USDA-FOREST SERVICE FS-2500-8 (6/06)

Report Date: 10-1-15

BURNED-AREA REPORT
(Reference FSH 2509.13)

PART I - TYPE OF REQUEST

A. Type of Report
- [X] 1. Funding request for estimated emergency stabilization funds
- [ ] 2. Accomplishment Report
- [ ] 3. No Treatment Recommendation

B. Type of Action
- [X] 1. Initial Request (Best estimate of funds needed to complete eligible stabilization measures)
- [ ] 2. Interim Report #1
  - [ ] Updating the initial funding request based on more accurate site data or design analysis
  - [ ] Status of accomplishments to date
- [ ] 3. Final Report (Following completion of work)

PART II - BURNED-AREA DESCRIPTION

A. Fire Name: **Northstar Fire**

B. Fire Number: **WA-COA-000157**

C. State: **Washington**

D. County: **Okanogan/Ferry**

E. Region: **06 – Pacific Northwest**

F. Forest: **21** – Colville, **08** – Okanogan Wenatchee

G. District: **Republic/Tonasket**

H. Fire Incident Job Code: **PAJ1KG (1502)**

I. Date Fire Started: **August 13, 2015**

J. Date Fire Contained: **October 15, 2015**

K. Suppression Cost: **$41,600,000 (est.)**

L. Fire Suppression Damages Repaired with Suppression Funds
1. Fireline waterbarred (miles): **164 miles total on fire; 40 miles COL and 13 OKW**
2. Fireline seeded (miles): **37.3 miles total**
3. Other (identify): **0**

M. Watershed Number(s): (6^{th} level hydrologic units, percent of watershed acres within fire perimeter):

6th Field HUC	Subwatershed Acres	Forest Service Lands Only (ac)	% Subwatershed Burned
Golden Harvest Creek	11,063	4,823	49.0
Thirteen Mile Creek-Sanpoil River	18,780	15,510	14.0
Scatter Creek-Sanpoil River	31,313	19,537	40.9
West Fork Granite Creek	21,948	16,387	0.2
Lower Lost Creek	25,474	10,920	95.7
Lower West Fork Sanpoil River	25,105	13,704	98.7
Upper Lost Creek	34,697	6,565	8.2
Upper West Fork Sanpoil River	36,305	16,920	32.1

N. Total Acres Burned: **217,871**
Colville NF (**17,972**), Okanogan Wenatchee NF (**27,428**), Other Federal (**170,721**), State (**749**), Private (**2,073**)

O. **Vegetation Types**: Dominant trees include Douglas-fir, western larch, ponderosa pine, lodgepole pine, and a lesser component of subalpine fir, Engelmann spruce, aspen, and western red cedar. Ponderosa pine is mainly found on south slopes and ridge tops at lower elevations. There are five biophysical environments:

- The *Warm Dry Douglas-fir Shrub* - common on lower elevation, southerly slopes in the east and northeast portions, and is the predominant environment on private land. Plant associations include Douglas-fir/ninebark and Douglas-fir/ninebark/twinflower, Douglas-fir/pinegrass, and Douglas-fir/snowberry.
- The *Cool Mesic Douglas-fir Forb-Shrub* - plant associations include Douglas-fir/big huckleberry and Douglas-fir/dwarf huckleberry.
- The *Cold Mesic Subalpine fir Forb-Shrub* - located mostly in the colder west and southwest portions at higher elevations. Plant associations include subalpine fir/twinflower, with subalpine fir/dogwood on wetter sites and subalpine fir/dwarf huckleberry.
- The *Very Moist Spruce-Subalpine Fir Bottoms* - almost exclusively in riparian areas and especially along Scatter Creek and around lakes. Plant associations include spruce/equisetum and subalpine fir/bunchberry dogwood.
- The *Cold Dry Subalpine fir Shrub* - covers cool dry sites at all elevations. Plant associations include subalpine fir/big huckleberry.

