Post-Fire BAER Assessment

Burned Area Emergency Response (BAER) Information Brief

CentralWashingtonFireRecovery.info

Cougar Creek Fire 2500-8 Summary

September 25, 2018

Okanogan-Wenatchee National Forest

FIRE BACKGROUND

The Cougar Creek Fire began as a lighting strike on July 28, 2018. As of the date of this report the Cougar Creek Fire perimeter includes 41,107 acres. The fire spread through a combination of slow creeping and short runs, spotting, and burnout operations resulting in a mosaic of fire severity on USFS land — 882 acres of high, 13,010 acres of moderate, 11,340 acres of low, and 13,092 of unburned. Over 53 miles of dozer line were constructed, with 4.9 miles on private land.

On September 14, 2018 the Central Washington Burned Area Emergency Response (BAER) team completed an assessment report of the burned area, and requested approval for initial funding for recommended emergency treatments. The report was submitted to the Pacific Northwest (Region 6) Regional Forester in Portland, Oregon.

FS-2500-8 BURNED AREA REPORT

ANALYSIS

Physical characteristics of the burned landscape

Geology: There are two major geologic types in the fire perimeter. The Tonalitic plutons (Kt) consists mostly of tonalite, gneissic tonalite, and tonalitic to granodioritic gneiss, with both hornblende and biotite. The Napeequa Schist (Kns) is predominantly fine-grained hornblende mica schist, fine-grained hornblende-rich schist, and amphibolite and quarts-rich schist, as well as minor gneiss, marble, and ultramafic rock.

Dominate Soils: Soils within the burn perimeter are diverse, but nearly all soils within the burned area contain volcanic ash. The most common soil groups within the burn are Xeric Vitricryands comprising 40% of the burn area, and Andic Haploxerepts which comprise 20%. Soils are primarily coarse and fine sandy loams.

Water-Repellent Soils (acres): Natural hydrophobicity present on approximately 60% of soils, or around 24,600 acres. Fire-induced or altered hydrophobicity occurred on approximately 18% of soils (100% of severely burned soil and 50% of moderately burned soil), or around 7,400 acres.

Soil Erosion Hazard Rating (acres): 438 acres of low; 2,551 acres of moderate; 38,066 acres of high; 51 acres not rated, or are rock/water.

Vegetation Types: Pre-fire forest conditions in the northwest portions of the fire were highly productive and densely stocked with Douglas fir, spruce, subalpine fir, lodge pole pine, and western white pine. Understories were dominated by alder, rocky mountain maple, huckleberry and Oregon grape. Forest types in the southern and eastern portions of the burn were open, dry forests dominated by ponderosa pine and Douglas fir with understories of ceanothus, snowberry, and grasses.

Miles of Stream Channels by Order or Class

Stream Type	Miles
Perennial	70.8
Intermittent	43.4
Ephemeral	0
Artificial Path	5.3
Grand Total	119.4

Transportation System

Trails: 43 miles (0 miles in designated wilderness)

Roads:

Maintenance Level	Miles
1 - Basic Custodial Care (Closed)	71.1
2 - High Clearance Vehicles	115.9
3 - Suitable For Passenger Cars	1.9
4 - Moderate Degree Of User Comfort	12.8
Non-FS Roads	3.8
Grand Total	**205.4**

Watershed Condition

Burn Severity (acres):

Soil Burn Severity by Ownership Acres					
Ownership	**Unburned**	**Low**	**Moderate**	**High**	**Total**
BLM	26	52	13	0	91
Private	805	558	260	0	1,624
State	419	194	405	50	1,068
Forest Service	13,092	11,340	13,010	882	38,325
Total	**14,342**	**12,144**	**13,688**	**933**	**41,107**

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Soil Erosion Hazard Rating:

- 438 acres: (low)
- 2,551 acres: (moderate)
- 38,066 acres: (high)
- 51 acres: (not rated)

Debris Flow Potential: Requested USGS debris flow modeling predicted 80-100% probability of debris flows in over twenty small drainages along the central portions of Mad River, and 60%-80% probability of debris flows in moderately sized drainages in an additional six. However, predicted debris flow magnitude was generally small, with the primary exception of the Wilma Creek drainage. Very steep slopes, highly erodible soils, and broad extent of high and moderate burn severity make the north facing drainages along the central Mad River and Hornet Creek highly likely to experience small to moderately sized debris flows.

