Burned Area Emergency Response Plan

FLICK CREEK FIRE

Lake Chelan National Recreation Area

Flick Creek Fire
BURNED AREA EMERGENCY RESPONSE PLAN

UNIT: Lake Chelan National Recreation Area (National Park Service)

LOCATION: Stehekin, Washington

DATE: October 10, 2006

PREPARED BY: North Cascades National Park Service Complex BAER Team

Submitted By: _____ Date: _____
William Paleck, Superintendent

BURNED AREA EMERGENCY RESPONSE PLAN REVIEW AND APPROVAL
NATIONAL PARK SERVICE

I. Project Leader approval that the Burned Area Emergency Response Plan meets approved land management plan management objectives**.**

_____

Jack Oelfke, Project Leader, North Cascades National Park Date

II. Regional Fire Management Coordinator concurrence that the plan fits the technical definition for use of Emergency Stabilization funding.

_____

Nelson Siefkin, Regional BAER Coordinator, Pacific West Region Date

III. Emergency Stabilization Funding Approval (check one box below):

☐ Approved

☐ Approved with Revision (see attached)

☐ Disapproved

_____

Jonathan B. Jarvis, Regional Director, Pacific West Region Date

IV. Emergency Stabilization Funding Approval (check one box below):

☐ Approved

☐ Approved with Revision (see attached)

☐ Disapproved

_____

Mike Wallace, Director, Fire Management Program Center Date

EXECUTIVE SUMMARY

Introduction

This Burned Area Emergency Response (BAER) Plan has been prepared in accordance with Department of the Interior and National Park Service (NPS) policy. This plan provides emergency stabilization recommendations for all lands administered by the NPS in Lake Chelan National Recreation Area (part of the North Cascades National Park Complex [NOCA]) within and around the Flick Creek Fire perimeter and downstream impact areas, including privately owned parcels. The plan was prepared in accordance with *DM 620 Part 3: Burned Area Emergency Stabilization and Rehabilitation* and the *Interagency Burned Area Emergency Response Guidebook*.

The Flick Creek fire started on July 26, 2006. The fire was human-caused, with an origin approximately 2.5 miles downlake of the Stehekin Landing, in the Flick Creek drainage. The fire grew quickly in the dry Douglas fir/ponderosa pine forest, reaching 1200 acres by the end of the first burning period. Limited suppression resources, several structures threatened along the Lake Chelan shoreline, and extremely steep terrain limited most suppression actions to structure protection the first few days of the fire. The initial fire strategy was to prevent fire movement uplake at the Hazard Creek drainage, to prevent fire from reaching the Stehekin Landing. That strategy was successful until Aug. 21, when the fire crossed into the Hazard Creek drainage in the upper elevations. The fire eventually moved into the Purple Creek and Imus Creek drainages before being contained just northward of Imus Creek, following cooler, wetter weather. The fire threatened numerous public, commercial and residential structures in several locations. Total fire acreage as of September 29 is estimated at 7883 acres. Suppression efforts including approximately 3.5 miles of hand and explosives line, 17 retardant drops, extensive helicopter water drops, fuel reduction around structures, and snag removal along powerlines. No structures were lost other than two trail bridges and associated infrastructure along trails.

The Flick Creek BAER plan was prepared in two phases—first in early to mid-August in conjunction with staff on the Wenatchee National Forest, and second in mid to late September by NPS staff, after the fire had grown substantially on NPS administered lands. The primary objectives of the Flick Creek Fire BAER Plan are:

- To prescribe cost effective post-fire stabilization measures necessary to protect human life, property, and critical cultural and natural resources.
- To ensure that those prescribed emergency stabilization measures are in compliance with approved unit land management plans and policies, and all relevant federal, state, and local laws.
- To identify non-emergency post-fire rehabilitation treatments for natural and cultural resources and minor facilities, including long-term restoration needs.

Assessments and Specifications

The topics assessed in this plan include: watershed, health and safety, cultural resources, vegetation and wildlife. Twelve specifications totaling $182,284 are requested to perform emergency stabilization treatments and activities on the Flick Creek Fire.

Watershed

Watershed issues include:

- Potential threats to human life and property within, and downstream of the Flick Creek Fire from possible increases in overland flow that could cause accelerated surface erosion, debris flows, and flooding. The values at risk include life, homes and outbuildings on private property, domestic water systems, public and private boat docks, campsites, and trails and footbridges within and downstream of the fire.
- Threats to cultural resources, particularly the historic Flick Creek Shelter, from increased flow and sediment deposition.
- Changes in water quality within and downstream of the fire due to increased suspended sediment, ash and nutrient loading from increased soil erosion within the burned area.
- Threats to NPS lands and resources from watershed treatments implemented on private parcels due to uncertain property boundaries.

A combination of aerial and ground reconnaissance were utilized to assess the threats of post-fire watershed conditions within and downstream of the Flick Creek Fire. In addition, two Burned Area Reflectance Classification (BARC) images—generated in early August and late September, respectively—were used to assist classification of soil burn severity within the fire perimeter. Based on these data, predictive modeling of post-fire watershed response, and knowledge of watershed events following other fires in the region, threats to human life, property, water quality and critical natural and cultural resources were identified and treatments specified.

The watershed assessment documented post-fire threats to life and property from floods and debris flows, but that those threats existed pre-fire and that landform instability is an inherent characteristic of the local geology. In addition, because the watershed threats are driven by geological phenomena (as opposed to surface erosion processes), typical upland watershed stabilization treatments will not be effective at preventing flood and debris flow events. The dominance of low soil burn severity (approximately 92% of the total burned acreage on NPS lands), however, will benefit the nature of post-fire watershed response within the burned area. Private land owners may have some localized treatment options with regard to protecting their homes and other infrastructure; the Natural Resource Conservation Service (NRCS) has been contacted and is available to consult on appropriate practices and participate in public meetings.

Two treatments (*W-1—Remove Floatable Woody Debris from Purple Creek* and *W-2—Assess Streams for Logs/Debris Jams*) are proposed to reduce the likelihood of debris flows within and below the burned area, while a third (*W-3—Cadastral Survey*) will provide boundary information for private land owners who perform local treatments as prescribed by the NRCS. In addition, information related to flooding and debris flows will be dispensed to the public and

private land owners through a variety of means, including signs, information packets, and public meetings (see *Health and Safety* below).

Health and Safety

Health and safety issues include:

- Fire-created snags are, and will continue to be, a hazard to users of the Lakeshore, Purple Creek, and Imus Loop trails, particularly until the spring or summer of 2007.
- The potential exists for debris flow impacts from burned watersheds within the Flick Creek Fire, particularly for users along the Lakeshore and Purple Creek Trails, Flick Creek Campground, and private homes within or below the fire perimeter. Most, if not all, of those at risk are likely unaware of the potential threats.
- Cars parked at the base of a steep slope in the Imus overflow parking lot are at risk from falling debris destabilized in the burned sections of the slopes above.

Several NPS staff conducted ground and/or aerial reconnaissance on the Flick Creek Fire for health and safety related threats in August and September 2006. Reconnaissance efforts concentrated on identifying and documenting potential hazard trees, trail tread and bridge conditions, potential debris flow routes and targets, and fire suppression impacts.

Three specifications (*S-1—Safety-Public Information, S-2—Hazard Tree Mitigation, S-3—Imus Parking Lot Safety Fence*) are proposed to account for threats to health and safety. Tree hazards and debris flows/rolling debris will exist beyond the one year BAER treatment window, and the NPS will continue to mitigate those hazards using other funding sources.

In addition to the threats identified above, treads of the Lakeshore, Imus Loop and Purple Creek trails experienced fire-related damage, and two wooden foot bridges at Fourmile Creek and Purple Creek were destroyed by fire. As these trails have been closed to the public and most emergency stabilization treatments and activities will not commence until spring of 2007 (those slated to begin in the fall of 2006 can be implemented safely), funds to repair these impacts will be sought through the non-emergency Burned Area Rehabilitation (BAR) source.

Cultural Resources

Cultural resources issues include:

- Thirty-three identified cultural resources lie within or downstream of the Flick Creek Fire perimeter, some of which may have been subjected to direct or indirect fire effects and/or are vulnerable to post-fire conditions

A preliminary assessment of impacts and threats to cultural resources was performed following the fire and during preparation of the BAER plan, and preliminary consultation with the Washington State Historic Preservation Officer (SHPO) was initiated. Stabilization and additional assessment needs were identified for three cultural resources. Four specifications (*C-1—Assess Cultural Site FS 292, C-2—Assess Cultural Site FS 245, and C-3—Tree Removal/Monitoring Site FS 292, C-4—Slope and Trail Stabilization*) are proposed to address

these needs. In addition, Section 106 compliance will be required for several treatments proposed in other specifications.

Vegetation

Vegetation issues include:

- Establishment and expansion of invasive plant species into burned areas and areas of fire suppression activity.

Vegetation specialists performed aerial and ground reconnaissance of the burned area in August and September 2006. Four noxious weed species are known to occur within the Flick Creek burn perimeter and several others are of concern. Of these, common crupina (*Crupina vulgaris*) is considered the greatest threat. Crupina populations on adjacent USFS lands were found to increase following the 2001 Rex Fire. In addition to known populations, areas of concern for noxious weed infestation include locations were fire suppression actions were carried out such as constructed firelines, helispots, drop points, staging areas and retardant drops.

No specifications are requested under BAER to address noxious weed concerns on the Flick Creek Fire. Rather, funds will be requested through the BAR source to treat and monitor weed populations from 2007 through 2009.

Wildlife

Wildlife issues include:

- Four federally listed species have suitable habitat within the boundaries of the fire area, including gray wolf (*Canus lupus*), grizzly bear (*Ursus arctos*), Canada lynx (*Lynx canadensis*), and spotted owl (*Strix occidentalis*).
- Of these, only the spotted owl is known to currently use habitat within the fire area, including two active nesting territories within or along the fire perimeter near Fourmile and Flick Creeks.
- Canada lynx may utilize habitat in the fire area above 4000 ft.
- Potential impacts to spotted owls exist from the fire and suppression and emergency stabilization actions.

The wildlife assessment was performed using aerial and ground reconnaissance in August and September 2006, park data on wildlife distributions, and through consultation with Fish and Wildlife Service biologists (Section 7 consultation was initiated at that time).

The nesting area of the Fourmile Creek spotted owl pair was surveyed for fire-related impacts. Several potential nesting platforms were observed. The understory vegetation was completely burned, as was most of the mid-story deciduous tree cover. Although several overstory coniferous species had significant scorching (with expected tree mortality), a majority of the overstory canopy remained green. Whereas it appears the overstory nesting habitat for spotted owls remained largely intact, there were likely significant impacts to the prey species and their

habitat in this spotted owl activity area, as well as to the mid-story deciduous cover that the owls used for shade.

No specifications are requested under BAER or BAR to address wildlife-related issues associated with the Flick Creek Fire. Three non-specification related actions will be taken including, monitoring spotted nesting sites within the burned area in 2007, ensuring recommendations by the Fish and Wildlife Service regarding operations in spotted owl habitat are followed during emergency stabilization and rehabilitation treatments, and sampling benthic invertebrate populations in streams affected by fire retardant drops in the fall of 2007.

Miscellaneous

Also submitted are specifications to fund preparation of the Flick Creek BAER plan (*O-1—Flick Creek BAER Plan Preparation*) and the Flick Creek BAER Implementation Leader (*O-2—BAER Implementation Leader*).

Plan Organization

Individual resource Burned Area Assessments produced by various specialists and individual emergency stabilization specifications identified in each assessment are found below. Appendix I contains the National Environmental Policy Act (NEPA) compliance documentation summary, and additional supporting documentation is provided in Appendix II.

SUMMARY OF TREATMENTS AND ACTIVITIES

The summary of treatments and activities below identifies emergency stabilization costs charged or proposed for funding from subactivity E13 funding sources.

PART E - SUMMARY OF ACTIVITIES AND COSTS

LINE ITEM NUMBER	SPEC NUMBER	TITLE	UNIT	UNIT COST	NUMBER OF UNITS	WORK AGENT	COSTS FY 2006	COSTS FY 2007	COSTS FY 2008	COSTS FY 2009	TOTAL COSTS
1	C-1	Assess Cultural Site FS 292	1	$ 4,680	1	F	$ -	$ 4,680	$ -	$ -	$ 4,680
2	C-2	Assess Cultural Site FS 245	Each	$ 2,545	1	F	$ -	$ 2,545	$ -	$ -	$ 2,545
3	C-3	Tree Removal/Monitoring Site FS 292	Sites	$ 5,498	3	F	$ -	$ 16,495	$ -	$ -	$ 16,495
4	C-4	Slope and Trail Stabilization	Site	$ 6,730	3	F	$ -	$ 15,915	$ 2,100	$ 2,175	$ 20,190
5	W-1	Remove Floatable Woody Debris Purple Cr	Meters	$ 25	30	P,M	$ -	$ 755	$ -	$ -	$ 755
6	W-2	Assess Streams for Log/Debris Jams	Miles	$ 2,635	5	F	$ -	$ 13,175	$ -	$ -	$ 13,175
7	W-3	Cadastral Survey	Parcels	$ 8,000	4	S	$ -	$ 32,000	$ -	$ -	$ 32,000
8	S-1	Safety - Public Information	Signs	$ 531	26	F	$ -	$ 13,800	$ -	$ -	$ 13,800
9	S-2	Hazard Tree Mitigation	Tree	$ 412	5	F	$ -	$ 2,060	$ -	$ -	$ 2,060
10	S-3	Imus Parking Lot Safety Fence	Feet	$ 30	200	F	$ -	$ 6,060	$ -	$ -	$ 6,060
11	O-1	Flick Creek BAER Plan Preparation	Plan	$ 44,023	1	F	$ 44,023	$ -	$ -	$ -	$ 44,023
12	O-2	BAER Implementation Leader	Year	$ 8,834	3	F	$ -	$ 9,136	$ 8,565	$ 8,800	$ 26,501
						TOTAL COSTS	**$ 44,023**	**$ 116,621**	**$ 10,665**	**$ 10,975**	**$ 182,284**

Work Agent: **C**=Coop Agreement, **F**=Force Account, **G**=Grantee, **P**=Permittees, **S**=Service Contract, **T**=Timber Sales Purchaser, **V**=Volunteer

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FIRE LOCATION AND BACKGROUND INFORMATION

Fire Name	Flick Creek
Fire Number	WA-NCP-213
Agency Unit	WA-NCP; WA-OWF
Region	NPS-PWR; Region 6
State	Washington
County(s)	Chelan
Ignition Date/Cause	7.26/06, human-caused
Zone	NC Washington; Chelan-Stehekin Fire Management Unit
Date Fully Contained	Not applicable at this time
Jurisdiction	Acres
Lake Chelan National Recreation Area (NPS)	6873
Okanagan-Wenatchee National Forest (USFS)	1010
Total Acres	7883
Date Contained	10/03/06

PART B - NATURE OF PLAN

Type of Action (check one box below)

X	Initial Submission
	Amendment to the Initial Submission

TEAM ORGANIZATION, MEMBERS, AND RESOURCE ADVISORS

I. Burned Area Emergency Response Team Members: *(List of technical specialists used to develop the plan)*

Position	Team Member (Agency)
Team Leader	Jack Oelfke, NPS Mel Bennett, USFS Terry Lillybridge, USFS Nelson Siefkin, NPS Richard Schwab, NPS
Public Information	Vicki Gempko, NPS
NEPA Compliance & Planning	Jack Oelfke, NPS; Vicki Gempko, NPS
Hydrologist	Marsha Davis, NPS Mel Bennett, USFS
Soil Scientist	Marsha Davis, NPS Mel Bennett, USFS
Geologist	Marsha Davis, NPS John Riedel, NPS
Cultural Resources/Archeologist	Andrea Weiser, NPS Robert Mierendorf, NPS
Vegetation Specialist	Mignonne Bivin, NPS Randy Niman, USFS; Brigette Ranne, USFS
Wildlife Biologist	Robert Kuntz, NPS
GIS Specialist	Jack Rainford, USFS
Photographer	Rena Rex, USFS

III. Resource Advisors: (Note: Resource Advisors are individuals who assisted the burned area emergency response team with the preparation of the plan. See Part H for a full list of agencies and individuals who were consulted or otherwise contributed to the development of the plan.

Name	Affiliation
Vicki Gempko	*North Cascades National Park Service Complex*
Brigitte Ranne	*Okanagan-Wenatchee National Forest*

FLICK CREEK FIRE INFORMATION

he Flick Creek fire (Map 1) started sometime before 1330 hours on July 26, 2006. The fire was human-caused, the result of an individual burning papers and failing to completely extinguish all burning embers before leaving the scene (From Fire Cause and Origin Report). The origin of the fire was within the Flick Creek drainage, approximately 600 ft. upslope of Lake Chelan, at around the 1600 ft. contour. Fuels near the origin were a mix of an overstory of Douglas fir and ponderosa pine, with a sparse understory of shrubs, grasses and some forbs. Bigleaf maple is also scattered in the midstory. Mistletoe (or witches broom) was prevalent throughout the forest, which provided ample ladder fuels into the upper canopy. The fire grew quickly, and was estimated to be 1200 acres by the end of the first burning period.

Due to numerous wildfires burning elsewhere in the country, suppression forces were limited, although a significant initial attack effort including smokejumpers, rappellers, heavy helicopters and over 20 ground firefighters delivered by boat attempted to catch this fire, the fire behavior and difficult terrain thwarted this effort. Given the rapid rate of fire spread and the need to suppress this fire as soon as possible, the park immediately ordered a Type I Team, given the threats to property owners along Lake Chelan, the close proximity of the Stehekin Landing and adjacent residential community uplake of the Landing, the very steep terrain, and burning conditions present at the fire. Suppression actions focused exclusively on protecting structures in the immediately vicinity of the fire. Structures are located on four private land parcels and an NPS campground (with a National Register structure there). Those lakeshore structures were evacuated on July 27, and by the time the Type I team arrived on July 28 the fire was estimated at 2000 acres. The Governor of the State of Washington visited the Stehekin community on July 28 to offer state support for the effort.

The initial WFSA selected an alternative that would prevent fire spread from advancing uplake (northwest) into the Hazard Creek watershed, thus preventing fire spread into the Stehekin Landing and the Stehekin Valley. This alternative used natural barriers to stop fire's progress in the upper elevations of the Flick Creek and Fourmile Creek watersheds, where the fire would eventually run into sparser fuels and cliffs. Downlake the fire would be stopped by the lack of fuels resulting from the 2001 Rex Creek fire, while protecting structures and inholdings on the Okanagan-Wenatchee National Forest lands there.
With available resources, some fireline was constructed around homes along the lakeshore. When tactically appropriate, the lakeshore trail was used to prevent fire from damaging structures. On July 31, the northward advance of the fire toward Stehekin was stopped by crews building handline with handtools and an explosives crew in very steep and rocky terrain. This effort was followed up with a small burn out operation between the handline and the advancing fire. By August 1 the explosive and hand lines were on the fire's north edge and fire progression was checked along the ridge dividing the Fourmile Creek and Hazard Creek watersheds (Map 2). By August 1 the fire acreage was measured at 4077 acres, with additional growth confined to the upper drainages of the Flick Creek and Fourmile watersheds. During this first week the fire also moved downlake (southeasterly) and crossed into the Fish Creek drainage on lands managed by the Forest Service, where it burned into the Rex Creek fire of 2001 and was contained there.

By August 4th fire activity was confined to the upper watersheds of Flick Creek and Fourmile drainages, and a Type II Team assumed command of the fire. On August 10th a contingency fireline was constructed along the ridge between Helispot 15 and a natural fuel break on the ridge separating Hazard creek from Fourmile Creek (Map 2). This was done to provide a fuel break at the northern edge of the fire in case the fire made a run toward the Hazard Creek watershed there. Fire activity largely was low intensity, single torching activity as the fire moved into the upper elevations of Fourmile Creek, where fuels were drying as the summer progressed. Throughout the first three weeks of August water drops were made to slow fire progression upslope in the Fourmile Creek watershed, and water drops and limited line construction was completed on spots near the northern edge of the fire at midslope elevations, above Helispot H-15. By August 20 fire size was measured at 4738 acres.

On August 21, low humidities and high wind pushed the fire into the upper end of Hazard Creek above the constructed handline mentioned above. This was a result of long distance spotting from multiple trees torching in the Fourmile Creek drainage. Approximately 80 acres were burning mostly in Hazard Creek with a small finger of fire working into the head of Purple Creek. All of this fire activity occurred above 6500'. Retardant was used to contain the fire spread in Hazard Creek and additional retardant was used to reinforce the handline constructed above Helispot 15.

Because the fire breached the chosen alternative in the original WFSA, the WFSA was amended and an alternative chosen that would focus on structure protection, the use of natural barriers, and the War Creek and Boulder Butte fires to prevent fire spread to the north. This, in combination with expected late fire season precipitation, would provide reasonable options for the incident command teams managing the incident.

At the head of Hazard and Purple Creek drainages, the fire activity became minimal, progressing slowly downslope, primarily through rolling debris. A 14 day FARSITE analysis of expected fire growth provided on August 24th concluded the fire would not reach the Stehekin Landing during the 14-day projection period. However by September 5 the fire had reached the 3100' contour in Hazard Creek; when it reached contours below the 3000' contour by September 7, a Level 2 evacuation notice was issued by the Chelan County Sheriff's Dept. On September 8 a Level 3 (mandatory evacuation) was issued for the homeowners at the mouth of Hazard Creek, and on September 9 that Level 3 notice was extended to the Stehekin Landing and uplake to the head of the lake. A Level 2 evacuation notice was issued for the area between the head of Lake Chelan and the Harlequin Bridge.

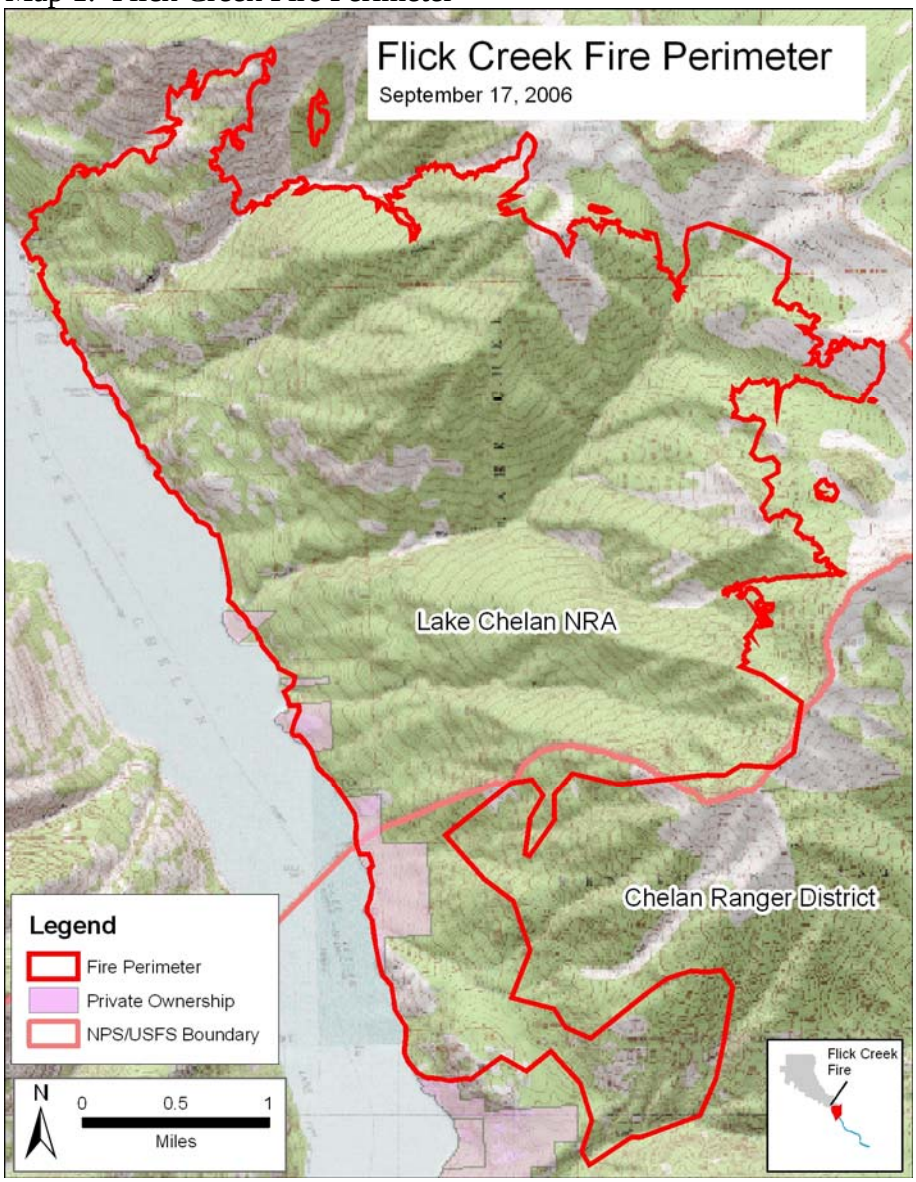
On September 10 the fire crossed onto the north side of the Purple Creek drainage. Burnouts around the Stehekin Landing were continued and completed on September 11 and 12. On September 13 the fire crossed Imus Creek, progressing northward. Seven retardant drops were made to slow the fire progression on the north edge. On September 14 cooler, moist weather moved in, with approximately 0.15" of rain falling on the fire. On September 15 a line around the north edge of the fire was completed. At this time the evacuation levels were dropped back to Level 2, and then to Level 1 on September 16. Mop-up efforts proceeded, and as of September 27 the fire has remained in check behind the control lines. Fire size is estimated at

7883 acres at this time, although it is recognized there has been some limited fire growth in the upper elevations of Fourmile Creek.

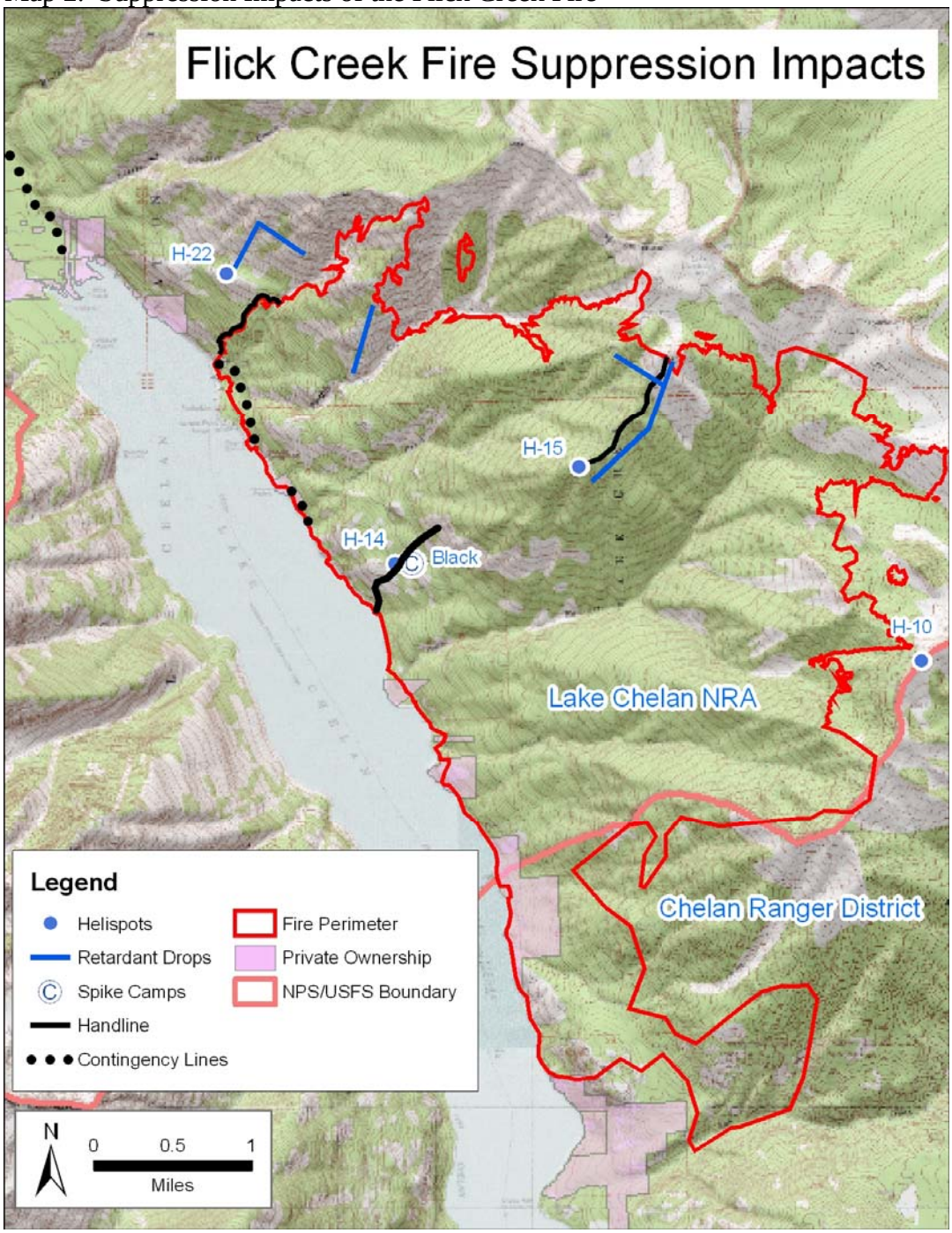
Due to the extreme terrain, most suppression efforts were limited to protecting structures and preventing the uplake spread of the fire. Most suppression efforts focused on water drops when helicopters were available; retardant drops occurred on 4 separate days, totaling 36,758 gallons of LCG-A and LCG-R retardant (a retardant containing ammonium polyphosphate, clay thickener, and iron oxide colorant). Approximately 4000 feet of explosives were used, all reinforced by handline construction. Total handline construction, excluding the short handlines built adjacent to private and federal structures, was approximately 3.5 miles. Fuel reduction had been completed around most of these structures during the past several years. Additional fuel modification was completed throughout the Stehekin Landing and at private inholdings uplake of the Landing to the head of the lake. A contingency line was completed from the head of the lake to Boulder Creek in anticipation of the fire reaching that area. Numerous snags were dropped along the powerline corridor from the Landing to the head of the lake as well. Four helispots were constructed within NPS boundaries. Spike camps was established for a limited period at Lucerne (downlake of the fire on Forest Service lands near the mouth of Railroad Creek) and at Helispot 14; during the height of suppression actions in September most fire personnel were supported from various locations at the Stehekin Landing and in the Stehekin Valley (including Weaver Point Campground). Several local businesses were utilized to support fire personnel.

