 1/2 miles	2%	2%	1%	0%	0%

West Spread — Maximum Probability

Distance	15-Jun	15-Jul	15-Aug	15-Sep	15-Oct
1/2 mile	52%	40%	16%	6%	2%
1 mile	50%	40%	16%	6%	2%
1 1/2 mile	37%	40%	16%	6%	0%
2 miles	21%	21%	16%	3%	0%
2 1/2 miles	17%	13%	16%	2%	0%
3 miles	11%	9%	7%	0%	0%
3 1/2 miles	9%	7%	2%	0%	0%

West Spread — Minimum Probability

Distance	15-Jun	15-Jul	15-Aug	15-Sep	15-Oct
1/2 mile	7%	3%	4%	1%	0%
1 mile	1%	1%	2%	1%	0%
1 1/2 mile	0%	0%	0%	0%	0%
2 miles	0%	0%	0%	0%	0%
2 1/2 miles	0%	0%	0%	0%	0%
3 miles	0%	0%	0%	0%	0%
3 1/2 miles	0%	0%	0%	0%	0%

NCNP Zone 2 | <34% = Low | 34 - 66% = Mod | 67 - 100% = High

North Spread — Average Probability

Distance	15-Jun	15-Jul	15-Aug	15-Sep	15-Oct
1/2 mile	99%	96%	83%	34%	13%
1 mile	96%	87%	52%	25%	7%
1 1/2 mile	86%	65%	34%	14%	3%
2 miles	64%	47%	30%	13%	1%
2 1/2 miles	50%	40%	27%	7%	1%
3 miles	43%	37%	22%	7%	0%
3 1/2 miles	36%	33%	21%	4%	0%

North Spread — Maximum Probability

Distance	15-Jun	15-Jul	15-Aug	15-Sep	15-Oct
1/2 mile	100%	99%	96%	74%	37%
1 mile	100%	98%	95%	74%	17%
1 1/2 mile	99%	98%	90%	51%	12%
2 miles	99%	98%	89%	51%	5%
2 1/2 miles	98%	96%	85%	32%	4%
3 miles	98%	96%	80%	32%	1%
3 1/2 miles	97%	95%	80%	19%	1%

North Spread — Minimum Probability

Distance	15-Jun	15-Jul	15-Aug	15-Sep	15-Oct
1/2 mile	98%	90%	75%	9%	2%
1 mile	92%	74%	17%	1%	0%
1 1/2 mile	67%	32%	3%	0%	0%
2 miles	29%	5%	0%	0%	0%
2 1/2 miles	13%	1%	0%	0%	0%
3 miles	6%	0%	0%	0%	0%
3 1/2 miles	2%	0%	0%	0%	0%

South Spread — Average Probability

Distance	15-Jun	15-Jul	15-Aug	15-Sep	15-Oct
1/2 mile	12%	8%	5%	3%	1%
1 mile	5%	0%	0%	0%	0%
1 1/2 mile	4%	0%	0%	0%	0%
2 miles	3%	0%	0%	0%	0%
2 1/2 miles	3%	0%	0%	0%	0%
3 miles	2%	0%	0%	0%	0%
3 1/2 miles	2%	0%	0%	0%	0%

South Spread — Maximum Probability

Distance	15-Jun	15-Jul	15-Aug	15-Sep	15-Oct
1/2 mile	13%	11%	7%	4%	2%
1 mile	13%	1%	0%	0%	0%
1 1/2 mile	13%	1%	0%	0%	0%
2 miles	13%	0%	0%	0%	0%
2 1/2 miles	11%	0%	0%	0%	0%
3 miles	9%	0%	0%	0%	0%
3 1/2 miles	8%	0%	0%	0%	0%

South Spread — Minimum Probability

Distance	15-Jun	15-Jul	15-Aug	15-Sep	15-Oct
1/2 mile	10%	6%	2%	0%	1%
1 mile	0%	0%	0%	0%	0%
1 1/2 mile	0%	0%	0%	0%	0%
2 miles	0%	0%	0%	0%	0%
2 1/2 miles	0%	0%	0%	0%	0%
3 miles	0%	0%	0%	0%	0%
3 1/2 miles	0%	0%	0%	0%	0%

East Spread — Average Probability

Distance	15-Jun	15-Jul	15-Aug	15-Sep	15-Oct
1/2 mile	99%	96%	70%	22%	2%
1 mile	89%	77%	58%	10%	2%
1 1/2 mile	81%	72%	41%	10%	2%
2 miles	74%	61%	28%	8%	0%
2 1/2 miles	63%	49%	21%	7%	0%
3 miles	51%	37%	17%	5%	0%
3 1/2 miles	44%	23%	11%	1%	0%

East Spread — Maximum Probability

Distance	15-Jun	15-Jul	15-Aug	15-Sep	15-Oct
1/2 mile	100%	99%	96%	48%	3%
1 mile	100%	98%	89%	16%	3%
1 1/2 mile	100%	96%	75%	16%	3%
2 miles	99%	92%	52%	10%	0%
2 1/2 miles	97%	87%	31%	10%	0%
3 miles	94%	78%	28%	8%	0%
3 1/2 miles	89%	57%	22%	2%	0%

East Spread — Minimum Probability

Distance	15-Jun	15-Jul	15-Aug	15-Sep	15-Oct
1/2 mile	98%	87%	23%	7%	1%
1 mile	60%	27%	20%	6%	1%
1 1/2 mile	40%	25%	19%	6%	0%
2 miles	27%	22%	19%	6%	0%
2 1/2 miles	19%	17%	9%	2%	0%
3 miles	13%	12%	6%	0%	0%
3 1/2 miles	9%	6%	4%	0%	0%

West Spread — Average Probability

Distance	15-Jun	15-Jul	15-Aug	15-Sep	15-Oct
1/2 mile	19%	15%	9%	4%	5%
1 mile	15%	8%	4%	2%	3%
1 1/2 mile	14%	7%	4%	1%	3%
2 miles	12%	6%	3%	1%	2%
2 1/2 miles	9%	5%	2%	0%	0%
3 miles	7%	3%	2%	0%	0%
3 1/2 miles	4%	2%	0%	0%	0%

West Spread — Maximum Probability

Distance	15-Jun	15-Jul	15-Aug	15-Sep	15-Oct
1/2 mile	26%	23%	17%	8%	23%
1 mile	26%	23%	17%	8%	20%
1 1/2 mile	26%	23%	17%	4%	19%
2 miles	26%	23%	16%	4%	12%
2 1/2 miles	26%	22%	12%	0%	3%
3 miles	20%	19%	10%	0%	3%
3 1/2 miles	10%	8%	2%	0%	3%

West Spread — Minimum Probability

Distance	15-Jun	15-Jul	15-Aug	15-Sep	15-Oct
1/2 mile	9%	6%	3%	1%	0%
1 mile	4%	0%	0%	0%	0%
1 1/2 mile	0%	0%	0%	0%	0%
2 miles	0%	0%	0%	0%	0%
2 1/2 miles	0%	0%	0%	0%	0%
3 miles	0%	0%	0%	0%	0%
3 1/2 miles	0%	0%	0%	0%	0%

NCNP Zone 3 <34% = Low | 34 - 66% = Mod | 67 - 100% = High

North Spread — Average Probability

Distance	15-Jun	15-Jul	15-Aug	15-Sep	15-Oct
1/2 mile	100%	100%	93%	21%	5%
1 mile	100%	87%	26%	9%	3%
1 1/2 mile	73%	46%	16%	9%	3%
2 miles	51%	25%	15%	9%	0%
2 1/2 miles	32%	22%	11%	2%	0%
3 miles	28%	18%	7%	1%	0%
3 1/2 miles	25%	16%	4%	1%	0%

South Spread — Average Probability

Distance	15-Jun	15-Jul	15-Aug	15-Sep	15-Oct
1/2 mile	78%	72%	16%	5%	1%
1 mile	9%	5%	2%	0%	1%
1 1/2 mile	1%	1%	0%	0%	0%
2 miles	0%	0%	0%	0%	0%
2 1/2 miles	0%	0%	0%	0%	0%
3 miles	0%	0%	0%	0%	0%
3 1/2 miles	0%	0%	0%	0%	0%

East Spread — Average Probability

Distance	15-Jun	15-Jul	15-Aug	15-Sep	15-Oct
1/2 mile	100%	100%	100%	97%	73%
1 mile	100%	100%	100%	88%	53%
1 1/2 mile	100%	100%	100%	88%	52%
2 miles	100%	100%	100%	87%	37%
2 1/2 miles	100%	100%	99%	87%	36%
3 miles	100%	100%	99%	82%	26%
3 1/2 miles	100%	100%	98%	76%	19%

West Spread — Average Probability

Distance	15-Jun	15-Jul	15-Aug	15-Sep	15-Oct
1/2 mile	44%	40%	35%	16%	3%
1 mile	33%	33%	27%	14%	2%
1 1/2 mile	31%	32%	24%	6%	0%
2 miles	30%	32%	15%	4%	0%
2 1/2 miles	21%	22%	15%	4%	0%
3 miles	19%	19%	10%	1%	0%
3 1/2 miles	19%	19%	5%	1%	0%

North Spread — Maximum Probability

Distance	15-Jun	15-Jul	15-Aug	15-Sep	15-Oct
1/2 mile	100%	100%	97%	34%	10%
1 mile	100%	100%	52%	28%	10%
1 1/2 mile	100%	84%	49%	28%	10%
2 miles	97%	81%	48%	28%	1%
2 1/2 miles	96%	73%	32%	5%	1%
3 miles	93%	62%	16%	5%	1%
3 1/2 miles	90%	59%	16%	5%	0%

South Spread — Maximum Probability

Distance	15-Jun	15-Jul	15-Aug	15-Sep	15-Oct
1/2 mile	100%	99%	35%	7%	2%
1 mile	12%	8%	3%	1%	2%
1 1/2 mile	2%	1%	0%	0%	0%
2 miles	0%	0%	0%	0%	0%
2 1/2 miles	0%	0%	0%	0%	0%
3 miles	0%	0%	0%	0%	0%
3 1/2 miles	0%	0%	0%	0%	0%

East Spread — Maximum Probability

Distance	15-Jun	15-Jul	15-Aug	15-Sep	15-Oct
1/2 mile	100%	100%	100%	100%	87%
1 mile	100%	100%	100%	92%	74%
1 1/2 mile	100%	100%	100%	90%	74%
2 miles	100%	100%	100%	90%	61%
2 1/2 miles	100%	100%	100%	90%	60%
3 miles	100%	100%	100%	89%	50%
3 1/2 miles	100%	100%	100%	86%	40%

West Spread — Maximum Probability

Distance	15-Jun	15-Jul	15-Aug	15-Sep	15-Oct
1/2 mile	100%	100%	89%	39%	5%
1 mile	88%	88%	74%	39%	5%
1 1/2 mile	86%	86%	65%	16%	0%
2 miles	86%	86%	40%	9%	0%
2 1/2 miles	64%	64%	40%	9%	0%
3 miles	58%	58%	30%	2%	0%
3 1/2 miles	58%	58%	16%	2%	0%

North Spread — Minimum Probability

Distance	15-Jun	15-Jul	15-Aug	15-Sep	15-Oct
1/2 mile	100%	100%	88%	11%	2%
1 mile	99%	59%	8%	1%	0%
1 1/2 mile	23%	8%	1%	0%	0%
2 miles	8%	2%	0%	0%	0%
2 1/2 miles	2%	0%	0%	0%	0%
3 miles	0%	0%	0%	0%	0%
3 1/2 miles	0%	0%	0%	0%	0%

South Spread — Minimum Probability

Distance	15-Jun	15-Jul	15-Aug	15-Sep	15-Oct
1/2 mile	14%	10%	6%	3%	1%
1 mile	4%	3%	1%	0%	0%
1 1/2 mile	0%	0%	0%	0%	0%
2 miles	0%	0%	0%	0%	0%
2 1/2 miles	0%	0%	0%	0%	0%
3 miles	0%	0%	0%	0%	0%
3 1/2 miles	0%	0%	0%	0%	0%

East Spread — Minimum Probability

Distance	15-Jun	15-Jul	15-Aug	15-Sep	15-Oct
1/2 mile	100%	100%	100%	95%	58%
1 mile	100%	100%	100%	83%	33%
1 1/2 mile	100%	100%	99%	83%	29%
2 miles	100%	100%	99%	82%	14%
2 1/2 miles	100%	100%	99%	80%	13%
3 miles	100%	100%	98%	77%	5%
3 1/2 miles	100%	100%	96%	66%	4%

West Spread — Minimum Probability

Distance	15-Jun	15-Jul	15-Aug	15-Sep	15-Oct
1/2 mile	11%	9%	6%	3%	1%
1 mile	1%	1%	1%	0%	0%
1 1/2 mile	0%	0%	0%	0%	0%
2 miles	0%	0%	0%	0%	0%
2 1/2 miles	0%	0%	0%	0%	0%
3 miles	0%	0%	0%	0%	0%
3 1/2 miles	0%	0%	0%	0%	0%

NCNP Zone 4

<34% = Low | 34 - 66% = Mod | 67 - 100% = High

North Spread — Average Probability

Distance	15-Jun	15-Jul	15-Aug	15-Sep	15-Oct
1/2 mile	100%	96%	32%	17%	6%
1 mile	73%	59%	32%	17%	6%
1 1/2 mile	59%	45%	32%	17%	4%
2 miles	53%	41%	22%	12%	0%
2 1/2 miles	43%	36%	22%	2%	0%
3 miles	38%	33%	15%	2%	0%
3 1/2 miles	29%	18%	5%	2%	0%

North Spread — Maximum Probability

Distance	15-Jun	15-Jul	15-Aug	15-Sep	15-Oct
1/2 mile	100%	100%	41%	24%	8%
1 mile	77%	62%	41%	24%	8%
1 1/2 mile	68%	57%	41%	24%	8%
2 miles	63%	57%	41%	24%	1%
2 1/2 miles	60%	57%	41%	3%	1%
3 miles	55%	57%	27%	3%	1%
3 1/2 miles	45%	31%	11%	3%	1%

North Spread — Minimum Probability

Distance	15-Jun	15-Jul	15-Aug	15-Sep	15-Oct
1/2 mile	100%	92%	23%	11%	4%
1 mile	69%	57%	23%	11%	4%
1 1/2 mile	50%	32%	23%	11%	0%
2 miles	44%	25%	3%	1%	0%
2 1/2 miles	26%	14%	3%	1%	0%
3 miles	20%	8%	3%	1%	0%
3 1/2 miles	12%	5%	0%	0%	0%

South Spread

Distance	15-Jun	15-Jul	15-Aug	15-Sep	15-Oct
1/2 mile	30%	28%	18%	5%	2%
1 mile	28%	26%	18%	5%	0%
1 1/2 mile	12%	11%	5%	0%	0%
2 miles	10%	10%	3%	0%	0%
2 1/2 miles	3%	3%	0%	0%	0%
3 miles	2%	2%	0%	0%	0%
3 1/2 miles	1%	1%	0%	0%	0%

South Spread — Maximum Probability

Distance	15-Jun	15-Jul	15-Aug	15-Sep	15-Oct
1/2 mile	49%	47%	31%	7%	3%
1 mile	46%	43%	31%	7%	0%
1 1/2 mile	15%	13%	5%	0%	0%
2 miles	14%	13%	5%	0%	0%
2 1/2 miles	6%	5%	1%	1%	0%
3 miles	3%	3%	1%	0%	0%
3 1/2 miles	2%	2%	1%	0%	0%

South Spread — Minimum Probability

Distance	15-Jun	15-Jul	15-Aug	15-Sep	15-Oct
1/2 mile	11%	9%	6%	3%	1%
1 mile	10%	9%	6%	2%	0%
1 1/2 mile	9%	9%	5%	0%	0%
2 miles	5%	7%	0%	0%	0%
2 1/2 miles	1%	0%	0%	0%	0%
3 miles	1%	0%	0%	0%	0%
3 1/2 miles	1%	0%	0%	0%	0%

East Spread

Distance	15-Jun	15-Jul	15-Aug	15-Sep	15-Oct
1/2 mile	100%	100%	98%	32%	11%
1 mile	100%	100%	71%	25%	11%
1 1/2 mile	100%	92%	41%	25%	2%
2 miles	95%	74%	37%	17%	2%
2 1/2 miles	89%	55%	36%	10%	1%
3 miles	60%	49%	30%	10%	0%
3 1/2 miles	55%	44%	25%	9%	0%

East Spread — Maximum Probability

Distance	15-Jun	15-Jul	15-Aug	15-Sep	15-Oct
1/2 mile	100%	100%	100%	67%	26%
1 mile	100%	100%	95%	62%	26%
1 1/2 mile	100%	100%	90%	62%	5%
2 miles	100%	100%	90%	43%	5%
2 1/2 miles	100%	99%	90%	28%	3%
3 miles	100%	99%	82%	28%	1%
3 1/2 miles	100%	98%	69%	27%	1%

East Spread — Minimum Probability

Distance	15-Jun	15-Jul	15-Aug	15-Sep	15-Oct
1/2 mile	100%	100%	95%	11%	3%
1 mile	100%	100%	55%	3%	3%
1 1/2 mile	100%	78%	7%	0%	0%
2 miles	84%	57%	1%	0%	0%
2 1/2 miles	77%	8%	0%	0%	0%
3 miles	12%	2%	0%	0%	0%
3 1/2 miles	5%	1%	0%	0%	0%

West Spread

Distance	15-Jun	15-Jul	15-Aug	15-Sep	15-Oct
1/2 mile	35%	15%	10%	4%	2%
1 mile	16%	14%	10%	4%	1%
1 1/2 mile	12%	13%	9%	2%	0%
2 miles	11%	10%	7%	0%	0%
2 1/2 miles	9%	10%	6%	0%	0%
3 miles	6%	8%	4%	0%	0%
3 1/2 miles	2%	4%	2%	0%	0%

West Spread — Maximum Probability

Distance	15-Jun	15-Jul	15-Aug	15-Sep	15-Oct
1/2 mile	70%	18%	11%	6%	2%
1 mile	18%	15%	11%	6%	2%
1 1/2 mile	16%	15%	11%	6%	0%
2 miles	16%	15%	11%	0%	0%
2 1/2 miles	15%	15%	9%	0%	0%
3 miles	11%	12%	8%	0%	0%
3 1/2 miles	4%	10%	6%	0%	0%

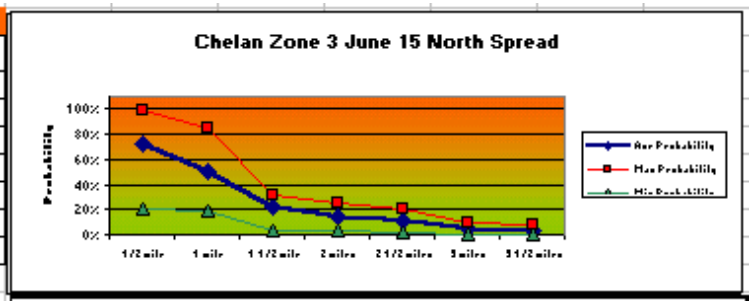
West Spread — Minimum Probability

Distance	15-Jun	15-Jul	15-Aug	15-Sep	15-Oct
1/2 mile	17%	13%	9%	3%	1%
1 mile	13%	13%	9%	2%	0%
1 1/2 mile	5%	9%	6%	0%	0%
2 miles	2%	1%	0%	0%	0%
2 1/2 miles	1%	1%	0%	0%	0%
3 miles	0%	0%	0%	0%	0%
3 1/2 miles	0%	0%	0%	0%	0%

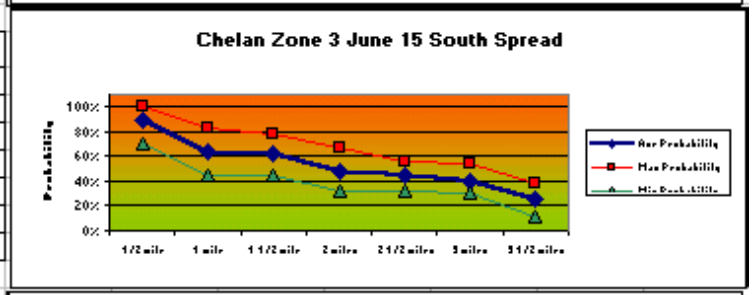
2. Chelan FMU Risk Assessment

a. Chelan Zone 3 June Risk

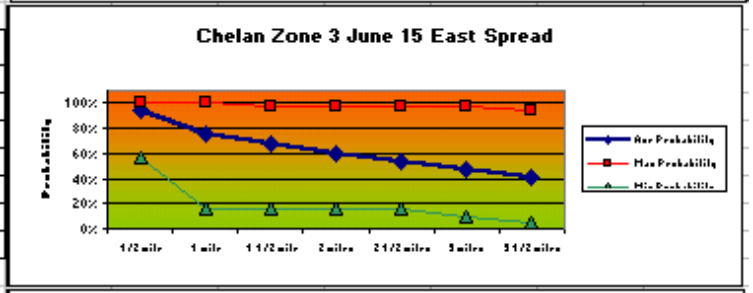
North Spread	<34% = Low	34 - 66% = Mod	67 - 100% = High
Distance	**Ave Probability**	**Max Probability**	**Min Probability**
1/2 mile	73%	99%	21%
1 mile	50%	85%	19%
1 1/2 mile	22%	32%	3%
2 miles	15%	26%	3%
2 1/2 miles	11%	20%	2%
3 miles	5%	10%	0%
3 1/2 miles	3%	8%	0%



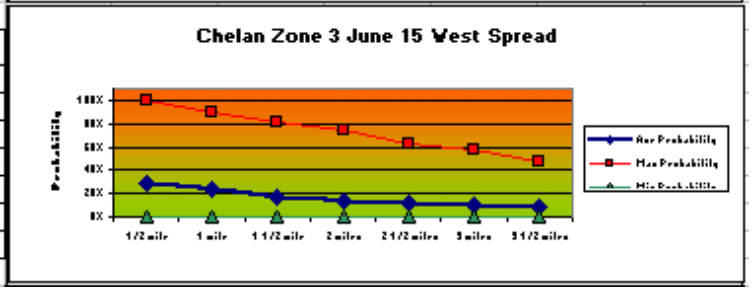
South Spread			
Distance	**Ave Probability**	**Max Probability**	**Min Probability**
1/2 mile	90%	100%	70%
1 mile	64%	83%	44%
1 1/2 mile	62%	79%	44%
2 miles	48%	66%	32%
2 1/2 miles	44%	56%	32%
3 miles	39%	53%	31%
3 1/2 miles	25%	38%	12%



East Spread			
Distance	**Ave Probability**	**Max Probability**	**Min Probability**
1/2 mile	95%	100%	57%
1 mile	76%	100%	16%
1 1/2 mile	68%	98%	16%
2 miles	60%	98%	16%
2 1/2 miles	54%	98%	16%
3 miles	47%	97%	10%
3 1/2 miles	40%	94%	4%

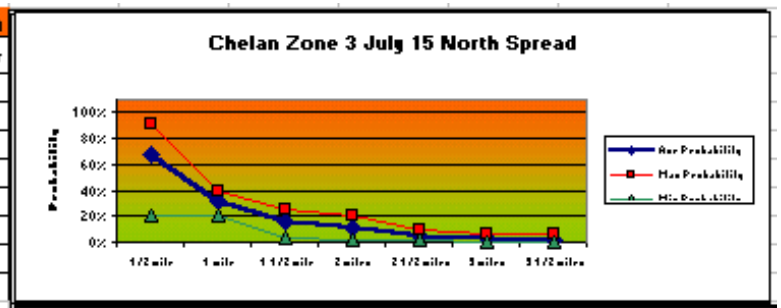


West Spread			
Distance	**Ave Probability**	**Max Probability**	**Min Probability**
1/2 mile	29%	100%	0%
1 mile	24%	90%	0%
1 1/2 mile	17%	82%	0%
2 miles	14%	74%	0%
2 1/2 miles	12%	62%	0%
3 miles	10%	57%	0%
3 1/2 miles	9%	48%	0%

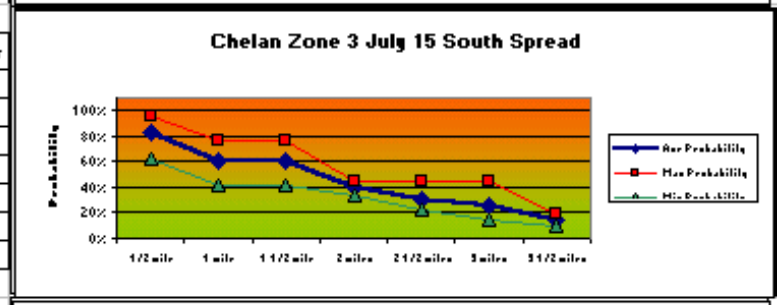


b. Chelan Zone 3 July Risk

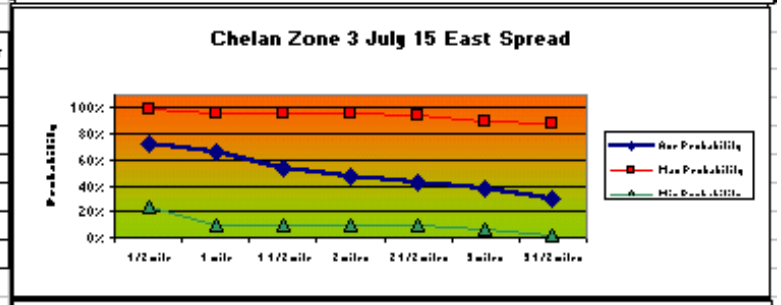
North Spread	<34% = Low	34 - 66% = Mod	67 - 100% = High
Distance	**Ave Probability**	**Max Probability**	**Min Probability**
1/2 mile	67%	92%	20%
1 mile	31%	39%	20%
1 1/2 mile	15%	25%	3%
2 miles	11%	20%	2%
2 1/2 miles	5%	9%	2%
3 miles	3%	6%	0%
3 1/2 miles	2%	6%	0%



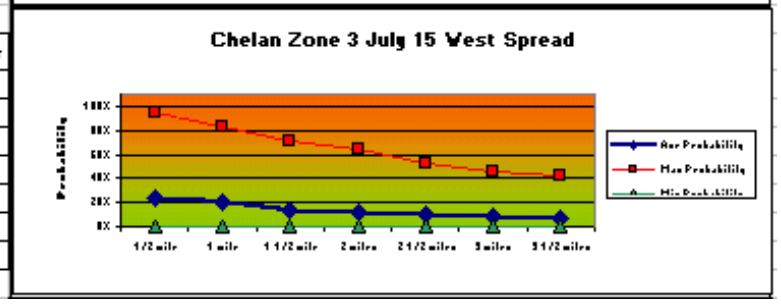
South Spread			
Distance	**Ave Probability**	**Max Probability**	**Min Probability**
1/2 mile	83%	96%	62%
1 mile	60%	77%	41%
1 1/2 mile	60%	77%	41%
2 miles	40%	45%	34%
2 1/2 miles	31%	44%	23%
3 miles	26%	44%	14%
3 1/2 miles	15%	20%	9%



East Spread			
Distance	**Ave Probability**	**Max Probability**	**Min Probability**
1/2 mile	73%	100%	24%
1 mile	65%	96%	10%
1 1/2 mile	54%	95%	10%
2 miles	47%	95%	10%
2 1/2 miles	42%	95%	10%
3 miles	37%	90%	7%
3 1/2 miles	30%	89%	2%

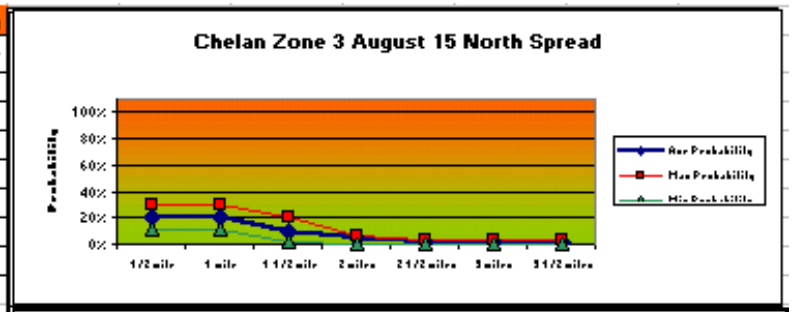


West Spread			
Distance	**Ave Probability**	**Max Probability**	**Min Probability**
1/2 mile	24%	95%	0%
1 mile	21%	83%	0%
1 1/2 mile	14%	71%	0%
2 miles	12%	64%	0%
2 1/2 miles	9%	52%	0%
3 miles	8%	46%	0%
3 1/2 miles	7%	42%	0%

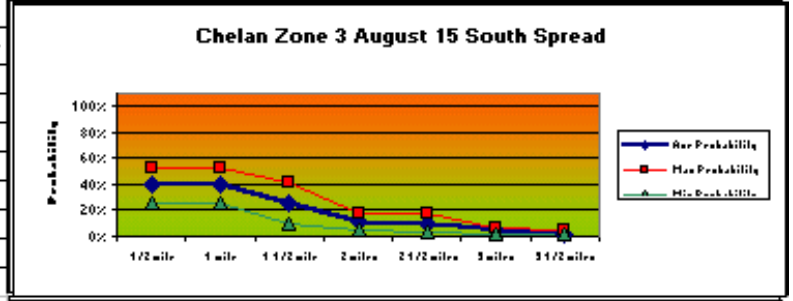


c. Chelan Zone 3 August Risk

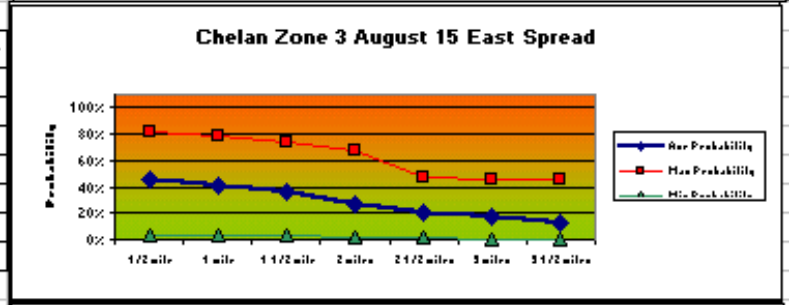
North Spread	<34% = Low	34 - 66% = Mod	67 - 100% = High
Distance	**Ave Probability**	**Max Probability**	**Min Probability**
1/2 mile	21%	30%	11%
1 mile	21%	30%	11%
1 1/2 mile	9%	20%	2%
2 miles	4%	7%	1%
2 1/2 miles	1%	2%	1%
3 miles	1%	2%	0%
3 1/2 miles	1%	2%	0%



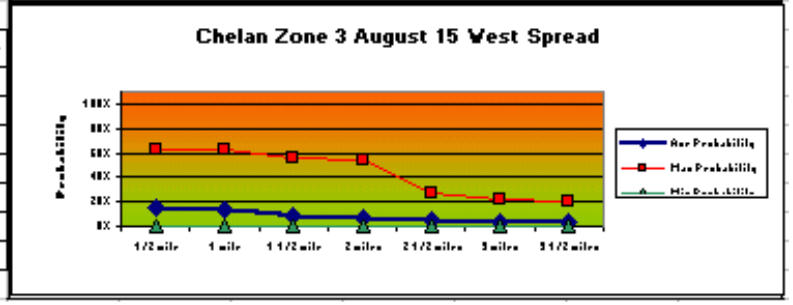
South Spread			
Distance	**Ave Probability**	**Max Probability**	**Min Probability**
1/2 mile	40%	53%	25%
1 mile	40%	53%	25%
1 1/2 mile	25%	42%	10%
2 miles	11%	18%	5%
2 1/2 miles	9%	18%	4%
3 miles	4%	7%	2%
3 1/2 miles	2%	5%	1%



East Spread			
Distance	**Ave Probability**	**Max Probability**	**Min Probability**
1/2 mile	46%	82%	4%
1 mile	41%	79%	4%
1 1/2 mile	36%	74%	4%
2 miles	26%	68%	2%
2 1/2 miles	20%	47%	2%
3 miles	17%	46%	0%
3 1/2 miles	13%	46%	0%

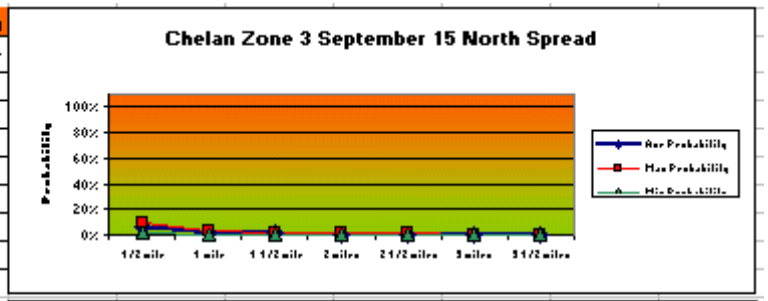


West Spread			
Distance	**Ave Probability**	**Max Probability**	**Min Probability**
1/2 mile	16%	63%	0%
1 mile	14%	63%	0%
1 1/2 mile	8%	56%	0%
2 miles	7%	53%	0%
2 1/2 miles	5%	27%	0%
3 miles	3%	21%	0%
3 1/2 miles	3%	20%	0%

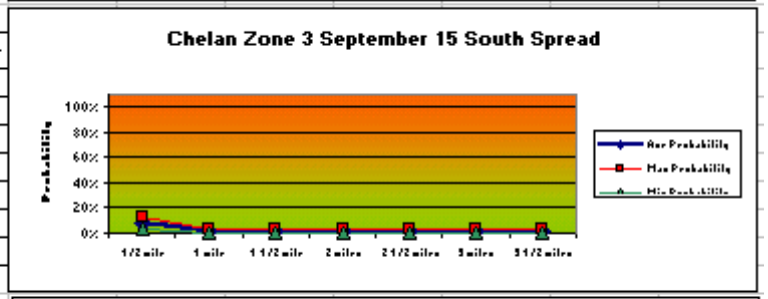


d. Chelan Zone 3 September Risk

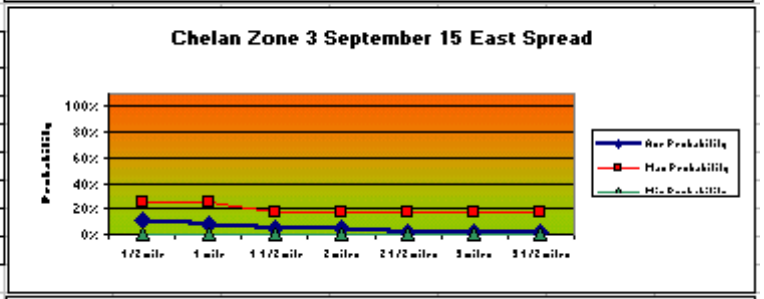
North Spread	<34% = Low	34 - 66% = Mod	67 - 100% = High
Distance	**Ave Probability**	**Max Probability**	**Min Probability**
1/2 mile	6%	9%	1%
1 mile	2%	3%	1%
1 1/2 mile	1%	1%	0%
2 miles	1%	1%	0%
2 1/2 miles	0%	1%	0%
3 miles	0%	0%	0%
3 1/2 miles	0%	0%	0%



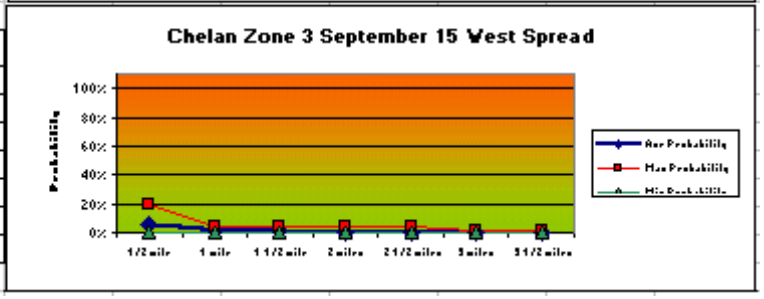
South Spread			
Distance	**Ave Probability**	**Max Probability**	**Min Probability**
1/2 mile	8%	13%	3%
1 mile	1%	3%	1%
1 1/2 mile	1%	3%	0%
2 miles	1%	3%	0%
2 1/2 miles	1%	3%	0%
3 miles	1%	3%	0%
3 1/2 miles	1%	3%	0%



East Spread			
Distance	**Ave Probability**	**Max Probability**	**Min Probability**
1/2 mile	11%	24%	0%
1 mile	8%	24%	0%
1 1/2 mile	4%	17%	0%
2 miles	4%	17%	0%
2 1/2 miles	2%	17%	0%
3 miles	2%	17%	0%
3 1/2 miles	2%	17%	0%

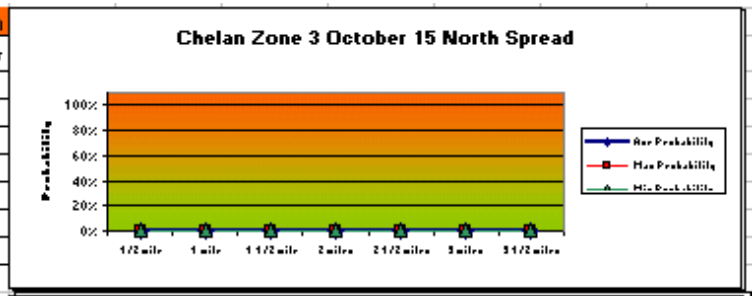


West Spread			
Distance	**Ave Probability**	**Max Probability**	**Min Probability**
1/2 mile	5%	19%	0%
1 mile	1%	5%	0%
1 1/2 mile	1%	5%	0%
2 miles	0%	5%	0%
2 1/2 miles	0%	4%	0%
3 miles	0%	1%	0%
3 1/2 miles	0%	1%	0%

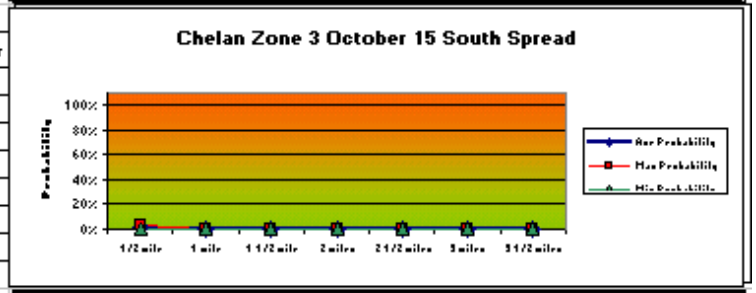


e. Chelan Zone 3 October Risk

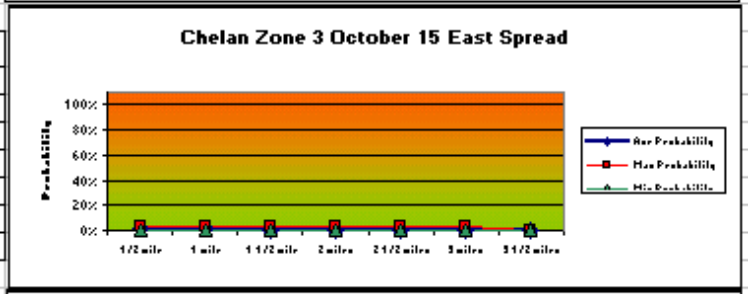
North Spread	<34% = Low	34 - 66% = Mod	67 - 100% = High
Distance	**Ave Probability**	**Max Probability**	**Min Probability**
1/2 mile	0%	0%	0%
1 mile	0%	0%	0%
1 1/2 mile	0%	0%	0%
2 miles	0%	0%	0%
2 1/2 miles	0%	0%	0%
3 miles	0%	0%	0%
3 1/2 miles	0%	0%	0%



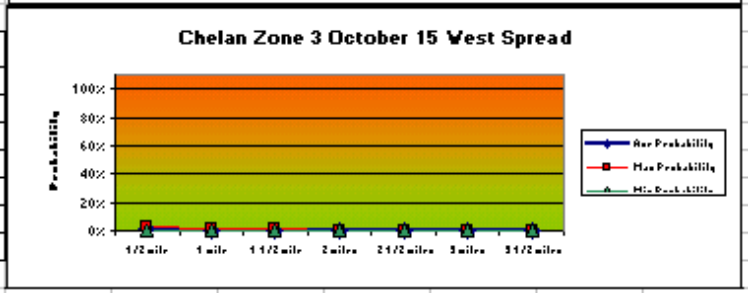
South Spread			
Distance	**Ave Probability**	**Max Probability**	**Min Probability**
1/2 mile	2%	4%	0%
1 mile	0%	0%	0%
1 1/2 mile	0%	0%	0%
2 miles	0%	0%	0%
2 1/2 miles	0%	0%	0%
3 miles	0%	0%	0%
3 1/2 miles	0%	0%	0%



East Spread			
Distance	**Ave Probability**	**Max Probability**	**Min Probability**
1/2 mile	2%	3%	0%
1 mile	1%	3%	0%
1 1/2 mile	1%	3%	0%
2 miles	1%	3%	0%
2 1/2 miles	1%	3%	0%
3 miles	0%	3%	0%
3 1/2 miles	0%	0%	0%



West Spread			
Distance	**Ave Probability**	**Max Probability**	**Min Probability**
1/2 mile	1%	3%	0%
1 mile	0%	2%	0%
1 1/2 mile	0%	2%	0%
2 miles	0%	0%	0%
2 1/2 miles	0%	0%	0%
3 miles	0%	0%	0%
3 1/2 miles	0%	0%	0%



f. Chelan Zone 3 Average Probability

Zone 1 Lower North

North Spread <34% = Low 34 - 66% = Mod 67 - 100% = High

Distance	15-Jun	15-Jul	15-Aug	15-Sep	15-Oct
1/2 mile	73%	67%	21%	6%	0%
1 mile	50%	31%	21%	2%	0%
1 1/2 mile	22%	15%	9%	1%	0%
2 miles	15%	11%	4%	1%	0%
2 1/2 miles	11%	5%	1%	0%	0%
3 miles	5%	3%	1%	0%	0%
3 1/2 miles	3%	2%	1%	0%	0%

South Spread

Distance	15-Jun	15-Jul	15-Aug	15-Sep	15-Oct
1/2 mile	90%	83%	40%	8%	2%
1 mile	64%	60%	40%	1%	0%
1 1/2 mile	62%	60%	25%	1%	0%
2 miles	48%	40%	11%	1%	0%
2 1/2 miles	44%	31%	9%	1%	0%
3 miles	39%	26%	4%	1%	0%
3 1/2 miles	25%	15%	2%	1%	0%

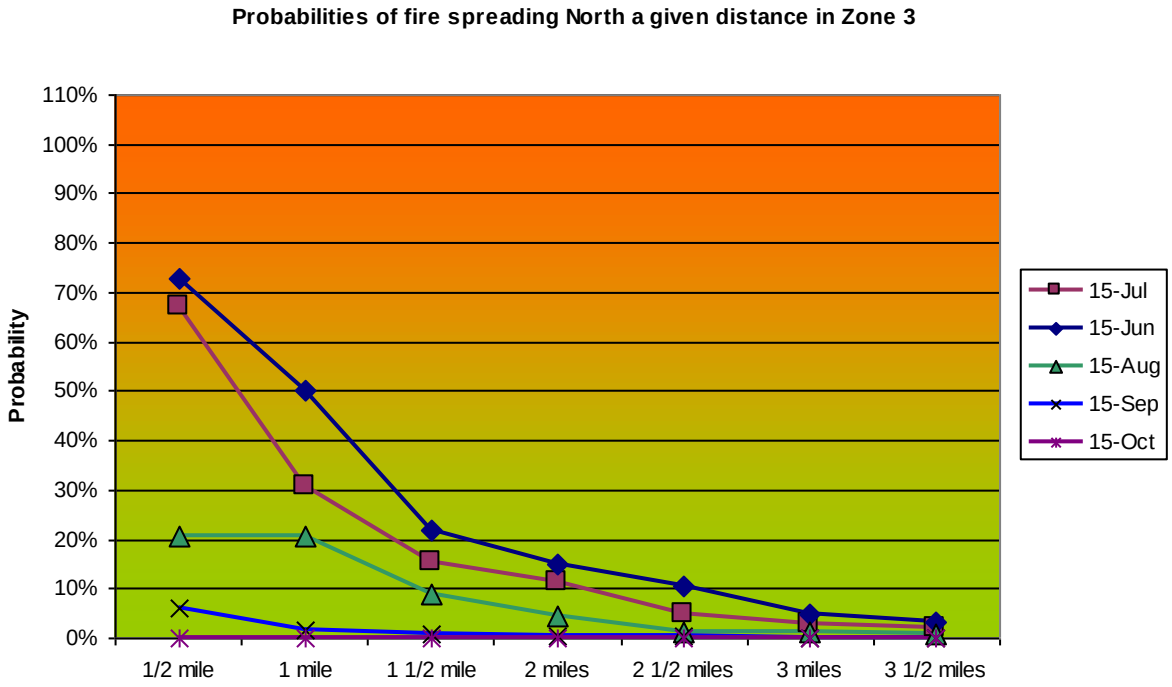
East Spread

Distance	15-Jun	15-Jul	15-Aug	15-Sep	15-Oct
1/2 mile	95%	73%	46%	11%	2%
1 mile	76%	65%	41%	8%	1%
1 1/2 mile	68%	54%	36%	4%	1%
2 miles	60%	47%	26%	4%	1%
2 1/2 miles	54%	42%	20%	2%	1%
3 miles	47%	37%	17%	2%	0%
3 1/2 miles	40%	30%	13%	2%	0%

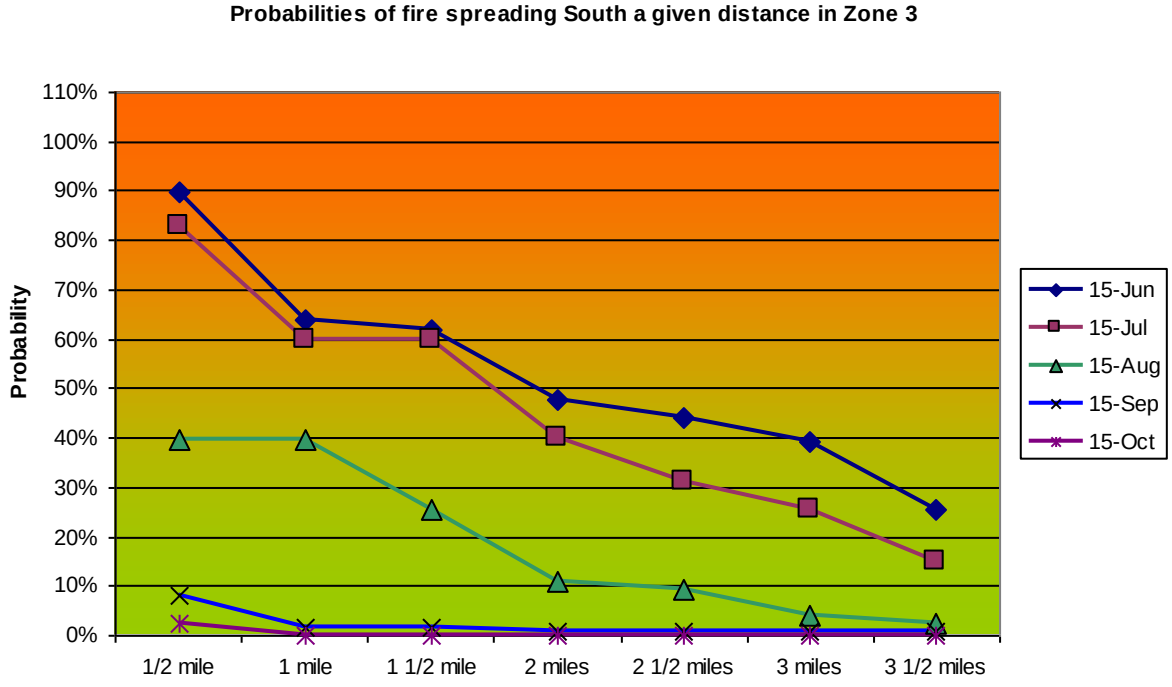
West Spread

Distance	15-Jun	15-Jul	15-Aug	15-Sep	15-Oct
1/2 mile	29%	24%	16%	5%	1%
1 mile	24%	21%	14%	1%	0%
1 1/2 mile	17%	14%	8%	1%	0%
2 miles	14%	12%	7%	0%	0%
2 1/2 miles	12%	9%	5%	0%	0%
3 miles	10%	8%	3%	0%	0%
3 1/2 miles	9%	7%	3%	0%	0%

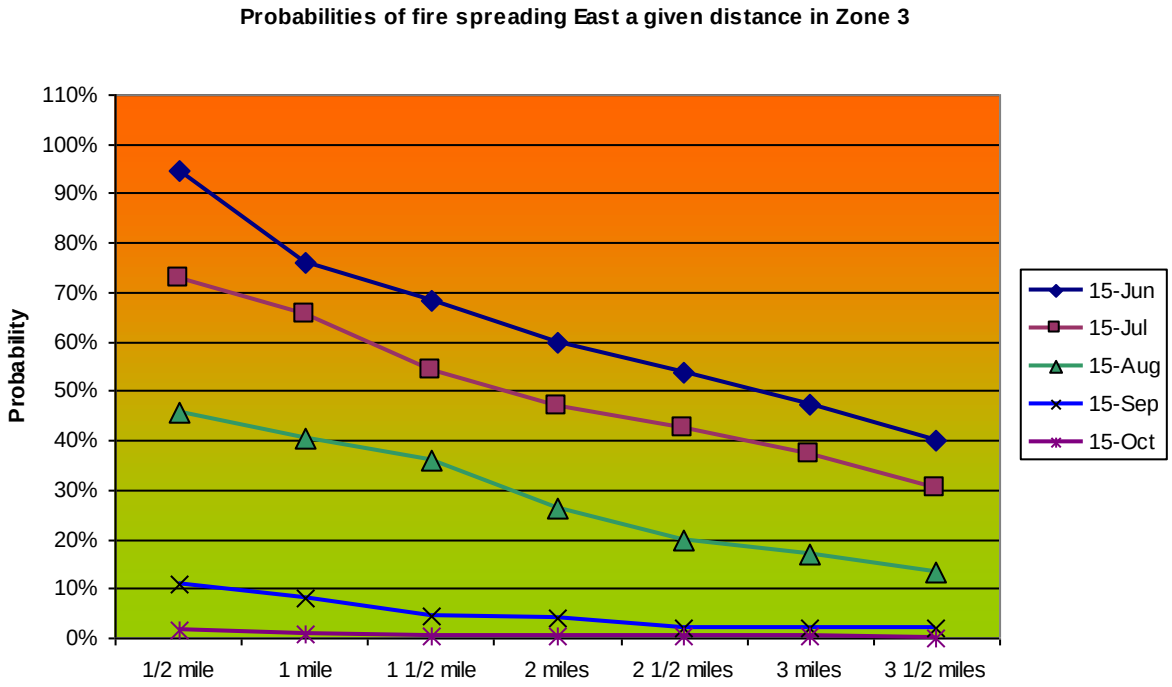
g. Probabilities of fire spreading North a given distance in Zone 3



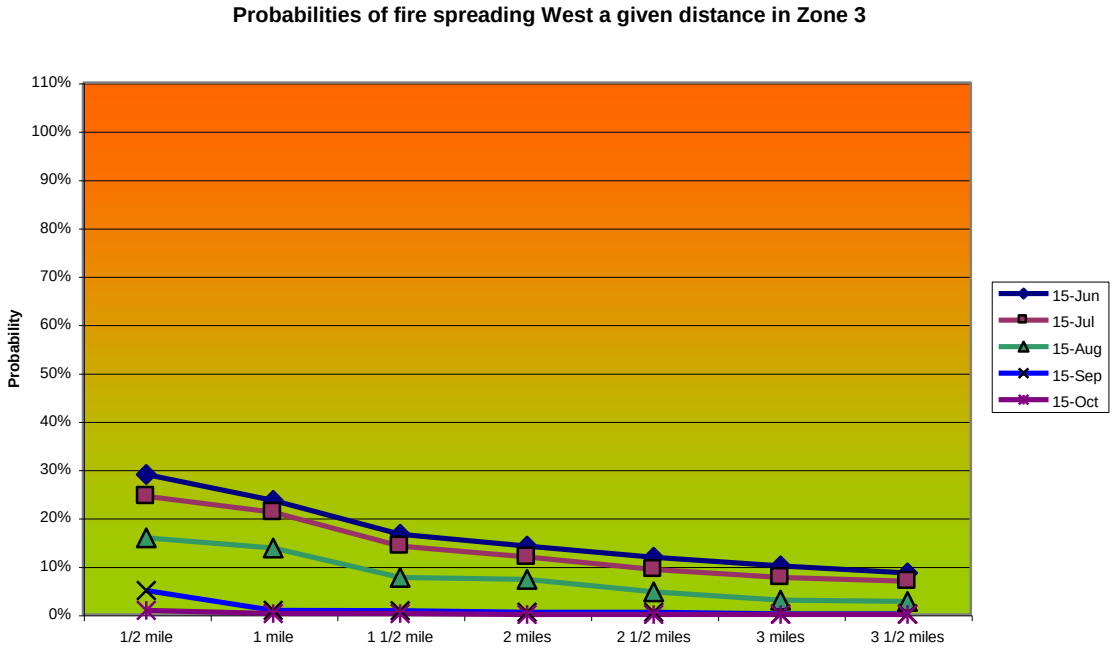
h. Probabilities of fire spreading South a given distance in Zone 3



i. Probabilities of fire spreading East a given distance in Zone 3

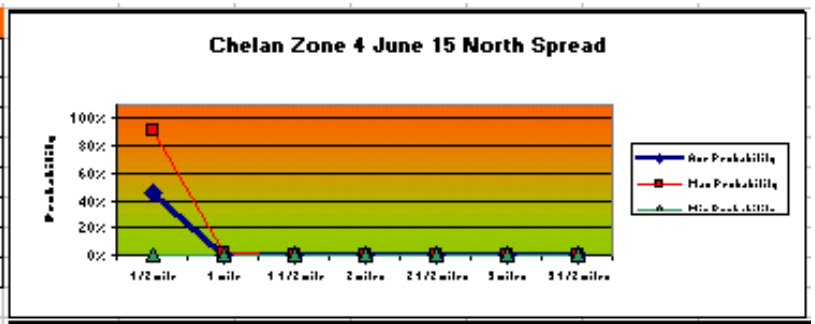


j. Probabilities of fire spreading West a given distance in Zone 3

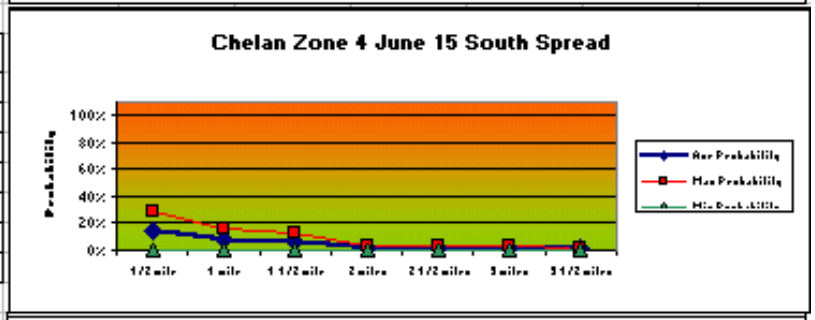


k. Chelan Zone 4 June Risk

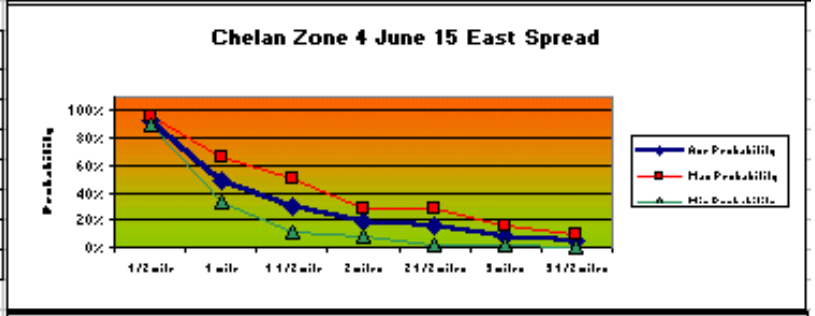
North Spread	<34% = Low	34 - 66% = Mod	67 - 100% = High
Distance	**Ave Probability**	**Max Probability**	**Min Probability**
1/2 mile	46%	91%	0%
1 mile	1%	1%	0%
1 1/2 mile	0%	0%	0%
2 miles	0%	0%	0%
2 1/2 miles	0%	0%	0%
3 miles	0%	0%	0%
3 1/2 miles	0%	0%	0%



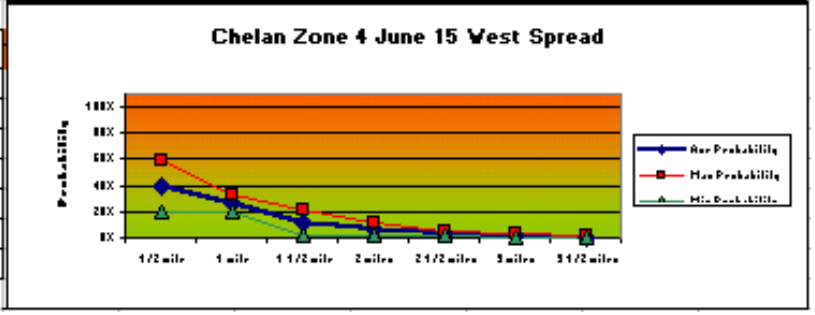
South Spread			
Distance	**Ave Probability**	**Max Probability**	**Min Probability**
1/2 mile	15%	29%	1%
1 mile	8%	16%	0%
1 1/2 mile	6%	12%	0%
2 miles	2%	3%	0%
2 1/2 miles	1%	3%	0%
3 miles	1%	2%	0%
3 1/2 miles	1%	2%	0%



East Spread			
Distance	**Ave Probability**	**Max Probability**	**Min Probability**
1/2 mile	93%	96%	90%
1 mile	49%	65%	33%
1 1/2 mile	30%	50%	10%
2 miles	18%	29%	8%
2 1/2 miles	15%	29%	1%
3 miles	8%	15%	1%
3 1/2 miles	5%	9%	0%

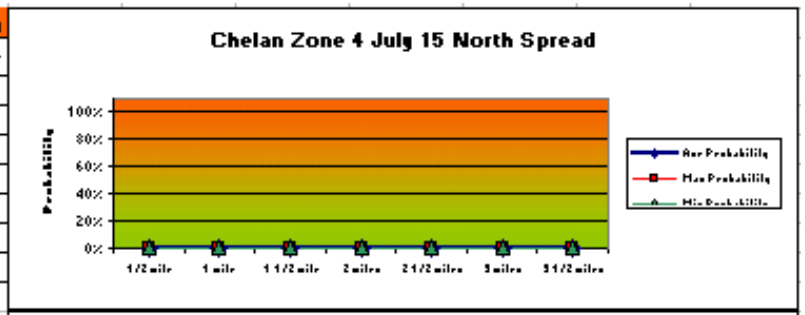


West Spread			
Distance	**Ave Probability**	**Max Probability**	**Min Probability**
1/2 mile	39%	58%	20%
1 mile	27%	34%	20%
1 1/2 mile	12%	22%	2%
2 miles	7%	11%	2%
2 1/2 miles	4%	5%	2%
3 miles	2%	3%	0%
3 1/2 miles	1%	1%	0%

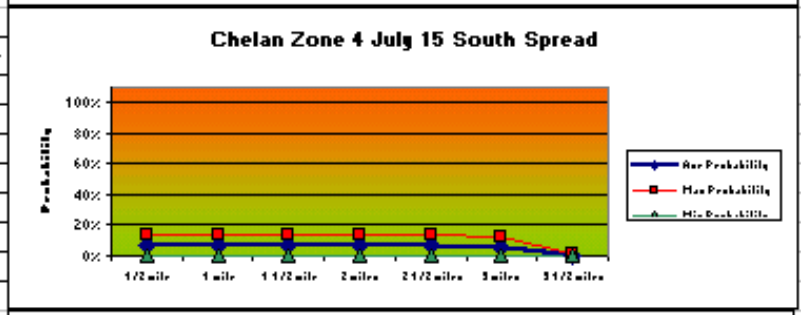


l. Chelan Zone 4 July Risk

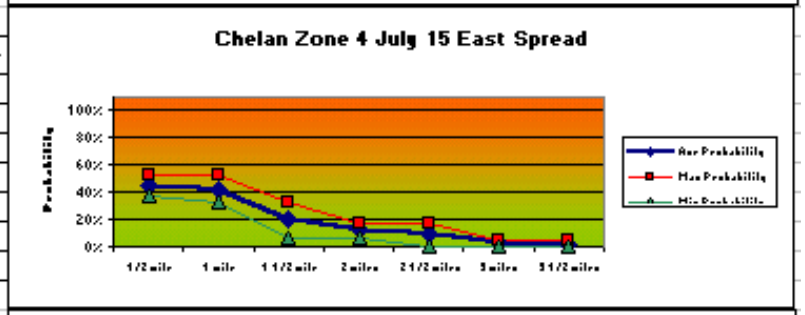
North Spread	<34% = Low	34 - 66% = Mod	67 - 100% = High
Distance	**Ave Probability**	**Max Probability**	**Min Probability**
1/2 mile	0%	0%	0%
1 mile	0%	0%	0%
1 1/2 mile	0%	0%	0%
2 miles	0%	0%	0%
2 1/2 miles	0%	0%	0%
3 miles	0%	0%	0%
3 1/2 miles	0%	0%	0%



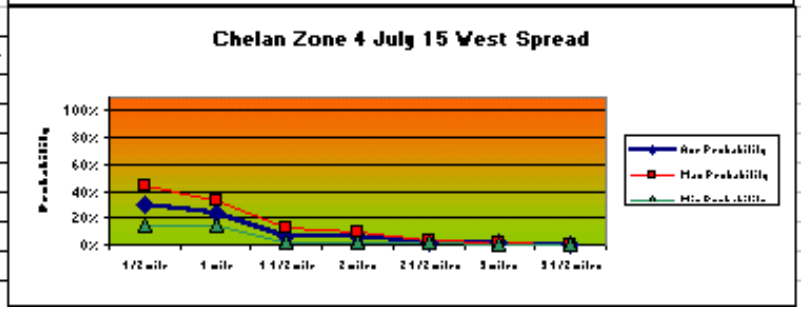
South Spread			
Distance	**Ave Probability**	**Max Probability**	**Min Probability**
1/2 mile	7%	14%	0%
1 mile	7%	14%	0%
1 1/2 mile	7%	14%	0%
2 miles	7%	14%	0%
2 1/2 miles	7%	14%	0%
3 miles	6%	12%	0%
3 1/2 miles	1%	1%	0%



East Spread			
Distance	**Ave Probability**	**Max Probability**	**Min Probability**
1/2 mile	45%	53%	37%
1 mile	42%	53%	32%
1 1/2 mile	19%	33%	6%
2 miles	12%	18%	6%
2 1/2 miles	9%	18%	1%
3 miles	2%	4%	1%
3 1/2 miles	2%	4%	0%