Hyper-concentrated flows are also possible in the Potato Cr, Decker Canyon, and Gray Canyon area. Although USGS debris flow modeling did not predict high likelihood of debris flows, the loose, pumiceous surface soils in this area combined with a summer-thunderstorm-precipitation regime dominated (high intensity, shorter-duration events) make this area susceptible to sediment transport where soils are exposed, even in areas of low and moderate burn.

ANALYSIS OVERVIEW

The Cougar Creek Fire started from a lightning strike on July 29, 2018. Approximately 2% of the area within the fire perimeter burned at a high soil burn severity (SBS) and 33% at moderate soil burn severity. The rest of the area within the fire perimeter had either low or very low soil burn severity with unburned inclusions. In high and moderate-SBS areas, groundcover burned intensely, consuming organic duff on the soil surface along with leaves and needles on standing live vegetation.

Hydrologic Response

The Cougar Creek Fire burned primarily within the Mad River watershed and in the watersheds of smaller tributaries to the Entiat River. Watershed response in the Cougar Creek Fire area is expected to include 1) an initial flush of ash, 2) rill and gully erosion in drainages and on steep slopes within the burned area, 3) flash floods with increased peak flows and sediment deposition; 4) debris flows. Watershed response are dependent on the occurrence of storm and snowmelt events and should be greatest with initial storm events. The disturbances will become less evident as vegetation is reestablished, providing ground cover and increasing surface roughness.

The primary hydrologic mechanisms of damage are flooding, debris flows, and debris jams. After a field reconnaissance, the BAER team identified the Mad River, Potato Creek, and Windy Creek of particular concern. The Soil Burn Severity map and modeling coupled with field observations were used to assess the level of threat and risk to the values at risk in and adjacent to the burned area, and to develop treatment recommendations.

The combination of moderate and high severities was used to indicate the hydrologic response because it is these severity ranges that produce the majority of the post-fire runoff. Thirty percent of the Mad River at the burn perimeter burned at high and moderate severity. Modeled post-fire runoff indicates an increase of two-times the pre-fire flow. This increase in flow for the Mad River poses a potential threat to roads, Pine Flat Campground and downstream private residences.High-intensity rainstorms often occur in the burned area from late June through the end of August, and are the precipitation events most likely to generate elevated post-fire runoff. Although relatively uncommon in the burned area, rain-on-snow events also have the potential to generate considerable post-fire runoff events. This type of event generally occurs in May to early June. The current risk of flooding and erosion is much higher than in the pre-fire condition, threatening various values within and downstream of the burned area.

RECOMMENDED EMERGENCY TREATMENTS

Objectives

The objectives of the emergency treatments proposed in this document are to manage identified unacceptable risks from “imminent post-wildfire threats to human life and safety, property, and critical natural resources on National Forest System lands” (FSM 2523.02). The timely application of the proposed treatments is expected to substantially reduce the probability of damage to the BAER critical values identified in the section A, above. Recommended emergency treatment objectives include the following:

Land Treatments

- Foster the recovery of native plant communities, including sensitive species, in the burned area by minimizing the proliferation of noxious weed populations (L1).

Channel Treatments

- No channel treatments proposed

Roads and Trails Treatments

- Reduce risk of road and trail infrastructure damage from elevated post-fire hillslope runoff and flood flows.
- Reduce erosion and transport of fine sediment into area streams, and thus reduce impacts of road and trail network to water quality and aquatic habitat for ESA-listed species.

Protection and Safety Treatments

- Protect human life and safety of forest visitors through raising awareness of the risks present in a post-fire forested mountain setting by installing informational and warning signs at trail and road portals in and adjacent to the burned area .
- Protect human life and safety from post-fire hazards at key sites where forest visitors and administrative personnel congregate, including Pine Flats Campground and several trailheads.
- Protect human life and safety of administrative and public road users on FSR 5700 by replacing fire-damaged safety guard rails at high-risk sections of the road.