At the peak of suppression activity total fire personnel reached 134 people, including numerous interagency fire personnel, the Chelan County Sheriff's office, and the Chelan Public Utilities District. No structures were lost other than two trail bridges and infrastructure associated with hiking trails.

Map 1. Flick Creek Fire Perimeter



Map 2. Suppression Impacts of the Flick Creek Fire



BURNED AREA ASSESSMENTS

SOIL AND WATERSHED RESOURCE ASSESSMENT

I. OBJECTIVES

- Assess overall watershed changes caused by the fire, particularly those that pose substantial threats to human life and property, and critical natural and cultural resources. This includes evaluating changes to soil conditions, hydrologic function, and watershed response to precipitation events.

- Develop map of soil burn severity.

- Identify potential flood and erosion source areas.

- Identify potential threats to life, property, cultural, and natural resources in relation to flood and erosion source areas.

- Develop treatment and management recommendations if necessary.

- Identify future monitoring needs.

II. ISSUES

- Potential threats to human life and property within, and downstream of, the Flick Creek Fire from potential increases in overland flow that could cause accelerated surface erosion, debris flows, and flooding. The values at risk include life, homes and outbuildings on private property, domestic water systems, public and private boat docks, campsites, trails and footbridges within and downstream of the fire.

- Threats to cultural resources, particularly an historic shelter, from increased flow and sediment deposition.

- Changes in water quality within and downstream of the fire due to increased suspended sediment, ash and nutrient loading from increased soil erosion within the burned area.

III. OBSERVATIONS

B. Background

1. Physiography/Geology

The Flick Creek Fire burned on the northeast side of Lake Chelan from the Imus Creek watershed above the Stehekin landing to the north side of Fish Creek watershed above Moore Point in Chelan County, Washington. Burned watersheds administered by the National Park Service include Imus Creek, Purple Creek, Hazard Creek, Fourmile Creek and Flick Creek, while Hunt's Creek and Fish Creek are administered by the Forest Service. The landscape is characterized by glacial troughs eroded on granodiorite and gneiss that served as melt-water drainage during the continental and alpine glaciation. Elevation ranges from 1100 feet near lake level to about 7100 feet near the upper ridge of the watersheds in the eastern part of the fire.

Geologists from North Cascades National Park and the Wenatchee National Forest have mapped surficial geology using a hierarchical mapping scheme that focuses on two scales that is linked to the USFS Ecological Unit Inventory (ECOMAP, 1993). At 1:62,000-scale, broad, primarily erosional landform features such as U-shaped valleys, valley floors and glacial cirques were mapped from air photos. At 1:24,000-scale, small, primarily depositional landforms such as terraces, alluvial fans, floodplains and mass movements were mapped in the field. These landform features are typically located in the bottom of valleys where tree canopy obscures them from being evaluated on air photos These features were created by distinct geological processes, many of which are still active, and their location and distribution provides important information on disturbance, aquatic and terrestrial habitat, plant communities, fire frequency, geologic hazards, and archeological potential.

Landform features include oversteepened bedrock slopes in the upper parts of the watersheds, debris chutes, and debris aprons across lower valley walls, bedrock benches, steep stream channels with narrow to no floodplains, bedrock canyons, and debris cones or alluvial fans at stream outlets. Specific landform features within the burned area are shown in Table 1.

Table 1. Landform features within the Flick Creek Fire.

Landform Features	
Lake Chelan National Recreation Area	**Wenatchee National Forest**
Ridge	Rounded Ridge Tops
Mountain Pass	Scoured Glacial Troughs
Cirque	Glacial Troughs
Valley Wall	Glacial Cirque Basins
Bedrock Bench	Glacial Moraines

Canyon	Glaciated Trough Valley Bottoms
Mass Movement: Fall/Topple	Landslide undifferentiated
Debris Apron: Glacial Till & Colluvium	Glacial outwash alluvial fan
Debris Cone, Debris cone terraces	
Valley Bottom	
Fan Terrace	
Other Mountain	

2. Soils

The inherent soil productivity is low for the Flick Creek fire. Soils are derived from hard crystalline igneous and metamorphic bedrock units (granite and gneiss). These rock units typically weather into very coarse "sandy soils" with a low nutrient capitol. A layer of volcanic ash forms the surface of most soils as well as varying thickness of pumice in some locations. Continental climatic conditions often limit available soil moisture. Soil moisture (except in valley bottoms) is often a limiting factor to plant growth on the rocky often southern exposures that predominate in the fire area. Glacial erosional and glacial fluvial processes have also had a major role in soil development on the landscape. Portions of some slopes may have glacial till deposits and surface soils include volcanic ash. Soil depths are relatively shallow with abundant rock outcroppings on trough walls and moderately deep on glacial till deposits and alluvial fans.

3. Climate

The Stehekin area is characterized by a xeric moisture regime (cold and wet winters, hot and dry summers). Average annual precipitation in the area of the Flick Creek Fire is approximately 30 to 35 inches. Precipitation occurs in two distinct seasons, early winter to spring snow storms and late summer convective thunderstorms. Rain-on-snow events in the spring of the year can lead to significant flooding events (i.e, 1948 flood). Precipitation, while low along the lakeshore, increases dramatically with elevation.

4. Hydrology

Shallow rapid debris flows are a natural hydrologic process on the mountain slopes surrounding Lake Chelan. Drainages are very steep and rocky. Natural (pre-fire) landform sediment delivery and routing efficiency (90%) is considered very high but episodic. Runoff is routed rapidly into a series of parallel first-order channels that form a dense network of tributary streams. Runoff from these tributaries can be flashy. The major source of sediment delivery is in the form of debris flows from tributary streams or first order debris torrents (chutes) into the main channels. This delivered sediment has and continues to contribute to the formation of debris cones and alluvial fans (characterized by sediment size and steep slope) at the mouth of subwatersheds. Over the centuries, a considerable amount of suspended and bed load sediment has been deposited into Lake Chelan. Due to the depth of the lake many subwatersheds deposit coarse

sediment as a steep debris cone, most of which is submerged, rather than as a lower sloped alluvial fan or delta. Larger debris flow deposits, such as at Imus Creek, Purple Creek, Hazard Creek, Fourmile Creek and Flick Creek, tend to gradually heighten their debris cones by channel aggradation and overtopping which can cause diversion of subsequent flows with resultant channel migration. Lower sloping alluvial fans, such as at Fish Creek, also display depositional features indicative of channel migration across the fan. Consequently, structures on active cones and fans are at risk of being damaged or destroyed during a debris flow event.

Relatively large debris flows trigger pulses of episodic sediment delivery. Normally debris flows occur in response to dramatic changes in vegetation due to landscape-level fires and/or from intense early summer thunder storms. Based upon local fire history, increased erosion rates induced by fire will substantially elevate the already extant risk of debris flows for at least the next 5 years or until vegetation has substantially recovered in the burned areas. Higher surface erosion rates on hillslopes will also increase the rate of debris failures in drainageways and ephemeral dissections. Less extreme precipitation and snow-melt events can trigger debris failures from burned areas.

C. Methodology

The purpose of this assessment is to determine if the fire caused emergency watershed conditions and if there are values at risk from these conditions. If emergency watershed conditions are found, and values at risk are identified, then the magnitude and scope of the emergency is described and the values at risk and resources to be protected are analyzed. Where feasible, treatment prescriptions are developed to protect values at risk. Emergency watershed conditions include both hydrologic and soil factors; typically potential for increased flooding and sedimentation and deterioration of soil condition, particularly loss of soil cover, leading to erosion and changes in hillslope hydrologic function resulting from decreased infiltration rates and increased runoff.

Due to remote access and steepness of the terrain only aerial reconnaissance was conducted to review overall watershed condition of the burned area during the BAER assessment. Ground reconnaissance was conducted for downstream values at risk. Field reconnaissance, conducted on August 13th, included a helicopter flight to review the spatial pattern of fire severity in relation to potential downstream values at risk for the watersheds between and including Fourmile Creek southward to the north side of Fish Creek. Values at risk and specific hazards associated with stream channels on debris cones were further identified during subsequent ground reconnaissance. Additional aerial and ground reconnaissance was conducted on September 19th and 20th to assess the watersheds between and including Fourmile Creek northward to Imus Creek that burned since the August assessment. The objectives of the field visits were to:

1) develop a burn severity map;

2) identify the watershed conditions that may contribute to increased risks;

3) review channel morphology and riparian conditions;

4) assess hillslope conditions;

5) identify and inventory values-at-risk, and

6) determine needs for emergency stabilization.

1. Satellite Mapping Using Burned Area Reflectance Classification Map

A Burned Area Reflectance Classification (BARC) map is a satellite-derived map of post-fire condition that classifies the burned area into unburned, low, moderate and high. The satellite image was taken by Landsat 5 on August 2, 2006 and initially classified at the USFS Remote Sensing Applications Center in Salt Lake City, Utah. This preliminary BARC classification (map) was modified and verified by the BAER team during helicopter reconnaissance on August 13, 2006 to produce the burn severity map. Bedrock and dense rocky areas are typically mapped as unburned or low burn severity because they do not contain the levels of fuel loading that produce moderate and high burn severities. Nevertheless, on the satellite image bedrock and dense rocky areas give a reflectance signal similar to areas that burned at high burn severity. Aerial reconnaissance enables the burn severity mapper to distinguish rocky terrain from high burn severity to produce a more accurate map of fire effects to vegetation and soil.

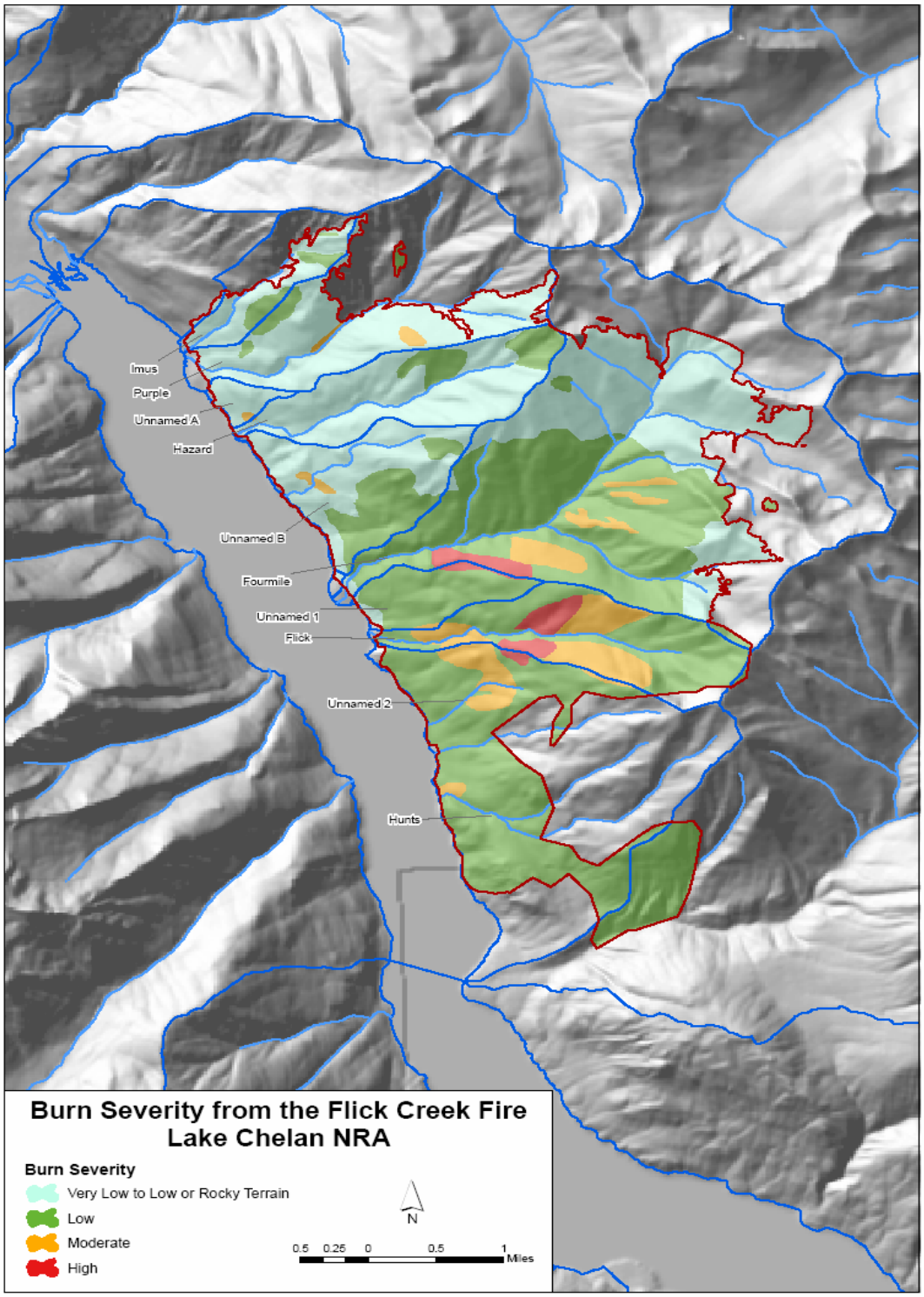
A BARC image was not available during the second field assessment on September 19th and 20th due to excessive cloud coverage during the time when the satellite passed over the burned area. Clear imagery was obtained by the EROS Data Center in Sioux Falls, SD on September 27th, and a second preliminary BARC classification made available the following day. This preliminary BARC was modified using pictures taken during the helicopter reconnaissance on September 19th to produce a burn severity map that included the watersheds north of Fourmile. Map 3 contains the final burn severity map.

2. Soil Burn Severity

Soil burn severity is not the same concept as fire intensity and fire severity as recognized by fire behavior specialists. Fire intensity and fire severity relate to fire behavior and fire effects, respectively, on overstory and understory vegetation. Fire ecologists use the term burn severity to describe fire effects to vegetation, while soil burn severity relates specifically to effects of the fire on soil conditions. Although soil burn severity is not primarily a reflection of fire effects on vegetation, vegetative conditions and pre-fire vegetation density are among the indicators used to assess soil burn severity.

Soil burn severity parameters include changes in litter and duff (vegetative ground cover), loss of soil structure, destruction of fine and very fine roots in the surface horizon, and development of hydrophobic (water repellent) soil surfaces. In some cases there may be complete consumption of vegetation by fire with little effect on soil. In general, the denser the pre-fire duff and litter layer and the longer the residence time of the fire, the more severe the effects are on soil. For example, deep ash after a fire usually indicates a deeper litter layer prior to the fire, which generally supports longer residence times.

Map 3. Burn severity, Flick Creek fire


Imus
Purple
Unnamed A
Hazard
Unnamed B
Fourmile
Unnamed 1
Flick
Unnamed 2
Hunts
Burn Severity from the Flick Creek Fire
Lake Chelan NRA
Burn Severity
Very Low to Low or Rocky Terrain
Low
Moderate
High
N
0.5 0.25 0 0.5 1
Miles

The burn severity of both vegetation and soil each contribute to assessing potential hydrologic response of watersheds. Due to limited time in the field and ground access only to the lower-most parts of the watersheds (in proximity to the Lakeshore Trail and adjacent slopes) ground reconnaissance of burned soil conditions higher in the watersheds was not achievable during this assessment. As a result the burn severity map derived from the BARC is more greatly influenced by overstory vegetation burn severity (or mortality) and less by understory and soil conditions, than is typically evaluated during a BAER assessment. Aerial reconnaissance, or BARCs, alone are insufficient for deriving a true soil burn severity map, primarily because areas with unburned tree canopy do not enable observation of the ground surface. But, for all other areas aerial reconnaissance and BARCs are invaluable for assessing the relative amount of heat that was in contact with the soil during the fire. In general, black ground conditions indicate incomplete consumption of ground fuels (char), while grey and white ash result from progressively greater amounts of burning. The spatial distribution and pattern of char and ash color are the primary evidence for the relative amount of conductive and radiant heat that affect the soil during the fire.

3. Watershed Response

The major determining factor influencing runoff and erosion from burned hillslopes is the amount of disturbance to the vegetative groundcover that protects the underlying mineral soil (Robichaud 2000). The unburned forest floor (vegetative groundcover) consists of a litter layer (leaves, needles, fine twigs, bark flakes, matted dead grass, mosses and lichens, O1 soil horizon) and a duff layer (partially decomposed remnants of the material in the litter layer, O2 soil horizon) (Martin and Moody 2001). These layers absorb most of the rainfall, provide storage of water and obstruct the flow of water on hillslopes. The combustion process converts the forest floor into ash and charcoal. Ash and small soil particles seal soil pores (Morin and Banyamini 1977, Neary et al. 1999), decreasing the infiltration rate (Fuller et al. 1995, Barfield et al. 1981) and increasing potential runoff and erosion. When the charcoal and ash are removed from the hillslope by post-fire runoff or wind, the soil is left bare and susceptible to rain splash and overland flow.

Overland flow occurs as a result of rainfall in excess of soil infiltration capacity and the storage capacity of depressions. On the unburned forest floor overland flow follows a myriad of interlinking flow paths that constantly change as organic material (litter and duff layers) and inorganic material (rock) are encountered (Huggins and Burney 1982). Consumption of the forest floor by fire alters the path of overland flow by reducing its overall length and concentrating flow. This concentration of overland flow increases the hydraulic energy of the flow and can result in rill erosion. At the watershed scale, the reduction in length of hillslope flow path and the formation of rills that have a high water conveyance capacity, reduce the times of concentration or the amount of time for overland flow to reach a defined point within the watershed.

Overland flow is also influenced by the fire-induced water repellency or hydrophobicity of soils. The reduction of infiltration due to water repellency can increase overland flow (DeBano et al., 1967). Infiltration curves for water repellent soils reflect increasing wettability over time once the soil is placed in contact with water. Infiltration increases

with time because the hydrophobic substances responsible for water repellency are slightly water soluble and slowly dissolve, thereby increasing wettability. In general, hydrophobicity is broken up or is sufficiently washed away within one to two years after a fire (Robichaud 2000).

Raindrops striking exposed mineral soil with sufficient force can dislodge soil particles and small aggregates. Once soil particles are detached by splash erosion they are more easily transported in overland flow. Surface erosion is defined as the movement of individual soil particles by a force, and is initiated by the planar removal of material from the soil surface (sheet erosion) or by concentrated removal of material in a downslope direction (rill erosion). Surface erosion is a function of four factors: 1) susceptibility of the soil to detach, 2) magnitude of external forces (raindrop impact or overland flow), 3) the amount of protection available by material that reduces the magnitude of the external force, and 4) the management actions applied to the soil that makes it less susceptible to erosion (Foster 1982; Megahan 1986).

Debris flows pose a hazard distinct from other sediment-laden flows because of their unique destructive power; debris flows can occur with little warning, exert great impulsive loads on objects in their paths, and even small debris flows can strip vegetation, block drainage ways, damage structures, and endanger human life. Cannon et al. (2000) found that the generation of debris flows at Storm King Mountain, Colorado, started with significant sheetwash, rill, and rainsplash erosion and transport of burned mineral soil and dry-ravel materials from high elevation hillslopes within contributing areas. The majority of the debris flows from Storm King Mountain initiated in 0 - and 1st order channels and hollows.

Debris flows are frequently produced in response to convective thunderstorm activity over basins burned by wildfire (Parrett 1987; Meyer & Wells 1997; Cannon 2001), as well as in response to winter frontal storms (Morton 1989; Cannon 2000). Cannon (et al., 2003) found that nearly 70 percent of the debris-flow generating storms for the Coal Seam and Missionary Ridge fires of 2002 were of durations equal to or less than 2 hours, and 93 percent of these had recurrence intervals of less than or equal to 2 years. The average intensities of the debris-flow triggering storms ranged between 0.04 and 0.67 inches/hour, (1.0 and 17.0 mm/hr) with 10-minute peak intensities up to 2.46 inches/hour (62.5 mm/hr). Robichaud (2002) found that debris flows were likely to initiate when rainfall intensities exceeded 0.15 inches in 30 minutes. Local knowledge suggests that rapid spring snowmelt, summer convective storms, and fall rain events could be triggers to debris flows in this area.

Cannon (et al., 2003) reported that debris flows were produced from basins underlain by interbedded sandstones, siltstones, and conglomerates, and from basins underlain by gneissic quartz monzonite and quartzite. The dominant geologic types within the Flick Creek Fire (see Geology on page 1) are similar to some of the geologic types reported by Cannon to produce debris flow response to storms.

4. Erosion Potential Modeling

Erosion potential and sediment yield was modeled for the Flick Creek watershed using the Erosion Risk Management Tool (ERMiT) developed by the USFS Forest Sciences Laboratory in Moscow, ID (Robichaud and others, 2006). ERMiT provides a distribution of rain event erosion rates. This is unlike most erosion prediction models, which typically have "average annual erosion" as output. ERMiT is a web-based application that uses Water Erosion Prediction Project (WEPP) technology to predict probability of erosion on burned and recovering forest, range, and chaparral lands, with and without the application of mitigation treatments. ERMiT combines weather variability and the spatial and temporal variabilities of soil properties to model the range of post-fire erosion rates likely to occur. ERMiT produces a distribution of runoff event sediment delivery rates with corresponding probabilities for exceeding these sediment amounts for each year for five years after the fire. These are based on one 100-year WEPP run and 20, 30, or 40 ten-year WEPP runs.

5. Pre and Post-Fire Flow Modeling

Pre and post-fire flood flows were modeled for the Flick Creek watershed using the USGS-Washington State Department of Transportation regression analysis (Cummans etal. 1975):

Q_T = (a) (A) (P) (F), where

Q_T = flood magnitude having a T-year recurrence interval, in cubic feet per second

a = regression constant for eastern Washington,

A = watershed area in square miles,

P = mean annual precipitation in inches,

F = percentage of watershed covered by forest.

6. Post-Fire Debris Flow Modeling

A statistical model designed to characterize the volume of debris flows after fires was applied to the Flick Creek watershed (Gartner, 2005). Model volume parameters are a function of (1) the area of the watershed that burned at moderate to high burn severity, (2) the area of the basin with gradients steeper than 30% slopes, and (3) selected rainfall input.

Pre-fire debris flows are typically infiltration/saturation-triggered events resulting from long-duration storms that diminish soil cohesion and leads to slope instability. Post-fire

debris flows are typically runoff-triggered events that are independent of soil saturation. The two are very different processes and cannot be compared with the same model. Smaller storms in a burned watershed can trigger bigger and faster debris flows than longer-duration infiltration storms. In as short as five minutes after initiation of rain, runoff-triggered events can result in flash floods and debris flows downstream and leave very little response time for human safety (Cannon, personal communication)!

D. Findings

1. Burn Severity and Watershed Response

A burn severity map is included in the BAER Assessment (Map 3). Table 2 displays a summary of burn severity in acres and percentage of watershed for the Flick Creek Fire. The Flick Creek watershed experienced the highest percentage of burned area (93%) and the highest percentage of high and moderate burn severity (39%). The Fourmile Creek watershed is the second-most impacted watershed with regard to burn severity within the Flick Creek Fire.

Table 2. Acreage and percent soil burn severity by watershed.

		HIGH		MODERATE		LOW		VERY LOW		UNBURNED		TOTAL ACRES BURNED	
Watershed	Total acres in watershed	Acres	% of watershed	Acres	% of watershed	Acres	% of watershed	Acres	% of watershed	Acres	% of watershed	Acres	% of watershed
Fish	10,082	0	0	0	0	469	5	x	x	9612	95	469	5
Hunts	866	0	0	13	1	208	24	x	x	645	75	221	25
Unnamed 2	522	0	0	5	1	225	43	x	x	292	56	230	44
Flick	841	85	10	243	29	473	56	x	x	40	5	801	95
Unnamed 1	303	15	5	6	2	266	88	13	4	3	1	300	99
Fourmile	4300	54	1	125	3	1420	33	1135	27	1566	36	2734	64
Unnamed B	710	0	0	13	2	240	34	448	63	9	1	701	99
Hazard	786	0	0	1	0	131	17	652	83	2	0	784	100
Purple	1568	0	0	27	2	47	3	673	43	821	52	747	48
Unnamed A	84	0	0	4	5	0	0	77	91	3	4	81	96
Imus	400	0	0	0	0	54	14	176	44	170	42	230	58
All Watersheds	20,462	154		437		3533		3174		13,163		7298	36

Watersheds in **bold** are partially ("Unnamed 2") or wholly (the remainder) on NPS lands. Fish, Hunts and part of Unnamed 2 are on USFS lands.

Grassy areas and areas of sparse vegetation provided little to burn and very short fire residence times, thus soil properties are not significantly altered in most places. These areas are classified as low soil burn severity. Low soil burn severity in shrub or forested vegetation is characterized by remaining litter and duff, some of which may be charred but not entirely consumed, and vegetation is generally mostly green and expected to survive.

Areas of moderate severity are characterized by partial consumption of litter and duff, and tree crowns are a mix of green and brown. Trees and shrubs with brown leaves/needles will provide leaf/needle cast that will act as a ground cover, providing

protection from erosion and raindrop impact, help reduce runoff velocity, and promote infiltration. Post-fire runoff and erosion are expected to increase over pre-fire levels until the vegetation recovers.

High soil burn severity areas showed the effects of longer periods of intense heat as observed by the complete loss of organic surface materials, most common directly underneath the forest canopy. Post-fire runoff and erosion are expected to increase significantly over pre-fire levels due to the combination of loss of ground cover, steepness of slope and vertical length of high soil burn severity areas.

The watershed response of the Flick Creek Fire is expected to include: 1) an initial flush of ash; 2) sediment delivery and deposition in low gradient stream reaches and 3) increases in peak flows that could potentially cause flooding or debris flows downstream.

Fire effects can also have a direct influence on the long and short-term accumulation of organic matter. About 2500 acres of the Flick Creek fire experienced low soil burn severity. Where the fire burned with a low fire severity no adverse effect on organic matter input in the short term or long term is expected. However, areas with high soil burn severity will likely reduce nutrient availability in the short and long term.

The Flick Creek Fire likely had some effect in volatilization of nitrogen (N), phosphorus (P) and sulfur (S) in a portion of Flick Creek and Four-mile Creek. In the high and moderate soil burn severity areas the duff/litter layer was consumed, most of the foliage and fine twigs were removed from conifers, and larger downed woody debris was severely charred.

There are numerous snags in the burned area that will eventually fall. The decomposition rate of this large downed woody debris is expected to exceed 100 years before becoming incorporated into soil wood as a part of the nutrient capital (Edmonds, 1990-p. 119). However, if the natural fire return interval occurs, this downed wood would be exposed to at least three ground fires. Hence, large downed wood on these sites will likely be consumed or reduced by fire before becoming organic matter incorporated into the soil.

2. Erosion Potential

Soils occurring on steep slopes where ground vegetation burned off, and especially in areas of moderate and high burn severity where the tree canopy was also burned or scorched, have an increased potential for accelerated rill and sheet erosion during precipitation events. Sediment generated from these source areas has the potential to be delivered to waterways, causing bulked water flows during flood events. Burned areas are also more susceptible to wind erosion than pre-fire conditions due to loss of vegetative groundcover.

3. Sediment Delivery and Peak Flows

Sediment delivery and peak flows are expected to increase in response to post-fire rainfall events, especially in the Flick Creek watershed and to a lesser extent in the

Fourmile, Hazard, Purple, and Imus watersheds and the small unnamed facet watersheds draining directly into Lake Chelan. Almost all of Flick Creek watershed burned (95%) and over one-third (39%) burned at moderate to high burn severity. Increases in sediment delivery and storm flow in this watershed will be in response to increased sheet, rill, and channel erosion on hillslopes with moderate and high burn severity (see Tables 3 and 4).

Between 48 and 64% of the Purple, Imus and Fourmile watersheds burned, but less then 5% of these watersheds burned at moderate and high burn severity. Over 95% of Hazard and most of the unnamed facet watersheds burned, but less than 7% of these watersheds burned at moderate and high burn severity. Increases in sediment delivery, storm flow and debris flows should be slightly elevated in these watersheds due to the fire. Ash and small char particles will flush off the hillslopes during the first few rain events. Increased sheet wash and rilling will occur on burned slopes underneath and downslope from areas where the tree canopy was burned or scorched. Yet, needlecast from scorched trees provide a surface mulch that will attenuate soil erosion of surface particles from sheet wash.