P. **Dominant Soils:** Manley-Devore Complex (223), 15-35 percent slopes ; Nevine-Merkel Complex (263), 15-35 percent slopes ; Nevine-Wilma-Rock outcrop Complex (268), 15-35 percent ; Stepstone ashy fine sandy loam (346), 15-35 percent slopes ; Resner-Sitdown Complex (311), 0-15 percent slopes ; Chumstick-Mineral-Rock outcrop Complex (133), 35-65 percent slopes ; Nevine-Rock land Complex (NrE), 15-50 percent slopes

Q. **Geologic Types:** Granitic and Gneissic bedrock formations, Metamorphic Schist bedrock formations, Rhyolitic and Andesitic bedrock formations, Eolian volcanic ash, Alluvial glacial till and outwash

R. Miles of Stream Channels by Order or Class: **Perennial: 323 miles Intermittent: 832 miles**

S. Transportation System: **Trails: 6 miles Roads: 195.5 miles**

PART III - WATERSHED CONDITION

Burn Severity on NF Lands (acres): **10,305** (Low/unburned) **14,553** (low) **13,571** (moderate) **4,077** (high)

Acres by Burn Severity on FS Lands in 6th-Field Hydrologic Units

6th-Field Subwatershed	High	Moderate	Low	Unburned	Total acres Burned	Subwatershed acres on Fores
Golden Harvest Creek	148 (3.1%)	596 (12.4%)	569 (11.8%)	1,052 (21.8%)	2,365 (49.0%)	4,823 (49.0%)
Thirteen Mile Creek-Sanpoil R	69 (0.4%)	505 (3.3%)	754 (4.9%)	846 (5.5%)	2,174 (14.0%)	15,510 (14.0%)
Scatter Creek-Sanpoil R	543 (2.8%)	2,925 (15.0%)	2,425 (12.4%)	2,095 (10.7%)	7,988 (40.9%)	19,537 (40.9%)
West Fork Granite Creek	2 (0.01%)	2 (0.01%)	14 (0.09%)	18 (0.11%)	36 (0.2%)	16,387 (0.2%)
Lower Lost Creek	755 (6.9%)	2,474 (22.7%)	3,972 (36.4%)	3,251 (29.8%)	10,452 (95.7%)	10,920 (95.7%)
Lower West Fork Sanpoil R	2,076 (15.1%)	5,334 (38.9%)	4,443 (32.4%)	1,668 (12.2%)	13,521 (98.7%)	13,704 (98.7%)
Upper West Fork Sanpoil R	478 (2.8%)	1,530 (9.0%)	2,118 (12.5%)	1,304 (7.7%)	5,430 (32.1%)	16,950 (32.0%)
Upper Lost Creek	6 (0.1%)	205 (3.1%)	258 (3.9%)	72 (1.1%)	541 (8.2%)	6,565 (8.2%)
Grand Total	4,077	13,571	14,553	10,306	42,507	104,396

B. Water-Repellent Soil (acres): **8,822**

C. Soil Erosion Hazard Rating (acres):
1,580 (low) **10,487** (moderate) **2,163** (high)

D. Erosion Potential: **6.6** ton/acre

E. Sediment Potential: **392** cubic yards / square mile

PART IV - HYDROLOGIC DESIGN FACTORS

A. Estimated Vegetative Recovery Period, (years):	**1 to 5**
B. Design Chance of Success, (percent):	**80%**
C. Equivalent Design Recurrence Interval, (years):	**25**
D. Design Storm Duration, (hours):	**3 hours**
E. Design Storm Magnitude, (inches):	**1.5"**
F. Design Flow, (cubic feet / second/ square mile):	**52 cfs/sq. mi.**
G. Estimated Reduction in Infiltration, (percent):	**40%**
H. Adjusted Design Flow, (cfs per square mile):	**74 cfs/sq. mi.**

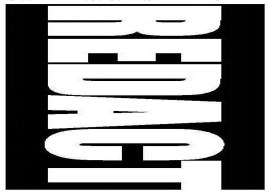
PART V - SUMMARY OF ANALYSIS

Background: The Northstar Fire was reported on August 13, 2015 twelve miles north of Nespelem. Fire investigators determined that the fire is believed to be human caused. Hot, windy conditions combined with very dry fuels caused the fire to grow extremely fast and sparked numerous spot fires. By August 22, the fire had grown to approximately 126,000 acres. The Northstar Fire is currently managed by the California National Incident Management team under Incident Commander Jerry McGowan.

A. Describe Critical Values/Resources and Threats:

Summary of Issues:

Critical Value	Value-at-Risk	Drainage with Value	Risk	Threat Description
Human Life & Safety **Property**	Roads Motorized Access	Upper WF Sanpoil Lower Lost Cr. Golden Harvest Cr. Scatter Cr. Lower WF Sanpoil R. Thirteenmile Cr.	Very High* Very High* Very High* Very High Very High Very High	Post-fire watershed conditions threaten the life and safety of visitors using the Forest Service roads and road infrastructure within the fire perimeter. Roads are downslope of high/moderate severity burned areas increasing the risk from debris flows, increased runoff, and erosion from over-steepened slopes during storm events. These events can plug culverts, erode roadbeds, and trap the public behind damaged areas. There is also an increased risk from burned, hazard trees, and rockfall.
Human Life & Safety **Property**	Homes, Buidlings, Utility lines	Upper WF Sanpoil Lower Lost Cr. Golden Harvest Cr. Scatter Cr. Lower WF Sanpoil R. Thirteenmile Cr.	Low NA Low High High NA	Several homes and associated roads occur on private lands downstream/downslope of moderate and high intensity burn areas. These areas may be subjected to increased peak flows that may cause damage to any structures/roads in low lying areas or scour utility lines along roads.
Property	Campgrounds	Upper WF Sanpoil Lower Lost Cr. Golden Harvest Cr. Scatter Cr. Lower WF Sanpoil R. Thirteenmile Cr.	NA Very Low NA High Low High	Post-fire watershed conditions threaten the life and safety of visitors using the Forest Service campgrounds within the fire perimeter. Campgrounds are downslope of high/moderate severity burned areas increasing the risk from debris flows, increased runoff, and rill/gully erosion from over-steepened slopes during storm events. There is also increased risk from hazard trees.
Property	Trails	Upper WF Sanpoil Lower Lost Cr. Golden Harvest Cr. Scatter Cr. Lower WF Sanpoil R. Thirteenmile Cr.	NA Very Low NA High Low High	Post-fire watershed conditions threaten the life and safety of visitors using the Forest Service trails within the fire perimeter. Trails are downslope of high/moderate severity burned areas increasing the risk from debris flows, increased runoff, and erosion from over-steepened slopes during storm events. These events can wash out the trail tread and damage other infrastructure. There is also an increased risk from hazard trees.
Human Life & Safety **Property**	Highway 21	Upper WF Sanpoil Lower Lost Cr. Golden Harvest Cr. Scatter Cr. Lower WF Sanpoil R. Thirteenmile Cr.	NA NA NA Low Very High Very High	Post-fire watershed conditions threaten the life and safety of traffic and road infrastructure on Highway 21. Portions of the highway is downslope of high/moderate severity burned areas increasing the risk from runoff and erosion during storm events. These events can plug culverts, erode roadbeds, and trap the public behind damaged areas.

Natural Resources	Native or naturalized communities non-forested	Upper WF Sanpoil Lower Lost Cr. Golden Harvest Cr. Scatter Cr. Lower WF Sanpoil R. Thirteenmile Cr.	All High	Field reviews indicate that there is a substantial risk of noxious weed invasion along roads, handlines and dozerlines used during fire suppression activities. This threat is due to the liklihood that some noxious weed seeds were brought into the area by fire equipment and suppression activity within known noxious weed locations within the burn. The slow natural regeneration following moderate to high burn severity also leaves some areas at risk. Known noxious and invasive weed populations are expected to aggressively compete with native species for space and nutrients in burned areas.
Cultural & Heritage Resources	Cultural Sites		Low Low Low High Very High Very High	The fire removed protective vegetation and litter (camouflaging) that obscured artifacts at several historic and native American sites increasing risks to exposed features and artifacts. This could lead to collection and looting of these sensitive sites which would also result in irreversible loss. Risk to historic sites [redacted] from debris flows, wind erosion, and burned vegetation adjacent to site.
Property	Domestic Water Sources	Upper WF Sanpoil Lower Lost Cr. Golden Harvest Cr. Scatter Cr. Lower WF Sanpoil R. Thirteenmile Cr.	High Low High High High Low	Ash and sediment can impact water quality for miles downstream until flow from unburned drainages dilutes it. There are many domestic and agricultural intakes that may have impaired water quality during the first few storms that generate erosion from burned hillslopes.
Natural Resource	Soil Productivity	Upper WF Sanpoil Lower Lost Cr. Golden Harvest Cr. Scatter Cr. Lower WF Sanpoil R. Thirteenmile Cr.	All High	The risk of accelerated erosion and mass wasting is very high because the forest canopy and effective ground cover have been completely consumed by moderate to high intensity burn. The condition is compounded further by the steep slopes which are underlain by highly erosive decomposed granitics, and a low to moderate degree of hydrophobicity in the surface soil horizons. A 2 or 5-year rainstorm event occurring within several years after the fire will greatly increase the potential for topsoil loss, including the ash from the burned plant litter and duff, and reduce the soil productivity of these sites.