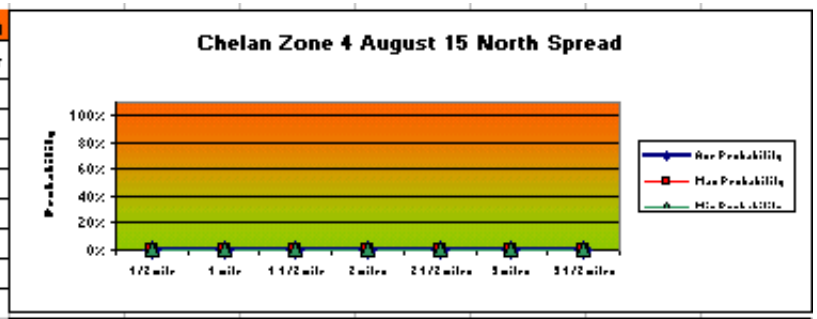


West Spread			
Distance	**Ave Probability**	**Max Probability**	**Min Probability**
1/2 mile	29%	44%	15%
1 mile	23%	32%	15%
1 1/2 mile	7%	12%	1%
2 miles	6%	10%	1%
2 1/2 miles	2%	2%	1%
3 miles	1%	2%	0%
3 1/2 miles	0%	0%	0%

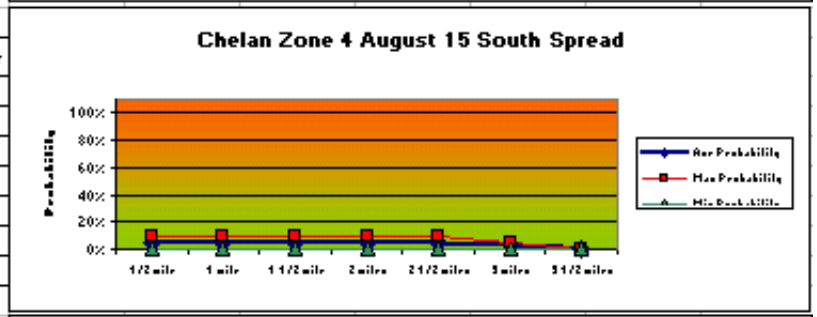


m. Chelan Zone 4 August Risk

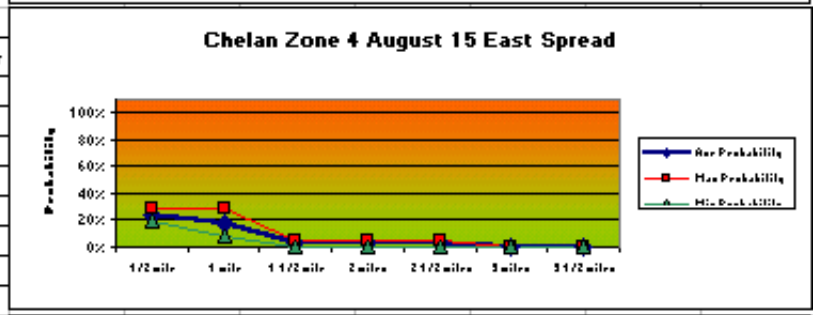
North Spread	<34% = Low	34 - 66% = Mod	67 - 100% = High
Distance	**Ave Probability**	**Max Probability**	**Min Probability**
1/2 mile	0%	0%	0%
1 mile	0%	0%	0%
1 1/2 mile	0%	0%	0%
2 miles	0%	0%	0%
2 1/2 miles	0%	0%	0%
3 miles	0%	0%	0%
3 1/2 miles	0%	0%	0%



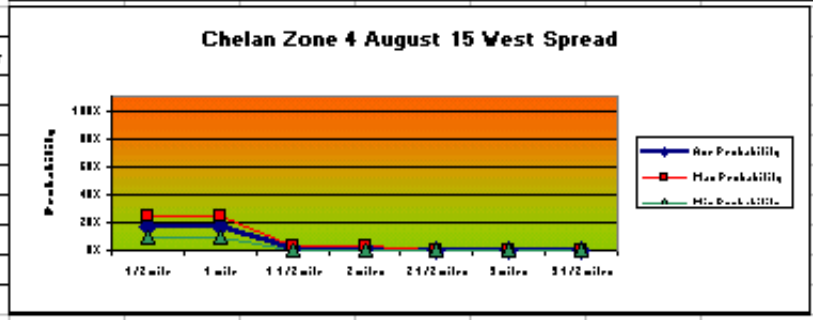
South Spread			
Distance	**Ave Probability**	**Max Probability**	**Min Probability**
1/2 mile	5%	10%	0%
1 mile	5%	10%	0%
1 1/2 mile	5%	10%	0%
2 miles	5%	10%	0%
2 1/2 miles	5%	10%	0%
3 miles	2%	5%	0%
3 1/2 miles	0%	1%	0%



East Spread			
Distance	**Ave Probability**	**Max Probability**	**Min Probability**
1/2 mile	24%	29%	19%
1 mile	18%	29%	7%
1 1/2 mile	2%	5%	0%
2 miles	3%	5%	0%
2 1/2 miles	3%	5%	0%
3 miles	0%	1%	0%
3 1/2 miles	0%	1%	0%

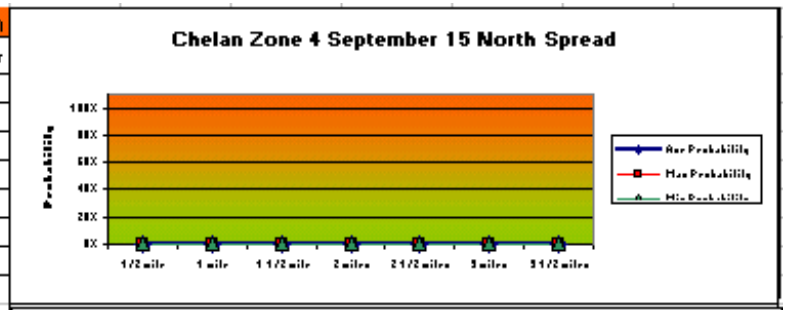


West Spread			
Distance	**Ave Probability**	**Max Probability**	**Min Probability**
1/2 mile	17%	25%	9%
1 mile	17%	25%	9%
1 1/2 mile	2%	4%	1%
2 miles	2%	4%	1%
2 1/2 miles	0%	0%	0%
3 miles	0%	0%	0%
3 1/2 miles	0%	0%	0%

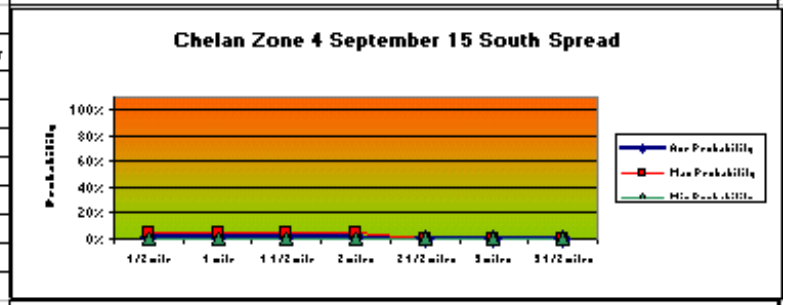


n. Chelan Zone 4 September Risk

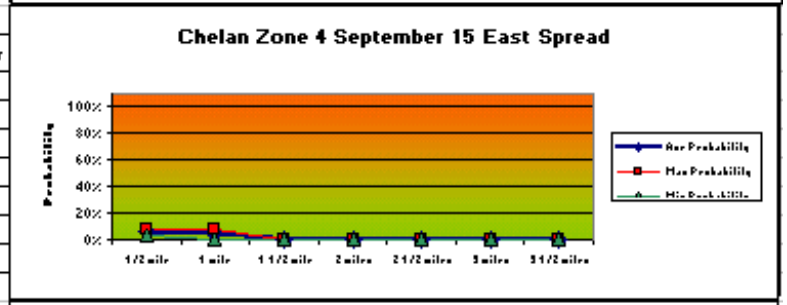
North Spread	<34% = Low	34 - 66% = Mod	67 - 100% = High
Distance	**Ave Probability**	**Max Probability**	**Min Probability**
1/2 mile	0%	0%	0%
1 mile	0%	0%	0%
1 1/2 mile	0%	0%	0%
2 miles	0%	0%	0%
2 1/2 miles	0%	0%	0%
3 miles	0%	0%	0%
3 1/2 miles	0%	0%	0%



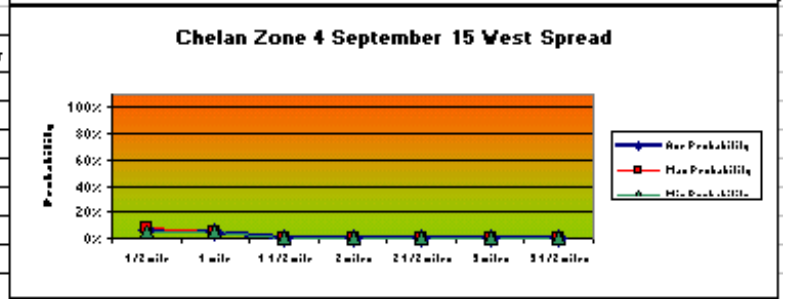
South Spread			
Distance	**Ave Probability**	**Max Probability**	**Min Probability**
1/2 mile	2%	4%	0%
1 mile	2%	4%	0%
1 1/2 mile	2%	4%	0%
2 miles	2%	4%	0%
2 1/2 miles	0%	0%	0%
3 miles	0%	0%	0%
3 1/2 miles	0%	0%	0%



East Spread			
Distance	**Ave Probability**	**Max Probability**	**Min Probability**
1/2 mile	6%	8%	4%
1 mile	4%	8%	0%
1 1/2 mile	0%	0%	0%
2 miles	0%	0%	0%
2 1/2 miles	0%	0%	0%
3 miles	0%	0%	0%
3 1/2 miles	0%	0%	0%

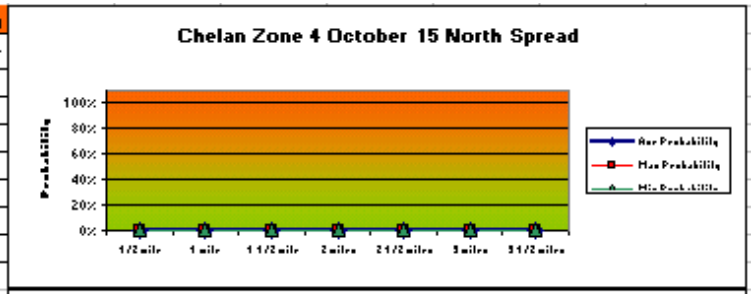


West Spread			
Distance	**Ave Probability**	**Max Probability**	**Min Probability**
1/2 mile	6%	8%	4%
1 mile	4%	5%	4%
1 1/2 mile	0%	0%	0%
2 miles	0%	0%	0%
2 1/2 miles	0%	0%	0%
3 miles	0%	0%	0%
3 1/2 miles	0%	0%	0%

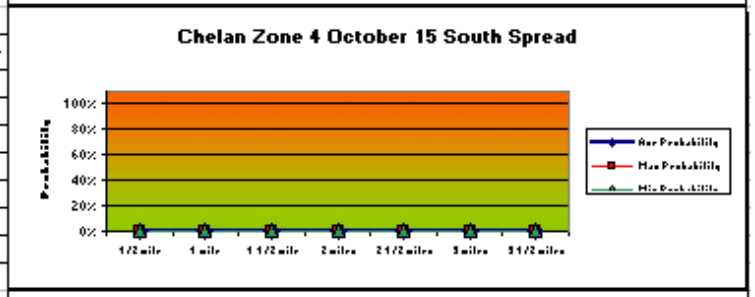


o. Chelan Zone 4 October Risk

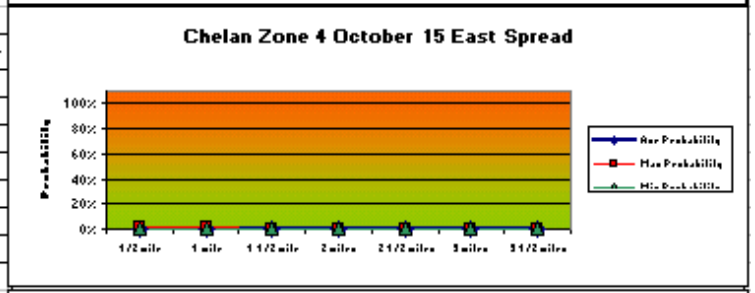
North Spread	<34% = Low	34 - 66% = Mod	67 - 100% = High
Distance	**Ave Probability**	**Max Probability**	**Min Probability**
1/2 mile	0%	0%	0%
1 mile	0%	0%	0%
1 1/2 mile	0%	0%	0%
2 miles	0%	0%	0%
2 1/2 miles	0%	0%	0%
3 miles	0%	0%	0%
3 1/2 miles	0%	0%	0%



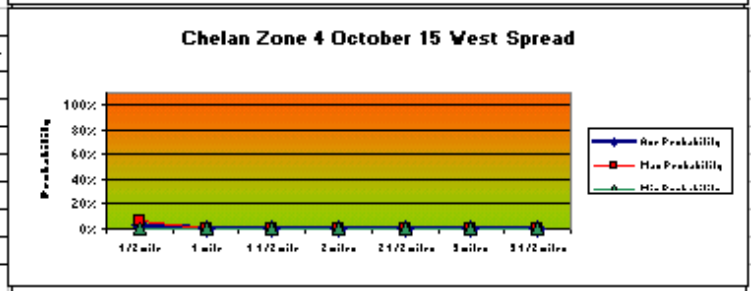
South Spread			
Distance	**Ave Probability**	**Max Probability**	**Min Probability**
1/2 mile	0%	0%	0%
1 mile	0%	0%	0%
1 1/2 mile	0%	0%	0%
2 miles	0%	0%	0%
2 1/2 miles	0%	0%	0%
3 miles	0%	0%	0%
3 1/2 miles	0%	0%	0%



East Spread			
Distance	**Ave Probability**	**Max Probability**	**Min Probability**
1/2 mile	1%	1%	0%
1 mile	1%	1%	0%
1 1/2 mile	0%	0%	0%
2 miles	0%	0%	0%
2 1/2 miles	0%	0%	0%
3 miles	0%	0%	0%
3 1/2 miles	0%	0%	0%



West Spread			
Distance	**Ave Probability**	**Max Probability**	**Min Probability**
1/2 mile	3%	6%	1%
1 mile	0%	0%	0%
1 1/2 mile	0%	0%	0%
2 miles	0%	0%	0%
2 1/2 miles	0%	0%	0%
3 miles	0%	0%	0%
3 1/2 miles	0%	0%	0%



p. Chelan Zone 4 Average Probability

Zone 4 Upper South

North Spread	<34% = Low	34 - 66% = Mod		67 - 100% = High	
Distance	15-Jun	15-Jul	15-Aug	15-Sep	15-Oct
1/2 mile	46%	0%	0%	0%	0%
1 mile	1%	0%	0%	0%	0%
1 1/2 mile	0%	0%	0%	0%	0%
2 miles	0%	0%	0%	0%	0%
2 1/2 miles	0%	0%	0%	0%	0%
3 miles	0%	0%	0%	0%	0%
3 1/2 miles	0%	0%	0%	0%	0%

South Spread

Distance	15-Jun	15-Jul	15-Aug	15-Sep	15-Oct
1/2 mile	15%	7%	5%	2%	0%
1 mile	8%	7%	5%	2%	0%
1 1/2 mile	6%	7%	5%	2%	0%
2 miles	2%	7%	5%	2%	0%
2 1/2 miles	1%	7%	5%	0%	0%
3 miles	1%	6%	2%	0%	0%
3 1/2 miles	1%	1%	0%	0%	0%

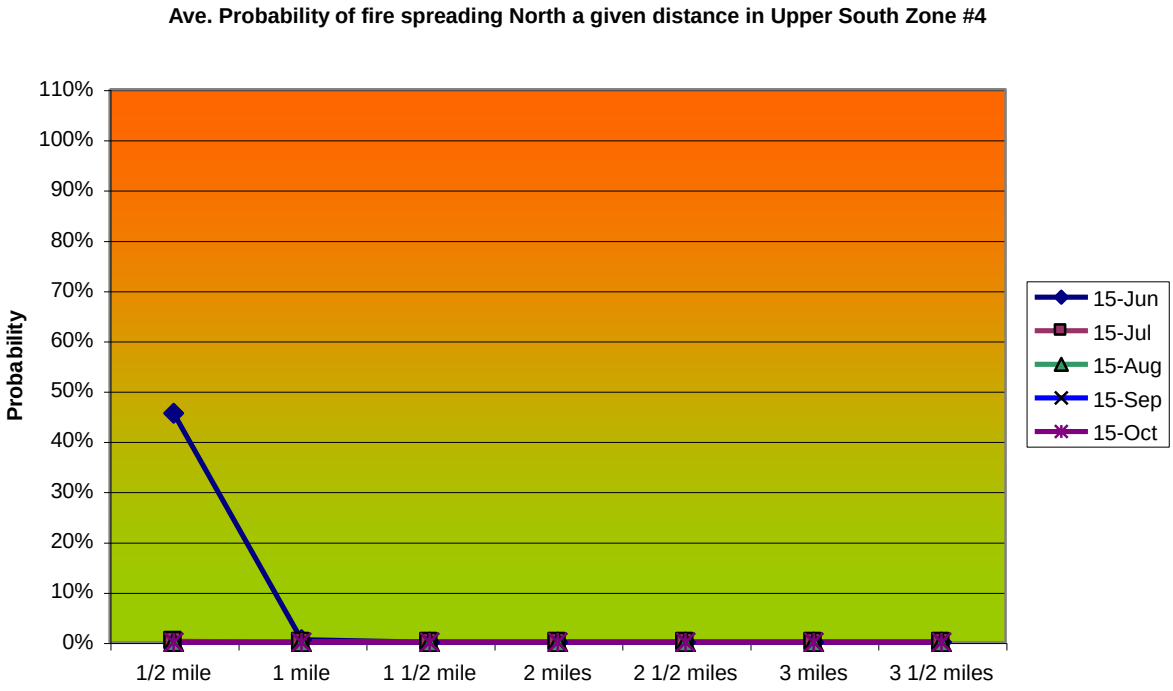
East Spread

Distance	15-Jun	15-Jul	15-Aug	15-Sep	15-Oct
1/2 mile	93%	45%	24%	6%	1%
1 mile	49%	42%	18%	4%	1%
1 1/2 mile	30%	19%	2%	0%	0%
2 miles	18%	12%	3%	0%	0%
2 1/2 miles	15%	9%	3%	0%	0%
3 miles	8%	2%	0%	0%	0%
3 1/2 miles	5%	2%	0%	0%	0%

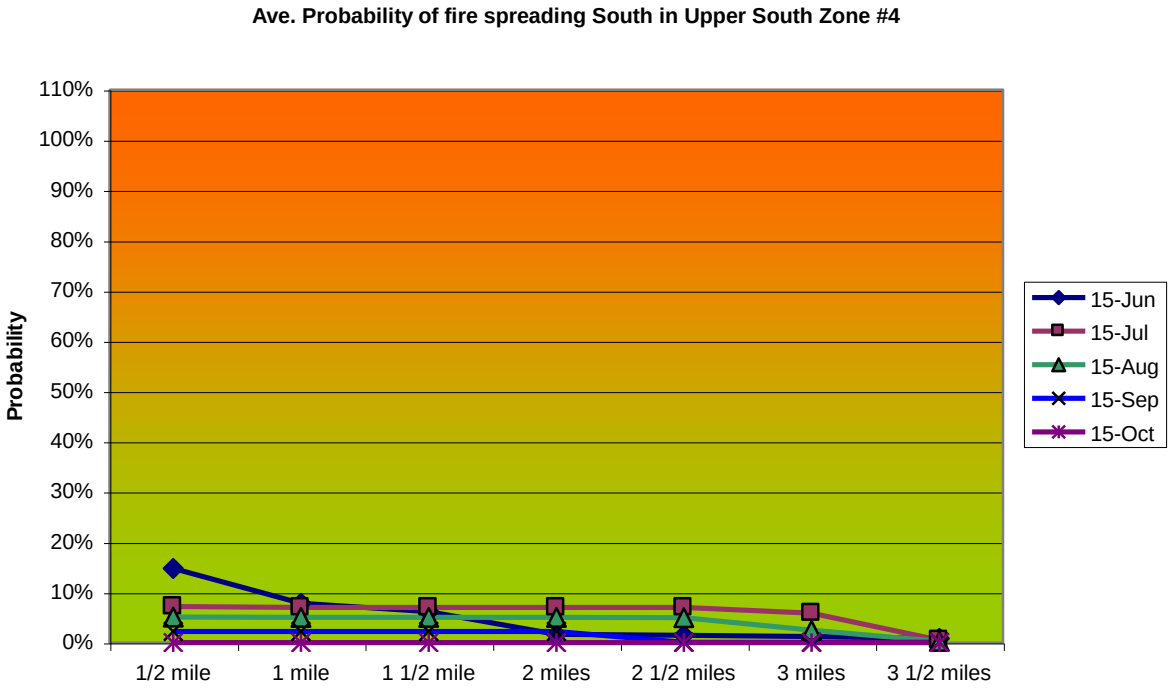
West Spread

Distance	15-Jun	15-Jul	15-Aug	15-Sep	15-Oct
1/2 mile	39%	29%	17%	6%	3%
1 mile	27%	23%	17%	4%	0%
1 1/2 mile	12%	7%	2%	0%	0%
2 miles	7%	6%	2%	0%	0%
2 1/2 miles	4%	2%	0%	0%	0%
3 miles	2%	1%	0%	0%	0%
3 1/2 miles	1%	0%	0%	0%	0%

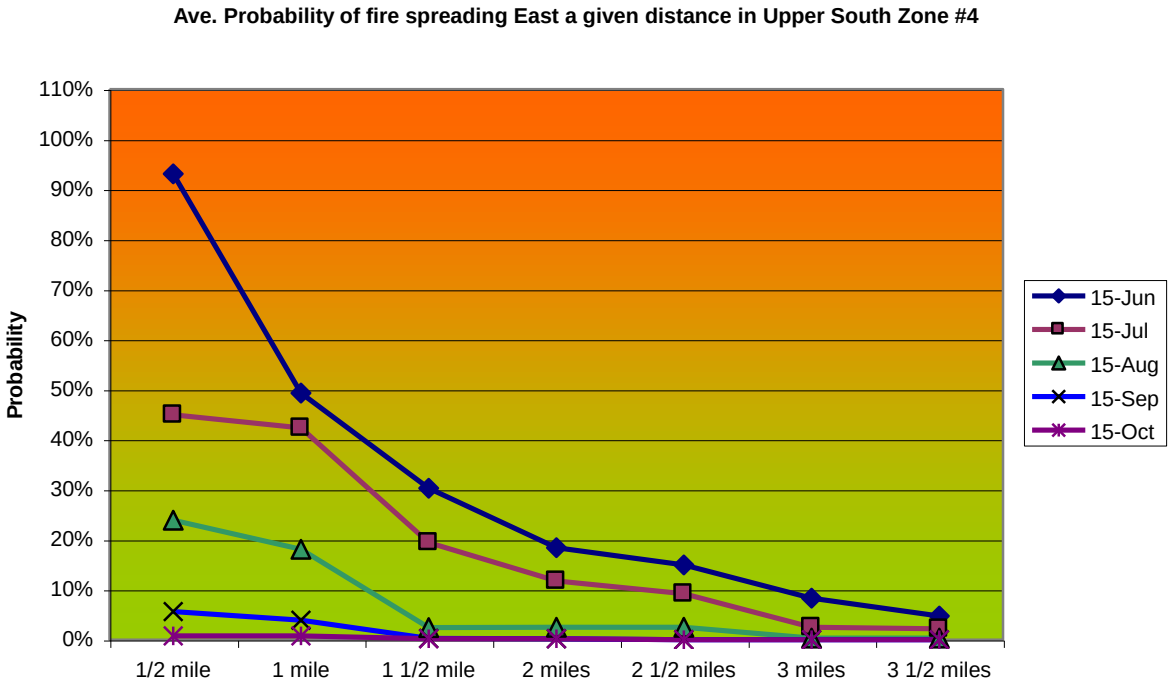
q. Probabilities of fire spreading North a given distance in Zone 4



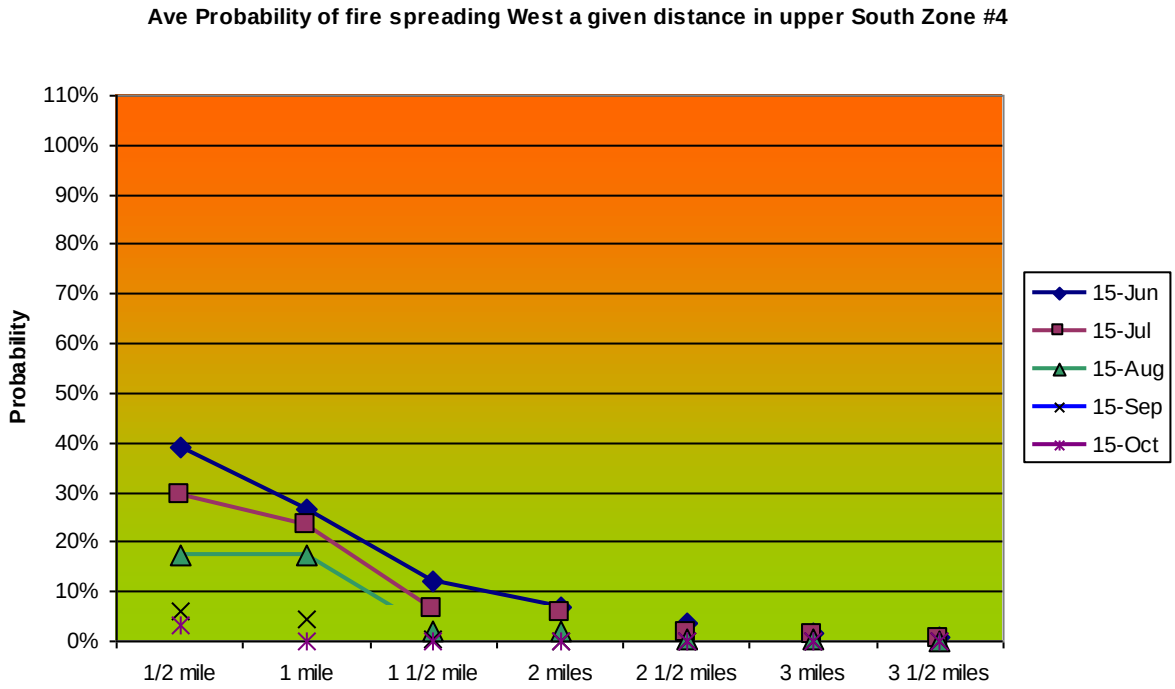
r. Probabilities of fire spreading South a given distance in Zone 4



s. Probabilities of fire spreading East a given distance in Zone 4



t. Probabilities of fire spreading West a given distance in Zone 4



IV. Wildland Fire Program Components

A. Management Response Decision-Making Process

Federal agencies use a planning system that recognizes both fire use and fire protection as inherent parts of natural resource management. The Decision Criteria Checklist aids agency administrators in making the initial decision to manage a fire or to suppress the fire (hereafter referred to as the Go/No Go decision with "Go" meaning use fire and "No Go" meaning suppress.) All decisions will be documented using WFDSS.

The WFDSS is an online decision document that has tools associated with it that can be used as needed after the initial decision criteria checklist. These tools include an initial short term fire behavior run, FSPro(Fire simulation probabilities) and RAVAR(rapid assessment of values at risk) Farsite or flammap. All but the short term fire behavior will be done with the assistance of an LTAN(long term analyst). Userscan chose which analysis or analyses are appropriate.

Initial Fire Assessment
The Fire Situation step documents the current and predicted situation and gathers all appropriate administrative information.

Short-Term Management Actions

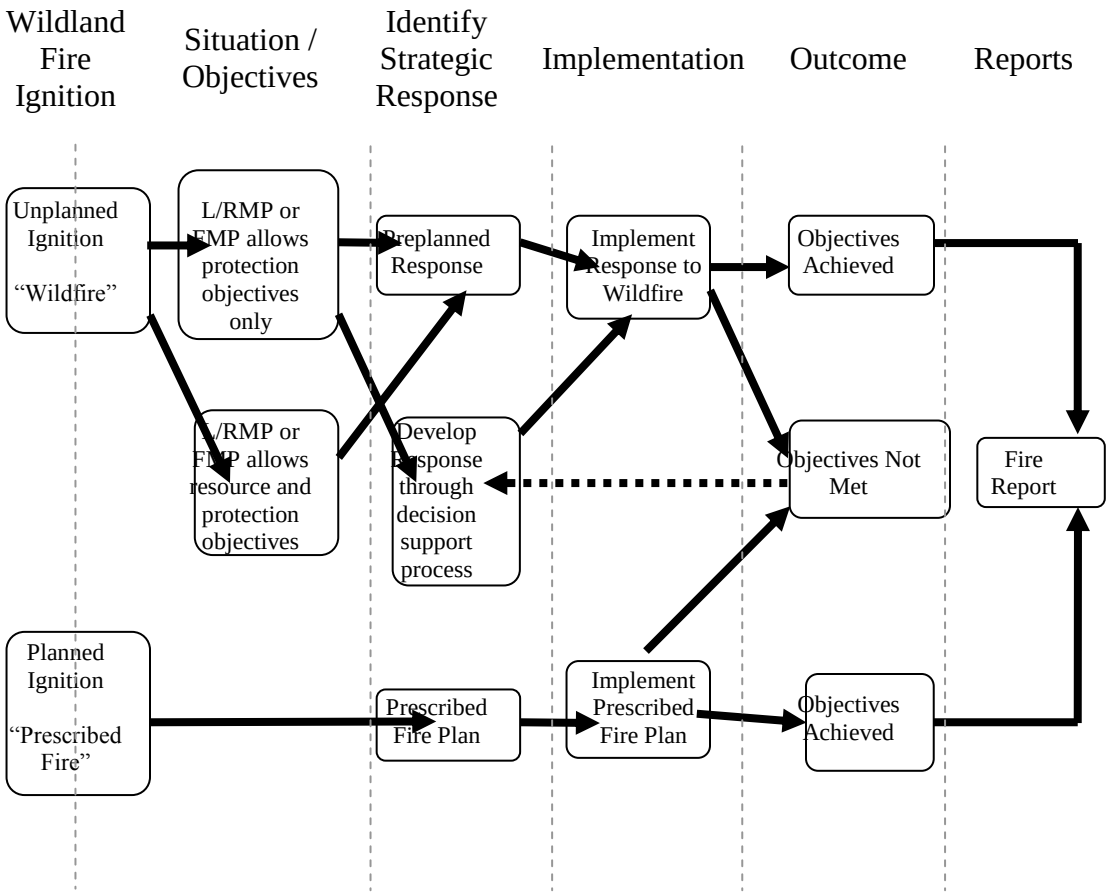
. Fire complexity and resource needs for short-term actions are determined and documented.
Long-Term ManagementActions

Details operational activities and documents to ensure adequate mitigation actions have been developed. An FSPro run is usually completed.Fire Projections, Long-Term Risk assessment, probability of success, threats to, public and firefighters are some of the many actions analyzed during this process..

Periodic Fire Assessment: This is built into WFDSS as one of the tabs and line officer(s) define how often decision validation and evaluation of meeting stated objectives occur... This assessment is completed as frequently as specified by the local unit but guidelines for monitoring are included on pg 14.

Note that the Agency Administrator has complete authority to declare that suppression action be taken at anytime during the life of a fire.

This chart depicts, in general, the process to be taken given an ignition, regardless of source. Management actions depend on the provisions in the approved Land, Resource and Fire Management Plan and/or Fire Management Plan for an area. This chart is generally applicable to most agencies' fire management programs. However, specific exceptions may exist.



Wildland Fire Flowchart

B. Wildland Fire Suppression

The objective of wildland fire suppression, as an integral part of wildland fire management, is to manage wildland fire safely and efficiently to protect human life, first and foremost, and also to protect property and natural/cultural resources. A full range of suppression responses are available throughout the Complex in order to meet this objective. The suppression program also includes the following elements: preparedness, prevention, education, training, Initial Response and extended attack. This section of the Plan addresses each of these elements in detail as well as describing the natural and cultural values at risk to be protected in suppression efforts.

1.Considerations

a. Species of Concern

Many species of concern—both plant and wildlife—exist in the Complex. Planning for the suppression of wildland fires must include plans to mitigate impacts to these species. In addition, fire managers consider the use of fire or not as a result of consultations with resource specialists and advisors. In this case, suppression efforts will be used to reduce the unwanted impacts of natural fire on species of concern. The suppression plan would then address how unwanted impacts to the species of concern would be mitigated.

Plant species

At this time no federally listed plant species are known to exist with the Complex. Those plants listed by the State of Washington, Natural Heritage Department are found in the Appendices of this Plan. For each species, elevation range, habitat, blooming time and state status are listed. Specific locations within the Complex are not known or have not been verified for many of the species listed. The list of sensitive plant species will be reviewed and revised as necessary on an annual basis to ensure current information is available for each fire season.

In addition to those taxa with Washington State status, managers are developing a list of plant species and habitats of special management concern in the Complex. Some of the species included in this designation may have been officially de-listed by Washington State or by the Federal government, but due to their limited distribution remain of concern to park management. Species or habitats of special concern include locally rare natives, those that are endemic to the Complex, species at the furthest extent of their range, species of special importance to the Complex (identified in legislation or by park management objectives), species of unusual public interest, and those vulnerable to local population declines. To date the species and plant assemblages that have been identified by staff are whitebark pine, aspen, large diameter old growth conifers, and the ponderosa pine stands on the eastside of Ross Lake.

Numerous rare plant surveys have been conducted in Stehekin, including several within hazard fuel reduction project areas and the Stehekin Contours units. Common moonwort, giant hellebore, *c*ommon blue-cup and Sierra cliff brake were found in surveys conducted in the Lake Chelan National Recreation Area. These plants were found either on the valley floor or on the valley walls.

Other sensitive species that have been located within the Complex in the last three years include: Arctic aster, moonwort, stalked moonwort, Buxbaum's sedge, russet sedge, Salish fleabane, bog clubmoss, Kotzebue's grass-of Parnassus, and curved woodrush.

Wildlife species

Ecosystems in the Complex evolved in response to periodic fire and other disturbance events. As a result, individual species that persist as part of these ecosystems either benefit from fire or are tolerant of it over the long-term, despite possible short-term loss of some individuals and habitat. As such, wildlife populations that currently occur in the Complex existed here in the presence of fire under historic fire regime conditions. There would be a range of both adverse and beneficial impacts to wildlife, depending on the species affected, and the season, timing, intensity of the fire and the rate of fire spread. These impacts would include alteration of habitat, species composition and population levels.

With approximately 489,000 acres of forested and subalpine habitat in the Complex, fires would likely have little consequence on long-term impacts to wildlife species, and if spread over the Complex in a pattern similar to its current mosaic of forest stand age classes, would result in overall beneficial impacts to most species. However, impact on some species, especially those with very small populations (e.g., spotted owl) or habitat specialists (e.g., marbled murrelet) could be adversely impacted. Increased soil temperatures, smoke, erosion,

and changes in vegetation also affect wildlife. While some loss or displacement of individual animals would inevitably occur in burned areas there would be long-term benefits to some populations as a result of restoration of fire-created habitat diversity. Wildlife would have a wide variety of reactions to fire, including burrowing, fleeing and flying. Some species, such as terrestrial amphibians, reptiles, insects and small mammals may survive fast-moving, low intensity fires by burrowing or fleeing, while some larger animals would not be able to move out of the fire path in time, becoming disoriented by the fire.

Riparian corridors and wetlands may act as refugia for some animals during fires. While soil surface temperatures remain high during fire, the soil below the surface (as few as 4 inches deep) may insulate against temperatures as high as 1000 degrees F (Lawrence 1966 in Barro and Conard 1991). Studies of pocket gophers in the Sierra Nevada, however, have determined that vapor pressure in burrows appears to be a better indication of survival of small mammals than temperature. Fires often result in a temporary increase in insect-feeding birds. Other species that may increase following fire include scavenger/predators such as ravens. Overall, forage species are often enhanced by an increase in nutrients, resulting in similar increases or benefits to populations dependent on these species. With the nutrient rich post-fire flush of herbaceous vegetation increasing browse for deer and other animals, prey-stalking opportunities also would increase. Such populations often increase where suitable habitat has burned. That habitat may be enhanced or expanded. The minor to major effects of fire on wildlife may be short- or long-term depending on vegetation recovery, fire severity and other factors.

Special tactical and planning considerations are required for four species of concern in the Park. Most concerns regarding the disruption and potential mortality of selected species is discussed as mitigation items within the FMP Biological Opinion (USFWS, June 2007).

The Parks fire management team and WFDSS teams will work closely with Park resource managers to reduce impacts of fire management activities to these species:

Northern Spotted Owl – Seasonal restrictions for mechanical and prescribed fire work in and to adjacent to habitat, August 1st restriction for the management of natural fire within spotted owl habitat, restrict the losses of mature trees during wildfire suppression activities and use retardant in this habitat only when life and property are at risk from advancing wildfire.
Marbled murrelet are suspected to nest in the northwest portion of the Park. Until formal surveys can verify specific habitats used by murrelets in the Park, and locate primary areas in need of specific guideline, use of wildland within modeled murrelet habitat will not be an option prior to August 6, and suppression crews will avoid cutting large diameter trees and retardant use should be avoided. There are no fuel reductions projects planned in marbled murrelet habitat.

North American Bald Eagle nest near water and one nest is used in the Stehekin drainage annually. No fuels treatments are planned near the nest site. Fire suppression activities occurring near riparian areas should take into consideration the potential that suppression activities could impact nest undiscovered nesting sites and forage habitat. As always, large tree removal should be avoided along with the use of aerial retardants.

Bull trout habitat will be impacted by the loss of riparian vegetation and the loss of canopy-casting shade which protects bull trout waters from oscillations in stream temperatures.

Strategies that prevent adjacent long term vegetation loss, reduce the chances for soil delivery into watercourses and prevent contamination from fire fighting chemicals will reduce long term impacts to Bull Trout habitat.

In addition to species specific recommendations, impacts to these and other sensitive species can be prevented through mitigation measures located in the biological opinion.

Ensuring updated resource advisors are involved in planning and implementation of large fire events will ensure incident action plans list appropriate mitigation measures to reduce impacts to sensitive species during suppression events. Interdisciplinary teams will continue to approve and tailor prescribed fire and mechanical fuels projects for specific areas and species concerns and ground personnel will continue to implement suppression tactics using the minimum tool as outlined in the NOCA Minimum Impacts Tactics guide located in the Appendix.

b. Cultural Resources

Historic and pre-historic cultural resources are essential to protect from both wildland fire and suppression activities. Detailed, site specific information regarding cultural resources at risk is available from the Complex Archeologist at (360) 873 4590 extension 23 and the Cultural Resource Management Specialist at (360) 873 4590 extension 20. All fire management activities will be conducted in accordance with the National Historic Preservation Act (NHPA) working in close consultation with Cultural Resource Advisors.

Pre-planning for values at risk is important to their overall protection. As outlined in the FMU descriptions, protection for cultural values at risk may include line construction, foil structure wrap; hose lays with nozzles or with sprinklers, and public notification or closures. (Guidelines for evacuation or closure are found in RM-18.)

A wide variety of cultural resources can be found in various locations within the Complex. Prehistoric resources may be found in lithic scatters, habitation sites, manufacturing sites, and special use sites (i.e. plant harvesting, goat hair harvesting, hunting, fishing and ceremonial sites). Resources from the era of exploration and survey may be found near the international border, historic roads and trails, and USGS snow survey cabins. Resources from the era of mining and trapping may be found near buildings and structures and remains such as adits, stopes, rails, and tailings. From the era of homesteading resources may be found at the Buckner Orchard near outbuildings, in the pasture, in fields and gardens and the circulation network (paths and trails) and near gravesites. Finally, there are cultural resources in the Complex that have to do with the generation of power. These may be found near the hydro dams and along electricity transmission lines.

The following table outlines specific response considerations in regard to cultural resources and is to be utilized only in consultation with cultural resource staff or designated advisers.

Cultural Resources: Considerations for Appropriate Fire Management Response

Historic Context	Resource Type	Management Response Considerations: Pre-Attack	Management Response Considerations: During and after Initial Response
Prehistoric	Lithic Scatters Habitation Sites Manufacturing Sites Special Use Sites	Minimal removal of overlying duff. Refine Rx and objectives for lower intensity burn. No off road vehicle operation. Hide all saw cuts.	Case by case assessment in consultation with Cultural Resource Advisors. No ground disturbance Avoid crushing artifacts. Maintain cool surface temperature. Remove heavy fuels. Avoid charcoal contamination. Flag/identify for vehicle, camp, water tank, fire line avoidance. Utilize alternate fireline construction techniques (wetline, natural barriers) for minimal mineral soil disturbance.
Exploration and Survey	International Border Historic trails/roads USGS Snow Survey	Evaluate the need for hazard fuel reduction immediately adjacent to structures at risk. If appropriate, hand remove sufficient vegetation to create a defensible space. Refine Rx and objectives for lower intensity burn around resources. No off road vehicle operation. Hide all saw cuts.	Case by Case assessment in consultation with Cultural Resource Advisors. No ground disturbance (line building, dozer line, road). Hide all saw cuts. Utilize alternate fireline construction techniques (wetline, natural barriers). Utilize sprinkler systems and wrap buildings/structures in fire safe cloth as appropriate. Flag for avoidance Flag/identify areas for vehicles, camps, water tank, fireline avoidance. Remove fuel in buffer around features. Monitor sites post fire.
Mining and Trapping	Buildings/structures remains		
Homesteading	Buildings/structures Orchard Outbuildings Pasture Gardens Circulation network Artifacts Graves		
Power/energy	Hydro dams Electricity trans lines Pneumatic trans Intake pipes		
State/Federal Land Management	Ranger Compounds Fire Lookouts Shelters, Golden West		

2. Fire Prevention Plan

According to the Interagency Standards for Fire and Aviation Operations (2004), NPS units that experience more than 26 human-caused fires per ten-year period are required to develop a prevention plan. The Complex experienced 36 human-caused fires in the ten-year period between 1994 and 2003. The first prevention plan for the Complex was written and signed in 1996. The following pages constitute the revised prevention plan.

Previous analysis of human-caused fires in the Complex has indicated that human-caused fires generally occur near camping areas, trails, roads and lakeshores. The vast majority have been escaped campfires. Over the past 31 years, 118 human-caused fires have burned a total of 47.2 acres, which averages out to three human caused fires burning 1.5 acres each year. This may not seem like a significant acreage; however, efforts should continue toward education of the public regarding the potential fire hazard, especially during periods of high fire danger.

During periods of high fire danger, certain high-risk areas may be closed to all open fires. The highest risk area in the Complex is the Stehekin Valley where there is a high risk to life and property. Closures will be recommended by the Fire Management Officer (FMO) in consultation with other agency cooperators and approved by the Superintendent. Closures will be announced by press releases, information provided at public contact stations, and on trailhead bulletin boards. All announcements of restriction will be coordinated with the Interpretation staff. The regional office will be promptly advised of any closures.

Fire prevention educational contacts at the Complex are primarily concentrated in Wildland Urban Interface areas (WUI), campgrounds and visitor centers. Opportunities for education arise when staff issues permits for campsites, visitor protection staff makes visitor contacts, and when interpretive staff present programs on fire ecology and/or suppression. Firefighters sometimes assist in fire prevention contacts as well, and all Complex staff are made aware of high fire danger and are encouraged to make educational contacts regarding fire safety.

a. Fire Precautions

The Washington Department of Natural Resource (DNR), USFS, Bureau of Land Management, and Bureau of Indian Affairs use the same four-level industrial regulation system. This system, which helps prevent wildfires by regulating work in the woods, is known as the Industrial Fire Precaution Level (IFPL) system. The Complex fire management recognizes and follows these guidelines.

- Level I Closed Fire Season: Fire equipment and firewatch service is required
- Level II Partial Hootowl: Limits certain activities 1 p.m. – 8 p.m.
- Level III Partial Shutdown: Prohibits some activities and limits others 1 p.m. - 8 p.m.
- Level IV General Shutdown: All operations prohibited

The following tables outline specific prohibitions according to activity:

Operation: Power Saws			
Precaution Level	Landing	Tractor/Skidder	Other Woods Saws
I. Closed Season	Fire Watch	Fire Watch	Fire Watch
II. Partial Hootowl	Fire Watch	Hootowl	Hootowl
III. Partial Shutdown	Hootowl	Hootowl	Prohibited
IV. General Shutdown	Prohibited	Prohibited	Prohibited

Operation: Yarding			
Precaution Level	Tractor/skidder	Cable (gravity systems)	Other Cable Systems
I. Closed Season	Fire Watch	Fire Watch	Fire Watch
II. Partial Hootowl	Fire Watch	Hootowl	Hootowl
III. Partial Shutdown	Hootowl	Hootowl	Prohibited
IV. General Shutdown	Prohibited	Prohibited	Prohibited

Other Operations			
Precaution Level	Loading	Blasting	Welding
I. Closed Season	Fire Watch	Fire Watch	Fire Watch
II. Partial Hootowl	Fire Watch	Hootowl	Hootowl
III. Partial Shutdown	Hootowl	Hootowl	Hootowl
IV. General Shutdown	Prohibited	Prohibited	Prohibited

All operations, including fire management operations, within the Complex will comply with the IFPL system, and all industrial operation contracts and permits will be administered for compliance with IFPL system and all other required fire prevention clauses.

b. National Fire Danger Rating System (NFDRS) Operating Plan

The National Fire Danger Rating System (NFDRS) allows fire managers to plan for an appropriate level of wildfire protection to assure management goals and objectives are met The Complex will use five adjective ratings (low, moderate, high, very high and

extreme) to inform the public of the current fire danger. The adjective rating is determined by the NFDRS calculated Preparedness Level.

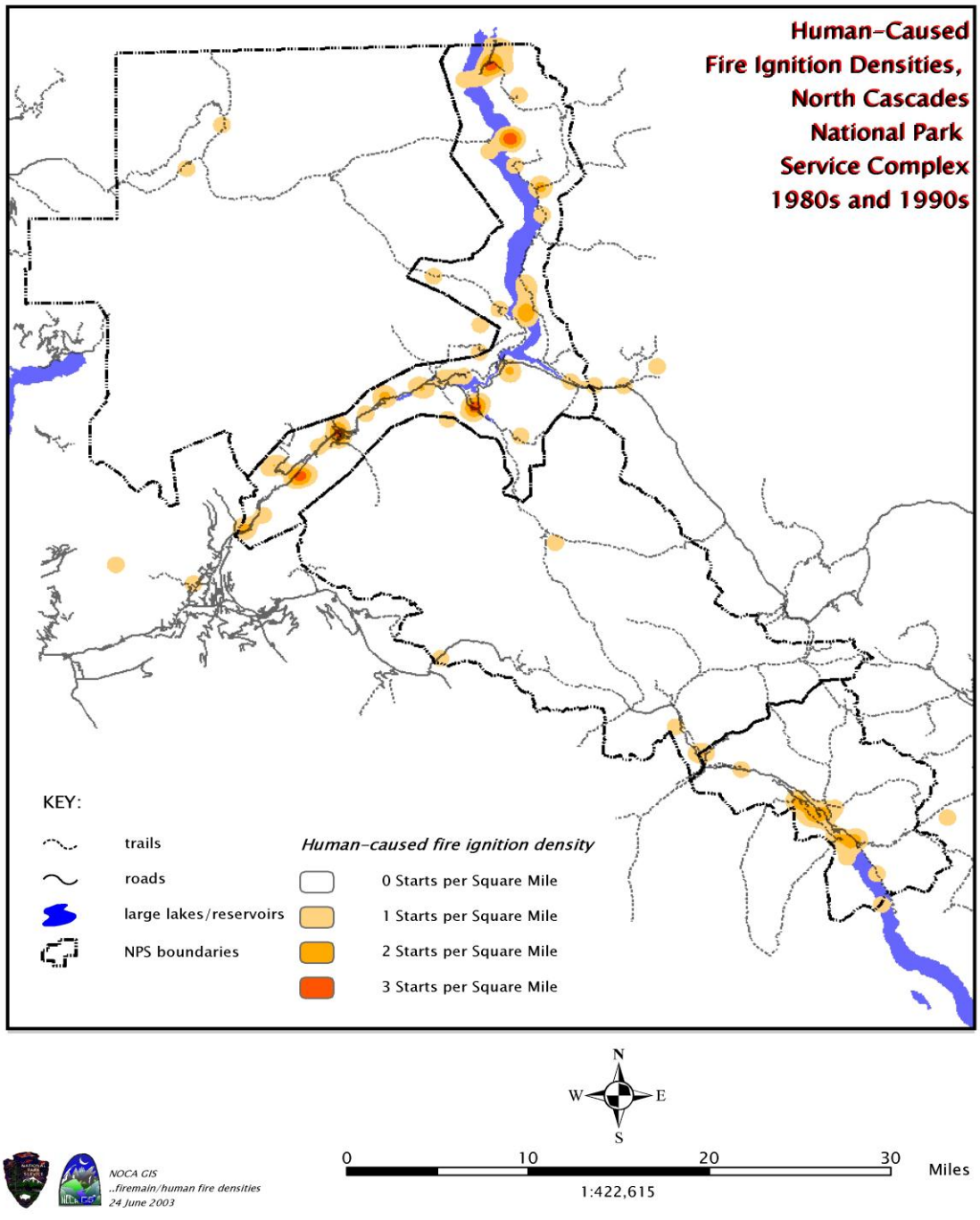
Six staffing ratings (1, 2, 3L, 3H, 4 and 5) are used. The Complex Preparedness will be calculated with NFDRS using fuel model G and using fire business thresholds as breakpoints to define preparedness levels this corresponds more closely than using ERC's alone since in Zone 662 (Stehekin RAWS) large fires generally occur around the 85th percentile.

Preparedness levels with corresponding adjective rating class will be as follows:

Internal & Interagency Communication	**Public & Visitor Communication**
Preparedness Level	Adjective Rating Class
1	Low
2	Low
3	Moderate
3H	High
4	Very High
5	Extreme

c. Human-Caused Fire History

The following map shows what areas of the Complex have the highest occurrence of human-caused fires. It can be utilized during periods of high fire danger to concentrate prevention efforts in these areas.



d. Roles of Fire Management Staff in Prevention Activities

The fire management staff will take the following steps to prevent the ignition and spread of unwanted human-caused fire.

- Establish and maintain appropriate communications with the Regional Office
- Establish and maintain working relationships with local fire districts and state agencies
- Coordinate fire prevention training
- Initiate fire investigations
- Ensure fire prevention activities are integrated into Complex programs and work plans.
- Include appropriate prevention provisions in contracts, permits, and functional plans
- Coordinate prevention programs with other agencies
- Provide media expertise to fire managers as requested
- Maintain media contacts with metropolitan areas within the state of Washington.
- Monitor prevention programs to determine effectiveness and the need for changes
- Write requests for severity funding and/or additional personnel for fire prevention
- Initiate fire investigations and pursue litigation when appropriate

e. Cooperative Fire Prevention Activities

To maximize effectiveness and efficiency the Complex will strive to promote and maintain partnerships with other agencies, associations, businesses, groups, and individuals to utilize skills, talents and resources in an effort to promote a coordinated fire prevention program. These efforts will include the following:

- Support the Smokey Bear program.
- Support and participate in area fire prevention cooperatives
- Support and participate in community fire prevention events
- Integrate fire prevention activities with other land management actions and programs

f. Closures and Public Restrictions

When necessitated by fire danger or large fire activity, normal public access to areas within the Complex may be restricted. The following general actions will be utilized to reduce human-caused wildfires.

- Regulated use of specific ignition sources such as campfires and spark emitting equipment.
- Public use restrictions and closures will be closely coordinated with the Department of Natural Resources, Okanogan-Wenatchee National Forest, Manning Provincial Park, Mount Baker-Snoqualmie National Forest and local counties and rural fire departments when necessary. All closures or restrictions will be approved by the Superintendent or his delegate.

In addition, proposed regulations restricting public use of the Complex for fire prevention purposes should meet the following criteria:

- Degree of regulation must fit the risk anticipated.

- Rules must be simple and understood by the public and easy to implement.
- Rules must be enforceable, and enforced
- Need for the rules must be obvious
- Rules must cover broad geographical areas
- Each rule must have a clearly defined objective.

Restrictions must be directed at the specific ignition sources and the activities associated with those sources. Except for in extraordinary situations, there should be no need to restrict the use of fire in low hazard areas.

g. Urban Wildland Interface

Continued growth and increased seasonal population as well as increasing fuel loads in the Stehekin area increase the risk of ignition on NPS and USFS lands and adjoining private property. The following actions are guidelines to help mitigate this increased risk.

- Participate with other fire management agencies in all-source ignition prevention
- Design media messages and personal contacts to increase awareness and encourage actions to reduce risks and modify hazards
- Promote defensible space
- Participate in Firewise workshops sponsored by the DNR

h. Wildfire Cause Determination

Determining the cause of all wildfires is a primary goal of management actions. This data and its accuracy is the raw material on which the prevention program is based. It is also the basis on which to pursue reimbursement for suppression expenditures. The following actions will help in determining the cause of wildfires.

- All Initial Attack fire management personnel will receive training on the identification and protection of areas of ignition
- A qualified fire investigator will be assigned to all fires of significant size or loss, and case reports will be developed
- Documentation of fire causes will be done on the Individual Fire Report with supplemental case reports and statements when necessary for clarification

i. Arson

The prompt recognition and elimination of arson-caused fires is a critical step in fire prevention. A coordinated effort between NPS and USFS fire managers as well as with local law enforcement officials is necessary to mitigate this threat. All suspected arson fires will be investigated.

3. Preparedness

Fire history in the Complex suggests that outside of drought and extreme weather conditions, the vast majority of lightning fires have been quickly suppressed. Instead of immediate suppression of a large number of lightning ignited fires, use of wildland fire is an appropriate management tool under most conditions and although response to a

wildfire is treated as an emergency, it is recognized as a natural phenomenon working to the benefit of resources within the Complex. Even under critical weather conditions, use of fire to meet multiple objectives is appropriate. However, in certain situations, critical weather conditions can cause rapid growth of unwanted fires that require suppression. The preparedness plan outlined below will be used to assure adequate resources are available and ready to respond to any fire event including fires within a suppression zone or fires that are within lands designated for use of fire considerations..

a. Preparedness Levels/Step-Up Plan

As the NFDRS Preparedness level rises, so will the efforts of Complex personnel. Specific actions will be as follows.

Preparedness level I-III: All personnel remain on a normal tour of duty. Red-carded personnel are available to respond to reported fires. Fire equipment and supplies are serviced and prepared for use. Duty officer knows the locations of red-carded personnel.

Preparedness level IV: Fire managers receive approval for expenditures from Step-Up funding from the Regional FMO. The Superintendent is notified of conditions. Tours of duty may extend to seven days a week. Key personnel (duty officer, dispatcher, prevention patrollers, and lookouts) may work longer hours for coverage. Red-carded personnel may be asked to work overtime. Neighboring agencies are contacted and prevention activities coordinated. High fire danger notices are posted at visitor centers and site bulletin boards. The need for campfire restrictions is assessed. The Superintendent gives authority for campfire restrictions or closures where necessary.

Preparedness level V: All activities in level IV are continued. Additional restrictions and closures of Complex areas may be necessary (subject to superintendent approval). Coordination with interagency partners on restrictions or closures is vital. Coordinated interagency campfire restrictions will be posted in various media. Appropriate signing will be coordinated with ranger and interpretive staff. Interpretive activities will include a fire safety message. Headquarters message phone will include information on restrictions.

b. Severity Requests

The objective of fire severity funding is to mitigate losses when an abnormally severe fire conditions occur over an extended period. These times are when the fire season starts earlier than usual, lasts longer than usual, and/or exceeds the average high fire danger rating for long periods.

Severity requests for the Complex are submitted when the prepardness level IV or greater and outlook showing a continuing drying trend. This takes into account both drought conditions and times when fires are most likely to occur. Severity funding is used to provide additional aerial reconnaissance, to increase firefighting staffing over the short term, to pre-position Initial Attack forces, or sometimes to increase prevention activities.

c. Fire Readiness

Each year prior to the beginning of fire season, fire-readiness of equipment and supplies needs to be ensured. Annual readiness actions should include the following:

- Brief red-carded personnel in Stehekin on operation of compressed air foam wildland engine
- Ensure all portable fire pumps are in operating condition
- Check and maintain proper function of all chainsaws
- Inventory and inspect fire caches (Marblemount & Stehekin) and order supplies as needed
- Provide eight-hour fire refresher course for red-carded personnel
- Administer field or walk test to those individuals without arduous duty positions
- Ensure arduous duty physicals are passed for personnel required to the pack test, prior to test.
- Administer pack tests after health clearance given by medical exam contractor or health survey questionnaire (HSQ) completion.
- Issue red-cards to qualified personnel
- Hold preparedness review using interagency partners
- Distribute fire gear and maps to key personnel

Ordering of equipment and supplies for the Complex begins at the end of the field season after all equipment is returned to Marblemount and Stehekin fire caches. Equipment is evaluated for repair or replacement needs. Pumps and saws that do not require repair or replacement are winterized. A list of equipment and supply needs for each fire cache is prepared by the lead fire technician for that area and through the area fire management officer. Items are ordered in the following sequence during the year by each area fire management officer. Supply orders will be coordinated to prevent duplication, especially for project needs. The schedule for ordering equipment and supplies will be as follows:

- Equipment/supply list will be faxed to Redmond Fire Cache to obtain items on their redistribution program in November with orders delivered in January.
- Equipment/supplies not filled by the Redmond order will be reordered in March and April.
- Additional equipment/supplies will be ordered in March and April using appropriate funds.
- Inventory of fire caches will be performed in June and submitted to the fire management program assistant
- At the end of all local fire events or crew assignments orders will be faxed to the Wenatchee fire cache for replacement of all damaged equipment and replenishment of necessary supplies to maintain the area fire caches prior to any new fire activity in the park.

Fire cache inventories are critical because they ensure a high level of readiness, provide incoming incident management teams with a list of equipment and supplies that can be used for suppression efforts, and train new firefighters in the location of equipment and supplies and in the use of correct terminology. Inventories also provide an opportunity for the area caches to exchange supplies that are over-stocked, under-stocked, or defective.

d. Training and Qualifications

Firefighters will receive the training appropriate for red-card qualifications as outlined in Interagency Qualifications Guide 310-1. Future training needs and goals will be identified by the FMO for firefighters and support personnel. Training will be followed by on the job experience using taskbooks specific to positions. Only fully qualified, red-carded individuals or qualified trainees will be sent on fire assignments.

Training schedules will be coordinated between the Complex, adjacent Forests, and DNR, and where mutually beneficial, joint participation will be encouraged to help insure uniformity in meeting interagency training requirements.

It is the responsibility of every supervisor to assure that only qualified personnel are used for each and every fire management action. Specifically, supervisors will do the following:

- Prepare individual training development plans based on individual training needs and previous experience.
- Assist the FMO in determining training needs to meet fire management direction
- Assure that all fire suppression training meet NWCG wildland fire qualification standards (310-1).

The FMO retains the responsibility to sign red cards, initiate task books, and recommend and sign trainees as being qualified for a specific qualification. The FMO may also remove qualifications of employees based on ill performance or need for updated mentoring.

Personnel performing fire management and prescribed fire duties will maintain a high level of physical fitness. This includes participation in a physical fitness program requiring one hour per day for individuals whose positions are at the arduous level. Individuals with less than arduous fire positions may be granted up to three hours of physical conditioning per week when authorized by the superintendent.

e. Fire Preparedness Review

Fire management employees in the Complex will participate in a preparedness review on a yearly basis using interagency partners from the Okanogan Wenatchee National Forest and the Mt. Baker Snoqualmie National Forest. These reviews will be completed with appropriate documentation and will focus on physical preparedness (engines, employee physical fitness, tools, and facilities), training, and management preparedness including dispatching and reporting**.** Reviews will be conducted in a manner that facilitates learning and improvement of existing conditions. Red-carded employees working for other divisions will be encouraged during the reviews to broaden and diversify fire employee knowledge.

f. Detection

Fire detection is accomplished by air or ground observation, and/or from fire lookouts. Aerial detection flights may be flown by NPS personnel utilizing contract aircraft or by the USFS in coordination with NPS. Park service personnel will fly USFS lands to assist

in detection at the request of or in coordination with USFS. Any flying occurring over cooperators land will be coordinated with adjacent FMO and dispatch. Flights will be made following lightning activity if there is a high likelihood of fire starts. Factors that would be considered in deciding whether to perform detection flights will include:

- Preparedness level of IV or greater and a lightning event in the forecast
- Amount of moisture with associated storm and forecast weather
- Detection of smokes from highway or lookouts
- Inability of stationary detection to triangulate on fire location
- Appropriate weather for flying

Fixed wing aircraft for detection is provided by our cooperators (when available and requested) through agreement at no charge when flying in neighboring districts.

Fire lookouts that are regularly staffed during fire season are Desolation, Sourdough and Copper Ridge. These lookouts are all in the Skagit FMU. There are no established lookouts in the Stehekin portion of the Chelan Sub-Basin FMU. However, the public in Stehekin is especially keen at reporting wildland fires. Detection of wildland fires in the Stehekin drainage continues to be a primary concern of Complex fire management staff. Interagency detection aircraft are often used for this purpose.