Several hillslope facets are drained by 1st-order channels directly into Lake Chelan. These small unnamed watersheds, such as the one at Fish Creek Campground, have small catchments with steep stream gradients. Approximately 100% of these watersheds burned, primarily at low severity, but have areas that burned at moderate to high burn severity which were too small to map. These watersheds also have an elevated risk for small rapid, flashy flows entrained with sediment and debris.

Only 5 percent of the Fish Creek watershed burned, all at low burn severity, from the Flick Creek Fire. Increased runoff and sediment delivery from the burned area is not expected to significantly increase above background rates for the watershed. But, because of the larger acreage that burned during the Rex Fire, there will be a slight additive effective to overall post-fire watershed response.

Table 3. Predicted sediment yield for Flick Creek watershed.

10% probability sediment yield will be exceeded*	Sediment delivery in tons per acre**				
	Year following the fire				
	1st year	2nd year	3rd year	4th year	5th year
Untreated hillslopes	11.68	6.07	0.72	0.66	0.65

* There is a 10% chance that sediment outputs listed above, by year, will be greater than listed. This is due to the chance that larger precipitation amounts will fall, driving even more erosion and sediment delivery than were used in the ERMiT model.

** Sediment delivery is eroded soil particles routed to a stream, where the material can be transported by water.

Table 4. Calculated stream discharge for Flick Creek watershed.

Recurrence Interval	Pre-fire Discharge (CFS)	Post-fire Discharge (CFS)	% Difference
5 years	51	55	8
10 years	86	92	6
25 years	134	144	7
100 years	219	238	9

4. Debris Flows

There is an elevated risk for the occurrence of debris flows, particularly in the Flick Creek watershed, due to the fire. High volumes of sediment can be mobilized in this watershed from low to moderate intensity storms of short duration (see Table 5).

Table 5. Calculated debris flow volumes in Flick Creek watershed for modeled storms.

Storm event	Precipitation		Calculated volume of debris flow	
	(inches)	(mm)	(yd3)	(m3)
1 hr, 1 year storm	0.30	7.62	10,212	7,796
1 hr, 2 year storm	0.40	10.16	11,170	8,527
1 hr, 5 year storm	0.50	12.70	12,089	9,228
1 hr, 10 year storm	0.60	15.24	12,984	9,911
1 hr, 25 year storm	0.70	17.78	13,865	10,584
0.5 hr, 1 year storm	0.20	5.08	9,182	7,009
0.5 hr, 2 year storm	0.30	7.62	10,212	7,796
0.5 hr, 5 year storm	0.35	8.89	10,698	8,166
0.5 hr, 10 year storm	0.50	12.70	12,089	9,228
0.5 hr, 25 year storm	0.60	15.24	12,984	9,911

The 1102-acre Flick Creek watershed is approximately 2.5 miles long, 0.75 miles wide, and 6,000 feet high. Steep sideslopes, high stream gradient, bedrock walls and rock fall deposits predispose this watershed to rapid runoff during storms and debris loading of the main channel. A narrow bedrock canyon in the lower reach of the watershed will constrict and heighten flash flows, increase the potential for debris or log jams to bottle-neck in the canyon, and increase the erosive power of flow as it exits the canyon above the debris cone. Neither hillslope treatments nor channel treatments would be effective in attenuating flood flows or debris flows. In fact, channel treatments are inappropriate for this hydrogeomorphic setting since they could become entrained during flash floods or debris flows.

Fourmile Creek shows geologic evidence of previous debris flows, but the low acreage that burned at moderate and high burn severity within this watershed does not substantially increase the existing risk. Some of the unnamed 1st-order drainages along facets to Lake Chelan almost completely burned at low burn severity, but have areas that burned at moderate to high burn severity that were too small to map. These small and narrow, but high gradient watersheds are now at increased risk of small debris flows due to the fire. The potential for increased peak flows, debris flows, and sediment deposition will be the highest during the summer convective storm season and winter rain-on-snow events until vegetation recovers.

Flood, debris and mud flow potential and sediment delivery will decrease as hillslopes re-vegetate and groundcover provides organic matter to the forest floor that will gradually increase soil infiltration capacity and hillslope roughness, thereby reducing overland flow.

5. Values at Risk

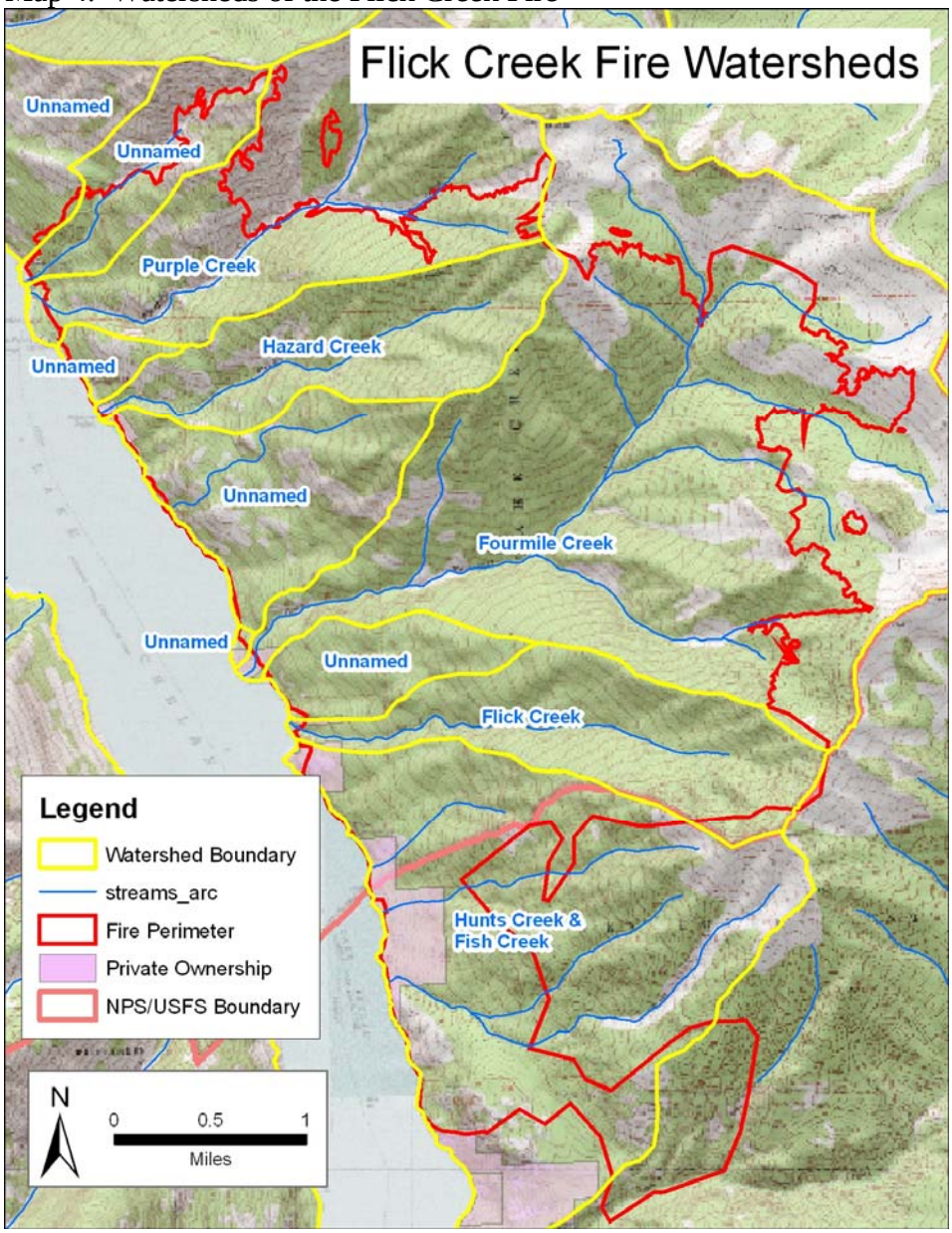
Watersheds within the Flick Creek fire are displayed in Map 4.

Structures along the Lake Chelan shoreline that are located on debris cones are inherent values at risk because these landforms are potentially hazardous areas. Debris cones are indicative of dynamic hydrogeologic events – debris flows – that episodically flush earthen debris and rock from steep watersheds, depositing them into the lake and along the shoreline at channel outlets. Fire increases the level of risk relative to the amount of acreage that burned and degree of burn severity in the watersheds. Although the Flick Creek Fire burned between 50 – 100% of most of its watersheds, with the exception of Flick Creek watershed most of the watersheds burned at low severity, leaving much of the tree canopy intact. Consequently, the increase in relative hazard level (as opposed to calculated risk value) is much lower than had these watersheds experienced a stand-replacing fire.

Nevertheless, there are potential values at risk to be considered for the Flick Creek Fire that include public buildings, houses, docks, water intakes, trails, footbridges, campgrounds, and a waste-water treatment facility. The effect of the fire on watershed

condition has increased the potential hazard to these values and human life—primarily in watersheds that are predisposed to mass failure events (e.g., above recreation sites and

Map 4. Watersheds of the Flick Creek Fire



structures on debris cones and alluvial fans). Most of the private lands and all of the campgrounds are located on alluvial fans or debris cones. Due to the national attraction of Lake Chelan, homeowners and recreationists will continue to use these facilities following the Flick Creek Fire. Even with temporary campground closures to reduce the threat to recreationists, people will continue to occupy and use the alluvial fans and debris cones that are at risk to severe flooding and/or debris flows. The threat to these areas was present prior to the fire and the fire has now elevated that risk.

The predominant erosion processes are not surface erosion but rather mass failures that are typically shallow and rapid in nature. Log erosion barriers, straw wattles and helimulching are not appropriate hillslope treatments in the burned watersheds to reduce this risk because: (1) slopes are too steep and rocky for these treatments to be effective in trapping sediment or reducing concentrated flows and (2) these treatments are not effective in reducing mass failure processes. Channel treatments are also not appropriate for these high gradient perennial stream systems since they could become entrained during flash floods or debris flows.

As previously described, the upper watersheds are comprised of extremely steep, rocky glacial trough landforms which are at an elevated risk for debris failures in streams and tributary channels. Due to impaired watershed conditions, remaining snags will break and fall or become wind throw. Increased amounts of large woody material, in upper debris tracks and stream channels, will become incorporated in the debris slides for which the risk is likely to increase. Post fire debris accumulations will accelerate the risk of debris failures in upper watershed channels which will pass additional soil, rock, and woody debris into lower stream reaches. This added debris will eventually be swept downstream onto the debris cones and alluvial fans at the stream outlets. Also, this added debris can form in-channel debris jams which can either breach and blowout during a flood, causing a surge of material to redeposit downstream, or divert flow across cones or fans, forming new channels.

These types of flood events occurred on Lake Chelan following the 1970 fires. A surge of flood debris washed out two dock facilities and a campground. Debris flows in 2006 along Lake Chelan came out of Canoe Creek (2001 Rex Creek Fire; see photo below) and Big Creek (2004 Deep Harbor Fire). At Big Creek, the dock, outhouse, shelter, and retaining wall were destroyed by the debris flow and the material substrate for the campground flushed out and replaced by boulders and finer sediment. Fortunately no lives were lost, in part due to administrative closures of National Forest System lands in Lake Chelan. Unfortunately, four fatalities occurred in the adjoining drainage (Entiat Valley) following the same type of flood event after the 1970’s fires.

Figure 1. Debris flow deposits at outlet to Canoe Creek following snowmelt, Spring 2006. Note house to left of channel.

Stehekin Landing: Potential threats to life and property from hydrologic events already exist (pre-fire) on both public land and private in-holdings located on the terminal debris cones of Imus and Purple Creeks at Stehekin landing. Figure 2 shows the layout of the community with respect to the two debris cones and their subordinate landform features – terraces, levees, floodplains and active channels. These subordinate landform features may be viewed as hazard zones of varying relative degree (low, moderate or high) based on existing physical conditions that direct and constrain stream flow. Active stream channels, whether perennial or intermittent, and their floodplains comprise the highest hazard zone. Terraces and the levees separating them from the active channels and floodplains are less hazardous areas. But, these settings could change as the result of a large channel obstruction during a flood or debris flow that could cause flow to abandon the channels presently occupied and establish new ones across each debris cone.

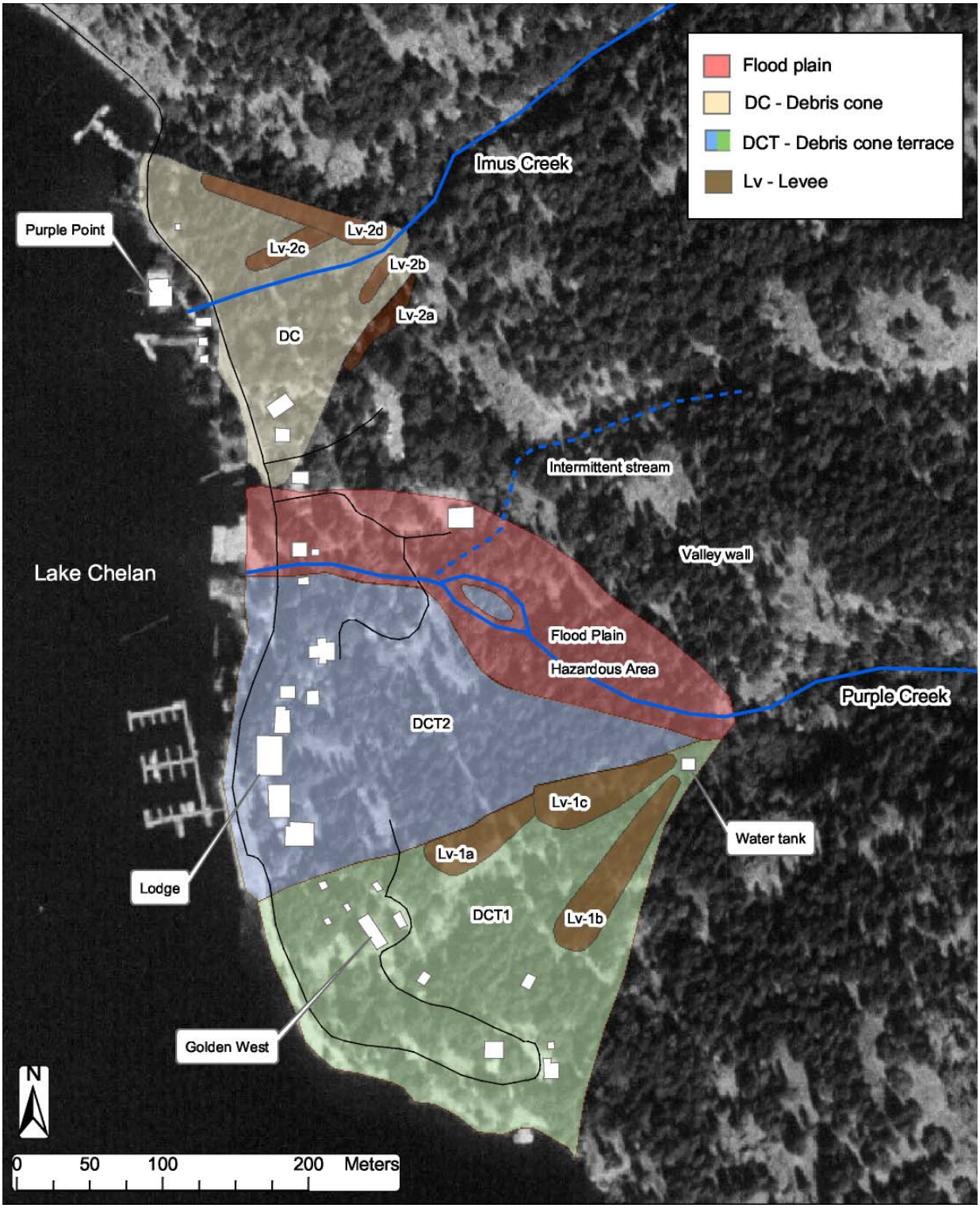
Imus Creek Watershed: Imus Creek is a first-order channel that drains a narrow long steep gradient watershed. The upper third of the watershed is predominantly bedrock valley wall and talus slopes with little to no soil cover or vegetation. Stream flow derives mostly from snowmelt and summer thunderstorms. These geologic and weather conditions provide for little infiltration and rapid runoff, the combined effect making Imus watershed a high runoff-gravity driven system predisposed to flash floods and debris flows. Overall, the Imus debris cone should be considered a naturally high hazard area for hydrologic events and this relative hazard rating may be further qualified as follows:

Highest hazard area: active stream channel

Intermediate: south half of debris cone

Lower hazard area: north half of debris

Figure 2. Map of landform features on debris cones at Stehekin landing.



Overall, the part of the debris cone north of the channel, where Purple Campground is located, is better protected by levees then the debris cone area south of the channel. Secondarily, the campsites farther away from the channel are at a slightly lower risk than those closest to the channel. The south half of the debris cone is afforded little protection by its configuration of levees.

Structures potentially at greatest risk in this watershed are the green house at Purple Point and the Courtney log house, both of which flank Imus Creek at its outlet, and the concrete box culvert at the road. The steep and entrenched linear stream channel on the debris cone lacks a floodplain, indicating that it passes stream flow efficiently to Lake Chelan. Maintaining this channel and the culvert free of obstructions so that it continues to pass confined flow is the first order and minimalist means, of protection from flooding and debris hazards for the rest of the debris cone

Purple Creek Watershed: Purple Creek is a second-order channel that drains a broad high-elevation headwater area through a bedrock canyon in the lower part of the watershed. First and second order channels above the canyon have well-developed narrow floodplains. Riparian vegetation was little disturbed by the fire except in the canyon where the fire burned at low and moderate severity. The upper third of the Purple debris cone also burned at a low severity. The Purple debris cone is larger and broader than the one along Imus Creek and has distinctive landforms showing changes in stream channel position during its existence. This debris cone should also be considered a natural high hazard area for hydrologic events. Relative hazard zoning may be further refined based on its fluvial landforms as follows:

Highest hazard area: active stream channel and floodplain along the north side of the cone

Intermediate: terrace 2 in the middle section of the cone

Lower hazard area: terrace 1 and its levees on the south section of the cone

Terrace 1 is the oldest and highest surface on the debris cone with the most developed soil and vegetation coverage. It was probably last active when, the lake was several feet higher in elevation. Terrace 2 is younger and lower in elevation and was probably active with the lake level was dropping towards its present elevation.

Structures potentially at greatest risk are those in the floodplain, especially those along the outer, north side of the active channel, and the concrete box culvert at the road. McKellar cabin is one of these structures, which is immediately adjacent to the channel. The waste water treatment facility is another and is located immediately below the confluence of an unnamed tributary to Purple Creek. All of this small tributary watershed burned at a low severity and may experience slightly elevated runoff until ground vegetation is re-established.

Structures on terrace 2 are in a lower hazard zone and structures on terrace 1 are in the lowest hazard zone. These relative hazard zone classifications should remain unchanged as long as Purple Creek continues to flow through the present floodplain. Maintaining

channel and floodplain clearance near the head of the cone will better enable conveyance of flood flows and reduce the risk of channel abandonment and reoccupation of either of the terrace surfaces.

Hazard Creek Watershed: Similar to Imus Creek, Hazard Creek is a first-order channel, but its watershed has less exposed bedrock, more forest cover and well developed riparian vegetation. The fire burned mostly ground vegetation on the hillslopes at low severity and very little of the forest canopy and riparian area. Increased runoff and flash flows can be expected until ground vegetation is re-established.

Structures at risk of flash floods or debris flows include a footbridge, pumphouse and water line located in the stream channel adjacent to the northern-most house at Adams Point, just below the Lakeshore Trail. The channel is 20 feet deep at the footbridge. The house is partially protected by a stream channel levee. All other structures at Adams Point are on older surfaces of the debris cone.

Fourmile Creek Watershed: Potential threats to life and property already exist (pre-fire) on both Park land and private in-holdings located on the terminal debris cone (fan) of the Fourmile watershed. Helicopter reconnaissance and ground assessment show the debris cone heading at the outlet of a narrow, steep-walled canyon. The active stream channel makes an abrupt left turn at the head of the debris cone and empties into the Lake on the south side of the cone. The most recent debris flow event is marked by a high embankment of boulders around the outside curvature of the channel (right bank) and is higher in elevation than the inside curvature of the channel (left bank).

The upper part of the debris cone, including a cultural site on Park land with historic stone walls, is within the burned area. The Lakeshore Trail that extends across the upper part of the debris cone and a footbridge that crosses the stream were burned during the fire. This trail segment and stream crossing, even if the bridge is replaced, is a potential life-threatening hazard area during and shortly after storms or rain-on-snow events. Flood and debris flow hazard warning signs should be posted along the trail from each direction where the trail starts to drop into the drainage. The cultural site is on a higher terrace and is at lower risk for impact by a debris flow or flash flood.

All other structures are located on private land on the lower part of the debris cone a short distance downstream from the burned area. Private structures include the historic Maxwell house and one outbuilding, both located on the crest of the debris cone, a construction staging area located on a perched drainage outlet, a second, smaller house and associated outbuilding located in a dry channel bottom (also a perched outlet), one dock below the houses, and historic stone cairns on a 20-foot high terrace near the stream outlet.

The structures most at risk are the small house and outbuilding located in the dry stream channel to the north of Maxwell's house. Flow could reoccupy this channel should channel morphology at the head of the debris cone change. The perched drainage outlet south of the Maxwell house is the second most-likely area of risk. A third, smaller, abandoned channel filled with firewood parallels the north side of the Maxwell house and is a lower risk. These channels should be kept free of permanent structures and stored

material. A major debris flow could damage, destroy or sweep away any material left in these channels.

Flick Creek Watershed: Potential threats to life and property already exist (pre-fire) in this watershed. The Lakeshore Trail goes up the drainage between 100 to 200 meters on the north side of the channel and crosses the stream just below a constricted canyon. Flood and debris flow hazard warning signs should be posted visible from both directions where the trail enters into this drainage (see Soil and Watershed Photo Appendix, this assessment).

One house, an outbuilding, and a dock are located on a small debris cone at the stream outlet. A waterline, burned by the fire, extends up the debris cone. Looking down the long steep deep and narrow stream channel from the trail above is like sighting down a rifle barrel to the house below. Structures and human life at this site are at greatest risk to damage, destruction and loss from a debris flow within the Flick Creek Fire area.

It is critical that the property owner at the outlet of this watershed be warned about the potential life-threatening risk and threats to structural damage or destruction of a flash flood or debris flow. Simply put, this watershed should not be occupied during rainfall events.

Unnamed watersheds along Lake Chelan: There are several small unnamed watersheds with first-order channels draining into Lake Chelan that are at a slightly increased risk of erosion and flashy runoff due to the fire. Although these small watersheds burned at primarily low burn severity, there are small unmapped areas of moderate burn severity that will contribute to accelerated runoff. Steep hillslopes where ground vegetation was burned off will most likely experience rilling during sheet flow, especially where the overlying tree canopy also burned. Rilling from rainfall that occurred on September 19th was already noted on some of these slopes adjacent to the Lakeshore Trail in areas labeled Unnamed A and Unnamed B on the burn severity map. Erosion associated with rilling may undermine loose rock on the hillslopes and contribute to an increase in rolling rocks onto and across the Trail. Needlecast from scorched trees will function as a mulch on the hillslopes to attenuate some of the sheet flow. The steep gradient of these first order channels predisposes them to rapid runoff during a rainstorm that could also bring sediment and woody debris across the Lakeshore Trail at stream crossings. Hikers should be made aware of the potential hazard at these otherwise benign-looking channels.

Flick Creek camp and shelter are located on a small debris cone in a very small (12 acres) first-order watershed. Mulching the steep hillslope above this site will mitigate localized overland flow and sheet wash and should provide some protection to the site from on-site rainfall (see Cultural Resource Assessment for treatment recommendation).

Moore Point and Fish Creek Watershed: Potential threats to life and property already exist (pre-fire) in this 10,000 acre watershed. Although only 4.7 percent of the watershed burned during the Flick Creek Fire, approximately one-third burned during the Rex Fire in 2001, and much of this at moderate and high burn severity. Trails within the lower reach of this watershed and the Lakeshore Trail, house and campground at Moore Point

are still at risk from flash floods and debris flows. Residents, campers, hikers and Forest Service employees should be made aware of the potential hazards that could occur.

Water quality in the Lake Chelan sub-basin is critical for many uses including municipal/domestic supply, agricultural uses, aquatic habitat, recreation and aesthetics. Lake Chelan is a major recreation destination of national significance. In the Flick Creek Fire, some drainages support small, domestic water supply systems servicing private homes along the lakeshore.

Water quality parameters most affected by the Flick Creek Fire are sediment loading, nutrient loading and stream water temperature. Stream sediment loading in fire-affected tributaries is expected to increase because of higher hillslope erosion rates for dry ravel and rilling which can increase debris slide and attendant debris flow activity. Ash, fine sediment and woody debris delivery and transport will increase during snowmelt runoff and in response to storm events. Episodic delivery of larger bed materials and woody debris will be associated with the event-driven debris flows. Increased sediment loading is expected to persist for at least the next two to three years after the fire and then decline.

Research has documented that wildfire exerts pronounced effects on the nutrient status of ecosystems (Tiedemann, and others, 1978). Nutrient loss via volatilization and solution is described in the section on site productivity. Both nitrogen and phosphorus are lost from the system, especially in the high soil burn severity areas. However, these losses begin to be offset by other processes such as N input from precipitation. Elevated nutrient concentrations in stream flow will persist for a relatively short period of time until the chemical retention capacity of the burned area is re-established. Elevated nutrient concentrations of runoff into Lake Chelan will be diluted to insignificance by the volume of the lake. Rapid development of vegetation in the burned area is critical to the re-establishment of the tight nutrient cycle in these forested watersheds. This alteration of nutrient cycling and re-establishment is a natural process associated with wildfire disturbance.

Water temperatures may increase significantly in the fire-affected stream reaches where the riparian canopy was burned. Experience suggests that riparian shrubs and herbaceous plants will rapidly re-sprout in those areas where root systems survived. This fire-influenced shift in temperature regime will persist until sufficient riparian canopy is re-established over the next two-three years to provide shade during the critical summer months. Wildfire influences all of the above water quality parameters.

At issue is the identification and treatment of those areas that may have burned at a greater than normal intensity due to human-caused influences (e.g., elevated fuel loading from past fire suppression activities) and concern for human safety and property development protection that are now part of the landscape.

Floating woody debris in Lake Chelan poses a public safety hazard. Following the 1972 storm events, log booms were installed at the mouths of several drainages to function as a catchment to retain input of floating debris. Following the period of record peak flow in

November 1995, public outcry resulted in the emergency expense of over $400,000 to collect and dispose of woody debris that had been flushed into the lake. Log booms were installed following the 2004 Deep Harbor Fire which later captured wood and campground remnants washed out of Big Creek during flood events in 2006. Log booms are effective in mitigating floatable debris effects to Lake Chelan. No booms are being proposed here since the fire severity is generally too low to justify this treatment.

IV. RECOMMENDATIONS

Since erosional processes are geologically driven (rather than surface erosion driven) it is unlikely that the type of upland treatments available would significantly reduce this risk. It is fortunate, however, that burn severities were generally low in the fire area. There may be some treatments that private landowners can apply on their lands to reduce the likelihood of damage from flood/debris flow events. The Natural Resources Conservation Service has been contacted and is willing to work with homeowners on appropriate practices and participate in public meetings.

A. Fire Suppression Rehabilitation

No recommendations.

B. Emergency Stabilization

1. Management

Flood and Debris Flow Hazard Warning Signs (see Safety Assessment – S-1):

Situation: Stream crossings along the Lakeshore Trail and campgrounds located on alluvial fans and debris cones (Moore Point, Flick Creek and Purple) are potentially at risk of flooding, debris flows and sediment deposition. The visiting public and NPS and USFS employees need to be aware of these potential hazards.

Recommendation: Install flood and debris flow hazard warning signs at campgrounds, boat docks, and along the Lakeshore Trail where it enters the burned area, including the dock at Flick Creek Camp (3 signs), where the trail drops down into stream channels at Imus, Purple, Hazard, Fourmile, Flick, Hunts and Fish Creeks, and the north and south ends of the areas between Purple Creek and Hazard Creek, Hazard Creek and Fourmile Creek, and Flick Creek and Hunts Creeks where there are several first order channels. (Refer to the "Health and Safety Assessment" for budget details.)

W-1: Remove floatable woody debris from Purple Creek channel:

Situation: The stream channel and floodplain at the head of the Purple Creek debris cone is at risk of being obstructed with rocky and woody debris emerging through the canyon above during flash floods or debris flows. Obstructing the channel increases the risk of conveying flow away from the floodplain and onto one of the presently inactive stream terraces where more structures are located further down the slope.

Recommendation: Remove floatable woody debris from the stream channel and floodplain near the head of Purple Creek debris cone to maintain channel clearance and capacity to convey storm runoff.

W-2: Assess streams for in-channel log and debris jams and remove obstructions:

Situation: Five principle watersheds that burned during the Flick Creek Fire are at variable increased risk for log-debris jams within their trunk channels. Log-debris jams obstruct stream channels which can deflect subsequent high stream flow, causing bank erosion and dislodgment of the jam, leading to channel degradation, flash flooding and debris flows further downstream.

Recommendation: Assess the channels for Flick Creek, Purple Creek, Imus Creek, Hazard Creek and Fourmile Creek in the lower half of their watersheds for log-debris jams after the first significant runoff event in the spring-summer of 2007 to identify where channel clearance treatments need to be done to protect downstream channel integrity and values at risk.