*** Hazard trees only, NA – Not Applicable**

B. Emergency Treatment Objectives:

The goal of the burned area emergency rehabilitation is to:

- Reduce threats to human life and safety to users of roads and protect road infrastructure in high and moderate severity burn areas in Upper WF Sanpoil, Lower Lost Cr., Golden Harvest Cr., Scatter Cr. Lower WF Sanpoil R., and Thirteenmile Cr. by installing increased drainage (e.g. overflow structures, enlarging culverts that could plug, and dropping select hazard trees on roads that can't be closed).
- Reduce threats to human life and safety by installing warning signs and conducting road storm patrols.
- Reduce threats to human life and safety to visitors using the Forest Service campgrounds and trails within the fire perimeter and protect the trail infrastructure downslope of high/moderate severity burned areas from debris flows, increased runoff, and erosion from over-steepened slopes during storm events.
- Control expected invasion of noxious weeds within the area, especially along and adjacent to Forest roads and dozer lines used by fire equipment and in existing populations.
- Reduce vandalism, theft and damage of a cultural site i[REDACT]
[REDACT]
- Identify appropriate monitoring activities that estimate the effectiveness of emergency stabilization treatments and identify necessary maintenance and continuation of other approved BAER activities.

Objective:

C. Probability of Completing Treatment Prior to Damaging Storm or Event:

Land **100** % Channel **NA** % Roads/Trails **85** % Protection/Safety **100** %

D. Probability of Treatment Success

	Years after Treatment		
	1	3	5
Land (Noxious Weeds)	70	80	80
Land (Cultural Protection)	85	90	90
Roads (Drainage and Erosion Control)	80	90	90
Trails (Drainage and Erosion Control)	90	100	100
Protection/Safety (Road/Trail Warning Signs)	100	100	100
Protection/Safety (Drainage and Erosion Control)	80	90	90

E. Cost of No-Action (Including Loss): Refer to Values at Risk (VAR) spreadsheet for specific information

The VAR analysis summary identified that the total treatment cost is estimated at $[REDACT] with an expected benefit of $2,792,070. The summary implied minimum value of protecting non-market resource critical values is justified for the treatments proposed in this BAER assessment. The expected benefit/cost ratio was 7.7.

F. Cost of Selected Alternative (Including Loss): Refer to (VAR) spreadsheet for specific information

G. Skills Represented on Burned-Area Survey Team:

[✓] Hydrology	[✓] Soils	[ ] Geology	[ ] Range
[ ] Forestry	[✓] Wildlife	[ ] Fire Mgmt.	[✓] Engineering
[ ] Contracting	[ ] Ecology	[✓] Botany	[✓] Archaeology
[ ] Fisheries	[ ] Research	[✓] GIS	[ ] Landscape Arch

Team Leader: **John Chatel, Pacific Northwest TES Program Manager**

Email: REDACT Phone: REDACT FAX: REDACT

Team Members:

Name	BAER Position
John Chatel, PNW RO	BAER Team Leader
Kate Meyer, Willamette NF	Team Leader (trainee)
William Amy, Santa Fe National Forest	Team Leader (trainee)/Wildlife
Eric Robertson, Apache-Sitgreaves NF	Soils
Crystal Danheiser, Lassen NF	Soils
Stacey Weems, Uinta-Wasatch-Cache NF	Soils (trainee)
Bill Goodman, Fremont-Winema NF	Hydro
John Rihs, Apache-Sitgreaves NF	Hydro
Mike McConnell, Gifford Pinchot NF	Hydro
Judy Kittson, BLM	Engineering
Shawn Robnett, Sawtooth NF	Engineering
Barbara Shanley, Lake Tahoe Basin	Engineering
Alicia Beat, Colville NF	Heritage
Kim Vieira-Rainville	GIS
Lisa Brehm, Ottawa NF	GIS
Eric Amstad, Malheur NF	Recreation
Dave Lent, Colville NF	Recreation
Tom Bates, Arapahoe/Roosevelt/Pawnee NF	Botany

H. Treatment Narrative:

Land Treatments:

Cultural Treatments

Purpose of Treatment: New features and artifacts are present following impacts from fire. In most REDACT

General Description: A perimeter assessment to record artifacts and features at four sites on the REDACT REDACT to cover and protect cultural resource materials and to determine the area in which patrolling is required.

Location (Suitable) Sites: REDACT REDACT

Design/Construction Specification(s): Weed free shredded mulch or seeding will be spread/planted at REDACT to cover and protect cultural resource materials exposed by the fire.

Noxious Weeds Early Detection Rapid Response

Purpose of Treatment: Prevention, combined with early detection and rapid response, is the most

effective means of controlling noxious weeds and protecting native plant communities. Prevent establishment of new infestations, prevent spread of existing infestations, and prevent increase in weed density in existing infestations.