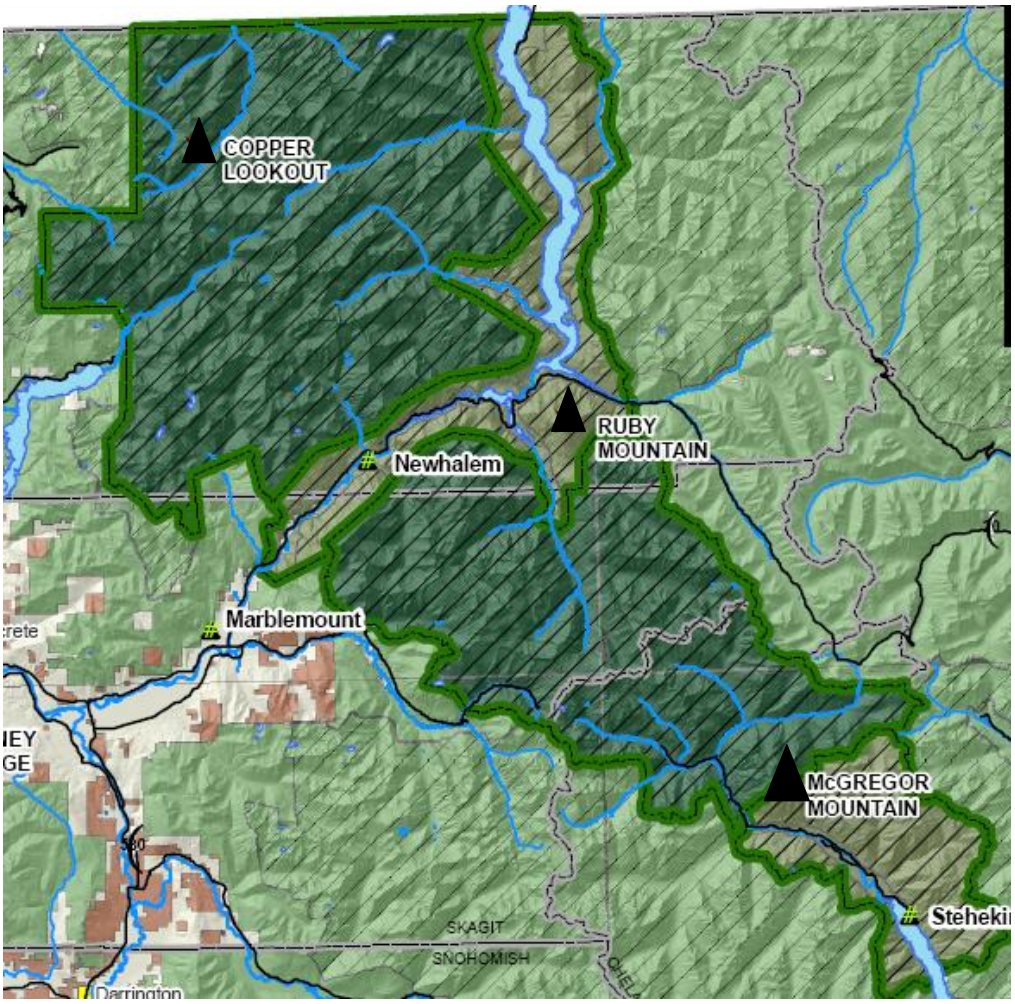
g. Dispatching

The fire dispatch organization in the Complex mobilizes fire management resources in a manner that is timely, cost-effective, and responsive to land and resource management goals and objectives. The Complex maintains an independent fire dispatch center within the fire management organization in Marblemount, Washington. Dispatchers, working under the supervision of qualified duty officers, provide suppression resources within a timely manner for incidents within the Complex. These same dispatchers fill resource order needs as requested by the Puget Sound Interagency Communication Center (PSICC) located in Everett, Washington. There is no centrally located Initial Attack dispatching system that cooperates on an interagency basis. Therefore, it is important for the Department of Natural Resources and the North Zone of the Mount Baker Snoqualmie National Forest to coordinate Initial Attack responses using the closest forces.

The Complex coordinates with the Methow and Chelan ranger districts of OWNF, although the centrally located dispatch Central Washington Interagency Coordination Center (CWICC) typically initiates the Initial Attack responses for these two districts.

h. Communications System

Three primary mountaintop repeaters provide radio coverage within the Complex. See the North Cascades Radio Communication Plan for specific information. The Map below shows the locations of these repeaters.



i. Fire Weather Stations and Networks

Weather stations in the Complex include; Hozomeen (451412), Marblemount (451504) and Stehekin(452121) with Monument 83 located east of Hozomeen in the Pasayten Wilderness. All of these stations are RAWS and are used for NFDRS purposes. .

The fire weather station network provides accurate and reliable weather data in support of fire management programs and activities region wide. Specific network information is contained in the Weather Station Handbook-and Interagency Guide for Wildland Managers, PMS 426-1.

All fire weather stations are set up and operated in accordance with NFDRS and the Weather Station Handbook an Interagency Guide for Wildland Managers, PMS 426-1.

4. Wildland Fire Records

All NOCA wildland fires, prescribed fires, and wildland fire dispatches will be recorded using the DOI's Wildland Fire Management Information (WFMI) reporting program. As a rule, incidents should be input within 10 days of the fire's control date, or within 10 days of dispatch return date.

Incident commanders are responsible for completing a "fireman's report" ensuring its accuracy prior to being issued to dispatch for recording. The FMO or delegate is responsible for checking fire location using the "Topozone" mapping program prior to completing the fire record in WFMI. A hard copy of the completed WFMI fire report along with the Topozone map will be placed in the individual fire report file. This file will be placed in the historical fire records file located in the Fire Ecologists office.

Should any historical record require correcting, the corrected (WFMI) hard copy will amend the original fire report. No historical record will be disposed of. Instead, a notation of correction along with explanation, date and name of person correcting the record will appear on the original record.

Large fire record boxes will be maintained using the "Wildland Fire Incident Records" retention guidance for permanent, temporary and non-record documentation. A copy of the 20 year permanent records will be sent to the National Archives. The NOCA copy of all records will be stored at NOCA in the Marblemount Curation Facility. A GIS copy of the final fire perimeter will be sent to the National Park Service Natural Resource GIS Data Store (NR-GIS Data Store).

5. Fire Education

Fire education activities will be multi-faceted and designed to reach local communities within and adjacent to federal lands, recreational visitors, and employees.

a. Community Outreach

In community outreach, information must be disseminated using a variety of methods to reach as many people as possible. This can be achieved through public meetings, public notices, and public relations.

Public meetings provide a forum for presenting future projects and scoping potential projects. reviewing fuel reduction work that has been performed, and/or inviting residents to participate in fuel hazard assessments or fuel reduction cooperative efforts. The meetings provide a chance for community members to give feedback. Finally public meetings are essential for briefing residents and visitors on current local large fire situations.

Public notices are posted to inform public of fire danger, restrictions, or closures, to provide advance notice of intended prescribed burns, fuel reduction projects, and firewood availability. They also provide notice of upcoming public meetings

Public relations opportunities occur on a regular basis and include informal and spontaneous discussions with community members about aspects of the fire management program, assisting residents with hazard assessments and recommendations for creating and improving defensible space, and coordinating with private land owners on fuel reduction projects adjacent to residences.

b. Interpretation

Interpretation can be a means to educate visitors, school groups, and other groups and organizations. Increasing opportunities exist for fire staff to assist in creating interpretive publications and exhibits. Opportunities also exist for fire staff and interpreters to present programs in local schools on topics of prevention, ecology and use of fire. The Complex website can also be utilized to update, describe, and post photographs of current fire management activities. Partnerships with the USFS and Lake Chelan Boat Company can be explored to provide fire management education to visitors to Lake Chelan. The fire management staff can also explore options for a shared position with interpretation to increase opportunities for fire education.

c. Staff Education

There are many opportunities to keep all Complex staff informed and up-to-date on fire management activities. Fire employees will be provided with management goals and specific project objectives. Non-fire personnel have been and will continue to be offered opportunities to join fire management personnel on field excursions to fuel reduction areas and/or with visiting experts. New employees, seasonal interpreters, and other staff will be reached through presentations at seasonal orientation. Finally, it will remain essential to inform all staff of fire danger levels.

d. Talking Points

The talking points in this list are important aspects of the fire planning process that should be included in communication with the public and staff. These are basic messages and should be considered when formulating talking points for specific incidents.

- This Plan implements *existing* fire management policy; it does not create new policy.
- This Plan is an interagency planning and coordination effort.
- This Plan has been created to address fire issues across a watershed. It recognizes that fire issues involve topographical areas, not administrative boundaries.
- This Plan defines parameters in which wildland fire can be managed to meet mutlitple objectives.. It does not give agencies permission to not manage fire(s). Definite action must be taken for each and every ignition
- This Plan gives fire managers a range of alternatives to manage wildland fires. protects the safety of firefighters, and takes advantage of fire's historic role and benefits to ecosystems.
- Using fire as a tool always involves accepting some degree of risk that any given fire might exceed the prescription within which it was expected to burn. Though escapes are not desirable, they are not completely unexpected.
- Fire issues considered in this Plan include a range of responses to wildland fires, and the use of prescribed fires.
- This Plan has been created using valuable input from citizen advisory committees.

- This Plan provides a flexible and dynamic framework for making decisions about fire both for natural resources and social needs.

5. Fire Response – Interagency Coordination

The Complex has divided its management response zones into two fire management units (FMU). Each FMU has been further divided into fire management areas (FMA). Both FMU include USFS lands. **The Forest Supervisor or Complex Superintendent has the prerogative to suppress any fires at anytime, regardless of location within their jurisdiction.**

The OWNF and Complex will communicate to share resources on Wildland fires at all possible times.

Report fire to the appropriate dispatch:

- USFS/Central Washington Interagency Communications Center (CWICC)
- (509) 663-8575 (open 24 hours year round)
- NPS/Marblemount communication center 360 854 7249
- (general emergency – open 0700 until 2300 hours) or
- NPS fire management dispatch office 360 854 7351
- Fire Management Officer -360 854 7350 or 360-391-2533
- Wildfire Operations Specialist – 360 854 7352
- If after 2300, contact Puget Sound Interagency Communication Center (PSICC)
- at (425) 783-6150

Marblemount fire staff will inform PSICC of ongoing incident and will request FIRECODE numbers.

a. Process

Upon confirmation of a fire start, the appropriate dispatch will determine response to fires based upon a map provided to them and other direction from the Complex Superintendent, Chief Ranger, Forest Supervisor, or Fire Staff Officer.

If the fire falls into an FMA where the use of fire is Not Compatible, a suppression response will be initiated.

If the fire is in an FMA where use of fire is appropriate, dispatch will immediately contact the district duty officer or FMO to determine if there are any critical areas where holding actions are warranted. If the duty officer or FMO cannot be contacted, dispatch will initiate the holding action until contact is made. Fire Size-Up and Situation information will be obtained and an assessment utilizing the Wildland Fire Decision Support System (WFDSS) will be made by the duty officer or FMO with assistance from the district ranger and resource specialists.

All ignitions must go through WFDSS and must be approved by the Superintendent
Initial Wildland Fire Assessment

Fire Situation element of WFDSS documents the current and predicted situation, all appropriate administrative information, and aids managers by providing them with decision criteria to make the initial decision whether to continue management of the fire or to take suppression action.

Upon verification of a wildland fire:

USFS: District Fire Team (FMO, district ranger, resource specialists) will initiate the WFDSS system, with input from forest headquarters as needed. If the fire is a candidate use of wildland fire, the District Ranger, if designated in writing by the Forest Supervisor, can proceed with the fire gaining benefits from and appropriately responding to fire. If the District Ranger does not have this authority, then the Forest Supervisor or acting supervisor must make the final decision.

NPS: District Fire Team (FMO, district rangers, and resource specialists) will initiate the WFDSS process with input from Complex headquarters as needed. If the wildland fire is a candidate for use of wildland fire, the FMO or Chief of Resource Management will recommend the action to the Superintendent or their designee who will make the final decision.

If the wildland fire occurs in an FMA that contains both OWNF and Complex lands or is adjacent to an FMA with joint or other agency ownership, then the WFDSS documentation will be signed by both the Complex Superintendent and the Forest supervisor or their designees.

If the wildland fire is not immediately suppressed:

USFS: District duty officer or district FMO will instruct dispatch to mobilize the suppression resources necessary to take the appropriate response.

NPS: Duty officer or FMO will mobilize the suppression resources needed to take appropriate action.

b. Roles and Responsibilities – OWNF Headquarters and Complex Fire Management Officer

- Evaluate and input information concerning national and regional preparedness levels, potential off-site impacts of the ignition, and to assure that the needs and concerns of cooperating agencies are part of the decision process.
- Ensure the Forest Supervisor (or designee) or Complex Superintendent (or designee) signs the WFDSS.
- Work with public affairs to assess information and education needs and take appropriate action to get needed assistance.
- Ensure the Forest Supervisor (or designee) or Complex Superintendent (or designee) is informed each day on the current and predicted status of each fire on the OWNF or in the Complex. This should be accomplished before 1200 daily and must include staffing level, current predicted weather, and suppression force availability.
- Assist public affairs and/or information officers to ensure accurate and prompt information is disseminated to appropriate public officials, tribal governments, and the news media.
- Review decisions as noted in periodic assessment tab of WFDSS with Forest Supervisor (or designee) or Complex Superintendent (or designee) to reaffirm previous decisions or to make new decisions during the entire life of the wildfire.
- Coordinate headquarters personnel involvement in developing and implementing the WFDSS.
- Assess capability to manage a fire or fires. Consider staffing requirements, complexities, duration, etc. If changes are appropriate, make recommendations to the Forest Supervisor (or designee) or Complex Superintendent (or designee).
- Track and document the trend toward severe burning conditions.

6. Pre-Attack Plan

The pre-attack planning checklist is designed to assist fire managers in the event that starts are likely, to facilitate efficient and effective initial and extended attack responses. This will save time and resources, leaving managers more time for protection of values at risk. The following pre-attack planning checklist will be utilized prior to fire season. It is a comprehensive list developed to facilitate necessary planning for all Complex fire events.

The necessary components of this list will be updated annually and in cooperation with necessary park specialists. They include but are not limited to biologists and botanists, cultural resource specialists, procurement specialists, radio technicians, ranger staff, maintenance staff, and the Superintendent.

PRE-ATTACK PLANNING CHECKLIST

COMMAND	OPERATIONS
Data Pre-loaded in WFDSS	Helispot, helibase locations
Pre-position resources	Flight routes, restrictions
Draft delegation of authority	Water sources
Management constraints	Control line locations
Interagency agreements	Natural barriers
Evacuation procedures	Safety Zones
Structural protection needs	Staging area locations
Closure procedures	
LOGISTICS	**PLANNING**
ICP, base, camp locations	Park base map
Road, trails (including limitations)	Topographic maps
Utilities	Infrared imagery
Medical facilities	Vegetation/fuel maps
Stores, restaurants, service stations	Hazard locations (ground and aerial)
Transportation resources location	Archeological/cultural base map
Rental equipment sources (by type)	Endangered species critical habitats
Construction contractors	Sensitive plant populations
Sanitary facilities	Special visitor use area
Police, fire departments	Land status
Communications (radio, telephone)	
Sanitary landfills	
Portable water sources	
Maintenance facilities	

7. Initial Attack

Initial Attack is an aggressive suppression action consistent with firefighter and public safety and values to be protected. This strategy is applied as the result of decisions made under the WFDSS process.. Suppression priorities are set with consideration for wildland urban interface, vegetation, fuel model and fire regime; wildlife habitat; archaeological and cultural sites; smoke/air quality impacts; and sensitive natural resources.

a. Initial Response Times

Initial response times vary widely since the Complex is sizeable and offers limited access in most locations. If there is an imminent or expected threat to human life or values to be protected, the response time is reduced to the maximum extent possible. During fire season, helicopters may be staged and available at Marblemount or North Cascades Smokejumper Base in Twisp. Retardant planes may be staged at Moses Lake airport. In addition, the following resources are generally available within the stated average response time.

Initial attack hand crew (5-person in Marblemount/Kettle Falls or 5-person in Stehekin): 1 – 4 hours
Wildland engine (USFS or DNR; the Complex has no engine) Hwy 20 corridor: 1 – 3 hours
Wildland engine-Stehekin: 5 minutes – 1/2 hour

- Smoke jumpers: ½ -1 ½ hours (priority based)
- Rapellers: 1 – 3 hours (priority based)
- Retardant: 1 hour (priority based)
- Helicopter: ½ - 4 hours (priority based)

b. Minimum Impact Tactics

Director's Order 18 states that Parks will use methods to suppress wildland fires that minimize impacts of the suppression action. Minimum impact tactics (MIT) and guidelines are included in RM-18. The goal of MIT is to do the least amount of damage to the landscape if suppression action is necessary.

In line construction this means contracting the least amount of fire line length and width in order to check fire spread. MIT recommends the use of natural barriers or areas with smaller, lighter fuel loads that do not require as wide a fire line or as much manipulation of the fuel. Camps, staging areas and helispots or helibases are also planned in a manner to result in the least possible impact with safety still given first priority. Because the vast majority of land in the Complex land is designated wilderness, minimum impact tactics are an important part of operations, and MIT briefings are provided prior to all suppression actions within the Complex. An implementation guide of MIT tactics is included as an appendix to this Plan.

8. Extended Attack

Extended attack occurs when a fire has not been contained or controlled by the Initial Attack forces and continues, either until transition to a higher level incident management team (Type I, Type II or III) is completed, or until the fire has been contained and/or controlled. Extended attack requires Wildand Fire Decision Support System (WFDSS) to document the re-evaluation of suppression strategies. If a wildfire occurs a WFDSS will be initiated. The FMO, along with a small ID team (including the ranger division and cultural and natural resources managers), is responsible for development of the WFDSS.

During an extended attack, the Incident Commander will be a qualified Type III Incident Commander or higher. That is, the extended attack automatically becomes a Type III incident. Personnel and equipment will be ordered from other agencies and cooperators, as required, using the closest forces concept.

The Type III organization has the responsibility to manage the incident within their qualifications. If the incident becomes more complex, the Type III team will prepare for an orderly transition to either a Type II or Type I Team. The Type III team will not expand into a Type II organization. The Type III Incident Commander will prepare an "Initial Attack IC Briefing" to give to the incoming team. Prior to and during transition

to another incident management team, the Type III team will continue fire suppression actions to meet agency administrator objectives. All area/national incident management teams will work directly for the superintendent or his delegate.

9. Escaped Fire Procedures

If an existing Prescribed fire plan is exceeded and could not be contained within 24 hours, a WFDSS document will be completed.

The Wildland Fire Decision Support System (WFDSS) is utilized to select a new strategy. Strategies include the range of suppression responses. It identifies, analyzes and evaluates reasonable management alternatives. Items analyzed include: firefighter safety, anticipated costs, resource impacts, and environmental, social or political considerations. A WFDSS document or any revisions must be approved by the agency administrator (for the NPS the Superintendent, USFS-Forest Supervisor). The triggering mechanism for the revision of a WFDSS document is when failure of the existing alternative is imminent.

10. Aircraft Use

The Complex has a sizeable wilderness with limited access. Rotor wing aircraft are utilized for a variety of purposes including the following: to move personnel and/or equipment, to aid detection and observation, to deploy smokejumpers/rapellers,and/or to make water or retardant drops. In addition to aiding suppression activities**,** helicopters are often also used for detection, observation, monitoring, infra-red imaging, and mapping.

National Park Service DO-60 states that employee and public safety is considered foremost for all aviation activities, but full consideration is also given to resource and visitor impacts. In keeping with this direction and to minimize risk to personnel and minimize noise impacts to wilderness, only flights deemed necessary to fire operations will be conducted with only necessary personnel. All non-incident flying will occur only after review and approval of the wilderness committee. Incident flights will be well-coordinated to meet multiple tasks and reduce flight time over wilderness areas. Mapping and reconnaissance flights will only occur as a result of markedly changed fire growth or as a result critical fire weather. Only previously disturbed areas or areas that require little manipulation of vegetation will be used for helispot construction whenever possible.

Safety is primary concern in all fire operations and is emphasized with helicopter operations. All helicopters and personnel utilizing helicopters involved in fire operations are subject to policies and guidelines in the Interagency Helicopter Operations Guide. For example, flying over populated centers increases risk and should be avoided if possible. . Alternate routes will be considered by helicopter managers and helibase managers.

Helibase sites with road access exist on the Marblemount compound, at the Goodell rock pit (Washington State Department of Transportation – DOT), the Newhalem heliport

(Seattle City Light), the Colonial Creek boat house, Swamp Creek (DOT), and on private agricultural fields in Marblemount (under agreement).

Care will be given to limit the spread of noxious weeds from the Stehekin airstrip and to or from other airstrips outside the park. Exotic species removal from the Stehekin airstrip is close to being completed. Opportunities exist for cooperating with the North Cascades Smokejumper base to minimize exotic species spread from that helibase or fields used as helibases outside of the town of Winthrop.

C. Use of Wildland Fire

One of the primary goals of North Cascades National Park managers is to permit lightning-caused fires to burn in order to preserve and restore wildland fire as a vital and necessary process to the Stephen Mather Wilderness and adjacent USFS lands to the greatest extent possible. In keeping with the goals of this Plan (Chapter III Section B) the use of fire is in keeping with historic interactions between fire and the environment influence over vegetation structure and biodiversity. Furthermore, in areas showing adverse effects from fire suppression, the use of fire can reduce the risk of unwanted, high-intensity wildland fires that might cause undesirable changes in forest type and threaten human lives or property.

1. Interagency Coordination and Fire Management Units

Possible cooperators in use of wildland fire include: Mt. Baker-Snoqualmie National Forest, Okanogan-Wenatchee National Forests(OWNF), Seattle City Light, Manning Provincial Park and British Columbia Forest Service. The OWNF is the only signatory that has a current fire plan.. That is, an agreement is in place for fire crossing OWNF boundaries. Actions on other lands will be subject to constraints of the governing agency.

If a fire is located within an FMA that includes land of any of our cooperators, the FMO or Duty Officer on the corresponding district will be informed of the fire as soon as possible. The WFDSS (if any of the alternatives include land from both agencies) will be completed cooperatively by both agencies and signed by the Forest Supervisor as well as the Park Superintendent.

The FMAs for the Stehekin portion of the Complex were completed in cooperation with OWNF. The map is included in the Chelan Basin fire management plan that was signed in May of 2002. The Ross Lake portion of the complex FMAs that borders the OWNF were drawn to natural boundaries rather than jurisdictional lines. Future cooperation with the Mt. Baker-Snoqualmie Forest, drawing similar boundaries, is expected during their management planning process.

2. Wildland Fire Decision Support System

Wildland Fire Assessment

Dispatcher or Duty Officer will create an incident in the WFDSS system with location (Lat/Lon), Fire number, code, start date and time If the wildland fire looks like it has more risk than benefits associated with it, the Duty Officer or FMO will mobilize the resources needed to take suppression action and notify the Superintendant.

If a Decision is needed

The fire team (FMO and resource specialists) will author a WFDSS document with input from Complex headquarters as needed. If the wildland fire can be used for benefits to the ecosystem, the FMO or Chief of Resource Management will recommend the action to the Superintendent or their designee who will make the final decision, supported by the analysis generated from WFDSS (such as short term fire behavior predictions and FSPRO runs).

If the wildland fire occurs in an FMA that contains both OWNF and Complex lands, or is adjacent to an FMA with joint or other agency ownership, the WFDSS will be completed jointly by both agencies and signed by both the Park Superintendent and the Forest Supervisor, or their designees.

Periodic Fire Assessment:

Assessment frequency will be set by the local unitline officer.. This is documented in WFDSS after the approval has been made. If there is a significant change outside the original frequency, the following measures should be implemented:

- Fire Manager may update the WFDSS based on line officer input and/or specialists used in preparation of the Initial Assessment, as needed.
- WFDSS documents any changes to the original and requires line officer approval.
- If the fire requires additional suppression, the team may be called upon to provide data and information for development of a plan. They can develop strategic alternatives that utilize suppression responses and recommend tactics that result in the least resource impacts.
- When the fire is declared out, the USFS district ranger or Complex FMO is responsible to do the following:
- **USFS:** Insure completion of the Fire Report and forward a copy to the appropriate dispatch. Dispatch will complete a computerized 5100-29 and submit it to the FIRESTAT master files.
- **NPS:** Insure completion of the Fire Report and submit it through WFMI system.

3. Monitoring

Monitoring should initially come from on the ground observations within three days of discovery. If no safety zones appropriate to the current and expected fire behavior are available for safety of the monitor, weather observations will come from a safe site that

has site similarities in fuel type, slope, exposure, aspect, and elevation. Monitoring after the initial observations, can be performed on site (if deemed safe and necessary), through aerial observation, or from a location from which the fire can be seen (i.e. fire lookout or neighboring ridge). If on-site monitoring is required, the entire cost will be charged to the fund appropriate for that incident. Any specialized equipment costs for monitoring (helicopters, infra-red imaging flights, film development) will also be charged to the appropriate funding code.

WFDSS identifies a process in which to validate decisions made within pre-designated time frames for the life of the fire. Complex staff or an Incident Commander will utilize spot weather forecasts, long-range forecasts, BEHAVE, RERAP,FSPro or farsite in making determinations on how close a fire is to a suppression zone or resources at risk. Fires will be monitored at the following frequencies agreed upon by Complex fire management staff:

Monitoring Frequency	**Proximity of fire to suppression zones or values at risk**
1-10 days	Greater than 2 weeks away
1-5 days	Less than 2 weeks away
Daily	Less than 1 week away
Through each burn period	Less than 3 days away

4. Fire Management Skills, Qualifications, and Organization

The qualifications, skills, and organization necessary to implement and manage a wildland fire vary depending upon the situation and complexity. Once a decision is made a qualified Incident Commander will be assigned to manage the incident. Other individuals responsible for the various WFDSS Response Levels and revalidations should have completed the appropriate academic or on-the-job training listed below.

Line Officers (Complex Superintendent, Forest Supervisors) who will make all final decisions regarding fire should possess the following skills and knowledge:

- Advanced Fire Use Applications (S-580)
- Fire Management for Line Officers
- National Advanced Wilderness Management Training for Line Officers or a regional wilderness line officer course.

Specialists that may be consulted in how to manage fire include a long-term fire behavior analyst, the Complex Wilderness District Ranger, incident information officers, fire operations specialists who are at least division group supervisor qualified, archaeologists, GIS specialists, or other specialists determined as necessary by the team.

Besides the expertise of the specialties they represent, the individuals should also possess the following skills and knowledge:

- Advanced Fire Use Applications (S-580)
- Familiarity with wilderness laws and philosophy

In addition, wildfire modules have been developed regionally and nationally that provide monitoring skills as well as direction for performing minor holding and/or protection actions as needed.

Based on past experience with prescribed natural fires and confinement fires on OWNF and WFU in the Pasayten Wilderness and within the Complex, the following organizational implications should be considered:

- Develop a rotation schedule for incident overhead positions to ensure consistency during transition or to allow for appropriate rest and recuperation (R & R) as needed

- Consider the possibility of a SOPLfor more than one incident. This may be feasible if there are a number of fires within the same vicinity. We have a limited number of qualified SOPLs to assist with management of incidents of this nature and such coordination would enable us to utilize this scarce resource more efficiently.

- Consider the use of WildlandFire Modules or short Type II Teams that have experience in the use of wildland fires or a strong Type III Team that is made up people with experience in managing remote and /or long-duration fires.

- Consider an independent radio frequency for flight-following aircraft and to keep track of personnel associated with incidents where communication “black holes” exist.

D. Prescribed Fire

Prescribed fire has been and will continue to be utilized for restoration of the fire cycle in fire dependant ecosystem. This burning is important for hazard fuel reduction to limit the spread potential of fires in a wildland urban intermix situation. It is also important to maintain the historic range of variability of vegetation composition and structure.

The first prescribed fire performed fire management personnel in the Complex was carried out in the Stehekin Valley in 1991. Areas of hand-lit prescribed fire were later planned and carried out in accordance with Forest Fuel Reduction and Firewood Management Plan (1995) in the lower Stehekin Valley. The General Management Plan (1988) speaks directly to using prescribed fire for restoration and to protect life and property in the Stehekin Valley.

1. Burn Plans

The Complex is required by Reference Manual and Director's Order 18 to provide the following before any prescribed fire:

- An approved fire management plan with associated NEPA document examining impacts of the prescribed fire units or a separate NEPA document for treatments not analyzed in the Plan.
- A burn plan that is in compliance with the National Historic Preservation Act (NHPA) and the Endangered Species Act (ESA)

In addition, all burn plans in the Complex are submitted to the interdisciplinary team for compliance and mitigation then approved by key individuals by signature prior to implementation.

All burn plans in the Complex are reviewed and signed by the following individuals:

- Agency Administrator (superintendent) as the ultimate approval authority
- Fire Management Officer
- Resource Chief
- Cultural Resource Chief
- Chief Ranger
- Chief of Interpretation
- Burn Boss
- Technical Reviewer (for burns that require a Type I or II Burn Boss)

Burn plans must address the following information:

- General and legal descriptions of the area
- Project size, elevation range, slope range, aspects
- Description of project boundaries
- Vegetation type and fuel models
- Goals and objectives
- Prescription parameters
- Pre-burn considerations
- Estimated Cost
- Scheduling
- Ignition and holding actions
- Risk analysis
- Complexity analysis
- Organization list
- Adequate holding resources worksheet
- Protection of sensitive features (cultural or privately owned resources within unit)
- Public and firefighter safety (Job Hazard Analysis, Medical Plan etc.)
- Smoke Management
- Interagency coordination and public information
- Wildfire transition plan
- Monitoring
- Post-fire Rehabilitation

- Agency Administrator Go/no-Go pre-ignition approval sheet
- Prescribed fire operations Go/no-Go checklist
- Vicinity Maps
- Project maps

2. Prescribed Fire Qualifications

Personnel qualifications for prescribed fire operations are as follows:

If assigned to a management ignited fire or prescribed natural fire, the **Prescribed Fire Manager** is responsible directly to the designated line officer for implementation, coordination, and ongoing management of the assigned fire activities.

The **Burn Boss** has direct responsibility for onsite implementation of specific actions in strict compliance with the approved burn plan. The **Burn Boss** is accountable to the **Prescribed Fire Manager**, if assigned, or the designated line officer in the absence of a Prescribed Fire Manager.

The **Ignition Specialist** reports directly to the Burn Boss.

All personnel required on prescribed fire must meet the requirements outlined in NWCG 310-1 for their positions.

3. Prescribed Fire Units

a. Stehekin Contours Units

These units are designed to protect the wildland urban interface community of Stehekin. Larger scale burning will compliment the Forest Fuel Reduction Areas (FFRA's) already present in the Stehekin Valley. Units on the valley walls tie into the FFRA's providing added fire protection from fire moving down valley. These upland areas carry fire readily both because the sites are drier and from fire suppression. Weather history data shows summer winds patterns are likely to push a fire down valley with the zone of influence extending to 2200 feet in elevation (the lower valley floor sits between 1150 at the Stehekin Landing and 1800 feet at High Bridge). Fires igniting on slopes above the valley floor in steep locations will also travel downhill readily from rolling material.

The project is expected to occur over a 10 year period. An estimated 300-800 acres will be burned each year.
All prescribed fire projects will be planned and implemented using the Interagency Prescribed Fire Reference Guide (2006).

i. Tools of Implementation

To effectively carry out these burns on a larger scale, helicopter ignition is essential. These areas are steep. The interior of these units lacks safe and appropriate access for firefighters and ignition personnel to complete burning.

Holding personnel would be used below the burn and on the upvalley and downvalley flanks only where terrain factors make it safe to do so. Some areas border private property, and some of this private property contains primary residences and some second homes of high value. The majority of the holding efforts will be concentrated in these areas. Holding efforts around structures may include pumps, hose lays and some hand line.

Helicopter water drops will be utilized for holding on the upslope sides of the burn units. In some cases this will be the only resource if the area is deemed too dangerous for ground personnel. In the wilderness, hand line will be utilized where natural barriers are not present as control lines. The use of natural barriers when it is possible makes prescribed fire cost effective as well as minimizing impacts to wilderness values. The Stehekin Valley on the southwest facing side does, in many cases, have some very good barriers to fire spread under prescribed conditions.

ii. Fuel Divisions

There are three areas of concentration that are broken down by their relative locations in the valley, fuel parameters, and forest types. They are divided in this manner primarily because weather and fuel conditions found at the north end of Lake Chelan National Recreation Area (High Bridge) are quite different from those at the south end (Flick Creek).

Starting from the south boundary there are three units along the shore of Lake Chelan which rise to 3500 feet elevation. These are Flick Creek, Maxwell, Hazard Creek and Imus. These units were burned in the Flick Fire 2006. The middle units are Buehler's, Boulder, and Rainbow and Company Creek. Units at the north end are McGregor Meadows, Field, Ranch, and Coon Lake.

iii. Sequencing

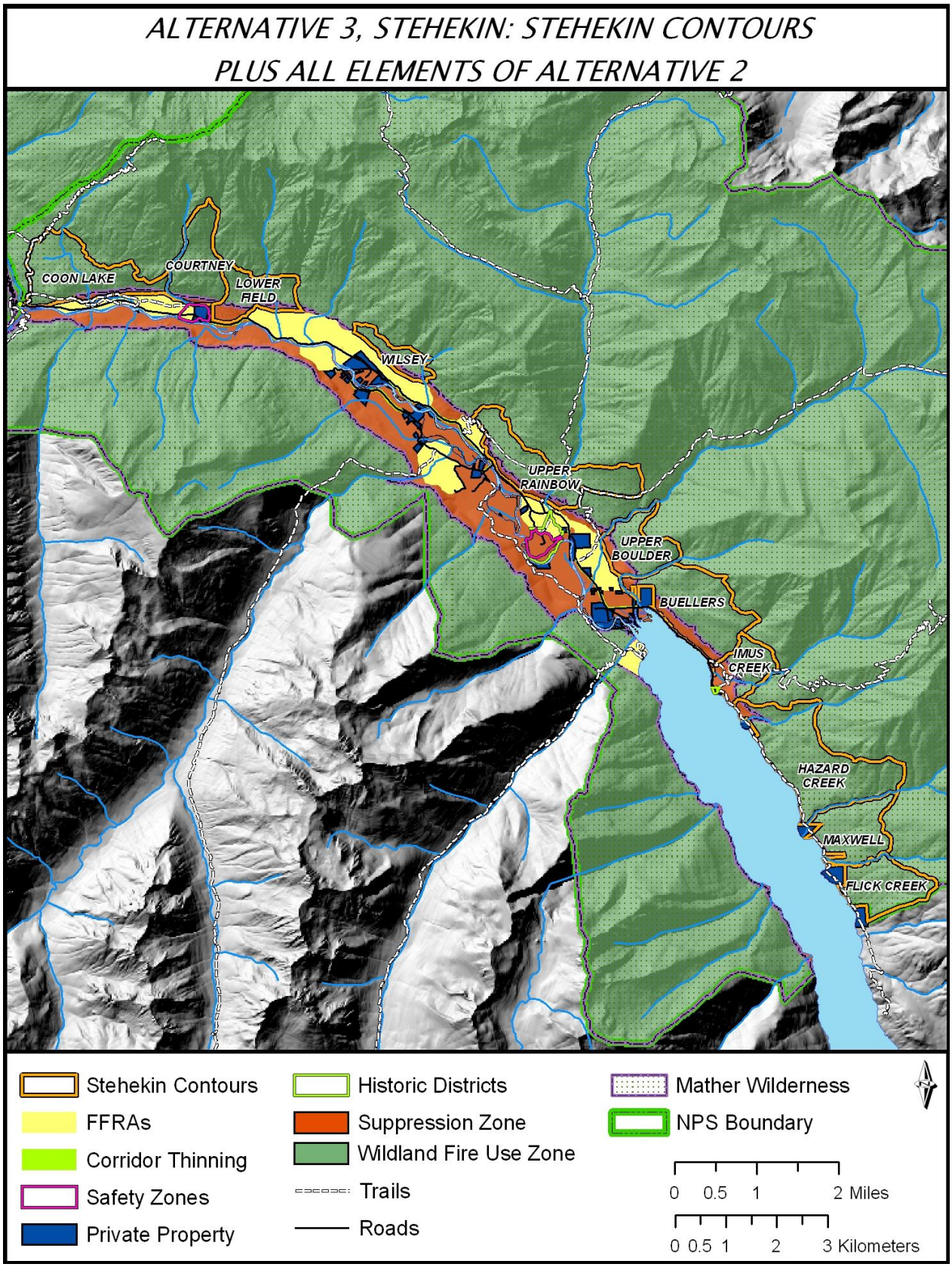
Sequencing for units is determined by ease of holding and amount of protection gained. The units that are completed first can be used to tie into for control lines. This would minimize both cost and impacts to wilderness. Burning would not be limited to one area (lower, middle or upper) in one year or from year to year in fiscal year 2011 and beyond. Instead, a range of options would remain available based on weather and fuel conditions.

On the south end, the Buehler and upper Boulder units will be burned first taking advantage of fire breaks to secure the prescribed fire (the Boulder Fire 1994 and Flick 2006). In the middle units the Rainbow would be first working upvalley toward the north units. On the north end, the Ranch unit will be burned first, since it is the easiest to hold and serves to protect the largest number of structures.

b. Forest Fuel Reduction Areas

The Stehekin Forest Fuel Reduction and Firewood Management Plan (1995) outlines a program of work for the protection of the Stehekin community. This plan included a combination of thinning and prescribed burning on the Stehekin Valley floor. Desired future condition has been obtained on some of these units and maintenance burning will be performed in these areas. Other areas have yet to be thinned to the desired basal area. These areas will be thinned and burned for fuel reduction in wildland urban interface until the desired future condition is met at which time maintenance burning will

commence. Additional acreage and units have been added to the Forest Fuel Reduction Areas (FFRA) in this plan. Thinning and prescribed will also be performed in these areas.


ALTERNATIVE 3, STEHEKIN: STEHEKIN CONTOURS
PLUS ALL ELEMENTS OF ALTERNATIVE 2
COON LAKE
COURTNEY
LOWER FIELD
WILSEY
UPPER RAINBOW
UPPER BOULDER
BUELLERS
IMUS CREEK
HAZARD CREEK
MAXWELL
FLICK CREEK
Stehekin Contours
FFRAs
Corridor Thinning
Safety Zones
Private Property
Historic Districts
Suppression Zone
Wildland Fire Use Zone
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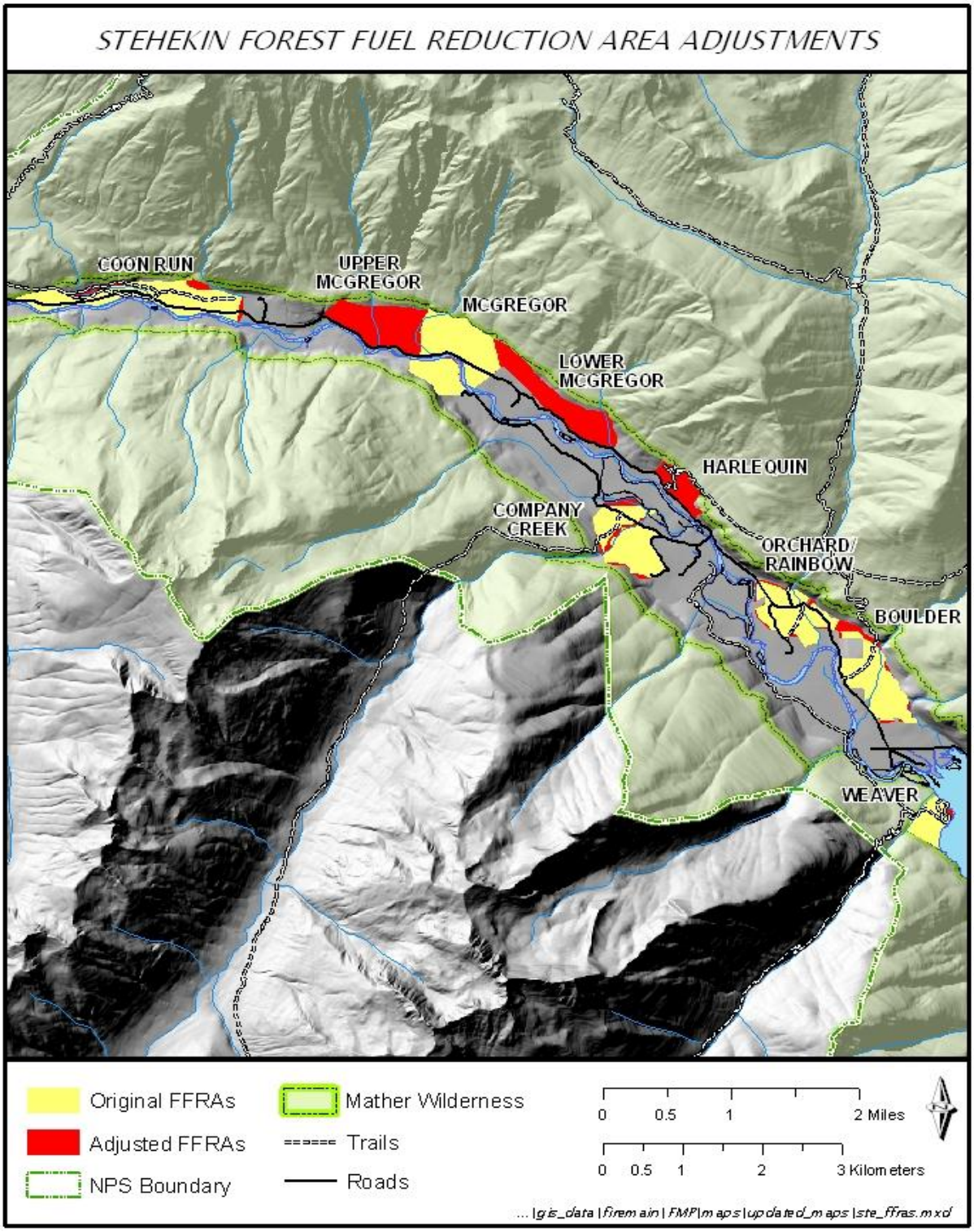
STEHEKIN FOREST FUEL REDUCTION AREA ADJUSTMENTS
COON RUN
UPPER MCGREGOR
MCGREGOR
LOWER MCGREGOR
HARLEQUIN
COMPANY CREEK
ORCHARD/ RAINBOW
BOULDER
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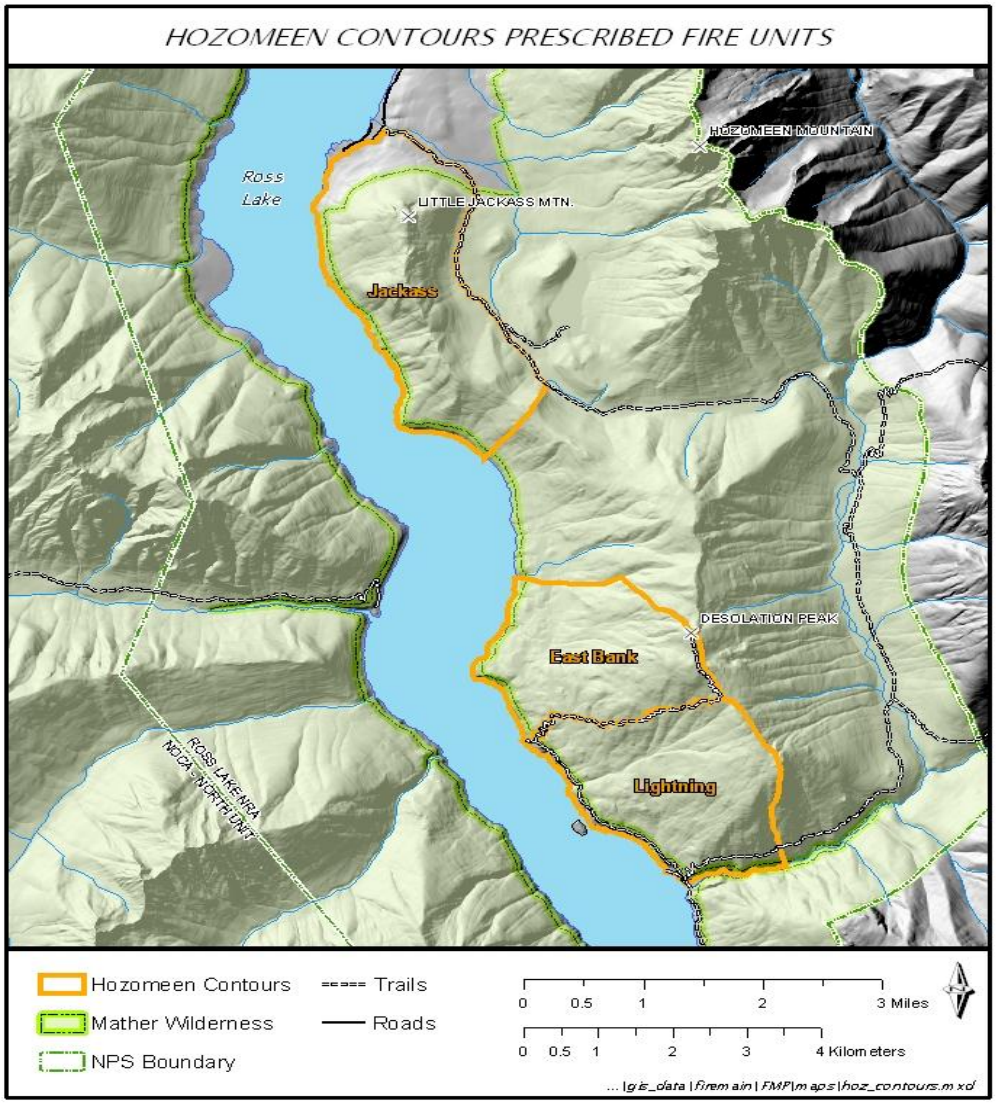
c. Hozomeen Contours Units

Prescribed fire units around Hozomeen are intended to protect the Hozomeen campground area and the shared boundary with Canada from wildland fires. These units are lower in priority than the Stehekin units because given the fire return interval is higher and values at risk are farther away. The majority of the Stehekin units will be completed prior to implementation of any Hozomeen units (see multi-year project plan below).



d. Prescribed Fire Units by Size

The average size of the Stehekin Contours units is 440 acres. The first of these units will be prescribed burned in fiscal year 2008. The average size of the Hozomeen contours units is 1737.

Stehekin Contours Prescribed Fire Units		Acres
Ranch		400
Coon Lake		569
Lower Field		444
Wilsey		338
Upper Rainbow		610
Upper Boulder		309
Buellers		663
Imus Creek Fire	Burned during Flick	269
Hazard Creek Fire	Burned during Flick	910
Maxwell Fire	Burned during Flick	409
Flick Creek Fire	Burned during Flick	400
Totals		**4,848**

Hozomeen Contours Prescribed Fire Units	Acres
Jackass	2149
Lightning	1385
Eastbank	1676
Totals	**5219**

e. Re-ignition of Suppressed Fires

Lightning-caused fires were suppressed within the Complex for many decades under both NPS and USFS management. These suppressed fires are viewed as missed opportunities for natural processes. Under this Plan fires suppressed due to management constraints could be re-ignited along the suppressed perimeters when constraints do not preclude use of fire. If re-ignition is performed in the same fiscal year that the fire was suppressed, a prescribed fire burn plan will be developed for each re-ignition, fire behavior modeling and spread projections, and the decision criteria checklist will be used. The prescribed fire manager may choose to use portions of WFDSS to assist in developing any planning required outside of the burn plan. Fire code money will not be expended during a re-ignition fire.

4. Air Quality

Under the Clean Air Act of 1977, North Cascades National Park is a Class I area, the recreation areas are Class II areas, and much of the Complex is adjacent to other Class I wilderness areas. Class I areas have the most stringent air quality requirements; managers are charged with protecting air quality-related values in these areas from adverse impacts by following State Implementation Plans (SIPs) for attainment of primary and secondary NAAQS, Prevention of Significant Deterioration, and for the protection of visibility. Director's Order #41: Wilderness Preservation and Management, calls for the reduction of impacts of smoke from wildland fires on visibility in Class I wilderness, "while understanding and promoting the need to re-introduce the natural role of fire into wilderness ecosystems (1999)." Final Regional Haze regulations call for the improvement of visibility in national parks and wilderness areas, as well as the development of long-term strategies to reduce emissions that cause visibility impairment in Class I areas.

All prescribed burns will take into account regional and national conditions related to air quality. Toward this end, fire managers will follow all SIP requirements (see below). For example, managers will make use of dispersion modeling to assure that large prescribed burns occur during optimal meteorological conditions for smoke to be dispersed away from nearby communities. State air quality officials may require that some burns be postponed or modified to assure that conditions are good for dispersal of pollutants.

Two IMPROVE (Interagency Monitoring of Protected Visual Environments) stations monitor changes in visibility in the North Cascades – one at Ross Lake NRA and the other in the Pasayten Wilderness. In addition, an e-BAM (beta attenuation monitor) will be installed in Stehekin to continuously measure particulate, volatile organic compounds, and nitrites. By monitoring smoke levels in Stehekin, managers will be able to quickly respond to any unanticipated and unacceptable levels of pollutants (e.g. by suppressing the fire) to assure the health and safety of the Stehekin community. The eBAM and IMPROVE monitors will also provide information on whether the prescribed burn program is affecting visibility and haze throughout the region.

a. Applicable Standards and Requirements

Under the federal Clean Air Act and the Washington State Clean Air Act, Washington State Department of Ecology, Washington State Department of Natural Resources, and the Environmental Protection Agency, Region 10 have primary responsibility for air quality management in North Cascades National Park.

b. National Ambient Air Quality Standards (NAAQS)

Air quality protection under the Clean Air Act of 1977, as amended, is achieved through implementation of National Ambient Air Quality Standards (NAAQS). Standards are set by the Environmental Protection Agency (EPA) for the following six pollutants considered harmful to public health and the environment: carbon monoxide, lead, nitrogen dioxide, particulate matter, ozone, and sulfur oxides. Particulate matter is the primary indicator of impacts from smoke; NAAQS standards are set for fine particles with a diameter less than or equal to 2.5 micrometers ($PM_{2.5}$) and particles with a

diameter less than or equal to 10 micrometers (PM_{10}). These standards must be met at all times. (See the EPA website for more information: http://www.epa.gov/air/criteria.html) These standards are implemented through regulations contained in the State Implementation Plan (SIP) developed by the Washington Department of Ecology and approved by EPA.

c. Visibility and Regional Haze

Special visibility protection provisions of the Clean Air Act apply to Class I areas. Under these provisions, the NPS identified "integral vistas" that are important to the visitor's visual experience in Class I areas. It is NPS policy to protect these scenic views. In addition to the development of a SIP for NAAQS, states are required to develop and implement a visibility SIP including special provisions for Class I areas. This plan falls under the Prevention of Significant Deterioration permit program for industrial sources. In addition, new national regulations have been promulgated to prevent and remedy regional haze affecting Class I areas. These regulations require states to develop regional haze SIPs to restore visibility in Class I areas to natural levels over the next 60 years.

Lightning-caused fires are considered natural and, therefore, for regulatory purposes, their smoke is not considered pollution. (Note, however, that the need to protect human health from the potential impacts of smoke from wildfire is important criteria in the decision to suppress or not suppress these fires separate from any regulatory scheme.) Smoke from management-ignited prescribed fires is considered manmade pollution, and fires must be conducted in a manner that assures compliance with NAAQS as well as visibility and regional haze requirements and associated SIP rules.

d. Washington Smoke Management Plan

Managers also must adhere to regulations for prescribed fire contained in the Washington State Department of Natural Resources Smoke Management Plan (SMP). The SMP is the key link between fire management practices and the Clean Air Act. The revisions to the plan in 1998 require approval from the DNR for all burns involving over 100 tons of fuel. Large fire (burn) approval considers a number of factors including the likelihood of intrusion into populated areas and Class I areas, air quality regulations, violation of emission reductions targets, violations of another state's air quality standards, and whether smoke will disperse within given timeframes. Following the SMP, working with DNR, and obtaining approval from DNR for all burns over 100 tons of fuel assures that the purposes of the SMP are met. These purposes are to:

- Protect human health and safety from the effects of outdoor burning
- Facilitate the enjoyment of the natural attractions of the state
- Provide a limited burning program for the people of this state
- Provide the opportunity for essential forest land burning while minimizing emissions
- Reduce emissions from silvicultural burning (other than for forest health reasons) by 50%
- Foster and encourage the development of alternative methods for disposing of or reducing the amount of organic refuse on forest lands
- Acknowledge the role of fire in forest ecosystems and allow the use of fire under controlled conditions to maintain healthy forests

The SMP contains several directives, which are listed below:

- Burning is allowed only if the fires do not contain prohibited materials.
- Smoke must not obscure visibility on public roads and highways or cause a nuisance.
- No ignition of fires that will consume 100 tons or more of fuel will be permitted on federally managed and participating tribal lands unless the department's Resource Protection Division, Smoke Management Section, has given smoke management approval, and the responsible land manager issues the final approval.
- All persons who propose to burn less than 100 tons of material must first call 1-800-323-BURN and follow the instructions that apply for the day and location of the proposed burning. If the message suspends burning because of poor air quality, all participants must comply.
- Burns that will consume 100 tons or more of material will not be allowed on weekends (midnight Thursday through midnight Sunday) between June 15 and October 1 nor on Independence Day or Labor Day.
- The gross fuel loading of material to be burned must be estimated using approved methods.
- All managers must immediately curtail all burning in their area when the mandatory allocation system has been activated and they are notified that their emissions allocation has been exhausted.

Note that, while federal agencies are not required to obtain permits to burn, they must comply with all state and local regulations and must pay fees to help defray the cost of those programs in the same manner and to the same extent as non-federal entities. Fee amounts for federal agencies reflect their appropriate share of program costs and are billed individually.

The DNR encourages burners to use techniques such as fans, crane piling, mass ignition, accelerated mop-up, and other methods to increase combustion and reduce smoldering stage. Given the amount of acreage to be treated and the limited emission levels allowed, it is no longer possible to rely solely on burning to achieve silvicultural objectives and hazard abatement. Using alternatives has become not only desirable, but necessary to meet the expectations of the legislature. Therefore, alternative methods of fuel reduction should be investigated before choosing to burn.

E. Non-Fire Fuel Reduction Applications

Non-fire fuel applications (i.e. thinning) will be utilized outside of wilderness in wildland urban interface areas. (See 5-year plan in appendix.) Treatments include thinning of understory or overstory trees to create defensible space around structures or create shaded fuel breaks. Treatment may also include chipping, piling and burning, or a combination of

methods. Chipping or piling and burning will be more commonly utilized where there are visual concerns about the charring of remnant trees (i.e. in close proximity to private property). Prescriptions for defensible space around structures are based on Firewise planning.

1. Interdisciplinary Team and Compliance

All projects are reviewed by an NPS interdisciplinary (ID) team to ensure that any potential impacts can be mitigated. A 5-year plan is given to Complex staff annually. Compliance for T and E species or monitoring needs are performed prior to project implementation. Any changes to project areas or timing of projects to meet compliance or monitoring needs are identified at that time. Project submissions for the upcoming fiscal year to the ID team are presented in October of that fiscal year for the next field season. If approval from the ID team is granted, the superintendent has ultimate signature authority.

2. Project Funding and Tracking

Funding requests for specific activities (compliance) or projects (implementation) are also submitted to the regional office and tracked through National Fire Plan Operations Reporting System (NFPORS) (and in WFMI for prescribed fire projects). Budget requests, project tracking, target reporting and any other upward reporting for the completion projects will be completed or delegated for completion by the FMO.

3. Utilization of Excess Wood Produced by Thinning Operations

Material from tree boles is not a resource benefit but rather a liability since the majority of thinning operations removes smaller or poorly formed trees and there is not a big enough market in Stehekin to support the sale of this less valuable type of wood for lumber. There is a consistent flow of locally available lumber generated through clearing of private land for new construction, salvage operations from flood events, and forest management of private land by individuals that own portable saw mills. Trees from clearing operations are generally not sold to mill owners but either given away or traded for milling at less than market value since there is consistent supply readily available.

Though the NPS does not perform commercial timber sales, the following provisions allow the NPS to sell material generated from restoration projects: Section 4 of the Act of August 8, 1953(16 U.S.C. 1b(4)), Director's Order 35A, and the May 11, 2004 memorandum from Lynn Scarlett (Assistant Secretary of the Department of Interior) and forwarded by Karen Taylor Goodrich on Implementation of the Policy Principles for Woody Biomass Utilization.

In Lake Chelan NRA, bole wood generated from Forest Fuel Reduction Areas under the 1995 Forest Fuel Reduction Area (FFRA) Plan can be utilized only as firewood by Stehekin residents. The amount of wood utilized by residents was estimated in the plan

as less than 150 cords per year. Due to more energy efficient building, heating and propane heating systems installed after the plan in most NPS structures and some private residences, the demand for firewood is not expected to increase significantly.
The amount trees that need to be thinned in the Forest Fuel Reduction areas are well in excess of 200 cords per year based on data collected in fire monitoring plots. If residents and the NPS were allowed to utilize wood for uses other than firewood, the demand may keep up with the supply. Currently, thinning projects are limited to the amount of firewood that will be generated. This means multiple thinning entries in FFRA's to meet the 1995 plan's desire future condition..

Data collected in monitoring plots in these units show current thinning efforts for the last 8 years, reduced the basal area of the stands that have had an entry by only 16%. The desired future condition for basal area reduction in these stands is 48% (Karen Kopper Fire Effects Monitoring report 2002). The units treated thus far total 100 acres out of a total of 790 acres. This plan is proposing an increase in FFRA's of just less than 400 acres.

Even if the desired future condition outlined in the Forest Fuel Reduction plan is met, management constraints made a reduction in the amount of thinning at the time the plan was written changing the canopy closure of desired future condition (as seen through basal area correlation) to 80% rather than 40-60 percent original intended by the Firewise silvilculture prescription originally intended by silviculturalist Trygve Culp (phone conversation 11/10/03).

Additional fiber generated from this plan includes the future FFRA units Lower McGregor and Lower Field units, the safety zone at the airstrip, additions to Boulder and Rainbow units, and defensible space from the Wyden Authority work on private land and hazard trees from the road corridor escape routes.

4. Forest Fuel Reduction Areas

In the Stehekin Valley forest fuel reduction areas, a program of basal area reduction thinning is in the process of completion. These areas have had multiple treatments to reduce fuel loads by restoring fire into the ecosystem. To achieve the desired objectives a several stage approach including larger diameter thinning in a fire regime 1, condition class 3 forested area has been utilized where necessary. Fire regime 1 is where fire would normally occur most frequently of all the fire regimes. Condition class 3 is vegetation displaying the highest departure from the historic fire regime. A full and detailed explanation of fire regime and condition classes is found in Chapter 1 Section III Part A Number 2 of this plan. Thinning for shaded fuel breaks is utilized where fire alone is either too dangerous to utilize or where restoration goals cannot be met with fire alone (Science Update PNW RS 2002). Historic conditions of mixed conifer forests have been altered through the exclusion of fire (Hessburg et. al.1994). Specific planning is subject to review of the ID team for compliance and mitigation measures.

5. Defensible Space/Firewise Landscaping

Previous to this plan landowners with structures adjacent to NPS land in Stehekin could request fire managers to evaluate fuels on their property as identified in the 1995 Stehekin Forest Fuel Reduction and Firewood Management Plan (Stehekin Plan). Fuel reduction was then performed on NPS land within 200 feet from private structures as needed to the benefit of both parties and as NPS budget and management concerns allowed.

This plan goes further by using the following authority to use federal monies and labor to assist in fuel reduction:

> . *16 U.S.C. §1f* authorizes the NPS to enter into agreements with cooperators for the purpose of sharing costs of services in carrying out authorized functions and responsibilities of the Secretary with respect to any unit or program of the national park system, any affiliated area, or any designated national scenic or historic trail.....This section principally gives authority for joint-funding arrangements entered into with non-federal partners ..., although it also addresses **sharing...services** in carrying out authorized functions and responsibilities.

Under this authority if an adjacent landowner wishes to have federal help in achieving fuel reduction on his land he can request help from the Complex so long as it is mutually beneficial to both parties. Fire management staff will assess the need and submit budget requests a year in advance of project implementation.

Since 1995, new research on effective Firewise techniques around structures has also become available. Firewise was created by the National Fire Protection Association and Jack Cohen of the Rocky Mountain Research station. These guidelines will be utilized for treatment around structures.

The following tables are meant to be utilized as recommendations. Different sites, locations, historic values or screening may alter distances utilized.

Defensible Space Recommended Distances Based on Slope

Vegetation	**0-20%**	**21-40%**	**+41%**
Grass	30 feet of green or inflammables	100 feet of green or inflammables	300 feet of green or inflammables
Shrubs	100 feet	200 feet	300 feet
Trees	30 feet	100 feet	200 feet

Recommended Separation Distances Between Tree Canopies

Slope	**Spacing (between crowns)**
0 to 20 percent	10 feet
21 to 40 percent	20 feet
+ 41 percent	30 feet

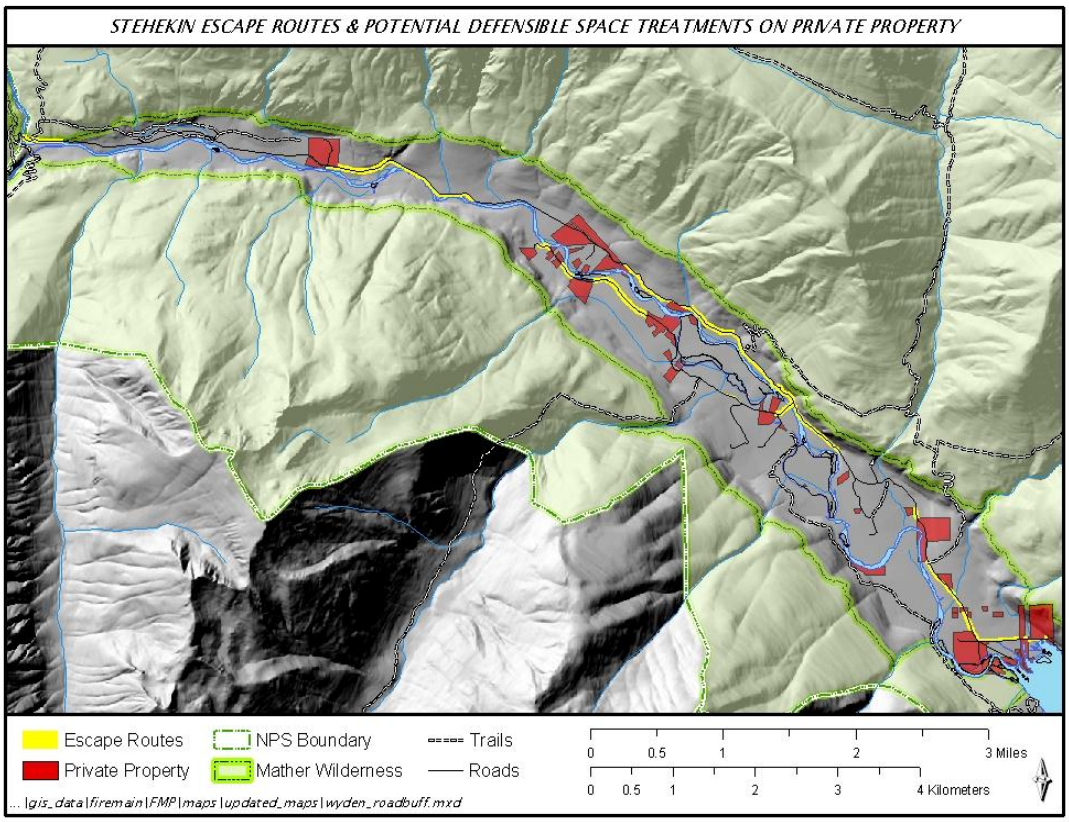
Clearances for burnables or combustibles:

- Stack woodpiles at least 30 feet from all structures.
- Locate LPG tanks at least 30 feet from structures with 10 feet of clearance.
- Remove branches within 15 feet of chimney.
- Clear flammables at least 10 feet away from burn barrels (if under open fire restrictions cover with wire mesh no larger than ¼ inch.
- Remove construction materials, pine needles, leaves and other debris within 30 feet of structures.