W-3: Cadastral Survey

Situation: There are several private inholdings within the boundaries of the Flick Creek fire within Lake Chelan National Recreation Area. Several inholdings are along the lakeshore of Lake Chelan, and most have some acreage that burned in the fire. Those inholdings downlake of Hazard Creek also have invasive species that are targeted in the invasives species treatments, and the accompanying BAR Plan requests Wyden Authority funds to complete treatment work on those inholdings.

Some of the inholdings have a potentially elevated risk of damage to structures from debris flows, as described elsewhere in this Soil and Watershed Assessment.

Recommendation: For those properties downlake of Hazard Creek (a total of four properties), it will be important to know precise boundary locations of the private vs. NPS lands for several reasons: 1) access onto inholdings is an extremely sensitive issue within NPS boundaries, and any BAER/BAR treatments must respect and avoid crossing those private boundaries or have approval from those landowners to access private lands; 2) If approval is granted to conduct BAR-related treatments under the Wyden Authority, we will need to know the boundaries of those treatments; 3) given the elevated risk to impacts from debris flows onto inholding lands and structures, it

will be critical for the NPS to know the NPS/inholding boundary lines should inholders choose to undertake actions (perhaps extraordinary) to mitigate potential debris flows, such as barrier construction, etc. Some of the inholder boundaries abut designated Wilderness as well.

2. Monitoring

No recommendations.

C. Rehabilitation

1. Management

No recommendations.

2. Monitoring

No recommendations.

D. Management Recommendations (Non-Spec)

1. Insure that residents along Lake Chelan below the Flick Creek Fire area and visitors are well informed of the post-fire flooding and debris flow safety hazards that may impact structures, trails and campgrounds. Methods to achieve this include public meetings, news releases, brochures, letters to residents at risk, information posted on public buildings (see "Health and Safety Assessment").

2. Notify community of Stehekin and property owners at Adams Point of potential storm event hazards for Imus Creek, Purple Creek and Hazard Creek (see "Health and Safety Assessment").

3. Keep concrete box culverts at Imus Creek and Purple Creek crossings clean of rock and woody debris. Patrol these steam crossings after storms and snowmelt and clean out any accumulated debris as soon as possible.

4. Model the stream flow capacity of the concrete box culverts at Imus Creek and Purple Creek for different size and duration storm events up to a 100-year storm.

5. Contact the National Weather Service to monitor storm paths over the burned area and issue short term hazardous weather announcements and flash flood watches.

CONSULTATIONS

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Soil and Watershed Photo Appendix
Flick Creek Fire BAER Report

Photos 1 & 2. High and moderate burn severity areas in Flick Creek watershed that will be source areas for higher sediment yield and watershed response.

Photo 1

Photo 2

Photos 3 & 4. Terminal debris cone at Flick Creek and bedrock canyon above it.

Photo 3

Photo 4

Photo 5. Imus Creek watershed showing its predominant bedrock character from headwall with incised stream channels to lower canyon.

Photo 6. Intermittent spacing of forest canopy is controlled by bedrock exposure.

Photo 7. High gradient channel on debris cone shows size of small boulders capable of being mobilized during high stream runoff.

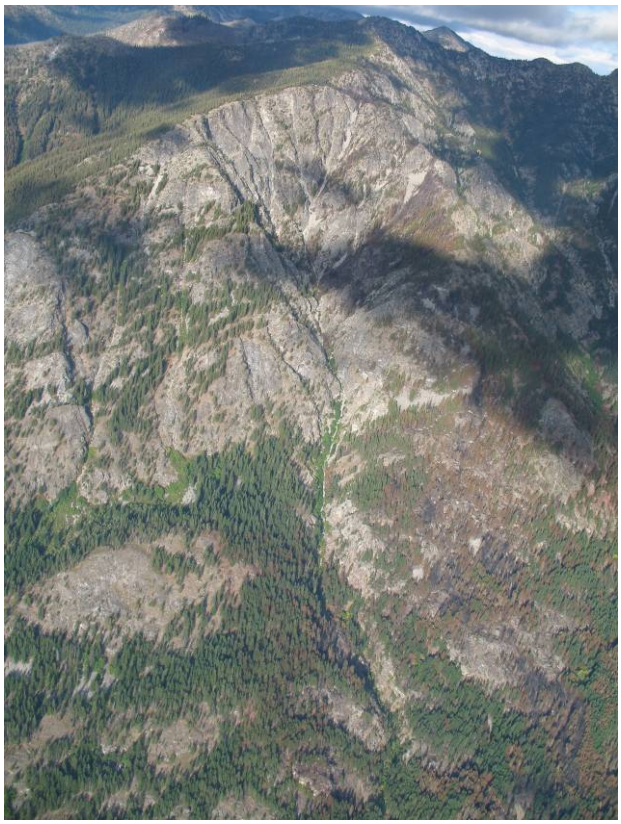

Photo 5

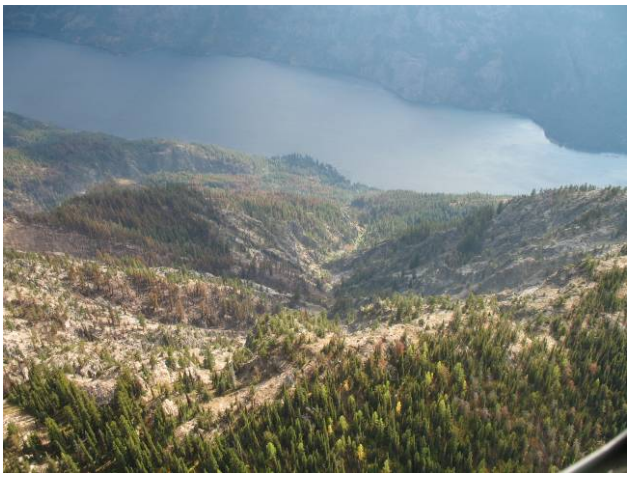

Photo 6

Photo 7

Photos 8 & 9. Predominant low burn severity of Purple Creek.

Photo 8

Photo 9

Photo 10. High gradient boulder-strewn stream channel on debris cone above concrete box culvert on road at Stehekin.

Photo 10

Photos 11 & 12. Low burn severity of Hazard Creek watershed.

Photo 11

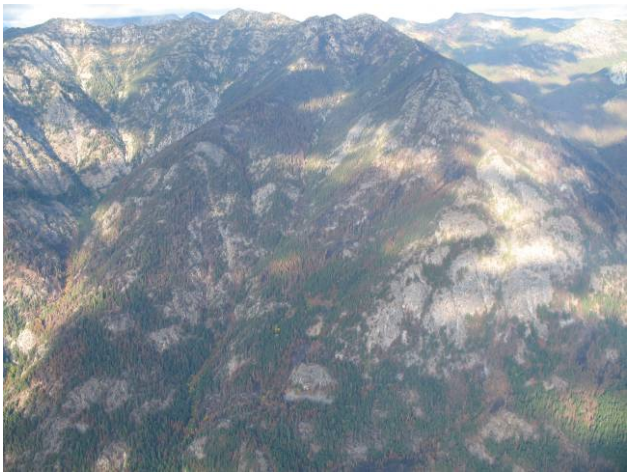

Photo 12

Photos 13 & 14. Fourmile watershed showing high, moderate and low burn severity mosaic.

Photo 13

Photo 14

HEALTH AND SAFETY BURNED AREA ASSESSMENT

OBJECTIVES

Identify and prevent/mitigate damage threats to human safety when employees, private landowners, and the public enter and/or stay within burned areas.

ISSUES

- Fire-created snags are, and will continue to be, a hazard to users of the Lakeshore, Purple Creek, and Imus Loop trails, particularly until the spring or summer of 2007, after winter storms have brought trees down.
- The potential exists for debris flow impacts from burned watersheds within the Flick Creek fire, particularly for users along the Lakeshore and Purple Creek trails, the Flick Creek campground, and private homes within the fire perimeter. Most, if not all, of these people at risk are likely unaware of the elevated risk from these debris flows.
- Cars parked at the base of a steep slope at the Imus overflow parking lot are at risk from falling debris that was destabilized in the burned sections of the slope above.

OBSERVATIONS

Background

The park complex has a Hazard Tree Management Plan (1995), updated in 2005, which guides the evaluation and monitoring of hazard trees. The Plan calls for scheduled monitoring of potential tree hazards for sites where the public is likely to stay or linger, such as administrative sites, campgrounds, picnic areas, docks, etc. It is park policy to not cut hazard trees along trails, given the expectation that visitors are moving, not lingering, along the trail. However, given the potential for extremely dangerous trees along the trail following the fire, the entire Lakeshore, Imus Loop and Purple Creek trails are assessed for hazard trees in this plan.

The park's current Fire Management Plan (1991) speaks only broadly of "rehabilitation" following fires, and not within the context of what we know of today as BAER. The park has a draft Fire Management Plan awaiting final NEPA compliance completion; within the 2005 Environmental Assessment is the direction to use the "least intrusive BAER actions required to mitigate actual or potential damaged caused by the fire."

The Lake Chelan National Recreation Area General Management Plan (1995) specifically directs that "New NPS facility developments would not be sited in geohazard areas, and existing NPS/concessioner developments would be relocated away from geohazards." Although this direction could potentially apply to the Flick Creek shelter, it is listed primarily to show that geohazards, such as debris flow alluvial fans at the bottom of watershed basins, are recognized

as natural features on the landscape that are hazardous and are to be avoided for any development.

Potential debris flow hazards within burned watersheds of the Flick Creek Fire are analyzed in the *Watershed Burned Area Assessment*.

Reconnaissance Methods

Several NPS staff (Regional and Park Geologists; Chief, Resource Management; Cultural Resource Specialist; Eastslope District Resource Management Specialist; Plant Ecologist; Chief, Maintenance; Stehekin Maintenance Foreman, and Trails staff) conducted field and/or aerial reconnaissance over several days in August and September 2006 on the Flick Creek Fire. Reconnaissance efforts concentrated on identifying and documenting potential hazard trees, trail tread and bridge conditions, potential debris flow routes and targets, and fire suppression impacts (handlines, helispots, stumps, historic structure impacts).

Reconnaissance methods included intensive ground surveys and helicopter overflights. Park records and archives information were searched for information on the known cultural resources. Site information was recorded using digital cameras and field notes.

Findings

All of the downed logs and surface debris on the Lakeshore Trail within the Flick Creek fire has been removed through suppression rehabilitation activities. In addition, five hazard trees were identified using the NOCA Hazard Tree Assessment protocol, two in Flick Creek Campground, two in the vicinity of Purple Creek and one above a sitting bench site on the Imus Loop trail. Hazard tree assessments will be repeated each spring because it is expected additional fire-related mortality will continue for several more years.

The potential hazards from erosional events focus primarily on the Fourmile and Flick Creek alluvial fans, and Flick Creek campground areas. Those potential hazards and issues are discussed in the *Watershed Burned Area Assessment*.

Recommendations

<u>Specifications</u>

S-1: Warning signs, public information package and interpretive programs

NPS staff will develop and distribute/deliver hazard warning signs, informational brochures and packets and interpretive programs to help mitigate health and safety threats following the Flick Creek Fire.

Hazard warning signs will be placed at 1) trailheads that lead into the burned area; 2) where trails cross the fire perimeter, and 3) at Flick Creek Campground and dock. Detailed signs describing flood/debris flow hazards will be posted along the Lakeshore,

Purple Creek, and Imus Loop trails and at the Flick Creek Campground dock. More discrete signs will be placed along trails at entrances to drainages with elevated risks of debris flows.

Informational brochures will be created and made available to the general public. Information packets will be distributed to property owners in the Flick Creek Fire area.

Interpretive staff will develop and present educational programs to visitors informing them of the potential hazards they may encounter while hiking through the burn area.

Interpretive staff will revise the "Imus Loop self-guided interpretive walk" to include information of potential hazards associated with the fire.

Letters will be sent certified mail to property owners within the burn area to notify them of the hazards associated with flood/debris flows and to provide contact information for the NRCS to request consultation.

Public meetings that target the inholders will be held in the Fall of 2006 to share the results of the Flick Creek Fire watershed assessment, as well as discuss debris flow events within the broader Lake Chelan watershed in recently burned and unburned watersheds. These meetings will include the NRCS and Chelan Country Sheriff's department.

S-2: Hazard tree removal

Identified hazard trees at the Flick Creek Campground (2), and along Purple Creek Trail (2) and Imus Loop Trail (1) will be removed. Additional hazard tree assessments will be completed in the spring of 2007.

Trees rating at least 7 of a possible 8 points in the NOCA Hazard Tree Assessment protocol will be marked for treatment. Trees should first be pushed, and failing that, felled with stumps cut as flush to the ground as possible. Dropped trees must be removed from any drainage course to prevent impeding flows.

S-3: Imus parking lot safety fence

Material on a steep slope above the Imus Parking Lot was destabilized due to fire. To prevent falling debris from entering the Imus parking lot and damaging vehicles, a safety fence will be installed at the toe of the slope to intercept rolling material. The safety fence will be constructed of 4 ft. cyclone fencing (9 gauge, vinyl coated-green) and be installed at the base of the slope along the eastern edge of the parking area.

CONSULTATIONS

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Kerry Olson, Interpretive Specialist, NOCA
Charles Beall, Acting Chief of Interpretation, NOCA
Bob Sheehan, Chelan District Ranger, Okanagan-Wenatchee National Forest

REFERENCES

The following references can be found on file in the NOCA Headquarters, 810 State Route 20, Sedro-Woolley, WA 98284:

General Management Plan, North Cascades National Park Service Complex, 1995

Fire Management Plan, North Cascades National Park Service Complex, 1991
Environmental Assessment, Fire Management Program, Cascades National Park Service Complex, 2005

Hazard Tree Management Plan, North Cascades National Park Service Complex, 1995 (updated 2005)

CULTURAL RESOURCE BURNED AREA ASSESSMENT

Objectives

- Assess damages to known historic and prehistoric cultural resources as the result of the fire effects.
- Assess potential risks to known/documented cultural resources as the result of the post-fire events (e.g., erosion, flooding).
- Assess potential risks to known cultural resources as the result of emergency stabilization activities.

I. Issues

- Thirty-three known cultural resources lie within or downstream of the Flick Creek fire perimeter. Thirty of these are on National Park Service land and three are located on private and public utility lands. These resources may be subject to direct or indirect effects of the fire.
- Emergency stabilization actions to protect cultural resources within or downstream of the fire perimeter need to be identified.

II. Observations

A. Background Information

Cultural History

Evidence of human occupation of the region that today includes North Cascades National Park and Lake Chelan National Recreation Area reliably dates to the early Holocene, approximately 10,000 years ago until the present. Archeologists identified several time periods that correspond to different cultures and/or cultural adaptations found in the park.

Pre-Contact Period. Early Archaic Period (ca. 10,000-8,000 calibrated years before present or BP). This period is represented by two archeological sites in the park. One of these, located along a well-used travel route, is linked with sites in the Stehekin Valley, thus providing indirect evidence for travel through the valley and along Lake Chelan for over 9,000 calibrated years. Archeological resources of this period consist of chipped stone (flaked lithic) scatters and prepared cooking hearths.

Late Archaic Period (8,000 – 5,000 BP). This period represents use of the North Cascades by larger indigenous populations than previously, as the climate became warmer and drier. Although there are few archeological sites dated to this period in the Stehekin Valley, there is one outstanding example in the lower valley that clearly indicates use of the valley's local resources by indigenous populations.

Archeological site types consist of buried lithic scatters and prepared cooking hearths.

Northwest Developmental Period (5,000 – 3,000 BP).
This period reflects a continued increase in regional populations and increased local use of the Stehekin Valley and surrounding area by indigenous people. It is also the beginning of the Neoglacial climate period, characterized by cooler and moister conditions and the expansion of local mountain glaciers in the North Cascades. It is also the time when modern forest types began to appear in the Pacific Northwest. Populations began to aggregate into large permanent and semi-permanent winter villages, which in turn became economically adapted to local resource abundances. Throughout the region complex new subsistence technologies began to appear, reflected in a wider range of artifacts used for fishing, hunting, and plant collecting. Archeological resources consist of lithic scatters, cooking hearths, and possibly other cultural remains.

Fully-developed Northwest Period (3,000 – 200 BP).
The period reflects maximum regional populations and the peak of local use of the Stehekin Valley and surrounding area by indigenous people, particularly around ca. 1200 BP. Local alpine glaciers cyclically advance and retreat in the Neoglacial climate, characterized by cool and moist conditions alternating with short, but sometime severe, droughts. Populations reside in large communities that heavily exploit local resources. Technologies continue to evolve into complex systems of artifacts and features designed to accommodate the subsistence needs of large populations, resulting in great diversity in artifact and archeological site types. As elsewhere, the Stehekin-Chelan Valley is likely to have experienced extensive use of the valley serving subsistence and travel needs for certain Northwest populations. Artifacts and features from this period are common in Stehekin-Chelan Valley and are often exposed at the modern ground surface. Site types include lithic scatter, rock art, talus pit, and rockshelter. Many sites contain the remains of prepared cooking hearths. Artifacts consist predominately of flaked and ground stone, but also include charred ethnobotanical remains associated with hearths and living areas. Hearth and living areas, in turn, are nearly always associated with flaked stone artifacts, but due the arid climate, some hearths contain the bone remains of animals prepared and consumed on-site.

This period ended with the rapid depletion of indigenous populations due to contact with Old World disease vectors some decades prior to, and during the initial contact period. Although indigenous communities thrive today, one effect of the devastation wrought by Old World diseases was loss of traditional elder knowledge of the long history of Native American presence in and use of the Stehekin-Chelan Valley. Today, this important history is embodied in the preserved physical remains of human activity that we collectively call “archeological remains.”

Post-Contact Period.
Over the years, humans have traversed this land and to varying degrees have left behind an imprint of use, adaptation, and change recognizable today. First used by Native Americans, the mountain passes and trails later carried fur traders and trappers. Explorers and surveyors followed and helped open the region to hardy settlers and miners filtering into the mountains to make a life and livelihood for themselves. Over several years land uses other than homesteading and prospecting became possible, and many more came to harvest timber, plant orchards, graze animals, and harness the mountain rivers for production of electricity. In later years as leisure time grew into a national obsession, people approached Stehekin and Lake Chelan with a new interest -- recreation. Concurrent with nearly all of the above activities was the presence of the federal government acting as the steward of these lands.

USFS Rangers became increasingly involved with recreation issues in the national forests as public use and demands on recreational resources increased in the 1930s. As a result, the USFS embarked on an ambitious shelter-building program, and with the manpower provided by the Civilian Conservation Corps (CCC), built many trail shelters. These shelters appeared throughout the backcountry providing hikers and campers with a place to stay and were enclosed on three sides with a roof that slopes to the rear and an overhang in front. The frame was constructed of cut logs, and the siding and roof of wood shakes. The open side typically faced a fire ring. By using native materials the USFS made a conscious effort to minimize the impact of a man-made structure on the natural environment. At one time, these shelters could be reached every ten or less miles along a trail.

The National Register listed Flick Creek shelter (MRA 88003444) is a 14’ x 14’ wood frame set on a log and rock foundation. It is one story, with wood shake siding on three sides over round logs. It has a wood-shaked saltbox roof with slightly extended eaves and extended ridgeline with the entrance opening on the southeast. Exterior features include exposed log purlins and rafters. This shelter was built circa 1930 by the USFS using CCC labor. The shelter is eligible under NR Criterion C: significant as a distinct type of building. It reflects the USFS design ethic of utilizing natural/native materials and siting structures sensitively in their environments. This shelter possesses integrity of design, location, materials, setting, workmanship, feeling, and association.

The Stehekin Valley contains a number of other significant historic structures and features relating to the early mining history, homesteading/orcharding, recreation (e.g., lodge/hotel accommodations) and Forest Service administration. Many of the structures are Listed on the National Register of Historic Places and are part of historic districts and cultural landscapes. The oldest of these directly or indirectly related to mining history and are the remnants of homesteads, camps, and a mine-to-market wagon road, circa 1880-1889. Forest Service facilities were built early on at the Stehekin Landing but only a few structures reflecting the earliest administrative

history remain intact (e.g., the Purple Point Ranger Station stone column, circa 1897). A number of more recent historic structures in good to excellent condition are still in use as residences for Park Service personnel and concessionaires, and the refurbished historic Golden West Lodge is currently in use as administrative offices for National Park Service personnel. These structures reflect the early administrative and recreational history of the Stehekin Valley, circa 1920-1947.

B. Reconnaissance Method

Prefield Research:

A records search was conducted utilizing various park resources to determine the extent, nature and fire-sensitivity of resources that may have been impacted by fire suppression activities and direct and indirect fire effects. A large part of the fire zone around the Lakeshore trail has been previously explored for cultural resources through a historic structures inventory and reconnaissance-level archeological surface surveys. On National Park Service land, 27 historic structures were identified as potentially within or downstream of the fire perimeter. These include structures which date from 1897 to 1945 associated with the historic Purple Point/Stehekin Ranger Station, Golden West lodge, a CCC trail and shelter program, and several residences. Nearly all of these are on the List of Classified Structures and 17 of them are Listed on the National Register of Historic Places (Appendix to this assessment). The National Park Service considers protection of these structures a high priority. In addition, one historic structure on private land (Maxwell's house) was identified as potentially within or downstream of the fire perimeter. This structure is still being used as a residence and, because it is on private land, has never been evaluated by the Park Service. Its build date and history are presently undocumented. However, this structure is in close proximity to, and is possibly associated with, one of the historic archeological sites on NPS land (FS 292).

Four archeological sites on National Park Service land were identified as potentially within or downstream of the fire perimeter (FS 220, FS 245, FS 291, FS 292). In addition, two archeological sites are known to be located on private/Chelan County Public Utility District land inholdings (45CH67 and 45CH410) and were identified as potentially within or downstream of the fire perimeter. Since these cultural resources are located on private land, they have not been previously evaluated by the National Park Service (NPS). However, as part of the BAER assessment process, all resources at risk (including cultural resources on private land) will be identified and potentially protected by proposed treatments (e.g., hillslope stabilization).

Field Research:

The BAER NOCA Cultural Resources representative is not Red Card certified, however, she entered the fire zone with an appropriately certified escort. The first field assessment by Cultural Resources representative was completed on August 13, 2006. An additional field assessment was completed on September 20, 2006.

All known historic structures and archeological sites on NPS, private, and Chelan County Public Utility District lands potentially within or downstream of the fire

perimeter were visited and evaluated for potential fire and post-fire effects. This entailed assessment for fire damage, indirect fire effects, post-fire damage and potential risks from erosion, looting, vandalism, and carbon contamination of archeological features.

C. Findings

The majority of the cultural resources were not within the burned area. However, acreages above (upslope of) these cultural sites are within the fire perimeter and have been evaluated for potential post-fire effects as part of the watershed assessment. All but seven cultural resources were determined to be at low risk for post-fire effects. Protection measures for these seven sites are described in the following section or in the "Soil and Watershed" or "Safety" assessments of this document, where indicated.

Cultural Resources in the Stehekin Landing area

Of the 25 historic structures and one archeological site examined in the Stehekin Landing area, only three groups of significant historic structures were determined to be at risk from post-fire effects; the Imus House and associated buildings, the George Miller house (MRA 88003464), and the McKellar cabin (see Appendix A for a full list of historic structures). Proposed treatments for these buildings are included in the assessment for the Imus and Purple watersheds (see Soil and Watershed Resource Assessment). The treatments proposed are not anticipated to adversely affect the structures. No additional treatments are recommended for these cultural resources.

Cultural Resources along the Lakeshore Trail

Of the seven cultural resources examined along the Lakeshore trail, only four were determined to be at risk from post-fire effects. These are described below.

Flick Creek Shelter (National Register listed; MRA 88003444)

The Flick Creek historic shelter was not adversely impacted by fire or fire-suppression techniques. When the Flick Creek fire was active in the vicinity of this structure, thermally reflective metalized foil (Fire Wrap) was wrapped around the structure and affixed with staples as a precautionary measure. The protective metalized foil was removed as the fire retreated from the area surrounding the shelter. Staples were later removed under the direction of Resource Advisor Vicki Gempko to ensure that the historic fabric of the building was not marred or damaged.

Fire intensity in this area was low with pockets of moderate burn intensity as evidenced by consumption of ground fuels to ash in places and one standing dead tree which was thoroughly burned. Although fire reached within seven meters of the south corner of the shelter, a constructed fire break (fire line) protected the structure. The fire line consisted of about a 2-foot wide, 3-5 inch deep furrow scratched into the ground surface and did not adversely impact historic features or artifacts. However,

in places, this fireline does provide a new route for slopewash to channel on a steep (60 degree) burned slope (a debris cone) which leads directly to the south corner of the structure. The 360 m debris cone is situated between two stream channels within a 12-acre unnamed facet watershed facing Lake Chelan.

Through field inspection, the BAER Team determined that the site had previously supported a sparse understory of grass species and shrubs in its unburned condition. Tree mortality as a result of the fire is generally low on the site with two exceptions. One standing tree was severely burned within a moderate severity pocket. This tree is situated adjacent to the Lakeshore trail directly upslope from the outhouse and shelter (Photo 1). The other standing tree was scorched and will die within a year.

Field Site 245

Field Site 245 (a historic trail segment) has not been evaluated for National Register status but it may be associated with the Flick Creek shelter (circa 1930). Through field inspection it was determined that a portion of this site is within the burned area, it has been mildly impacted from direct fire effects (scorching on cultural features) and is at high risk from further damage due to tree fall, rock fall, and erosion. The site consists of two short trail segments, one of which crosses a steep-sided unnamed drainage channel near the base of a steep (60-70 degree) slope. Ground vegetation on and above the site has burned to ash in some places, leaving a loose, rocky slope and channel which is susceptible to slopewash and increased seasonal channel runoff. Trail tread and rock retaining walls on this historic trail segment are highly susceptible to impacts from channel flow and rolling rock.

Field Site 292

Field Site 292 (historic rock walls and artifact scatter) has not been evaluated for National Register status but appears to have potential to be eligible. Through field inspection it was determined that this site is within the burned area and has been mildly impacted from direct fire effects (scorching on cultural features) and is at risk from further damage due to tree fall. Burn severity in this area is generally low with moderate severity hotspots. Ground vegetation has been consumed and a light duff layer remains in places. The largest threat to this resource are standing dead and dying trees which have been damaged by direct (charring) and indirect (scorching) fire impacts. Standing dead trees are hazards to the resource, particularly those which are in or near cultural features. These trees, when uprooted, will disturb or destroy the cultural features.

45CH67

45CH67 is a prehistoric site which has been field-assessed as eligible for the National Register by an independent archeological contractor. This site is partly on private land and partly on Chelan County Public Utility District land. The land directly upslope of the site is owned by the National Park Service. Through field inspection it was determined that this site and the slope above it (NPS land) is within the burned area and puts the archeological site at risk from post-fire effects such as enhanced

erosion and charcoal contamination in prehistoric features. Fire intensity in this area was low with pockets of moderate burn intensity as evidenced by consumption of ground fuels to ash in places. The site is situated near the base of a shallow, 720 m long unnamed channel in a 24-acre facet watershed facing Lake Chelan.

The site is currently under study regarding reservoir impacts as a part of the Federal Energy Regulation Commission (FERC) Lake Chelan Hydroelectric Project relicensing agreement (FERC Relicense No. 637) and mitigation measures are incorporated into an approved plan for historic resources management. In order to determine appropriate action regarding post-fire effects to this site, consultation with the Chelan PUD and private landowners is necessary. The Wyden authority and other memorandum of agreements may be appropriately invoked in order to protect this site from post-fire impacts or expedite ongoing work at the site (i.e., archeological excavation) before information is lost. No specific treatments are recommended at this time until consultation with landowners can be completed.

III. Recommendations

Five emergency projects are recommended to protect cultural resources from post-fire effects (see Table below).

Cultural Site	*Proposed Activity*	*Justification*
Flick Creek Historic Shelter (National Register Listed)	Construction of 50-ft of trail and application of woodstraw mulch to burned areas	Soil stabilization and construction of trail to minimize the proliferation of "social" trails in the area and thereby protect historic structure
	Monitoring of treatments for 3 years	Evaluate whether treatment maintenance is needed
Field Site 245	Assessment of post-burn effects to cultural resource	Evaluate the potential need for and feasibility of stabilization efforts
Field Site 292	Assessment of fire effects on cultural site and propose specific treatment	Site-specific documentation and treatment recommendations

	Tree removal if needed* (based on maximum number of trees that *may* need to be removed)	Protection of historic features from tree fall

A. Management (specification related)

C-1 and C-2: Assess Cultural Resource Sites FS 292 and FS 245.
Assessments of two cultural sites (FS 245 and FS 292) are needed to determine the extent of post-fire impacts and appropriate treatments. These sites will require a thorough cultural resource assessment to delineate site boundaries and locate cultural features and artifacts at risk before specific treatment recommendations can be developed. The assessments will involve mapping and documenting the archeological site contents and recommending specific treatments as needed.

#C-3 Remove Hazard Trees/Site Protection.
Tree removal is a standard treatment for cultural sites with hazard trees which threaten the resource (i.e., the cultural resource is the target). Two known cultural resource sites are at risk from standing dead/dying trees. Two trees near the Flick Creek shelter put the structure at risk from tree fall and flying debris. These trees also pose a risk to human life (i.e., people using the adjacent campsite) and will be removed as part of the hazard tree treatments within the Flick Creek fire perimeter (as per the North Cascade National Park Service Complex Hazard Tree Management Plan, 1995). After a brief field inspection, thirty of the standing dead trees (10-24" dbh) on Field Site 292 were identified to be potential risks to the historic features because they are dead or will die within a year. These trees, if uprooted, will disturb or destroy the cultural features. Though a cultural resource site assessment must first be completed before any trees are removed, a budget has been prepared for the removal of a maximum of 30 trees if deemed necessary following the evaluation. This treatment is costly because it requires tree fallers with technical expertise and a Cultural Resource specialist to supervise protection of cultural features during implementation (i.e., during tree cutting).