General Description: Field reviews by Forest Service BAER team indicate that there is a risk of noxious weed invasion. There are 12 species of non-native invasive plants (absinth wormwood, common St. Johnswort, Dalmatian toadflax, diffuse knapweed, hoary allysum, houndstongue, meadow hawkweed, plumeless thistle, orange hawkweed, oxeye daisy, sulphur cinquefoil, and tansy ragwort) documented within the burned area. Miles of dozerline and heavy fire suppression traffic travelling from areas of existing noxious weed infestations greatly increases the risk of introducing noxious weed seeds to adjacent native plant communities that were burned within the Northstar Fire perimeter

Location (Suitable) Sites: Treat known and expected weed infestations on the Colville NF (101 acres) and on the Okanogan Wenatchee (878 acres) NF within and directly adjacent to high severity burned areas on the Northstar Fire burned area on National Forest System Lands. All mechanical and hand constructed control line, drop points, heli-spots and heli-bases.

Design/Construction Specifications: Select herbicide, application rate, and application timing based on specific weed being treated, and access to the location of the infestation; Consideration for sensitive species habitat and sensitivity when selecting appropriate herbicide.

Channel Treatments:

Roads and Trails Treatments:

Road Drainage Stabilization

Purpose of Treatment: The watersheds burned in the North Star Fire will show the effects of the fire via increased runoff rates, erosion, sediment, and debris transport creating a future concern for roads and culverts. The effects will most likely result in plugged culverts and overtopped or washed away road surfaces and fills. There is also increased danger to structures that remain in the flood plains due to the increased risk for debris slides and flooding. The treatments identify roads and culverts that are predicted to be impacted by post-fire debris flows and flooding, and where necessary, recommends treatments to minimize the risks to public safety and protect the investment of the transportation system from the expected increased post-fire runoff.

General Description: Several road stabilization treatments have been prescribed for Forest Service Roads located on the Okanogan-Wenatchee NF within the Northstar Fire that will be directly impacted by post fire events. These treatments are necessary to mitigate the predicted effects that will occur to the transportation infrastructure system.

Location (Suitable) Sites: Portions of roads travel through moderate and high severity burn areas. Those sections of roads (15 miles) that run through the moderate and high severities were found to have or will have road drainage issues and at a minimum will require all or part of the treatments listed in the "Design/Construction Specifications".

Design/Construction Specifications:

Level 3 to 5 Roads

1) Ditch Cleaning – All drain ditches along the length of the roads shall have all existing silt and debris removed and either hauled away or spread out such that the material cannot reenter the drainage structure during a runoff event.
2) Culvert Cleaning – Remove any blockages from inlet, outlet and inside barrel. Straighten bent or replace inlets. Catchment-basins shall have all existing silt and debris removed and either hauled away or spread out such that the material cannot reenter the drainage structure during a runoff event. Install carsonite posts when necessary.

3) Debris (Trash) Racks - Assemble wood or steel culvert inlet debris racks where indicated or found to be necessary on or above culvert locations. Debris racks design shall be such that it will capture the expected woody debris material that will come with the expected flows in each of the drainages.

Level 2 Roads

Spot drainage treatments specified below would occur on all non-high traffic Level 2 roads to ensure drainage structures do not plug and the road infrastructure is not impacted. Upon this treatment the road would be gated where hazard trees are too extensive to treat and risk to the public are very high. If any Level 2 roads are deemed needed for salvage then non-emergency funds should be used to reduce hazard tree risks and more extensive drainage treatments should be implemented. If any remaining Level 2 roads are deemed high traffic roads then more extensive drainage treatments should be implemented and an interim 2500-8 for these costs submitted.

1) Ditch Cleaning – All drain ditches along the length of the roads shall have all existing silt and debris removed and either hauled away or spread out such that the material cannot reenter the drainage structure during a runoff event.
2) Culvert Cleaning – Remove any blockages from inlet, outlet and inside barrel. Straighten bent or replace inlets. Catchment-basins shall have all existing silt and debris removed and either hauled away or spread out such that the material cannot reenter the drainage structure during a runoff event. Install carsonite posts when necessary.
3) Culvert Replacement – where culverts will be severely impacted by post-fire runoff, remove and replace with culvert sized for post-fire flows. Where appropriate design as an AOP.
4) Gates – Install gates to close roads when necessary for public safety and to develop and implement closure orders when necessary.