Complete Firewise construction techniques, Fire-Wise plants and other tips are available at www.firewise.org/usa.

Procedures for Performing Forest Fuel Reduction or Defensible Space Around Prehistoric and Historic Structures or Districts:

- Forest fuel reduction in or around pre-historic or historic sites will be planned in consultation with cultural resource advisors.
- A prescription will be written or burn plan reviewed (in the case of prescribed fire) for the fuel reduction within the viewshed of historic structures, districts or units containing prehistoric sites.
- Treatments that could be utilized with consultation from cultural resources could include: thinning live trees or removal of dead ones, piling and burning of brush, branch or bole material less than 3 inches in diameter, understory burning, or a combination of methods.



6. Road Corridor: Escape Routes

a. Thinning of Understory Trees

Of the 124 acres of potential roadside treatments the majority are already inside forest fuel reduction areas and will be, or have already been, thinned under the 1995 Stehekin Plan prescription. This prescription would be extended to roadside corridors outside of the forest fuel reduction areas to facilitate safe transport to the two safety zones in the valley (Buckner Orchard and Stehekin Valley Ranch) in the event of a major wildland fire. Thinning of understory trees (< 8 inches diameter) would limit the probability of a fire crossing the road, as well as reducing the heat from excess fuels along the roadside that may prohibit safe passage.

The prescription targets ladder fuels—small trees, or branches of larger trees, which provide vertical continuity between surface and canopy fuels—that enable fire to spread to tree crowns. Treatment of these trees may include cutting of understory trees and limbing of surrounding remnant trees.

b. Treatment of Potential Road Obstructions (PROs)

In addition to the roadside corridor treatment described above, treatment of potential road obstructions (PROs) will be performed. This treatment targets trees along the Stehekin and Company Creek roads that have a high probability of creating multiple obstructions in a wildfire event. It would be difficult to completely eliminate this potential; however there are about 100 trees in the 124 acres that have a high probability of falling or dropping tree tops or large mistletoe brooms on the road. These areas have well over 100 trees per acre so there is not a large amount of treatment per acre.

Not every dead tree within striking distance of a road presents a high probability of obstruction. Dead trees with a marked lean away from the road do not represent a high PRO. Identified trees with high potential include trees with large amounts of pitch (sap) on boles (trunks), dead trees leaning toward and within falling distance of the road, and trees with large mistletoe brooms leaning toward the road or with mistletoe brooms on limbs over the road.

Trees with large amounts of pitch on the boles will allow fires to burn very hot and deep into the heartwood removing structural integrity rapidly. In addition, large amounts of pitch sometimes indicate the presence of root disease, which may create a situation where fire burns quickly through the roots resulting in a falling tree.

Dead trees leaning toward the road would in a fire event pose a threat of obstruction when either roots burned out or embers caught in rotting wood causing the tree to fall.

Trees leaning toward the road with large mistletoe brooms or with large brooms on limbs over the road are dangerous because of the intense heat generated by fire in mistletoe brooms. In addition to presenting the threat of the tree falling or the limb breaking off, mistletoe brooms can drop a large amount of burning debris and create a threat of throwing embers to other side of road and starting spot fires.

c. Treatment Options for PROs

Treatment options for these trees include limbing, topping, or removal depending on the potential for reducing the hazard and depending on the risks involved versus the benefits gained.

d. Evaluation Methods for Treatment Options

A variety of methods will be used to evaluate if a tree should be limbed, topped or removed. These will include a visual inspection of tree lean and distance to the road as well as an evaluation of structural integrity of the bole wood and root systems by digging or boring to determine the presence of root disease and/or other defects. This evaluation will also consider the relative risk involved in performing each treatment option. Evaluation will be performed by individuals trained in the recognition of tree diseases as well as in safe limbing, topping, and falling practices.

e. Disposal of Bole Wood, Small Trees, Limbs and Tops

Larger diameter wood from this operation (> 8 inches) will either be left for down woody habitat or, if a large amount of wood results, be moved to the maintenance yard wood staging area and utilized by the community. Smaller diameter material (< 8 inches) will be piled (on site if possible) and burned in the late fall after the piles have cured and fire danger has passed.

f. Insect Considerations

Piling large amounts of slash or allowing bole wood to sit may lead to increases in insect broods. Cooperation with the OWNF pest office has been and will continue to be an integral part of the program to limit or eliminate potential of insect kill to residual stands.

7. Proposed Fuel Reduction Projects

The following table is a list of all fuel reduction projects described in this Plan. It lists all mechanical and prescribed fire treatments covered by the environmental assessment preferred alternative that provided direction for this plan.

North Cascades National Park Service Complex: Fire Management Project Areas

Unit Name	Acres		Type	Description
Stehekin Contours	4,848	13,000	Understory Burn	Understory burn designed to restore forest ecosystems and provide the community wildfire protection.
Stehekin Roadside	124	124	Thinning	Provide an Escape Route to Safety Zones. Community wide LCES.
FFRA unit Increase	15	15	Thin and Burn	Changes to unit boundaries for Boulder FFRA (8 ac) and Company FFRA (7 ac).
Future FFRA's	322	322	Thin and Burn	FFRAs that were considered for future treatment in the 1995 Forest Fuel Reduction Plan. Three additional units. Ref. maps.
Hozomeen Contours	5219	5210	Understory Burn	Understory burn designed to restore forest ecosystems.
Stehekin Wyden	441	441	Thinning	Defensible Space work on private in-holdings in the Stehekin Valley.
FFRAs unit GIS map corrections	N/A	N/A	N/A	Corrections made to unit boundaries by ground proofing and coordinating the corrections with a GIS Technician. Increases or decreases in sub-unit sizes. Changes on map only, not to ground treatment area.
NOCA Re-ignition	N/A	N/A	Prescribed Fire	Re-ignite lightning started wildfires that were suppressed, using favorable weather and conditions.
NOCA Park	All	All	Use of Fire	Manage lightning caused fires to meet resource objectives.

8. Multi-Year fuels treatment Plan

In keeping with the ten-year comprehensive strategy a multi-year project plan for North Cascades has been developed. This project plan provides a basis for priority setting. Wildland Urban Interface areas are given highest priority with ecosystem maintenance or restoration given second priority. This project plan is subject to change based on funding or changes made through the adaptive management process.

F. Fire Effects and Fuels Treatment Monitoring

A fire effects monitoring plan will be developed for each fuels management project. A draft plan has been developed for the three project areas for which fire effects monitoring and/or fuels monitoring is currently performed, or will be implemented (Appendix VII). These areas include:

- Stehekin Valley Forest Fuel Reduction Areas (1995 Stehekin FFRA)
- Stehekin Contours Prescribed Fire Unit (preliminary)
- Hozomeen Contours Prescribed Fire Unit (preliminary)

Fire effects monitoring is performed by the Complex fire effects monitoring team and overseen by the Fire Ecologist. Forest plots are established in a stratified random organization within treatment units using protocols defined in the NPS Fire Monitoring Handbook (DOI 2001). Data is collected on the characteristics of trees, shrubs, understory vegetation and ground fuels to monitor fire management treatment effects on structural changes in vegetation communities. Data is collected pre-treatment, during and immediately following prescribed fire, and at 1-year, 2-year, 5-year, and 10-year post-burn intervals (or until the next treatment, which begins the cycle again). Trees and ground fuels are monitored one year following thinning.

The fire effects monitoring data is analyzed and reported on a yearly basis to the NPS resource and fire management staff. Immediate post-treatment data is also reported to fire managers on an as-need basis. This data is used to monitor trends that result from fire management treatments and can be used to guide fire management activities and develop adaptive management strategies as necessary.

Fire effects on wildland fires will be monitored when this can be accomplished in a safe and timely manner. The fire effects monitoring team and fire ecologist can serve as fire effects monitors on these wildfireevents. In this capacity they establish rapid assessment plots that have fewer sampling protocols and smaller sampling areas. These plots are established in areas that are expected to burn, and then revisited the year following a burn.

G. Emergency Stabilization and Rehabilitation

This portion of the plan describes how funding will be requested should it be necessary to repair or mitigate the effects of unwanted fire on resources in the Complex.

1. Emergency Stabilization

For each funding request, a Burned Area Emergency Response (BAER) plan will be written to specify the treatments required to implement post-wildland fire emergency repairs or mitigations. This plan may be written by an interdisciplinary team of specialists or through the use of BAER team assigned to a particular wildland fire incident. The document will be initiated during or immediately following the containment of a wildland fire.

The BAER team will determine the emergency treatments needed to minimize threats to life or property or to prevent unacceptable degradation of natural and cultural resources. The team will also evaluate long-term impacts to critical resources and identify areas unlikely to recover naturally from severe wildland fire damage. The team will then develop and implement cost-effective plans to emulate historical or pre-fire ecosystem structure, function, and diversity consistent with approved land management plans. If this is not feasible, the team will develop a plan to restore or establish a healthy, stable ecosystem in which native species are well represented. They will also repair or replace minor facilities damaged by wildland fire or by suppression tactics.

Specific considerations for the need of a BAER plan may include:

- Irreparable loss of vegetation due to a high intensity wildfire occurring in a predominantly low intensity fire regime
- Loss of spotted owl habitat due to unwanted fire or suppression tactics
- Excessive soil loss resulting in the potential damage of a municipal water source
- Damage to a maintained trail through undermining, tree fall, sloughing, or suppression tactics
- Damage caused to a contracted field (helibase) in support of air operations

The emergency stabilization plan must contain:

- A description of each treatment or activity
- A discussion demonstrating how the specifications are consistent with approved land use plans, and how the proposed actions are related to damage or changes caused by the wildland fire
- An explanation of how the treatment or activity is reasonable and cost effective relative to the severity of the burn

- Provisions for monitoring and evaluation of treatments (including criteria for measuring a successful treatment) and techniques, and a procedure for collecting, archiving, and disseminating results
- A clear delineation of funding and responsibilities for implementation, operation, maintenance, monitoring, and evaluation throughout the entire life of the project

For specific language of policy and a complete list of allowable actions to be conducted through funding as a result of the emergency stabilization plan see 620DM 3 (2004).

Specific allowable emergency stabilization actions within the Complex include:

- Placing structures to slow soil and water movement
- Stabilizing soil to prevent loss or degradation of productivity
- Installing protective fences or barriers to protect treated or recovering areas
- Conducting assessments of critical habitat and significant heritage sites in areas affected by emergency stabilization treatments
- Seeding or planting to prevent impairment of designated critical habitat for federal and state-listed, proposed or candidate threatened and endangered species
- Stabilizing critical heritage resources
- Seeding to prevent establishment of invasive plants and direct treatment of invasive plants
- Using integrated pest management techniques to minimize the establishment invasive species within the burned area.

2. Rehabilitation

A separate plan is required for the rehabilitation or improvement of lands damaged by wildfire and to rehabilitate or establish healthy, stable ecosystems in the burned area. This is an independent plan from the emergency stabilization plan. The rehabilitation plan will specify non-emergency treatments which meet approved land management plans to be carried out within three years following containment of the fire. These plans will be developed with full public involvement and cannot be completed until all assessments are concluded. The rehabilitation plan must contain:

- A discussion demonstrating how the specifications are consistent with approved land use plans, and how the proposed actions are related to damage or changes caused by the wildland fire
- Provisions for monitoring and evaluation of treatments (including criteria for measuring a successful treatment) and techniques, and a procedure for collecting, archiving, and disseminating results
- Clear delineation of funding and responsibilities for implementation, operation, maintenance, monitoring, and evaluation throughout the entire life of the project, including rehabilitation actions and follow-up actions beyond three years that may be necessary (Note that funding for activities beyond three years may not be funded from the wildland fire management account.)

The following are the only actions allowed with the Complex that may be funded through the rehabilitation plan:

- Repair or improve lands unlikely to recover naturally from wildfire damage by emulating or pre-fire ecosystem structure, function, diversity, and dynamics consistent with existing land management plans
- Chemical, manual, and mechanical removal of invasive species, and planting of native and non-native species, restore or establish a healthy, stable ecosystem even if this ecosystem cannot fully emulate historical or pre-historical or pre-fire conditions.
- Repair or replace fire damage to minor operating facilities.

All planning documents will be reviewed and approved by the superintendent and submitted through the regional office for approval, prioritization, funding, and accountability.

V. Organization and Budget

A. The FIREPRO Budgeting System

FIREPRO provides the analysis and budget information that is necessary to determine staffing and resource needs for fire management on NPS administered lands. Special resources (natural and cultural) and private and publicly owned structures that may be at risk from wildland fire are identified. FIREPRO input also includes the following:

- permanent and seasonal staffing requests
- capitalized equipment purchase requests
- information on existing or proposed aircraft contracts
- line item funding requests that covers activities unique to specific regional/national offices

The system provides verification and approval for budget requests at the local, park, support office, regional, and national levels. FIREPRO can also generate the following reports: Regional Office Report, Report of Parks within a Region, Region-Wide Capital Equipment Priority Report, National Personnel Report, and the Capitalized Equipment Report.
Note that a new program called "Fire Program Analysis" is expected to replace the current FIREPRO budgeting system by 2007. This analysis will combine the fire management budget needs of all federal agencies within small area sub-units and allow fire managers to divide budgets among the interagency partners as they see fit.

B. Budget

A preparedness (PWE P11) budget is allocated to the Complex to fund annual programs for suppression and readiness, planning and oversight, detection, prevention, and general support. FIREPRO provides staffing dollars for permanent and seasonal employees. Within the Complex FIREPRO analysis justifies a fire management officer (FMO), a fire program management assistant, a lead forestry technician, two lookouts, and four seasonal firefighters. Seasonal positions are funded through the primary fire season (mid-June – mid-September) and may be funded during the off season to complete fuels management targets. The FMO is accountable for the preparedness account and has the flexibility to allocate resources within the constraints of the wildland fire business management rules. The preparedness account may be augmented through supplemental budgeting requests with approval from the fire management leadership board.

Severity funding may augment the preparedness account during periods of high fire danger or during an increase in workload unforeseen by the FIREPRO analysis. However, adherence to the governing rules on severity spending is crucial for the success of the program. Severity money has traditionally been used in the Complex to boost fire

detection by staffing of Sourdough Lookout and to increase Initial Response effectiveness by stationing aircraft at Marblemount and in Stehekin and by extending personnel hours.

The fire ecology and fire effects monitoring program budget (PWE H14) provides for the planning and monitoring of fuels treatments throughout a cluster of national parks in Oregon and Washington. The fire effects group is based in Marblemount and is comprised of a fire ecologist, a lead fire effects monitor, an assistant to the lead fire effects monitor, and two seasonal fire effects monitors. The fire ecologist is responsible for this budget and proper expenditures within the framework of the fire business management rules.

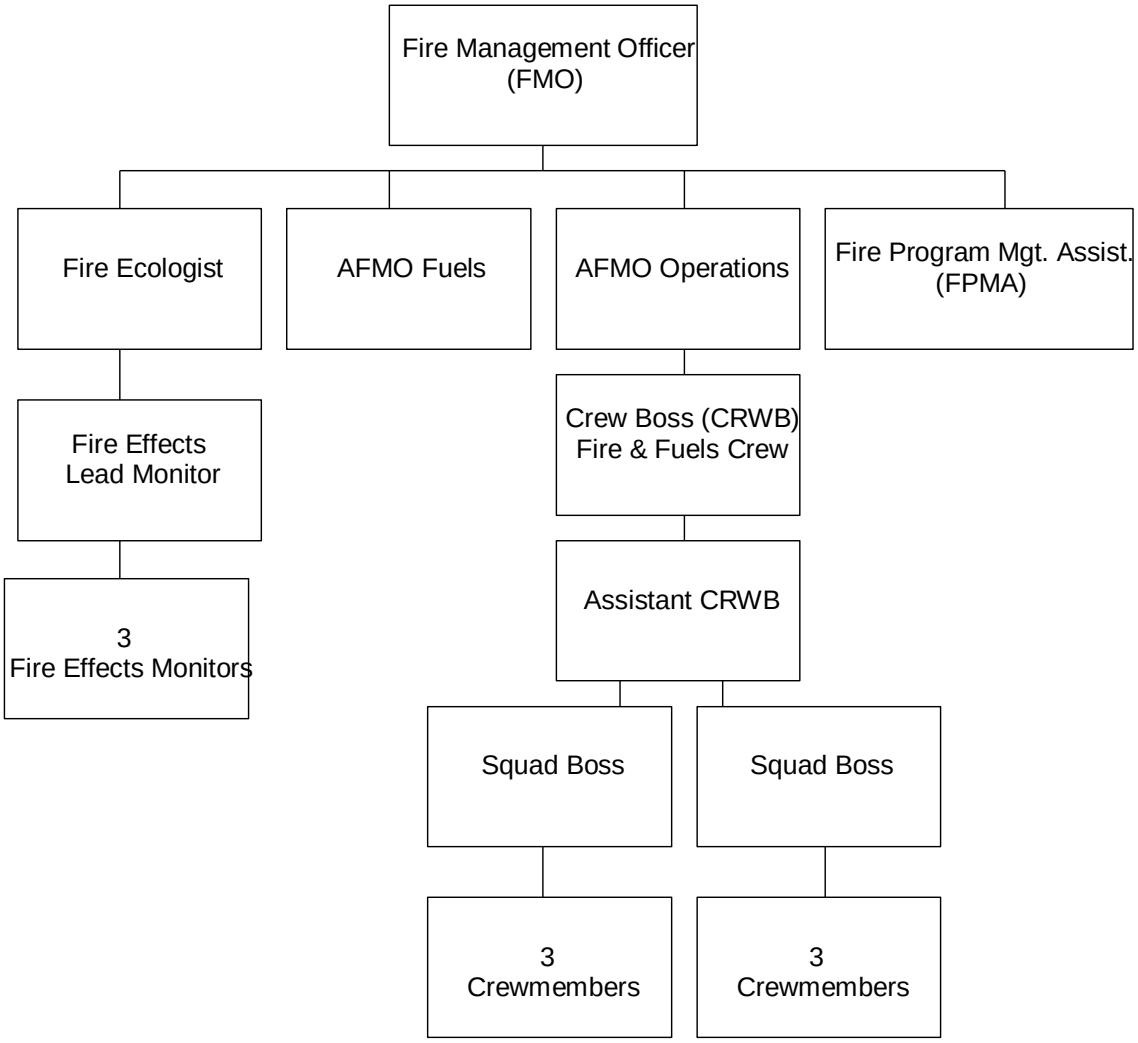
The urban wildland interface budget (PWE W11) provides a fulltime planner and project implementation specialist to coordinate treatments specifically in interface areas. A prescribed fire specialist is based in Stehekin and is shared with Lake Roosevelt National Recreation Area. The Complex FMO and Lake Roosevelt designee agree to an annual program of work for this specialist. The Complex FMO retains supervisory responsibility and budget accountability.

The fuels management program treats acres of excess fuels in its urban interface near communities at risk from wildfire. Funding for these treatments is currently requested through the National Fire Plan Operations and Reporting System (NFPORS). The accomplishment of the budgeted projects is tracked through this system as well and final accountability lies with the Superintendent. The Complex typically requests monies for compliance (PWE W13), prescribed fire (PWE W12), mechanical treatment (PWE W22), and monitoring of projects (PWE W14).

The majority of all funding is spent on personnel and local contracts. Interagency agreements are written to enable the sharing of personnel. Vehicles and necessary supplies are also purchased on these accounts. Unused monies are returned for regional accounting and redistribution.

C. Organization

The organizational chart below is the current fire organization based on the annual FIREPRO allocation for for the Complex. **Add Desolation Lookout under AFMO Ops.**



D. Roles and Responsibilities

The primary roles and responsibilities of the fire management team in the Complex are as follows:

The **Fire Management Officer** is stationed in Marblemount, is supervised by the Chief of Resource Management, and is primarily responsible for:

- Overall program accountability, upward reporting, target accomplishment budget requests and budget accountability, fire management planning, and training and qualifications for all fire personnel; is an ID team member and a WFDSS team leader,
- Supervision of a fire ecologist, fire management program assistant, prescribed fire specialist,fire operations specialist..
- Maintaining current highest red card qualification:SOPL, Prescribed Fire Manager type 1, Helicopter Manager

The **Fire Ecologist** is stationed in Marblemount, is supervised by the Fire Management Officer, and is primarily responsible for:

- Overall program accountability for the fire effects monitoring program including budget requests, programming and tracking, coordination of targets and work plan for assistance to other parks within the cluster needing fire effects monitoring assistance; is a WFDSS team member, a fire management planning team member throughout the cluster, and an ID team member,
- Development of fire research programs
- Supervision of a lead fire effects monitor

The **Prescribed Fire Specialist** is stationed in Stehekin, is a split-time position between the Complex and Lake Roosevelt National Recreation Area and is responsible for:

- Fuels treatment planning and compliance including writing burn plans and silvicultural prescriptions, assisting in writing contracts, and meeting annual fuels program targets
- Fire suppression management at North Cascades National Park, Lake Chelan National Recreation Area including preparedness and Initial Response and coordinating interagency fire management response; is a WFDSS team member, an ID team member, and fire team representative for Lake Chelan Recreation Area,
- Supervision of Initial Response resources stationed in Stehekin
- Maintaining current highest red card qualifications: Incident Commander type 4, Prescribed Fire Burn Boss type 2

The **Fire Management Program Assistant** is stationed in Marblemount, is supervised by the Fire Management Officer, and is primarily responsible for:

- Personnel timekeeping, maintaining training records through Interagency Qualifications Computer System (IQCS), dispatch and coordination with PSICC, recording fire records through the agency Shared Applications Computer System (SACS), tracking budget and expenditures, budget programming in Administrative Financial System III (AFSIII), and year -end reporting
- Acting as the primary emergency contact in Marblemount.

The Fire Operations Specialist is stationed in Marblemount and supervised by the Fire Management Officer is primarily responsible for:

- Fire program readiness and operations, including hiring and training the seasonal workforce, staffing and maintaining detection lookouts, upkeep and inventory of Marblemount fire cache and helibase, is primary fire operations person for the Park; is a WFDSS team member and an ID team member.
- Coordination with the prescribed fire specialist in developing fuels treatment plans throughout the Complex, writing and developing contracts and developing annual work plans for fuels management crews
- Supervision of fuels crew leader stationed in Marblemount and Desolation Lookout position

Maintaining current red card qualifications: Division Group Supervisor, ICT3-T, Prescribed Fire Burn Boss type 2 The **Lead Fire Effects Monitor** is stationed in Marblemount, is supervised by the Fire Ecologist and is primarily responsible for:

- Leading a 3-4 person fire effects monitoring crew and completing the installation of plots in targeted fuels treatment areas and completing pre-and post-burn plot reads based on the needs of individual parks throughout the cluster.
- Training and mentoring personnel, preparing timesheets, inputting fire effects monitoring data and assuring its accuracy.
- Completion of annual monitoring project report
- Maintaining current highest red card qualification: Fire Effects Monitor

VI. Monitoring and Evaluation

Monitoring and evaluation are separate, sequential activities that provide information to determine whether programs and projects are meeting fire management and general management plan goals and objectives. Monitoring is designed to observe and record the results of both natural processes and actions permitted by the Fire Management Plan Environmental Assessment. Monitors collect information, on a sample basis, from sources specified in the guidelines found below. Overall direction is found in 36 Code of Federal Regulations (CFR) 219.12(k).

The General Management Plan for Lake Chelan National Recreation Area (1988) requires that monitoring and evaluation be conducted to determine whether the fire program is meeting GMP direction and that such activities are commensurate with the risks, costs, and values involved. The GMP also requires the involvement of the public, Mt Baker-Snoqualmie and Okanogan-Wenatchee National Forests, and other park and interagency specialists in the monitoring and evaluation process.

A. Implementation Monitoring

Implementation monitoring determines if prescriptions, projects, and activities are implemented as designed and in compliance with fire program objectives and with RM-18 and DO-18 guidelines. (***WHO PERFORMS THE FOLLOWING ACTIONS? ADD TO THE FOLLOWING TWO SENTENCES.) use the post-fire evaluation report in Chapter 10 RM-18 and post-burn monitoring data from fire effects monitoring plots for prescribed burn units. Use the after action review process (from Interagency Standards "Red Book"), document results and changes in implementation (if any) in project files or incident files.

B. Effectiveness and Validation Monitoring

Effectiveness monitoring determines if plans, prescriptions, projects, and activities are meeting management objectives, standards, and guidelines. Validation monitoring is conducted by establishing permanent plots in close coordination with the fire ecologist, fire monitoring personnel, and agency specialists and should be conducted at a level commensurate with resource values including public issues and interests.

C. Evaluation of Monitoring Results

Monitoring and evaluation are separate, sequential tasks. Evaluation examines monitoring results, determines how well those results meet the Plan direction, and identifies measures to keep the Plan viable.

1. Evaluation Techniques

Evaluation techniques include, but are not limited to:

- Site-specific observations by on-site resource specialists
- Field assistance trips by other technical specialists
- General field observations by interagency specialists.
- On-going accomplishment reporting processes.
- Formal management reviews on a scheduled basis (5 year review).
- Discussions with other agencies and the public users.
- ID team review of monitoring results
- Involvement with existing research activities
- Review and analysis of the Fire Effects Monitoring Report.

2. Documentation Requirements for Use of Wildland Fire

Objectives
The objective of this monitoring is to provide documentation and reassess the decisions made during fire season on the strategies chosen and the rationale used. This will help us to revise complexity ratings developed for each FMA, and the suitability for use of fire within each FMA.

- To evaluate the results of fire management actions when use of fire has occurred.
- To identify needed changes or corrections in policy, management procedures or performance.
- To improve management of use of wildland fires by evaluation of actions taken.
- To track the number of "decisions and reasons for each.
- To periodically (5 – 10 years) analyze decisions for use of fire trends vs. decisions to not use fire and opportunities to increase the number of use of fire decisions.
- Review appropriateness of use of fire suitability of each FMA.

Items to Consider

- Were actions performed SAFELY?
- Expected conditions compared to actual conditions?
- Expected fire behavior compared to actual fire behavior?
- Existing fire regime compared to historical regime?
- Did management actions affect the extent, intensity or duration of the fire?
- How well was the current use of fire plan understood and accepted?
- How effective was interagency management fires?

3. Post-Fire and Project Season Evaluation

The fire management team will conduct a post-season review with fire management staff and specialists from affected resources including administrative and support personnel. The evaluation will consider the follow issues:

- Was firefighter and public safety highest priority on every project or incident?
- Was interagency and intra-agency communication effective?
- Was contact with public effective, timely and positive?
- Did incidents or projects meet current regulations and policy?
- Was regional office involvement timely; were they kept informed of the situation?
- Were the actions implemented cost effectively?
- Were personnel used on the fire fully qualified for the position?
- Were training opportunities provided when appropriate?
- Was appropriate feedback from after action reviews incorporated on other projects or incidents

VII. Fire Research Needs

A. Fire History Research

Fire history research is a need identified in the North Cascades Resource Management Plan to establish the natural frequency of fire in different portions of the Complex, and determine the impacts that modern human activities have had on fire occurrence and fire extent. Two extensive fire history studies have been performed in the Complex: a fire history of Desolation Peak in the transitional climatic zone (east-west mix) forests (Agee *et al.* 1986) and a subalpine forest in the Thunder Creek Basin (Prichard 2004). The highest priority areas for additional fire history studies are a low elevation west-side drainage and in the Stehekin Valley, as well as completion of the comprehensive Complex fire history map.

Research should effectively establish fire history of the area through an integrated study of biological evidence (fire scars, tree ring analysis, soil profiles, sediment cores, and vegetative patterns), historic documents (official records, fire atlases, previous studies, photographs, vegetation maps, newspaper accounts, and journals) and interviews with retired personnel and long time residents of the area.

This information will be used by fire managers to help define desired future conditions. Knowledge of past fire occurrence and behavior gives insight into probable future fire behavior, and thus may be used:

- in preparedness planning (especially when pre-positioning fire fighting resources or fire management resources)
- to refine fire prescriptions for use of fire.
- to help in the analysis of management options for new ignitions
- to identify locations where management action is needed to mitigate the impacts of recent human ignitions and suppression actions
- to identify potential fire safety concerns for visitors and employees

B. Fire Effects on Plant and Wildlife Species of Interest

Research on the effects of fire on individual species of interest, including but not limited to rare, threatened, and endangered species is needed to determine when and where mitigation following wildland fire events may be required.

C. Comparative Studies

Research comparing the effects of fire suppression to the use of fire would be of value in establishing decision-making criterion for wildland fire activities. Potential topics could include direct impacts from trampling, smoke impacts, and modeled fire behavior.

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IX. Appendices

A. Acronyms

AQRV: Air Quality Related Values
BIA: Bureau of Indian Affairs
BLM: Bureau of Land Management
CFR: Code of Federal Regulations
CWICC: Central Washington Interagency Communications Center
DM: Department Manual
DNR: Department of Natural Resources (Washington State)
DO: Directors Orders (NPS)
DOE: Department of Ecology
DOI: Department of Interior
EIS: Environmental Impact Statement
ERC: Energy Release Component
EPA: Environmental Protection Agency
FEIS: Final Environmental Impact Statement
FIL: Fire Intensity Level
FMA: Fire Management Area
FMO: Fire Management Officer
FMP: Fire Management Plan
FMU: Fire Management Unit
FPA: Fire Program Analysis
FP: Forest Plan
FS: Forest Service
FSH: Forest Service Handbook
FSM: Forest Service Manual
FUMA: Fire Use Manager
GAO: General Accounting Office
GIS: Geographic Information System
GMP: General Management Plan (NPS)
HUC: Hydrologic Unit Code
IC: Incident Commander
ICBEMP: Interior Columbia Basin Ecosystem Management Project
IDT: Interdisciplinary Team
IFPL: Industrial Fire Precaution Level
IIO: Incident Information Officer
IR: Infra Red
IRMT: Interagency Management Review Team
LSR: Late Successional Reserve
LSRA: Late Successional Reserve Assessment
LTA: Land Type Association
MLSA: Managed Late Successional Area

MLSR: Managed Late Successional Reserve
MMA: Maximum Manageable Area
NAAQS: National Ambient Air Quality Standards
NCNPSC: North Cascades National Park Service Complex
NCSB: North Cascades Smokejumper Base
NFDRS: National Fire Danger Rating System
NFFL: Northern Forest Fire Lab
NFMAS: National Fire Management Analysis System
NFMID: National Interagency Fire Management Information Database
NPS: National Park Service
NWCG: National Wildfire Coordinating Group
NWFP: Northwest Forest Plan
OWNF: Okanogan and Wenatchee National Forests
PAG: Plant Association Group
PAO: Public Affairs Officer
PM10: Particulate Matter 10 microns in diameter
PM2.5: Particulate Matter 2.5 microns in diameter
PNV: Potential Natural Vegetation
PSD: Prevention of Significant Deterioration
PSICC: Puget Sound Interagency Communications Center
PUD: Public Utility District
R & R: Rest and Recuperation
RAZ: Risk Assessment Zone
RERAP: Rare Event Risk Assessment Process
RM: Reference Manual (NPS)
ROD: Record of Decision
SIG: Special Interest Group
SIP: State Implementation Plan
SMP: Smoke Management Plan
SOPL: Strategic Operational Planner
T & E: Threatened and Endangered Species
TSP: Total Suspended Particulates
USDA: United States Department of Agriculture
USDI: United States Department of Interior

WFU: Wildland Fire Use for Resource Benefits (termininolgy change 2009- use of fire)
WFMCS: Wildland Fire Computer System (NPS)
WFSA: Wildland Fire Situation Analysis (terminology change in 2009)
WFDSS: Wildland Fire Decision Support

B. Definitions

Appropriate Management Response - Specific actions taken in response to a wildland fire to implement protection and fire use objectives. This term is a new term that does not replace any previously used term. Use of this term replaced in 2009

Common Daily Spread – The average spread of a fire on a daily basis in a given direction.

Compatible – Classification of an FMA that indicates whether or not it is to be considered for WFU based on its ability to meet the Land Management Plan objectives through WFU.

Critical Spread Events – The spread event either common or rare, that causes the fire to reach the geographical area of concern.

Crown Fire – Fire sustained in the overstory or a surface fire with high fire line intensity leading to significant, scorch related, overstory death.

Daily revalidation – A process named the periodic fire assessment, which evaluates the continued capability of the local unit to manage the fire for resource benefits, and to determine if the fire is escalating in complexity and operational needs. This process is completed as frequently as specified by the local unit.

Decision Criteria Checklist (Initial Go/No-Go Decision) – A set of standards evaluation criteria to determine if the current wildland fire meets criteria to be managed for resource benefits. The completion of these criteria will lead to a decision to "Go/Not-Go" with management of the fire for resource benefits. Changed in 2009

Deciview: A measurement of visibility used to track changes overtime

Energy Release Component (ERC) – The amount of energy released (per square foot of flaming front). Energy release is dependant upon fuel moisture content of the fuel, the dryer the more easily it burns and the more energy it releases.

Expected Weather Conditions - those 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. These conditions are used in making fire behavior forecasts for different scenarios (one necessary scenario involves fire behavior prediction under "expected weather conditions").

Experienced Severe Weather Conditions - those weather conditions that occur infrequently, but have been experienced on the fire site area during the period of weather records. For example, rare event weather conditions that significantly influence fires may

have occurred only once, but their record can be used to establish a baseline for a worst-case scenario. These are the most severe conditions that can be expected. These conditions are used in making fire behavior forecasts for different scenarios (one necessary scenario involves fire behavior prediction under "experienced severe weather conditions").

Fire Complexity Analysis – A process for assessing wildland fire organizational needs and relative complexity in terms of ICS types (I, II, III etc.).

Fire Intensity Level (FIL) – How hot the fire is burning based upon its flame length. (FIL 1 = 0-2 feet flame lengths; FIL 2 = 2-4 feet flame lengths; FIL 3 = 4-6 feet flame length; FIL 4 = 6-8 feet flame lengths; FIL 5 = 8-12 feet flame lengths; and FIL 6 = 12+ feet flame lengths)

Forest Plan (FP) – The Land and Resource Management Plan (LRMP) developed to direct the respective national forest.

Forest Use – Term used that includes both Prescribed Fire and WFU.

Fire Management Areas (FMA) - a sub-geographic area within an FMU that represents a predefined ultimate acceptable management area for a fire managed for resource benefits. This pre-defined area is useful for those units having light fuel types conducive to very rapid fire spread rates. Pre-definition of these areas permits pre-planning of the fire area, identification of threats to life, property, resources, and boundaries, and identification of initial actions.

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, or major fire regimes, etc., that sets it apart from management characteristics of an adjacent unit**.** FMUs are delineated in Fire Management Plans (FMP). These units may have dominant management objectives and pre-selected strategies assigned to accomplish these objectives.

Use of fire- The use of fire to meet resource objectives or a combination of objectives. Itcan include a range of suppression options.

Holding Actions - planned actions required to achieve wildland and prescribed fire management objectives. These actions have specific implementation timeframes for fire use actions but can have less sensitive implementation demands for suppression actions. Specific holding actions are developed to preclude fire from exceeding desired boundaries. For prescribed fires, these actions are developed to restrict the fire inside the

planned burn unit. For suppression actions, holding actions may be implemented to prohibit the fire from crossing containment boundaries. These actions may be implemented as firelines are established to limit the spread of fire.

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

Initial Response- An action taken in response to report of wildfire which involves fire size up and situation assessment to then implement planned actions.

Land and Resource Management Plan (LRMP) – Developed to direct the respective national forest.

Management Action Points - also called "trigger points." Either geographic points on theground or specific points in time where an escalation or alteration of management actions is warranted. These points are defined and the management actions to be taken are clearly described in an Incident Action Plan, WFDSS or Prescribed Fire Plan. Timely implementation of the actions when the fire reaches the action point is generally critical to successful accomplishment of the objectives.

Mitigation Actions - Mitigation actions are considered to be those on-the-ground activities that will serve to increase the defensibility of the control lines; check, direct, or delay the spread of fire; and minimize threats to life, property, and resources**.** Mitigation actions may include mechanical and physical non-fire tasks, specific fire applications, and limited suppression actions. These actions will be used to construct firelines, reduce excesssive fuel concentrations, reduce vertical fuel continuity, create fuel breaks or barriers around critical or sensitive sites or resources, create "blacklines" through controlled burnouts, and to limit fire spread and behavior.

Normal Fire Year – The normal fire year for suppressed wildland fires is the year with the third highest number of wildland fires in the past ten years of record. The normal wildland fire managed for resource benefits year is the year with the third highest number of acres burned by wildland fire managed for resource benefits in the past ten years of record.

PM10 – Particulate Matter 10 microns or less in diameter

PM2.5 – Particulate Matter 2.5 microns or smaller in diameter

Preparedness - Activities that lead to a safe, efficient and cost effective fire management program in support of land and resource management objectives through appropriate planning and coordination. This term replaces presuppression.

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. This term replaces management ignited prescribed fire.

Prescribed Fire Plan - a plan required for each fire application ignited by managers. It must be prepared by qualified personnel and approved by the appropriate Agency Administrator prior to implementation. Each plan will follow specific agency direction and must include critical elements described in agency manuals. Formats for plan development vary among agencies, although content is the same.

Prescription - Measurable criteria which define conditions under which a prescribed fire may be ignited, guide selection of appropriate management responses, and indicate other required actions. Prescription criteria may include safety, economic, public health, environmental, geographic, administrative, social or legal considerations.

Rare and Significant Spread – Those fires spread events when the fire makes long runs in a given direction in a single day.

Rare Event Frequency – The rate at which rare and significant events occur.

Rare Event Risk Assessment Process (RERAP) – The SPREAD spreadsheet was developed by Don Carlton, Aviation and Fire Management, USDA Forest Service, Pacific Northwest Region, Portland, Oregon, with assistance from Rod Norum, National Monument Service, (Retired), Boise, Idaho. TERM and RISK spreadsheets were developed by Marc Wiitala, Aviation and Fire Management, USDA Forest Service, Pacific Northwest Region, Portland Oregon. The visual basic version of RERAP was developed by Nora Holmquist, Willamette National Forest, USDA Forest Service, Eugene, Oregon.

Risk Assessment Zone – Combination of contiguous FMA based on similar fuel, topography and weather for use in risk assessment.

Season Ending Event – The data of the weather event after which fires cease to pose a significant problem, in terms of spread, to fire managers.

Suitable – Classification of an FMA that indicates whether or not it is to be considered for use of fire based on social, & political concerns as determined by the line officer. This is not to be confused with "suitable habitat".

Surface Fire – Low intensity in the forest understory with occasional individual tree torching or scorch related mortality.

Trigger points - see Management action points.

Values at Risk – "Improvements" or areas of concern that could be damaged or destroyed by fire.

Waiting Time Distribution – The probability distribution of the number of days from the assessment date that it will take for a critical spread event or a season ending event to occur.

Wildfire - An unwanted wildland fire. ***This term was only included to give continuing credence to the historic fire prevention products. This is NOT a separate type of fire.***

Wildland Fire Use for Resource Benefit (WFU) – Past terminology as of 2009. A fire ignited by lightning and burning under a specified set of environmental conditions.

Wildland and Prescribed Fire Complexity Analysis – The formal process to determine thefull complexity rating for wildland and prescribed fires. It utilizes 12 variables having numerically weighted importance combined with user identified complexity values.

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 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 to restore and sustain ecosystem health.

Wildland Fire Decision Support System (WFDSS) - A decision-making process that evaluates alternative management strategies against selected safety, environmental, social, economic, political, and resource management objectives.

Wildland Fire Suppression – A 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.

Use of Wildland Fire - the management of naturally ignited wildland fires to accomplish specific resource management objectives or a combination of objectives.

C. Five-Year Fuels Treatment Plan

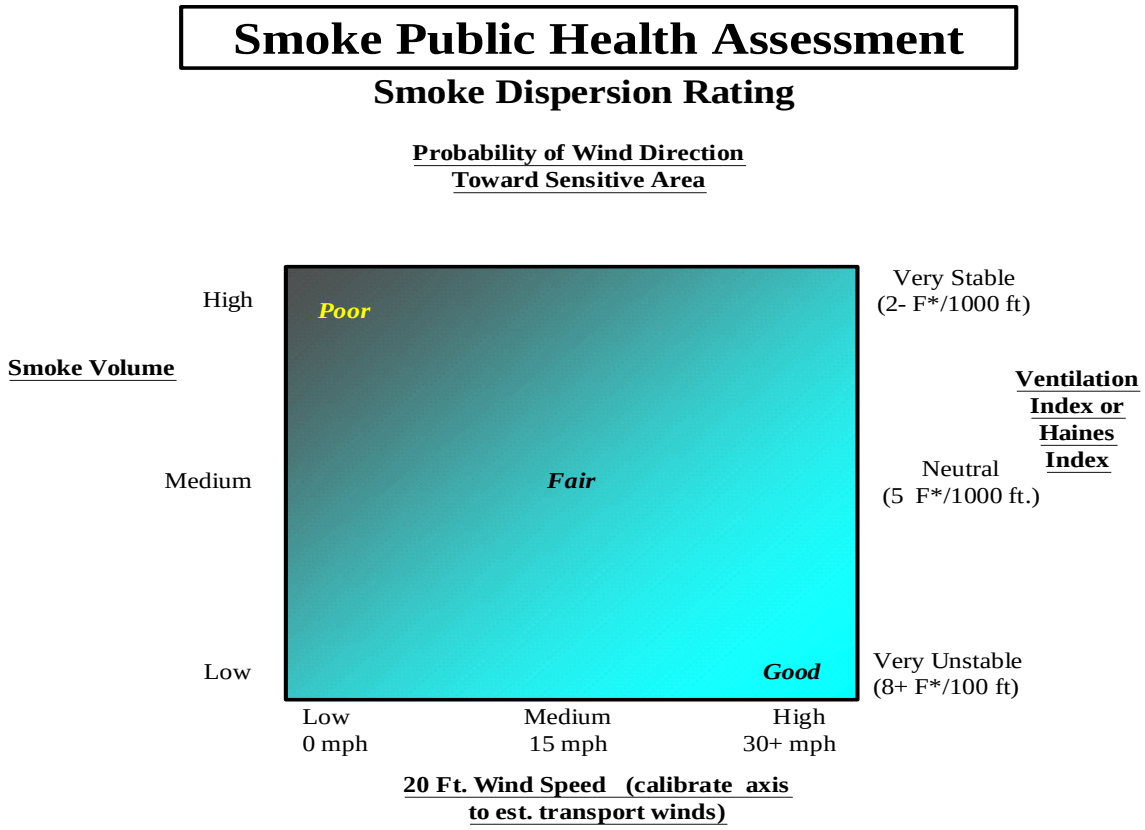
North Cascades National Park Service Complex Fuels Projects 5-Year Plan 2007

2007			
LOCATION	**PROJECT**	**TREATMENT**	**ACRES**
Stehekin Contours	SC Ranch Rx	Broadcast Burn (WUI)	375
Stehekin Contours	SC- Beuhler/Upper Boulder Rx	Broadcast Burn (WUI)	658
Stehekin	Stehekin Boulder Biomass Removal	Biomass Removal (WUI)	50
Stehekin	Stehekin Boulder Large Diameter Thin	Thinning (WUI)	50
Stehekin	Stehekin Coon Run Biomass Removal	Biomass Removal (WUI)	50
Stehekin	Stehekin Coon Run Contract Thin	Thinning (WUI)	50
Stehekin Defensible sp	Stehekin DS Fall Pile Burning	Hand Pile Burn (WUI)	10
Stehekin Defensible sp	Stehekin DS Hand Pile	Hand Pile (WUI)	15
Stehekin Defensible sp	Stehekin DS Thin	Thinning (WUI)	15
Stehekin	Stehekin Roadside Hand Pile	Hand Pile (WUI)	62
Stehekin	Stehekin Roadside Thin	Thinning (WUI)	62
2008			
LOCATION	**PROJECT**	**TREATMENT**	**ACRES**
Stehekin	Stehekin Boulder #1 Hand Pile Burn	Hand Pile Burn (WUI)	15
Stehekin	Stehekin Boulder #2&3 Rx	Broadcast Burn (WUI)	79
Stehekin Defensible sp	Stehekin DS Hand Pile	Hand Pile (WUI)	15
Stehekin Defensible sp	Stehekin DS Hand Pile Burn	Hand Pile Burn (WUI)	15
Stehekin Defensible sp	Stehekin DS Thinning	Thinning (WUI)	15
Stehekin	Stehekin McGregor #1 & 4 Rx	Broadcast Burn (WUI)	85
Stehekin	Stehekin Roadside #1 Hand Pile Burn	Hand Pile Burn (WUI)	62
Stehekin	Stehekin Roadside #2 Hand Pile	Hand Pile (WUI)	62
Stehekin	Stehekin Roadside #2 Thinning	Thinning (WUI)	62

North Cascades National Park Service Complex Fuels Projects 5-Year Plan 2007

2009			
LOCATION	**PROJECT**	**TREATMENT**	**ACRES**
Stehekin Contours	SC Rainbow prep	Hand line const	50
Stehekin Contours	Inst/Read-Upper Rain	Monitoring	610
Stehekin FFRA	Orchard/Rain	Thinning (WUI)	128
Stehekin Defensible sp	DS Pile Burn	Hand Pile Burn (WUI)	15
Stehekin Defensible sp	DS Thinning	Thinning (WUI)	15
Stehekin Defensible sp	DS Piling	Hand Pile	15
Hozomeen	Hozomeen 3 Thinning	Thinning (WUI)	20
Stehekin	Coon Run Thinning-contract	Thinning (WUI)	40
Stehekin FFRA	Mcgreggor 3 &4	Understory burn	149
2010			
LOCATION	**PROJECT**	**TREATMENT**	**ACRES**
Stehekin Contours	Upper Rainbow Burn	Burning	610
Stehekin Defensible sp	DS Pile Burn	Hand Pile Burn (WUI)	15
Stehekin Defensible sp	DS Thinning	Thinning (WUI)	15
Stehekin Defensible sp	DS Piling	Hand Pile	15
Stehekin Contours	SC Lower Field prep	Hand line const	50
Stehekin Contours	Install/Read-Lower Field	Monitoring	525
2011			
LOCATION	**PROJECT**	**TREATMENT**	**ACRES**
Stehekin Contours	SC Lower Field Burn	Burning	525
Stehekin Contours	Install/Read-Wilsey	Monitoring	338
Stehekin Contours	Wilsey Prep Handline	Hand Line const.	50
Stehekin Defensible sp	DS Pile Burn	Hand Pile Burn (WUI)	15
Stehekin Defensible sp	DS Thinning	Thinning (WUI)	15
Stehekin Defensible sp	DS Piling	Hand Pile	15

D. Smoke Dispersion Rating Graphics

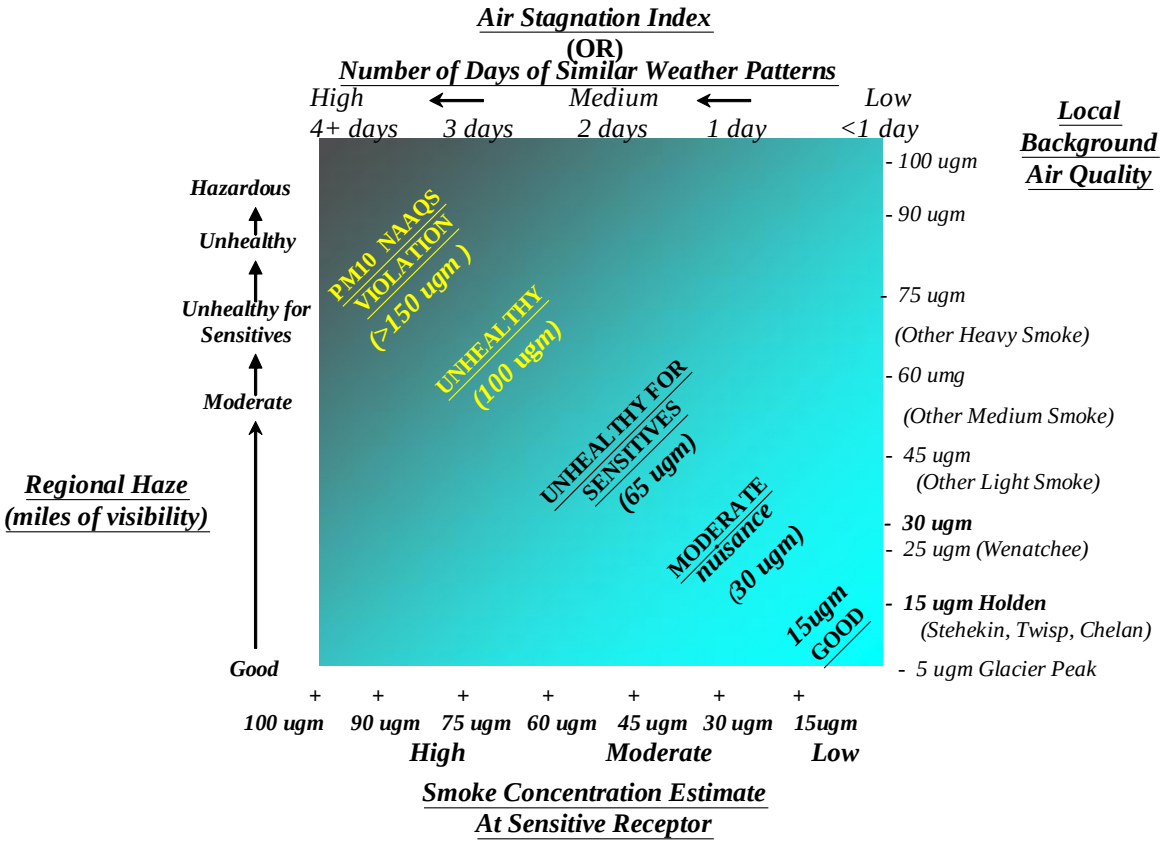


Smoke Wind Speed – The speed of the wind that will be moving the smoke. In stable air conditions such as inversions or night time down valley wind flows this will be the wind speed at 20 feet above the trees, the ***20 foot winds***. In unstable air conditions such as afternoon upslope winds creating a column, this will be the wind speed aloft, the winds reported as ***transport winds*** in the fire weather forecast.

Probability of Smoke Direction To - The higher the rating the higher the risk of having stagnant air that will concentrate smoke in a small area.

Smoke Public Health Assessment

Air Quality Condition Estimate



Smoke Concentration Estimate – This rating comes from chart on the previous page.

Background Air Quality of Immediate Area - Other sources PM could be other wildland fires, agricultural burns, dust, vehicle exhaust, industrial emissions, etc. from sources in the immediate vicinity. Can be estimated using Visibility Distances (see Visibility Estimation Chart).

Regional Background Air Quality – Smoke, dust, or pollution coming into the target from outside the immediate vicinity. This can be attained by contacting DNR.

Number of Days With a Similar Weather Pattern – Days that will repeatedly push smoke into the same sensitive receptor. Accumulative build ups raise concentrations. **(OR)** Use the **Ventilation Index** found at www.intellicast.com/Health?World/United States/AirStagnation/

Air Quality Condition Estimate - This is the sum of all background concentrations and the smoke concentration from this fire. The accumulative result can be expressed as a concentration or by the standard air quality descriptors, good, moderate, unhealthy for sensitive groups, unhealthy, very unhealthy, and hazardous. See the next page for definitions, concentrations, recommended smoke management actions and advisories for each air condition class.

E. Communication Plan

Fire Management Area (FMA): A sub-geographic area within a Fire Management Unit (FMU) that represents a predefined acceptable management area for a fire managed for resource benefits.

North Cascades has a communication center located in Marblemount at the Wilderness Office. This "Comm." Center provides emergency dispatch services to the park complex from 0700 to 2300 hours from June to October. All search and rescue, medical or mechanical breakdown requiring assistance is provided though the Comm Center. Fire Dispatching is performed in the fire office when available and through Comm center when Fire Dispatch is unavailable. Fire dispatch hours are 0700 to 1730 June through October Monday through Thursday and seven days a week with longer hours of operation while staffing wildfires.

1. Repeaters

There are four repeaters located within the complex. The Ruby repeater serves the majority of the Skagit and Ross Lake areas. The Copper repeater serves the Copper Ridge, Chiliwack and Hannegan Pass areas. The Finney Repeater serves between Marblemount and Sedro Woolley and the McGreggor Repeater serves south of Cascade Pass, Bridge Creek and Stehekin Valley. Using these repeaters will enable a person to contact either Comm center or Fire Dispatch during operating hours. Contacting other hand held radios in different locations of the complex on these repeaters is met with varying degrees of success. Often times Comm center is used to relay to another user of a handheld radio.

The following radio frequency lists are programmed in NOCA fire radios and the first six channels in each group are common to all NOCA radios. Need new config. inserted from Aaron.

GROUP	1	DESCRIPTION:		NOCA Main Group						
Channel	Label	RX Freq	RX Tone	TX Freq	TX Tone	Mod	Scan	Channel Description	Access	MOU
1	NOCADIR	166.750	none	166.750	103.5	WIDE	X	NOCA Direct	Direct	N/A
2	NOCACOP	166.750	none	165.975	118.8	WIDE		NOCA Copper/Slide Ridge Repeaters	Repeater	N/A
3	NOCARUB	166.750	none	165.975	156.7	WIDE		NOCA Ruby Repeater	Repeater	N/A
4	NOCAMCG	166.750	none	165.975	131.8	WIDE		NOCA McGregor Repeater	Repeater	N/A
5	NOCAFIN	166.750	none	165.975	103.5	WIDE		NOCA Finney (Lenonards Ridge)Repeat	Repeater	N/A
6	HILINE	153.305	none	153.305	none	WIDE		Highline Helicopters (direct)	Direct	???
7	FSPROJ6	170.125	none	170.125	none	WIDE		USFS Region 6 Project (direct)	Direct	N/A
8	DNRCOMM	151.415	none	151.415	none	WIDE		DNR Common (direct)	Direct	Yes
9	FSBAKER	169.925	none	169.925	146.2	NAR		USFS Mt. Baker RD (direct)	Direct	Yes
10	FSDARR	170.525	none	170.525	146.2	NAR		USFS Darrington RD (direct)	Direct	Yes
11	FSCHLN	173.050	none	173.050	146.2	NAR		USFS Chelan RD "Forest 2" (direct)	Direct	Yes
12	FSMAID	173.050	none	168.750	136.5	NAR		USFS Old Maid Repeater (Chelan RD)	Repeater	Yes
13	FSMETH	169.875	none	169.875	146.2	NAR		USFS Methow Valley RD (direct)	Direct	Yes
14	AIRGND	168.300	none	168.300	none	WIDE		Air/Ground (direct)	Direct	N/A
15	SCF2	154.265	none	154.265	none	WIDE		Skagit County Fire Tactical 2 (direct)	Direct	Yes
16	AIRGRD	168.625	none	168.625	110.9	WIDE		Air Guard	Direct	N/A

GROUP	2	DESCRIPTION:		USFS NEW NARROWBAND FREQS						
Channel	Label	RX Freq	RX Tone	TX Freq	TX Tone	Mod	Scan	Channel Description	Access	MOU
1	1 SEDRO	169.9250	none	164.1250	146.2	NAR		USFS Sedro Woolley (Mt. Baker RD)	Repeater	N/A
2	2 GLACR	169.9250	none	164.1250	156.7	NAR		USFS Glacier (Mt. Baker RD)	Repeater	N/A
3	3 PANDM	169.9250	none	164.1250	167.9	NAR		USFS Panorama Dome (Mt. Baker RD)	Repeater	N/A
4	4 LOOKT	169.9250	none	164.1250	103.5	NAR		USFS Lookout Mtn. (Mt. Baker RD)	Repeater	N/A
5	5 PORT	169.9250	none	164.1250	118.8	NAR		USFS Portable Repeater (Mt. Baker RD)	Repeater	N/A
6	6 DARR	170.5250	none	162.6125	146.2	NAR		USFS Darrington/Verlot (Darrington RD)	Repeater	N/A
7	7 MINRS	170.5250	none	162.6125	100.0	NAR		USFS Miners Ridge (Darrington RD)	Repeater	N/A
8	8 LSTCRK	170.5250	none	162.6125	131.8	NAR		USFS Lost Creek (Darrington RD)	Repeater	N/A
9	9 GRNMTN	170.5250	none	162.6125	103.5	NAR		USFS Green Mtn. (Darrington RD)	Repeater	N/A
10	10DUNCAN	173.0500	none	168.7500	146.2	NAR		USFS Duncan Hill (Entiat RD)	Repeater	N/A
11	11 MAID	173.0500	none	168.7500	136.5	NAR		USFS Old Maid (Chelan RD)	Repeater	N/A
12	12 SLIDE	173.0500	none	168.7500	141.3	NAR		USFS Slide Ridge (Chelan RD)	Repeater	N/A
13	13 SLATE	169.8750	none	172.3500	131.8	NAR		USFS Slate Peak (Methow Valley RD)	Repeater	N/A
14	14 N20MI	169.8750	none	172.3500	167.9	NAR		USFS N 20 Mile (Methow Valley RD)	Repeater	N/A
15	15 GRANT	169.8750	none	172.3500	123.0	NAR		USFS Granite (Methow Valley RD)	Repeater	N/A
16	16 MON83	169.8750	none	172.3500	146.2	NAR		USFS Monument 83 (Methow Valley RD)	Repeater	N/A

GROUP	3	DESCRIPTION:		DNR Repeaters						
Channel	Label	RX Freq	RX Tone	TX Freq	TX Tone	Mod	Scan	Channel Description	Access	MOU
1	1 AREA A	159.4350	none	151.1900	141.3	NAR		DNR Area A - Maynard Hill (NW Region)	Repeater	N/A
2	2 AREA B	159.2400	none	151.2350	114.8	NAR		DNR Area B - Orcas (NW Region)	Repeater	N/A
3	3 AREA C	168.3750	none	151.3700	141.3	NAR		DNR Area C - Lyman Hill (NW Region)	Repeater	N/A
4	4 AREA D	159.2400	none	151.2350	141.3	NAR		DNR Area D - Sumas Mtn. (NW Region)	Repeater	N/A
5	5 AREA E	159.2400	none	151.2350	156.7	NAR		DNR Area E - Skykomish (NW Region)	Repeater	N/A
6	6 AREA G	159.2850	none	151.3850	141.3	NAR		DNR Area G - Darrington (NW Region)	Repeater	N/A
7	7 REPUBL	158.3600	156.7	151.1600	156.7	NAR		DNR Republic (NE Region)	Repeater	N/A
8	8 TONASK	166.5625	156.7	168.1500	156.7	NAR		DNR Tonasket (NE Region)	Repeater	N/A
9	9 BREWST	159.3600	156.7	151.2200	156.7	NAR		DNR Brewster (NE Region)	Repeater	N/A
10	10AREA2E	159.2250	none	151.4750	156.7	WIDE		DNR Area 2E (SE Region)	Repeater	N/A
11	11STATA	159.4200	none	151.2950	103.5	WIDE		DNR State A - Maynard Hill	Repeater	N/A
12	12STATB	159.4200	none	151.2950	114.8	WIDE		DNR State B - Lyman Hill	Repeater	N/A
13	13STATC	159.4200	none	151.2950	127.3	WIDE		DNR State C - Orcas Island	Repeater	N/A
14	14COMMON	151.4150	none	151.4150	none	WIDE		DNR State Common	Direct	N/A
15										N/A
16										N/A

GROUP	4	DESCRIPTION:		DNR Tactical Channels & Portable Repeaters						
Channel	Label	RX Freq	RX Tone	TX Freq	TX Tone	Mod	Scan	Channel Description	Access	MOU
1	1 RPTR1	159.3750	none	151.3700	none	WIDE		Portable Repeater 1	Repeater	
2	2 RPTR2	159.3300	none	151.3850	none	WIDE		Portable Repeater 2	Repeater	
3	3 RPTR3	159.2400	none	151.2650	none	WIDE		Portable Repeater 3	Repeater	
4	4 RPTR4	159.3300	none	151.2500	none	WIDE		Portable Repeater 4	Repeater	
5	5 RPTR5	172.3750	none	170.5750	none	WIDE		Portable Repeater 5	Repeater	
6	6REDNET	153.8300	none	153.8300	none	WIDE		Statewide Fire Tactical	Direct	
7	7DNRAIR	159.2700	none	159.2700	none	WIDE		DNR Air	Direct	
8	8 TAC 1	151.3100	none	151.3100	none	WIDE		Tactical 1	Direct	
9	9 TAC 2	151.3400	none	151.3400	none	WIDE		Tactical 2	Direct	
10	10 TAC 3	171.5750	none	171.5750	none	WIDE		Tactical 3	Direct	
11	11 TAC 4	163.1000	none	163.1000	210.7	WIDE		Tactical 4 (FCC Common User)	Direct	
12	12 TAC 5	168.3500	none	168.3500	210.7	WIDE		Tactical 5 (FCC Common User)	Direct	
13	13 TAC 6	153.9350	none	153.9350	176.2	WIDE		Tactical 6	Direct	
14	14 TAC 7	151.2800	none	151.2800	none	WIDE		Tactical 7	Direct	
15	15COMM	151.4150	none	151.4150	none	WIDE		DNR State Common	Direct	
16										

Group	5	RX Freq	RX Tone	TX Freq	TX Tone	Mod	Scan	Channel Description	Access	MOU
1	1AIRGRD	168.6250	none	168.6250	110.9	WIDE		Air Guard	Direct	
2	2AIRDSP	168.6500	none	168.6500	none	WIDE		Local Air Dispatch	Direct	
3	3CONTCT	168.5500	none	168.5500	none	WIDE		National Interagency Incident Contact	Direct	
4	4FCCCU1	163.1000	none	163.1000	123.0	WIDE		FCC Ground Common User 1	Direct	
5	5FCCCU2	168.3500	none	168.3500	123.0	WIDE		FCC Ground Common User 2	Direct	
6	6AIRTAC1	166.6750	none	166.6750	none	WIDE		National Air-Ground Tactical	Direct	
7	7AIRTAC2	169.1500	none	169.1500	none	WIDE		National Air-Ground Tactical	Direct	
8	8AIRTAC3	169.2000	none	169.2000	none	WIDE		National Air-Ground Tactical	Direct	
9	9AIRTAC4	167.9500	none	167.9500	none	WIDE		National Air-Ground Tactical	Direct	
10	10AIRTC5	170.0000	none	170.0000	none	WIDE		National Air-Ground Tactical	Direct	
11										
12										
13										
14										
15										
16										

F. Natural Event Action Plan for Wildfire Particulate Matter in Chelan County (Entiat Sub-Basin, Wenatchee Sub-Basin, and Chelan Sub-Basin)

The Environmental Protection Agency (EPA) has a natural events policy to address public health concerns during episodes of high concentrations of harmful pollutants from wildfires, volcanic eruptions, and high wind events. If a violation of the National Ambient Air Quality Standards (NAAQS) can be determined to be the result of a natural event, and if a natural event action plan is prepared within 18 months after the episode, then a non-attainment designation can be avoided. During the 1994 wildfires, Wenatchee had violations of the PM_{10} NAAQS when the PM_{10} monitor at Wenatchee Valley Community College recorded a PM_{10} level of 361 micrograms/cubic meter on July 31 and 248 micrograms/cubic meter on August 2, 1994.