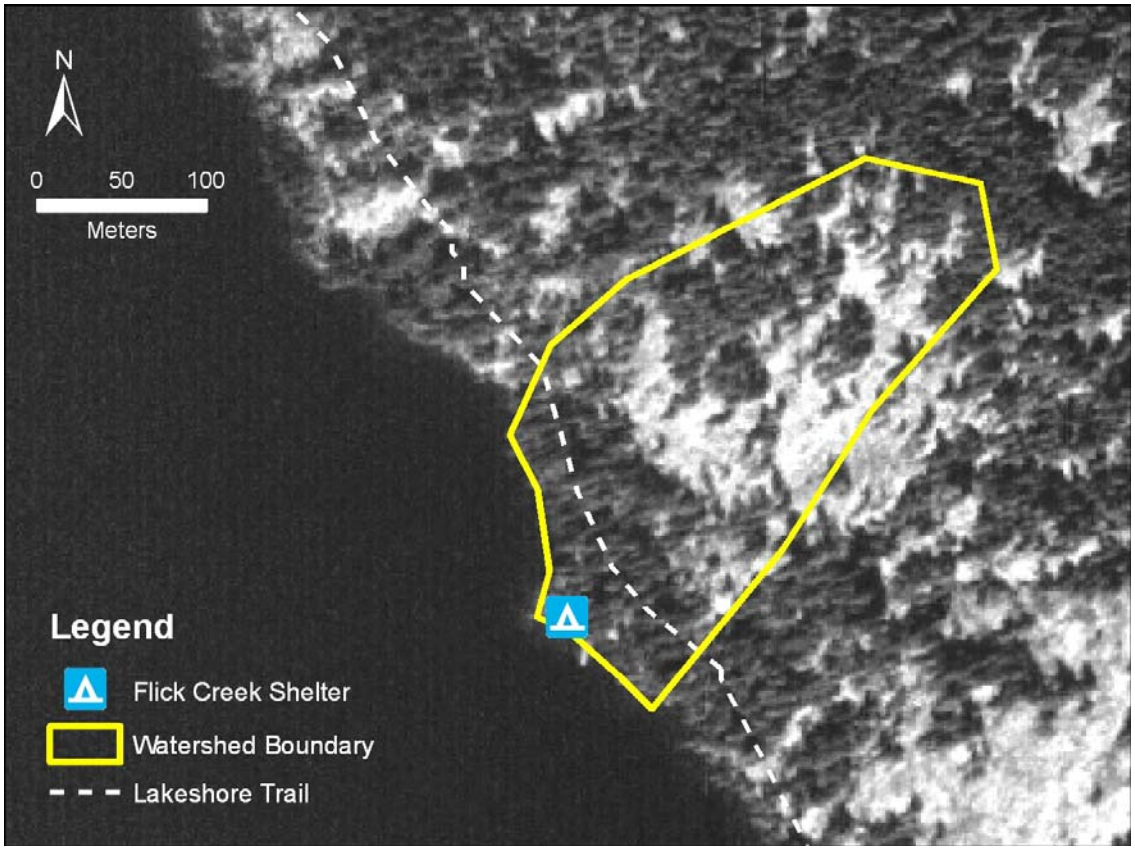
#C-4 Soil/Slope Stabilization and Trail Construction.
Soils on a 60 degree slope directly above the Flick Creek Shelter (National Register listed; MRA 88003444) are now destabilized due to fire consumption of vegetation and ground litter. Initially, the Flick Creek Shelter was assessed to be a downstream value at moderate risk because it was assumed to be directly connected to the Flick Creek watershed which had experienced moderate and severe burn severity and therefore had a significantly heightened risk for major erosional events such as debris flows (see Flick Creek Soil and Watershed Resource Assessment). After analysis of landform data using

a 10 meter resolution topographic interval digital elevation model, it was determined that the Flick Creek shelter and campground is actually in a more protected location than surrounding terrain. A small, localized set of treatments are proposed to protect the Flick Creek shelter and are expected to be effective in this small facet watershed (ca. 12 acres) which drains to the south (downlake) of the Flick Creek Camp (Map 5).

In order to protect the historic structure from rolling rock, debris, and accumulation of sediment against the shelter walls, a small hillslope treatment was deemed necessary on this cultural site. A number of possible treatments were discussed including seeding, mulching, log diversions, and temporary removal of the historic structure. Most potential treatments were rejected because they were likely to fail or put the structure at risk. The recommended treatment for soil stabilization is mulching using a product called woodstraw. This is a waste product of veneer production, similar to wood chips, and composed of small, narrow strips of wood. When applied, these strips interlock and stabilize soils much like Ponderosa pine needles. A budget for the application of woodstraw mulch on about 1-acre of slope is influenced by the relatively high cost of the material and logistic requirements for transport it to this remote site. Since this site is at the base of a small watershed which is not directly fed by Flick Creek, the treatment is expected to be successful in protecting the National Register listed historic property from post-fire effects. The woodstraw mulch will stabilize the soil and provide moisture and cover for natural reseeding of local plants. Implementation of this treatment will require that a Cultural Resource specialist is on site to ensure that no historic features, structures or artifacts are put at risk during application.

A new 50-ft section of trail is needed to re-direct erosion away from cultural resources. A current social trail between the Lakeshore trail and the Flick Creek Campsite and historic shelter poses an elevated risk for erosion and channelization because the steep (60 degree) burned debris cone leads directly to the south corner of the structure. Due to vegetation loss, exposed soil on this slope is unstable and a social trail in this location provides a route for increased slopewash to channel and flow toward the structure. It is recommended that the current social trail be eliminated and replaced by a small section of trail designed to re-direct foot traffic away from the steep slope above the cultural site. Signage to clearly indicate the new route for foot traffic in this section of trail will be included in the “Safety Assessment” section of the BAER report and is not included in the budget for in this treatment. A Cultural Resource specialist is required to be on site during implementation to ensure that no historic features, structures, or artifacts are adversely affected.

Map 5. Watershed encompassing the Flick Ck Shelter



B. Monitoring (specification related)

<u>C-4 (cont): Soil/slope Stabilization to Protect a Cultural Site.</u>
The recommended hillslope treatment will require post-implementation monitoring to identify any additional needs to maintain the treatment for cultural site protection. The application of mulch on burned slopes has been found effective to reduce soil erosion (e.g., Roubichaud et al. 2000), and the preferred mulch type on the Flick Creek fire is woodstraw. The use of woodstraw mulch eliminates concerns about introduction of invasive species that can accompany straw mulch, and this method is expected to be effective at the Flick Creek site (pers. comm., Pete Roubichaud, August 17, 2006). A monitoring plan will be developed by a Cultural Resource specialist and carried out by a monitor, who is based in the Stehekin District, over the next three years. The budget for this activity is based on five site visits per year for three years. The number of site visits was derived from two standard visits per year and up to three additional impromptu visits following storm events. Though rental equipment for precise mapping of soil movement and mulch cover was considered, the need to ship equipment to and from the remote location for multiple site visits and multiple years was determined inefficient and costly. The purchase of a Trimble GPS unit will also allow for use of this equipment as a

mapping tool during cultural assessment of two other archeological sites (FS 245 and FS 292). This budget request also includes salary costs related to development of a specific monitoring plan and documentation of results based on monitoring plots. Essentially the monitoring methods would include precise mapping of mulch cover versus bare ground within removable test grid squares. Each grid square would be positioned relative to a stationary but temporary datum stake which could be removed after the three-year monitoring period. Soil movement would be measured through photographic evidence and against stationary depth markers near the historic structure. All monitoring stakes and datums would be carefully placed so that visual effects would be minimal and temporary and so that no other adverse effects to the cultural site would be caused by the monitoring activity.

C. Management (non-specification related)

Post-fire inventory for unevaluated lands.
Wildland fire has the potential to adversely affect cultural resources, however it also offers the opportunity to perform inventories in areas that were previously inaccessible and in areas where fire has effectively removed ground cover that was obscuring sites. This is true for the Flick Creek fire where there is little survey to provide baseline data for events of this type. Funding for these suggested activities should come from the Park's operating program or other funding sources. It is recommended that systematic cultural resources inventory and site documentation in areas of high site probability be carried out in the burned area within the next two years, before vegetation regrowth obscures mineral soil visibility.

IV. Consultations

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Jennifer Burns, Cultural Resource Manager, Chelan Public Utility District, Wenatchee, WA

Tribal Entities - Confederated Tribes of the Colville Reservation and Yakama Nation have been informed (August 2006) of the extent and potential impacts of the Flick Creek fire to cultural resources. No issues of concern have been identified and none are

anticipated at this time. Burn Area Emergency Response treatments will be monitored by a Cultural Resource Specialist and Tribal consultation will be conducted, as needed, regarding these activities.

SHPO – Chief of Cultural Resources Branch, Dr. Jesse G. Kennedy III initiated discussion with Greg Griffith, Deputy WaSHPO by telephone and electronic mail on Thursday, July 27, 2006. Historic resources at risk and mitigation measures were identified and approved. Discussions with the WaSHPO were conducted as dictated by changing fire conditions. After the BAER field inspection, WaSHPO was notified of the findings of the Cultural Resource Specialist. Consultation with the SHPO regarding Section 106 issues will be initiated, as needed, based upon proposed undertakings (i.e., BAER treatments).

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VI. Photographs

Photo 2. Flick Creek Camp outhouse at base of slope

Photo 1. Flick Creek Shelter from boat dock

Photo 3. Burned trees on Field Site 292

Photo 4. Fallen tree over a historic feature on FS 292. Fall occurred between first site visit (8/13/2006) and second site visit (9/20/2006)

Photo 5. Severe burn pocket in feature on 45CH67

Appendix A: List of Significant Historic Structures on National Park Service Property in or near the Flick Creek Fire perimeter

Structure Name	National Register No.	List of Classified Structures No.	Build Date	At Risk
Flick Creek Shelter	88003444	30162	1930	X
Golden West Lodge	8800342	30140	1926	
Golden West Cabin 10	8800342	30142	1940	
Golden West Cabin 11	8800342	30143	1945	
Golden West Cabin 12	8800342	30144	1940	
Golden West Cabin 13	8800342	30145	1940	
Golden West Cabin 14	8800342	30146	1920	
Golden West Cabin 15	8800342	30147	1940	
Golden West Garage/Workshop	88003442	30141	1927	
Golden West Rock Walls and Steps	88003442	30166	1897	
Golden West Swimming Pool	8800342	30168	1928	
Golden West Terraced Stone Paths	8800342	30169	1898	
Golden West Shuffleboard	8800342	30171	1940	
George Miller House	88003464	30139	1938	X
Imus House		30177	1941	X
Imus House Stone walls		30178	1941	X
Imus House Stone and Mortar Foundations		30179	1941	X
Imus House Laundry Shed		30180	1941	X
Imus House Wooodshed/shop		30181	1941	X
McKellar Cabin		30176	1922	X
Purple Point Ranger Station Residence	88003460	30148	1926	
Purple Point Ranger Station	88003460	30164	1926	

Structure Name	National Register No.	List of Classified Structures No.	Build Date	At Risk
Woodshed				
Purple Point Ranger Station Bunkhouse			ca. 1926-1934	
Purple Point Ranger Station Stone Column	88003460	30167	1897	
Purple Point Ranger Station Shop			1928	
Purple Point Ranger Station Corral/barn foundation			1939	

VEGETATION BURNED AREA ASSESSMENT

OBJECTIVES

- Evaluate and assess the fire impact to the vegetation resources including potential state listed plant species.
- Determine emergency stabilization, monitoring, early detection and eradication of weeds supported by specification to aid in the vegetation and soil stabilization efforts.
- Provide management recommendations to assist in habitat protection, revegetation, and rehabilitation if needed.

ISSUES

- Establishment and expansion of the invasive plant species into burned areas and the areas of suppression activity.

OBSERVATIONS

Findings and recommendations contained within this assessment are based on NOCA and US Forest Service staff reconnaissance of impacted areas and aerial surveys. On August 13, and September 20-21 2006, the NOCA Plant Ecologist surveyed the fire area via helicopter and ground surveys.

The Flick Creek Fire was a mixed severity fire. Most of the area was low severity with some areas of moderate and high severity.

Findings

North Cascades National Park Complex is floristically diverse, with approximately 1700 vascular plant species. NOCA has an existing vegetation map developed in 1990 under contract by Pacific Meridian Resources. In 2004, a revision of the existing vegetation map and the development of an associated vegetation classification system began by the NPS. These maps and classification are expected to be completed by 2010.

In the summer season of 2002 a contract botanist (Joe Arnett) surveyed the Stehekin area for sensitive plant species. This contract was initiated by the Fire Management Office of NOCA in preparation for proposed landscape prescribed burns on the walls above the Stehekin Valley. The vegetation community types were also documented in the course of the survey. The area surveyed in the contract spanned from the NPS/USFS boundary on the south to the Coon Lake drainage approximately 12 miles to the north.

The fire area has steep to very steep slopes. The forests on the site had open to very dense stands (dog-hair) of Douglas fir. Douglas fir/Ponderosa stands varied from dense forests to open woodlands. Understory of the forested stands ranged from very sparse to a dense cover

of shrubs or forbs and grasses. Riparian forests were restricted to the narrow steam corridors. A dense shrub layer dominated the understory of the riparian forests. Rock outcrops are abundant throughout the fire area.

The vegetation types documented in the Arnett survey, within the Flick Creek Fire area included rock outcrops, grassland patches, dry coniferous forest, riparian corridor, and seeps.

Vegetation Type Descriptions

Rock outcrops are dominated by low shrubs, annual grasses and forbs, and perennial species. Species include *Cheilanthers gracillima, Polystichum lonchitis, Montia perfoliata, Arctostaphylos nevadensis, Bromus tectorum, Bromus mollis, Zigadenus venenosus, Z. paniculatus* and *Heuchara cylindrica*.

Grassland patches are often above or adjacent to rock outcrops. Species include ferns, annual and perennial grasses and herbs. Species include *Pseudoroegneria spiecat, Aspidotis densa, Apocynum androsaemifolium, Lithophragma pariflora, Lomatum geyeri, L brandegei* and *L. triternatum and Bromus carinatus*.

Seeps are found mostly in rock outcrops and are dominated by ephemeral herbaceous species. Species include *Plectritis macrocera, Saxifraga integriflora, Suksfdorfia ranuculifolia* and *Mimulus guttatus*.

Dry coniferous forests are dominated by Douglas fir (*Pseudotsuga menziesii*) and ponderosa pine (*Pinus ponderosa*), mostly <12" DBH. The understory is sparse or absent. In some areas shrubs occur. Common shrubs include spirea (*Spirea betufolia*), serviceberry (*Amelanchier alnifolia*), rose (*Rosa gymnocarpa*), and in moist areas big leafed maple (*Acer macrophyllum*) and Western dogwood (*Cornus nuttallii*) are abundant. There are occasional patches of well developed pine grass (*Calamagrostis rubencens*) in the understory.

Riparian forest occur along drainages and are dominated by a canopy big leafed maple (*Acer macrophyllum*) with a shrub layer including thimbleberry (*Rubus parviflorus)* snowberry (*Symphoricarpus albus*), and oceanspray (*Holodiscus discolor*).

State Listed Species

NOCA has no known federally listed plant species, but the Complex has approximately 58 potential state listed plant species. Two of these state listed plant species occur within the Flick Creek Fire: Sierra cliff brake (*Pellea brachyptera*) and giant helliborne (*Epipaticus gigantea).* The Sierra cliff brake is a state listed sensitive species, and giant helliborne is a state watch species. Two locations of giant helliborne and five locations of the Sierra cliff brake were identified in the 2001 Arnett survey within the Flick Creek Fire area. No post-fire surveys have been conducted to document the effect of the Flick Creek Fire on the on these sensitive plant species. Surveys are scheduled to be conducted in the 2007 field season.

Invasive plant species

Approximately 250 species (14% of the NOCA flora) are invasive species. The Flick Creek Fire area has not been surveyed for invasive plant populations or the extent of these populations since the fire occurred. Four species are known to occur within the Flick Creek Fire area, Common crupina (*Crupina vulgaris*), six-week fescue (*Vulpia* spp.) Scott's broom (*Cytisus scoparius*) and Cheatgrass (*Bromus tectorum*). Other weeds of concern in the Flick Creek Fire area include Canada thistle (*Cirsium arvense*), bull thistle *(Cirsium vulgare*) and several knapweeds (*Centaurea* spp.).

Populations of invasive species within the fire area have not been mapped. In the 2006 summer season, Western Washington State University students began a mapping effort to document the location and extent of the cheatgrass populations in burn units proposed for prescribed burns on the valley walls above Stehekin Valley. Three of these units, Flick, Hazard and Imus, are contained within the area that was burned in the Flick Creek fire. Only the northern portion of the Hazard Creek unit had been surveyed prior to the fire. NOCA staff observations of the Lakeshore Trail prior to the burn have reported extensive cheatgrass locations throughout the trail zone.

The primary weed of concern in and around the Flick Creek Fire area is common crupina which is a Class A noxious weed in the state of Washington. This plant currently infests 500 acres in and adjacent to the Flick Creek Fire (Map 6). A portion of the established crupina population infestation was burned in the Rex Creek Fire in 2001. These burned populations were documented to increase in size and density as a result of the decreased canopy and ground cover. Common crupina, the six-week fescues and cheatgrass are winter annuals. These species germinate in the fall and early winter and begin active growth in the early spring, setting seed in the summer months. The thistles and knapweeds are perennial herbs and spread rapidly via wind dispersed seed. Scott's broom is a perennial shrub. Scott's broom, crupina and cheatgrass have been shown to be fire adapted species, increasing in frequency and density after fire.

Seventeen fire retardant drops over 4 days (August 20 and 21 and September 1 and 13, 2006) were made on the Flick Creek fire. A total 36,758 gallons of LCG-A and LCG-R retardant were dropped; both of these retardants consist of ammonium polyphosphate with a clay thickener and an iron oxide colorant. Fire retardant has been shown to have several effects on vegetation, including an increase annual grass biomass, decreases in foliar cover and species richness, and the reduction of post germination survivorship of some native legume species (Larson and Newman 1996; Adams and Simmons 1999). The likely effects of retardant drops on the vegetation of the Flick Creek Fire area are an increase in the cover and abundance of annual weedy grasses such as cheatgrass and six-week bromes.

RECOMMENDATIONS

Specifications

Funds to identify and treat invasive plant species will be sought through the BAR source.

Management (non-specification related)

Survey, assess and monitor state listed plant species

A survey and assessment of state listed species will be performed and a monitoring plan developed to track the post-fire response of these plant populations. The surveys will be conducted in early summer 2007. Funding for these activities will be obtained from sources other than BAER or BAR.

Public education

Public education in the form of signing, interpretive talks, public meetings and brochures will be an important part of the continued reduction and control of invasive species management for the Flick Creek Fire.

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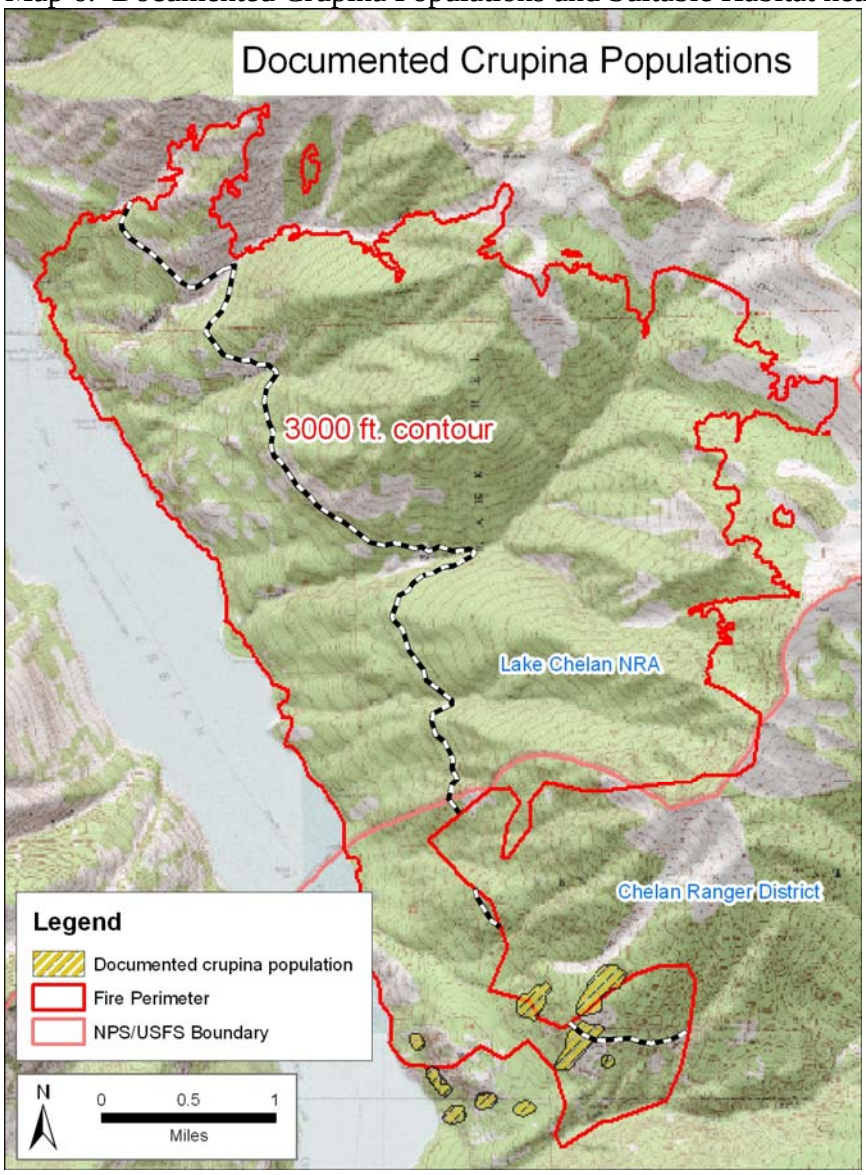
Map 6. Documented Crupina Populations and Suitable Habitat near Flick Creek Fire



WILDLIFE BURNED AREA ASSESSMENT

OBJECTIVES

- Assess effects of the fire and suppression tactics to Federally listed Threatened and Endangered species and their habitats
- Conduct Section 7 Emergency consultation with the U.S. Fish and Wildlife Service.
- Prescribe emergency stabilization measures and/or monitoring.
- Assess effects of proposed stabilization actions to listed species and habitats.

ISSUES

- Four federally listed species have suitable habitat within the boundaries of the fire area, including gray wolf (*Canus lupus*), grizzly bear (*Ursus arctos*), canada lynx (*Lynx canadensis*), and spotted owl (*Strix occidentalis*).
- Of these species, only the spotted owl is known to currently use habitat within the fire area. Two active spotted owl nesting territories occur within or along the boundary of the fire perimeter near Fourmile and Flick Creeks.
- Canada Lynx may be using habitat in the fire area above 4,000 ft. elevation.
- Potential impacts to spotted owls exist from wildfire, suppression actions, and emergency stabilization and rehabilitation treatments.

OBSERVATIONS

Background

The Flick Creek Fire burned approximately 7,900 acres along the eastern shore of Lake Chelan within Lake Chelan National Recreation Area (LACH) and the Okanagan-Wenatchee National Forest. The fire was human-caused. The fire started on July 26th near Flick Creek. The fire continues to burn, and is expected to burn to the watershed ridgetops until a season-ending precipitation event. To date, the Flick Creek Fire has burned approximately 6,800 acres within NPS lands, most of which is within the Steven Mather Wilderness Area.

The Flick Creek Fire Area lies within the Lake Chelan National Recreation Area (LACH). LACH is located along the east slope of the Washington Cascades Range in Chelan County and lies within the semi-arid continental zone. East of the Cascade crest a rainshadow effect exists creating cool winters and warm dry summers. Below 1,220 m, forested habitat is dominated by the Douglas-fir cover type with western red cedar, lodgepole pine (*Pinus contorta*), western white pine (*Pinus monticola*), and Ponderosa pine (*Pinus ponderosa*) commonly found as minor components (Agee and Kertis 1986). Above the 1,220 m elevation line, forested habitat is dominated by the subalpine fir (*Abies lasiocarpa*) cover type (Agee and Kertis 1986). Other tree species that are common in this cover type include mountain hemlock and Englemann spruce (*Picea engelmannii*). Although less common, the Pacific silver fir cover type is also found on

the east side above 1,220 m, most notably in the Bridge Creek section of the Stehekin River drainage. Both western hemlock and mountain hemlock were commonly found in this cover type.

Wildlife of the Flick Creek area is typical of the dry eastslope of the Cascade Range. From the summer of 1988 through late winter 1992, Kuntz and Glesne (1993) documented 138 wildlife species within or near the Flick Creek burn area. This included 5 amphibian species, 8 reptile species, 25 mammal species, and 104 species of birds. The only Federal and/or State listed or candidate species currently known to occur within the Flick Creek burn area is the Spotted Owl. However, suitable habitat for 4 other listed species (Gray Wolf, Canada Lynx, Grizzly Bear, and Bald Eagle) occurs within this burn area.

Currently, there are two known spotted owl activity sites (Fourmile and Flick Creek activity sites) in the area of the Flick Creek Fire. In 2006, the Fourmile Creek pair was observed nesting at a location near Hazard Creek on 11 May. Last monitored on 11 July, both adults and one branched young (still unable to fly; R. Christophersen pers. comm.) were observed (NOCA files). Occupancy of the Flick Creek activity site is unknown as this site was not visited in 2006.

Within the burn area, there are no fish bearing streams. However, 17 fire retardant drops over 4 days (August 20 and 21 and September 1 and 13, 2006) were made on the Flick Creek Fire (see table below). Drop locations were near the headwater areas of Fourmile and Hazard Creeks and along the lower northern slopes of Purple and Imus Creeks (Map 2). A total of 36,758 gallons of retardant were dropped. Two retardants were used (LCG-A and LCG-R), both of which consist of ammonium polyphosphate with a clay thickener and an iron oxide colorant. Fire retardant has been shown to have little to no effect to terrestrial fauna, however it does have very deleterious effects on fish and aquatic insects. At high temperatures, retardant breaks down into ammonia and phosphoric acid as well as sodium and hydrogen cyanide. Retardant can have immediate effects on amphibians, fish and macro invertebrates. Studies have shown that a single retardant drop may have sufficient ammonium concentration to be lethal to fish and other aquatic organisms. Delayed effects, such as algae blooms resulting from increased phosphate, can also occur. These blooms can cause depletion of oxygen in aquatic ecosystems.

Following the 1994 Boulder Creek Fire, during which fire retardant was dropped in Boulder Creek (whose headwaters are immediately north of Fourmile Creek), Fourmile Creek was used as a control site to compare macroinvertebrate populations between watersheds with and without retardant drops. No discernible differences were noted, but that effort provided baseline inventory macroinvertebrate information that may be useful for future analyses. There may be short term impacts to macroinvertebrate populations within these drainages due to increased concentrations of sediment and debris following storm and high water events. BAER will not cover an analysis of potential water quality impacts to stream organisms, but a non-specification recommendation is to conduct sampling of macroinvertebrates in Hazard, Imus, and Purple Creeks in the fall of 2006 and spring of 2007.

Retardant drops, Flick Creek fire

DATE	GALLONS OF RETARDANT	LOCATION
8/20/06	2514	Ridge between Fourmile and Purple Creeks
8/21/06	8211	Upper elevations, Purple Crk watershed
9/1/06	8212	Ridge between Purple and Imus Creeks
9/13/06	17821	Mid-elevation, immediately uplake of Imus Crk

Reconnaissance Methods

The Burned Area Emergency Response (BAER) initial briefing was conducted with Resource Management staff on August 12, 2006. On August 13, 2006 and again on September 20, 2006 the BAER team made site visits to assess the severity of the Flick Creek fire and determine effects to natural and cultural resources. The BAER leaders provided additional briefings and met with individuals and provided small group discussions. These consultations led to the list of wildlife issues discussed in this assessment.

Information for this assessment is based on a review of relevant literature, North Cascades National Park Service Complex Wildlife Sighting Database and NOCA wildlife inventory and monitoring data (Kuntz and Christophersen 1996, Christophersen et al. 2005; NOCA files), habitat inventory information (NOCA files), field reconnaissance, and personal communication with U.S. Fish and Wildlife Service biologists and NOCA biologists and Resource Management personnel. Information of the effects of the fire came from interviews with fire suppression personnel and resource advisors. Further information was obtained through fire area reconnaissance August 11-13, 2006, the September 20, 2006 site visit, and the helicopter flights over the fire area on August 13 and September 19, 2006.

The purpose of this assessment is to discuss the potential effects of fire, suppression tactics and propose emergency stabilization activities to federally listed species. Species addressed or mentioned in this assessment was developed from documents referenced in this report and input from NPS and USFWS biologists and resource managers.

This assessment is not intended to definitively answer the many specific species effects questions that are inevitably brought up in an incident such as the Flick Creek Fire. The only focus of this assessment is to determine the potential for the immediate, emergency actions that may be necessary to prevent further impacts to federally listed species and habitats occurring within North Cascades National Park Service Complex.