Level 1 Roads

Colville and Okcanogan Wenatchee NF – There are 62 Level 1 roads on the Colville NF and 41 Level 1 roads on the Okcanogan Wenatchee NF within the fire. Some of these roads may still have drainage structures at risk from plugging. A complete inventory did not occur during the rapid assessment. However, it is believed some of these may have drainage structures at risk. If this situation occurs then we recommend the drainage structures be removed and the roads bermed where equipment will not create excessive road damage. The Forest should complete an assessment of these roads and submit an interim 2500-8 if additional funds are needed.

1) Remove Culverts - Culverts will be removed and have the excavated hole laid back to match the surrounding stream banks in order to pass the increased flows and debris that are anticipated from future storm events.
2) Block Entrances - Install rock and dirt berms on five Level 1 roads that are currently in a storage status, but not closed. These roads are a high risk to flooding and erosion.

Trail Drainage Reconstruction and Maintenance

Purpose of Treatment: Ensure maximum effectiveness at preventing erosion of trail surface and consequent sediment loading in streams and lakes.

General Description: Install additional drainage structures to prevent erosion that is predicted to occur from moderate and high severity burn areas. Measures would address the risk of losing the trail infrastructure. Clean existing trail drainage structures on 5 miles of trails in the burn area to ensure increased runoff will not destroy trail tread and contribute sediment to streams and lakes. Select hazard trees will be felled along trail where crews will be working installing and maintaining waterbars to provide a safe work area.

Location (Suitable) Sites: The Swan Lake and Fish Lake, Long Lake, Tenmile Trails on the Colville NF within burn perimeter are likely to contribute significant volumes of sediment to stream system if drainage facilities are not adequate to increased runoff.

Design/Construction Specifications:

1) Construct Check Dams according to EM-7720-104 (drawing 915-2).
2) Construct Grade Dip according to EM-7720-104 (drawing 912-4).
3) Construct Waterbars according to EM-7720-104 (drawing 922-1 and 922-2).
4) Clean waterbars as per FSH 2309.18

Protection/Safety Treatments:

Recreation Hazard Signs

Purpose of Treatment: Ensure maximum visibility and readability of signs warning visitors of the hazards to human life and safety that exist in burned area. Signs are intended to emphasize the increased hazards from falling burned trees, and potential for debris flows and flooding.

General Description: Install signs at roads, campsites, recreation sites and trailheads that enter or are within the burned area or provide access to trails within the burn; warning of increased hazard from falling burned trees, debris flows and flooding or to close sites and trails.

Location (Suitable) Sites:

Post signs at trails or campgrounds on the Colville NF within the burn area or that provide access into the burn area.

Design/Construction Specifications:

Sign and poster guidelines for the Forest Service EM7100-15

Hazard Tree Falling for High Use Campground

Purpose of Treatment: Severely burned trees pose a risk to public safety as trees weaken. Trees that pose the greater risk to campsites and other recreation sites within the Swan Lake campground would be removed within the first year.

General Description: Remove fire killed and weakened trees which pose a hazard to public, employees, and property.

Location (Suitable) Sites: Swan Lake campground is a high use recreation area used by local anglers, campers, hikers, and bicyclists on the Colville NF. Camp sites are always in high demand. In general the campground experienced a low intensity burn. However, a number of single trees burned adjacent to 5 camp sites that are difficult to close because they are in loop with other sites that did not burn. Burned trees are also near other campground infrastructure (well house, toilets, parking areas, etc.)

Design/Construction Specification(s): Fall select trees away from portions of campsites and other that would be reasonably expected to have people occupy them (parking areas, tent sites, picnic tables, social trails, etc).

Hazard Warning and Closure Signs for Roads

Purpose of Treatment: The purpose of "Burned Area Warning Signs" is to reduce the risks to human life and safety by warning motorists of existing threats while traveling the authorized routes within the areas susceptible to flooding, debris flows, hazards trees, and all other risks attributable to post fire events on the landscape. The purpose of highway warning signs is to replace the existing signs that were burned during the fire. These signs are necessary to warn travelers of hazardous road conditions and features such as curve signs and falling rocks. Road closure signs are needed to alert the travelers of closed roads which will be necessary to protect all users from driving into areas that have been determined to be more susceptible to hazards caused by the fire.

General Description: This treatment is for installation of "Burned Area" warning signs, highway warning signs, and road closure signs.