The natural event action plan below is the first in the country. It is intended to help prevent any unnecessary federal, state, or local regulations in Chelan County. A non-attainment designation would affect all producers of emissions including Alcoa, timber mill operation at Winton and orchardists, as well as USFS and NPS prescribed fire and wildland fire programs.

The plan targets Leavenworth, Cashmere, Wenatchee, Entiat, and Chelan in Chelan County, and East Wenatchee in Douglas County for air pollution and wildfire education, and health advisory messages.

The EPA's Natural Events Policy lists several requirements for PM_{10} exceedances to be treated as the result of a natural event. The requirements are as follows:

- analysis and documentation of the event
- flagging the relevant data in the national EPA database
- submittal of documentation to the EPA regional office
- public involvement.

When forest fires are reported to Central Washington Interagency Communication Center (CWICC), the Chelan County Department of Emergency Services is kept appraised. When the Department of Emergency Services verifies that one or more potentially large or difficult to control wildfires have broken out.

Chelan County Department of Emergency Services will call the Chelan-Douglas County Health Department and **Chelan-Douglas County Health Department** will do the following:

- Call the Washington Department of Ecology (DOE) to increase PM10 monitoring frequency and for weather and smoke predictions.
- Notify appropriate parties of potential for health advisories, including hospitals, nursing homes, daycare facilities, and school districts

- Notify news media with prepared responses and contact people

Washington State DOE will do the following:

- Increase PM_{10} monitoring frequency in Wenatchee Valley to every other day or possibly every day
- Put mobile monitoring van and operator on stand-by
- Consult with Washington State Department of Natural Resources (DNR) or USFS information officer, or fire team regarding fire behavior, weather, and fire control expectations
- Consult with the National Weather Service Spokane office for fire weather information
- Advise Chelan-Douglas County Health Department regarding PM_{10} levels, weather, and smoke predictions
- Notify news media with prepared responses about air quality monitoring and who to contact at the DOE and the County Health Department for health questions

The **Chelan-Douglas Health Department** will use one of the following health advisory alerts as is necessary:

Level 1 – Local Air Pollution Alert

When PM_{10} concentrations exceed a 24-hour average of 75 mg/m^3 or a four-hour rolling average of 100 mg/m^3 or one-hour average of 150mg/m^3 in combination with a fire weather or fire behavior forecast and a fire control or smoke prediction indicating continued poor or worsening air quality. The recommended health advisory is:

All individuals with pre-existing lung or heart disease should contact their physician for specific advice and try to remain indoors with doors and windows closed, and avoid excessive exertion and exposure to tobacco smoke and other respiratory irritants. People who need to take regular medications should make sure that they have at least a 5-day supply available. Individuals with chronic medical conditions should contact their physicians for guidance, regardless of the occurrence of symptoms. All others should contact a health care provider in the presence of any of the following symptoms, headache, repeated coughing, chest tightness or any wheezing in the chest, excessive phlegm production, difficulty in breathing, or nausea. All individuals should avoid vigorous outdoor activity.

Level 2 – Local Air Pollution Warning

When PM_{10} concentrations exceed a rolling 4-hour average of 150 mg/m^3 in combination with a fire weather or fire behavior forecast and a fire control or smoke prediction indicating continued poor or worsening air quality. The recommended health advisory is

All Level 1 air pollution advice remains in effect. In addition individuals with chronic respiratory and cardiac conditions should be advised to evacuate to a "smoke free" site,

providing this can be done safely. Such sites can either be away from the community, a Red Cross shelter, or school specially equipped with very tight windows and doors and appropriate indoor air filtration equipment. All other individuals should try to remain indoors, with doors and windows closed, and avoid excessive exertion and exposure to tobacco smoke and other respiratory irritants.

Level 3 – Local Air Pollution Emergency

When hourly PM_{10} concentrations at the site exceed a rolling four-hour average of 400 mg/m^3. The recommended health advisory is:

Healthy individuals who choose to remain in the community should stay indoors, deep windows and doors tightly closed, reduce activity, avoid exposure to tobacco smoke and other respiratory irritants, and conserve energy. Persons that are uncomfortable should be advised to move out of the area or to a pre-designated "clean" site. Those individuals with respiratory and/or cardiac problems, the elderly, infirm persons, and young children should also be relocated to the "clean" site following careful screening by health care providers.

The Chelan-Douglas Health Department will fax health advisories to local radio stations (KOZI FM – Chelan, KPQ AM – Wenatchee, and KNWR FM – Ellensburg/Wenatchee), school districts, hospitals, day care, nursing homes, or home care facilities, and local government agencies. A Chelan-Douglas Health Department phone number for further information will be included in the message. Chelan County Department of Emergency Services in conjunction with the Chelan County Sheriff, will coordinate with the Chelan-Douglas Health Department, the DNR and the USFS on whether to issue an advisory regarding hazardous road conditions or closed roads. Return of relocated persons should occur when fire conditions allow.

Agency Land Resource Management Plans (LRMP – USFS and GMP – NPS):

Okanogan/Wenatchee National Forest (OWNF) and North Cascades National Park Service Complex (the Complex) both manage federal lands in the Chelan Sub-basin. All USFS LRMPs (Land and Resource Management Plans) and the Complex General Management Plan (GMP) state that the agency will meet or exceed applicable federal and state air quality standards and that visibility and other air quality related values (AQRV) within Class I areas. The LRMP, also, state that prescribed burning will be managed to comply with the State Smoke Management Plan (SMP) and Smoke Implementation Plan (SIP).

On Wenatchee National Forest **(before merging with the Okanogan) the LRMP was signed in 1990 and included this specific emissions reduction goal:**

To meet Regional Standards and Guidelines, the Wenatchee National Forest will demonstrate reasonable progress in reducing total suspended particulates (TSP) from

prescribed burning during Forest Plan implementation. The starting point for the forest is 5,000 tons.

In addition, this plan stated that prescribed fires exceeding applicable air regulatory standards would receive appropriate suppression action to minimize the impact.

On Okanogan National Forest **(before merging with the Wenatchee) the LRMP was signed in 1990 and included these statements about emissions reductions:**

The effects of the forest's prescribed burning program … will be the production of Total Suspended Particulates (TSP) emissions."
"(There will be a) 10% change in TSP emissions produced from baseline values of 7,600 tons per year.

The TSP goals in the Wenatchee and Okanogan LRMP are in line with the state's goal of a 20 percent reduction of emissions by the end of 1994 and a 50 percent reduction in emissions by the end of 2000. Emissions from burning in eastern Washington for the purpose of restoring forest health or for preventing the deterioration of forest health are exempt from the state's emissions ceilings. The state does not attempt to regulate WFU. Broadcast burning and pile burning of activity fuels is regulated. Because of the reduction of the timber program, the 50 percent reduction of emissions on the eastside was achieved by 1993.

In North Cascades National Park Service Complex the GMP, signed in 1995, is the equivalent of the USFS LRMP. The plan states that national park is designated as a Class I area, but the Lake Chelan National Recreation Area and the Ross Lake National Recreation Area are Class II. Most prescribed burning is done prior to July 4th and after Labor Day to avoid visibility impacts on weekends when visitation is highest. The average Standard Visual Range for the Complex is approximately 90 miles during the summer.

The Complex also completed a Wildland Fire Management Plan in 1991. That plan states that prescribed natural fires (now referred to as WFU and changed to use of fire-in 2009) may be put out if they threaten any one of seven items. Air quality is one of those items especially where it concerns populated areas. Air quality impacts will be considered for all fire management actions within the Complex. Smoke from using fire will be allowed to obscure scenic views in the Complex. It is accepted that backpackers in the designated Wilderness may encounter smoke from use of wildlanf fire, as they may encounter other natural phenomena.

The draft environmental impact statement (EIS) of the **Interior Columbia Basin Ecosystem Management Project** (ICBEMP) included a regional air quality assessment of the effects of an increased prescribe fire program compared to the current trend of wildfires of greater intensity and size. This assessment starts off with a discussion of pre-settlement air quality conditions. Since good information on this topic is hard to find, the

text of this description is quoted below. The following text and references can be found in the Draft ICBEMP EIS.

Air quality in the project area was not pristine before settlement by Europeans in the 1800s. Layers of charcoal found in the Sheep Mountain bog near Missoula, (MT) and the Williams Lake Ren north of Cheney (WA) provide evidence of wildland fire at varying intervals from 10,000 years ago to the present (Johnson et al. 1984). Fires from as long as 4000 years ago are evident from charcoal found at Blue Lake near Lewiston, (ID). Several sites show significantly increased levels of charcoal starting approximately 1,000 years before present, attributed to burning by American Indians. Many historical accounts refer to the presence of smoke and burned areas in the interior Columbia Basin, the Harney Basin, near the mouth of the Umatilla River, on the western slope of the Blue Mountains, and along the section of the Oregon Trail from the juncture of the Boise and Snake Rivers to the Columbia River (Robbins and Wolf 1994). Some accounts merely noted the presence of burned areas, while others attributed fire to burning by American Indians (ibid). Levels of smoke have declined as fire was excluded from forests, particularly after the advent of organized fire suppression in the 1930's. Brown and Bradshaw (1994) concluded that levels of smoke in the Bitterroot Valley, (MT) were 1.3 time greater prior to settlement in the 1800s than then have been recently.

To evaluate the environmental consequences of a range of prescribe fire alternatives for the EIS, a sophisticated dispersion and concentration computer model, CALPUFF, was used. Eight different prescribed fire scenarios were model. These scenarios represented prescribe fire programs ranging from size of the current program up to a program that is 16 times larger. These scenarios were modeled for spring and fall fires, the most likely time for prescribe burning. A wildfire scenario was, also, developed and compared to the prescribed fire scenarios. The wildfire scenario used actual wildfires from 1990 and 1994 and was modeled for the summer, the time when most wildfires occur.

The conclusion from the analysis was that wildfire impacts on air quality may be significantly greater in magnitude than emissions from prescribed burning. However, this analysis provided only a gross assessment of the impacts from wildfire and prescribed on air quality. Scientific limitations prohibit concluding that wildfires will always pose a greater air quality hazard than prescribe fires. The air quality modeling also suggests that prescribed fire particulate emissions considered alone may not cause wide spread regional-scale exceedances of the National Ambient Air Quality Standards (NAAQS). However, the evaluation of ambient air and compliance with the NAAQS is based on the cumulative impacts from all sources of air pollution on ambient air. This analysis did not assess the impacts from other sources of particulate matter pollution. The modeling analyses also did not adequately assess the possibility for localized exceedances of the NAAQS caused by prescribed fire emissions. The modeling results do suggest that regional-scale degradation of visibility is possible from prescribe fire emissions. While this scale of analysis allowed a general comparison of alternatives in the EIS, its broad scale may mask sub-regional and smaller-scale impacts.

More detailed air quality analyses should be conducted at subsequent planning levels when emissions can be more accurately quantified and the locations and meteorology associated with a specific planned burn are known.

The Washington State Department of Ecology has reservations about the idea that prescribed fire will reduce emissions and improve air quality. The higher and more frequent background levels of particulates from prescribed fires could result in more frequent periods of unhealthy air quality when added to other sources of particulates. They point out that the model runs of prescribed fire used in the analysis did not include wildfires that may occur simultaneously, especially in the fall. A prescribed fire program will not eliminate wildfires. The combined emissions from prescribe fire and wildfire could also cause more frequent unhealthy air quality conditions. The net effect may be more frequent and longer periods where the NAAQS are exceeded than with wildfire alone.

G. Draft North Cascades National Park Service Complex Fire Effects and Fuels Treatment Monitoring Plan

Introduction

The North Cascades National Park Service Complex (the Complex) has prescribed fire and fuels management projects in which monitoring through the fire effects monitoring program is currently underway or will be implemented. The three project areas for which fire effects monitoring and/or fuels monitoring is currently performed, or will be implemented include:

- Stehekin Valley Forest Fuel Reduction Areas (1995 Stehekin FFRA)
- Stehekin Contours Prescribed Fire Unit (preliminary)
- Hozomeen Contours Prescribed Fire Unit (preliminary)

The fire effects and fuels monitoring plan objectives for the FFRA will be discussed in their entirety (although in draft form) for this report. Fire effects and fuels monitoring for the Stehekin and Hozomeen Contours will be introduced but not fully developed until site specific targets for hazard fuel reduction and/or restoration have been developed. The fire effects and fuels monitoring plans for the new units will be peer reviewed by the PWR NPS Fire Ecology Group before their implementation.

Description of ecological models
There is one ecological model for the Stehekin FFRA and Stehekin Contours Prescribed Fire Unit because they both occur in the dry Douglas fir/Ponderosa pine forest community of Stehekin, in the valley bottom (lowland) wildland urban interface and adjacent wilderness contours (upland), respectively. Their ecology will be described jointly as the *eastside Douglas fir/Ponderosa pine monitoring type*, although their management and monitoring objectives will be discussed separately.

The Hozomeen Contours Prescribed Fire Unit contains two monitoring types, 1) the *Eastwest Douglas fir/Lodgepole pine-Ponderosa pine monitoring type* at Lightning Creek and 2) the *Douglas fir/Western Hemlock monitoring type(s)* that is a broad monitoring type that will be applied throughout the Hozomeen Contours outside of Lightning Creek.

Eastside Douglas fir/Ponderosa pine monitoring type
The monitoring type (ecological model) for the Stehekin Valley FFRA and the Stehekin Contours is a Douglas fir dominated mixed conifer forest that is part of the true Douglas fir zone east of the Cascades (Franklin and Dyrness 1988). It is the most xeric forest type on the Complex, and is comparable to Douglas fir forests of the Rocky Mountains. It is found throughout the Stehekin valley bottom and the Stehekin Contours, primarily below 3000 feet.

Douglas fir is the dominant species, which occurs with Ponderosa pine in all layers of the canopy. In the valley bottom the ratio of Douglas fir to Ponderosa pine is approximately 8:1

(Kopper and Drake 2002). Along the Contours there are some isolated pockets that are dominated by Ponderosa pine rather than Douglas fir, usually occurring on open rocky slopes. The most prevalent plant association in the project areas is Douglas fir/Snowberry (*Symphoricarpos alba*).

A recent 433-year fire history reconstruction of a dry Douglas fir forest in the Teenaway River drainage in the nearby Wenatchee NF determined that the median fire interval varied within a range of 7 to 43 years, and that larger fires (> 4000 ha) occurred at intervals of 1 to 37 years (Wright and Agee 2004). Historically, small fires created gaps in the forest canopy that perpetuated a mosaic of fire effects; subsequent fires would burn up to but not within the perimeter of the recently burned areas because the fuels were sparser in those areas (Wright and Agee 2004).

The fire regimes in the Stehekin valley, like other dry Douglas fir forests of the eastern Cascades have been altered to a greater or less degree by fire suppression, climate change, and selective harvesting (Agee 1994). The Teanaway study, and others performed in similar areas found a significant lengthening of fire free intervals during the suppression era (1910 to present) (Wright and Agee 2004, Everett *et al.* 2000). Ground fuels and understory regeneration have increased beyond historic levels (Agee 1994, Wright and Agee 2004). Furthermore, historic levels of Ponderosa pine have decreased as fire suppression and selective harvesting allowed the more shade tolerant Douglas fir to shade the more fire dependent pine out (Ohlson and Schellhaas 1999).

The Douglas fir/Ponderosa pine forest shows characteristic signs of being at risk of a stand replacing fire; a dense understory of Douglas fir pole and seedling trees that overcrowds a weakening overstory which is succumbing to insects and disease. The survey performed in preparation of the 1995 Stehekin Plan describes the "unnatural fuels buildup" along with insects and disease in Stehekin (Oliver and Larson 1981, USDI 1995). The fire effects monitoring that is currently underway in the Stehekin FFRA reveal a heavy average fuel loading of 31.5 tons per acre total fuel loading (7.4 woody, 24.1 litter and duff), and greater than 250 trees/ha (of overstory trees > 15 cm dbh) (Kopper and Drake 2004). These stand conditions increase the likelihood of crown fires and high severity fire events (Wright and Agee 2004, Hessburg and Agee 2003).

Eastwest Douglas fir/Lodgepole pine-Ponderosa pine monitoring type
This forest type, occurring at Lightning Creek is classified as part of the dry to mesic *eastwest* forest type that occurs in the transitional climatic zone between coastal and inland influence. The Lightning Creek Prescribed Burn Unit is unique in that there is an unexpected Ponderosa pine component west of the Cascade crest. Ponderosa pine comprises 5% of the stand, mostly consisting of large trees with yellow-bark old-growth characteristics (Agee *et al.* 1986).

This dry forest type is restricted to low elevations (1600 ft to 3400 ft) on southwesterly aspects within an area that is approximately 1500 acres. There is a dense understory of shrubs, including many fire-adapted species such as the vigorous post-fire resprouting Snowbush (*Ceanothus velutinus*) (Agee *et.al.* 1986). On very rocky sites the shrubs are

replaced by drought resistant herbs such as Strawberry (*Fragaria virginiana),* Yarrow (*Achillea millefolium),* Pine grass (*Calamogrostis rubescens)* and Hawkweed (*Hieracium).*

In a 400-year fire history this forest type was found to have an average fire return interval of 52 years, and in areas where Ponderosa pine is the primary dominant within this forest type the natural fire rotation was even shorter; calculated at 44 years (Agee *et al.* 1986). Although it is not clear whether the high fire frequency above Lightning Creek was partially the result of Native Americans or early settlers burning, it is clear that without low severity fire, the Ponderosa pine will eventually be replaced by more shade tolerant species (Agee *et al.* 1986). This area is classified as a Condition Class 2 forest because it has missed one fire rotation.

Douglas fir/Western Hemlock monitoring type

The ecological model for the Hozomeen Contours Prescribed Fire Units outside of Lightning creek is a broad mixed conifer type that includes forests that are Douglas fir or Western hemlock dominated. These mixed conifer forests include 1) dry Douglas fir dominated stands influenced by the rain shadow of the Cascades, 2) mesic coastal Douglas fir dominated stands with a codominance of Western hemlock, 3) westside Western hemlock dominated stands with varying amounts of Douglas fir, Red Cedar, and other mixed conifers.

Fire Management Objectives and Monitoring

Forest Fuel Reduction Area objectives and monitoring

A rigorous fire management program utilizing prescribed fire and fire surrogates (thinning) has been underway in the Stehekin Valley FFRA since 1995.

The Stehekin Valley is an isolated community located 55 miles up Lake Chelan with no escape routes or safety zones other than the lake itself, which along with housing ninety permanent residents year-round, hosts a summer tourist population that balloons to approximately 200 persons per day (Stehekin Visitor Center Statistic). The dominant forest type in the Stehekin Valley is dry Douglas fir/Ponderosa pine, which has been altered structurally by fire suppression and human activities, and currently exhibits hazardous fuel conditions.

The primary objective of the 1995 Stehekin Valley Plan is hazard fuel reduction in the wildland/urban interface in order to reduce the potential for high intensity and severity fires, including crown fires. The hazards that can be mitigated (weather being an uncontrollable factor) include; 1) ladder fuels, the dead branches and low shrubs and seedlings that facilitate the spread of ground fire into the canopy, 2) crown density and continuity which allow fires to spread from crown to crown, and 3) heavy and continuous fine fuel loading which increases fire intensity and facilitates fire spread on the surface (Graham et.al. 2004).

These factors are targeted in the FFRA restoration objectives along with the achievement of stand conditions more characteristic of historical Douglas fir/Ponderosa pine stands (full document Appendix A). Restoration objectives are met through thinning and prescribed burning. These objectives are replaced by maintenance objectives that will be maintained primarily through prescribed fire treatments, with little or no thinning.

Management Objectives (Restoration)

- Decrease standing live trees in pole-size class and smaller by 50-85% by 1 year post-burn and post-thin
  - Reduce overstory tree density by 30 – 60% by 1 year post-burn and post-thin
  - Reduce total basal area by 40 - 60% by 1 year post-burn and post-thin
- Individual numbers of exotic species to increase by no more than 20% by 2nd year post-burn
  - Increase vegetative ground cover by 10-30% by 2nd year post-burn,
- Reduce fuel loading of 1-hour fuels 55-90%; reduce 10-hour fuels 45-65%; 100-hour 15-35%; 1,000 hour fuels 0-20%.

Monitoring Variables

Effects of thinning and prescribed fire: Total fuel load, density of over-story (>15 cm dbh) and pole-size (2.5 – 15cm dbh) trees, and seedling regeneration in restoration phase.

Monitoring Objectives

Monitor all objective variables in order to be 80% confident of meeting the condition objectives, with the acceptance of a 20% chance of saying that the desired future conditions were met when they were not. The attainment of the desired future conditions will serve as trigger point to begin the maintenance phase. Monitor maintenance phase condition objectives variables at the same level of confidence.

Monitoring Design

The management objectives are monitored through the use of the Fire Monitoring Handbook 2001 (FMH) protocols for the collection of data on trees, ground fuels, understory vegetation and shrubs (USDI 2001). There are (27) 50 by 20 meter FMH forest plots distributed throughout the FFRA in order to accurately monitor the overall objectives.

The FFRAs consist of 9 sub-units ranging in size from 52 acres in the Weaver Point subunit to 199 acres in the McGregor subunit (Table 1). Treatments on six of these units, with a total acreage of 822, began following the approval of the 1995 Stehekin Valley Plan. Three additional units with a total of 322 acres (Harlequin, Lower McGregor, and Lower Field) were designated as "Future Units", but have not been treated yet. The delineation of the sub-units was originally, and continues to be based upon tactical concerns; trails, roads, and stands of trees that could be treated under a uniform prescription. The units were broken into small subunits with the intention to monitor the effects of the treatments, and allow for adaptive management as the plan progressed.

FFRA Sub-Units	1995 Acreage	Adjusted Acreage	FMH Plots
Orchard/Rainbow	120	128	4
Boulder Creek	132	147	4
Company Creek	138	157	14
Coon Run	180	201	5
McGregor	200	200	future
Weaver Point	52	54	future
Harlequin		51	future
Lower McGregor		133	future
Lower Field (Upper McGregor)		138	future
Totals	822	1209	27

Table 1. Fire Management Units in the Forest Fuel Reduction Areas

Monitoring Objectives
The confidence levels as stated in the monitoring objectives are based upon minimum requirements for tracking long and short-term trends. Greater statistical significance is not considered necessary for the purposes of this work. We will monitor all objective variables in order to be 80% confident of meeting the condition objectives, with the acceptance of a 20% chance of saying that the desired future conditions were met when they were not. The attainment of the desired future conditions will serve as trigger point to begin the maintenance phase. Monitor maintenance phase condition objectives variables at the same level of confidence.

Field Measurements
We use the field methods included in the Fire Monitoring Handbook (USDI National Park Service 2001) for all of the above listed variables with the exception of tree damage. We have incorporated the following damage codes in order to track insect infestations and tree diseases:

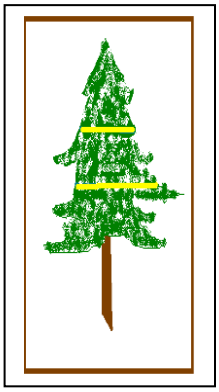
Insect Infestation Rating
Insect infestations are tracked through the use of the established and supplemental FMH-established damage codes that are recorded for overstory trees. The damage codes are recorded on both live and dead trees in order to distinguish between pre and post treatment insect populations. Supplemental damage codes are as follows:
INSE-U: Unsuccessful insect attack as evidenced by entrance holes in the bark that are plugged with sap.
INSE-S: Successful insect attack as evidenced by unplugged entrance holes in the bark.
INSE-F: Presence of frass within the holes or at base of tree indicating further damage following successful attack.

Dwarf Mistletoe Infection Rating

The degree of tree infection by dwarf mistletoe is rated using a scheme known as the *Hawksworth scheme* (Hawksworth 1977) using a scale from 1-6. The tree is visually broken into equal thirds, and each third is given a rating of 0, 1, or 2 based on the degree of infection. The rating for each third is summed for the tree, with a rating of 6 being the highest level of infection (Edmonds, 2000). The following figure illustrates the Hawksworth scheme:

6-class Mistletoe Rating System

Step 1: divide crown into thirds
Step 2: Rate each third 0, 1, or 2
0 = no visible infection
1 = light infection (1/2 or less of total number of branches infected in the third)
2 = heavy infection (more than ½ of total number of branches in the third infected)
Step 3: Add ratings of thirds to obtain rating for total tree



Timing of monitoring:

The peak bloom for understory species in the Stehekin Valley occurs between mid-June and early August, although this is subject to seasonal variation. Monitoring variables and timing is as follows:

- **Preburn/thin, 1-year, 2-year, and every fifth year** (00PRE, 01YR01) following the initial burn (until re-burning, at which point the cycle begins again) will be performed during the peak bloom for the major understory vegetation and grasses and will include all variables listed on the FMH-4 as preburn variables. The preburn read will serve as the pre-thin read, and this **preburn/thin** read will be performed no more than three years prior to thinning or burning, or it will be repeated before treatment.

- **Post-thin** (**00YR02 status**): monitoring variables will occur year following thinning, unless a prescribed burn is anticipated before 1 year has passed, in which case the 1-year post-thin plot will be read as immediately before the burn. The post-thin monitoring will only include tree density and fuel transects since these are the only variables that are expected to change. If no thinning occurred in the plot then it wouldn't be read.

- **Immediate postburn (01POST status):** monitoring will be performed on every plot within a burn unit that has been burned whether they appear to have burned or not. This will occur within 2 months following prescribed fire and includes all variables listed on the FMH-4 as immediate-postburn variables.

Future Units Objectives and Monitoring:

The approach for monitoring of the Stehekin Contours and Hozomeen Contours Prescribed Burn Units will differ from that of the FFRA monitoring in several ways. Here are some preliminary plans for monitoring in the various units:

- **Stehekin Contours**

The Stehekin Contours Units (ranging from 338 – 635 acres per unit) are within designated wilderness areas where only prescribed burning will be implemented. The management objectives, to increase protection of the Stehekin Valley and restore historic dry Douglas fir/Ponderosa pine forest structure, are equally weighted. Emphasis will be placed on determining the structure of, and monitoring the effects of prescribed burning on, the pattern of gaps and patches created from low and high severity fire effects across the landscape.

The primary monitoring variables (trees, fuels, understory vegetation, shrubs, dwarf mistletoe and insect infestations) are not anticipated to change from that of the FFRA monitoring, however, a greater number of smaller sampling units may be employed to address fire effects occurring on a broader scale. Rapid Assessment protocols described on the NPS Fire Ecology website may be adapted to reduce sampling sizes. Remote sensing data may be used to monitor larger landscape scale patterns.

- **Lightning Creek Prescribed Fire Units**

Lightning Creek is a unique area that has Ponderosa pine within the wilderness area of the Hozomeen Contours Prescribed Burn Unit. The primary goal of prescribed burning in this unit is to maintain the Ponderosa pine. There is not a hazard fuel reduction objective. Full FMH monitoring plots are anticipated to be utilized in this unit.

- **Other Hozomeen Contours Prescribed Fire Units**

The other Hozomeen Contour Units will be prescribed burned in wilderness areas primarily for the purpose of reducing fuel loadings near the Hozomeen community so that fires can be managed for multiple objectives in the future. Because a greater amount of variability is anticipated in this broad monitoring type, a greater number of smaller plots will be utilized in order to achieve a greater degree of statistical significance. Rapid assessment plots will be modified in a manner similar to the Stehekin Contours Units.

Aspects of Monitoring Common to All Units

Monitoring Plot Relocation

A GIS map will be (or has been) made of all of the plots in the monitoring unit, which will be provided to the North Cascades Fire Ecologist, Fuels Specialist and Fire Effects Monitoring team.

GPS and written descriptions (Plot Location Data Sheets) will be used to get in the general vicinity of the monitoring plot. FMH Plots are permanently marked with (17) 2’ rebar

stakes that are 5" above the ground and are clearly labeled with the plot and stake identification codes as per FMH protocols. Rapid Assessment plots (if they are utilized) will also be marked with rebar at 4 corners.

Intended data analysis approach:

Data will be analyzed by running minimum sample size equations as plots are installed to confirm that a minimum sample size is obtained. As all plots approach the time periods for each respective objective variable, minimum sample size equations will be run again, and new plots installed, or monitoring objectives reassessed, until minimum plot numbers are met.

We will contrast our results with other past fire ecology studies that have taken place in the Complex and other forest communities of the same ecological model elsewhere.

Data Sheet Examples

See the Fire Monitoring Handbook (USDI National Park Service 2001).

Information Management

Data will be collected, entered, checked for errors, and managed in FEAT (Fire Effects Assessment Tool) by the fire effects monitoring staff at North Cascades National Park. A copy of the FEAT database will be kept by the North Cascades Fire Ecologist after the data has been thoroughly checked by the North Cascades fire effects monitoring team (by the beginning of the following field season). Copies of all hard and soft data will be filed in North Cascades fire management office.

Quality Control and Data Errors

Quality Control will be a shared responsibility. The following methods will be used to minimize data errors:

- Minimizing errors in recording, such as incomplete or uncollected data, are the responsibility of the North Cascades Lead Biological Technician. This person would make sure all data sheets are completely filled out, before leaving the field.

- Minimizing the field effects of monitoring, such as trampling is the responsibility of the North Cascades Lead Biological Technician.

- Minimizing data entry errors, such as transcription errors, is the responsibility of the North Cascades fire ecologist. Error will be checked before and after the entry of the data of every plot.

- Ensuring the correct identification of species is the responsibility of the North Cascades Lead Biological Technician in consultation with the North Cascades fire

ecologist, and local experts. Field and voucher specimens will be collected. The field specimens will be maintained at the North Cascades fire effects monitoring office.

- Minimizing other field errors, e.g., species that are overlooked or not seen, or data collected at the wrong time of year is the responsibility of the North Cascades Lead Biological Technician.

- Quality training for the North Cascades fire effects monitoring crew will be arranged by the North Cascades fire ecologist.

- Proper interpretation of monitoring design is the responsibility of the North Cascades fire ecologist.

- All plot locations will be located using a GPS. In addition, the North Cascades Lead Biological Technician will maintain accurate documentation of plot locations for ease of relocation.

Responsible Party

The fire ecologist for the North Cascades National Park Service Complex is responsible for pilot sampling, monitoring crew supervision and data entry, management and analysis. This person is also responsible for annual reports and data analysis. The North Cascades Fire Effects Monitoring Crew will carry out data collection and data entry.

The North Cascades Fire Ecologist and the Regional Fire Effects Monitoring Coordinator are responsible for management plan revision and annual monitoring program review.

Funding

The Fire Ecologist or Fire Effects Monitoring Program Manager at North Cascades National Park Service Complex is responsible for overseeing the fire effects / fire ecology budget. General funds for the time and travel for North Cascades monitoring will come from the North Cascades fire effects / fire ecology budget except travel for fire behavior and immediate postburn monitoring activities which will come from project funds.

Management Implications of Potential Results

The fire management officer and the resource management specialist will review monitoring results each December. This group will determine if the trend results of previous burns are acceptable. If the desired future conditions are not achieved, or if resource needs change, during the restoration phase (i.e., higher mortality of trees, lower level of understory species than expected, fuel load too high following thinning, invasive plant species invasion) then the variables that were not achieved will be reported to the acting fire management officer and the resource management specialist. Through consultation with ecologists and silviculturalists, adaptive management strategies will be applied to the restoration plan. These strategies might include altering some or all of the

following: burn prescriptions, monitoring objectives, and/or burn unit boundaries. Managers may recognize a need for additional research or increasing treatment on non-native species. The plan will not move into the maintenance phase until all desired future conditions have been achieved.

Monitoring data will be reported to other NPS personnel and other agencies through publications, conferences, and other professional meetings as appropriate.

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North Cascades Fire Effects Monitoring Plan Appendix A

FMH-4 MONITORING TYPE DESCRIPTION SHEET Park: NOCA

Monitoring Type Code* F P S M E 2 D 0 8 **Date Described:** 02/27/03

Monitoring Type Name: Mixed Conifer / Burn and Thin
Preparers (FireEcol/FMO): K.Kopper, T.Johnson

Burn Prescription (Restoration): Units will be burned between April until green-up, or between Labor Day and end of October. Flame length 0.4-1.5 ft. and rate fuels to 3-5 tons/acre; rate of spread range between 0 - 3 ch/hr. Temperatures should range from 30°-85°F.; Relative humidities 25 - 55%; Midflame wind speed 0-20 mph; Fuel moisture as follows: 1-hr 6-14, 10-hr 8-15, 100-hr 10-30.

Thin Prescription (Restoration): Fuels Crew thinning of PSME <6" dbh, reduction of ladder fuels. Contract thinning of PSME > 6" diameter to reduce overstory tree density to 70 overstory trees per acre, selection against root-rot and mistletoe infected trees.

Management Objectives (Restoration): 1) Decrease standing live trees in pole size class and smaller by 50-85% by 1 year post-burn and post-thin, 2) Reduce overstory tree density by 30 – 60% by 1 year post-burn and post-thin, 3) Reduce total basal area by 40 - 60% by 1 year post-burn and post-thin, 4) Individual numbers of exotic species to increase by no more than 20% by 2nd year post-burn, 5) Increase vegetative ground cover by 10-30% by 2nd year post-burn, 6) Reduce fuel loading of 1-hour fuels 55-90%; reduce 10-hour fuels 45-65%; 100-hour 15-35%; 1,000-hour fuels 0-20%.

Monitoring Variables: Effects of thinning and prescribed fire: Total fuel load; density of overstory and pole-size trees, and seedling regeneration in restoration phase.

Monitoring Objectives: Monitor all objective variables in order to be 80% confident of meeting the condition objectives, with the acceptance of a 20% chance of saying that the desired future conditions were met when they were not. The attainment of the desired future conditions will serve as trigger point to begin the maintenance phase. Monitor maintenance phase condition objectives variables at the same level of confidence.

Physical Description: Includes all aspects and slopes below an elevation of 1650', which includes midslopes to valley bottoms. Talus slopes and steep ravines (>40% slope) are excluded. Characteristic soils consists of deep coarse to fine cobbly, sandy loam of the Wapal or Palmont Series, with some deep silt loam of the Goddard series. There are also some areas of alluvium mixed with volcanic ash.

Biological Description: Mixed conifer forest dominated by Douglas Fir (*Pseudotsuga menziesii*) (55-100% cover), with some ponderosa pine (*Pinus ponderosa*). The variable

understory includes shrubs (20-40% cover): Snowberry (*Symphoricarpos alba*), Oceanspray (*Holodiscus discolor*), Serviceberry (*Amelanchier alnifolia*), Oregon boxwood (*Pachistima myrsinites*), pine grass (*Calamagrostis rubescens*) and grasses/ forbs (20-40% cover) which include: elk sedge (*Carex geyeri*), pine grass (*Calamagrostis rubescens*). Total fuel load ranges from 10-20 tons/acre.

Rejection Criteria: Areas >30% barren; areas with anomalous vegetation; riparian areas or areas containing 4 or more ≥ 2.5cm dbh deciduous trees, such as big-leaf maple (*Acer macrophyllum),* red alder (*Alnus rubra*) or Dogwood (*Cornus nutallii*); areas within 20 meters of roads, man-made trails, or human created clearings; and sites with rock outcrops comprising >20% of the area are to be rejected.

Additional Notes: * Read fuel line 1 ft perpendicular to right side of fuel line when rock is on transect point unless both litter and duff are above the rock. * Do not count AMAL, PAMY, SPBE or SYAL on brush transect. (Do count HODI, CEVE, RUID, RIHO, PREM, SACE).

The Following Damage Codes are ADDITIONAL VARIABLES for Overstory Trees

Insect Infestation Rating:

Insect infestations are tracked through the use of the established and supplemental FMH-established damage codes that are recorded for overstory trees. The damage codes are recorded on both live and dead trees in order to distinguish between pre and post treatment insect populations. Supplemental damage codes are as follows: **INSE-U**: Unsuccessful insect attack as evidenced by entrance holes in the bark that are plugged with sap. **INSE-S**: Successful insect attack as evidenced by unplugged entrance holes in the bark. **INSE-F**: Presence of frass within the holes or at base of tree indicating further damage following successful attack.

Dwarf Mistletoe Infection Rating:

The degree of tree infection by dwarf mistletoe is rated using a scheme known as the *Hawksworth scheme* (Hawksworth 1977) using a scale from 1-6. The tree is visually broken into equal thirds, and each third is given a rating of 0, 1, or 2 based on the degree of infection. The rating for each third is summed for the tree, with a rating of 6 being the highest level of infection (Edmonds 2000). The following figure illustrates the Hawksworth scheme:

6-class Mistletoe Rating System

Step 1: divide crown into thirds
Step 2: Rate each third 0, 1, or 2
0 = no visible infection
1 = light infection (1/2 or less of total number of branches infected in the third)
2 = heavy infection (more than ½ of total number of branches in the third infected)
Step 3: Add ratings of thirds to obtain rating for total tree

NOCA FMH-4: GENERAL PROTOCOLS		YES (√)	NO (√)		YES (√)	NO (√)
Preburn	Control Plots/Opt	√		Herb Height/Rec	√	
	Herbaceous Density/Opt		√	Brush Cover: Set 1 x 1 m frame at points 1, 5, 10, 15, 20, 25, 30, 35, 40, 45 meters on inside of Q4-Q1 and Q3-Q2. Frame lies from x to x+1 meters along the tape.		
	OP/Origin Buried		√	Abbreviated Tags	√	
	Voucher Specimens/Rec	√		Stakes Installed: Q1-Q4, 1A-4B, 0P, Origin		
	Stereo Photography/Opt		√	Crown Intercept/Opt		√
	Brush Individuals/Rec	√*		Herb. Fuel Load/Opt		√
	Herbaceous Data Collected at: **Q4-Q1 · Q3-Q2**					
	Species Inventory: Quarters 1-4					
Burn	Duff Moisture/Rec	√		Flame Zone Depth/Rec		√
Postburn	Herbaceous Data/Opt: FMH - ~~17~~			Herb. Fuel Load/Opt		√
	100 Pt. Burn Severity/Opt		√			

FOREST PLOT PROTOCOLS		YES (√)	NO (√)		YES (√)	NO (√)
Overstory	Area sampled: 50 x 20m			Quarters Sampled: Q1-Q4		
	Tree Damage/Rec	√		Crown Position/Rec	√	
	Dead Tree Damage/Opt	√*		Dead Crown Position/Opt	√	
Pole-size	Area Sampled: 50 x 20m			Quarters Sampled: Q1-Q4		
	Height/Rec	√		Poles Tagged/Rec	√ Post-thin	
Seedling	Area Sampled: 25 x 10m for all trees. 50 x 20 for PIPO only	 √ √		Quarters Sampled: Q1 all species. Q1-Q4 PIPO only.	 √ √	
	Height/Rec	√		Seedlings Mapped/Opt		√
Fuel Load	Sampling Plane Length: 6, 6, 12, 100, 100	√		Fuel Continuity/Opt		√
	Aerial Fuel Load/Opt		√			
Postburn	Char Height/Rec	√		Mortality/Rec	√	

H. North Cascades National Park Lake Attributes (Potential Water Dipping Sources)

NOCA LAKES > 1 and <= 4.0 Hectares and >7m maximum depth; and lakes >4.0 hectares with > 5m maximum depth							
Water Code	Water Name	UTM_E	UTM_N	AREA_AC	AREA_HA	MAXDEPTH_M	MAXDEPTH_F
CP-01-01	DOUBTFUL	644384.0625	5370621	30.19375995	12.219	20.8	62.4
DD-04-01	BOUCK	633736.0938	5393719.5	10.80936112	4.3744	19.25	63.1
DD-05-01	UNNAMED (UPPER BOUCK)	634995.625	5393470.25	5.4807889	2.218	8.85	29.0
EP-06-01	UNNAMED (UPPER WILCOX/LILLIE)	634874.9375	5384523.75	10.52716721	4.2602	19.8	65.9
EP-09-02	STOUT	633112.7188	5383417.25	25.24671785	10.217	53.5	175.5
EP-14-01	UNNAMED (HIDDEN LK TARN)	634043.8125	5373554.25	4.936910795	1.9979	13	42.7
FP-04-01	KLAWATTI	641771.9375	5379677	76.40684284	30.9208	33	108.3
FP-07-01	MORAINE	641475.1875	5376385.25	83.28501052	33.7043	33	108.3
GM-01-01	TRAPPER	647784.5313	5366904	147.2145335	59.5757	49	160.8
GM-02-01	GREEN VIEW	655834.3438	5370309	41.72713872	16.8864	47.3	155.2
HM-02-01	HOZOMEEN	643801.4375	5424707.75	97.46216568	39.4416	20.33	62.3
HM-03-01	RIDLEY	644253.375	5423441.5	10.89288261	4.4082	10.7	35.1
HM-04-01	WILLOW	646033.6875	5422914.5	16.85972705	6.8229	8.2	24.6
LS-06-01	IPSOOT	607515.5625	5396239.5	8.919749185	3.6097	15.5	50.8
LS-07-01	BLUM (LOWER/WEST, N0. 4)	610273.375	5400321.75	6.375309	2.58	7.9	25.9
M-04-01	GREEN	610200.6563	5394060.25	79.98615877	32.3693	46.7	153.0
M-05-01	UNNAMED (NERT)	610336.1875	5395532.25	3.567454885	1.4437	9	27.7
M-07-01	UNNAMED (LOWER BERDEEN)	612074.7188	5395790	7.46405363	3.0206	11	36.1
M-08-01	BERDEEN	613080.425	5396745	126.7231043	51.2831	65.5	215.0
M-19-01	THORNTON (MIDDLE)	622610.125	5394101.25	11.91120232	4.8203	24	78.7
M-20-01	THORNTON (LOWER)	623160.9688	5393495.25	55.0994729	22.298	33	108.3
M-23-01	MONOGRAM	626976.5	5379435	27.89543635	11.2889	37.2	122.1
MA-02-01	SILENT (UPPER)	659605.625	5379180.25	3.740428385	1.5137	10	32.8
MA-03-01	SILENT (LOWER)	659939.75	5379095	3.06558463	1.2406	9.6	31.5
MC-02-01	BLUM (VISTA/NORTHWEST, NO. 1)	610362.1875	5401594.25	2.54468729	1.0298	10.68	35.0
MC-06-01	COPPER	613584.6563	5419305.75	12.70193832	5.1403	22.6	67.2
MC-07-01	UNNAMED (KWAHNESUM)	611202.0938	5425694.5	16.66179594	6.7428	27.2	104.3
MC-11-01	REDOUBT	623611.125	5425716	18.41080513	7.4506	14	45.9
MC-12-01	BEAR	623700.4375	5422478.5	25.66284267	10.3854	46.3	151.9
MC-16-01	MIDDLE (UPPER)	620725.6875	5416001.75	4.497311	1.82	7.9	25.9
MC-17-01	TAPTO (UPPER)	619638.3125	5415689.25	10.234842	4.1419	13.1	43.0
MC-27-01	WILD	619985.9375	5405364.75	12.71379936	5.1451	8.8	28.9
ML-02-01	UNNAMED (SWEET PEA)	651671.9375	5384916	10.30279587	4.1694	28.06	92.1
ML-03-01	UNNAMED (TORMENT)	651475.375	5384099.25	3.5731383	1.446	15.2	45.0
ML-04-01	UNNAMED (VULCAN)	650636.4063	5380712	8.21624125	3.325	7.67	25.2
MM-06-01	WADDELL (LOWER/SANDALEE)	661540.9063	5367227	10.12488027	4.0974	11.9	39.0
MM-10-01	COON	660536.6563	5361590.25	11.34805002	4.5924	5.8	17.2
MM-11-01	UNNAMED (UPPER RAINBOW, WEST)	666407.3438	5363463.75	3.5434857	1.434	8.4	27.6
MP-02-01	UNNAMED (FIRN)	635626.3135	5410361.25	5.660928445	2.2909	11.5	37.7
MP-09-01	AZURE	628433.3125	5402997.5	91.577113	37.06	105	344.5
MR-01-01	UNNAMED (STILETTO)	673284.4063	5372325.75	9.891860255	4.0031	26	84.0
MR-05-01	KETTLING	667808.875	5368447.75	9.90347419	4.0078	7	23.0
MR-10-01	MCALESTER	672011.0938	5366347.5	13.24754616	5.3611	7	23.0
MR-11-01	UNNAMED	671232.4063	5364761.25	2.853321435	1.1547	8.8	27.5
MR-13-02	UNNAMED (UPPER RAINBOW, SOUTH)	666823.4688	5363115	3.57956303	1.4486	7.35	24.1
MR-14-01	RAINBOW	667416.1875	5363307	15.47668036	6.2632	32.8	107.6
MR-15-01	UNNAMED (UPPER DEE DEE)	674007.5313	5363620.75	12.17881703	4.9286	27.2	89.2

I. Minimum Impact Techniques (MIT)

The following guidelines include the nationally recognized MIST (Minimum Impact Suppression Tactics) techniques for fire suppression augmented with guidelines specific to North Cascades National Park Service Complex (the Complex). These guidelines, written by and agreed upon by Complex staff, are to be used for suppression and wildland fire activities (including monitoring efforts), and are to be considered during the implementation of prescribed fire and the re-ignition of suppressed fires.

WILDLAND FIRE GUIDELINES

If an unplanned ignition in the Complex is being used to meet resource objectives or a combination of objectives the strategy for the fire is selected and documented in the WFDSS system. The minimum tool for monitoring fires that cannot be safely or adequately observed from the ground by existing lookouts or other qualified field staff will be either:

1) Aircraft overflights, or
2) Fire monitors

The recommendation to place fire monitors via aircraft will be made by a team consisting of the Fire Management Officer or Fire Use Manager, the Wilderness District Ranger (or delegate) and a delegate from the Resource Management Division. It is recognized that, depending on the location of the fire and many other factors, either regular overflights *or* fire monitors placed on the ground could be the minimum tool for monitoring. If the minimum tool selected is to place monitors at an observation point, it will be done so as to provide accurate and timely information to the Incident Commander, SOPL, and/or Fire Team and to reduce the number of aircraft overflights required to manage the incident.

Considerations the team will use as criteria for selecting monitoring by aircraft or placing on-the-ground monitors include:

- Location of the fire within the Complex, aspect, fuels, and potential for fire moving in the direction of values at risk
- Frequency and type of observation required by the line officer
- Sensitivity of natural resources to long-term residence by monitors
- Proximity of the observation point to primary access trails and known, visitor-used cross-country routes
- Other time or resource specific concerns

Guidelines for FIRE monitors:

- Monitors placed by aircraft will go in with supplies to sustain their work and personal needs for at least a period of seven days.

- Food storage containers (wildlife resistant) will be used. In addition to the containers located at the Fire Cache, these may be available from the Wilderness or Trails programs.
- Other camping guidelines (use of fires, human waste management, site selection, etc) will follow what is outlined in the Complex's Wilderness Management Plan (these camping guidelines are available in handouts) and standard Leave No Trace literature (available from Wilderness Information Center). In other words, fire monitors will follow the same guidelines as other backcountry users and Complex workers.

MINIMUM IMPACT TACTICS (MIT)

Establishing and Setting Up Camp

- Ideally a Resource Advisor from the Complex will advise the camp manager for prolonged suppression efforts, typically type 1, 2, and 3 incidents. If a type 4 incident requires a prolonged presence in a sensitive area, then a qualified Resource Advisor will provide direction to the incident commander through the incident action plan to reduce or prevent unwanted impacts.
- Consider impacts on both present and future visitors, as well as wildlife and vegetation. An agency commitment to wilderness values will promote those values to the public.
- Whenever possible, avoid establishing spike or coyote camps in wilderness.
- If wilderness camps are unavoidable, use existing, or previously impacted campsites.
- If existing campsites are not available, use the local Resource Advisor to help identify the most resilient sites on rocky or sandy soils.
- Always select sites that are unlikely to be observed by wilderness visitors.
- Avoid camping in wet meadows, in subalpine / alpine vegetation, over biological soil crusts, along streams, or on lake shores.
- Layout camp components carefully from the start. Define cooking, sleeping, and latrine areas; define water supplies.
- Limit travel ways within, to, and from camp. Walk in a dispersed fashion whenever possible rather than single file to avoid trail development.
- Minimize disturbance to land in preparing bedding and campfire sites. Do not clear vegetation, trench, or excavate a flat spot to create bedding sites.
- Place indoor-outdoor carpet, scrim, or other material on the ground to protect vegetation in the most heavily traveled areas of camp; i.e., kitchen, campfire, and washing-up areas.
- Resource advisors should work with cache personnel during the off-season to ensure that tents are cleaned of any noxious weed seeds prior to being sent to a wilderness fire.
- Do not use nails in trees.

Washing

- Use designated personal washing areas if provided.
- In small spike camps or coyote camps, carry water and bathe away from lakes and streams.

- Do not introduce soap, shampoo, or other personal grooming chemicals into waterways.
- If a large camp is employed, designate a common area for personnel to wash up. Provide fresh water, biodegradable soap, and a place for waste water. Washing areas should be located near the kitchen area, to concentrate smells that attract wildlife in one location.
- Devise a plan for disposing of waste water from kitchen and washing areas.

Human waste management

- If a large number of firefighters are using a spike camp and the camp is being serviced by helicopter, fly in portable backcountry latrines, and fly out human waste as necessary. If the camp does not have air support, establish community latrines well away from water sources (200-foot minimum), rather than leaving it up to the individual. OR:
- Crews will follow suggested methods in place for other work crews and visitors. These are outlined in materials from the Wilderness Information Office if needed. Crews in sensitive subalpine, non-designated camps or other areas where cat-holes are not feasible may be supplied with a composting toilet if a prolonged camp is expected. The toilet would be maintained on site by the fire crew and returned after de-mobilization to Marblemount.
- Use established latrines where provided.
- In small camp situations (1 crew), individuals should use the cat-hole method of disposing of human waste. Toilet seats should be located a minimum of 200 feet from water sources. Holes should be dug 6-8 inches deep.

Cooking and Food storage

- Use of food canisters is encouraged. They may be available through the Wilderness Information Center and at the Fire Cache.
- Store food properly so that it is not accessible to wildlife. Always hang food in trees at least 15 feet off the ground and 5 feet from the trunk of the tree, or preferably, store food in animal-resistant containers. Store food away from the campsite (100 feet or more, preferably in or near the kitchen area) to reduce the risk of human and bear conflicts and habituation of wildlife to humans.
- Animal-resistant containers should be at minimum on the "approved" list provided by the Sierra Interagency Black Bear Working Group (http://www.sierrawildbear.gov). The exception in the Complex is that Knaack boxes are approved for use as long as they are properly latched at all times they are not in use, and the locking flight-ready drums provided at the Fire Cache may also be used.
- Hang or store garbage in the animal resistant containers. Do not let garbage and food scraps accumulate in camp. All garbage and food scraps need to be removed from the camp on a regular basis if the camp is being served by a helicopter, or properly stored.
- Cooking and food storage areas will be separated from sleeping areas by at least 100 feet.
- Food will not be permitted in sleeping areas.

- Food will not be cooked over campfires.

Campfires

- Use of fires in camp will follow established Complex regulations for recreational fires (see Backcountry and Wilderness Use Regulations); if a camp is located within a fire-allowed camp, (with a designated fire pit with grate) the use of a 24-hour on-going fire is prohibited.
- Use stoves for cooking.
- Campfires should never be used for warmth in subalpine/alpine areas.
- Use dead and down firewood. Avoid cutting firewood and choose firewood that can be carried by hand and broken. Use small diameter wood that burns down more cleanly.
- Do not burn garbage or food - pack it out with the rest of the camp garbage.

Helispot Construction

- Whenever possible, the Resource Advisor should help select a helispot location, observe the construction (tree, plant, rock removal), and monitor its long-term use in order to prevent or reduce impacts to wilderness character.
- Natural helispots (openings) will be considered first before using a helispot requiring alteration.
- Whenever possible, locate helibases in weed free areas to prevent the transport of noxious weeds into wilderness.
- When planning for helispots, determine the primary function of each helispot; i.e., crew shuttle, logistical support, or both.
- If a helispot is needed only for logistical support to deliver and retrieve supplies or gear, consider using a long line remote hook in lieu of constructing a helispot.
- If a helispot is needed for crew shuttle, consider the minimum size helicopter that could do the job, if you have an option, and still meet suppression objectives.
- If some tree falling or cribbing is necessary, avoid high visitor use locations unless the modifications can be rehabilitated to be generally unnoticeable. Feather the opening so that it appears more natural looking.
- Perform an aerial reconnaissance of the fire area and select potential helispots. In determining helispot locations, involve, at a minimum, the Air Operations Manager, responsible land manager or Resource Advisor, and the Helitack Manager. Consider drawing a sketch and discuss which trees need to be cut to ensure a safe operation for the size of the helicopter deemed necessary or available.
- If a high level of resource impact is anticipated from a proposed helispot, evaluate carefully whether it is absolutely necessary and if there isn't an alternative outside of wilderness.

Helicopter Flight Time and Landings

- Minimize flight time by using alternate means and combining trips whenever possible.

- Minimize landings; especially when any alteration of the site is required to allow safe landing; i.e., consider the use of remote hook and net before requiring a landing.
- Avoid landing on fragile subalpine/alpine vegetation or biological soil crusts.

Fire Lining Phase

- Select procedures, tools, and equipment that least impact the environment.
- Give serious consideration to the use of water as a fire lining tactic.
- If there is a risk that hose coming directly from a local unit's cache is contaminated with noxious weed seeds, order fresh hose from the regional cache.
- Resource Advisors, Operations Chief, and Logistics Chief should be cognizant of any equipment that is being moved from a non-wilderness fire to a wilderness fire and make attempts to clean equipment of noxious weed seeds prior to it being used in the wilderness.
- In light fuels consider:
  - Cold-trail line. Constantly recheck.
  - Allowing fire to burn to natural barriers.
  - Use “burn out” as a tactic to reduce the necessity for mop-up.
  - If constructed fire line is necessary, use minimum width and depth to check fire spread.
- In medium and heavy fuels consider:
  - Use of natural barriers and cold-trailing.
  - Cooling with dirt and water and cold-trailing.
  - If constructed fire line is necessary, use minimum width and depth to check fire spread.
  - Minimize bucking to establish fire line. Preferably move or roll material out of the intended constructed fire line area. If moving or rolling is not possible, or the down log is already on fire, build line around the log and let it be consumed.
- In aerial fuels, brush, trees, and snags:
  - Minimize cutting of trees and snags.
  - Live trees should not be cut unless it is determined they will cause fire spread across the fire line or seriously endanger workers. If tree cutting occurs, cut the stumps flush with the ground and camouflage the cut surface with soil or brush.
  - Scrape around tree bases near fire line if hot and likely to cause fire spread.
  - Identify hazard trees with an observer, flagging, and/or glow-sticks.
- When using indirect attack:
  - Do not fall snags outside the constructed fire line, unless they are an obvious safety hazard to crews working in the vicinity.
  - On the intended burn-out side of the line, fall only those snags that would reach the fire line should they burn and fall over. Consider alternative means to falling; i.e., fire line explosives or bucket drops.
  - Review consideration listed above for aerial fuels, brush, trees, and snags.

Other Tools

- Use of water pumps and generators: Minimize because of the noise and the use of mechanical devices in wilderness. Use a water pump when it will help to avoid digging line and/or cutting trees.

Mop-up Phase

- Use gravity socks in streams and/or a combination of water blivits and fold-a-tanks to minimize impacts to streams.
- Do not bring in any non-native materials to be used for sediment traps in streams. Use of non-native materials creates a risk that noxious weeds will be introduced to the area.
- Place absorbent cloth under pumps to avoid spilling fuel on the ground.
- Personnel should avoid using rehabilitated fire lines as travel corridors whenever possible because of potential soil compaction and possible detrimental impacts to rehab work; i.e., water bars.
- Consider using infrared detection devices along perimeter (aerial or hand-held).
- Align saw cuts to minimize visual impacts from more heavily traveled corridors. Slope cut away from line of sight when possible.
- In light fuels:
  - Cold-trail areas adjacent to unburned fuels.
  - Do minimal spading; restrict spading to hot areas near fire line only.
  - Use extensive cold-trailing to detect hot areas.
- Medium to heavy fuels:
  - Cold-trail charred logs near fire line; do minimal scraping or tool scarring.
  - Minimize bucking of logs to check for hot spots or to extinguish fire; preferably roll the logs and extinguish the fire.
  - Return logs to original position after checking or when ground is cool.
  - Refrain from making bone piles; burned and partially burned fuels that were moved should be arranged in natural position as much as possible after they are cold.
  - Consider allowing larger logs near the fire line to burn out, instead of bucking them into manageable lengths. Use a lever or pry bar to move large logs.
- Aerial fuels, brush, small trees, and limbs:
  - Remove or limb only those fuels which, if ignited, have the potential to spread fire outside the fire line.
- Burning trees and snags:
  - First consideration is to allow burning trees or snags to burn themselves out or down. Ensure adequate safety measures are communicated.
  - Identify hazard trees with an observer, flagging, and/or glow-sticks.
  - If burning trees/snags pose serious threat of spreading fire brands, consider attempting to extinguish fire with water or dirt. Falling by chainsaw should be the last means; consider falling by blasting, if available.
- Mop-up of prescribed fires will occur mostly at the fire's immediate edge, allowing the interior of the unit to burn out naturally.

- Utilize fire-ending events (rain or snow) when possible to end prescribed fires in order to reduce or eliminate the need to mop-up, patrol, and monitor the burn for escape after cool down.

Structures and Installations

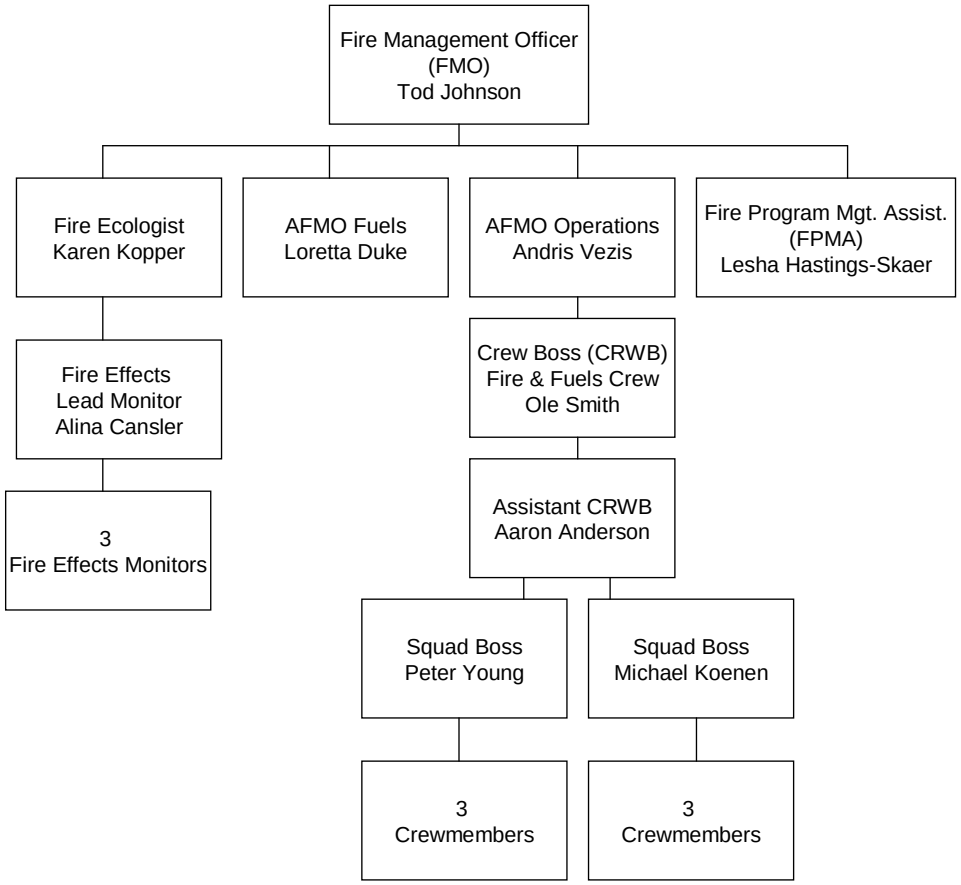
- Installation of RAWS (Remote Automated Weather Stations): use when necessary to minimize suppression activities and properly manage FIRE, prescribed burns, and re-ignitions. Installation should be without ground or vegetation alteration.
- Installation of webcams: only use to reduce the need for helicopter flights to observe the fire.
- Installation of radio repeaters: use if needed to ensure firefighter safety. Installation should be without alteration of ground or vegetation.
- Marking fire effects monitoring plots: use the decision tree developed by the Wilderness Committee for approval. This requires approval from the Wilderness Committee and the Superintendent.

J. NOCA Wildland Fire Annual Operating Plan 2007 Need to insert 2009 or 2010 Plan

Wildland Fire Annual Operating Plan 2007 Season North Cascades National Park Service Complex

I. Organization and Availability

The organizational chart below is the current fire organization with fire, fuels, and fire ecology funding. All fire effects, fuels crew and fire crew personnel work on fuels and preparedness projects but are available to respond to in-park fires at any time. Availability for out of park dispatch will be determined by the FMO in consultation with the AFMOS.


Fire Management Officer
(FMO)
Tod Johnson
Fire Ecologist
Karen Kopper
AFMO Fuels
Loretta Duke
AFMO Operations
Andris Vezis
Fire Program Mgt. Assist.
(FPMA)
Lesha Hastings-Skaer
Fire Effects
Lead Monitor
Alina Cansler
Crew Boss (CRWB)
Fire & Fuels Crew
Ole Smith
3
Fire Effects Monitors
Assistant CRWB
Aaron Anderson
Squad Boss
Peter Young
Squad Boss
Michael Koenen
3
Crewmembers
3
Crewmembers

II. Initial Response Plan

Dispatching

Fire dispatching operations are run out of Marblemount. To report a fire, request resources or report status call "Fire Dispatch" on the appropriate repeater. There are 4 repeaters in the park. A repeater map is located in the appendix to this plan. Daily hours of operation for fire dispatch are Monday-Friday 0700 to 1630 and when necessary to meet critical preparedness coverage. If fire dispatch is unavailable call "comm." center and ask for the fire duty officer. "Comm. Center" maintains a list for duty officer coverage. Comm. center is available for 0700 – 2300 through the average fire season.