Findings

Biological Assessment for Federally Listed Species

Direct effects as described in this report refer to individual mortality or disturbance resulting in flushing, displacement or harassment of the animal. Indirect effects refer to modification of habitat and/or prey species and possible subsequent affects to the species.

***Northern Spotted Owl**:* The range of the Northern Spotted Owl includes the Coastal Mountains and east and west slopes of the Cascade Range from southwestern British Columbia south through Washington and Oregon to Marin County in northern California. Mojave and Sonoran deserts in California, Nevada, Arizona, Utah, and Sinaloa, Mexico (Gutierrez et al. 1995). On the east slope of the Washington Cascades, Northern Spotted Owls utilize mature coniferous forests with dense canopy cover at low and moderate elevations (Smith et al. 1997). The Northern Spotted Owl was listed as threatened on June 26, 1990. Critical habitat was designated on January 15, 1992. The area within the Flick Creek Fire is not designated critical habitat.

DIRECT FIRE EFFECTS: In extreme cases, wildland fires and fire suppression (hazard tree felling) can result in direct mortality of adults, eggs, or young. The potential risk for spotted owls to be killed or injured during a wildland fire use fire or fire suppression activities is highest in the area relatively close to the nest tree during the breeding season, defined as March 15 to August 31. During a fire or tree felling, non-breeding adult spotted owls can reasonably be expected to move away from the area and avoid injury. However, nesting spotted owls tending to reproductive activities such as incubation or brooding may be reluctant to leave the area (Delaney et al. 1999) and, therefore, may be vulnerable to injury. Fledglings, whether in or out of the nest, may also be at risk of direct mortality if they are unable to sufficiently fly in order to move away from a fire or leave a falling tree. Potential effects to eggs range from parental abandonment to destruction from fire or tree felling (Drent 1972, White and Thurow 1985). These kinds of effects are most likely to occur when breeding activities are underway. In the event that wildland fire use or fire suppression activities will occur during the early nesting season, eggs or juveniles that have not fledged could be killed.

INDIRECT FIRE EFFECTS: Indirect effects of fire may include loss or displacement of prey species. Stand replacing fires that remove large trees, snags, and downed wood can affect prey composition and/or availability by altering characteristics of the habitat upon which prey species depend. Because the amount of dead (i.e., snags) and down material present on the forest floor is positively correlated with densities of some spotted owl prey species, the loss of these materials may contribute to declines in spotted owl prey, at least on a localized, short-term basis (Williams et al. 1992, Bevis et al. 1997). Because availability of large prey species, particularly dusky-footed woodrats and northern flying squirrels, has been shown to be important for spotted owl reproductive success (Barrows 1985, Zabel et al. 1995), activities that reduce prey populations could lower spotted owl nesting success and recruitment. However, recently in the southern Sierras of California nighttime detections (eg. foraging spotted owls) have had a high portion of their detections in burned areas (Rodney Siegel, The Institute of Bird Populations, pers. comm.).

DIRECT FIRE SUPPRESSION EFFECTS: Suppression activities that occur adjacent to occupied spotted owl nesting habitat during the spotted owl nesting season have the potential to affect the outcome of nesting success. The use of chainsaws, heavy equipment, and small helicopters could introduce an increased level of sound into the environment during the nesting season, and an increased human presence adjacent to nest territories, and therefore, may disrupt normal behavior causing birds to flush from the nest, abort a feeding attempt, or postpone the feeding of a chick (breeding season defined as March 15 to August 31; USFWS In prep.).

INDIRECT FIRE SUPPRESSION EFFECTS: Indirect effects of the burnout operation include temporary loss of small amounts of suitable owl habitat and a potential shift in prey species. Effects of short-term shifts in prey species are unknown for the Cascades.

POST FIRE OBSERVATIONS: The nesting area of the Fourmile spotted owl pair was surveyed for fire-related impacts on September 20, 2006. Several potential nesting platforms were observed in the general area. The understory vegetation was completely burned, as was most of the mid-story deciduous tree cover (big-leaf maple). Although several overstory coniferous species had significant scorching (with expected tree mortality), a majority of the overstory canopy remained green. Whereas it appears the overstory nesting habitat for spotted owls remained largely intact, there were likely significant impacts to the prey species and their habitat in this spotted owl activity area, as well as to the mid-story deciduous cover that the owls used for shade.

Other Species of Concern

Canada Lynx*:* Fire, wind, insects, and disease historically played an important role in maintaining the mosaic of forest successional stages that provide habitat for both snowshoe hare and lynx (Fox 1978, Bailey et al. 1986, Quinn and Thompson 1987, Koehler and Brittell 1990, Poole et al. 1996, Slough and Mowat 1996). For the first few years after a burn, there appears to be a negative correlation between lynx use and the amount of area burned (Fox 1978). This short-term effect is likely due to the reduction of snowshoe hare populations, removal of cover, and possibly also to increased competition from coyotes in open habitats (Stephenson 1984, Koehler and Brittell 1990). The lag time until the peak of hare population increase is generally about 15 to 30 years (this varies depending on tree species, habitat type and severity of disturbance). Re-sprouting of broadleaf species occurs more quickly, in 3 to 12 years. Hare populations again decrease as the forest canopy develops and shades out the understory. Forest gap processes, such as large blowdowns, insect infestations, and outbreaks of disease, produce similar effects (Agee 2000).

Lynx habitat in the Cascade Mountains was dominated historically by infrequent (70 - 150 years) stand-replacing fire regimes (Agee 2000). Disturbance interval and fire severity varied by cover type, with xeric pine types such as lodgepole or jack pine typically experiencing more frequent and more severe fires than mixed conifer types and spruce/fir.

***Grizzly Bear and Gray Wolf**:* Both species are habitat use generalists and highly mobile. Neither species has been documented in the burn area in many years. Thus, neither species is addressed in this wildlife assessment.

Bald Eagle: Bald Eagles have nested near the mouth of the Stehekin River, approximately 1.5 miles north of the Flick Creek Fire Area. This species also is a regular winter visitor to areas at the head of Lake Chelan. Habitat loss due to the Flick Creek Fire is confined to a few trees along the lake shore used as perch trees and should not negatively affect eagles using Lake Chelan NRA.

RECOMMENDATIONS

Management (non-specification related)

These recommendations were derived from consultation with Fish and Wildlife Service Biologist, Linda Saunders (personal communication, August 2006).

Monitor Spotted Owl Nesting Sites

Monitor sites in 2007 to determine if pairs remain and/or have returned to remaining suitable habitat (to be covered by normal park Resource Management operations)

Minimize Impacts to Spotted Owls from Operations

Implement the recommendations outlined in the Fish and Wildlife Service Biological Opinion of the NOCA Fire Management Plan

Activity	Threshold distance for spotted owls
blasting, Type 1 helicopter, large airplane	1 mile
Type 2 & 3 helicopter or a single-engine airplane	120 yds
impact pile driver, jackhammer, rock drill	60 yds
chainsaws	65 yds
heavy equipment	35 yds

Sample Benthic Macroinvertebrates

Because of the retardant drops in the Imus, Purple, and Hazard Creek watersheds, park staff should complete sampling of benthic macroinvertebrates in those streams to assess and document the potential impacts of that suppression effort to stream quality. Sampling should occur in the fall of 2006 as soon as adequate flow exists in those drainages, and again in the spring or early summer of 2007 as snowmelt occurs in the area of the retardant drops.

DETERMINATIONS OF EFFECT TO THREATENED SPECIES

Northern Spotted Owl

FIRE EFFECTS: Due to the season timing of this fire, direct mortality is highly unlikely at either the Four-mile Activity Site (2006 status: adult pair with one branched young) or the Flick Creek Activity Site (2006 status: unknown). Direct habitat loss may affect future use of these two activity sites, as both sites were burned over to some degree in the fire.

SUPPRESSION ACTION EFFECTS: Use of suppression tools and suppression activities occurring at or near these activity sites could cause nesting failure. However, since most activities have occurred after August 1, during the late nesting season, it is highly unlikely that these suppression activities have resulted in direct harm to these owls at either activity site.

Canada Lynx, Grizzly Bear and Gray Wolf

FIRE EFFECTS: None.

SUPPRESSION ACTION EFFECTS: None.

Determinations were made with the aid of US Fish and Wildlife Service biologists Linda Saunders and Patty Walcott by conference call and emails on August 10 and 11, 2006. Park staff updated the USFWS staff on October 2, 2006 with information on the additional fire growth and known conditions with the spotted owl activity areas within the fire perimeter. All consultations included discussions on the status of the fire, potential effects, and recommendations on actions needed, as outlined in Sections III and IV of this assessment.

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SPECIFICATIONS

PART F - INDIVIDUAL SPECIFICATION

TREATMENT/ACTIVITY NAME	Assess Cultural Site FS 292	**PART E SPECIFICATION #**	C-1
NFPORS TREATMENT CATEGORY*	Assessment	**FISCAL YEAR(S) (list each year):**	2007
NFPORS TREATMENT TYPE *	Risk Assessment	**WUI? Y / N**	Y
IMPACTED COMMUNITIES AT RISK	Stehekin	**IMPACTED T&E SPECIES**	None

* See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

WORK TO BE DONE (describe or attach exact specifications of work to be done):

Number and Describe Each Task:

A. General Description: Cultural Site FS 292 is at high risk from further damage due to tree fall, rock fall, and erosion.
B. Location/(Suitable Sites): Site FS 292.

C. Design/Construction Specifications: Assessment to determine the extent of post-fire impacts and appropriate treatments. This will require a more thorough cultural resource assessment to delineate site boundaries and locate cultural features and artifacts at risk before specific treatment recommendations can be developed. The assessments will involve mapping and documenting the archeological site contents and recommending specific treatments as needed.

D. Purpose of Treatment Specifications: The site consists of historic rock walls and artifact scatter. Through field inspection it was determined that this site is within the burned area and has been mildly impacted from direct fire effects (scorching on cultural features). The largest threat to this resource are standing dead and dying trees which have been damaged by direct (charring) and indirect (scorching) fire impacts.

E. Treatment Effectiveness Monitoring Proposed: The recommended hillslope treatment will require post-implementation monitoring to identify any additional needs to maintain the treatment for cultural site protection.

LABOR, MATERIALS AND OTHER COST:

PERSONNEL SERVICES: (Grade @ Cost/Hours X # Hours X # Fiscal Years = Cost/Item): Do not include contract personnel costs here (see contractor services below).	**COST / ITEM**
GS-9 Archeologist, 1 Pay Period at $2,425	$ 2,425
GS-7 Natural Resource Spec, 1/2 Pay Period at $2,040/PP	$ 1,020
TOTAL PERSONNEL SERVICE COST	$ 3,445
EQUIPMENT PURCHASE, LEASE AND/OR RENT (Item @ Cost/Hour X # of Hours X #Fiscal Years = Cost/Item): Note: Purchases require written justification that demonstrates cost benefits over leasing or renting.	**COST / ITEM**
Digital Camera	$ 500
Metal Detector	$ 300
TOTAL EQUIPMENT PURCHASE, LEASE OR RENTAL COST	$ 800
MATERIALS AND SUPPLIES (Item @ Cost/Each X Quantity X #Fiscal Years = Cost/Item):	**COST / ITEM**
Miscellaneous Costs (Sample Bags, etc.)	$ 25
Curation Costs	$ 100
TOTAL MATERIALS AND SUPPLY COST	$ 125
TRAVEL COST (Personnel or Equipment @ Rate X Round Trips X #Fiscal Years = Cost/Item):	**COST / ITEM**
Backcountry Perdiem, two persons for 5 days at $40 per day	$ 200
Ferry Trip, 2 trips at $25 per trip	$ 50
Vehicle Mileage, 1 trip at $60	$ 60
TOTAL TRAVEL COST	$ 310
CONTRACT COST (Labor or Equipment @ Cost/Hour X #Hours X #Fiscal Years = Cost/Item):	**COST / ITEM**
TOTAL CONTRACT COST	$ -
	$ 4,680

SPECIFICATION COST SUMMARY

FISCAL YEAR	PLANNED INITIATION DATE (M/D/YYYY)	PLANNED COMPLETION DATE (M/D/YYYY)	WORK AGENT	UNITS	UNIT COST	PLANNED ACCOMPLISH MENTS	PLANNED COST
FY 07	10/01/06	10/15/06	F	1	$ 4,680	1	$ 4,680
				TOTAL	$ 4,680	**1**	**$ 4,680**

Work Agent: **C**=Coop Agreement, **F**=Force Account, **G**=Grantee, **P**=Permittees, **S**=Service Contract, **T**=Timber Sales Purchaser, **V**=Volunteer

SOURCE OF COST ESTIMATE

1. Estimate obtained from 2-3 independent contractual sources.	
2. Documented cost figures from similar project work obtained from local agency sources.	
3. Estimate supported by cost guides from independent sources or other federal agencies.	
4. Estimates based upon government wage rates and material cost.	
5. No cost estimate required - cost charged to Fire Suppression Account.	

P = Personnel Services, **E** = Equipment **M** = Materials/Supplies, **T** = Travel, **C** = Contract, **F** = Suppression

RELEVANT DETAILS, MAPS AND DOCUMENTATION INCLUDED IN THIS REPORT

TOTAL COST BY JURISDICTION

JURISDICTION	UNITS TREATED	COST
NPS North Cascades National Park	1	$ 4,680
	TOTAL COST	**$ 4,680**

Specification Form Created September 23, 2006

PART F - INDIVIDUAL SPECIFICATION

TREATMENT/ACTIVITY NAME	Assess Cultural Site FS 245	**PART E SPECIFICATION #**	C-
NFPORS TREATMENT CATEGORY*		**FISCAL YEAR(S) (list each year):**	200
NFPORS TREATMENT TYPE *		**WUI? Y /**	Y
IMPACTED COMMUNITIES AT RISK	Steheki	**IMPACTED T&E SPECIES**	Non

* See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

WORK TO BE DONE (describe or attach exact specifications of work to be done):

Number and Describe Each Task:

A. General Cultural Site FS 245 is at high risk from further damage due to tree fall, rock fall, and erosion.
B. Location/(Suitable Sites): Site FS
C. Design/Construction Specifications: Assessments to determine the extent of post-fire impacts and appropriate treatments. This will require a more thorough cultural resource assessment to delineate site boundaries and locate cultural features and artifacts at risk before specific treatment recommendations can be developed. The assessments will involve mapping and documenting the archeological site contents and recommending specific treatments as needed.
D. Purpose of Treatment Specifications: The site consists of two short trail segments, one of which crosses a steep-sided unnamed drainage channel near the base of a steep (60-70 degree) slope. Ground vegetation on and above the site has burned to ash in some places, leaving a loose, rocky slope and which is susceptible to slopewash and increased seasonal channel runoff.
E. Treatment Effectiveness Monitoring Proposed: The recommended hillslope treatment will require post-implementation monitoring to identify any additional needs to maintain the treatment for cultural site protection.

LABOR, MATERIALS AND OTHER COST:

PERSONNEL SERVICES: (Grade @ Cost/Hours X # Hours X # Fiscal Years = Cost/Item): Do not include contract personnel costs here (see contractor services below).	**COST / ITEM**
GS-9 Archeologist, 1/2 Pay Period at ($2,425 / 2) = $1,215	$ 1,21
GS-7 Natural Resource Specialist, 1/2 Pay Period at ($2,040 / 2) = $1,020	$ 1,02
TOTAL PERSONNEL SERVICE COST	$ 2,23
EQUIPMENT PURCHASE, LEASE AND/OR RENT (Item @ Cost/Hour X # of Hours X #Fiscal Years = Note: Purchases require written justification that demonstrates cost benefits over leasing or renting.	**COST / ITEM**
Non	
TOTAL EQUIPMENT PURCHASE, LEASE OR RENTAL COST	$ -
MATERIALS AND SUPPLIES (Item @ Cost/Each X Quantity X #Fiscal Years = Cost/Item):	**COST / ITEM**
Non	
TOTAL MATERIALS AND SUPPLY COST	$ -
TRAVEL COST (Personnel or Equipment @ Rate X Round Trips X #Fiscal Years = Cost/Item):	**COST / ITEM**
Backcountry Perdiem, 2 persons at $40 per day at 5 days = $200	$ 20
Ferry Trip, 2 trips at $25 per trip = $50	$ 5
Vehicle mileage, 1 trip at $60	$ 6
TOTAL TRAVEL COST	$ 31
CONTRACT COST (Labor or Equipment @ Cost/Hour X #Hours X #Fiscal Years = Cost/Item):	**COST / ITEM**
Non	$ -
TOTAL CONTRACT COST	$ -

SPECIFICATION COST SUMMARY

FISCAL YEAR	PLANNED INITIATION DATE (M/D/YYYY	PLANNED COMPLETION DATE (M/D/YYYY	WORK AGENT	UNITS	UNIT COST	PLANNED ACCOMPLISH MENTS	PLANNED COST
FY	10/01/0	10/30/0	F	Eac	$ 2,54	1	$ 2,54
FY							
FY							
				TOTAL	$ 2,54	**1**	**$ 2,54**

Work Agent: **C**=Coop Agreement, **F**=Force **G**=Grantee **P**=Permittees **S**=Service **T**=Timber Sales Purchaser, **V**=Volunteer

SOURCE OF COST ESTIMATE

1. Estimate obtained from 2-3 independent contractual sources.	
2. Documented cost figures from similar project work obtained from local agency sources.	
3. Estimate supported by cost guides from independent sources or other federal agencies.	
4. Estimates based upon government wage rates and material cost.	
5. No cost estimate required - cost charged to Fire Suppression Account.	

P = Personnel Services, **E** = Equipment **M** = Materials/Supplies, **T** = Travel, **C** = Contract, **F** = Suppression

RELEVANT DETAILS, MAPS AND DOCUMENTATION INCLUDED IN THIS REPORT

TOTAL COST BY JURISDICTION

JURISDICTION	UNITS TREATED	COST
NPS North Cascades National Park	1	$ 2,545
	TOTAL COST	**$ 2,545**

Specification Form Created September 23, 2006

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PART F - INDIVIDUAL SPECIFICATION

TREATMENT/ACTIVITY NAME	Tree Removal/Monitoring Site FS 292	**PART E SPECIFICATION #**	C-
NFPORS TREATMENT CATEGORY*		**FISCAL YEAR(S) (list each year):**	200
NFPORS TREATMENT TYPE *		**WUI? Y /**	Y
IMPACTED COMMUNITIES AT RISK	Steheki	**IMPACTED T&E SPECIES**	Non

* See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

WORK TO BE DONE (describe or attach exact specifications of work to be done):

Number and Describe Each Task:

A. General Hazard Tree Management: Two known cultural resource sites are at risk from standing dead/dying trees. Two trees near the Flick Creek shelter put the structure at risk from tree fall and flying debris. Thirty of the standing dead trees (10-24" dbh) on Field Site 292 were identified to be potential risks to historic features because they are dead or will die within a year. These trees also pose a risk to human life (i.e., people using the adjacent campsite) and will be removed as part of the hazard tree treatments within the Flick Creek fire perimeter (as per the North Cascade National Park Service Complex Management Plan, 1995).

B. Location/(Suitable Sites): Flick Creek shelter and FS 292.

C. Design/Construction Specifications: Tree fallers with technical expertise and a Cultural Resource specialist to supervise protection of cultural features during implementation

D. Purpose of Treatment Specifications: These trees, if uprooted, will disturb or destroy the cultural features.

E. Treatment Effectiveness Monitoring Proposed: The recommended treatment will require post-implementation monitoring to identify any additional needs to maintain the treatment for cultural site protection.

LABOR, MATERIALS AND OTHER COST:

PERSONNEL SERVICES: (Grade @ Cost/Hours X # Hours X # Fiscal Years = Cost/Item): Do not include contract personnel costs here (see contractor services below).	**COST / ITEM**
TREE REMOVAL, PILE AND BURN	
WG-9 Maint Worker (Sawyer-Type B&C Qualification), I pay period at $3,000	$ 3,00
WG-7 Lead Carpenter (Sawyer-Type B Qualification), 1 pay period at $2,375	$ 2,37
WG-7 MVO (Swamper), 1 pay period at $2,455	$ 2,45
WG-5 Maint helper (Swamper), 1 pay period at $1,795	$ 1,79
GS-9 Archeologist, 1 pay period at $2,425	$ 2,42
PILE BURNING TO SPECIFICATIONS	
GS-7 Supervisory Forester, 1/2 pay period at $1,500 per pay period	$ 75
GS-6 Forestry Tech, 1/2 pay period at $1,360 per pay period	$ 68
GS-5 Forestry Tech, 1/2 pay period at $1,220 per pay period	$ 61
GS-5 Forestry Tech, 1/2 pay period at $1,220 per pay period	$ 61
TOTAL PERSONNEL SERVICE COST	$ 14,70
EQUIPMENT PURCHASE, LEASE AND/OR RENT (Item @ Cost/Hour X # of Hours X #Fiscal Years = Note: Purchases require written justification that demonstrates cost benefits over leasing or renting.	**COST / ITEM**
Non	$ -
TOTAL EQUIPMENT PURCHASE, LEASE OR RENTAL COST	$ -
MATERIALS AND SUPPLIES (Item @ Cost/Each X Quantity X #Fiscal Years = Cost/Item):	**COST / ITEM**
Tools / gear (chains, dolmars, files)	$ 40
Supplies (gas, bar oil, etc.)	$ 40
Slash paper	$ 20
TOTAL MATERIALS AND SUPPLY COST	$ 1,00
TRAVEL COST (Personnel or Equipment @ Rate X Round Trips X #Fiscal Years = Cost/Item):	**COST / ITEM**
Backcountry perdiem - 8 days 3 each at $160	$ 48
Backcountry perdiem - 4 days 2 each at $80	$ 16
Ferry Trip - 3 each at $25	$ 7
Vehicle mileage, 1 trip	$ 8
TOTAL TRAVEL COST	$ 79
CONTRACT COST (Labor or Equipment @ Cost/Hour X #Hours X #Fiscal Years = Cost/Item):	**COST / ITEM**
TOTAL CONTRACT COST	$ -

SPECIFICATION COST SUMMARY

FISCAL YEAR	PLANNED INITIATION DATE (M/D/YYYY)	PLANNED COMPLETION DATE (M/D/YYYY)	WORK AGENT	UNITS	UNIT COST	PLANNED ACCOMPLISH MENTS	PLANNED COST
FY 2007	11/01/06	01/30/07	F	Acres	$ 5,498	3	$ 16,495
FY 2008							
FY 2009							
				TOTAL	$ 5,498	**3**	**$ 16,495**

Work Agent: **C**=Coop Agreement, **F**=Force Account, **G**=Grantee, **P**=Permittees, **S**=Service Contract, **T**=Timber Sales Purchaser, **V**=Volunteer

SOURCE OF COST ESTIMATE

1. Estimate obtained from 2-3 independent contractual sources.	
2. Documented cost figures from similar project work obtained from local agency sources.	
3. Estimate supported by cost guides from independent sources or other federal agencies.	
4. Estimates based upon government wage rates and material cost.	
5. No cost estimate required - cost charged to Fire Suppression Account.	

P = Personnel Services, **E** = Equipment **M** = Materials/Supplies, **T** = Travel, **C** = Contract, **F** = Suppression

RELEVANT DETAILS, MAPS AND DOCUMENTATION INCLUDED IN THIS REPORT

TOTAL COST BY JURISDICTION

JURISDICTION	UNITS TREATED	COST
NPS North Cascades National Park	1	$ 16,495
	TOTAL COST	**$ 16,495**

Specification Form Created September 23, 2006

PART F - INDIVIDUAL SPECIFICATION

TREATMENT/ACTIVITY NAME	Slope and Trail Stabilization	**PART E SPECIFICATION #**	C-4
NFPORS TREATMENT CATEGORY*	Erosion/Sedimentation	**FISCAL YEAR(S) (list each year):**	2007
NFPORS TREATMENT TYPE *	Hillslope Protection	**WUI? Y / N**	Y
IMPACTED COMMUNITIES AT RISK	Stehekin	**IMPACTED T&E SPECIES**	None

* See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

WORK TO BE DONE (describe or attach exact specifications of work to be done):

Number and Describe Each Task:

A. General Description: Soils on a 60 degree slope directly above the Flick Creek Shelter (National Register listed; MRA 88003444) are now destabilized due to fire consumption of vegetation and ground litter. In order to protect the historic structure from rolling rock, debris, and accumulation of sediment against the shelter walls, a small hillslope treatment was deemed necessary. A new 50-ft section of trail is needed to re-direct erosion away from cultural resources.
B. Location/(Suitable Sites): Flick Creek Shelter.
C. Design/Construction Specifications: Mulching using a product called woodstraw. This is a waste product of veneer production, similar to wood chips, and composed of small, narrow strips of wood. When applied, these strips interlock and stabilize soils much like Ponderosa pine needles. Mulch on about 1 acre of slope. Current social trail be eliminated and replaced by a small section of trail designed to re-direct foot traffic away from the steep slope above the cultural site

D. Purpose of Treatment Specifications: Protect the historic structure from rolling rock, debris, and accumulation of sediment against the shelter walls.
E. Treatment Effectiveness Monitoring Proposed: Cultural Resource specialist will be on site to ensure that no historic features, structures or artifacts are put at risk during application. Post-implementation monitoring will identify any additional needs to maintain the treatment for cultural site protection.

LABOR, MATERIALS AND OTHER COST:

PERSONNEL SERVICES: (Grade @ Cost/Hours X # Hours X # Fiscal Years = Cost/Item): Do not include contract personnel costs here (see contractor services below).	**COST / ITEM**
WG-4 Laborer (Trails), 1 pay period at $2,000 per pay period	$ 2,000
WG-4 Laborer (Trails), 1 pay period at $1,600 per pay period	$ 1,600
GS-7 Natural Resource Spec, $2,035/PP, 1 PP/yr, 3 yrs (COLA figured in)	$ 6,310
GS-9 Archeologist, 1 pay period at $2,425 per pay period	$ 2,425
TOTAL PERSONNEL SERVICE COST	$ 12,335
EQUIPMENT PURCHASE, LEASE AND/OR RENT (Item @ Cost/Hour X # of Hours X #Fiscal Years = Cost/Item): Note: Purchases require written justification that demonstrates cost benefits over leasing or renting.	**COST / ITEM**
Trimble GPS unit and software for precise mapping of monitoring plots	$ 5,000
TOTAL EQUIPMENT PURCHASE, LEASE OR RENTAL COST	$ 5,000
MATERIALS AND SUPPLIES (Item @ Cost/Each X Quantity X #Fiscal Years = Cost/Item):	**COST / ITEM**
Woodstraw mulch material, 80 bales at $12 per bale	$ 960
Removable grid squares (6 @ $83/each) and rebar ($52) for precise mapping	$ 550
TOTAL MATERIALS AND SUPPLY COST	$ 1,510
TRAVEL COST (Personnel or Equipment @ Rate X Round Trips X #Fiscal Years = Cost/Item):	**COST / ITEM**
Barge and Shuttle Boat Fee, 1 trip at $1,600	$ 1,160
backcountry perdiem 1 person, 4 days@$20/day	$ 80
ferry trip, 1@ $25/trip	$ 25
vehicle mileage, 1 trip@ $80/trip	$ 80
TOTAL TRAVEL COST	$ 1,345
CONTRACT COST (Labor or Equipment @ Cost/Hour X #Hours X #Fiscal Years = Cost/Item):	**COST / ITEM**
None	
TOTAL CONTRACT COST	$ -

SPECIFICATION COST SUMMARY

FISCAL YEAR	PLANNED INITIATION DATE (M/D/YYYY)	PLANNED COMPLETION DATE (M/D/YYYY)	WORK AGENT	UNITS	UNIT COST	PLANNED ACCOMPLISH MENTS	PLANNED COST
FY 07	10/15/06	11/15/06	F	Site	$ 15,915	1	$ 15,915
FY08	10/01/07	04/30/08	F	Site	$ 2,100	1	$ 2,100
FY09	10/01/08	04/30/09	F	Site	$ 2,175	1	$ 2,175
				TOTAL	$ 6,730	**3**	**$ 20,190**

Work Agent: **C**=Coop Agreement, **F**=Force Account, **G**=Grantee, **P**=Permittees, **S**=Service Contract, **T**=Timber Sales Purchaser, **V**=Volunteer

SOURCE OF COST ESTIMATE

1. Estimate obtained from 2-3 independent contractual sources.	
2. Documented cost figures from similar project work obtained from local agency sources.	
3. Estimate supported by cost guides from independent sources or other federal agencies.	
4. Estimates based upon government wage rates and material cost.	
5. No cost estimate required - cost charged to Fire Suppression Account.	