Location (Suitable) Sites: Locations for "Burned Area" warning signs will be located at points of entries by use of forest system roads into the burned areas. These locations are as follows:

Colville NF

- Beginning of the northern fire perimeter along Road 5330 – 1 each
- Beginning of the fire perimeter along Road 5314 – 1 each
- Before the fire perimeter along Road 53 north of 5320-008 – 1 each
- Before the fire perimeter along road 5314-062 west of 53 – 1 each

Okcanogan Wenatchee NF

- Beginning of the western fire perimeter each end along Road 3120 – 2 each
- Northwestern fire perimeter of Road 3785-200 – 1 each
- Eastern fire perimeter of Road 3785-200 – 1 each
- Beginning of obvious fire perimeter east of Lost Creek along road 3785-100 – 1 each

Design/Construction Specification(s): "Burned Area" warning signs along the roads shall measure, at a minimum, 30 inch by 36 inch and consist of 0.08" aluminum, sheeted in high intensity yellow with black letters, which is shown in the photo below. The "BURNED AREA" lettering shall be a minimum of 5 inches in height and all remaining lettering shall not be less than 3.5 inches in height. Traffic Warning, Road Closure, and Barricade Markers Signs shall conform to the M.U.T.C.D. standards and shall be installed per Federal Highway Safety Standards.

Gate Closure

Purpose of Treatment: The primary reason of installing the gates is for public safety especially during periods of expected moderate to high rainfall events. In the event severe stormy weather passes over the Northstar Fire area a line officer may decide they need to close the roads that would be affected by the expected run off. A gate would be necessary in preventing the public from accessing the area of the forest by vehicle during these severe weather events. The closure orders will be necessary when it is determined there is a danger to the public caused by potential debris flows and flooding from the hill slopes above the roads.

General Description: This treatment is for the installation of steel post gates to close roads when necessary for public safety and to develop and implement closure orders when necessary.

Location (Suitable) Sites:

Okcanogan Wenatchee NF

1) NFSR 3115100 (Upper West Fork of the Sanpoil River) - Install gate past last private property access.
2) Western section of NFSR 3005 approximately 2 miles from road 3000
3) Eastern section of NFSR 3005 entering fire perimeter from east
4) Easternmost section of NFSR 3005 approximately 2 miles beyond 3005110
5) NFSR 3120140 1 mile NW of intersection with 3120
6) NFSR 3120140 from eastern side of fire perimeter

Colville NF - NFSR 5314000 at junction with 5330400 and junction with 5330000 – 2 gates
NFSR 5320800 at junction with 5320000 – 1 gate

Design/Construction Specification(s):

1) The gate shall be constructed according to the *Standard Specifications for Construction of Roads and Bridges on Federal Highway Projects FP-03* (Similar to the photo below). All signing associated with the gate installation shall follow Forest Service Engineering Manual 7100-15 and the Federal Highways Manual of Uniform Traffic Control Devices (MUTCD). This includes typical gate barricade markers and object markers and any signs that may be installed with the gate such as a road closed sign.
2) The gate shall be able to be secured in the open position so as not to be a hazard to traffic. Cables, chains, or single-wire barriers shall never be used across any roadway because they are not readily visible to road users. Travel management signs may be used on gates to display access and travel management restrictions and closures. Refer to the Sign Installation Guide for additional information about the required gate signs.

3) Ensure the area around the gate is large enough for a vehicle with trailer to turn around.
4) Road closure information will be posted on the gates and through public notices.

Hazard Tree Falling for Roads

Purpose of Treatment: Remove specific hazards trees to reduce the threat to workers installing road treatments and the public using high traffic roads

General Description: Forest service roads within the North Star Fire that pass through areas where the severity of the burn is moderate and high are at risk of having burnt and dying trees fall over the roadway. These hazard trees pose a risk to motorists using these roads especially during high wind events. All hazard trees on Level 3 roads and higher would be felled. On the Colville National Forest spot hazard trees will be felled on several high traffic Level 2 roads that will remain open to reduce risks. Spot hazard trees would also be removed on all Level 2 roads where drainage work would occur in extensive areas of high and moderate burn. If Level 2 roads are deemed needed for salvage then non-emergency funds should be used to reduce hazard tree risks. If any remaining Level 2 roads are deemed high traffic roads and not needed for salvage then more extensive hazard tree removal should be implemented and an interim 2500-8 for these costs submitted.

Location (Suitable) Sites: The initial area to first concentrate the removal of hazard trees is on those high use roads (Maintenance Level 3 and above) that will remain open and traverse through the sections of high and moderate burn severities. Expand treatment to high use ML2 roads in high severity areas if the roads shall remain open. Maintenance Level 1 roads are closed roads and will not be treated, Maintenance Level 2 roads may be closed due to safety concerns (at the Rangers discretion), it is generally accepted that Maintenance 3 roads provide important access and need to remain open and should be treated for safety reasons.