A qualified IC must be dispatched to all fires. A fire complexity rating guide will be used to determine fire type rating (pg 3 of this plan).

The name of the incident commander (IC) will be announced on the radio, and at each time a new IC assumes responsibility. The IC is responsible for all matters of the incident including strategy, support, safety and administration until that incident is declared "out" or new IC assumes responsibility for the fire.

Qualified IC's in Marblemount are:

- Andris Vezis-ICT3, OPBD
- Jerry Ainscough – ICT4, FALC, HECM
- Ole Smith ICT4^{T}, ICT5, ENGB, CRWB^{T}, HECM
- Aaron Anderson-ICT5, FFT1, HECM^{T}
- Michael Koenen-ICT5, FFT1, HECM
- Peter Young –ICT5, FFT1, HECM^{T}, FALC
- Dan Mcguigan – ICT5^{T}, FFT1, HECM^{T}

    - See duty officer availability list for firefighters available on the west side of the Park.

Qualified IC's in Stehekin are:

- Loretta Duke-ICT4, STLC, FALC, HECM, ENOP
- Maria Cook-ICT5, CRWB, HECM, FALB, ENOP

Other Red-carded firefighters in Stehekin are:

- Tom Langley- FFT1, ENOP
- Erin Brown- FFT2, HECM,
- Aaron Robinson- FFT2, HECM, FALB
- Vicki Gempko- FFT2
- Jordan Mammel-FFT2
- Bill Fitzpatrick- FFT2

Incident Complexity Analysis (Type 3, 4, 5)		
Fire Behavior	**Yes**	**No**
Fuels extremely dry and susceptible to long-range spotting or you are currently experiencing extreme fire behavior.		
Weather forecast indicating no significant relief or worsening conditions.		
Current or predicted fire behavior dictates indirect control strategy with large amounts of fuel within planned perimeter.		
Firefighter Safety		
Performance of firefighting resources affected by cumulative fatigue.		
Overhead overextended mentally and/or physically.		
Communication ineffective with tactical resources or dispatch.		
Organization		
Operations are at the limit of span of control.		
Incident action plans, briefings, etc. missing or poorly prepared.		
Variety of specialized operations, support personnel or equipment.		
Unable to properly staff air operations.		
Limited local resources available for initial response.		
Heavy commitment of local resources to logistical support.		
Existing forces worked 24 hours without success.		
Resources unfamiliar with local conditions and tactics.		
Values to be protected		
Urban interface; structures, developments, recreational facilities, or potential for evacuation.		
Fire burning or threatening more than one jurisdiction and potential for unified command with different or conflicting management objectives.		
Unique natural resources, special-designation areas, critical municipal watershed, T&E species habitat, cultural value sites.		
Sensitive political concerns, media involvement, or controversial fire policy.		

If you have checked "Yes" on 3 to 5 of the analysis boxes, consider requesting the next level of incident management support.

Procedures for Smoke Report

The following pages of procedures for smoke reporting should be used when reporting a fire. Other information may be requested by the dispatch office.

1. **State a general radio question**: This is _____. Does anyone in the vicinity of _____ see smoke?
   (This may end further action and or save time if it ends up being smoke from BBQ, wood burning stove etc. or someone is already on site)

2. **Call Fire Dispatch** and let them know you are investigating a smoke in _____area. (You don't need to call them again until you arrive at the fire or confirm a false alarm).

3. Anyone can give a **size-up**. The higher the fire qualifications the better but some info is better than none. Fire Dispatch will prompt you if you don't know what info to give.

4. If there is a fire and it is anywhere in the **lower valley at low elevations let the District Ranger know**. If traffic control or public safety is an immediate concern let them know that also.

5. The **incident commander** is the first one on scene until a person of higher qualifications comes on the incident. When this occurs it will be **announced** on the radio. **Use radio** as needed but please **be brief.**

Size up questions:

Where is it? (Location by landmark, slope aspect, how do people get there?)
How big is it? (Estimate—people tend to overestimate so when in doubt go a little smaller)
What color is the smoke?
What is it burning in (on the ground or in the treetops, fuel types)?
How fast is the fire moving? (Smoldering, creeping, torching, spotting running?

How close is the nearest structure?
How is the fire behaving (how long are the flames)?
What is your best estimate of how many and what type of resources are needed?
Any immediate hazards or concerns? (Traffic, power lines, public, hazmat)

(These questions are most easily answered by highest qualified people but any info given can help.)

6. **If you are not red-carded or do not have all PPE**
   on, you can still help but remember:
   - Do not do anything you don't feel comfortable with. Do not put yourself in harms way
   - You are not required to do anything except tell fire dispatch.
   - You can wait (and in many cases should) until qualified people and/or PPE or proper tools arrive.
   - You can even leave if you want to (after you brief incoming firefighters would be most appropriate unless personal safety is at risk)

What is a reportable fire?

Any fire burning outside of a campfire ring that requires a suppression response (of any kind) is a reportable fire.

Appropriate Management Response Process

All fires will be managed using the appropriate management response process. This process includes all the alternatives of fire suppression including confine, contain and control strategies as well as Fire Use for resource benefit goals if fire is lightning caused and in a designated fire use zone.

Upon confirmation of a fire, the duty officer will complete stage 1 of the Wildland Fire Implementation Plan. Ignitions that are considered a "no –go" will be suppressed by safe appropriate tactics. If stage 1 is a "go" then use of fire will be considered and WFDSS used as needed to support and document decisions. Should joint WFDSS be required for fires that border adjacent Wenatchee National Forest lands or for those fires threatening DNR protected lands, those fire protection agencies will be involved in the processes. All ignitions will be safely yet aggressively suppressed if they occur within the "Stehekin suppression zone", the "Skagit suppression zone", and the "Canadian border suppression zone".

Initial Attack Times

Firefighters will not compromise personal and crew safety while responding to fires. Speed limits will be observed, tactics well planned, the 10 and 18 and LCES will be used to guide all responses. Helicopters may be staged and available at North Cascades Smokejumper Base in Twisp, or Marblemount if a ship is obtained under fire severity. Retardant planes are available at Moses Lake airport. In addition, the following resources are generally available within the stated average response time. The availability of resources will be communicated to the incident commander through the duty officer.

- Initial Attack hand crew (5-person in Marblemount or 5-person in Stehekin): 1/2 – 4 hours
- Wildland engine-Stehekin: 5 to 20 minutes
- Smoke jumpers: ½ -1 hour (priority based)
- Rapellers: 1 – 2 hours (priority based)
- Retardant: 1 hour (priority based)
- Helicopter: ½ - 4 hours (priority based)

Aviation

When helicopters are used, all guidelines in the Interagency Helicopter Operations Guide will be followed. There are currently15 qualified helicopter crewmembers and 2 helicopter managers in

Marblemount and 4 qualified helitack personnel in Stehekin. Helicopter module personnel will be responsible for passenger manifesting, briefing, loading and unloading of cargo and passengers, and remote cargo operations. No helicopter managers are available in Stehekin.

Helibases in NOCA include: Marblemount, Colonial and Swamp Creek. Helispots that require no improvement will be selected over those requiring tree removal or ground disturbance. If additional helispots in Wilderness are needed, they will be created only following concurrence with the assigned resource advisor. See Minimum Impact Tactics (MIT) guide for further guidance.

A primary helicopter landing zone is marked on the south end of the Stehekin Airstrip. The Stehekin Valley Ranch is located on private land and can be used by permission of Cliff Courtney. The lower field is NPS land that is occasionally mowed for hay. It can be used, however notification to Cragg Courtney should be done prior to use if possible and use should be limited to short term or intermittent use.

National Park Service DO-60 states that employee and public safety is considered foremost for all aviation activities, but full consideration is also given to resource and visitor impacts. In keeping with this direction, to minimize risk to personnel and minimize noise impacts to wilderness, only flights deemed necessary to fire operations will be conducted with only necessary personnel. Incident flights will be well-coordinated to meet multiple tasks and reduce flight time over wilderness areas.

Exceeding Initial Response
If a fire exceeds Initial Response a Wildland Fire Decision Support System (WFDSS) will be utilized and a qualified Incident Commander (IC) will be responsible for the fire. The WFDSS team includes representatives from fire and other resource specialists. The team will be assembled by the FMO. Additional resources will be ordered through the Puget Sound Interagency Coordination Center.

If a Type I or II team assumes command that team will work directly for the Superintendent or his delegate.

Emergency Operations

Structural Fire
The towns of Marblemount, Diablo and Newhalem have volunteer fire departments. There are no NPS personnel qualified to fight structure fires.

Stehekin has no structural firefighting apparatus. In the event of a structure fire no personnel will enter a burning structure. Water or a combination of foam and water can be utilized on the exterior, however if structure has more than 1/3 involvement, water is better used to keep fire from spreading to other structures (apply to base of flames at fire perimeter).

Unified Command – Volunteer firefighters
When wildland fire threatens infrastructure in the populated valleys, chances are good that volunteer firefighters will be encountered. On NPS administered lands, the volunteer firefighters will fall under the incident command structure of the NPS. Should the volunteer firefighters be needed by the NPS, a unified command structure may be employed with the volunteer fire department fire chief. When a unified command is established, this will be communicated to all firefighters and duty officers.

Duty Officers
Qualified Duty Officers in North Cascades National Park are Tod Johnson, Andris Vezis and Loretta Duke. Dispatching within Stehekin will occur in cooperation with Marblemount Fire Dispatch.

Duty Officer Responsibilities
- Represents the Superintendent and is delegated the authority to initiate action on all fire related matters (suppression, prevention, detection and wildland fire).
- Serves as initial contact person on most incidents for the dispatch centers (PSICC) and cooperating agencies. Fills and places resource orders.
- Supervises ongoing fire management activities including fire suppression actions.
- Ensures appropriate staffing occurs.
- Ensures appropriate investigation occurs for all wildland fires.
- Ensures that only trained and qualified personnel are made available for wildland fire assignments.
- Ensures that all NOCA and out of area wildland firefighters have received an appropriate briefing.
- Ensures that a local qualified resource advisor is assigned to wildland fires transistioning from Initial Response into extended attack.
- Ensures that a Type II or Type III Safety Officer is ordered for incidents when 50 or more people are assigned or exceptional hazards are present.
- Provides input to line officer in completing Incident Management Team Fire Complexity Analysis.

Administrative Items
All fire funding codes will be issued through Fire Dispatch in Marblemount (360) 854 7351. All travel will be processed through Gelco Travel Manager. Fire reports will be completed by the IC's and submitted to Marblemount Fire Office for signature prior to entry on-line into WFMI system.

All time sheets will be filled out by personnel engaged in firefighting and submitted to appropriate personnel officers. All crew time reports (CTR's) will be sent with signatures and appropriate accounting codes and fire number to Fire Dispatch for submission with time sheets and/or firefighter time reports (FFTR's). Crew Bosses and IC's recording time on CTR's will track time and fill out appropriate codes for both GS and Wage Grade employees (GS and WG employees time should be tracked on separate CTR's to facilitate time entry). FFTR's are not required for firefighters performing on home unit within NOCA unless an incident command team is delegated authority for fire suppression responsibilities .

Meal provisions (from RM-18 Chapter 19, pg. 6, 1/24/2005)
Local Staff Assigned to Their Park's Incidents: The Incident assumes no responsibility for the feeding and/or per diem of local staff who do not meet the qualification criteria in the Federal Travel Regulations.

The exception to this would be under unique circumstances where the Incident Commander has deemed it necessary to restrict an employee's work and off-clock hours to the incident location (e.g. spike camp, fire camp, etc.), which would preclude spending a portion of the day at home for rest and feeding. Under these circumstances the employee would be qualified for feeding and/or per diem at the expense or provision of the incident.

Media Plan
Fire information can be distributed to visitors and residents through local business owners and Visitor Centers. Media messages and press releases will be coordinated through District Interpreters or Fire Information Officers assigned to incidents. Charles Beall will coordinate all fire information needs. In Stehekin, Kerry Olsen is a PIO2^{T}. She has developed a working relationship with business owners and media contacts appropriate for distributing fire information and has trained staff to help disseminate information. All information officers will coordinate messages commensurate with community, local, and national media needs. There is no qualified fire PIO stationed on the west side of the Complex.

Non-Fire Emergency Operations Occurring on Fires
In all areas other than Stehekin all emergencies not fire related will be called in to Comm. Center and they will be in contact with individuals to determine the appropriate response.

The visitor protection division assumes responsibility for resource and visitor protection and safety. This includes major and minor emergencies dealing with law enforcement, medical, search and rescue, boating and water activities, evacuation, and hazardous materials and spill notifications. The NOCA Emergency Response Plan should be consulted for contact information and response information.

A hazardous spill response plan is currently under formulation.

Stehekin Non-fire Emergencies
Stehekin has no 911 system. Emergencies are coordinated by radio through cooperation with various valley businesses and the National Park Service (NPS). In the event of an evacuation, a coordinated response between valley residents and neighborhood areas, business owners, NPS staff and the Chelan County Sheriff's Office will occur.

For power line emergencies a radio call on Park Direct frequency to Bob Neilson (call number H-52) notifying him of the nature of emergency, location and need. Bob will be responsible party but may request assistance for related activities (i.e. securing the area) from Rangers, PUD Relief Operators or others.

For medical and/or law enforcement emergencies, contact rangers on NPS Direct or McGregor repeater for assistance. There are 3 basic level EMT's within the valley and several First Responders. There are 2 Chelan County EMS responders living in the valley who work in partnership with the NPS. Information needed over the radio for appropriate response is: nature of incident, injury or illness, status of patient (critical, non-critical) and location. Contact with the Chelan Sheriff's Office or Chelan EMS will be made by emergency responders by NPS satellite phone or by radio traffic through the NPS Slide Ridge or Chelan County Grouse Mountain repeaters. There is a large staff of trained and certified Chelan County Search and Rescue volunteers living in the valley as well as Chelan County radios posted throughout the valley with direct contact with Chelan County River Com through the Grouse Mountain repeater.

Information on how to make contact with Chelan EMS is posted near all phones in the NPS Golden West Visitor Center in the event that rangers are not in the immediate vicinity and immediate contact is needed.

Weather and Remote Automated Weather Stations (RAWS)

NOCA has three RAWS—Marblemount (451504), Stehekin(452121) and Hozomeen(451412). Tracking and correction of observations in WIIMS is maintained by PSICC. The National Weather Service located in Seattle is responsible for fire weather predictions within the Complex (Zones 658 and 662). They are the weather service of record. The Spokane office does not forecast weather for Stehekin. Weather stations are maintained by NOCA fire staff.

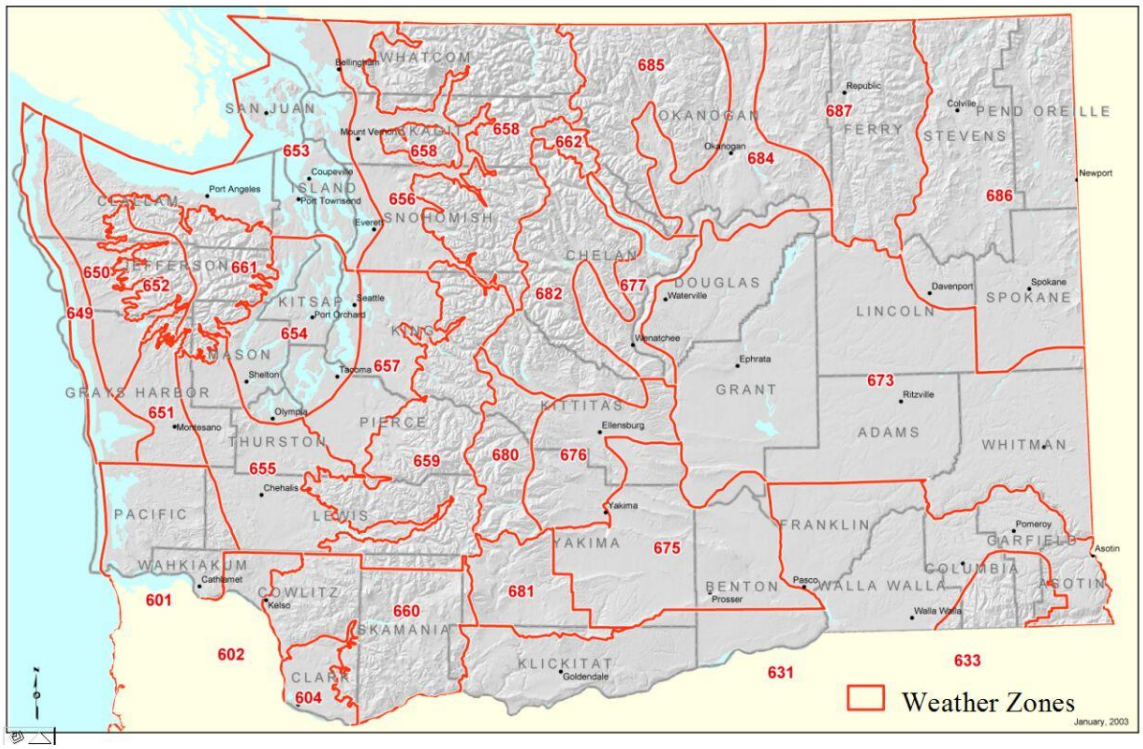
The NOCA fire and fuels team brief every morning on the current fire and weather situation while working in the Park. The dissemination of this information is the responsibility of the duty officer.

In the event of a fire, spot weather forecasts are requested via the NWS website.

When a Fire Weather Watch or a Red Flag Warning is issued by the weather service they will be broadcast to the fire suppression organization via radio.

The weather zone for the majority of the complex is 658. The zone for the south side of the complex is 662. The forecast can be found at: http://www.wrh.noaa.gov/sew/fire.php

Washington State Fire Weather Zones



Weather Warnings, ERC's and Spot Forecast Requests
When red-flag warnings are issued, Comm. Center or Fire Dispatch will announce on the radio as well as the nature of the warning. Typical causes for Red-Flag warnings are high winds, or predictions of dry lightning in association with very dry ground fuels.

ERC's or energy release components are calculated by either the FMO in Marblemount or the Prescribed Fire Specialist in Stehekin. When the breakpoint for preparedness level 4 is reached (just below the 90th percentile), personnel are notified via radio and informational postings and step-up plan implemented as appropriate. Visitor use and visitor protection personnel will encourage safe campfire techniques to visitors.

Spot forecast requests are highly recommended on wildfires within the complex. Requests from fires will go though either the Marblemount or Stehekin fire office and submitted on-line to the Seattle weather service office. This forecast will be read over the radio and confirmation of transmission receipt from IC's is required. Feedback on spot forecasts is encouraged and will help forecasters to be more accurate.

Fire Danger

Fire history in the Complex suggests that outside of very high to extreme fire danger or fires under the influence of the local wind in Stehekin and Skagit Valleys or Valley (fires less than 2200' elevation) on warm days (usually these are human caused fires), the majority of fires have been quickly suppressed with relatively few acres burned. The preparedness plan outlined below will be used to ensure adequate resources are available and ready to respond to any fire events, including fires within the three suppression zones (Stehekin Valley, Hwy 20 corridor, Canadian Border), or any wildland fire requiring staffing.

National Fire Danger Rating System (NFDRS) Operating Plan
The National Fire Danger Rating System (NFDRS) allows fire managers to plan for an appropriate level of public and visitor communication. The Complex will use five adjective ratings (low, moderate, high, very high and extreme) to inform the public of the current fire danger. The adjective rating is determined by the NFDRS calculated staffing class.

Preparedness levels are used for fire managers to help determine appropriate staffing and management of fire personnel. Six Preparedness levels (1, 2, 3L, 3H, 4 and 5) were determined as most effective based on amount of historic fire business received in the Complex including days that had multiple fires (more than 3) or days that had large fires (greater than 5 acres). Preparedness levels over the course of a season examined at least once weekly by the FMO or Prescribed Fire Specialist will be determined by calculating the ERC's and using the ERC breakpoints given under the step-up plan on the next page using Fire Family Plus. These breakpoints are displayed in graph form in Appendix A, attached to this plan.

Preparedness levels with corresponding adjective rating class will be as follows:

Internal & Interagency Communication	**Public & Visitor Communication**
Preparedness Level	Adjective Rating
1	Low
2	Low
3	Moderate
3H	High
4	Very High
5	Extreme

Step-Up Plan
As the NFDRS indices rise, so will the preparedness actions in NOCA. In addition to the plan below, the FMO or duty officer may require additional staffing as a result of lower than preparedness level IV in combination with a significant wildland fire trigger event such as a dry lightning prediction or a persistent east wind event. It is anticipated the duty officer will show due diligence and flexibility outside of this plan in order to meet the objectives in the North Cascades National Park Fire Management Plan. Fire business thresholds and breakpoint graphs from Fire Family Plus are included in Appendix A.

Fire Preparedness Levels and Step-up Actions
Level I-3L Low to Moderate (NOCA Fire Danger Rating Area ERC values 0-30):
All personnel remain on a normal tour of duty. Red-carded personnel are available to respond to reported fires. Fire equipment and supplies are serviced and prepared for use.

Level 3H High (NOCA Fire Danger Rating Area ERC values 31-40):
ERC's are normal to above normal. Firefighters will be ready for fire dispatches and Duty Officer has up to date contact information and knows locations of red-carded personnel, even on their designated days off.

Level IV Very High(NOCA Fire Danger Rating Area ERC values 41-53):

ERC's are approaching the 90th percentile. Fire managers may receive approval for expenditures from Step-Up funding from the Regional FMO. Tours of duty may extend to seven days a week. Key personnel (duty officer, dispatcher, prevention patrollers, and lookouts) may work longer hours for coverage. Red-carded personnel may be asked to work overtime. Neighboring agencies are contacted and prevention activities coordinated. High fire danger notices are posted at visitor centers and site bulletin boards. The need for campfire restrictions is assessed. All campfire restrictions will be coordinated with the neighboring agencies. The Superintendent gives authority for campfire restrictions or closures where necessary.

Level V Extreme (NOCA Fire Danger Rating Area ERC's 54+):
ERC's consistently exceeding 90th percentile and the long range forecast shows no change. All activities in Staffing Class IV are continued. Additional restrictions and closures of Complex areas may be necessary (subject to superintendent approval). Daily interagency resource coordination will occur. Interagency partners will be included in any decision regarding closures or restrictions. The Superintendent is notified of conditions. Appropriate signing will be coordinated with ranger and interpretive staff. Interpretive activities will include a fire safety message. Headquarters message phone will include information on restrictions.

Industrial Fire Precaution Level (IFPL) Restrictions:
All industrial operation restrictions to prevent fires are controlled using the Washington State Department of Natural Resources (WADNR) Industrial Fire Precaution Level (IFPL) system. Industrial operations are those that require a contract (timber sale, road maintenance, trail maintenance, silvicultural operations, etc.) which, by signing, indicates the contractor agrees to abide by the contract IFPL provisions. This system has been in place since the late 1980s and is used by all federal agencies in the Pacific Northwest Region. The intent of the system is to prevent fires caused by industrial spark emitting equipment. To obtain the current precaution level visit the WADNR website at: http://www2.wadnr.gov/IFPL/ifpltoday.html

Precaution levels and measures taken:

- Level I: Closed Fire Season: Fire equipment and firewatch service is required.
- Level II: Partial Hootowl: Limits certain activities between the hours of 8 p.m. and 1 p.m.
- Level III: Partial Shutdown: Prohibits some activities altogether and limits other activities between the hours of 8 p.m. and 1 p.m.
- Level IV: General Shutdown: All operations prohibited.

Operation: Power Saws			
Precaution Level	Landing	Tractor/Skidder	Other Woods Saws
I. Closed Season	Fire Watch	Fire Watch	Fire Watch
II. Partial Hootowl	Fire Watch	Hootowl	Hootowl
III. Partial Shutdown	Hootowl	Hootowl	Prohibited
IV. General Shutdown	Prohibited	Prohibited	Prohibited

Operation: Yarding			
Precaution Level	Tractor/skidder	Cable (gravity systems)	Other Cable Systems
I. Closed Season	Fire Watch	Fire Watch	Fire Watch
II. Partial Hootowl	Fire Watch	Hootowl	Hootowl
III. Partial Shutdown	Hootowl	Hootowl	Prohibited
IV. General Shutdown	Prohibited	Prohibited	Prohibited

Other Operations			
Precaution Level	Loading	Blasting	Welding
I. Closed Season	Fire Watch	Fire Watch	Fire Watch
II. Partial Hootowl	Fire Watch	Hootowl	Hootowl
III. Partial Shutdown	Hootowl	Hootowl	Hootowl
IV. General Shutdown	Prohibited	Prohibited	Prohibited

Public Use Restrictions

The DNR also administers Public Use Restrictions, which limits activities on forest land during periods of high fire danger.

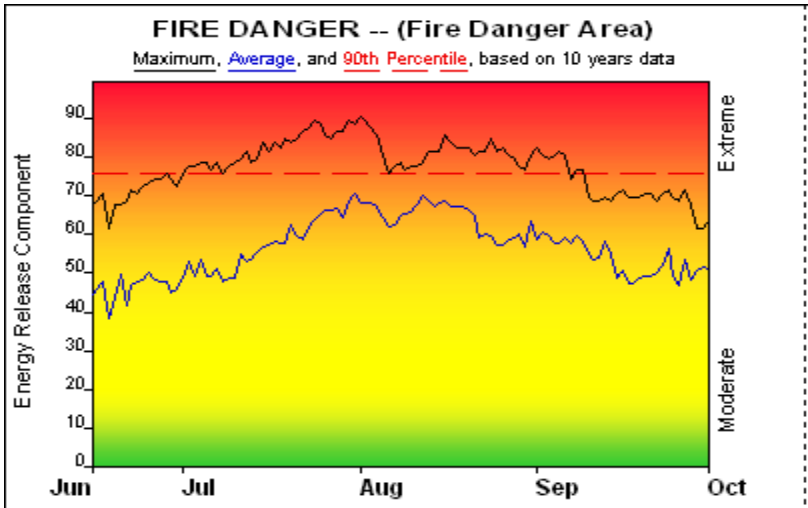
Below are the restrictions and what they mean:

Summer Fire Rules: From April 15 through October 15, or longer if the fire danger warrants it, the following restrictions are in place:

1. Cigarette smoking on forest land is only allowed within vehicles.
2. Fireworks may not be lit on forest land, and

3. The non-industrial use of chain saws needs to follow IFPL requirements.

Burn Ban: During burn bans initiated by DNR, all open fires are prohibited. Burn bans initiated by DNR cover all lands DNR protects from wildfire, but may include other lands protected by local fire departments or by federal agencies. Contact the DNR at 1-800-323-BURN or your local fire protection agency before your burn.



Fire Danger Area:

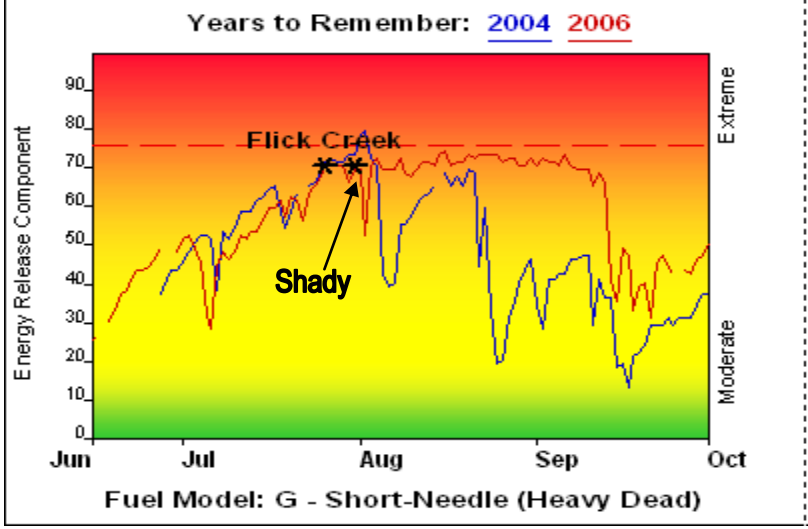
- NOCA
- Zone 662
- Stehekin 452121
  * Meets NWCG Wx Station Standards

Fire Danger Interpretation:

EXTREME -- Use extreme caution
(Caution) -- Watch for change
Moderate -- Lower Potential, but always be aware

Maximum -- Highest Energy Release Component by day for 1997 - 2006
Average -- shows peak fire season over 10 years (1005 observations)
90th Percentile -- Only 10% of the 1005 days from 1997 - 2006 had an Energy Release Component above 75

Local Thresholds - Watch out: Combinations of any of these factors can greatly increase fire behavior: 20' Wind Speed over 15 mph, RH less than 25%, Temperature over 90, 1000-Hour Fuel Moisture less than 12



Remember what Fire Danger tells you:

- Energy Release Component gives seasonal trends calculated from 2 pm temperature, humidity, daily temperature & rh ranges, and precip duration.
- Wind is NOT part of ERC calculation.
- Watch local conditions and variations across the landscape -- Fuel, Weather, Topography.
- Listen to weather forecasts -- especially WIND.

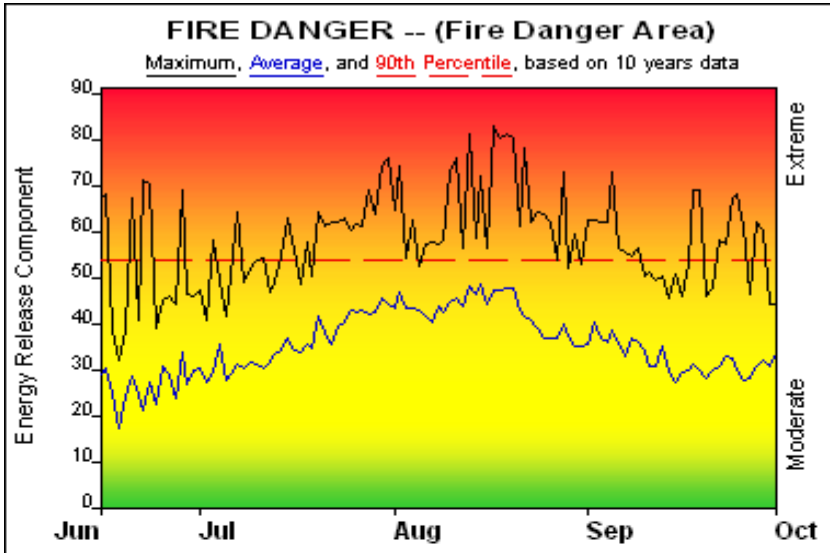
Past Experience:

Large fires can and do occur at less than the 90th percentile in this area. Wind is not part of ERC equation just as variations in slope or fuel jackpots. Flick and Shady fires occured at the same ERC---the 85th percentile for an ERC value of 71.

Local down valley wind zone of influence is roughly 2200 feet elevation. It usually starts in mid-morning extending through the entire burn period.

Always keep safety zones nearby: At least 4 times the length of the current and expected flame lengths for the diameter of the opening.

Responsible Agency: NPS
FF+3.0.5 04/23/2007-11:33 (C:\Documents and Settings\Valuke.PWR\Des...\noca_2006.mdb)
Design by NWCG Fire Danger Working Team



Fire Danger Area:

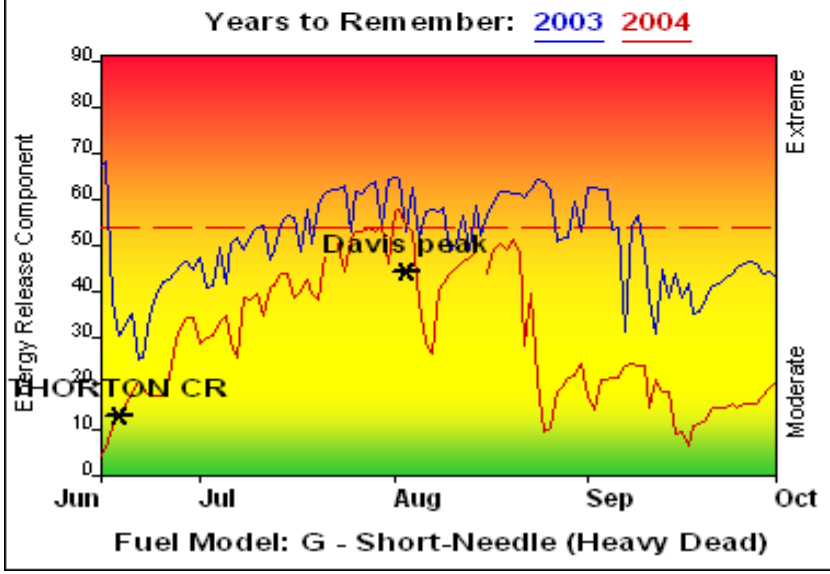
- NOCA
- 658
- MMT, HOZO, STE
  * Meets NWCG Wx Station Standards

Fire Danger Interpretation:

EXTREME -- Use extreme caution
(Caution) -- Watch for change
Moderate -- Lower Potential, but always be aware

Maximum -- Highest Energy Release Component by day for 1997 - 2006
Average -- shows peak fire season over 10 years (1056 observations)
90th Percentile -- Only 10% of the 1056 days from 1997 - 2006 had an Energy Release Component above 54

Local Thresholds - Watch out: Combinations of any of these factors can greatly increase fire behavior:
20' Wind Speed over 15 mph, RH less than 25%,
Temperature over 90, 1000-Hour Fuel Moisture less than 18



Remember what Fire Danger tells you:

- ☑ Energy Release Component gives seasonal trends calculated from 2 pm temperature, humidity, daily temperature & rh ranges, and precip duration.
- ☑ Wind is NOT part of ERC calculation.
- ☑ Watch local conditions and variations across the landscape -- Fuel, Weather, Topography.
- ☑ Listen to weather forecasts -- especially WIND.

Past Experience:

ERC's use the average slope and fuel profiles with the associated weather stations. If your fire is not representative of the average, the pocket card will not be representative--WATCH STEEPER THAN AVERAGE SLOPES, FUEL JACKPOTS OR FLASHY FUELS

Keep adequate safety zones nearby: at least 4 times the length of the current and expected flame lengths for the diameter of the opening.

Responsible Agency: NPS--N. Cascades Complex
FF+3.0.5 04/23/2007-11:23 (C:\Documents and Settings\Volute.PWR\Des...\noca_2006.mdb)
Design by NWCG Fire Danger Working Team

Season Predictions and Current Conditions from NWCC Outlook
The Northwest Geographic Area generally appears poised to undergo an **AVERAGE** 2007 fire season for much of the area. The Okanogan/Methow region is an area to watch given the frequency of large fires over the past few fire seasons in that area. However, at this time, snow pack and rainfall are close to average and lightning potential is not projected to be as great.

The Pacific Northwest experienced a generally wet winter from the Cascade crest westward. East of the Cascades the rain and snowfall totals were near normal in Washington and well below normal in Oregon. Earlier snow melt in the deficient spots could lead to an earlier start for fire season at lower elevations in eastern Oregon. However, large fire threat depends mainly upon lightning outbreaks with little to no precipitation. These conditions don't arrive until late July. This is when fire danger is approaching its peak in the Cascade Mountain Range.

Warmer than average temperatures and dry conditions during July and August will result in fire danger indices rising to above average levels, similar to those observed during the 2006 fire season. Fire danger indices will approach record values in Oregon, slightly lower values are anticipated in Washington.

It should be reemphasized that the primary driver of fire season severity is the weather conditions during the fire season, not the preceding winter's snow and rain. Lightning events with little precipitation that occur during periodic summer hot spells tend to be the primary ignition source leading to significant wildfire outbreaks. Human caused ignitions tend not to be numerous enough to overwhelm Initial Response efforts unless weather conditions are critical.

Demand for firefighting resources is likely to be high across the western states in fire season 2007. While the Pacific Northwest is not expected to be a particularly busy region, demand for scarce resources could prove to be a problem if significant outbreaks occur here.

Fire Family Plus Predictions Using Historic Weather Data
The 2003 season created new maximum ERC's (as depicted by the red or top line). Updates in ERC's will be posted at the fire office in Marblemount, the fire cache in Stehekin and the GWVC periodically as changes occur. All firefighters in NOCA have been issued a pocket card. ERC's will be routinely run by either Tod Johnson or Loretta Duke and announced over the radio when preparedness levels change.

Trigger Points for Staging Additional Resources
The majority of the complex is accessible only by aircraft. Fortunately, most of the values at risk are located outside the complex on the Hwy 20 corridor. When fire danger reaches the level of very high (defined in the step-up plan), a helicopter may be obtained for pre-positioning in the complex to facilitate fire management.

Stehekin has the majority of life and property values contained within the complex with limited access and a limited number of fire suppression resources. Resources

available outside of Stehekin include: NPS Fire and Fuels Crew in Marblemount, other red-carded personnel within NOCA (20-30), smokejumpers, rapellers, and neighboring USFS crews. If preparedness level reaches IV (very high) and a helicopter is staged in Marblemount, moving resources to Stehekin can be more easily facilitated.

The FMO or duty officer may pre-position at any time before trigger points are reached such as a dry lightning event or a persistent east wind event. The following are minimum recommendations only.

Trigger points for supplying additional resources pre-positioned in Stehekin are:

- Preparedness level V with lightning in the forecast (LAL of 2- 4)
- More than 2 fires that have not been declared controlled with a Preparedness level of 4 or greater with more lightning in the forecast.

Fire Support in Stehekin

This section outlines basic information and procedures for procuring and/or activating support resources for transportation services and meals for incident assigned fire staff.

If the IC, FMO or AR (agency representative) determines that securing meals or transportation from vendors is necessary, the following action should be taken:

1. A meal log is included on the form which should be signed by each employee (or Crew Rep for a crew) eating meals at restaurants. It also documents the number of meals (or sack lunches) ordered. The individual responsible for coordinating meals should coordinate through the responsible NOCA Procurement Technician who will ensure the proper paperwork is provided to the vendor.
2. Vendors will be notified and advised of invoicing and payment procedures and schedules by the responsible Procurement Technician. Generally, it's best to have vendors submit invoices once every week. Vendors can expect payment within approximately 30 days from the time the invoices are submitted to AOC by the Procurement Technician.

Other requests for purchasing of supplies, services, equipment, etc, should be done through the Park Fire Office and FMO, or appropriate Ordering Unit.

Larger fires or multiple incidents requiring additional support and/or resources

If a fire grows to a point that district employees can no longer meet management objectives of a particular incident and additional resources are needed, (such as hand crews, smokejumpers, rapellers, logistical support staff, incident management teams, etc.), the IC, FMO or responsible agency representative may choose to initiate any of the established Blanket Purchase Agreements NOCA has already set-up with Stehekin Vendors. Note: A Management Team may choose to initiate their own BPAs with vendors.

Primary contact for Contracting and Procurement activities in Stehekin:

Annelise Lesmeister
(Contracting Officer, TIME-T, PTRC)
509/682-2549 (Chelan Ranger Station)
509/784-1020 (Home)
509/679-1256 (Cell)
**In the event of a fire incident in Stehekin, Annelise is available for assistance with BPA initiation, purchasing (if authorized by incident IC or FMO) and Time Keeping.

Communication (Internet and Phone Service)

No cell phone service is available in Stehekin Valley. Stehekin has 3 Voice over internet phone lines at the landing, a public phone is at the landing and phones are available in the Goldenwest Visitor Center but space on these lines is limited to 3 at any one time including the public phone. Portable satellite phone service is spotty at best and should never be considered a safe alternative to other conventional

communication systems. Locals know where satellite phones may work. A small team of people can be supported on the third floor of the Goldenwest (fewer than 10)

For internet communication, a satellite internet system should be brought in for use by team members whether it is on the third floor of the Goldenwest or elsewhere. If a larger team is present and a camp situation is needed, internet and voice over internet for phone service are the best options available. There are openings large enough in the tree canopy to obtain connection in all the places listed as possible camp areas.

Meals

Stehekin is a small settlement that relies on tourism for economic viability. In the event of a large fire tourism will usually decrease and the ability of the area to supply meals to firefighters and overhead will increase, however, with short notice it is difficult to feed more than 100 people at the three food establishments in the valley since local restaurants only maintain a small amount of stock. Food must be shipped up and prepared in advance. With several days warning it is difficult but possible to feed as many as 140 fire fighters with local vendors.

Once the Valley establishments are unable to keep up with demand a caterer should be considered. Options for meals include basing a caterer in the Methow Valley or near Chelan. Here, the caterer is located near primary highways and services required to support a large catering operation. This is logistically less difficult than basing a caterer in Stehekin. Meals would need to be flown or boated to fire camps located in Stehekin. Should it be logistically efficient, a caterer may be barged to Stehekin using on Tom Courtney's Tug and Barge. The barge runs about once a week but can be available for other times if chartered. (509)682-2493.

<u>NOCA has the following BPAs already set up with Stehekin Vendors:</u>

Stehekin Landing Resort
MEALS - generally breakfast and dinner),

Stehekin Pastry Company
MEALS – generally breakfast and lunches

Stehekin Valley Ranch
MEALS – generally dinner and breakfast

Transportation:

To Stehekin

Passenger Ferries

Stehekin is located at the north end of Lake Chelan. Two passenger ferries run between Chelan and Stehekin daily in the summer. The quickest way by boat is to drive to field's point. Field's Point is located on the south side of Lake Chelan and is reached by driving uplake on highway 971 from alternate 97. The Lady Express leaves at 0920. This gets you to Stehekin at 1045 if on time. Allow at least 20 minutes at Field's Point to unload and park vehicles. The Lady of the Lake leaves Field's Point at 0945 and arrives in Stehekin at 1230. Other options are to charter the Lady Cat (509)682-2399 or Lake Chelan Boat Tours (509) 682-8287. Passenger capacity for these boats can be determined by calling the above numbers.

Float Plane

Chelan Airways operates a float plane between Chelan and Stehekin. The flight takes about 30 minutes and has flights several times daily in the summer months. The Chelan Airways employs OAS carded pilots and takes only 30 minutes from Chelan to Stehekin (509)682-5555. Up to 7 firefighters with gear may be transported at one time in the Beaver, however, it is best to provide the vendor with a manifest before relying on this figure.

Government Boats
The Park Service and the Forest Service both operate boats on the lake. The park has one boat that holds 5 people with gear and another that can hold 10 people with gear. The Forest Service has a boat that can hold 15 people with gear.

Within Stehekin:

Vehicles
Stehekin has a limited number of government vehicles and providing transportation for more than 20 additional people will need to be provided outside the local government fleet. Several options exist for providing this.

Options for transportation:

Stehekin Adventure Company
TRANSPORTATION – small and large passenger van/bus with operator

Local residents also may have vehicles that could be utilized with drivers using an emergency equipment rental agreement.

Another option for transportation is to barge rental or government vehicles up lake with Tom Courtney's Tug and Barge service. The barge runs about once a week but can be available other times if chartered. (509)682-2493.

Helicopters
The Stehekin airstrip has room for 3 helicopters off to the side of the runway (including room for one those as type 1). There is no jet A fuel at the airstrip. If required, fuel truck(s) will need to be barged up lake via Tom Courtney's Tug and Barge (509)682-2493. Large fire operations using multiple aircraft have been successfully managed from the North Cascades Smokejumper base where contract aircraft are able to access fuel, parts and supplies independent of the boat and barge schedule delay.

Boats
The NPS has two boats in Stehekin. One is operated by the Maintenance Division and is a landing craft type aluminum hulled boat that holds 5 people in the cab and other people/gear outside of cab. The other is operated by the Ranger Division and can hold 10 people in the cab and gear outside. This boat is the primary water ambulance for Stehekin and should overnight in Stehekin and can be pulled from any assignment to function in that capacity.

The USFS has a boat that can hold 15 people plus gear that may be subject to availability. Call Annelise Lesmeister in Chelan at (509)682-2576.

Other boats that can be used by rental agreement include the Sheriff's boats (3 boats holding 7-15 passengers each), the Llama boat and the USFWS boat.

Lodging and Fire Camp Areas

There are several lodges, bed and breakfasts, rental cabins and such that may or may not have space available to check the locations and availability go to http://www.stehekinvalley.com. If visitation is down because of fire activity there may be enough rooms available to house up to 100 people. Choosing local vendors to house fire managers will help to the local economy that historically loses tourism business during active fire seasons in the Chelan drainage.

Potential Fire Camp Locations:

Orchard Pasture (3 ½ miles up Stehekin Valley Rd)

This is the most likely spot for a large fire camp and ICP. The turnoff is well marked 200 feet past the turnoff to Rainbow Falls on the opposite side of the road. It has potable water nearby and can hold more than 500 people and facilities for support. It is 3 ½ miles up valley from the landing on the west side of the orchard between the orchard and the Stehekin River. Shower facilities and toilets will need to be barged in by Tom Courtney's Tug and Barge (509)682-2493.

Camp Grounds

There are several established campgrounds that can be used if visitation is down. There are Purple Point, Weaver Point, Harlequin, Bullion, High Bridge and Tumwater campgrounds. Maximum numbers for each camp ranges from 10-40 people with existing facilities. Purple Point, Weaver Point and Harlequin are the only ones with potable water available. Check with the Goldenwest Visitor center for campground specifics and availability.

Stehekin Landing and Lake Chelan

Space at the landing for crews is limited, especially if campgrounds and visitor center are occupied at peak levels. There is Purple Overflow campground by the Fire Cache and some surrounding space that could hold one 20 person crew. Coordinate with the District Interpreter Kerry Olson for use of the overflow campground or other space nearby. If any fire operations or briefing or camping of crews takes place at or near the fire cache, portable toilet facilities should be placed nearby since only two outhouses in the overflow campground exist and none for the fire cache area.

There is a campground across the lake at Weaver Point that can hold up to 40 people without bringing additional toilet facilities. Transportation for people staying at Weaver Point should be considered. There are two NPS boats available that can hold 10 a piece for short hauls with minimal gear.

There are other campgrounds on the lake. Flick Creek is 4 miles down lake on the north shore. The campground is fairly small but does have a pit toilet. No potable

water is available here. Manly Wham is similar in size and near Flick Creek on the south shore. Moore Point is a larger campground on USFS land but is within a noxious weed zone and measures to prevent spread must be taken. Lucerne is about 8 miles down lake on the south shore. There is a large campground, Forest Service guard station, potable water and toilet facilities.

Stehekin Airstrip/Maintenance yard (4 miles up across Harlequin Bridge)
There is space at the baseball field for crew sleeping. If transportation to fire is via helicopter this is good area to stage crews. If more than 1 crew is staged at this location, portable toilet facilities should be brought in. There are two outhouses between the airstrip and the ball field and one flush toilet in an outhouse type building just east of the entrance road between the post and beam shelters. The area can hold up to 100 people and facilities for their support.

Lower Field (7 miles up Stehekin Valley Rd.)
The lower field is mowed for hay by Cragg Courtney through agreement but the land belongs to the NPS. This field can be used as a helispot but generally not as a camping area unless it is for just a few people for a short stay. This is to keep hay operation from being impacted. There are no facilities of any kind at this site including potable water. Cragg Courtney should be notified prior to use.

Shower Facilities:

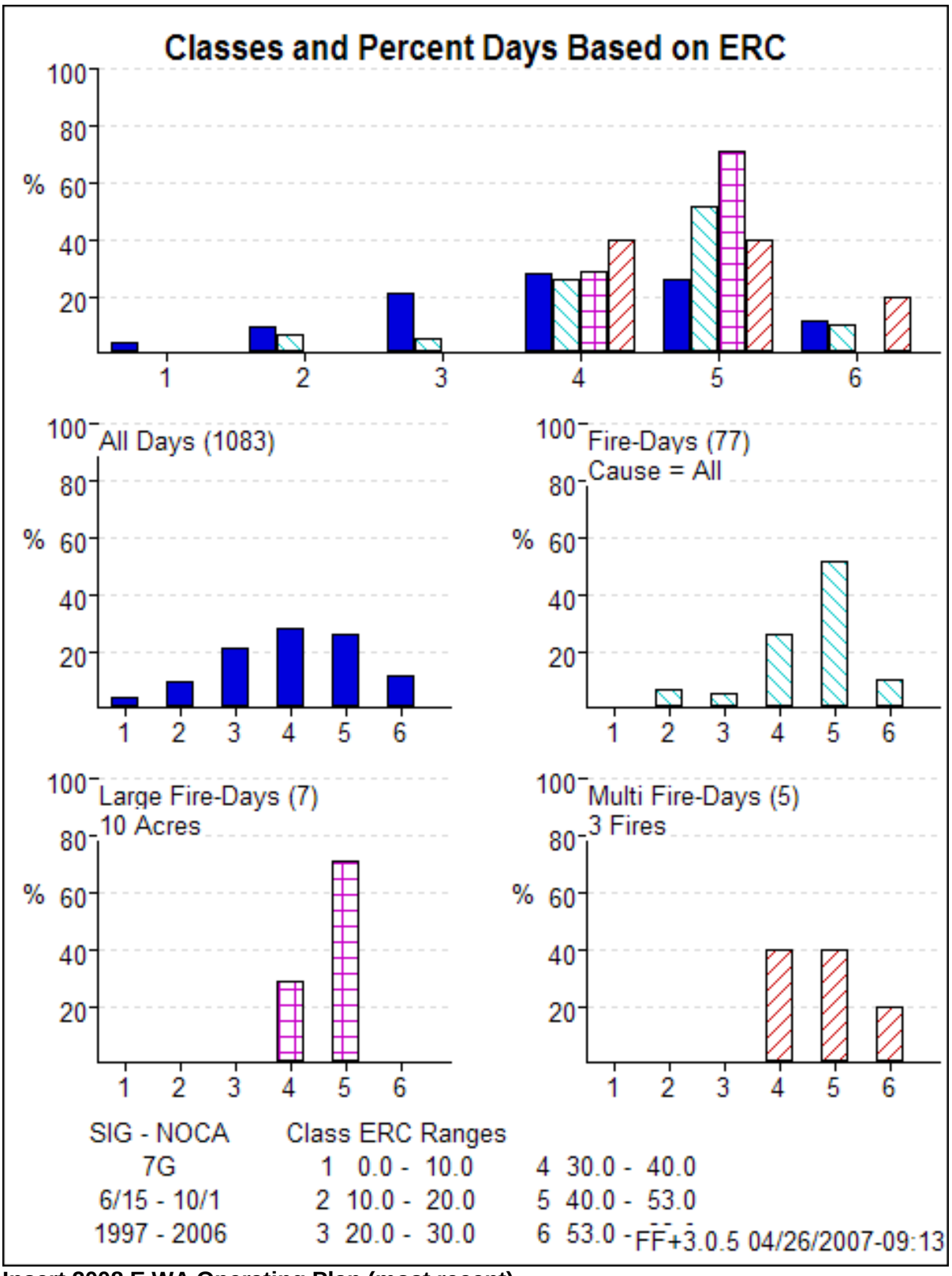
There is one public shower at the landing and one shower on the third floor of the Goldenwest Visitor Center. The Stehekin Valley Ranch has two women's and two men's shower facilities that can be rented by agreement. Rooms rented from the Stehekin Lodge have been used in the past to provide shower space for crews. If other shower facilities are needed a shower unit will need to be brought in.

Potable Water

Stehekin has good quality potable water and hose bibs are available at the landing and fire cache, Weaver Point, maintenance yard and orchard pasture. Since all trash and recyclables in Stehekin have to be packaged, handled several times, and barged down lake, bottled water is not recommended as method of supplying drinking water.

Appendix A

NOCA Breakpoints for Preparedness Levels *(4 on graph is Preparedness Level III High)*



Insert 2008 E.WA Operating Plan (most recent)

K. Eastern Washington Local Operating Fire Plan 2007

2007
EASTERN WASHINGTON LOCAL OPERATING FIRE PLAN

Between

Colville National Forest
NFS 04-FI-11060000-297
DUNS No. 929332484

Okanogan and Wenatchee National Forests
NFS 04-FI-11060000-297
DUNS No. 929332484

Bureau of Indian Affairs
Colville, Spokane, Yakama Agencies
AGP000723
DUNS No. 076425305

National Park Service
North Cascades Complex
Lake Roosevelt National Recreation Area
H8075040099
Duns No. 092773134

Spokane District Bureau of Land Management
HAI040007
DUNS No. 798067393

USDI Fish and Wildlife Service, National Wildlife Refuges
Mid-Columbia River National Wildlife Refuge Complex
Little Pend Oreille
Turnbull
10131-4-H100A
DUNS No. 129285792

Washington State Department of Natural Resources,
Northeast and Southeast Regions
IAA-04-143
DUNS No. 808883474

PREAMBLE

This Eastern Washington Local Operating Fire Plan between the identified agencies will become effective on the last date shown on the signature page. This Operation Plan is prepared pursuant to the Master Cooperative Fire Protection Agreement (MCFPA) signed and dated April 13, 2004; and the Northwest Operating Plan/Oregon Statewide Operating Plan/Washington Statewide Operating Plan signed and dated July 21, 2004.

This Operating Plan supersedes all Eastern Washington Local Operating Fire Plans executed previously.

The purpose of this Operating Plan is to clarify and refine cooperative fire protection services and procedures for pre-suppression, detection, suppression, fire prevention and fire planning on lands protected by the agencies signatory to the MCFPA in eastern Washington.

The State Agencies acknowledge, at this time, the critical importance of agreements and strong, effective relationships between Federal Agencies and non-signatory (to the MCFPA) Local Fire Districts. The State Agencies retain oversight and involvement throughout all phases of the establishment and implementation of any agreements between the State and Local fire Districts.

INTERAGENCY COOPERATION

Dispatch Centers:

Dispatch centers operated by one or more of the parties to this Operating Plan are identified in Exhibit A herein.

Fire dispatching for fires on land protected by agencies will comply with the following:

1. Resources will be dispatched using the closest force(s) concept. Pre-planned dispatch cards will be utilized to guide this process. (MCFPA, Operations, Provision #24)
2. The responsibility for management of the incident will fall to the most qualified Initial Response supervisor on the first crew to arrive at the scene He/She will remain as Incident Commander until released of these duties by the jurisdictional agency.
3. Agencies are responsible to provide information and assistance to each other in a timely manner, for proper completion of the fire reports.
4. In the event of an extended attack or when incident management teams are in command of incident, dispatch actions, for that incident will be conducted through the jurisdictional agency, unless the jurisdictional agency delegates other wise. These Interagency Emergency Operations Centers will be established as necessary or appropriate.

Interagency Resources: Agency's equipment may be operated and utilized by the other agency's qualified personnel in emergency situations. Agency personnel may staff each other's suppression resource jointly, as mutually determined necessary. Appropriate adapters and other specialized equipment will be carried on engines and on personnel transport or administrative vehicles, which will allow agency equipment to be interchanged.

Interagency Shared Resources: Shared interagency fire resources are identified in Exhibit B herein. When additional interagency-shared resources are formed, or when other resources are dissolving, the information should be shared with the Eastern Washington Wildfire Coordinating Group (EWWCG) so that Exhibit B may be amended appropriately.

Protection Planning: Pre-planned dispatch cards, coupled with the closest forces(s) concept, will be utilized by the dispatch and suppression programs to facilitate effectiveness for all agencies.

Protection Areas and Boundaries and Reciprocal Fire Assistance: See Pre-Planned Dispatch Maps in Dispatch Centers, for delineation of protection areas and boundaries. Reciprocal Fire Protection will be effect during those periods of time when the States have declared "Closed Fire Season." Outside that period of time the parties may provide support to one another on a reimbursable basis.

The current suppression resources and their locations, for all agencies are listed on pre-planned dispatch cards and in the dispatch centers. Aircraft and air delivered resources are also available though dispatch centers.

Joint Projects and Project Plans: Annual prescribed burning and land management projects are scheduled on a regular basis. Utilization of resources in support of these projects are encouraged and anticipated. The MCFPA allows for cooperative project accomplishment. Each project requires a "Project and Financial Plan" completed and signed by an agency representative that has the proper level of authority to cover the amount of expenses incurred and has the ability to commit the resources required. Project plans must be completed and approved prior to project start (See MCFPA, Exhibit D).

Fire Prevention Policies: Agencies have common goals, objectives and approach with regard to the Fire Prevention education program. Agencies will coordinate and cooperate in the fire prevention effort.

Dissemination of information during the critical dry period of the year to forest users is accomplished through a series of signing and public contacts. Joint efforts for updating signs, outdoor display boards, and contacting the public while recreating on protected lands is accomplished in a cooperative manner.

Public Use Restrictions: All factors, as listed in the MCFPA, are applicable. (MCFPA, Preparedness, Provision #20)

Burning Permit Procedures: Burning permits issued will be the responsibility of jurisdictional agency. Jurisdictional agency must notify appropriate dispatch center of all permits issued. Procedures and notifications will be coordinated with local fire districts and other cooperating agencies. Smoke Management procedures will be followed.

Prescribed Fire and Fuels Management: Agencies will notify each other of known prescribed burning activities within the reciprocal area.

Smoke Management: Smoke management planning and accomplishment will be the responsibility of the jurisdictional agency. WADNR is available to provide smoke management forecasting for silvicultural burning.

DETECTION

Fire Lookouts: Staffing schedules will be coordinated and communicated between affected agency dispatchers during fire season on a regular basis as necessary. Operational lookouts are identified in Exhibit D herein.

Aerial Detection: Aerial detection flights, whether scheduled or unscheduled, will be coordinated between the affected agency dispatchers or other fire staff in order to avoid duplication and to encourage efficient and effective use of detection aircraft and fight coverage. Any cooperative detection fight(s) done under a reimbursable fee basis should be documented on a Project Plan format. (See MCFPA Exhibit D)

Fire Notification: - Detection will be coordinated between agencies as needed. All fire detected will be reported to appropriate dispatch center.

OPERATIONS

Initial Response: Initial Response (IA) will consist of those incident suppression resources, as listed on pre-planned dispatch cards based on availability. The closest force(s) concept will be used for Initial Response. Suppression response, "strategy", will be "control" for all incidents. If modified suppression strategies are required by jurisdictional agency then Supplemental Fire Suppression Agreement will be prepared.

Any suppression or support resources utilized by agencies that are not listed on the pre-planned dispatch card(s) as an IA resource will be reimbursable. Supplemental Fire Suppression Agreement will be utilized as appropriate. (See MCFPA, Use and Reimbursement of Interagency Fire Resources section and Glossary of Terms)

Wildland engines from agencies under this agreement will respond to vehicle or structure fires according to each agency's policy. They may provide assistance to fire districts; maintain equipment and supplies; support communications; deploy hoselay outside of

structures; and protect structure/vehicle fires from burning onto wildland or wildland fires from reaching structures.

Investigations: The Initial Response resources are responsible to initiate protection of the origin area and to make a reasonable attempt to gather and save evidence that relates to fire cause. The jurisdictional agency has the responsibility to investigate the fire. Upon request, agencies will provide, as available, qualified fire investigator to assist the other, within the limits of their jurisdiction and authority, as a reimbursable service. Joint incidents involving multiple agencies' land, may have a cooperative investigation of the cause. Leadership responsibility will be the agency with the highest cost or damage, or as agreed to. (MCFPA, Operations Provision #33).

Reciprocal Suppression Operations: refer to dates (April 15 – October 15) All factors, as listed in the MCFPA, Operations, Provision #29, are applicable, EXCEPT, the wording in the fourth and fifth paragraphs have been modified as follows:

If the Initial Response resources with the first 24-hour period do not control a fire, or if reinforcements/services are requested and later approved, by the jurisdictional agency, the jurisdictional agency will reimburse the supporting agency for any additional costs, not identified as Initial Response, on the preplanned dispatch cards.
If it is determined that a fire will not be controlled in the first 24-hour period, the jurisdictional agency must take over the fire or request that the Initial Response party continue suppression action beyond the 24-hour period.

Incident Commander: Incident Commander designations will comply with the MCFPA and each agency's policy. (MCFPA, Interagency Cooperation, Provision #12).

Duty Officer: Agencies' will provide a Duty Officer capable of coordinating fire suppression activities, with the authority to approve the use of aircraft, equipment, and specialty personnel. These Duty Officers are authorized to represent their agency administrator until they are relieved.

Boundary Line Fires: All factors, as listed in the MCFPA, are applicable. (MCFPA, Operations, Provision #26).

Independent Action on Lands Protected By Another Agency: All factors, as listed in the MCFPA, are applicable. (MCFPA, Operations, Provision #27).

Land Management Considerations: All factors, as listed in the MCFPA, are applicable. (MCFPA, Operations, Provision #30). It is the jurisdictional agency's responsibility to provide adequate guidelines for appropriate suppression response.

Delegation of Authority: Jurisdictional agency will issue delegation of authority consistent with agency guidelines and policies.

Incident Advisors: All factors, as listed in the MCFPA, are applicable. (MCFPA, Operations, Provision #32).

USE AND REIMBURSEMENT OF INTERAGENCY FIRE RESOURCES

Training: All factors, as listed in the MCFPA, are applicable. (MCFPA, Use and Reimbursement of Interagency Fire Resources, Provision #41).

Communications System: All factors, as listed in the MCFPA, are applicable. (MCFPA, Use and Reimbursement of Interagency Fire Resources, Provision #42). Each Agency has agreed to allow the other agencies to use their frequencies for the purpose of fire traffic radio communications. Each Agency will obtain any authorizations (RFA's) needed beyond this agreement. Authorized frequencies can be obtained from local dispatch centers.

Aviation Operations: IA Incident Commander is authorized to order one load of retardant, regardless of protection responsibility, (see pre-planned dispatch cards for exception). Duty officer of the jurisdictional agency must approve additional retardant. Jurisdictional agency will be billed for the retardant delivered. Costs of air resources not identified on pre-planned dispatch cards will be the responsibility of the jurisdictional agency.

Supporting agency will notify jurisdictional agency of all fires that require additional air resources.

Billing Procedures: Will comply with provisions in the MCFPA Use and Reimbursement of Interagency Fire Resources section, Provisions #34 thru #46.

Media Coordination: Joint new releases will be issued for subjects of mutual concern, when appropriate. All agencies will approve the message prior to release. Media releases about a specific incident will be the responsibility of the jurisdictional agency. The protecting agency should be kept informed.

These local operating plan supplements the terms stipulated in the MCFPA and NWOP will stay in effect until modified or cancelled. This plan will be reviewed and validated by May 1, of each year. Modifications may be made at any time when approved by each agency's representative. Any party to this plan may terminate their participation with this plan by providing 30 day written notice to the other signatory parties between the months of October and March.

Glossary

Closed Fire Season – In State of Washington means the period between April 15 and October 15, unless the Department of Natural Resource designates different dates because of prevailing fire weather condition for those lands that the DNR protects.
MCFPA – Master Cooperative Fire Protection Agreement
NWOP – Northwest Operating Plan
EWWFCG–Eastern Washington Wildland Fire Coordinating Group.
EWLOFP – Eastern Washington Local Operating Fire Plan.

List of Exhibits

SIGNATURE PAGE FOR EWWCG OPERATION PLAN 2007.