P = Personnel Services, **E** = Equipment **M** = Materials/Supplies, **T** = Travel, **C** = Contract, **F** = Suppression

RELEVANT DETAILS, MAPS AND DOCUMENTATION INCLUDED IN THIS REPORT

TOTAL COST BY JURISDICTION

JURISDICTION	UNITS TREATED	COST
NPS North Cascades National Park	1	$ 20,190
	TOTAL COST	**$ 20,190**

Specification Form Created September 23, 2006

PART F - INDIVIDUAL SPECIFICATION

TREATMENT/ACTIVITY NAME	Remove Floatable Woody Debris Purple Cr	**PART E SPECIFICATION #**	W-1
NFPORS TREATMENT CATEGORY*	Erosion/Sedimentation	**FISCAL YEAR(S) (list each year):**	2007
NFPORS TREATMENT TYPE *	Channel Debris Removal	**WUI? Y / N**	Y
IMPACTED COMMUNITIES AT RISK	Stehekin	**IMPACTED T&E SPECIES**	None

* See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

WORK TO BE DONE (describe or attach exact specifications of work to be done):

Number and Describe Each Task:

A. General Description: Trail crew will be used to remove floatable woody debris from Purple Creek. Debris includes all downed trees smaller than 18 inches in diameter, branches, charred wood, household trash, etc. Also remove all charred remains of the burned footbridge.
B. Location/(Suitable Sites): Purple Creek stream channel and floodplain between the apex of the debris cone near the abandoned water intake and 30 meters downstream from this point.
C. Design/Construction Specifications:
1. Remove floatable woody debris (described above) from the stream channel and floodplain and place it on the other side of the debris cone levee a few meter south of the channel floodplain to prevent it from being mobilized in flood events.
2. Leave downed trees that are in the channel and floodplain that are larger than 18-inches in diameter, unless they have already been cut into sections, in which case they should be bucked out of the channel and floodplain and placed on the other side of the debris cone levee a few meters south of the channel floodplain.
3. Household debris and other trash should be recycled or disposed appropriately.
D. Purpose of Treatment Specifications: To maximize channel capacity to better convey flood flows; to reduce obstructions and floatable debris that could cause overland flows and block culverts, roads or other structures.
E. Treatment Effectiveness Monitoring Proposed: Inspect stream channel after flood events to remove newly deposited floatable debris.

LABOR, MATERIALS AND OTHER COST:

PERSONNEL SERVICES: (Grade @ Cost/Hours X # Hours X # Fiscal Years = Cost/Item): Do not include contract personnel costs here (see contractor services below).	**COST / ITEM**
WG-8 Maintenance Mechanic (Trails) @ $32.50 per hour X 8 hours X 1 yr	$ 260
WG-5 Laborer (Trails) @ $28.75 per hour X 8 hours X 1 yr	$ 230
WG-4 Laborer (Trails) @ $20.63 per hour X 8 hours X 1 yr	$ 165
TOTAL PERSONNEL SERVICE COST	$ 655
EQUIPMENT PURCHASE, LEASE AND/OR RENT (Item @ Cost/Hour X # of Hours X #Fiscal Years = Cost/Item): Note: Purchases require written justification that demonstrates cost benefits over leasing or renting.	**COST / ITEM**
None	$ -
TOTAL EQUIPMENT PURCHASE, LEASE OR RENTAL COST	$ -
MATERIALS AND SUPPLIES (Item @ Cost/Each X Quantity X #Fiscal Years = Cost/Item):	**COST / ITEM**
Miscellaneous supplies for chainsaws	$ 100
TOTAL MATERIALS AND SUPPLY COST	$ 100
TRAVEL COST (Personnel or Equipment @ Rate X Round Trips X #Fiscal Years = Cost/Item):	**COST / ITEM**
None	$ -
TOTAL TRAVEL COST	$ -
CONTRACT COST (Labor or Equipment @ Cost/Hour X #Hours X #Fiscal Years = Cost/Item):	**COST / ITEM**
None	$ -
TOTAL CONTRACT COST	$ -

SPECIFICATION COST SUMMARY

FISCAL YEAR	PLANNED INITIATION DATE (M/D/YYYY)	PLANNED COMPLETION DATE (M/D/YYYY)	WORK AGENT	UNITS	UNIT COST	PLANNED ACCOMPLISH MENTS	PLANNED COST
FY 2007	10/15/06	11/15/06	P,M	Meters	$ 25	30	$ 755
				TOTAL	$ 25	**30**	**$ 755**

Work Agent: **C**=Coop Agreement, **F**=Force Account, **G**=Grantee, **P**=Permittees, **S**=Service Contract, **T**=Timber Sales Purchaser, **V**=Volunteer

SOURCE OF COST ESTIMATE

1. Estimate obtained from 2-3 independent contractual sources.	
2. Documented cost figures from similar project work obtained from local agency sources.	
3. Estimate supported by cost guides from independent sources or other federal agencies.	
4. Estimates based upon government wage rates and material cost.	
5. No cost estimate required - cost charged to Fire Suppression Account.	

P = Personnel Services, **E** = Equipment **M** = Materials/Supplies, **T** = Travel, **C** = Contract, **F** = Suppression

RELEVANT DETAILS, MAPS AND DOCUMENTATION INCLUDED IN THIS REPORT

TOTAL COST BY JURISDICTION

JURISDICTION	UNITS TREATED	COST
NPS North Cascades National Park	30	$ 755
	TOTAL COST	**$ 755**

Specification Form Created September 23, 2006

PART F - INDIVIDUAL SPECIFICATION

TREATMENT/ACTIVITY NAME	Assess Streams for Log/Debris Jams	**PART E SPECIFICATION #**	W-2
NFPORS TREATMENT CATEGORY*	Assessment	**FISCAL YEAR(S) (list each year):**	2007
NFPORS TREATMENT TYPE *	Risk Assessment	**WUI? Y / N**	Y
IMPACTED COMMUNITIES AT RISK	Stehekin	**IMPACTED T&E SPECIES**	None

* See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

WORK TO BE DONE (describe or attach exact specifications of work to be done):

Number and Describe Each Task:

A. General Description: Five principal watersheds within the NPS area of the Flick Creek Fire are at variable increased risk for log-debris jams within their main channels. These channels should be evaluated after the first significant runoff event in the spring-summer of 2007 in case any large log-debris jams in the lower half of their watersheds have developed.

B. Location/(Suitable Sites): Assess the lower half of the following five stream channels, shown in priority order:

1. Flick Creek
2. Purple Creek
3. Imus Creek
4. Hazard Creek
5. Fourmile Creek

C. Design/Construction Specifications: This assessment will be conducted by NOCA physical science technicians. Surveys will require hiking at least halfway up each watershed and close enough to the main stream channel to provide a clear view of the channel bottom, banks and floodplain. Staff will map the location of any log-debris jams, measure their dimension (length, width, height), and record the number and size of any entrained logs. Technicians will determine which jams to remove, the location of the jams and identify locations out of the floodplain to relocate logs so that they are less available to obstruct the channel.

D. Purpose of Treatment Specifications: Log-debris jams obstruct stream channels which can deflect subsequent high stream flow, causing bank erosion and dislodgment of the jam, leading to channel degradation, flash flooding and debris flows further downstream. Assessment of channels for log-debris jams after a fire is needed to identify where channel mitigation treatments need to be done to protect downstream channel integrity and values at risk.

E. Treatment Effectiveness Monitoring Proposed: This assessment should also be done after any major (25-yr event or greater) summer storms for three years after the fire.

LABOR, MATERIALS AND OTHER COST:

PERSONNEL SERVICES: (Grade @ Cost/Hours X # Hours X # Fiscal Years = Cost/Item): Do not include contract personnel costs here (see contractor services below).	**COST / ITEM**
2 GS-07 Physical Science Technicians @ $2035/payperiod X 2.5 payperiods	$ 10,175
TOTAL PERSONNEL SERVICE COST	$ 10,175
EQUIPMENT PURCHASE, LEASE AND/OR RENT (Item @ Cost/Hour X # of Hours X #Fiscal Years = Cost/Item): Note: Purchases require written justification that demonstrates cost benefits over leasing or renting.	**COST / ITEM**
Miscellaneous supplies	$ 100
helicopter flights to conduct surveys, 3 hrs @$800/hr	$ 2,400
TOTAL EQUIPMENT PURCHASE, LEASE OR RENTAL COST	$ 2,500
MATERIALS AND SUPPLIES (Item @ Cost/Each X Quantity X #Fiscal Years = Cost/Item):	**COST / ITEM**
None	$ -
TOTAL MATERIALS AND SUPPLY COST	$ -
TRAVEL COST (Personnel or Equipment @ Rate X Round Trips X #Fiscal Years = Cost/Item):	**COST / ITEM**
ferry trip, 2 people x 2 trips/yr each @ $25/trip	$ 100
backcountry perdiem, $20/day x 2 people x 5 days x 2 trips	$ 400
TOTAL TRAVEL COST	$ 500
CONTRACT COST (Labor or Equipment @ Cost/Hour X #Hours X #Fiscal Years = Cost/Item):	**COST / ITEM**
None	$ -
TOTAL CONTRACT COST	$ -

SPECIFICATION COST SUMMARY

FISCAL YEAR	PLANNED INITIATION DATE (M/D/YYYY)	PLANNED COMPLETION DATE (M/D/YYYY)	WORK AGENT	UNITS	UNIT COST	PLANNED ACCOMPLISH MENTS	PLANNED COST
FY 2007	06/01/07	09/30/07	F	Miles	$ 2,635	5	$ 13,175
				TOTAL	$ 2,635	**5**	**$ 13,175**

Work Agent: **C**=Coop Agreement, **F**=Force Account, **G**=Grantee, **P**=Permittees, **S**=Service Contract, **T**=Timber Sales Purchaser, **V**=Volunteer

SOURCE OF COST ESTIMATE

1. Estimate obtained from 2-3 independent contractual sources.	
2. Documented cost figures from similar project work obtained from local agency sources.	P
3. Estimate supported by cost guides from independent sources or other federal agencies.	
4. Estimates based upon government wage rates and material cost.	
5. No cost estimate required - cost charged to Fire Suppression Account.	

P = Personnel Services, **E** = Equipment **M** = Materials/Supplies, **T** = Travel, **C** = Contract, **F** = Suppression

RELEVANT DETAILS, MAPS AND DOCUMENTATION INCLUDED IN THIS REPORT

TOTAL COST BY JURISDICTION

JURISDICTION	UNITS TREATED	COST
NPS North Cascades National Park	5	$ 13,175
	TOTAL COST	**$ 13,175**

Specification Form Created September 23, 2006

PART F - INDIVIDUAL SPECIFICATION

TREATMENT/ACTIVITY NAME	Cadastral Survey	**PART E SPECIFICATION #**	W-3
NFPORS TREATMENT CATEGORY*	Land Ownership	**FISCAL YEAR(S) (list each year):**	2007
NFPORS TREATMENT TYPE *	Boundary Establishment	**WUI? Y / N**	Y
IMPACTED COMMUNITIES AT RISK	Stehekin	**IMPACTED T&E SPECIES**	None

* See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

WORK TO BE DONE (describe or attach exact specifications of work to be done):

Number and Describe Each Task:

A. General Description: Conduct cadastral surveys on four private inholdings affected by the Flick Creek Fire at North Cascades National Park.
B. Location/(Suitable Sites): Inholdings of concern are located in the southern part of the Flick Creek fire area within the Flick and Fourmile drainages.
C. Design/Construction Specifications: Surveys will be conducted by licensed surveyors using accepted standards for cadastral surveys.
D. Purpose of Treatment Specifications: To determine NPS legal jurisdictional boundaries.
E. Treatment Effectiveness Monitoring Proposed: The implementation leader will monitor for contract compliance and completion.

LABOR, MATERIALS AND OTHER COST:

PERSONNEL SERVICES: (Grade @ Cost/Hours X # Hours X # Fiscal Years = Cost/Item): Do not include contract personnel costs here (see contractor services below).	**COST / ITEM**
None	$ -
TOTAL PERSONNEL SERVICE COST	$ -
EQUIPMENT PURCHASE, LEASE AND/OR RENT (Item @ Cost/Hour X # of Hours X #Fiscal Years = Cost/Item): Note: Purchases require written justification that demonstrates cost benefits over leasing or renting.	**COST / ITEM**
None	$ -
TOTAL EQUIPMENT PURCHASE, LEASE OR RENTAL COST	$ -
MATERIALS AND SUPPLIES (Item @ Cost/Each X Quantity X #Fiscal Years = Cost/Item):	**COST / ITEM**
None	$ -
TOTAL MATERIALS AND SUPPLY COST	$ -
TRAVEL COST (Personnel or Equipment @ Rate X Round Trips X #Fiscal Years = Cost/Item):	**COST / ITEM**
None	$ -
TOTAL TRAVEL COST	$ -
CONTRACT COST (Labor or Equipment @ Cost/Hour X #Hours X #Fiscal Years = Cost/Item):	**COST / ITEM**
Contract for cadastral survey, $8000 ea x 4 parcels.	$ 32,000
TOTAL CONTRACT COST	$ 32,000

SPECIFICATION COST SUMMARY

FISCAL YEAR	PLANNED INITIATION DATE (M/D/YYYY)	PLANNED COMPLETION DATE (M/D/YYYY)	WORK AGENT	UNITS	UNIT COST	PLANNED ACCOMPLISH MENTS	PLANNED COST
FY 2007	10/01/06	12/30/06	S	Parcels	$ 8,000	4	$ 32,000
				TOTAL	**$ 8,000**	**4**	**$ 32,000**

Work Agent: **C**=Coop Agreement, **F**=Force Account, **G**=Grantee, **P**=Permittees, **S**=Service Contract, **T**=Timber Sales Purchaser, **V**=Volunteer

SOURCE OF COST ESTIMATE

1. Estimate obtained from 2-3 independent contractual sources.	C
2. Documented cost figures from similar project work obtained from local agency sources.	
3. Estimate supported by cost guides from independent sources or other federal agencies.	
4. Estimates based upon government wage rates and material cost.	
5. No cost estimate required - cost charged to Fire Suppression Account.	

P = Personnel Services, **E** = Equipment **M** = Materials/Supplies, **T** = Travel, **C** = Contract, **F** = Suppression

RELEVANT DETAILS, MAPS AND DOCUMENTATION INCLUDED IN THIS REPORT

TOTAL COST BY JURISDICTION

JURISDICTION	UNITS TREATED	COST
NPS North Cascades National Park	4	$ 32,000
	TOTAL COST	**$ 32,000**

Specification Form Created September 23, 2006

PART F - INDIVIDUAL SPECIFICATION

TREATMENT/ACTIVITY NAME	Safety - Public Information	**PART E SPECIFICATION #**	S-1
NFPORS TREATMENT CATEGORY*		**FISCAL YEAR(S) (list each year):**	2007
NFPORS TREATMENT TYPE *		**WUI? Y / N**	Y
IMPACTED COMMUNITIES AT RISK	Stehekin	**IMPACTED T&E SPECIES**	None

* See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

WORK TO BE DONE (describe or attach exact specifications of work to be done):

Number and Describe Each Task:

A. General Description: For human health and safety purposes, create and install hazard signs and create informational brochure, interpretive programs and a public meeting to provide notice of potential hazards to those entering or living in the burn area.

B. Location/(Suitable Sites): 1. Hazard warning signs: Lakeshore Trail, Purple Creek Trail, Imus Loop Trail, Flick Creek Campground
2. Informational brochures and interpretive programs: Golden West Visitor Center
3. Public Meeting: Stehekin

C. Design/Construction Specifications: 1. Install hazard warning signs at Lakeshore, Purple Creek, Imus loop trailheads, where trails cross the fire perimeter, flick creek dock.

D. Purpose of Treatment Specifications: To inform public and property owners of the hazards associated with debris flows and falling debris.

E. Treatment Effectiveness Monitoring Proposed: The implementation leader will monitor for specification compliance and completion.

LABOR, MATERIALS AND OTHER COST:

PERSONNEL SERVICES: (Grade @ Cost/Hours X # Hours X # Fiscal Years = Cost/Item): Do not include contract personnel costs here (see contractor services below).	**COST / ITEM**
WG-5 Laborer (Trails) @ $27.50/hr x 40 hrs	$ 1,100
GS-11 Interpretive Specialist @ $33.75 / hr x 160 hrs	$ 5,400
GS-11 Interpretive Specialist @ $31.25/hr x 80hrs	$ 2,500
GS-5 Interpretive Ranger @ $15.00 /hr x 80	$ 1,200
TOTAL PERSONNEL SERVICE COST	$ 10,200

EQUIPMENT PURCHASE, LEASE AND/OR RENT (Item @ Cost/Hour X # of Hours X #Fiscal Years = Cost/Item): Note: Purchases require written justification that demonstrates cost benefits over leasing or renting.	**COST / ITEM**
None	
TOTAL EQUIPMENT PURCHASE, LEASE OR RENTAL COST	$ -

MATERIALS AND SUPPLIES (Item @ Cost/Each X Quantity X #Fiscal Years = Cost/Item):	**COST / ITEM**
Regulatory warning signs $75/each x 26	$ 1,950
Brochure $2/each x 300	$ 600
Property owner notification letter $5/each x 10	$ 50
TOTAL MATERIALS AND SUPPLY COST	$ 2,600

TRAVEL COST (Personnel or Equipment @ Rate X Round Trips X #Fiscal Years = Cost/Item):	**COST / ITEM**
Public Meeting Speakers @ $200 each person x 5 people	$ 1,000
TOTAL TRAVEL COST	$ 1,000

CONTRACT COST (Labor or Equipment @ Cost/Hour X #Hours X #Fiscal Years = Cost/Item):	**COST / ITEM**
None	$ -
TOTAL CONTRACT COST	$ -

SPECIFICATION COST SUMMARY

FISCAL YEAR	PLANNED INITIATION DATE (M/D/YYYY)	PLANNED COMPLETION DATE (M/D/YYYY)	WORK AGENT	UNITS	UNIT COST	PLANNED ACCOMPLISH MENTS	PLANNED COST
FY 2007	10/01/06	12/30/06	F	Signs	$ 531	26	$ 13,800
FY 2008							
FY 2009							
				TOTAL	$ 531	**26**	**$ 13,800**

Work Agent: **C**=Coop Agreement, **F**=Force Account, **G**=Grantee, **P**=Permittees, **S**=Service Contract, **T**=Timber Sales Purchaser, **V**=Volunteer

SOURCE OF COST ESTIMATE

1. Estimate obtained from 2-3 independent contractual sources.	
2. Documented cost figures from similar project work obtained from local agency sources.	M
3. Estimate supported by cost guides from independent sources or other federal agencies.	
4. Estimates based upon government wage rates and material cost.	
5. No cost estimate required - cost charged to Fire Suppression Account.	

P = Personnel Services, **E** = Equipment **M** = Materials/Supplies, **T** = Travel, **C** = Contract, **F** = Suppression

RELEVANT DETAILS, MAPS AND DOCUMENTATION INCLUDED IN THIS REPORT

TOTAL COST BY JURISDICTION

JURISDICTION	UNITS TREATED	COST
NPS North Cascades National Park	26	$ 13,800
	TOTAL COST	**$ 13,800**

Specification Form Created September 23, 2006

PART F - INDIVIDUAL SPECIFICATION

TREATMENT/ACTIVITY NAME	Hazard Tree Mitigation	**PART E SPECIFICATION #**	S-2
NFPORS TREATMENT CATEGORY*		**FISCAL YEAR(S) (list each year):**	2007
NFPORS TREATMENT TYPE *		**WUI? Y / N**	Y
IMPACTED COMMUNITIES AT RISK	Stehekin	**IMPACTED T&E SPECIES**	None

* See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

WORK TO BE DONE (describe or attach exact specifications of work to be done):

Number and Describe Each Task:

A. General Description: Mitigate 5 fire-killed tree hazards posing immediate threat to public safety.
B. Location/(Suitable Sites): Two trees need to be removed at Flick Creek Campground, two trees to be removed in the vicinity of Purple Creek and one to be removed from the sitting bench on the Imus Loop Trail.
C. Design/Construction Specifications: 1. If possible, push trees away from buildings water courses, and trails. If trees require cutting, directionally fall trees away from buildings water courses, and trails.
2. Flush cut all stumps, camouflage if possible.
D. Purpose of Treatment Specifications: To provide for public safety and property protection.
E. Treatment Effectiveness Monitoring Proposed: The implementation leader will monitor to see that all designated trees are removed.

LABOR, MATERIALS AND OTHER COST:

PERSONNEL SERVICES: (Grade @ Cost/Hours X # Hours X # Fiscal Years = Cost/Item): Do not include contract personnel costs here (see contractor services below).	**COST / ITEM**
WG-04 Laborer (Trails) X $2080/payperiod x 0.5 payperiods	$ 1,040
GS-07 Resource Management Specialist / $2040/payperiod X 0.5 payperiods	$ 1,020
TOTAL PERSONNEL SERVICE COST	$ 2,060
EQUIPMENT PURCHASE, LEASE AND/OR RENT (Item @ Cost/Hour X # of Hours X #Fiscal Years = Cost/Item): Note: Purchases require written justification that demonstrates cost benefits over leasing or renting.	**COST / ITEM**
None	$ -
TOTAL EQUIPMENT PURCHASE, LEASE OR RENTAL COST	$ -
MATERIALS AND SUPPLIES (Item @ Cost/Each X Quantity X #Fiscal Years = Cost/Item):	**COST / ITEM**
None	$ -
TOTAL MATERIALS AND SUPPLY COST	$ -
TRAVEL COST (Personnel or Equipment @ Rate X Round Trips X #Fiscal Years = Cost/Item):	**COST / ITEM**
None	$ -
TOTAL TRAVEL COST	$ -
CONTRACT COST (Labor or Equipment @ Cost/Hour X #Hours X #Fiscal Years = Cost/Item):	**COST / ITEM**
None	$ -
TOTAL CONTRACT COST	$ -

SPECIFICATION COST SUMMARY

FISCAL YEAR	PLANNED INITIATION DATE (M/D/YYYY)	PLANNED COMPLETION DATE (M/D/YYYY)	WORK AGENT	UNITS	UNIT COST	PLANNED ACCOMPLISH MENTS	PLANNED COST
FY 2007	10/01/06	11/15/06	F	Tree	$ 412	5	$ 2,060
FY 2008							
FY 2009							
				TOTAL	$ 412	**5**	**$ 2,060**

Work Agent: **C**=Coop Agreement, **F**=Force Account, **G**=Grantee, **P**=Permittees, **S**=Service Contract, **T**=Timber Sales Purchaser, **V**=Volunteer

SOURCE OF COST ESTIMATE

1. Estimate obtained from 2-3 independent contractual sources.	
2. Documented cost figures from similar project work obtained from local agency sources.	P
3. Estimate supported by cost guides from independent sources or other federal agencies.	
4. Estimates based upon government wage rates and material cost.	
5. No cost estimate required - cost charged to Fire Suppression Account.	

P = Personnel Services, **E** = Equipment **M** = Materials/Supplies, **T** = Travel, **C** = Contract, **F** = Suppression

RELEVANT DETAILS, MAPS AND DOCUMENTATION INCLUDED IN THIS REPORT

TOTAL COST BY JURISDICTION

JURISDICTION	UNITS TREATED	COST
NPS North Cascades National Park	5	$ 2,060
	TOTAL COST	**$ 2,060**

Specification Form Created September 23, 2006

PART F - INDIVIDUAL SPECIFICATION

TREATMENT/ACTIVITY NAME	Imus Parking Lot Safety Fence	**PART E SPECIFICATION #**	S-3
NFPORS TREATMENT CATEGORY*	Protection and Warning	**FISCAL YEAR(S) (list each year):**	2007
NFPORS TREATMENT TYPE *	Protective Fence / Barriers	**WUI? Y / N**	Y
IMPACTED COMMUNITIES AT RISK	Stehekin	**IMPACTED T&E SPECIES**	None

* See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

WORK TO BE DONE (describe or attach exact specifications of work to be done):

Number and Describe Each Task:

A. General Description: Stehekin Maintenance Workers will install a 200" long cyclone safety fence to protect the parking lot (and vehicles parked within) from rolling debris off the burned steep hill located directly above the parking lot.

B. Location/(Suitable Sites): The Imus parking lot is located at the base of a steep hill which burned in the Flick Creek fire, within the Stehekin Landing area. The parking lot cannot be moved due to a lack of other suitable locations, thus this location needs protection.

C. Design/Construction Specifications: 1. Clear the minimal amount of vegetation necessary to install the cyclone fence along the entire upslope edge of the Imus parking lot.

2. Install the cyclone fence (5 ' above ground height) along the entire upslope edge of the parking lot, to a sufficient length and configuration to prevent rolling debris from upslope to enter the parking lot.

D. Purpose of Treatment Specifications: To prevent rolling debris coming down the burned slope and entering the parking lot, potentially damaging the vehicles contained within. During the fire one rolling rock came within 15' of the parking lot.

E. Treatment Effectiveness Monitoring Proposed: The BAER Implementation Leader will inspect the completed project and monitor rolling debris on a monthly basis for 3 years.

LABOR, MATERIALS AND OTHER COST:

PERSONNEL SERVICES: (Grade @ Cost/Hours X # Hours X # Fiscal Years = Cost/Item): Do not include contract personnel costs here (see contractor services below).	**COST / ITEM**
WG-8 Maintenance Worker @ $2455 /PP X 1 PP	$ 2,455
GS-9 Archeologist @ $2440/PP x 0.5 PP	$ 1,220
TOTAL PERSONNEL SERVICE COST	$ 3,675
EQUIPMENT PURCHASE, LEASE AND/OR RENT (Item @ Cost/Hour X # of Hours X #Fiscal Years = Cost/Item): Note: Purchases require written justification that demonstrates cost benefits over leasing or renting.	**COST / ITEM**
Barging uplake of fencing material.	$ 200
TOTAL EQUIPMENT PURCHASE, LEASE OR RENTAL COST	$ 200
MATERIALS AND SUPPLIES (Item @ Cost/Each X Quantity X #Fiscal Years = Cost/Item):	**COST / ITEM**
5' tall green vinyl cyclone fence, $10/ft, 200' length	$ 2,000
TOTAL MATERIALS AND SUPPLY COST	$ 2,000
TRAVEL COST (Personnel or Equipment @ Rate X Round Trips X #Fiscal Years = Cost/Item):	**COST / ITEM**
Travel costs for Archeologist, ferry, 1 trip@$25/trip	$ 25
backcountry perdiem, $20/day, 8 days	$ 160
TOTAL TRAVEL COST	$ 185
CONTRACT COST (Labor or Equipment @ Cost/Hour X #Hours X #Fiscal Years = Cost/Item):	**COST / ITEM**
None	$ -
TOTAL CONTRACT COST	$ -

SPECIFICATION COST SUMMARY

FISCAL YEAR	PLANNED INITIATION DATE (M/D/YYYY)	PLANNED COMPLETION DATE (M/D/YYYY)	WORK AGENT	UNITS	UNIT COST	PLANNED ACCOMPLISH MENTS	PLANNED COST
FY 2007	10/01/06	12/30/06	F	Feet	$ 30	200	$ 6,060
				TOTAL	$ 30	**200**	**$ 6,060**

Work Agent: **C**=Coop Agreement, **F**=Force Account, **G**=Grantee, **P**=Permittees, **S**=Service Contract, **T**=Timber Sales Purchaser, **V**=Volunteer

SOURCE OF COST ESTIMATE

1. Estimate obtained from 2-3 independent contractual sources.	
2. Documented cost figures from similar project work obtained from local agency sources.	P,M
3. Estimate supported by cost guides from independent sources or other federal agencies.	
4. Estimates based upon government wage rates and material cost.	
5. No cost estimate required - cost charged to Fire Suppression Account.	

P = Personnel Services, **E** = Equipment **M** = Materials/Supplies, **T** = Travel, **C** = Contract, **F** = Suppression

RELEVANT DETAILS, MAPS AND DOCUMENTATION INCLUDED IN THIS REPORT

TOTAL COST BY JURISDICTION

JURISDICTION	UNITS TREATED	COST
NPS North Cascades National Park	200	$ 6,060
	TOTAL COST	**$ 6,060**

Specification Form Created September 23, 2006

PART F - INDIVIDUAL SPECIFICATION

TREATMENT/ACTIVITY NAME	Flick Creek BAER Plan Preparation	**PART E SPECIFICATION #**	O-1
NFPORS TREATMENT CATEGORY*	Planning	**FISCAL YEAR(S) (list each year):**	2006
NFPORS TREATMENT TYPE *	ES / BAER Plan	**WUI? Y / N**	Y
IMPACTED COMMUNITIES AT RISK	Stehekin	**IMPACTED T&E SPECIES**	None

* See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

WORK TO BE DONE (describe or attach exact specifications of work to be done):

Number and Describe Each Task:

A. General Description: Staff from North Cascades National Park, the NPS Pacific West Regional Office, Okanagan-Wenatchee National Forest, and the National Interagency Fire Center developed the BAER Plan for the Flick Creek fire. Staff met on two occasions (mid-August and mid-Sept) due to a renewal of the fire in early September that put fire into 3 additional watersheds within NPS boundaries.
B. Location/(Suitable Sites): Staff based out of Chelan, WA in the Forest Service offices, and completed two field trips to the Flick Creek fire itself.
C. Design/Construction Specifications: 1. Complete a BAR Plan for relevant rehabilitation treatments on the Flick Creek fire.
2. Complete a BAER Plan for relevant emergency stabilization treatments on the Flick Creek fire.
D. Purpose of Treatment Specifications: To address relevant emergency stabilization and rehabilitation needs on the Flick Creek fire within Lake Chelan National Recreation Area, which burned approx. 6800 acres on NPS lands.
E. Treatment Effectiveness Monitoring Proposed: Not Applicable.