Monitoring and Coordination

- Facilitate partner agency efforts to install temporary systems on NFS land to provide early warning for precipitation and runoff events that could threaten off-NFS values.
- Monitor the effectiveness of road and trail treatments and facilitate any needed maintenance of treatments during the first year following the fire.

Land Treatments:

Noxious Invasive Weed Early Detection Rapid Response (EDRR) – Early detection and treatment of invasive plants is critical to maintain relatively weed-free native populations in fire-affected areas. Treatment is most effective when infestations are small and isolated. Timing of treatments is important in order to address the weeds before they can produce seed and proliferate. EDRR is covered under the Okanogan-Wenatchee Forest-wide Site-specific Invasive Plant Management FEIS and ROD (2016) with a range of treatment options including use of nine herbicides. Proposed treatments fall under two categories: L1a suppression repair related mitigation of dozer lines that passed through noxious weed-infested areas on private land and into uninfested national forest system and L1b land protection of sensitive native plant communities.

Following the 2018 update of national weed treatment guidance, BAER is the preferred mechanism to treat suppression-related potential spread of invasive weeds along equipment-installed fire line where equipment is known to have passed through weed-infested areas and into uninfested areas, in the first year following the fire. Dozer lines below 4000' elevation were judged to be at greatest risk for spreading knapweed, spotted cinquefoil, and other aggressive invasive weeds onto the Forest from infested lands. Areas along the forest boundary adjacent to infestations of common bugloss and hoary cress are also considered highly vulnerable to invasion by these two noxious invasives that have to date not been found on the Okanogan-Wenatchee NF. EDRR in both of these settings in the first year following the fire should enable OWNF personnel to minimize the spread of these weeds onto previously undisturbed Forest lands.

Iliamna longisepala (long-sepal globemallow) is a sensitive plant species that grows in dry, unshaded habitats that are vulnerable to infestation. Invasive plants are considered to be the primary threat to these populations, especially in the post-fire environment. EDRR by OWNF weeds personnel will ensure that invasive weeds to not gain a toe-hold in these areas in the first critical year following the fire.

Channel Treatments:

No channel treatments are prescribed

Roads and Trail Treatments:

The Cougar Creek burned area includes 129 miles of open system (ML 2-4) road and 43 miles of system trail. There are additional unquantified miles of road that are outside of the fire perimeter but immediately downslope of burned hillslopes. Many of these roads and trails are within or below areas burned at moderate or high SBS, and were determined to be at elevated levels of risk of damage in the post-fire environment. Road and trail treatments are designed to improve drainage in order to remove higher levels of runoff from trails and roads before extensive damage or loss of infrastructure can occur.

Roads and trails were prioritized in an effort to limit treatments to the routes serving the greatest number of values that were most vulnerable to post-fire damage. Similarly, efforts were made to prescribe the least-cost alternative to accomplish the desired mitigation. Treatments were prescribed on 13 out of 43 miles of trail within the burn perimeter, and 15.2 out of 129 miles of open system road. No treatments were presribed on 70.8 miles of closed (ML 1) system roads.

Roads considered highest in priority to protect are proposed for improved road drainage and stream crossing protection at sites considered to be highly vulnerable to damage or failure due to post-fire runoff events. The least-cost effective treatment for protection of the vulnerable stream crossing sites was determined to be installation of armored relief dips at the crossing. These structures provide essentially unlimited overflow capacity in the event that an undersized culvert is plugged, or its capacity exceeded in a flow event. A somewhat lower-cost alternative (unarmored relief dips) was considered, as were alternatives of similar cost (trash racks, overflow pipes). Unarmored dips were rejected because these structures typically scour and fail during extended high-volume events of the sort anticipated in the drainages where armored relief dips are prescribed.