_____ _____

ACEY OBERLY
Superintendent
BIA, Yakama

Date

_____ _____

PALMER "CHIP" JENKINS
Superintendent
North Cascades National Park Service Complex

Date

_____ _____

NANCY CURRY
Project Leader
Turnbull National Wildlife Refuge

Date

_____ _____

RAYMOND T. FRY
Superintendent
BIA, Colville

Date

_____ _____

RICK BRAZELL
Forest Supervisor
Colville National Forest

Date

_____ _____

SHARON YEPA
Superintendent
BIA, Spokane

Date

_____ _____

ROBERT TOWNE
District Manger
BLM. Spokane

DATE

_____ _____

LOREN TORGERSON
NE Region Manager
Dept. of Natural Resources

Date

_____ _____

BECKY HEATH Date
Forest Supervisor
Okanogan-Wenatchee National Forests

_____ _____

LISA LANGELIER Date
Project Leader
Little Pend Orielle National Wildlife Refuge

_____ _____

WILLIAM O. BOYUM Date
SE Region Manager
Dept. Natural Resources

_____ _____

GREGORY HUGHES Date
Mid-Columbia River
National Wildlife Refuge Complex

_____ _____

DEBBIE BIRD Date
Superintendent
Lake Roosevelt National Recreation Area

EXHIBITS FOR

EASTERN WASHINGTON LOCAL OPERATING FIRE PLAN

EXHIBIT A

DISPATCH CENTERS

North Cascades National Park Complex - Marblemount, WA
Yakama Agency BIA - Toppenish, WA
CWICC - Okanogan and Wenatchee National Forests/SE Region Department of Natural Resources - East Wenatchee, WA
Colville Agency, BIA - Mt. Tolman Fire Center, Keller, WA
NE Region Department of Natural Resources - Colville, WA
Colville National Forest - Colville, WA
Spokane District Bureau of Land Management - Spokane, WA
Spokane Agency BIA - Wellpinit, WA
Colville National Forest - Colville, WA
Hanford Dispatch – US Fish and Wildlife Dispatch for Mid-Columbia River NWR Complex

EXHIBIT B

INTERAGENCY RESOURCES

None known at this time. Any Interagency Resources will be according to this plan or other local project plan.

EXHIBIT C

PROTECTED LANDS

OKANOGAN and WENATCHEE NATIONAL FORESTS AND NORTHEAST/SOUTHEAST REGIONS, - DEPARTMENT OF NATURAL RESOURCES:

Wilderness: The Okanogan and Wenatchee National Forests agrees to reimburse the Northeast Region and/or Southeast Region of Washington Department of Natural Resources any suppression resources utilized within the Wilderness areas protected by the Okanogan and Wenatchee National Forests.

Yakima Canyon Fire Protection Agreement Area: The Southeast Region of the Department of Natural Resources agrees to reimburse the Okanogan and Wenatchee National Forests for any suppression resources utilized with the boundary of the Yakima Canyon Fire Protection Agreement Area.

All Other Lands Protected by Alpine District of the Southeast Region of the Department of Natural Resources and Okanogan and Wenatchee National Forests: Each agency agree to provide requested ground resources with no reimbursement for the first 24 hours. After that time the jurisdictional agency will reimburse the assisting agency for suppression resources provided. (These resources will be identified on supplemental fire suppression agreement.) All air resources will be reimbursed by the jurisdictional agency.

SOUTHEAST REGION OF THE DEPARTMENT OF NATURAL RESOURCES AND NORTH CASCADES NATIONAL PARK:

Stehekin Area: The Northeast/Southeast Regions of the Department of Natural Resources agrees to reimburse the North Cascades National Park for any Suppression action required to protect private lands with the Stehekin Area. Notification of Suppression action must be made at time of detection.

SOUTHEAST REGION OF THE DEPARTMENT OF NATURAL RESOURSES AND YAKAMA NATION BIA:

Mutual Response Area: This area includes 1mile zone along the North and South boundary of the Yakama Agency Lands. Each agency agrees to take Initial Response action within this zone and notify the other agency of action taken.

SPOKANE DISTRICT BLM LANDS

Addendum to Eastern Washington Local Operating Fire Plan between NE Region DNR, Spokane District BLM, Okanogan/Wenatchee National Forest and Colville National Forest regarding protection of BLM lands located within Chelan, Okanogan, Stevens, Ferry, and Pend Oreille Counties.

As per the Master Cooperative Fire Protection Agreement, the USFS is the responsible protection agency on BLM managed lands in Chelan, Okanogan, Ferry, Stevens, and Pend Oreille Counties.

All BLM lands within the counties of Chelan, Okanogan, Ferry, Stevens, and Pend Oreille will be dispatched either by CWICC, Colville Dispatch or NE DNR Dispatch, utilizing the "closest forces" concept regardless of agency affiliation.

In areas outside of reciprocal boundaries, the agency that has closest forces to the incident will be the "primary dispatch center" and will have dispatch responsibilities for the entire incident unless these responsibilities are handed off through mutual agreement.

BLM lands lying within the reciprocal boundaries of the OWF/NES will become the responsibility of CWICC/OWF/BLM.

BLM lands lying within the reciprocal boundaries of the COF/NES will become the responsibility of Colville Dispatch/COF/BLM.

The "primary dispatch center" will notify Spokane BLM on any fires occurring on or near BLM lands within these counties, Dispatch (509) 536-1235 or Duty Officer (509) 981-3549) as soon as possible, as well as notifying the appropriate other agency dispatch center if applicable. (Okanogan County – CWICC/NE DNR Dispatch; Ferry, Stevens, Pend Oreille – Colville Dispatch/NE DNR Dispatch).

If DNR forces take action exclusively on BLM lands, BLM agrees to reimburse for all reasonable suppression costs associated with full suppression and control of the fire. Mop-up costs will be dealt with on a case by case basis on a supplemental agreement.

Supplemental cost apportionment agreements will be written on fires where there are multiple jurisdictions and acreages involved on the incident.

Investigation of fire cause and origin will be in accordance with the provisions in the Eastern Washington Local Operating Fire Plan as set forth under "Investigations"

Use of dozers should be coordinated thru BLM for fires occurring on these lands. If life or property (homes) is immediately threatened, dozer use may be justified without full coordination.

On fires which are 10 acres or larger, BLM will assign a Resource Advisor to the incident.

A copy of the field fire report should be sent to Spokane District BLM Dispatch within 21 days after the fire has been declared out.

All agreements now occurring between NE/SE Region DNR, Colville National Forest, and Okanogan-Wenatchee Forest shall remain in effect and not be changed by this addendum to the operating plan.

EXHIBIT D

OPERATIONAL FIRE LOOKOUTS

Clemans Mt.
Thorp
Aeneas
Kobau (Canada)
Goat Peak
Bonaparte
Sugarloaf
Alpine
Red Top

Tyee
Cody Butte
Whitmore Mountain
Keller Butte
Whitestone
Gold Mountain
Omak Mountain
Wellpinit Mountain
Tower Mountain
South Baldy

EXHIBIT E

Northeast Region, Washington Department of Natural Resources
And
Bureau of Indian Affairs, Department of Interior, Colville Agency

I. This agreement between the parties listed above, is to clarify certain items not specifically addressed in the Master Cooperative Fire Protection Agreement, Northwest Operating Plan, and the Eastern Washington Local Operating Fire Plan.

II. Training – The Department of Natural Resources (DNR) will provide training on Washington State forest fire laws and regulations as requested.

III. Fire Suppression

1. The protecting agency will notify the other agency the day of the fire when:

a. The fire involves BIA contractor or landowner operations.

b. The fire will not be controlled within 24 hours, or the air operations exceed one load of retardant, or three hours of PBY or helicopter flight time.

IV. Fire Reports:

The Northeast Region office (DNR) will send completed fire reports to the Colville Agency (Forest Manager) for fires that occur on Indian Trust Lands exterior to the boundaries of the Colville Indian Reservation. The Colville Agency will send fire reports to the Northeast Region (DNR) for fires on fee land (Forest Patrol Assessed) and for fires solely extinguished by the Colville Agency outside the exterior boundary of the reservation.

V. Burning Permits:

1. The Colville Tribe's will write all burning permits on private (fee) land inside the Reservation boundary that is assessed Forest Protection Assessment. The DNR will provide Forest Warden Commissions and burning permit forms as needed.

2. The Colville Agency and the Northeast Region (DNR) will immediately notify each other of apparent burning permit violations of fires adjacent to the Colville Indian Reservation boundary.

3. DNR will provide the Colville Agency with a copy of its current burning permit regulations.

VI. Slash Burns:

1. Each agency will notify the other of "larger" slash burns visible to the other.

2. The Colville Agency will notify the DNR- Olympia Fire Control of all proposed burns over 100 tons the day before burning.

VII. Forest Practices:

1. The Colville Agency will send copies of harvesting contracts on Indian Trust Lands (allotments) protected by the DNR, directly to the Northeast Region (DNR).
2. The DNR will posts copies of all Forest Practices accessible via Internet by the Colville Agency. Colville Agency personnel can establish a specific reviewer profile.

VIII. Communications:

1. Frequency use is covered within Operating Plan
2. Direct communications between dispatchers to coordinate resource information and Industrial Precaution Levels (IFPLs) will be as needed, during the fire season.
3. Annually, each agency will exchange telephone and radio call sign lists, including after hours or home phone numbers, when possible.

IX. Colville Agency of BIA has authority for enforcing all State fire protections laws, including extreme hazard laws WAC 332-24-650) through (332-24-660) on private lands within the boundary of the Colville Indian Reservation.

X. Principle Contacts:

Loren Torgerson
Northeast Region Manager
Washington Department of Natural Resources
P.O. Box 190
Colville, WA 99114 (509) 684-7474

Ike Cawston
FMO, Colville Agency
Bureau of Indian Affairs
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Keller, WA 99140-0325 (509) 634-4511

EXHIBIT F

Northeast Region, Washington Department of Natural Resources
And
Bureau of Indian Affairs, Department of Interior, Spokane Agency

I. This agreement between the parties listed above, is to clarify certain items not specifically addressed in the Master Cooperative Fire Protection Agreement, Northwest Operating Plan, and the Eastern Washington Local Operating Fire Plan.

II. Training:

The Department of Natural Resources (DNR) will provide training on Washington State forest fire laws and regulations as requested.

III. Fire Detection:

DNR will provide maps of protected areas outside the reservation. DNR will also provide "lookout orientation" for areas outside the reservation.

IV. Reciprocal Fire Assistance

The DNR and the Spokane Agency recognize MUTUAL RESPONSE AREAS. The boundaries of the areas are located 1 mile either side of the exterior boundaries of the Spokane Indian Reservation, adjacent to DNR protection.

All fires reported within the MUTUAL RESPONSE AREAS will be reported to both agencies representatives indicated in the operating plan. Both agencies will dispatch the Initial Response forces appropriate for the day.

(a) Each agency will be responsible for the costs of their own Initial Response resources for the Initial Response period, 24 hours, unless otherwise mutually agreed.

(b) Costs for resources needed beyond the Initial Response period will be responsibility of the agency having the protection responsibility for fires burning on a single jurisdiction, be prorated on fires burning on both

jurisdictions based on a supplemental agreement developed by representatives of the agencies at the time of the fire.

During periods of low fire danger and with the agreement of both agencies, one agency may respond to a fire in the MUTUAL RESPONSE AREA. Cost of the Initial Response response will be the responsibility of the responding agency.

V. Fire Suppression

The protecting agency will notify the other agency the day of the fire when:

a. The fire involves BIA contractor or landowner operations. (Chewelah and Airway Heights Allotments)

b. The fire occurs within 1 mile on eight side of the Spokane Indian Reservation boundary or;

b. The fire will not be controlled within 24 hours, or the air operations exceed one load of retardant, or three hours of PBY or helicopter flight time.

Cultural issues will be considered during suppression action.

VI. Fire Reports:

The Northeast Region office (DNR) will send completed fire reports to the Spokane Agency Fire Management Officer for fires that occur on Indian Trust Lands exterior to the boundaries of the Spokane Indian Reservation. The Spokane Agency will send fire reports to the Northeast Region (DNR) for fires on fee land within the boundary of Spokane Indian Reservation (Forest Fire Protection Assessment) and for fires solely extinguished by the Spokane Agency outside the exterior boundary of the reservation.

VII. Fire Investigations:

For fires that originate on the lands DNR collects Forest Fire Protection Assessment within the Spokane Indian Reservation boundary, and where the DNR would share the cost of suppression, the DNR and the Spokane Agency will cooperate in an investigation to attempt to determine the cause and origin of the fire.

VIII. Burning Permits:

a. The Spokane Agency will write all burning permits on private (fee) land inside the Reservation boundary. The DNR will provide Ranger Commissions and burning permit forms as needed. These permits apply only to silvicultural burning.

b. The Spokane Agency and the Northeast Region (DNR) will immediately notify each other of apparent burning permit violations of fires within the mutual response area.

c. DNR will provide the Spokane Agency with a copy of its current burning permit regulations.

VIII. Slash Burns:

a. Each agency will notify the other of "larger" slash burns visible to the other.

b. The Spokane Agency will notify the DNR- Northeast of all proposed burns over 100 tons the day before burning.

IX. Forest Practices:

a. The Spokane Agency will send copies of harvesting contracts on Indian Trust Lands (Chewelah allotments) protected by the DNR, directly to the Northeast Region (DNR).

b. The DNR will posts copies of all Forest Practices accessible via Internet by the Spokane Agency. Spokane Agency personnel can establish a specific reviewer profile.

X. Communications:

a. DNR Colville office and the Spokane Agency of the BIA hereby authorize each other to install and use radio frequencies for Incident Management purposes.

DNR: Common – Rx & Tx 151.4150
DNR: Air to Ground, no tone, (NB) – Rx & Tx 159.2700
DNR: Air to Air, no tone - Rx & Tx 122.925
DNR: Chewelah, (NB) – Rx 159.4500 Tx 151.4600 Tone 156.7
DNR: Lincoln, (NB) – Rx 159.4500 Tx 151.2650 Tone 156.7
DNR: Tac 1, no tone – Rx & Tx 151.3100
DNR: Tac 2, no tone – Rx & Tx 151.3400
SPA: Common – Rx & Tx 171.700, Tone 110.9
SPA: Air to Ground, no tone – Rx 172.425 Tx 164.550
SPA: Air to Air, no tone – Rx & Tx 132.175

b. Direct communications between dispatchers to coordinate resource information and Industrial Precaution Levels (IFPLs) will be as needed, during the fire season.

c. Annually, each agency will exchange telephone and radio call sign lists, including after hours or home phone numbers, when possible.

XI. Spokane Agency of BIA has authority for enforcing all State fire protections laws including extreme hazard laws WAC 332-24-650) through (332-24-660) on private lands within the boundary of the Spokane Indian Reservation.

XII. Principle Contacts:

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Bureau of Indian Affairs
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Updated: 02/21/07

L. FINDING OF NO SIGNIFICANT IMPACT:FIRE MANAGEMENT PROGRAM ENVIRONMENTAL ASSESSMENT

North Cascades National Park Service Complex
April 2007

Purpose and Need
The purpose of this proposed federal action is to further develop a fire management program in the North Cascades National Park Service Complex that restores and maintains ecosystem processes, while minimizing the negative impacts of fire to the public, firefighters, natural and cultural resources, and private property. This action is needed to 1) protect lives, health, and property in the park complex; 2) restore fire-dependent ecosystem processes in areas that are outside their historical range of variability; and 3) maintain natural fire processes in areas that are not yet outside their historical range of variability.

1. Protect lives, health, and property. The following forest characteristics have been found to significantly increase potential for high severity fires: 1) ladder fuels, which are dead branches, shrubs and seedlings that provide continuity between surface fuels (dead and downed wood, litter and duff) and tree crowns; 2) dense and continuous canopy cover of trees that allows fire to spread from crown to crown; and 3) heavy and continuous fine surface fuel loading (small diameter dead and downed wood, litter, and duff), which increases fire intensity and facilitates fire spread on the surface. These forest conditions are considered to be *hazardous fuels* in the wildland urban interface where potential fire behavior puts lives, health and property at risk. Fuels treatments (thinning and prescribed burning) aimed at reducing hazard fuels are currently performed in the Forest Fuel Reduction Areas (FFRAs) that were designated in the 1995 Stehekin Plan. Additional thinning around structures and along roadsides is also performed in the Stehekin Valley in order to create defensible space.

Monitoring of the thinning and prescribed fire treatments in Stehekin demonstrates that the 1995 plan's objectives are being met on the 780 acres of dry Douglas fir/ponderosa pine forest where treatments have occurred to date. In 2000, results from the peer review of the 1995 Stehekin Plan included recommending that additional measures are needed to provide greater community protection in areas at risk; for example, larger acreages of fire adapted conifer stands along the valley walls (Stehekin Contours) could be prescribed burned.

2. Restore fire-dependent ecosystem processes. The historical range of variability is the natural range of conditions occurring in key ecosystem components (species composition, structural stage, stand age, canopy closure, and fuel loadings) in an ecosystem unaffected by human influence. The identification of the historical range is dependent on the fire regime (e.g., low severity fire regimes are shorter and their imprint on the landscape is only perceptible for centuries rather than millennia, whereas high severity fire regimes are longer and occur at the millennial time scale).

All of these components show signs of alteration in the Douglas fir/ponderosa pine forests of Stehekin. Prescribed burning and thinning in non-wilderness areas (Stehekin FFRAs), or prescribed burning only in wilderness (Stehekin Contours) could be used to restore stand structure and composition. Thinning, where it is applied, can efficiently reduce stand density to a desired future condition within the historical range of variability which also meets hazard fuel reduction goals; however, it does not replace the need for prescribed burning to reduce surface fuels, and stimulate regeneration of fire-adapted plant species.

3. Maintain natural fire processes. Managing for fire in areas that are still within their natural range of variability will help to maintain fire as a natural process in those ecosystems. It is important to note that fire objectives may not be easily achieved in areas in which fuel loads have increased beyond their historical range, causing un-naturally severe fire behavior during wildland fire. These areas are targeted for prescribed burning so that the use of fire can be considered as a management alternative in the future. Additionally, prescribed burning is needed to reduce fuel loads in areas that may be within their historical range of variability, but that are adjacent to resources at risk (Hozomeen, Stehekin). Until these areas have been treated, fire may not be safely implemented.

Selected Management Alternative

Of the three management alternatives evaluated in the Environmental Assessment (EA), Alternative 3, the Preferred Alternative and the Environmentally Preferred Alternative, will be implemented. The proposed actions under the Preferred Alternative, as detailed in the EA, remain unchanged except for two details: 1) the number of proposed acres of prescribed burning in the Stehekin Contours will be reduced by 1,967 acres; and 2) prior to prescribe burning each unit, the extent of cheatgrass (*Bromus tectorum*), an invasive and non-native grass, will be mapped and containment strategies will be implemented. Both of these changes are within the scope of the original environmental impact analysis and do not affect significance determinations. No substantive comments were received during the public review, nor did any of the comments necessitate changes to the original proposal.

The number of proposed acres in the Stehekin Contours will be reduced because the Flick Creek Fire of 2006 completely burned four of the proposed contour burns (Flick Creek, Maxwell, Hazard Creek, Imus Creek) and a portion of a fifth (Buellers). The remaining burn units of the Stehekin Contours, totaling 2,881 acres, will be burned according to prescription. Cheatgrass surveys and containment strategies will be implemented because since the EA was published, the extent of the invasive plant was found to be more widespread than previously thought in some of the burn units in both Stehekin and Hozomeen.

The selected alternative includes four fire management strategies: suppression, use of fire, prescribed fire and manual/mechanical thinning. These strategies are the basis for the Fire Management Plan, which will guide fire management within the Complex for the next 10 years, at which time it will be re-evaluated and refined as necessary

based on new environmental information, experience from project implementation, and/or advances in fire management practices which could not be foreseen. Projects and program elements include:

1. *Use of fire*. An assumed average of 200 acres will burn each year as a result of lightning ignitions that would be allowed to burn for the benefit of the resources.
2. *Suppression*. An assumed average of 260 acres will burn each year as suppression fires, i.e., unwanted fires that are actively extinguished by fire management staff.
3. *Stehekin Forest Fuel Reduction Areas*. Up to 200 acres will be thinned and prescribe burned per year to reduce hazard fuels in the Stehekin valley bottom, for a total of 1,209 acres.
4. *Corridor Thinning*. Ten to 15 acres will be thinned and pile-burned per year along the Stehekin road corridor, for a total of 124 acres.
5. *Safety Zone Thinning*. Ten to 15 acres will be thinned and pile-burned per year within the Orchard and Ranch safety zones in Stehekin, for a total of 24 acres.
6. *Wyden Amendment Thinning/Burning*. Two to 10 acres of privately-owned land in Stehekin will be thinned and pile-burned or prescribe burned per year, at the landowner's request, and when such action would benefit both the NPS and the landowner.
7. *Stehekin Contours*. Between 153 and 604 acres along the south facing slopes above Stehekin will be prescribe burned per year, for a total of 2,881 acres.
8. *Hozomeen Contours*. Between 1,630 and 3,039 acres above Ross Lake near Hozomeen will be prescribe burned per year, for a total of 5,219 acres.
9. *Re-ignition of Suppressed Fires*. Up to 200 acres will be burned through the re-ignition of suppressed fires per year.

All of the projects and program elements described above that would take place in designated wilderness have been deemed essential for managing the area as wilderness. Activities associated with the projects and/or program elements would utilize the minimum tools necessary to accomplish the objectives.

Other Alternatives Considered in the Environmental Assessment
Two other alternatives were considered and evaluated:
Alternative 1 (No Action): Continue current management under 1991 Wildland Fire Management Plan and 1995 Stehekin Valley Forest Fuel Reduction/Firewood Management Plan. This alternative would utilize all fire management strategies, including prescribed burning for hazard fuel reduction on 822 acres in Stehekin. This alternative was not chosen because it does not allow for larger scale treatments aimed at protecting the Stehekin community under severe fire conditions, nor does it meet the need to restore and maintain ecosystem function throughout the Complex.

Alternative 2: Continue current direction under 1991 Wildland Fire Management Plan and 1995 Stehekin Valley Forest Fuel Reduction/Firewood Management Plan, with an increase in acreages of forest fuel reduction areas in Stehekin. This alternative

would also utilize all fire management strategies. The forest fuel reduction areas in Stehekin would increase from 822 acres to 1,209 acres. Roadside thinning of conifers totaling 124 acres and thinning along safety zones totaling 24 acres would also occur. This alternative would allow thinning and prescribed fire treatments on up to 440 acres of privately owned property in Stehekin under the Wyden Authority. An increase in treatment acreage for hazard fuel reduction in Stehekin would help to further protect Stehekin; however, it does not attempt to restore altered ecosystems in wilderness adjacent to Stehekin. This alternative would perpetuate the effects of fire exclusion on stand structure and composition, and as a result, fire near this community would not be an option given the threat of spread toward the community.

Environmentally Preferred Alternative

Alternative 3, the selected management alternative, is the environmentally preferred alternative. This alternative causes the least damage to the biological and physical environment, and best protects, preserves, and enhances historic, cultural, and natural resources. Both alternatives 1 and 2 concentrate project work on the Stehekin valley bottom and fail to address the broader impacts of fire suppression and exclusion surrounding Stehekin and Hozomeen. Alternative 3 treats additional altered acres surrounding Stehekin and Hozomeen, which will help to restore natural processes and relationships in designated wilderness so that they can be maintained indefinitely into the future.

Mitigation Measures and Best Management Practices

The following mitigation measures and best management practices (BMPs) were developed to minimize the impacts or effects of fire management activities on the environment. The measures are identical to those listed by resource in the EA, except for the fish and wildlife section, which was updated according to the Conservation Measures outlined in the Biological Opinion issued by the US Fish and Wildlife Service in March 2007.

Table 1: Mitigation Matrix

Resource	***Impact Mitigation and Best Management Practices***	***Responsible Party***
Air Quality	Same-day burn approval from the Washington State Department of Natural Resources will be sought for all prescribed burns involving over 100 tons of fuel	Fire Management Officer (FMO)
	Local air quality will be monitored during the fire season using equipment at Ross Dam and Stehekin	FMO, Park Physical Scientist
	Interagency Monitoring of Protected Visual Environments (IMPROVE) data (e.g., aerosols) will be analyzed to build an understanding of air quality effects from local fires	Park Physical Scientist

Resource	***Impact Mitigation and Best Management Practices***	***Responsible Party***
Water Resources (Draw-down)	Only approved dip lakes will be used for bucket operations (high lakes that have been identified as sensitive during research conducted for the Mountain Lakes Fishery Management Plan EIS (pending) are not approved for dipping)	FMO, Resource Advisor
	Limit the quantity of water that can be drawn from any of the approved lakes if it appears that normal water level fluctuations may be exceeded	Resource Advisor
	Monitor impacts to lakes during suppression operations and determine whether or not they can continue to be used as a water source	Resource Advisor
Water Resources (Retardants)	The superintendent of the Complex is the only NPS official who can authorize the use of fire retardant chemicals	Superintendent
	Avoid direct drops of retardant or foam into rivers, streams, lakes, or along shores. Establish ¼ mile buffer zones around all water bodies, within which chemicals cannot be applied unless human lives are at stake	FMO, Resource Advisor
	During training or briefings, inform field personnel of the potential danger of fire chemicals, especially foam concentrates, in surface water	FMO
	Locate mixing and loading points for fire retardants where contamination of natural water, especially with the foam concentrate, is extremely unlikely	FMO
	Maintain all equipment in good working condition and use a pump system equipped with check valves where appropriate to prevent release of foam concentrate into any body of water	FMO
	Exercise particular caution when using any fire chemical in watersheds where federal- or state-listed species exist	Resource Advisor
	Dip from a tank rather than directly from a body of water, to avoid releasing any foam into these especially sensitive areas	FMO
	Make sure all buckets/containers that have carried chemicals are completely cleaned before resuming dipping in natural water bodies)	FMO
	The FMO will monitor and record the types of chemicals used, their amounts, dates of application, and areas where applied	FMO

Resource	***Impact Mitigation and Best Management Practices***	***Responsible Party***
	Water chemical analysis of nutrients, surfactants, and other significant chemical components of these products will be monitored shortly after application in the vicinity of any water body	Physical Scientist
	Notify proper authorities promptly if any fire retardant chemical is used in an area where there is likelihood of negative impacts	Resource Advisor
	Insist that manufacturers provide pertinent information on the chemical content of their products	FMO, Resource Advisor
Water Resources (Riparian)	All prescribed burns require a burn plan, in which specific direction regarding riparian areas of concern will be discussed. This may include buffer distances to avoid burning or cutting any riparian vegetation	Prescribed Fire Specialist
	All thinning projects are conducted using approved silvicultural prescriptions	Prescribed Fire Specialist
	Both prescribed burn and thinning project proposals require review by the Complex's Inter-disciplinary Team (IDT), and approval by the superintendent. Mitigation for impacts to water resources could be required prior to approval of the proposal	Superintendent
	Use alternative methods of fire line building in sensitive areas	Resource Advisor
Topography and Soils	Avoid digging line across, and especially down, steep slopes whenever possible	FMO, Resource Advisor
	Construct water bars along fire line that crosses steep slopes	
	Set aside the removed topsoil and organic debris for later restoration	
	Rake over fire lines as soon as possible, and/or before fall rains	
	Use ignition patterns and weather conditions that will result in reduced fire intensities and residence time. This will prevent excessive heat pulses that could penetrate lower soil levels	
	Use aeration and raking to relieve soil compaction and promote re-growth	
	Leave woody material when prescribed burning for nutrient cycling and fungal (e.g., mycorrhizal) function	

Resource	***Impact Mitigation and Best Management Practices***	***Responsible Party***
	Avoid, if possible, any activity in areas covered by cryptobiotic crusts, including helispot locations, fire line digging, foot traffic, and camp locations	
	Educate field personnel on how to identify cryptobiotic soil crusts and how to avoid impacts	
Fish and Wildlife (Fish Species & Aquatic Habitat)	***Fire Suppression and Use of Fire***	
	A resource advisor will be consulted on fires greater than 1.0 acre regarding the presence of Federally listed fish species	Resource Advisor
	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)	FMO, Resource Advisor
	Avoid water withdrawals from fish bearing streams whenever possible. Helicopter bucket dipping from streams in or adjacent to spawning should be avoided, including inlet streams to lakes	FMO, Resource Advisor
	Direct the spraying of foam away from waterways whenever possible	FMO
	Avoid backflushing pumps and charged hoses into surface water. Utilize check bleeder valves whenever possible. Direct flow away from water sources when draining pumps or charged hoses	FMO
	Consult with Physical Scientist prior to installing temporary check dams	Physical Scientist
	Stream profile will be restored in areas where temporary check dams were constructed	Physical Scientist
	If tactically possible, use of foam or retardant will be limited to upslope areas	FMO
	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	FMO
	If foam application is necessary, crews will consider whether to use a remote dip tank away from water sources	FMO
	Pump intakes placed in streams will be covered with 1/8 inch or less screened material to prevent harm to amphibians and young fish	FMO
	Avoid the use of riparian areas (300 feet from flowing water) as landing areas and refueling areas for helicopter operations whenever possible	FMO, Resource Advisor

Resource	*Impact Mitigation and Best Management Practices*	*Responsible Party*
	Locate fire camps at least 200 feet away from riparian areas whenever possible	FMO
	Sediment Control	
	Limit fire lines to 3 feet in width, construct erosion control structures (e.g., water bars), and rehabilitate them as soon as possible to minimize sediment delivery to streams whenever possible	FMO, Resource Advisor
	To protect fisheries resources, stream disturbing activities shall generally be limited to the dry season from July 15 through August 15	FMO
	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	Resource Advisor, Chief of Resources
	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	FMO
	Water Quality	
	In the event of a hazardous fuel spill, the Complex will adhere to the Spill Prevention Control and Countermeasures Plan	FMO, Resource Advisor
	On larger pumping and helicopter operations, spill prevention kits will be available onsite to control, absorb, or contain the spill for cleanup and disposal	FMO
	Any machinery maintenance involving potential contaminants (fuel, oil, hydraulic fluid, etc) will occur greater than 200 feet from the riparian area whenever possible. This measure is designed to avoid/minimize the introduction of chemical contaminants associated with machinery	FMO
	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. This measure is designed to avoid/minimize the introduction of chemical contaminants associated with machinery used in project implementation	FMO

Resource	***Impact Mitigation and Best Management Practices***	***Responsible Party***
	Heavy equipment should not enter streams except in extreme circumstances. Any equipment that does enter a stream should be rinsed clean and should only use vegetable-based hydraulic fluids	FMO
	Removal of mature coniferous and deciduous trees within 250 feet of a wetland, stream, or river will be minimized when possible. In the event that trees need to be felled, trees should be felled so that they stay in the floodplain, instead of upslope, if this can be safely accomplished. If requested by a Resource Advisor, the crew will directionally fall trees towards the waterway	FMO, Resource Advisor
	Helicopter landings in stream and river channels will occur on gravel bars outside the active channel whenever possible	FMO
Fish and Wildlife (Terrestrial Species and Habitat)	A resource advisor will be assigned to fires as needed to minimize impacts to threatened and endangered species	Resource Advisor
	A wildlife biologist will be part of the Wildland Fire Decision Support System team to provide input to mitigate impacts of fire fighting tactics in listed species habitat and an up to date map of listed or sensitive species (e.g., spotted owl, marbled murrelet, and bald eagle) habitat and survey results. This information will be provided to the Incident Commander for consideration in planning fire activities	Wildlife Biologist
	Fire management personnel will use “minimum impact techniques” when suppressing fires in the Complex	FMO
	When possible, crews will hike into and out from a fire rather than flying	FMO
	When possible, hand tools will be used rather than power equipment	FMO
	When possible, helicopters will avoid staging within threatened and endangered species habitat in the Complex	FMO, Resource Advisor
	When possible, helicopters will fly higher than 1,500 feet over threatened and endangered species habitat	FMO, Resource Advisor
	Retardant will only be used when required to protect human life and property and is considered only when all other efforts have failed	FMO

Resource	***Impact Mitigation and Best Management Practices***	***Responsible Party***
	Explosives will not be used to manage fires in the Complex	FMO
	Mechanized equipment, such as dozers, will not be used in preparation work for or during the implementation of prescribed fire or fire suppression. Any preparation will follow the minimum impact tactic guidelines developed for the Complex described in the EA	FMO
Bald Eagle Mitigation Measures	Removal of mature coniferous and deciduous trees will be minimized	FMO
	Maintain mature trees to protect forage, perch, alternate nest and roost habitat within a 0.25 mile radius of a known nest site	FMO, Wildlife Biologist
	Avoid fire management activities that result in increased pedestrian activity within 0.5 mile of nest sites, and carefully manage public trail use and camping within that distance	FMO, Wildlife Biologist, Resource Advisor
	Avoid tree cutting and other activities that produce noise above ambient levels within 0.25 mile (0.5 mile if line of sight) of an active nest during the breeding season (January 1 to August 31)	FMO, Wildlife Biologist
	Maintain high tree density and moderate canopy closure to visually buffer bald eagle nests from human activities	FMO, Wildlife Biologist
	Helicopter pilots and crew will watch for and avoid bald eagles and their nests when dropping water from buckets	FMO, Wildlife Biologist
	There will be no prescribed fire or thinning treatments from January 1 through August 31 within 0.5 mile of any known bald eagle nest. No trees greater than 9 inches DBH will be removed	FMO, Wildlife Biologist
Spotted Owl Mitigation Measures	Removal of mature coniferous trees will be minimized	FMO
	Maintain all suitable spotted owl habitat within 0.7-miles of known nest trees/site centers. If there is an owl management plan in place for a specific territory, it will take precedence over this conservation measure	Wildlife Biologist, FMO
	Use of fire will be excluded within the 100-acre core of suitable habitat around any nest tree/site center at any time of year	FMO, Wildlife Biologist

Resource	*Impact Mitigation and Best Management Practices*	*Responsible Party*
	Use of fire will be excluded within 0.7-mile radius of any known nest tree/site centers before August 1 to protect eggs and nestlings. After August 1, use of fire is permitted, provided that all suitable spotted owl habitat within 0.7-miles of known nest trees/site centers is maintained (see second bullet above)	FMO, Wildlife Biologist
	After August 1, maintain 55 percent of suitable habitat within any known owl territory within 1.8 miles (outside of the 0.7-mile radius) of any known nest tree or site center. If there is an owl management plan in place for a specific territory, it will take precedence over this conservation measure	FMO, Wildlife Biologist
	Limit the use of wildland fire and disturbing activities within 0.25 mile of unsurveyed suitable owl habitat to after August 1	FMO
	Avoid tree cutting and other noises that are above ambient noise levels within 0.25 mile of an active nest during the breeding season (March 1 to September 30)	FMO, Wildlife Biologist
	Lightning fires detected before August 1 burning in suitable spotted owl habitat will be managed using a suppression strategy	FMO
	Lightning fires detected in the “red zones” (i.e., the low elevation spotted owl habitat within the Stehekin Valley, United States/Canada International boundary, and Skagit River corridor and portions of the rest of the complex will be managed using a suppression strategy	FMO
	Prescribed fires, re-ignition fires, and/or thinning projects occurring near suitable spotted owl habitat will be scheduled for after August 1	FMO
	All preparation work for prescribed fire within or adjacent to suitable spotted owl habitat will occur after August 1	FMO
	Spotted owl surveys will be conducted prior to the initiation of any project occurring in the Stehekin drainage. Occupied territories will not be considered for prescribed fire or thinning treatments	Wildlife Biologist, FMO

Resource	***Impact Mitigation and Best Management Practices***	***Responsible Party***
	Site-specific spotted owl activity buffers will be developed by local Complex biologists, and prescribed fire and thinning treatment units altered to protect occupied spotted owl habitat	Wildlife Biologist, FMO
Marbled Murrelet Mitigation Measures	Removal of mature coniferous trees will be minimized	FMO
	Garbage and food items will be handled appropriately by firefighters to minimize attraction of corvids	FMO
	Lightning fires detected before August 6 burning in marbled murrelet habitat will be managed using a suppression strategy	FMO
Vegetation	Equipment (hand tools, trucks, pumps, tracked equipment, tents, etc.) and personal line gear (line packs, nomex, boots, etc.) will be checked and cleaned in between movement of fire crews for invasive weed seeds and plant parts. Contracted equipment must be thoroughly cleaned before arrival and prior to departure	FMO
	Disturbed sites will be monitored and invasive species will be controlled before they spread	Plant Ecologist / Fire Ecologist
	A resource advisor will monitor and document hazard tree removal along the Stehekin road corridor	Resource Advisor
	Avoid known locations of sensitive plant species that are disturbance-intolerant during prescribed burning and thinning operations. Monitor locations before and after treatment	FMO, Plant Ecologist / Fire Ecologist
Research Natural Areas	Manage fire perimeters (both suppression response fires and re-ignitions) using a confinement strategy, which limits the extent of the fire area to preset boundaries such as natural barriers and terrain breaks	FMO
	Use a confinement strategy within the Silver Lake RNA / US Border Suppression Zone area, and use direct suppression activities (fire retardant drops, hand line construction, tree felling, back burning, etc) only when absolutely necessary to prevent a fire from spreading into Canada. Use of fire will be the preferred management strategy for the other four RNAs	
	Establish no large fire camps (type 3 incidents or larger) within Research Natural Areas	
Wilderness	Follow all Minimum Impact Techniques	FMO

Resource	***Impact Mitigation and Best Management Practices***	***Responsible Party***
	Follow all Minimum Tool procedures	
Cultural Resources	The Park Archeologist and/or Cultural Resource Specialist will be consulted early on in the case of planned burns, and as soon as possible in the case of unplanned fire events	FMO, Park Archeologist, Cultural Resource Specialist
	In consultation with the Park Archeologist and/or Cultural Resource Specialist, identify any threatened cultural resources, define their boundaries, and determine the Area of Potential Effect (APE)	FMO, Park Archeologist, Cultural Resource Specialist
	In consultation with the Park Archeologist and/or Cultural Resource Specialist, maintain an updated version of the Complex-wide archeological/cultural resource sensitivity map for use as a quick reference by fire management staff to assess the potential effects of new fires on cultural resources	GIS Specialist, Park Archeologist, Cultural Resource Specialist
	In consultation with the Park Archeologist and/or Cultural Resource Specialist, identify the important qualities of the cultural resources and any potential threats to these qualities	FMO, Park Archeologist, Cultural Resource Specialist
	Avoid disturbances within the APE, and in particular, avoid effects to any important site qualities that are identified as threatened in consultation with the Park Archeologist and/or Cultural Resource Specialist	FMO, Park Archeologist, Cultural Resource Specialist
	Make available to fire crews a brief workshop, conducted by the Park Archeologist and/or Cultural Resource Specialist, with the goal to train crews in the recognition, management, and preservation of cultural resources	Park Archeologist, Cultural Resource Specialist
	Depending on the cultural sensitivity of the undertaking, it may be necessary for a qualified archeologist to monitor on-site during the construction of fire lines and helispots	Park Archeologist
	Minimum Impact Tactics (MIT) will be used. Minimize the extent of built fire lines and helispots, and other ground-disturbing actions to mitigate damage to subsurface and surface cultural resources	FMO

Resource	***Impact Mitigation and Best Management Practices***	***Responsible Party***
	In prescribed burn plans, identify threatened cultural resources, or those within the APE, assess the potential fire effects and fire fighting tactics to the same, and avoid, minimize, or mitigate these effects, as required by according to 36CFR Part 800	Park Archeologist, Cultural Resource Specialist
Visitor Use	Perform work during shoulder seasons (spring and fall) when visitation is lower	FMO
	Rehabilitate areas as soon as possible to minimize visual impacts	FMO, Plant Ecologist / Fire Ecologist
Health and Safety	Fire personnel must: • meet qualifications for incident assignments, including all applicable medical requirements • meet qualification standards for the implementation of prescribed fires and for using power equipment such as chainsaws for thinning and bucking • be equipped with personal protective equipment • comply with fitness and personal protective equipment standards • complete a required amount of wildland fire training, including refresher safety training	FMO
	Notify the Washington Department of Natural Resources during fires and discuss current and forecast smoke impacts	FMO
	The superintendent will make closures in areas of the Complex if a fire is posing a threat to human health or safety	Superintendent
	Visitors will be kept at a safe distance during fire operations, and when possible, work will be conducted during shoulder seasons when there are fewer visitors	FMO
	Private property owners in the vicinity of fire operations will be notified of upcoming projects and other potential disturbances	FMO
	Fire retardant chemicals will only be used during emergencies that threaten life and property and only with the superintendent's approval	Superintendent
Socioeconomics	Conduct projects during shoulder season (spring and fall) to minimize impacts to tourism	FMO

Why the Selected Action will not have a Significant Effect on the Environment

The NPS has determined that the selected alternative can be implemented with no significant adverse impacts or effects on air quality, water resources, topography and soils, fish and wildlife, vegetation, research natural areas, wilderness, cultural resources, visitor use, health and safety, or socioeconomics. The following criteria were used to determine the significance of each impact:

1. Impacts that may have both beneficial and adverse aspects and which on balance may be beneficial, but that may still have significant adverse impacts.

   Although there are short-term adverse impacts under the selected alternative, there are none that would have significant adverse impacts. Some of the short-term impacts will include noise disturbance from helicopter activity, smoke, temporary trail closures, and a loss of solitude in wilderness during fire management activities.

2. Effects on public health and safety.

   The selected alternative would not significantly impact human health and safety if all operational precautions and smoke mitigation measures are followed.

3. Unique characteristics of the area (proximity to historic or cultural resources, wild and scenic rivers, ecologically critical areas, wetlands or floodplains, and so forth).

   The selected alternative will help to maintain and/or restore natural conditions across the landscape. Fire will be used to help maintain fire as a natural process in those areas that are still within their natural range of variability. Altered fire regimes in designated wilderness surrounding Stehekin and Hozomeen will be restored so that in the future the use of fire can be safely considered as a management alternative.

4. Degree to which impacts are likely to be highly controversial.

   Impacts from the selected alternative will not likely be highly controversial. None of three public comment letters identify controversial actions.

5. Degree to which potential impacts are highly uncertain or involve unique or unknown risks.

   The procedures outlined in the Fire Management Plan ensure that work activities and their impacts are reasonably certain.

6. Whether the action may establish a precedent for future actions with significant effects, or represents a decision in principle about a future consideration.

The selected alternative neither establishes a precedent for future actions with significant effects, nor represents a decision in principle about a future consideration.

7. Whether the action is related to other actions that may have individual insignificant impacts but cumulatively significant effects.

   There are no known other actions that could contribute to cumulatively significant effects.

8. Degree to which the action may adversely affect historic properties in or eligible for listing in the National Register of Historic Places, or other significant scientific, archeological, or cultural resources.

   Implementation of the selected alternative would not adversely affect any identified historic property, or scientific, archeological, or cultural resources.

9. Degree to which an action may adversely affect an endangered or threatened species or its habitat.

   The US Fish and Wildlife Service concurs that the selected alternative may affect, but is not likely to adversely affect, the wolf, lynx, or grizzly bear. Authorization for an incidental take was granted for spotted owl, murrelet, bald eagle, and bull trout, and it was determined that the level of incidental take anticipated would not jeopardize the continued existence of any of the four species.

10. Whether the action threatens a violation of federal, state, or local law or requirements imposed for the protection of the environment.

    The selected alternative conforms to all existing law and policy, including Director's Order #18: Wildland Fire Management, and Director's Order #41: Wilderness Preservation and Management.

Public Review and Agency Consultation

Public scoping for the revision of the Fire Management Plan took place from October 9 to November 17, 2003. A scoping letter was sent to agencies, tribes and interested organizations and individuals. Eleven comment letters were received from landowners in Stehekin, Rockport, East Wenatchee, and North Central Washington; from the Chelan Ranger District (USFS) and Washington Department of Natural Resources; from Northwest Ecosystem Alliance; and from individuals in both Colorado and California. Comments ranged from criticism for not suppressing fires in Ross Lake National Recreation Area, to support for suppressing fires in the Stehekin Valley, to support for allowing naturally-caused fires to run their course.

The Fire Management Plan revision and proposed actions were also discussed in Stehekin community meetings since 2001. These community meetings were informal and occurred annually to discuss management issues of particular interest to Stehekin residents and property owners. Typically three to eight community members attended

the meetings. In 2003, maps of the proposed alternatives were presented. The main focus of the discussion that ensued was the recent wildfire activities that had occurred in the Chelan-Stehekin watershed during the previous two years and the need to prevent such wildfires from impacting Stehekin through proposed prescribed fire treatments. Most comment regarding the proposed prescribed fires was about the potential visual impacts (some did not care for the appearance of blackened tree trunks), others suggested that well-visited areas should be buffered from prescribed fire (i.e., Coon Lake and the popular Rainbow Falls area). Other questions or comments were primarily operational in nature. Some of these meeting attendees submitted letters commenting on the EA. All were invited to submit letters to be sure their comments were a part of the public record. Informal discussions with specific community members also occurred at their requests.

Internal scoping meetings with park staff were held to provide a forum for comment during this same period. Comments from all sources were used to identify key issues and help determine the scope of analysis in the EA.

The environmental assessment was released to the public on May 18, 2005 and comments were accepted through June 20, 2005. Copies of the document were sent to 70 agencies, legislators, tribes, organizations, media, and public libraries. An additional 80 letters were sent to potentially interested individuals, informing them of the availability of the document locally and on-line using the public comment system (PEPC). Three comment letters were received. Two of the letters (one from a private citizen in Stehekin and one from the Ministry of Environment in Canada) were in support of the preferred alternative and one (from a private citizen in Marblemount) was opposed to the entire fire management program. No substantive issues were raised in the letter of opposition. The official from the Ministry of Environment noted Canada's plan to introduce fire through prescribed burns north of the international boundary. The agency also expressed an interest in working together to establish a fire regime based on natural ecosystems rather than international boundaries. The Complex is dedicated to assisting land management agencies in Canada with the planning and implementation of prescribed fire treatments where there is mutual benefit.

US Fish and Wildlife Service (USFWS)
On September 13, 2005 the NPS submitted a Biological Assessment (BA) to USFWS on the potential effects of the proposed fire management program on listed fish and wildlife species. On October 18, 2005 USFWS requested supplemental information to the BA. After additional information was provided, formal consultation was initiated on December 12, 2005 in accordance with section 7(a)(2) of the Endangered Species Act of 1973, as amended. The USFWS Biological Opinion was received on March 2, 2007. The BA evaluated the effects of the proposed action on the threatened northern spotted owl (*Strix occidentalis caurina)*, marbled murrelet (*Brachyramphus marmoratus marmoratus*), bald eagle *(Haliaeetus leucocephalus)*, bull trout (*Salvelinus confluentus*), Canada lynx (*Lynx Canadensis*), grizzly bear (*Ursus arctos horribilis*), the endangered gray wolf (*Canus Lupus*), and designated bull trout critical

habitat. The consultation covers the time period October 1, 2006 to December 31, 2010.

The USFWS concurred with the NPS' finding that the proposed action "may affect, but is not likely to adversely affect" the wolf, lynx, or grizzly bear. Incidental take was authorized for the spotted owl, murrelet, bald eagle, and bull trout. The level of incidental take anticipated would not jeopardize the continued existence of any of the four species. The following reasonable and prudent measures were identified as necessary and appropriate to minimize the incidental take of the four species:

1. Monitor project implementation
2. Report monitoring results to the USFWS

Washington State Historic Preservation Office (SHPO) and affected Tribal Historic Preservation Office (THPO)
The environmental assessment was sent to the Washington State Historic Preservation Office (SHPO) and affected tribes for review and comment on May 18, 2005. No comments were received. Consultation with the Washington SHPO and any affected Tribal Historic Preservation Offices (THPO) for all planned fire-related undertakings will be conducted according to the National Historic Preservation Act as amended (NHPA; 16 USC 470 et seq.) and the regulations of the Advisory Council on Historic Preservation (ACHP) (36 CFR 800). For unplanned future wildfire events, the Cultural Resource Manager and/or Archeologist will, upon notification of the fire event, contact the SHPO and any affected THPO and initiate consultation if an identified historic/cultural resource is at risk from a wildfire or related activities.

United States Forest Service (USFS)
The Okanogan-Wenatchee National Forest, Mount Baker-Snoqualmie National Forest, and North Cascades National Park Service Complex wrote their respective fire management plans concurrently. Specific plans for fire management options in areas adjacent to the Complex that are managed by the USFS are contained in the Complex's Fire Management Plan.

Non-impairment of Park Resources and Values
The Environmental Assessment found that the selected alternative will have no major adverse impacts or effects to any resource or value whose conservation is 1) necessary to fulfill the specific purposes identified in the park's enabling legislation; 2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park; or 3) identified as a goal in the park's General Management Plan or other relevant planning documents. The impacts resulting from implementation of the selected alternative will not impair park resources or values and will not violate the Organic Act of 1916.

Determination
Based on the environmental impact analysis contained in the Environmental Assessment; the mitigation measures designed to avoid, reduce, or eliminate potential

impacts; and the results of public review and agency coordination, the National Park Service has determined that the selected alternative does not constitute a major federal action that would significantly affect the quality of the human environment. The selected alternative is not without precedent, nor is it similar to an action which normally requires an environmental impact statement. No connected actions with potential significant impacts were identified. Therefore, in accordance with the National Environmental Policy Act of 1969 and regulations of the Council on Environmental Quality, an Environmental Impact Statement will not be prepared.

RECOMMENDED

Superintendent, North Cascades National Park Service Complex
Date

APPROVED

Regional Director, Pacific West Region
Date

Insert 2009 Operating Plan:Master Cooperative Fire Agreement

M. Fire Protection Services 2007 Operating Plan; Master Cooperative Fire Agreement

SUPPLEMENTAL AGREEMENT
07-FI-11060500-055
to
Master Cooperative Fire Agreement
NFS 04-FI-11060000-297
between
STATE OF WASHINGTON DEPARTMENT OF NATURAL RESOURCES,
NORTHWEST REGION
OLYMPIC REGION
SOUTH PUGET REGION
PACIFIC CASCADE REGION
and
USDI NATIONAL PARK SERVICE,
MT. RAINIER NATIONAL PARK
NORTH CASCADES NATIONAL PARK SERVICE COMPLEX
OLYMPIC NATIONAL PARK
SAN JUAN ISLAND NATIONAL HISTORICAL PARK
and
USDI BUREAU OF INDIAN AFFAIRS,
OLYMPIC PENINSULA AGENCY
PUGET SOUND AGENCY
TAHOLAH AGENCY
and
USDI FISH AND WILDLIFE SERVICE,
PACIFIC REGION
and
USDI BUREAU OF LAND MANAGEMENT,
SPOKANE DISTRICT
and
USDA FOREST SERVICE,
MT. BAKER-SNOQUALMIE NATIONAL FOREST
OLYMPIC NATIONAL FOREST

FIRE PROTECTION SERVICES
OPERATING PLAN

A. PREAMBLE:

This operating plan is prepared pursuant to the Master Cooperative Fire Protection Agreement hereinafter called the "Master Agreement", signed and dated April 13, 2004

The parties of this operating plan are**:**
The State of Washington Department of Natural Resources, Northwest Region, hereinafter called "NWS", the Olympic Region, hereinafter called "OLS", the South Puget Region, hereinafter called "SPS", the Pacific Cascade Region, hereinafter called "PCS", or when the Regions are referred to jointly they will be called the "DNR".

The United States Department of Agriculture Forest Service, Mt. Baker-Snoqualmie National Forest, hereinafter called "MSF" and the Olympic National Forest, hereinafter called "OLF" or when referred to jointly they will be called the "USFS".

The United States Department of Interior, National Park Service, Mt. Rainier National Park, hereinafter called "MRP" and the North Cascades National Park Service Complex hereinafter called "NCP" and the Olympic National Park hereinafter called "OLP" and the San Juan Island National Historical Park hereinafter called "SJP" or when referred to jointly they will be called the "NPS".

The United States Department of Interior, Bureau of Indian Affairs, Olympic Peninsula Agency, hereinafter called "OPA," the Puget Sound Agency, hereinafter called "PSA" and the Taholah Agency or when referred to jointly they will be called the "BIA." The BIA will represent the individual Indian tribes, not having sovereign nation status.

The United States Department of Interior, Fish and Wildlife Service, hereinafter called "FWS", Includes San Juan Island NWR, Copalis NWR, Flattery Rocks NWR, Quillayute Needles NWR, Dungeness NWR, Protection Island NWR, Willapa NWR, Nisqually NWR, Julia Butler Hansen NWR, Ridgefield NWR, Steigerwald NWR, Franz Lake NWR, and Pierce NWR. See attached maps.

The United States Department of Interior, Bureau of Land Management, Spokane District, hereinafter called "SPD". Note that only SPD lands within San Juan County apply to this plan. See attached map.

When referred to jointly, the federal agencies as listed above will be called "federal agencies."

Unilateral amendments may be established between any of the signatory parties to this operating plan provided that such amendments do not affect any other signatory party. Copies of any amendments shall be furnished to the other signatory parties within 30 days of the last parties' signature.

This Operating Plan is updated and adds language that all agencies have agreed to.

This plan will be in effect beginning on the last date shown on the signature page and will remain in effect until five years from date of last signature and is subject to an annual review by all the parties. If any part of the operating plan is revised as a result of the annual review, a new text will be written and approved by the agency administrators. Any party to this plan may terminate their participation in this plan by providing a 30-day written notice to the other signatory parties between the months of October and March.

This operating plan supersedes and cancels all local fire related operating plans, agreements, and Memorandums of Understanding (MOU's) between the parties signed before October 14, 1998.

B. INTERAGENCY COOPERATION:

1. Mission Statement:

The purpose of this plan is to facilitate fire management services and to provide for the efficient and cost saving utilization of resources. The parties agree to coordinate, cooperate, and communicate with each other within the scope of this operating plan. The parties to the best of their ability will provide incident support as requested.

2. Interagency Resources:

The parties may discuss, coordinate, and participate in interagency staffing, funding, and utilization of resources (including overhead, engines, crews, and prevention patrols) and/or facilities. When deemed necessary, such activities will be subject to a project/financial plan.

3. Standards:

All aviation resources used on incidents under federal jurisdiction and/or protection, except those provided under Clause 28 "Independent Action", in the Master Agreement, need to comply with all federal agency specific standards for aircraft/pilot approvals and operating procedures. Aircraft used on federal land where others provide protection will
meet the standards of the jurisdictional agency i.e. AMD, Aviation Management Directorate or USFS carded aircraft.

C. PREPAREDNESS:

1. Protection Planning:

The local jurisdictions to this agreement may meet annually to share information regarding the kind and amount of resources.

2. Protection Area Boundaries:

a. Reciprocal Fire Response Boundaries:

NWS and MSF reciprocal response area:

The reciprocal fire response area is defined as the Northwest Region DNR fire protection boundaries within Whatcom, Skagit, Snohomish Counties and parts of King County, and all of the Mt. Baker, Darrington, Skykomish Ranger Districts of the Mt. Baker-Snoqualmie National Forest. This reciprocal area excludes Wilderness areas, Natural Area Preserves, and Natural Resource Conservation Areas. See attached map.

SPS and MSF reciprocal response area:

The reciprocal fire response area is defined as the South Puget Region DNR fire protection boundaries within the King and Rainier Districts and all of the Snoqualmie Ranger District of the Mt. Baker-Snoqualmie National Forest. This reciprocal area excludes Wilderness areas, Natural Area Preserves, and Natural Resource Conservation Areas. See attached map.

SPS and OLF reciprocal response area:

The reciprocal fire response area is defined as the South Puget Region DNR fire protection boundaries within Mason County and those portions of the Hood Canal Ranger District that is also within Mason County. This reciprocal area excludes Wilderness areas, Natural Area Preserves, and Natural Resource Conservation Areas. See attached map.

OLS and OLF reciprocal response area:

The reciprocal fire response area is defined as the Olympic Region DNR fire protection boundaries within Grays Harbor, Jefferson and Clallam Counties and those portions of the Hood Canal Ranger District also within Grays Harbor, Jefferson and Clallam Counties. This reciprocal area excludes Wilderness areas, Natural Area Preserves, and Natural Resource Conservation Areas. See attached map.

PCS and OLF reciprocal response area:

The reciprocal fire response area is defined as the PCS Region DNR fire protection boundaries within Grays Harbor County limited to those portions of the Hood Canal Ranger District within Grays Harbor County. This reciprocal area excludes Wilderness areas, Natural Area Preserves, and Natural Resource Conservation Areas.

b. Reimbursable Fire Response Boundaries:

Lands managed by the signatory parties not specifically described as reciprocal, fee basis, or offset will be considered reimbursable.

c. Fee Basis Services Boundaries:

OLS and OLF fee basis service area:

The fee basis service area is defined as the Pacific Ranger District that will be under the protection of Olympic Region DNR. See attached map.

d. Offset Services Boundaries:

BIA, DNR, Quinault and Makah Nations offset service area:

BIA, DNR and Quinault Nation offset boundaries are described in the Statewide Operating Plan. Western Washington BIA jurisdiction is protected by DNR for Trust Lands within Indian Reservations and Indian Public Domain Trust Lands with the exception of the 117,176 acre area on the Quinault Indian Reservation that is under protection of the Quinault Indian Nation.

3. Joint Projects and Project/Financial Plans:

The DNR, federal agencies, Quinault Nation may discuss, coordinate, and participate in planning and activities including but not limited to the following: Fire Prevention, Fire Investigation, Prescribed Fire and Fuels Management, Training, Fire Weather Systems including data collection and station maintenance, and Communication Systems. When deemed necessary, such activities shall be subject to a project/financial plan.

4. Public Use Restrictions:

The affected agencies agree to discuss and coordinate proposed restrictions by the respective agencies prior to any restrictions being placed in effect. When feasible, restrictions will be advertised in a joint press release that is easily understood by the visiting public.

5. Industrial Fire Precaution Levels (IFPL's), Energy Release Component (ERC):

The affected agencies agree to jointly determine IFPL zone boundaries. The observed calculated weighted average for each IFPL zone will be used to determine the IFPL each day. If an agency wants to deviate from the observed calculated weighted average they will contact the appropriate fire management official of the affected agency and jointly determine the IFPL.

For IFPL zone 658: The primary contacts will be the NWS fire staff or standby and the MSF North Zone FMO.

For IFPL zone 659N: The primary contacts will be SPS fire staff or standby and the MSF South Zone FMO.

For IFPL zone 652SE: The primary contacts will be SPS fire staff or standby and the OLF FMO.

For IFPL zones 649N, 650, 651N, 652NW, 652NE, 652SW, and 653S within OLS and OLF will be coordinated by Olympic Region Dispatch Center with local agency fire staff.

During fire season, dispatch offices shall announce the Energy Release Component (ERC) each morning and afternoon while broadcasting the fire weather forecasts for each pocket card published in their area.

6. Prescribed Fire, Fuels Management, and Use of Fire:

All parties to this plan agree to notify each other of fire activities that are believed to be of mutual interest.

7. Aerial Detection Flights:

When any agency anticipates the need to fly an aerial detection mission, the dispatch office will contact adjacent dispatch offices of the other agencies. By mutual agreement, detection routes and/or aerial detection services may be coordinated to provide maximum coverage and reduce costs to the participating agencies.

D. OPERATIONS:

1. Dispatch Procedures, Notification Procedures, Aviation, Heavy Equipment and Information Sharing:

a. General:

Any agency receiving an initial fire report will promptly determine and notify the appropriate jurisdictional agency.

The **Initial Response** (IA) dispatch office shall inform all responding resources of the name of the assigned **Incident Commander** (IC) and all other pertinent information concerning the incident. All changes in incident command leadership shall be documented by the dispatching agency and announced to assigned and incoming resources during initial and extended attack incidents. This information should also be relayed to appropriate fire management staff.

During fire season, on request, all parties to this plan agree to provide each other with information about available resources and current incident status.

For all fires, use of heavy equipment will be approved by the jurisdictional agency. On federal lands a resource advisor may be required to be on site.

For all fires, use of aircraft will be approved by the jurisdictional agency. Any independent action with aircraft will be coordinated with the jurisdictional agency.

For all NPS, FWS, and USFS fires, orders for shared resources such as heavy and medium helicopters, lead planes, air tankers, smoke jumpers, rappellers, and type 1 crews will be placed with PSICC.

In Wilderness Areas, Natural Area Preserves, Natural Resource Conservation Areas, and known Native American Cultural Resource sites, permission of the jurisdictional agency administrator is required prior to utilizing any mechanized equipment or transportation.

In the event of an escape joint or boundary line fire, the affected parties will jointly prepare a supplemental agreement that will identify the responsibilities and expectations of each agency. The supplemental fire suppression agreement template in the master agreement may be used as a guideline.

The federal agencies agree to jointly prepare a Wildland Fire Decision Support System (WFDSS) on joint or boundary line fires that escape Initial Response.

On any fire where USFS personnel are utilized the OSHA 30 mile hazard abatement plan requirements will be followed by and for USFS employees.

All resources assigned to fires on USFS jurisdiction will follow OSHA 30 mile

hazard abatement plan requirements.

For DNR fires, utilizing any USFS resources including USFS units not party to this operating plan, DNR dispatch will request the appropriate "fire forest" P Number or management code from PSICC.

b. Reimbursable Areas:

In reimbursable areas, dispatching will be the responsibility of the jurisdictional agency.

In reimbursable areas, fires where there is no pre-planned dispatch card, the first agency on the scene, if other than the jurisdictional agency, will monitor the incident and may initiate suppression action using light-hand on the land tactics until the jurisdictional agency approves further action.

c. Reciprocal and Fee Basis Service Areas:

In DNR/USFS reciprocal and the OLS/OLF fee basis areas, the DNR will be the primary dispatcher for initial response.

In USFS/DNR reciprocal and OLS/OLF fee basis service areas, initial response dispatch will utilize pre-planned dispatch cards. The closest forces, regardless of agency, will be dispatched to the incident. The staffing level will be used to determine the appropriate level of response. The default staffing level will be the observed value for the appropriate IFPL zone. Pre-planned dispatch cards will be determined and agreed to by the parties.

In DNR/USFS reciprocal and OLS/OLF fee basis service areas, dispatch's primary frequency for communications with initial response resources will be announced when communicating with those resources.

In USFS/DNR reciprocal and OLS/OLF fee basis service areas, during fire season, USFS overhead, engines and Initial Response crews will, if available, inform the DNR dispatcher of their location and status by 1000 hours each morning. Significant changes in location or status will be reported throughout the day. Prevention units report their status daily.

In USFS/DNR reciprocal and OLS/OLF fee basis service areas, fires occurring during normal working hours either agency receiving an initial fire report will promptly notify DNR dispatch. For fires on USFS land, DNR dispatch will promptly notify the USFS

FMO. If DNR has difficulty contacting the USFS FMO then DNR will promptly contact Puget Sound Interagency Coordination Center (PSICC).