LABOR, MATERIALS AND OTHER COST:

PERSONNEL SERVICES: (Grade @ Cost/Hours X # Hours X # Fiscal Years = Cost/Item): Do not include contract personnel costs here (see contractor services below).	**COST / ITEM**
Natural Resource Staff (Bivin, Oelfke, Gempko)	$ 7,989
Cultural Resource Staff (Mierendorf, Weiser)	$ 4,739
Physical Science Staff (Riedel, Davis)	$ 3,556
Overhead (Schwab, Siefkin)	$ 4,911
Actual personnel costs from August 6-Sept 2, 2006 work (from AFS reports all NPS BAER staff combined)	$ 15,000
TOTAL PERSONNEL SERVICE COST	$ 36,195
EQUIPMENT PURCHASE, LEASE AND/OR RENT (Item @ Cost/Hour X # of Hours X #Fiscal Years = Cost/Item): Note: Purchases require written justification that demonstrates cost benefits over leasing or renting.	**COST / ITEM**
None	$ -
TOTAL EQUIPMENT PURCHASE, LEASE OR RENTAL COST	$ -
MATERIALS AND SUPPLIES (Item @ Cost/Each X Quantity X #Fiscal Years = Cost/Item):	**COST / ITEM**
BARC map (one scene @ $2500 each)	$ 2,500
Use of Chelan Ranger District Office (telephone, supplies, printer ink, etc.)	$ 250
TOTAL MATERIALS AND SUPPLY COST	$ 2,750
TRAVEL COST (Personnel or Equipment @ Rate X Round Trips X #Fiscal Years = Cost/Item):	**COST / ITEM**
NOCA staff travel and perdiem.	$ 2,079
PWRO staff travel and perdiem	$ 1,329
FMPC staff travel and perdiem	$ 870
Total staff travel/perdiem, actual costs from AFS reports, Aug. 6 – Sept 2, 2006	$ 800
TOTAL TRAVEL COST	$ 5,078
CONTRACT COST (Labor or Equipment @ Cost/Hour X #Hours X #Fiscal Years = Cost/Item):	**COST / ITEM**
None	$ -
TOTAL CONTRACT COST	$ -

SPECIFICATION COST SUMMARY

FISCAL YEAR	PLANNED INITIATION DATE (M/D/YYYY)	PLANNED COMPLETION DATE (M/D/YYYY)	WORK AGENT	UNITS	UNIT COST	PLANNED ACCOMPLISH MENTS	PLANNED COST
FY 2006	08/06/06	09/27/06	F	Plan	$ 44,023	1	$ 44,023
				TOTAL	$ 44,023	**1**	**$ 44,023**

Work Agent: **C**=Coop Agreement, **F**=Force Account, **G**=Grantee, **P**=Permittees, **S**=Service Contract, **T**=Timber Sales Purchaser, **V**=Volunteer

SOURCE OF COST ESTIMATE

1. Estimate obtained from 2-3 independent contractual sources.	
2. Documented cost figures from similar project work obtained from local agency sources.	P,T
3. Estimate supported by cost guides from independent sources or other federal agencies.	
4. Estimates based upon government wage rates and material cost.	
5. No cost estimate required - cost charged to Fire Suppression Account.	

P = Personnel Services, **E** = Equipment **M** = Materials/Supplies, **T** = Travel, **C** = Contract, **F** = Suppression

RELEVANT DETAILS, MAPS AND DOCUMENTATION INCLUDED IN THIS REPORT

TOTAL COST BY JURISDICTION

JURISDICTION	UNITS TREATED	COST
NPS North Cascades National Park	1	$ 44,023
	TOTAL COST	**$ 44,023**

Specification Form Created September 23, 2006

PART F - INDIVIDUAL SPECIFICATION

TREATMENT/ACTIVITY NAME	BAER Implementation Leader	**PART E SPECIFICATION #**	O-2
NFPORS TREATMENT CATEGORY*		**FISCAL YEAR(S) (list each year):**	2007
NFPORS TREATMENT TYPE *		**WUI? Y / N**	Y
IMPACTED COMMUNITIES AT RISK	Stehekin	**IMPACTED T&E SPECIES**	None

* See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

WORK TO BE DONE (describe or attach exact specifications of work to be done):

Number and Describe Each Task:

A. General Description: Provide funding to support a part-time BAER Implementation Leader to ensure prompt implementation of the rehabilitation treatments. The individual will provide management direction of rehabilitation treatments and monitoring specifications. Administrative support is provided to cover costs associated with expenses incurred by the Park to provide services for contracting, procurement, payroll, and other administrative services.

B. Location/(Suitable Sites): Flick Creek Fire, Northern Cascades National Park

C. Design/Construction Specifications:

1. Coordinate all aspects of rehabilitation actions approved in the Flick Creek Fire Burned Area Emergency Stabilization Plan including the contracting of treatment specifications and activities, administering contracts, document treatments installed, maintaining financial tracking of costs, reporting rehabilitation progress, submitting supplemental requests for funding, ensuring the completion of all approved treatments, entering data in NFPORS, and coordinating with private landowners, universities, research groups and other affected agencies.
2. Contract and coordinate on-the-ground implementation of treatments including site orientation of contractors, developing daily/weekly work plans and supervising implementation activities.
3. Monitor work to ensure compliance with all relevant Federal laws and regulations. Such laws and regulations include but are not limited to NEPA and NHPA mitigation requirements and all OSHA regulations and safety standards.
4. Provide quarterly accomplishment reports in NFPORS and written fiscal year annual accomplishment reports detailing percent accomplishment for each project specification, dates of completion, funds expended, quality control inspection reports, and treatment effectiveness monitoring reports.
5. At the completion of the one year funding cycle for treatments, the Implementation Leader will prepare an annual accomplishment report and budget request for the following year. At the end of the three years, a final report will be repaired to summarize all data requested in the quarterly reports and provide a comprehensive and objective compendium of lessons learned of the treatment effectiveness of the prescribed treatments based on the prescribed monitoring plans found within the BAER plan

D. Purpose of Treatment Specifications: To provide fiscal support for proper administration of the short and long-term treatments prescribed in the Flick

E. Treatment Effectiveness Monitoring Proposed: The Implementation Leader will conduct review of projects, financial accountability, and oversight and provide written and electronic monitoring reports as prescribe within DOI policy and the BAER plan.

LABOR, MATERIALS AND OTHER COST: FISCAL YEAR 2007

PERSONNEL SERVICES: (Grade @ Cost/Hours X # Hours X # Fiscal Years = Cost/Item): Do not include contract personnel costs here (see contractor services below).	**COST / ITEM**
GS-7 Implementation Leader @ $25.40/hr x 240	$ 6,096
GS-5 Administrative Tech @ $18.00/hr x 80	$ 1,440
TOTAL PERSONNEL SERVICE COST	$ 7,536
EQUIPMENT PURCHASE, LEASE AND/OR RENT (Item @ Cost/Hour X # of Hours X #Fiscal Years = Cost/Item): Note: Purchases require written justification that demonstrates cost benefits over leasing or renting.	**COST / ITEM**
None	$ -
TOTAL EQUIPMENT PURCHASE, LEASE OR RENTAL COST	$ -
MATERIALS AND SUPPLIES (Item @ Cost/Each X Quantity X #Fiscal Years = Cost/Item):	**COST / ITEM**
Miscellaneous supplies	$ 300
TOTAL MATERIALS AND SUPPLY COST	$ 300
TRAVEL COST (Personnel or Equipment @ Rate X Round Trips X #Fiscal Years = Cost/Item):	**COST / ITEM**
NFPORS reporting (Skagit district) 1 person @ $500	$ 500
COTR-training (Seattle) 1 person @ $800	$ 800
TOTAL TRAVEL COST	$ 1,300
CONTRACT COST (Labor or Equipment @ Cost/Hour X #Hours X #Fiscal Years = Cost/Item):	**COST / ITEM**
None	$ -
TOTAL CONTRACT COST	$ -
	$ 9,136

LABOR, MATERIALS AND OTHER COST: FISCAL YEAR 2008

PERSONNEL SERVICES: (Grade @ Cost/Hours X # Hours X # Fiscal Years = Cost/Item):	**COST / ITEM**
GS-7 Implementation Leader @ $26.160/hr x 240	$ 6,280
GS-5 Administrative Tech @ $18.54/hr x 80	$ 1,485
TOTAL PERSONNEL SERVICE COST	$ 7,765

EQUIPMENT PURCHASE, LEASE AND/OR RENT (Item @ Cost/Hour X # of Hours X #Fiscal Years = Cost/Item):	COST / ITEM
None	$ -
TOTAL EQUIPMENT PURCHASE, LEASE OR RENTAL COST	$ -
MATERIALS AND SUPPLIES (Item @ Cost/Each X Quantity X #Fiscal Years = Cost/Item):	**COST / ITEM**
Miscellaneous supplies	$ 300
TOTAL MATERIALS AND SUPPLY COST	$ 300
TRAVEL COST (Personnel or Equipment @ Rate X Round Trips X #Fiscal Years = Cost/Item):	**COST / ITEM**
NFPORS reporting (Skagit district) 1 person @ $500	$ 500
TOTAL TRAVEL COST	$ 500
CONTRACT COST (Labor or Equipment @ Cost/Hour X #Hours X #Fiscal Years = Cost/Item):	**COST / ITEM**
None	$ -
TOTAL CONTRACT COST	$ -
	$ 8,565

LABOR, MATERIALS AND OTHER COST: FISCAL YEAR 2009

PERSONNEL SERVICES: (Grade @ Cost/Hours X # Hours X # Fiscal Years = Cost/Item):	COST / ITEM
GS-7 Implementation Leader @ $26.95/hr x 240	$ 6,470
GS-5 Administrative Tech @ $19.10/hr x 80	$ 1,530
TOTAL PERSONNEL SERVICE COST	$ 8,000
EQUIPMENT PURCHASE, LEASE AND/OR RENT (Item @ Cost/Hour X # of Hours X #Fiscal Years = Cost/Item):	**COST / ITEM**
None	$ -
TOTAL EQUIPMENT PURCHASE, LEASE OR RENTAL COST	$ -
MATERIALS AND SUPPLIES (Item @ Cost/Each X Quantity X #Fiscal Years = Cost/Item):	**COST / ITEM**
Miscellaneous supplies	$ 300
TOTAL MATERIALS AND SUPPLY COST	$ 300
TRAVEL COST (Personnel or Equipment @ Rate X Round Trips X #Fiscal Years = Cost/Item):	**COST / ITEM**
NFPORS reporting (Skagit district) 1 person @ $500	$ 500
TOTAL TRAVEL COST	$ 500
CONTRACT COST (Labor or Equipment @ Cost/Hour X #Hours X #Fiscal Years = Cost/Item):	**COST / ITEM**
None	$ -
TOTAL CONTRACT COST	$ -
	$ 8,800

SPECIFICATION COST SUMMARY

FISCAL YEAR	PLANNED	PLANNED	WORK AGENT	UNITS	UNIT COST	PLANNED	PLANNED COST
FY 2007			F	Year	$ 9,136	1	$ 9,136
FY 2008			F	Year	$ 8,565	1	$ 8,565
FY 2009			F	Year	$ 8,800	1	$ 8,800
				TOTAL	$ 26,501	**3**	**$ 26,501**

Work Agent: **C**=Coop Agreement, **F**=Force Account, **G**=Grantee, **P**=Permittees, **S**=Service Contract, **T**=Timber Sales Purchaser, **V**=Volunteer

SOURCE OF COST ESTIMATE

1. Estimate obtained from 2-3 independent contractual sources.	
2. Documented cost figures from similar project work obtained from local agency sources.	P,T
3. Estimate supported by cost guides from independent sources or other federal agencies.	
4. Estimates based upon government wage rates and material cost.	
5. No cost estimate required - cost charged to Fire Suppression Account.	

P = Personnel Services, **E** = Equipment **M** = Materials/Supplies, **T** = Travel, **C** = Contract, **F** = Suppression

RELEVANT DETAILS, MAPS AND DOCUMENTATION INCLUDED IN THIS REPORT

TOTAL COST BY JURISDICTION

JURISDICTION	UNITS TREATED	COST
NPS North Cascades National Park	1	$ 26,501
	TOTAL COST	$ 26,501

Specification Form Created September 23, 2006

APPENDIX I - ENVIRONMENTAL COMPLIANCE

FLICK CREEK FIRE BURNED AREA EMERGENCY RESPONSE PLAN
Lake Chelan National Recreation Area
Environmental Compliance Considerations and Documentation

A. Federal Environmental Compliance Responsibilities

All projects proposed in the Flick Creek Burned Area Emergency Response (BAER) Plan that are prescribed, funded, or implemented on park lands are subject to compliance with the *National Environmental Policy Act* (NEPA) in accordance with the guidelines provided by the *Council on Environmental Quality (CEQ) Regulations (40 CFR 1500-1508).* This Appendix documents the BAER Team considerations of NEPA compliance requirements for prescribed emergency stabilization and monitoring actions described in this plan for areas affected by the Flick Creek Fire in Lake Chelan National Recreation Area, Washington.

This plan identifies specific emergency stabilization, rehabilitation, and monitoring actions and recommendations designed to mitigate damages to resources as a result of the Flick Creek fire and associated fire suppression activities. The park must complete separate NEPA analyses and compliance for fire response activities not addressed in this plan.

Agency Specific Guidance: This NEPA documentation has been developed in accordance with National Park Service specific guidelines. Emergency stabilization actions proposed on National Park Service lands, involving the agencies permitting, funding, or implementation, must comply with regulations set forth in the *Department of the Interior Manual Part 516 (DM 12).*

B. Related Plans and Cumulative Impacts Analysis

Lake Chelan National Recreation Area General Management Plan, 1995. These documents provide management guidance and identify land use decisions for the preservation of park resources and management of the backcountry and designated wilderness portions of the park.

North Cascades National Park Service Complex Fire Management Program EA, 2005: The document recommends utilization of the least intrusive and least resource damaging methods to manage unwanted wildland fire, and the least intrusive BAER actions required to mitigate actual or potential damage caused by the fire.

North Cascades National Park Service Complex Wildland Fire Management Plan 1991: The document references rehabilitation treatments in relation to suppression related activities.

North Cascades National Park Service Complex Hazardous Tree Management Plan 1995, revised 2000: The document outlines the Hazard Tree Assessment Protocol for rating hazardous trees in determining priority for treatment.

Cumulative Impact Analysis: The emergency stabilization treatments for the Flick Creek fire, as proposed in this plan, do not result in an intensity of impact (i.e., major ground disturbance, etc) that would cumulatively constitute a significant impact on the quality of the environment.

The treatments are consistent with the above park management plans and associated environmental compliance documents of the NPS, and categorical exclusions presented below.

No direct or indirect unavoidable adverse impacts to the biological or physical environment would result from the implementation of this Flick Creek BAER Plan.

C. Applicable Categorical Exclusions and Prior Approved Compliance Documents Relevant to the Flick Creek BAER Plan

Project #	Treatment Project	Park/Compliance Document	Applicable CE
1	BAER plan preparation		DO-12 3.3 D
2	BAER implementation leader		Part 516 DM 2, App. 1.1
3	Install warning signs		DO-12 3.4 C.(5)
4	Develop interpretive program to warn visitors of post-fire safety hazards		DO-12 3.3 O.
5	Install cyclone fencing - parking lot		DO-12 3.4 C (18)
6	Hazard tree assessment	NOCA - Hazardous Tree Management Plan 1995	
7	Develop public information brochure		DO-12 3.3 H
8	Cadastral survey of inholder lands		DO-12 3.3 I
9	Remove woody debris - Purple Crk		Part 516 DM 2. App. 1, the 2003 BAER CE
10	Assess streams for debris jams		DO-12 3.4 E. (6)
11	Install signs to educate public about invasive species		DO-12 3.4 C.(5)
12	Erosion control - application and monitoring of woodstraw mulching		DO12- 3.4 C (4), DO-12 3.4 E (6)
13	Erosion control - trail construction		DO12- 3.4 C (12)
14	Site assessment- FS292		DO-12 3.4 E. (6)
15	Hazard tree assessment - FS292	NOCA - Hazardous Tree Management Plan 1995	
16	Site assessment- FS245		DO-12 3.4 E. (6)
17	Public information meeting		DO-12 3.3 H

D. Consultations

<u>National Park Service</u>

- Jesse Kennedy, Cultural Resource Specialist, North Cascades National Park
- Jack Oelfke, Chief of Natural Resources, North Cascades National Park
- Bob Kuntz, Wildlife Biologist, North Cascades National Park

- Bob Mierendorf, Archeologist, North Cascades National Park
- Nelson Siefkin, PWR BAER Coordinator, National Park Service

External Consultations:

- U S Fish and Wildlife Service (Northern spotted owl)
- The Washington State Historic Preservation Officer has been contacted. Should any BAER treatments lead to activities that may impact cultural resources, consultation will be initiated before any actions are implemented.
- The Colville Reservation and Yakima Nation have been contacted. Should any BAER treatments lead to activities that may impact cultural resources, consultation will be initiated before any actions are implemented.

Categorical Exclusion Form

North Cascades National Park
Ross Lake National Recreation Area
Lake Chelan National Recreation Area

Project: Flick Creek Fire BAER Plan **Date: September 23, 2006**
Project Location: Lake Chelan National Recreation Area, Chelan County, Washington

Describe the project, including location (reference the attached Environmental Screening Form (ESF), if appropriate):

Project Description: There are several proposed treatments in the Flick Creek BAER Plan. Those treatments include:

1. BAER Plan preparation
2. Hire a BAER Implementation Leader
3. Install several warning signs along the Lakeshore Trail, Flick Creek campground and dock
4. Develop Interpretive program to warn visitors of post-fire safety hazards along trails
5. Install cyclone fencing to protect parking lot from rolling debris
6. Hazard Tree Assessments at Flick Creek campground, shelter and Lakeshore Trail.
7. Develop and distribute brochure to educate public of the natural processes and potential hazards during landscape recovery after wildfires.
8. Cadastral survey on inholder land boundaries
9. Remove woody debris (less than 18" dbh) from Purple Creek
10. Assess streams for in-channel log/debris jams
11. Install signs to educate the public of the presence and methods to control the spread of invasive plant species
12. Install and monitor the effects of woodstraw mulch to prevent erosion at Flick Creek Shelter site.
13. Construct 50 ft of trail to concentrate foot traffic in an area of high erosion potential at Flick Creek Shelter site.
14. Cultural Site Assessment of Field Site #292 (FS#292)
15. Hazard Tree Assessment at Field Site #292
16. Cultural Site Assessment of Field Site #245
17. Conduct public meeting to educate property owners and general public of the natural processes and potential hazards during landscape recovery after wildfires.

All treatments are described in greater detail in the Flick Creek BAER Plan Resource Assessments.

Mitigation(s): The following projects listed above require mitigation, as described below:

- Project 5: A park staff archeologist will be on-site when the cyclone fence is installed, during the woodstraw mulching and trail construction at Flick Creek shelter

site, and during hazard tree assessment at FS #292 to monitor for archeological resources.

- Projects 6 and 15: Hazard tree removal activities may be limited March 15 thru Sept 6 due to restrictions on helicopter and chainsaw use in the area surrounding an occupied spotted owl nest site.
- Project 9: Removal of woody debris from the Purple Creek channel below the bridge is considered an "emergency action" under the State of Washington's Hydraulic Permit Approval process. The action will be documented and an emergency action Hydraulic Permit Application will be submitted to the State.

Describe the category used to exclude action from further NEPA analysis and indicate the number of the category (see section 3-4 of NPS-12):
The following CE's apply, or other park compliance was completed through an approved plan, per each Project listed above:

Project 1: DO-12 3.3 D

Routine and continuing government business — for example, supervision, administration, operations, maintenance, and replacement activities having limited context and intensity, meaning the activities are limited in size and magnitude or have short-term effects.

Projects 2: Part 516 DM 2, App. 1.1

Personnel actions and investigations and personnel services contracts

Projects 3, 11: DO-12 3.4 C (5)

Installation of signs, displays, and kiosks

Project 4: DO-12 3.3 O. Changes in interpretive and environmental education programs.

Project 5: DO-12 3.4 C (18)

Installation of fencing enclosures, exclosures, or boundary fencing posing no effect on wildlife migrations

Projects 6, 15: North Cascades National Park Hazard Tree Management Plan, 1995

Projects 7, 17: DO-12 3.3 H

Activities that are educational, informational, advisory, or consultative to other agencies, public and private entities, visitors, individuals, or the general public

Project 8: DO-12 3.3 I

Land and boundary surveys

Project 9: Part 516 DM 2, App. 1, a 2003 DOI CE on post-fire rehabilitation actions.

Projects 10, 12, 14, 16: DO-12 3.4 E (6)

Non-destructive data collection, inventory (including field, aerial, and satellite surveying and mapping), study, research, and monitoring activities

Project 12: DO-12 3.4 C (4)

Routine maintenance and repairs to cultural resource sites, structures, utilities, and grounds if the action falls under an approved Historic Structures Preservation Guide or Cyclic Maintenance Guide (or equivalent guides), or if the action would not adversely affect the cultural resource

Project 13: DO-12 3.4 C (12)

Minor trail relocation or development of compatible trail networks on logging roads or other established routes

Describe any public or agency involvement effort conducted (reference the attached ESF):

USFWS consultation on Northern spotted owl: Consultation with US Fish and Wildlife Service biologists Linda Saunders and Patty Walcott via conference call and emails on August 10 and 11, 2006. Park staff updated the USFWS staff on October 2, 2006 with information on the additional fire growth and known conditions with the spotted owl activity areas within the fire perimeter. All consultations included discussions on the status of the fire, potential effects, and recommendations on actions needed, as outlined in Sections III and IV of this assessment.

Colville Reservation and Yakima Nation: Confederated Tribes of the Colville Reservation and Yakama Nation have been informed (August 2006) of the extent and potential impacts of the Flick Creek fire to cultural resources. No issues of concern have been identified and none are anticipated at this time. Burn Area Emergency Response treatments will be monitored by a Cultural Resource Specialist and Tribal consultation will be conducted, as needed, regarding these activities.

Washington State Historic Preservation Officer: Chief of Cultural Resources Branch, Dr. Jesse G. Kennedy III initiated discussion with Greg Griffith, Deputy WaSHPO by telephone and electronic mail on Thursday, July 27, 2006. Historic resources at risk and mitigation measures were identified and approved. Discussions with the WaSHPO were conducted as dictated by changing fire conditions. After the BAER field inspection, WaSHPO was notified of the findings of the Cultural Resource Specialist. Consultation with the SHPO regarding Section 106 issues will be initiated, as needed, based upon proposed undertakings (i.e., BAER treatments).

On the basis of the environmental impact information in the statutory compliance file, with which I am familiar, I am categorically excluding the described project from further NEPA analysis. No exceptional circumstances (i.e., all boxes in the ESF are marked “no”) or conditions in section 3-6 apply, and the action is fully described in section 3-4 of NPS-12.

Prepared by: Vicki Gempko, Resource Management Specialist (Stehekin)

Approved: _____

William F. Paleck, Superintendent Date

ENVIRONMENTAL SCREENING FORM

Project Description and Location:
This project proposes to implement the Flick Creek Fire BAER Plan. Please review the BAER plan for project descriptions, resource assessments and specifications.

	Yes	No	Data Needed to Determine
Mandatory Criteria (A-M). Would the proposal, if implemented:			
A. Have significant adverse effects on public health or safety?		X	
B. Have adverse effects on such unique characteristics as historic or cultural resources; park, recreation, of refuge lands; wilderness areas; wild or scenic rivers; sole or principal drinking water aquifers; prime farm lands; wetlands; floodplains; or ecologically significant or critical areas, including those listed on the National Register of Natural Landmarks?		X	
C. Have highly controversial effects?		X	
D. Have highly uncertain and potentially significant environmental effects or involve unique or unknown environmental risks?		X	
E. Establish a precedent for future action or represent a decision in principle about future actions with potentially significant environmental effects?		X	
F. Be directly related to other actions with individually insignificant, but cumulatively significant, environmental effects?		X	
G. Have adverse effects on properties listed or eligible for listing on the National Resister of Historic Places?		X	NOCA Archeologist must be on site during woodstraw mulching and trail construction at Flick Creek shelter site, installation of cyclone fence near Imus Creek, and during hazard tree assessment and treatment at FS#292

<table>
<tr><td>H. Have adverse effects on species listed or proposed to be listed on the List of Endangered or Threatened Species, or have adverse effects on designated Critical Habitat for these species?</td><td></td><td>X</td><td>The following mitigations apply March 15-Sept 6 to the surrounding area of occupied
<table>
<tr><th>Equip</th><th>Distance from nest site</th></tr>
<tr><td>Type 2 & 3 helicopter</td><td>120 yds</td></tr>
<tr><td>impact pile driver, rock drill</td><td>60 yds</td></tr>
<tr><td>chainsaws</td><td>65 yds</td></tr>
</table>
northern spotted owl nest sites</td></tr>
<tr><td>I. Require compliance with Executive Order 11988 (Floodplain Management, Executive Order 11990 (Protection of Wetlands), of the Fish and Wildlife Coordination Act?</td><td></td><td>X</td><td></td></tr>
<tr><td>J. Threaten to violate a federal, state, local, or tribal law for requirement imposed for the protection of the environment?</td><td></td><td>X</td><td></td></tr>
<tr><td>K. Require a permit from a federal, state, or local agency to proceed, unless the agency from which the permit is required agrees that a CE is appropriate?</td><td></td><td>X</td><td></td></tr>
<tr><td>L. Have the potential for significant impact as indicated by a federal, state, or local agency of Indian tribe?</td><td></td><td>X</td><td></td></tr>
<tr><td>M. Have the potential to be controversial regardless of its impact?</td><td></td><td>X</td><td></td></tr>
<tr><td>N. Have the potential to violate the NPS Organic Act by impairing park resources or values?</td><td></td><td>X</td><td></td></tr>
<tr><td>Are any measurable impacts possible in the following categories relating to physical, natural, or cultural resources?</td><td></td><td></td><td></td></tr>
<tr><td>A. Geological resources -soils, bedrock, streambank, etc.</td><td></td><td>X</td><td></td></tr>
<tr><td>B. From geohazards?</td><td></td><td>X</td><td></td></tr>
<tr><td>C. Air quality, traffic, or from noise?</td><td></td><td>X</td><td></td></tr>
<tr><td>D. Water quality or quantity?</td><td></td><td>X</td><td></td></tr>
<tr><td>E. Streamflow characteristics</td><td></td><td>X</td><td></td></tr>
<tr><td>F. Floodplains or wetlands?</td><td></td><td>X</td><td></td></tr>
<tr><td>G. Land use, including occupancy, income, values, ownership, type of land use?</td><td></td><td>X</td><td></td></tr>
<tr><td>H. Rare or unusual vegetation - old growth timber, riparian, alpine, etc.?</td><td></td><td>X</td><td></td></tr>
<tr><td>I. Species of special concern (plant or animal; state or federal listed or proposed for listing) or their habitat?</td><td></td><td>X</td><td>The following mitigations apply March 15-Sept 6 to the surrounding area of occupied northern spotted owl nest sites</td></tr>
</table>

			Equipt / **Distance from nest site** Type 2 & 3 helicopter / 120 yds impact pile driver, rock drill / 60 yds chainsaws / 65 yds
J. Unique ecosystems?		X	
K. Unique or important wildlife or wildlife habitat?		X	
L. Unique or important fish or fish habitat?		X	
M. Introduce or promote non-native species (plant or animal)?		X	
N. Recreation resources, including supply, demand, visitation, activities, etc.?		XX	
O. Visitor experience, aesthetic resources?		X	
P. Cultural resources, cultural landscape, sacred sites, etc.?		X	
Q. Socioeconomics, including employment, occupation, income changes, tax base, infrastructure?		X	
R. Minority and low-income populations. Ethnography, size, migration patterns, etc.?		X	NOCA Archeologist must be on site during woodstraw mulching and trail construction at Flick Creek shelter site, installation of cyclone fence near Imus Creek, and during hazard tree assessment and treatment at FS#292
S. Energy resources?		X	
T. Other agency or tribal land use plans or policies?		X	
U. Resource, including energy, conservation potential?		X	
V. Urban quality, gateway communities, etc.?		X	
W. Long-term management of resources or land/resource productivity?		X	
X. Other important environmental resources?		X	

Please answer the following questions:

1. Are the personnel preparing this form familiar with the site, and/or has a site visit been conducted? (Attach additional pages noting when site visit took place, staff attending, etc.) Yes the BAER team conducted site visits on 8/13/06 and 9/20/06.

2. Has consultation with all affected agencies or tribes been completed? (Attach additional pages detailing the consultation, including the name, date, and summary of comments from other agency or tribal contacts.)

   USFWS has been consulted and their recommendations on Northern spotted owls have been included

Washington State Historic Preservation Officer has been contacted. Should any BAER treatments lead to activities that may impact cultural resources, consultation will be initiated before any actions are implemented.

Colville Reservation and Yakima Nation have been contacted. Should any BAER treatments lead to activities that may impact cultural resources, consultation will be initiated before any actions are implemented.

Instructions:

When you have completed a site visit (or if staff are familiar with the specifics of the site) and consultation with affected agencies and/or tribes, and if the answers in the checklist above are all "no", you may proceed to the categorical exclusion form if the action is described in section 3-4 of DO-12. If any answers in the checklist are "yes" or "data needed to determined," or if the action is not described in section 3-4, prepare an environmental assessment or environmental impact statement.

Attach maps, notes of site visits, agency consultation, relevant data or reports, the categorical exclusion form or other relevant information to this form to begin the statutory/administrative record file.

Signatory

In signing this form, you are saying you have completed a site visit or are familiar with the specifics of the site, that you have consulted with affected agencies and tribes, and that the answers to the questions posed in the checklist are, to the best of your knowledge, correct.

_____

Interdisciplinary Team Leader Date

_____

Technical specialist Date

APPENDIX II - SUPPORT DOCUMENTS