In addition to added road drainage and culvert relief dips, the third road treatment prescribed is storm inspection and response. Many of the roads that are vulnerable to damage from post-fire runoff and erosion were not specified for maintenance treatments or culvert protection and upgrades. On these roads, the proposed treatment is to evaluate the roads during or immediately after significant runoff-producing events in order to remove obstructions to road drainage and otherwise ensure that road drainage is functioning well enough to avoid severe damage or loss to the infrastructure. While this treatment is less likely to be successful than more aggressive (and expensive) treatments, it was judged to be appropriate given the critical values judged to be at risk on these roads. Roads

where this work is proposed are listed in the engineering report and summarized in the values table in this document.

Many of the trails in the burned area are at high to very high risk due to the burning of stabilizing brush, roots and logs. Current trail drainage features are not adequate to address the anticipated increased runoff. Treatments are needed to provide sustainability of the trails and to prevent off-site impacts, should the trails erode or fail.

Trail features will be constructed to standard as defined by USFS Trails Handbook 2309.18. Installation should be designed to last no more than three years. Permanent structures are not part of this treatment. If safety risks (e.g. hazard trees) cannot be mitigated for work crews, work will be delayed until threat is reduced or stabilized. Drainage feature installation will will be implemented on trail segments passing through and/or immediately below areas of moderate or high soil burn severity. The focus will be on sections of trail that have continuous gradient for a length of greater than roughly 50 feet (depending on trail gradient) and are either insloped (cupped) or show evidence of routing water (rills, gullies). Hazards within or along the trail route that restrict efficient and safe access to work sites will be mitigated (rocks, trees). This treatment is designed to stabilize trails for anticipated increases in runoff. The stabilization methods may vary by site but are designed to reduce trail erosion or damage.

Treatment prescriptions for trail drainage maintenance include:

- Clean existing drainage features
- Installation of rolling grade dips and non-structure water bars
- Berm removal, bank stabilization and the installation of non-structure stream crossing

Protection/Safety: Road and Trail Hazard Warning Signs: Working, traveling, and recreating in burned areas poses an elevated risk to Human Life and Safety. The purpose of this treatment is to acknowledge and alert forest employees and visitors to the existing threats associated with traveling routes (roads and trails) within and downstream of burned areas.

“Entering Burned Area” signs are needed to alert the public to possible threats to life and safety. These signs should contain language addressing risks that warrant heightened awareness such as falling trees, rolling rocks, and flash floods. These warning signs should be posted in key locations to alert travelers to upcoming dangers such as falling rocks, “Flood Risk – No Parking or Standing”, etc. The OWNF has existing templates for these signs. Specifications and cost information are described in the engineering and recreation reports.

Hazard Tree Mitigation: A high risk to human life and safety exists at areas where the public and employees congregate—specifically, trailheads, parking areas and campgrounds. This proposed treatment would identify and mitigate overhead hazards at eight trailheads/parking areas and one developed campground (Pine Flat). This work will be required prior to reopening these sites to the public.

Road Guard Rails: The fire burned two sections of guard rail on hazardous curves on the ML4 section of FSR 5700. Guard rails were originally installed on these segments due to a history of crashes at these locations. The risk of harm to human life and safety was considered high, and so replacement was considered necessary on this primary route. National guidance tightly dictates guard rail specifications.

Automated Local Evaluation in Real Time (ALERT) System Support: This treatment provides support in the form of any required review and expedited permit processing for a cooperating organization to install a precipitation or stream staging monitoring device that would be installed to procide early warning of flooding to relevant agencies. If no such request is made, then these funds would not be necessary.

Although not a BAER treatment, Okanogan – Wenatchee National Forest personnel should further evaluate the potential risk of flood impacts at the Pine Flats Campground through additional surveys and flood modeling. A better understanding of flood risk may inform longer-term disposition of the campground. Similarly, continued coordination with the NWS, NRCS, Chelan County, and Cascadia Conservation District is also encouraged in support of these entities’ efforts at mitigating flood and debris flow risk to homeowners in areas below the burn — particularly at the bottom of drainages along the east side of the Entiat River and in the community of Ardenvoir.

Monitoring Narrative: Treatment monitoring will occur as part of the treatments for weeds, roads, and trails. No additional funding is requested for monitoring.