Design/Construction Specification(s): Colville NF and Okanogan Wenatchee NF

1) FS personnel will prepare and administer the contract.
2) Estimated length of ML 3 roads in high to moderate severity burn areas total 4 miles, there are no ML 4 or ML5 roads noted within the high to moderate burn areas.
3) Assume the removal of hazard trees within approximately 75 feet of the road centerline to calculate total acreage of area to cut and drop hazard trees = 73 acres.
4) Assuming only trees on slopes above the road need to treated, estimate 50% of the 73 acres will need to be treated = 36.5 acres. Only hazard trees within these acres will be felled.

Road Storm Patrols

Purpose of Treatment: The purpose of the monitoring is to evaluate the condition of roads for motorized access and to identify and implement additional work needed to maintain and/or repair damage to road surfaces and flow conveyance structures across roads in order to provide safe access across FS lands. The patrols are used to identify those road problems such as plugged culverts and washed out roads and to clear, clean, and/or block those roads that are or have received damage. The storm patrollers shall have access to at least a backhoe and dump truck that can be used when a drainage culvert is plugged or soon to be plugged and to repair any road receiving severe surface erosion. District personnel will survey the roads within the fire perimeter after high-intensity summer thunderstorms in 2016. Survey will inspect road surface condition, ditch erosion, rolling drain dip failure and culverts/inlet basins for capacity to accommodate runoff flows.

General Description: Roads within the Northstar Fire contain drainage structures that cross streams and side channels located in watersheds that have areas of a large percentage of high burn severity. These side channels now have the potential for increased runoff and debris flows. The predicted increased flows are a direct cause from the lack of vegetation to slow down the water flow and/or from hydrophobic soil conditions that can prevent surface water infiltration. These flow increases pose a threat to the existing crossings which may result in plugging culverts or exceeding their maximum flow capacity. If these flows plug drainage structures, the result could be massive erosion and debris torrents further down the drainage due to the failure of the fill slope. Also, there is an immediate and future

threat to travelers along these roads within the burned area due to the increased potential for rolling and falling rock from burned slopes and increased potential for flash floods and mudflows. With the loss of vegetation normal storm frequencies and magnitudes can more easily initiate rill and gully erosion on the slopes and it is likely that this runoff will cover the roads or cause washouts. These events make for hazardous access along steep slopes and put the safety of users at risk.

Location (Suitable) Sites: The patrols should first focus on the Forest Service roads that receive the most traffic and are of more value to the transportation system. Due to the vast distance between each of the roads to be patrolled the team could also check where the highest rain intensities occurred when a storm passes through the fire area and concentrate their efforts on the areas receiving the most precipitation. Per the BAER Treatments Catalog, storm patrols are intended for use at the following locations:

1) Road crossings where loss of control of water or exceedance is identified.
2) Road access is necessary throughout the storm season.
3) Road crossings where high sediment and debris is anticipated.
4) Roads susceptible to landslides.
5) Roads with all-season surfacing (aggregate or asphalt).

Design/Construction Specifications:

1) FS personnel will direct the work.
2) Immediately upon receiving heavy rain and spring snowmelt the FS will send out patrols to identify road hazard conditions – obstructions such as rocks, sediment, washouts – and plugged culverts so the problems can be corrected before they worsen or jeopardize motor vehicle users.
3) The road patrols shall bring in heavy equipment necessary to mechanically remove any obstructions from the roads and culvert inlets and catch basins where necessary.
4) All excess material and debris removed from the drainage system shall be placed outside of bank-full channel where it cannot re-enter stream channels.

Monitoring Narrative:

**** No monitoring funding is not being requested. All of the monitoring below is already included in the previous treatments. Monitoring is only displayed here to better portray what is taking place.***

Cultural Patrols

Patrolling and monitoring of archaeological and historic resources will be required to lessen the chance of vandalism and looting to resources until natural vegetation reestablishes itself on the forest floor. Monitoring by an archaeologist for the first year is recommended to keep baseline data on the condition of resources in the [redacted]. subwatersheds.

Road Treatments

Storm Patrols – Monitor the storm-patrol response time to ensure objectives are being met. Identify the type of storm event that mobilizes material.

Road Drainage – Monitoring shall be performed during while construction is in progress and re-inspected during "Storm Inspection and Response" periods.

Gate and Signs - MUTCD or Forest Service standards and will be periodically checked by the district to ensure they are still in place. Monitoring shall be performed during while construction is in progress and re-inspected during "Storm Inspection and Response" periods.

Hazard Trees - Monitor the hazard tree removal by taking note of the reduced number of trees seen falling across the roads each spring when the roads are drivable and after high winds events.