In USFS/DNR reciprocal and OLS/OLF fee basis service areas, fires occurring after normal working hours, either agency receiving an initial fire report may dispatch their own resources to the incident utilizing the pre-planned dispatch card(s).

In USFS/DNR reciprocal areas only, if DNR dispatch is unable to perform initial response dispatching services on USFS land, DNR dispatch will promptly notify the appropriate USFS FMO or duty officer. In the event that the USFS FMO or duty officer, decides to initiate suppression action, the USFS FMO or duty officer, will promptly notify DNR dispatch of this decision.

Specific Operations for the OLS and OLF Fee Basis Services Area:

Fee basis service shall mean suppression and support of fires, including Initial Response dispatch and suppression, reinforcements, mop up forces, initial fire investigation services, and responses to false alarms and non-statistical fires.

OLF shall provide OLS with fee basis area maps, suppression guidelines for sensitive areas including wildlife and fish habitat, research natural areas, and wilderness areas.

OLF shall provide OLS with a resource advisor/fire liaison at the site as soon as possible.

OLF shall assume command and control of fires not likely to be controlled within 24 hours unless mutually agreed to by both parties.

OLS shall utilize readily available OLF resources, personnel, and equipment located in or near the fee basis service area.

OLS shall conduct the initial fire investigation.

OLS shall provide a fire report within 10 days for fires controlled within 24 hours.

OLS shall mop-up and patrol fires beyond 24 hours for fires that are generally controlled within 24 hours unless mutually agreed to by both parties.

Specific Operations for the DNR and BIA Offset Services Area:

The DNR, BIA and Quinault Nation offset service area will be addressed in the Statewide Operating Plan. Local operations, procedures and that portion of the Quinault Nation not within the offset area may be included as an amendment to this operations plan as provided in section A.

2. Documentation Procedures:

a. All resources, including Initial Response, responding to incidents will be documented on a Resource Order form (ICS 259). When a pre-planned dispatch card is used, the card name and the staffing level used for the initial response will be noted on the resource order form. The use of this form will be consistent with direction in the NW mobilization guide and national standards.

b. Only the jurisdictional agency will assign Incident/Project Order Numbers (block #3). PSICC has been delegated the authority to assign Incident Project Order Numbers for all the federal agencies except for SPD.

c. Only the jurisdictional agency will assign Request Numbers (block #12). The DNR will assign Request Numbers for USFS fires that they dispatch for in the USFS/DNR reciprocal and OLS/OLF fee basis service areas. PSICC has been delegated the authority to assign Request Numbers for the federal agencies except for SPD. In the OLS/OLF fee basis service area, OLS may assign Request Numbers when it is mutually agreed that OLS will manage the entire incident through its conclusion**.**

d. In all areas except the OLS/OLF fee basis service area, the jurisdictional agency is responsible for completing their own fire reports. An agency responding to a fire, not under their jurisdiction, will collect and provide any available information to aid the reporting agency.

3. Command and Control:

a. In all areas except the OLS/OLF fee basis service area, the jurisdictional agency will as soon as practical, assume total command and control of any incident under their jurisdiction unless otherwise agreed to by agency management.

b. In the USFS/DNR reciprocal and OLS/OLF fee basis service areas, dispatching responsibilities for USFS fires that exceed Initial Response will generally be transferred from the DNR to the appropriate Forest**.** In the OLS/OLF fee basis service area, the OLS may continue dispatching when it is mutually agreed that OLS will manage the entire incident through its conclusion. On request, the DNR will furnish copies of Initial Response Resource Orders and other appropriate Initial Response documentation to the USFS or PSICC.

c. In all areas, except the OLS/OLF fee basis service areas, the jurisdictional agency will be responsible for patrolling and mop up of fires on lands under their jurisdiction unless further assistance is requested.

4. Fire Investigation:

a. The Initial Response resources of any agency taking the first action on an incident will protect the origin and gather preliminary information about the incident.

b. In all areas except the OLS/OLF fee basis service area, the jurisdictional agency will be responsible for providing or requesting a fire investigator when needed.

c. On incidents with joint jurisdiction, a joint investigation will be conducted, unless otherwise agreed. One investigation will be conducted to satisfy both agencies' administrative needs.

5. Land Management Considerations:

On any fire in Wilderness Areas, Natural Area Preserves, Natural Resource Conservation Areas, known Native American Cultural Resource sites, and any designated cultural site, or any non-wilderness federal agency fire that is expected to exceed 1 acre in size requires a jurisdictional agency resource advisor to be requested by the IC.

6. Delegation of Authority:

An Incident Commander will be designated, documented and announced for all incidents.

A delegation of authority will be implemented for all Type 1, Type 2 incidents, and Type 3 incidents where the IC is not from the jurisdictional agency.

7. Fire Weather Stations and Plan:

See web site

8. Communications:

All units assigned to an incident **MUST** have a common means of communications.

Radio frequencies will be provided in local mobilization guides and frequency guides.

The parties authorize the use of their radio frequencies by the other parties to this operations plan for incidents of mutual concern or response. Net control will be maintained by the agency to which the frequency is assigned.

Radio frequencies may only be utilized within their designated area. Frequency use shall not exceed the authorization of the agency to which the frequency is assigned.

The parties may, by mutual agreement, allow another party to temporarily install radio equipment on lands under their jurisdiction or authorize temporary use of their radio frequencies or equipment to another party for use on an incident(s).

Aviation operations that require agency flight following will be coordinated by the scheduling party. Flights that plan to cross agency boundaries that may require assistance with communications will be discussed with the affected parties prior to the flight.

9. Media Coordination:

On subjects of mutual concern, joint news releases will be issued.

News releases about a specific wildland fire or prescribed fire will be the responsibility of the jurisdictional agency and will not be made by any supporting agency without prior permission. When the supporting agency is in a managing role they will be provided an opportunity to review news releases prior to their being made public.

An ICS-209, if approved by the jurisdictional agency, will be considered public information and may be provided to the media by any agency.

E. REIMBURSEMENT:

1. Fire Suppression Billings:

There will be no claim for reimbursement of reciprocal Initial Response resources, up to two engines and one qualified Incident Commander (IC) within reciprocal areas for the first operational period, up to 24 hours. However, if the suppression action transitions to extended attack, the claim for reimbursements may include reciprocal Initial Response resources retroactive from the start of the incident.

Responsible agencies that have a negligent start or trespass fire, and will be seeking cost recovery for suppression and investigation actions, may request the reciprocal assisting agency to bill them for all resources assigned to the incident from the initial dispatch

A supporting agency may be reimbursed for the use of facilities (such as a fire camp) and/or support functions. Terms, conditions, and payment for use will be documented on a project/financial plan.

Costs for City or County Fire District resources dispatched to local fires by the DNR or federal agencies will be assumed by the jurisdictional agency, per the Master Cooperative Fire Agreement. If an agency has a supplemental agreement with a city or county fire district, those guidelines will be followed.

Costs for Helicopters, Air Tankers, Lead Planes, and retardant will be assumed by the jurisdictional agency.

Generally, the BIA will process payment for Indian Wildland fire resources. Other agencies may directly pay for these resources when approved by the BIA. Personnel AD rates will be consistent with the Interagency Fire Business Management Handbook. The BIA may establish equipment rates for BIA supplied resources.

2. Fee Basis Services Billing:

The OLF will pay OLS by May 1st each year, a fee equal to 2.3 months of 1 GS-4 temporary employee at cost to government. In addition, OLS resources will be considered and billed as reimbursable when responding to an OLF incident in the fee basis service area.

3. Billing Content:

Each claim or bill for reimbursement of fire suppression resources will include the following as a minimum:

Name of Incident, Date of Incident, Incident Project Number, Incident generated cost report (such as ICARS) or a standard agency cost report, and list of resources and request numbers.

The federal agencies and DNR regions agree to consolidate billings twice a year. Billings will not be combined or consolidated between DNR regions and billings will not be offset between DNR and the federal agencies.

For all services rendered between December 1 and May 31, billings will be submitted by June 30.

For all services rendered between June 1 and November 30, billings will be submitted by December 31.

Exceptions to consolidated billings may be made for large fires, third party cost recovery fires, or similar situations.

Exceptions to billing periods or deadlines may be made upon mutual agreement between the affected parties.

Estimated costs for OLS/OLF fee based service area will be submitted by OLS to OLF by September 15th each year.

DNR claims for reimbursement from the BIA and BIA claims for reimbursement from the DNR will be mailed to:

DNR Olympia Headquarters Resource Protection Division- P.O. Box 47037 - MS: 47037 Olympia, WA. 98504

DNR claims for reimbursement from federal agencies will be mailed to the appropriate federal agency office attention to the Fire Management Office.

Mt. Baker-Snoqualmie National Forest- 21905 64th Avenue West Mountlake Terrace, WA. 98043

Olympic National Forest-1835 Black Lake Blvd. SW, Suite A, Olympia, WA, 98512

USDI, Washington Maritime National Wildlife Refuge Complex - 33 South Barr Road, Port Angeles, WA. 98362

USDI, Mt. Rainier National Park – 55210 238th Ave. East, Ashford, WA. 98304

USDI, North Cascades National Park - 7280 Ranger Station Road, Marblemount, WA. 98267

USDI, Olympic National Park - 600 East Park Avenue, Port Angeles, WA. 98362

USDI, San Juan Island National Historical Park - P.O. Box 429, Friday Harbor, WA. 98250

USDI, Spokane District, BLM 1103 North Fancher Road Spokane, WA. 99212

Quinault Indian Nation, P.O. Box 189, Taholah WA 98587

Federal agency (except BIA) claims for reimbursement from the DNR will be mailed to the appropriate DNR Regional office attention to the Fire Management Office.

Northwest Region DNR- 919 North Township Street Sedro-Woolley WA. 98284

Olympic Region DNR- 411 Tillicum Lane Forks, WA. 98331

South Puget Sound Region DNR- P.O. Box 68 Enumclaw, WA. 98022

Pacific Cascade Region DNR- P.O. Box 280 Castle Rock, WA 98611

For Billing questions contact the following positions:

OLF/ MBF – Fire and Aviation Staff

OLP/MRP/NCP/ Quinault Nation – Fire Management Officer

San Juan NHP – OLP Fire Management Officer

FWS – Zone Fire Management Officer

WA DNR – Dispatch Supervisor

BIA – Region Fire Management Officer

BLM – District Fire Management Officer

4. Non-Fire Suppression Billing:

Procedures for claims and/or reimbursement for non-fire suppression activities will be documented in a Project/Financial Plan.

ATTACHMENT LIST

1. Maps
   a. NWS and MSF Reciprocal Area Map

   b. SPS, MSF and OLF Reciprocal Area maps

   c. OLS and OLF Reciprocal Area and Fee Basis Services Area Map

   c.1. OLS Natural Areas

   d. SPD San Juan County BLM Administered Lands

   e. Wildlife Refuge Maps

   f. Quinault Indian Nation Area Map

F. SIGNATURES:

WILLIAM J. WALLACE, Regional Mgr. Date
Northwest Region
WA, Dept. of Natural Resources

JOHN VIADA, Regional Manager Date
Olympic Region
WA, Dept. of Natural Resources

RANDY ACKER, Regional Manager Date
South Puget Region
WA, Dept. of Natural Resources

MARK KAHLEY, Division Manager Date
Resource Protection
WA, Dept. of Natural Resources

RAY MALDONADO, Superintendent Date
Olympic Peninsula Agency,
USDI, Bureau of Indian Affairs

JUDY JOSEPH, Superintendent Date
Puget Sound Agency,
USDI, Bureau of Indian Affairs

DAVE UBERUAGA, Superintendent Date
Mount Rainier National Park,
Complex,
USDI, National Park Service

Chip Jenkins, Superintendent Date
North Cascades National Park Service
USDI, National Park Service

WILLIAM LAITNER, Superintendent Date
Olympic National Park,
USDI, National Park Service

PETER DEDERICH, Superintendent Date
San Juan Island National Historical Park,
USDI, National Park Service

RORY WESTBERG, Superintendent Date
Columbia-Cascades Support Office,
USDI, National Park Service

DALE HOM, Supervisor Date
Olympic National Forest,
USDA, National Forest Service

Y. ROBERT IWAMOTO, Supervisor Date
Mt. Baker-Snoqualmie National Forest
USDA, National Forest Service

PAM ENSLEY, Regional FMC Date
Pacific Region
USDI, Fish and Wildlife Service

JOSEPH BUESING, District Manager Date
Spokane District
USDI, Bureau of Land Management

ERIC SCHROFF, Region Manager Date
Pacific Cascade Region
WA. Dept. of Natural Resources

N. Memorandum of NOCA Fire Management Officer Delegation of Authority Insert 2009 DOA Letter

United States Department of the Interior

NATIONAL PARK SERVICE
North Cascades National Park
Lake Chelan National Recreation Area
Ross Lake National Recreation Area
810 State Route 20
Sedro-Woolley, Washington 98284-1239

IN REPLY REFER TO:

Y14

May 15, 2007

Memorandum

To: All Staff, North Cascades National Park Service Complex

From: Superintendent, North Cascades National Park Service Complex

Subject: Fire Management Officer Responsibilities and Delegation of Authority

Responsibility for Unplanned Ignitions

The Fire Management Officer or his acting has the responsibility to assess all reports of wildland fire within the district and determine, initiate, and oversee the appropriate management response. The Fire Management Officer is responsible for assuring that all actions provide for wildland firefighter and public safety and address values to be protected, commensurate with the Park's Fire Management Plan. This responsibility will be delegated to the Park's Wildland Fire Duty Officer in the absence of the Fire Management Officer.

Fire Program Primary Authorities and Responsibilities

The Fire Management Officer is delegated the authority to act on my behalf for the following duties and actions:

(1) Determine the Appropriate Management Response to a wildland fire commensurate with the Park's Wildland Fire Management Plan, initiates Decision Criteria Checklist of the Wildland Fire Implementation Plan and forms an interdisciplinary WFDSS team as needed.
(2) Determine the appropriate level of response to a wildland fire based on the Park's Wildland Fire Management Plan.

(3) Authorize and expend overtime, hazard pay and other premium pay as appropriate.
(4) Request and oversee distribution of severity funding.
(5) Ensure all incidents are managed in a safe and cost-effective manner.
(6) Coordinate all fire funding accounts with Park and Region budget officers to assure Park and Region guidelines are adhered to and targets are met.
(7) Authorized to hire Emergency Firefighters in accordance with the DOI Pay Plan for Emergency Workers (AD).
(8) Ensure that only fully qualified personnel are used in wildland fire operations.
(9) Coordinates all prescribed fire activities in the Park and suspend prescribed fire operations when conditions warrant.
(10) Represent the Superintendent when required at incident management team briefings, debriefings and as needed during interagency coordination meetings.
(11) Approve through signature all wildland firefighter qualification (red) cards for the North Cascades National Park Service Complex.

The authorities and responsibilities as described shall be required of the Park's Fire Management Officer or his acting as of the signature date below.

_____
_____
Superintendent Date
North Cascades National Park Service Complex

O. Tolo Fire Joint Delegation of Authority

TOLO FIRE
JOINT DELEGATION OF AUTHORITY

North Cascades National Park Service Complex
Okanogan and Wenatchee National Forests

Effective **July 21, 2007 at 1300**, Barbara Bonefeld, Type 2 Incident Commander is assigned to manage the Tolo wildfire incident. You have full authority and responsibility for managing the fire suppression activities within the framework of law, Forest Service, and National Park Service policies.

You and your team are responsible for suppression of the Tolo Incident within the in the North Cascades National Park Service Complex and adjacent Okanogan-Wenatchee National Forest. We are particularly concerned about public and firefighter safety and cost. You are to organize and direct your assigned resources towards the safe and cost effective management of your assigned incidents.

Specific direction for this incident, covering management and environmental concerns, are as follows:

1. Firefighter, public, and aviation safety is your primary responsibility. The terrain and the fuel conditions are extremely hazardous, requiring utmost attention to firefighter safety and public safety. The incidents are in very remote portions of Wildernesses, making evacuation of firefighters and Stehekin community members difficult. Visitor safety is a concern. To help mitigate this concern, maintain trail and area closures to keep the general public out of the area and consider additional closures as necessary. Any trail closures can be facilitated through the Agency Administrator's Representative as you see a need. Any closure orders recommended by you must be approved and signed by the Forest Supervisor or Acting Forest Supervisor and the Park Superintendent or delegate to have legal standing.

- No resource or facility is worth the loss of human life, however, we recognize that the wildland fire environment is complex and possesses inherent hazards that can, even with reasonable mitigation, result in harm to firefighters engaged in fire operations. In recognition of this, we expect you, as Incident Commander, to aggressively manage risk.

- We expect you to convey clear and concise intent to all assigned personnel, while ensuring that all assignments are managed safely, effectively, and efficiently. Your Team is responsible to convey these requirements throughout the incident organization, to monitor

compliance, and ensure adherence to these safety standards. We expect you to be personally committed to and involved in communicating this expectation and monitoring compliance in your organization.

- We expect you to carefully and closely manage fatigue and use your judgment to ensure that the safety of assigned personnel is not compromised due to fatigue.

2. The Agency Administrator's representative is Bob Sheehan for the Forest Service and Tod Johnson for the National Park Service. They have full authority to act in their role as Agency Administrator representatives.

3. The most appropriate management response shall be used upon consultation and agreement by me or my representative. The Wenatchee National Forest Land and Resource Management Plan provides specific direction for your activities on national forest land. For the Forest Service, Mallory Lenz and Ken Duhl (both in Chelan) are Resource Advisors assigned to assist you.Vicki Gempko (Stehekin)is the Park Service Resource Advisor.

4. Maintain contact with appropriate agencies, elected officials, business leaders and members of the public. Specifically, we expect news releases to be coordinated with the Chelan District Ranger and Charles Beall in Sedro Woolley @ charles_beall@nps.gov. Kerry Olson kerry_olson@nps.gov is the Park's FIO located in Stehekin. Developing a strong relationship with the Stehekin community should be a high priority for the Incident Command Team

5. Coordinate and consult with Kriste Solbrack, Okanogan-Wenatchee Forest Safety and Health Manager. See Appendix A for a description of expected roles and interactions.

6. Maintain contact with appropriate agencies, elected officials, business leaders and members of the public. Specifically, I expect you to contact the Chelan County Commissioners, Holden Village, the Stehekin community and Chelan County Fire District #10 Fire Chief **Bob Nielson**. Information news releases are to be coordinated with Kerry Olson and Charles Beall and the Chelan District Ranger.

7. A Wildland Fire Situation Analysis (WFSA) has been developed for the Tolo Incident. Alternative B has been selected which emphasizes firefighter and public safety, community protection, and cost effectiveness, with considerable emphasis on natural resource values. The specific objectives are outlined in that document. To implement the selected alternative, you are authorized to spend up to 3.9 million as a suppression cost objective.

8. When consultations between members of your IMT and Park and Forest Staff indicate that weather conditions, fuels, and topography may allow more direct attack options to reduce burned acres and successfully achieve perimeter control, we encourage your IMT to pursue these opportunities where they can be achieved safely. Whenever possible, conduct burnout operations to achieve burn characteristics consistent with the fire regime and condition class associated with the historic fire return interval.

9. You are operating primarily within the Stephen Mather and Glacier Peak Wildernesses. Use Minimum Impact Tactics (MIT) whenever possible. For example, conduct burnout operations to achieve burn characteristics consistent with the fire regime and condition class associated with the historic fire return interval. The use of chainsaws, water pumps and helicopter landings at existing helispots are authorized within the Glacier Peak and the Stephen Mather Wildernesses. You have permission to temporarily install radio repeaters in either Wilderness. Use of any specialized equipment must be approved by the District Ranger, except dozer use which must be approved by the Regional Forester and the Park Superintendent.

10. Aviation safety is a high priority. Risk Assessments (weighing the risk against the benefit of the mission and deciding whether the risks are acceptable) will be completed on all aviation missions in support of this suppression effort. You are to comply with Federal Aviation Policies. Steve Baumann, Forest Aviation Officer will have primary responsibility for setting aviation priorities across the Forests, in addition to serving as liaison and Kelly Bush will be your contact for aviation issues in the Park. Follow WADNR aviation policy during activities on State protection or when State protection is threatened (see Appendix E).

11. The Incident will function as a Harassment-Free Environment in accordance with National Park, and Forest Service policy. Reports of harassment in any form will be dealt with in an immediate and appropriate manner. Manage the human resources assigned to the fire in a manner that promotes a positive and harassment free work environment and creates a “no tolerance” atmosphere for harassment, alcohol, or illegal drug use. All personnel assigned shall be treated with dignity and respect.

12. The most appropriate management response shall be used upon consultation and agreement by us. The Okanogan Forest Land and Resource Management Plan and the North Cascades National Park fire management plan provide specific direction for your activities.

13. Utilize the appropriate Cooperative Law Enforcement Agreement for the National Park. Law enforcement needs should also be coordinated with commissioned officers of the National Park Service (NPS). Kinsey Shilling is your NPS contact in Sedro Woolley . Establish contact and coordinate with

the local Emergency Services within the Chelan County Sheriff's Office. Maintaining positive relationships with the Chelan County Sheriff's Office and all other involved law enforcement agencies is a necessity.

14. Cost containment is a high priority. Annelise Lesmeister is available to assist you with Park specific agreements with local vendors. Maureen Hanson, Administrative Officer, is available to coordinate Incident Business activities for this incident for the Forest. Bob Crowe is the DNR Incident Business Advisor. The Agencies require the use of the Incident Cost Accounting Reporting System (ICARS) to track incident costs. We encourage you to document cost efficiency measures you consider and implement during the course of this incident. Business practices will comply with Pacific Northwest Incident Business Management Guidelines.

15. Coordinate ordering resources through Expanded Dispatch at Puget Sound Interagency Communication Center (PSICC) in Everett, Washington at 425 744 3550.

16. Initial attack on all new fires will be the responsibility of the local unit. You may be asked to support local unit initial attack efforts with air and ground resources.

17. Compliance with direction provided in Interim Directive Numbers 5100-2003-1, 5120-2003-2 and 5130-2003-3, issued by the Chief of the Forest Service and effective 4/24/2003 through 10/24/2004, as they relate to the Thirtymile Accident Prevention Plan of December 14, 2001 and the Thirtymile Hazard Abatement Plan of March 26, 2002 is required. This direction is summarized in the National Thirtymile Hazard Abatement Monitoring Plan (4/24/03) and Thirtymile Hazard Abatement – Monitoring Checklist (4/24/03), which is provided as Appendix D.

To ensure compliance with direction, your IMT is expected to complete the applicable Monitoring Checklist items on a daily basis and include completed Checklists in the Documentation package. (Checklist also available at: www.fs.fed.us/fire/safety/investigations/30mile/index.html

18. WADNR-protected lands may become involved. Specific suppression directions would apply and can be found in Appendix F.

19. A standard final Incident Documentation package will be provided to each agency prior to the team's release. The Documentation packages will be complete and follow the established National Incident Business Management Interagency format.

Thank you in advance for your assistance and we wish you a safe and successful assignment.

_____
_____

Jim Boynton
Date/Time
Forest Supervisor
Okanogan and Wenatchee Nat'l. Forests

_____
_____

Chip Jenkins
Date/Time
Park Superintendent
North Cascades Nat'l. Park Service Complex

_____
_____ **Date/Time**

Barbara Bonefeld Type 2 Incident Commander
Date/Time

Appendix A

Forest Safety and Health Manager and Incident Safety Coordination

The Forest Safety Manager represents the Agency Administrator by providing occupational safety and health oversight on Type I, II and III incidents.

The following is intended to assist with the coordination efforts between the Forest Safety and Health Manager and the Team Safety Officer(s).

a) Forest Safety and Health Manager will communicate safety concerns specific to the location of the incident, safety related contacts, Forest expectations and policies, and discuss communication schedules with the Team Safety Officer.

b) Team Safety Officer will notify the Forest Safety and Health Manager immediately of any incident/accident that results in hospitalization or death of a firefighter.

c) Team Safety Officer will alert the Forest Safety and Health Manager of trends, unresolved safety concerns and/or significant events.

d) Team Safety Officer will provide information and/or reports relative to accidents/incidents to the Forest Safety and Health Manager, as requested.

e) The Forest Safety and Health Manager will be available to the IMT, when requested, to assist with safety and health consultation and inspections.

Appendix B

United States Department of Agriculture | **Forest Service** | **Pacific Northwest Region**

333 SW First Avenue (97204)
PO Box 3623
Portland, OR 97208-3623
503-808-2468

File Code: 1910/2080/5100/2520-3 **Date:** July 26, 2006
Route To:

Subject: Integrating Invasive Species Considerations into Fuels and Fire Management Activities and Burned Area Emergency Response (BAER) in R6

To: Forest Supervisors, CRGNSA Manager, Director, Resource Planning and Monitoring, Director, Natural Resources, Director, Fire and Aviation Management

On October 11, 2005, I signed a Record of Decision (ROD) for programmatic *Invasive Plant Program - Preventing and Managing Invasive Plants within the Pacific Northwest Region*. The ROD amends Forest Land and Resource Management Plans with standards for preventing the introduction, establishment, and spread of invasive plants and standards for invasive plant treatment and site restoration. This new direction for invasive plant management is incorporated into Forest Plans effective on March 1, 2006.

Hazardous fuels reduction, wildfire suppression, and burned area emergency response (BAER) are three activities where the ROD standards apply. Specifically fire and fuels management plans, wildland fire situation analyses, wildland fire incident management plans and BAER implementation plans are required to address invasive weed prevention standards. In addition, the *National Strategy and Implementation Plan for Invasive Species Management* (USFS, 2004) calls for comprehensive management of impacts and threats from invasive species as a whole.

To assist in compliance with the programmatic ROD and Forest Plans, Forests are expected to include the enclosed ***R6 Invasive Species Watch-Out Checklist for Fuels Management Activities, Wildfire Suppression and BAER*** as standard forest procedure and include in the Delegation Letter to Incident Management Teams brought on Forest. This checklist highlights the key areas where invasive species should be integrated into fire related activities.

Thank you for your support in preventing the spread of invasive species on National Forests. Questions may be addressed to Nancy Phelps at 503.808.2914 (nphelps@fs.fed.us), Steve Howes at 503.808.2937 (showes@fs.fed.us) or Dave Bridgwater at 503.808.2666 (dbridgwater@fs.fed.us).

/s/ Charlie Krebs (for)
LINDA GOODMAN

Regional Forester

Enclosure

cc: Nancy Phelps, David Bridgwater, Steve Howes, Ken Snell

R6 Invasive Species Watch-Out Checklist for Fuels Management Activities, Wildfire Suppression and BAER

☐ 1. Has the lead agency provided the Incident Management Team (IMT) with maps and management information on noxious weed populations and aquatic nuisance species (ANS; e.g. whirling disease, New Zealand mud snail, Eurasian watermilfoil, sudden oak death, Port Orford cedar root rot) locations? Have vehicle wash sites been identified and mapped? Are management emphasis areas for the IMT designated, including staging areas, dip sites or the potential burn area? (This should be done immediately upon arrival)

☐ 2. Are fire camps, spike camps, helipads and vehicle staging areas located on areas free of noxious weeds?

☐ 3. Are vehicle undercarriages examined at appropriate times (arrival to, and/or departure from, a weed infested site) by a knowledgeable inspector for weed contamination? Are identified vehicles pressure washed thoroughly? Unwashed equipment and vehicle undercarriages are potentially transporting noxious weed seeds and/or disease spores.

☐ 4. Where weeds are identified, the Natural Resource Advisor should be consulted to ensure weed and ANS prevention practices are followed e.g. hand pulling, mowing helipads, and flagging off weed infestations. Were proper weed disposal techniques used?

☐ 5. Are vehicle wash stations self-contained (weed seeds and spores stay on-site) and/or located on hardened sites that will not readily become infested later?

☐ 6. Is the vehicle wash station(s) schedule coordinated with the daily equipment deployment schedules, reducing chance of equipment bottlenecks?

☐ 7. Are daily briefings of fire line personnel and equipment operators being conducted to ensure staff are knowledgeable of the priority weeds and their locations? Do staff members clearly understand their role in preventing infestations of invasive species?

☐ 8. Are ANS prevention protocols being supported (e.g. washing and drying water buckets with chlorine solution, cleaning equipment before contaminating other water sources and water bodies that contain ANS species)? Are the necessary precautions being taken to avoid mixing contaminated water or depositing with other water source(s)?

☐ 9. Certified weed free materials should be used for revegetation activities (i.e. hay, straw, mulch, soil, and seed). Are proper testing procedures for seed purchases being followed?

Appendix C

EMERGENCY HAZARDOUS MATERIALS SPILL PLAN

Updated June, 2003

Hazardous materials management and hazardous waste generated by a fire or emergency incident is the responsibility of the Incident Commander and will be included as a performance element for the Incident Team. The IC will ensure that all hazardous materials are properly stored, labeled, handled, and used. Upon release from the incident, all hazardous waste, properly stored and labeled, will be released to the Forest for disposal. The Forest Hazardous Waste Coordinator has established procedures for disposing of the waste. Cost for the hazardous waste disposal will be charged to the incident. Hazardous Waste Manifests generated during the incident are to be submitted to the Forest Hazardous Waste Coordinator at the close of the incident.

A hazardous WASTE is a hazardous material, which cannot be used for the intended purpose:

- The material is excess and requires disposal.
- The material has been contaminated with another hazardous substance.

To avoid creating a hazardous WASTE: Reduce, Reuse, and Recycle

- Purchase only the amount required for the situation.
- Keep all materials in appropriate, properly labeled containers.
- Handle material in a manner to prevent leaks and spills.
- Do not mix hazardous materials.

Gas, oil, or diesel fuel is not a hazardous waste IF KEPT SEPARATELY. EXAMPLE: if an oil/gas mixture is needed for chainsaw fuel, mix only in small amounts; use approved containers; date and label container appropriately; keep lids tightly closed to prevent explosion.

Proper disposal of hazardous waste not only protects human health and the environment, IT'S THE LAW. Personnel are legally responsible for proper storage, handling, use, and disposal of hazardous materials in accordance with State regulations. Hazardous waste handling and disposal is regulated in Washington through the Department of Ecology in accordance with the Dangerous Waste Regulations (Chapter 173-303 WAC) and in Oregon through the Department of Environmental Quality in accordance with the Hazardous Waste Regulations (OAR 340-101).

When disposal of hazardous waste is required, the generator of the waste is responsible for the following:

Identifying the waste as Extremely Hazardous Waste (EHW) or Dangerous Waste (DW) as listed in the regulations.
Obtaining an EPA/State Identification Number for the site. Most sites on the Okanogan-Wenatchee NF have an EPA number.

Storing the waste safely, in proper containers, and labeling containers in accordance with EPA/STATE regulations.

Arranging for proper transportation and disposal.

Completing the Uniform Hazardous Waste Manifest.

Keeping complete records of hazardous waste activities.

"Housekeeping" size spills are minor incidents which occur when conducting normal work activities. The release does not expose persons or the environment outside the immediate work area and is not an immediate or substantial threat to human health or the environment.

Clean-up of "housekeeping" size spills is conducted by the employee(s) responsible for the spill. Supervisors and managers must provide employees with the following:

- Appropriate PPE to protect employees from exposure during cleanup.
- Cleanup materials and tools.
- Training including use of equipment and tools, and procedures for cleaning up the hazardous material they will be working with.

Forest herbicide spray operations, for example, include spill kits to handle minor incidents as described and approved in the Herbicide EIS.

Emergency Hazardous Material spills are the release of a quantity of a hazardous substance beyond the capability of employees to cleanup. The release poses an immediate or substantial threat to human health or the environment and must be reported to Central Washington Interagency Communication Center (CWICC, Wenatchee Dispatch), at (509)884-3473 immediately. CWICC will follow standard procedures for handling an emergency incident and will report the spill to the Duty Officer and the Washington State Department of Ecology (DOE). DOE is responsible for clean-up actions. Forest Service employees DO NOT attempt to clean up an emergency hazardous material spill.

When a possible hazardous material dumpsite or lab site is discovered, employees should:

- Stay away from the site.

- Make sure others stay away from the site.
- Call Law Enforcement.

Appendix D

4/24/03

Thirtymile Hazard Abatement – Monitoring Checklist

(Applicable Items are shown in bold.)

Incident Name: _____ IC: _____
Monitor: _____ Date: _____

(Note: File the completed Checklist in the incident records)

Monitoring Question	Accomplishment
1. Was a complexity analysis prepared at the time of initial attack as part of size up and there after as appropriate?	O Yes O No (see notes) O Documented in Incident Records.
2. Have the safety & welfare of all personnel & the public been addressed and mitigation identified and completed?	O Yes O No (see notes) O Documented in Incident Records (optional)
3. Are firefighting actions in full compliance with the Ten Standard Fire Orders?	O Yes O No (see notes) O Documented in Incident Records. (optional)
4. Is mitigation of the applicable Watch Out Situations being accomplished?	O Yes O No (see notes) O Documented in Incident Records. (optional)
5. Did arriving ground fireline personnel on Type 3 – 5 wildland fires have positive & documented contact with appropriate incident mgt. personnel & receive an adequate briefing?	O Yes O No (see notes) O Documented in Incident Records.
6. Do all resources know the name of their immediate supervisor and on Type 3 – 5 incidents the name of the assigned IC?	O Yes O No (see notes) O Documented in Incident Records. (optional)
7. Is the IC's identity and all changes in command (ICs) evident in the incident records?	O Yes O No (see notes) O Documented in Incident Records.
8. On Type 1 – 3 wildland fires, does the IC have no collateral duties, except for those of unfilled command & general staff positions?	O Yes O No (see notes) O Documented in Incident Records. (optional)
9. Does every fireline supervisor have a copy of the Incident Response Pocket Guide (PMS #461)?	O Yes O No (see notes) O Documented in Incident Records. (optional)
10. Does every fireline supervisor on Type 3 – 5 wildland fires have a copy of the host unit's Fire Danger Pocket Card?	O Yes O No (see notes) O Documented in Incident Records. (optional)
11. Have all fireline qualified individuals received training in entrapment recognition, deployment protocols, and in recognition & selection of safety zones when such training has not been provided by the home/host Units?	O Yes O No (see notes) O Documented in Incident Records.

12. Were personnel mobilized by their Home Unit fully qualified for their assignment?	O Yes O No (see notes) O Documented in Incident Records. (optional)
13. Are personnel only assigned to fireline positions for which they are qualified, as certified by their employing agency?	O Yes O No (see notes) O Documented in Incident Records. (optional)
14. Are firefighters complying with the NWCG work/rest guidelines?	O Yes O No (see notes) O Documented in Incident Records.
15. On fires that exceed one operational period, has the IC monitored compliance with work/rest guidelines and documented the following information in the daily record: **a) Descriptions of actions taken to monitor work/rest cycles;** **b) Every incidence where work/rest guidelines were exceeded;** **c) Actions taken to ensure compliance with the guidelines?**	O Yes O No (see notes) O Documented in Incident Records.
16. Has the IC conducted inspections on the fire for safety and health hazards, including compliance with the Ten Standard Fire Orders and mitigation of the applicable Watch Out Situations?	O Yes O No (see notes) O Documented in Incident Records.
17. Did the IC monitor effectiveness of planned strategy and tactics and immediately delay, modify, or abandon firefighting action on any part of the fire where strategies and tactics could not be safely implemented?	O Yes O No (see notes) O Documented in Incident Records. (optional)
18. Are performance ratings completed on Type 3 – 5 wildfires for all ground fireline personnel assigned from outside the local area, and do the ratings include compliance with the Ten Standard Fire Orders and mitigation of applicable Watch Out Situations?	O Yes O No (see notes) O Documented in Incident Records.

Accomplishment Notes

Monitoring Question	Remarks

Appendix F
Specific WADNR Direction

General:

- At present the fire is not impacting DNR protected lands. If a threat exists and action is planned on state and private the IC is to call SE Region prior to taking any action. Contact Gary Berndt: 509-899-2376; Bill Boyum: 509-856-8067; or Bob Crowe: 509-899-1328.
- Steve Goetz will act as the local representative and will interact with the Chelan Ranger District to monitor potential impact to DNR protection. Office phone 509-664-3100 or Cell 509-398-1222.
-

Priorities:

- The priority for protection in ranked order is as follows: personal safety of firefighters and the public, natural resources on DNR protected-property, and developed property.

Safety:

- Your top priority is to provide for firefighter and public safety at all times.
- Require and monitor compliance of the "18 Watch Out Situation" and the "Ten Standard Firefighting Orders" by all incident personnel.
- Strive to adhere to a 2:1 work/rest ratio for all fire line personnel. Document any decision to deviate from this direction.
    - Immediately notify the assigned Agency Representative when the health or safety of any incident personnel has been compromised.

Incident Management

- Cooperate with fire districts and local law enforcement in developing structural protection and evacuation plans were needed.
    - Develop strategies that seek to minimize acreage burned on DNR protected lands, consistent with providing for safe and effective operations.
- Notify the Agency Representative as soon as practicable if there is a threat of the loss of structures, or a threat to existing containment or control.
- Coordinate in advance with the Agency Representative on all interactions with elected officials.
- Utilize local fire district resources and private contractors when it is safe, cost effective and timely to do so.
- Maintain good relations with the community, private landowners, timber industry representatives, elected officials and other stakeholders.
- On WADNR protected lands, roads used during suppression operations will be maintained at an appropriate level to avoid damage to the sub-grade and significant accumulations of surface dust.

Incident Business Management:

- Provide a daily accounting of incident management expenditures to the Agency Representative and transmit a duplicate copy to the SE Region office.
- A cost apportionment agreement is to be developed among the following agencies: Forest Service, National Park Service and WADNR. The Agency Representative in cooperation with the assigned Incident Business Advisor shall represent my interest in negotiating this agreement, and I retain signatory authority for the final agreement and any subsequent changes. Your team is to assist in preparing this agreement.

Agency Transfer Standards:

- Mop-up (select one option)
    - Option 1: One hundred percent mop-up will be completed within 300 feet of the fire perimeter and within 300 feet of any structures, verified by at least two operational periods of "no heat" detected by thermal sensing.
- Significant areas of unburned fuel will be tight-trailed and perimeters secured where safe to do so.
- Significant concentrations of fuel within the fire perimeter (slash piles, areas of blowdown, etc.) will be extinguished and 100 % mopped up unless unsafe to do so.
- A rehabilitation plan is to be developed and implemented following approval by the Agency Representative.
    - All fire trails or roads constructed or reconstructed during incident operations will be water-barred to minimize erosion and prevent damage to public resources that include water, fish, wildlife and capital improvements of the state or its political subdivisions. Such trails and roads will be restored to the standard that existed prior to the incident.
    - Fire trail berms that could impede surface water runoff are to be removed.
    - A map is to be prepared showing any road maintenance activities not completed as a result of safety concerns, environmental issues or weather related delays.
    - Fences damaged or removed during fire suppression operations will be repaired to the pre-existing standard.

Incident Closeout Standards:

- The management organization will have developed a transition plan and briefed the incoming management organization prior to Transfer of Command.
- The Incident Documentation package will be complete and meet WADNR NE Region's Incident Business Operation Guidelines.
- Any "incident within the incident" will have been investigated and appropriate documentation will have been completed. This includes personnel or equipment accidents, tort claims, etc.

P. Puget Sound Interagency Communications Center 2007 Operations Plan Insert 2010 Plan

B. 07-IA-110605-00-014

SUPPLEMENTAL FOR
INTERAGENCY AGREEMENT 04-IA-11060500-042

C. PUGET SOUND INTERAGENCY COMMUNICATIONS CENTER OPERATIONS PLAN 2007

This Operations Plan is prepared in accordance with the Puget Sound Interagency Communications Center sub-Agreement to the National Interagency Agreement for Fire Management. As directed, it provides detailed information on the operations of the Center and the working relationships with the agencies and units to accomplish the mission.

LOCATION

The Puget Sound Interagency Communications Center is temporally located at: 21905 64th Ave West, Mountlake Terrace WA 98043-2251; Telephone 425-775-9702; FAX 425-744-3255; Email: DMS = wapsc@dms.nwcg.gov, Lotus Notes = fi-lastname@fs.fed.us, example: (jsmith@fs.fed.us)

HOURS OF OPERATION – PSICC

NORMAL-outside of the established fire season. Center hours will be Monday through Friday approximately 0800 to 1630 hours.

FIRE SEASON-during the established fire season, Center hours will be 0800 to 1630 hours, seven days per week and expanded as necessary to meet needs. Fire season coverage will begin and run concurrently with the Seattle Weather Service Office or as mutually agreed to by the members of the Board of Directors. Not-with-standing this

definition, the Center will ensure that all Northwest Coordination Center and National Weather Service reporting and information requirements are met on a daily basis.

AFTER HOURS-A Duty Officer will be assigned for after hour's contact.

UNIT CONTACT PROCEDURES

NORMAL- Field units will furnish to the Center, by May 1st, an agency contact procedure for each unit. This procedure will identify how to contact each unit having resources to dispatch during their normal hours of operation, and a means (e.g. telephone number) of contact.

FIRE SEASON- Field units will furnish to the Center, by May 1st 24 hour contact procedure and roster. This procedure will be designed to ensure that someone on each unit is readily available to the Center, throughout fire season. This may be a roster, answering system, cellular phone or equivalent. The contact person will be capable of processing requests for assistance and information in a timely manner. This information will be kept current on an as needed basis.

FUNDING

Operational funding will be on a cost-share basis between the participating agencies. The Board of Directors will base the percentages on the projected workload that has been established from historical data and negotiated agreement. For FY2007, they are

MSF-42%, OLF-33%, NPS-17%, FWS-3%, and BIA-5%. BIA funding shares are subject to tribal fund status.

BUDGET

The Center Manager is responsible for monitoring expenditures and budget status. The Center Manger will prepare a proposed budget for the upcoming fiscal year and present it to the Board of Directors for approval. The budget for the fiscal year will include a detailed breakdown of planned expenditures.

ORGANIZATION AND MANAGEMENT

The Center Manager is a permanent full time GS 11, Bob Reis.

The Assistant Center Manager is a permanent full time GS 07, Lynn Satterfield.

The dispatcher is a seasonal GS-3/4/5. The Board of Directors has delegated the authority to the Center Manager for selection and hiring of the seasonal position.

The Host Agency Official and supervisor of record is the Fire Management Officer for the Mount Baker-Snoqualmie National Forest, John Heckman- Acting Fire Staff.

The Operations Committee as listed below will appoint the Board of Directors.

- **Mt. Baker-Snoqualmie NF Acting Fire Staff, John Heckman***
- **Olympic NF Fire Staff, George Rubiaco***
- **Olympic Peninsula Agency and Puget Sound Agency, BIA: Stanley Surridge***
- **Mt. Rainier National Park: Alison Robb**
- **North Cascades National Park Service Complex: Tod Johnson**
- **Olympic National Park and San Juan Island National Park: Larry Nickey***

- **Washington Maritime National Wildlife Refuge Complex: Bruce Babb***

* **Board of Directors and principal contacts for each agency.**

In the absence of the Host Agency Official, the Chairperson of the PSICC Board of Directors will be contacted and consulted for matters beyond the authority of the Center Manager.

Rotation of the Chairperson for the Board of Directors will be on a two-year rotation. The rotation schedule will be NPS, BIA, FWS, and USFS. It will be reviewed, updated and agreed upon every other year prior to January 1. The Chairperson of record will assume their duties January 1 of every even year, (2002, 2004, 2006…). The NPS representative will assume the duties of Board Chairperson on January 1, 2006.

The Center Manager's performance evaluation shall be conducted as described in the PSICC Supplemental Agreement

The organization will increase as needed to meet emergency situations. The additional personnel will be provided by the signatory agencies on an as needed basis as determined by the Center Manager. They will be requested on a resource order. Training opportunities will be provided to maintain and enhance the dispatch and logistics skills of participating agency employees.

TIMEKEEPING

CENTER PERSONNEL WILL DOCUMENT THEIR TIME AND ATTENDANCE ON

AGENCY-SPECIFIC TIME FORMS. These forms will be reviewed and initiated by the

Center Manager and forwarded to the appropriate agency timekeeper for processing.

Proper time and attendance recording is the responsibility of the employee and will be attended to as outlined by agency policy.

DAILY OPERATIONS – All PSICC Units/Agencies

Receive and process orders from cooperating units for resources such as overhead, crews, equipment, supplies and aircraft needed to respond to incidents including Initial Response support, as requested.

Receive and process resource orders from neighboring units or agencies including DNR Regions within the PSICC area via the Resource Ordering and Status System (ROSS), Gifford Pinchot NF, Central Washington Interagency Communication Center (CWICC), Yakima Indian Agency, and the Northwest Interagency Coordination Center (NWC).

Resource orders will be placed from/to units using the contact procedure furnished to the Center as required under “Unit Contact Procedures,” above.

Monitor Initial Response activity and prepare for immediate support. Process Initial Response resource orders from information given by Units or DNR IA dispatch offices. Inform appropriate agency personnel of any safety concerns noted.

Solicit trainee assignment opportunities compatible with agency/unit-documented needs.

Expanded dispatch operations will be required of the appropriate agency at such times as deemed necessary by the Center Manager in consultation with the affected agency and the host agency official. PSICC will provide assistance in establishing expanded dispatch operations.

Insure that flight-following requirements are met for those flights ordered through the Center. Perform flight following via the Automatic Flight Following system (AFF) If unavailable, establish radio contact with the aircraft, if the aircraft is out of PSICC radio coverage; insure that designated unit(s) have radio contact.
If positive contact can not be maintained with the aircraft, the flight should be terminated immediately.

Distribute pertinent available information to all units. Keep appropriate agency staff informed of developing situations such as lightning occurrence, multiple fires, or a fire with potential in the area.

Provide public information pertaining to logistical support of incidents and appropriate contacts for agency specific information, such as closures or information about specific incidents. If an agency has a major incident and deems the Center the appropriate contact for the public and the media, they will furnish or order appropriate information staff to the Center.

Throughout the year, daily May 1 through October 31 and weekly November 1 through April 30 (daily when prescribed burning is occurring), gather information for the Situation Report, interpret, consolidate, format and send to NWC. Units are required to submit reports to PSICC at least 1 hour prior to PSICC's SIT report deadline. Send Area/National intelligence reports to units on request.

During the established fire season, obtain Lightning Detection maps and/or information and distribute to PSICC subscribing offices. (Under contract PSICC is not allowed to disseminate to non-subscribers).

Establish links on the PSICC Web Page to the National Weather Service daily fire weather page. Distribute special weather advisories and updates as appropriate. Red Flag Warning and Red Flag Notification will be transmitted to field units via local dispatch centers; other fire personnel and staff will be contacted directly by phone. Outside of fire season weather forecasts will be distributed on request for emergency, aviation or smoke management activities.

Obtain weather observations from Manual and RAWS weather stations as requested by PSICC cooperators, screen for errors and enter into WIMS. Retrieve NFDRS observations and forecasts from WIMS and distribute to all units. 24 Hour RAWS data will be retrieved on request only.
Monitor weather station data, RAWS watchdog, etc., to assure the stations are performing and appear accurate. Request appropriate units make visual check of non-operating stations, order repairs or notify appropriate persons to do so.

Facilitate Spot Weather Forecasts as requested by PSICC cooperators via the NWS web site.

Request Special Weather Forecasts via the NWS Fire Weather Desk, Seattle, as requested by PSICC cooperators,
Provide data for annual end of year agency reports.

Respond to requests for information, compile reports and conduct analysis of PSICC activities as requested.

Receive and process orders for administrative and project flights. Provide aviation technical assistance to Districts (i.e. ordering procedures, military airspace conflicts, aircraft selection, documentation requirements, and costs). Travel method cost comparisons and the unit requesting the flight, with PSICC assistance when needed, will determine preferred modes of travel. Cost analysis of least cost aircraft will be performed by PSICC. Process the 6500-122's (payment documents) for both fixed wing and rotor contracts.

NOTE: NPS, FWS and BIA cooperating units may obtain non-incident aircraft through USDI and/or other agency specific processes but may order through PSICC as needed.

FS units will submit their prescribed fire burning requests directly to DNR Smoke Management via the "FASTRACS" reporting system; PSICC will receive and forward approvals/disapproval's accordingly. DOI units will contact DNR directly by phone or fax with their requests. Burning Units are required to **notify** PSICC by approximately 1500 the weekday prior to the prescribed burn of any intent to ignite. (**Notification to PSICC is required** on Friday for Monday burns and Thursday for Weekends) (This is for Situation reporting and to provide a single point of contact for the general public and other agencies.) PSICC should be informed of cancellation or modification of previous days prescribed burn plan as soon as the field unit alters its reported plan. FS units will report acres burned/accomplishments using "FASTRACS;" DOI units will report accomplishments to DNR via phone or fax and provide upward reporting through NFPORS.

Utilizing the AMIS program: consolidate, edit and enter all Aircraft Invoice information.

Utilizing the ROSS program: facilitate movement of resources between cooperators, neighboring units and Geographic Area Coordinating Centers (GACC's)

Utilizing the FIRESTAT program: consolidate, edit and enter all Fire Report information. Submit completed reports to the Kansas City Computer Center as required.

Utilizing the Incident Qualification and Certification System (IQCS): update and enter personnel fire qualifications information. Print Red Cards and submit to Forest Fire Staff on an annual basis.

Utilizing the FIRECODE program: obtain and issue incident numbers for PSICC cooperators.

Complete and submit end of year reports to the Northwest Coordination Center on an annual basis.

Center Manager serves as both Olympic and Mt. Baker-Snoqualmie N.F. Training Coordinator. Serves as a participant at Forest Qualification Committee meetings.

ACTIVITIES AND PROCEDURES

Update and revise Mobilization Guides (PSICC Area and Northwest Area).

Update and revise the Guest Dispatcher Guide and Duty Officer Handbook.

Update and revise Local Aircraft and Pilot Information/Qualifications.

Update and revise the PSICC – Expanded Dispatch Plan and will maintain one Expanded Dispatch Kit.

Maintain appropriate computer programs to facilitate the Center.

Procedures for assigning: Resource Orders Numbers (Block #3), Request Numbers (Block #12), FIRECODES for Forest Service and NPS, FWS and BIA will be outlined in chapter 20 of the PSICC Area Mobilization Guide. The PSICC Board of Directors will review these procedures.

Resource orders for crews and engines will be filled using 1) closest forces and 2) a rotation schedule. Each year PSICC will choose the rotation order using a lottery method. Assignment out of turn or turning down an assignment when no other resources are available counts as a turn.

Resource orders for overhead will be filled using 1) closest forces and 2) overhead availability reports submitted by units and rotation between units. Some logistical and cost considerations may preclude this.

All Units/Agencies will provide, and keep current, an aircraft Hazard Map. Agencies will keep the Center informed of changing hazards such as any air operations being conducted, skyline placement and other short-term hazards.

Member agencies may provide contracts, agreements, and blanket purchase authorities (BPA's), when requested by the Center. If possible, they will include the Center as part of the ordering authority. For those BPA's where the Center has been granted ordering authority, a listing will be furnished to the Center including all relevant information about the BPA.

All Units/Agencies will provide necessary information, in a timely manner, to allow the Center to operate within a planned schedule to meet due dates and other time line requirements. The Center will provide a time line or schedule to the member units/agencies.

OTHER:

INTERAGENCY MOBILIZATION GUIDE

This guide is a component of this Operations Plan. Each unit will receive copies to meet their needs.

GUEST DISPATCHER GUIDE

The guide is a component of this Operations Plan and will be located in the Center. It will provide detailed instruction on how to do the various tasks required, such as accessing WIMS, processing SIT reports, and flight following procedures. Copies may be furnished to the member agencies upon request.

DUTY OFFICERS HANDBOOK

The guide is a component of this Operations Plan and will be located in the Center. It will provide detailed procedures for dispatching and mobilizing resources. Copies may be furnished to the member agencies upon request

WESTERN WASHINGTON INTERAGENCY TRAINING COMMITTEE

The Training Coordinator will participate in WWITC activities and meetings as a representative of the Olympic and Mt. Baker-Snoqualmie National Forests

REMOTE AUTOMATED WEATHER STATIONS

The Center will facilitate bringing the NFRDS stations on line, initialization, and out of service in accordance with the agencies RAWS plan and operating procedures

The PSICC Board of Directors has reviewed the preceding Operations Plan for PSICC, dated 2007:

Signatures:

_____	_____	_____
Y. Robert Iwamoto	Date	Dale Hom
Date		
Mt. Baker-Snoqualmie NF		Olympic NF
USDA, Forest Service		USDA, Forest Service

_____	_____	_____
Stanley Surridge	Date	Larry Nickey
Date		
Puget Sound Agency, Olympic Agency USDI, Bureau of Indian Affairs		Olympic National Park/ San Juan Island National Park USDI, National Park Service
_____	_____	_____
Alison Robb	Date	Tod Johnson
Date		
Mt. Rainier National Park USDI, National Park Service		North Cascades National Park USDI, National Park Service

_____	_____
Bruce Babb	Date
Region Office, Region 1 USDI, Fish and Wildlife Service	

Q. Fire-wise Defensible Space

Defensible space

Your first defense against wildfire is to create and maintain a defensible space around your home. This does **not** mean your landscape must be barren. A defensible space is an area, either man-made or natural, where the vegetation is modified to slow the rate and intensity of an advancing wildfire. It also creates an area where fire suppression operations can occur and helps protect the forest from a structure fire.

A disaster waiting to happen.

This home is more easily defendable.

Defensible Space

Wildfire hazards can be effectively reduced by following these defensible space guidelines developed by the Colorado State Forest Service. (Also see Cooperative Extension Fact Sheet 6.302.)

- The dimensions of a defensible space are subjective and depend on site characteristics, but typically a defensible space, on flat ground, extends a minimum of 75 feet around a home. This distance should be extended if the structure is located on a slope.

- Thin out continuous tree and brush cover around structures. The initial 15 feet around a structure should consist of an area in which all flammable vegetation is removed.
- Beyond the initial 15 feet, trees should be thinned to 10-12 foot crown spacing. Occasionally, clumps of 2 or 3 trees are acceptable for a more natural appearance if additional space surrounds them.
- Mow dry grass and weeds to a height of 6 inches or less for a distance of 30 feet from all structures.

- Prune tree branches within the defensible space up to a height of 10 feet above the ground.
- Dispose of all slash and debris left from thinning by either chipping, hauling away or piling and burning (check with your local fire department for burning restrictions.

R. Creating Wildfire Defensible Zones

NATURAL RESOURCES SERIES

FORESTRY

Creating Wildfire-Defensible Zones no. 6.302

by F.C. Dennis [1]

Quick Facts...

Wildfire will find the weakest links in the defense measures you have taken on your property.

The primary determinants of a home's ability to survive wildfire are its roofing material and the quality of the "defensible space" surrounding it.

Even small steps to protect your home and property will make them more able to withstand fire.

Consider these measures for all areas of your property, not just the immediate vicinity of the house.

Colorado State University Cooperative Extension

Fire is capricious. It can find the weak link in your home's fire protection scheme and gain the upper hand because of a small, overlooked or seemingly inconsequential factor. While you may not be able to accomplish all measures below (and there are no guarantees), each will increase your home's, and possibly your family's, safety and survival during a wildfire.

Start with the easiest and least expensive actions. Begin your work closest to your house and move outward. Keep working on the more difficult items until you have completed your entire project.

Defensible Space

Two factors have emerged as the primary determinants of a home's ability to survive wildfire. These are the home's roofing material and the quality of the "defensible space" surrounding it.

Use fire-resistive materials (Class C or better rating), not wood or shake shingles, to roof homes in or near forests and grasslands. When your roof needs significant repairs or replacement, do so with a fire-resistant roofing material. Check with your county building department. Some counties now restrict wood roofs or require specific classifications of roofing material.

Defensible space is an area around a structure where fuels and vegetation are treated, cleared or reduced to slow the spread of wildfire towards the structure. It also reduces the chance of a structure fire moving from the building to the surrounding forest. Defensible space provides *room for firefighters to do their jobs*. Your house is more likely to withstand a wildfire if grasses, brush, trees and other common forest fuels are managed to reduce a fire's intensity.

The measure of fuel hazard refers to its continuity, both horizontal (across the ground) and vertical (from the ground up into the vegetation crown). Fuels with a high degree of both vertical and horizontal continuity are the most hazardous, particularly when they occur on slopes. Heavier fuels (brush and trees) are more hazardous (i.e. produce a more intense fire) than light fuels such as grass.

Mitigation of wildfire hazards focuses on breaking up the continuity of horizontal and vertical fuels. Additional distance between fuels is required on slopes.

Creating an effective defensible space involves developing a series of management zones in which different treatment techniques are used. See Figure 1 for a general view of the relationships among these management zones. Develop defensible space around each building on your property. Include detached garages, storage buildings, barns and other structures in your plan.

The actual design and development of your defensible space depends on several factors: size and shape of buildings, materials used in their construction, the slope of the ground on which the structures are built, surrounding topography, and sizes and types of vegetation on your property. These factors all affect your

S. FYO8 Pacific West Region Fuels Management Activity Treatment Verification Form

Thursday, May 10, 2007

Pacific West Region

FY08 Fuels Management Activity and Treatment Verification Form

North Cascades National Park

Details for the Park's FY08 fuels management treatments and activity proposals are summarized in the table below and have been entered into NFPORS. These treatments and activities have a high probability of accomplishment in FY08, and will receive the full support of the Park's staff if funded. The Park Superintendent is accountable for accomplishment of treatments and activities that have received funding. Park staff will report monthly accomplishments in NFPORS by the 23rd of each month, and will notify the Regional Fire Management Officer or designated Regional Fuels Contact within five (5) working days of any of the following events:

- The probability of accomplishing any project/activity is significantly reduced. In this event the Region may reprogram funding to another treatment or activity with a higher probability of accomplishment. This does not relieve the Park of accountability for accomplishing the project until such time as a replacement is found to meet the acreage target.
- It is determined that additional funding may be needed to complete the treatment or activity. The Region may provide additional funding if justified and available.
- It is determined that the treatment or activity will likely be completed under budget. In this event the Region may reprogram the likely cost savings to another treatment or activity.
- A treatment or activity has been completed for the fiscal year (no further work will occur in FY08). It is important to report costs to date so that reprogramming of excess funds may occur.

Superintendent Verification Signature _____ Date _____

Activity Name	WUI? (Y/N)	Target	Unit Measure	Contract (Y/N)	Est. Seas FTE	Funding Amount
NOCA - Stehekin DS Hand Pile Burn	Y	15	acres	N		$9,400
NOCA - Stehekin Roadside #2 Thinning	Y	62	acres	N		$39,600
NOCA - Stehekin Roadside #2 Hand Pile	Y	62	acres	N		$16,500
NOCA - Stehekin Roadside #1 Hand Pile Burning	Y	62	acres	N		$16,300
NOCA - Stehekin DS Thinning	Y	15	acres	N		$9,400
NOCA - Stehekin DS Hand Pile	Y	15	acres	N		$9,500
NOCA - Stehekin Boulder #2 & 3 Rx	Y	79	acres	N		$57,300
NOCA - Stehekin Boulder #1 Hand Pile Burn	Y	15	acres	N		$9,100
NOCA - Stehekin & Hozomeen Invasive Species Monitoring	Y	0	EACH	N		$12,900
NOCA - SC-Beuhler/Upper Boulder Rx	Y	945	acres	N		$75,500
NOCA - SC Spotted Owl Monitoring	Y	0	EACH	N		$6,000
NOCA - Network Fire Effects Crew Travel	N	0	each	N		$11,600
NOCA - Stehekin McGregor #1 & 4 Rx	Y	85	acres	N		$44,300

Insert 2009 Border Agreement

August 31, 2004

NORTHWEST BORDER ARRANGEMENT FOR FIRE PROTECTION

BETWEEN

PROVINCE OF BRITISH COLUMBIA, MINISTRY OF FORESTS

AND

USDA FOREST SERVICE, PACIFIC NORTHWEST AND NORTHERN REGIONS

NATIONAL PARK SERVICE, PACIFIC WEST AND INTERMOUNTAIN REGIONS

BUREAU OF LAND MANAGEMENT, OREGON/WASHINGTON AND IDAHO, STATE OFFICES

IX. List of Preparers

List of Preparers:
Loretta Duke: Prescribed Fire Specialist, North Cascades National Park Service Complex, Lake Roosevelt National Recreation Area
Karen Kopper: Fire Ecologist, North Cascades National Park Service Complex
Tod Johnson: Fire Management Officer, North Cascades National Park Service Complex
Cathi Jones: Resource Management Specialist (GIS), Fire Management Plan Environmental Assessment Chief Writer and Editor
Jessica Moore: Fire Program Assistant, North Cascades National Park Service Complex
Andris Vezis: Supervisory Forestry Technician, North Cascades National Park Service Complex
Janeen Tervo: Silviculturalist, and Fuels specialist, Chelan Ranger District, Okanogan-Wenatchee National Forest
Natasha Anatanova, GIS Specialist, North Cascades National Park Service Complex
Anne Braaten, GIS Specialist, North Cascades National Park Service Complex
Jesse Kennedy, Chief of Cultural Resources, North Cascades National Park Service Complex
Jim Burdick, Fire Planner, Okanogan-Wenatchee National Forest
Tom Leuschen, Fire Planner, Fire Vision Enterprise Team, Okanogan-Wenatchee National Forest
Jack Rainford, GIS Specialist, Okanogan-Wenatchee National Forest
Mark Grupe, Fire Ecologist, Golden Gate National Recreation Area
Dee Dee Epperson, Writer Editor, Fire Vision Enterprise Team, Okanogan-Wenatchee National Forest

List of Consultants:
Dan Allen: NEPA writer, North Cascades National Park Service Complex
Trygve Culp: Silviculturalist, United States Forest Service, Retired
Nancy Holman: Stehekin District Interpreter, North Cascades National Park Service Complex
Jack Oelke: Resouce Chief, North Cascades National Park Service Complex
Wendy Ross: Resource Manager, Stehekin Airstrip Coordinator, North Cascades National Park Service Complex
Richard Smedley: Fire Planner, Pacific West Region, National Park Service
Elizabeth Waddell: Air Resources Specialist, Pacific West Region, National Park Service
Craig Holmquist, Trails Foreman, North Cascades National Park Service Complex
Kelly Bush, Wilderness District Ranger, North Cascades National Park Service Complex
Mignonne Bivin, Plant Ecologist, North Cascades National Park Service Complex
Bob Mierendorf, Archeologist, North Cascades National Park Service Complex
Bob Kuntz, Wildlife Biologist, North Cascades National Park Service Complex
Linda Saunders-Ogg, Wildlife Biologist, US Fish and Wildlife Service, Olympia, Washington

X. Supplemental Appendices List

Get Updates

- NOCA Aviation Management Plan (2006)

- NW MAC Operations Handbook, Northwest Geographic Area Multi-Agency Coordination Group (2007)

- NOCA Environmental Assessment: Fire Management Program (2005)

- Interagency Prescribed Fire Planning and Implementation Procedures Reference Guide (2006)