

Date of Report: August 21, 2021

BURNED-AREA REPORT**PART I - TYPE OF REQUEST****A. Type of Report**

- ☒ 1. Funding request for estimated emergency stabilization funds
- ☐ 2. No Treatment Recommendation

B. Type of Action

- ☒ 1. Initial Request (Best estimate of funds needed to complete eligible stabilization measures)
- ☐ 2. Interim Request # _____
- ☐ Updating the initial funding request based on more accurate site data or design analysis

PART II - BURNED-AREA DESCRIPTION**A. Fire Name:** Bootleg Fire**B. Fire Number:** OR-FWF-210321**C. State:** Oregon**D. County:** Klamath & Lake County**E. Region:** R6**F. Forest:** Fremont-Winema NF**G. District:** Bly RD, Chiloquin RD, Paisley RD, and Silver Lake RD**H. Fire Incident Job Code:** P6N43V (0602)**I. Date Fire Started:** July 6, 2021**J. Date Fire Contained:** Aug 16, 2021**K. Suppression Cost: (est)** \$91.2 Million (as of 8/9/21)**L. Fire Suppression Damages Repaired with Suppression Funds (estimates):**

- Fireline repaired (miles):** The suppression effort created approximately 211 miles of dozerline and 7 miles of handline as well as 296 acres of staging areas and safety zones. In addition, 824 miles of existing roads were improved, plowed or brushed for fire suppression. Some of the repair has been completed, but most of it will happen later in the season when resources are more readily available.
- Other (identify):**

M. Watershed Numbers:

Table 1: Acres Burned by Watershed

HUC #	Watershed Name	Total Acres	Acres Burned	% of Watershed Burned
1712000502	Silver Creek	242,567	114	0%
171200050205	Thompson Reservoir	42,835	114	0%
1712000601	Upper Chewaucan River	120,982	26,945	22%
171200060101	Headwaters Dairy Creek	21,996	14,617	66%

171200060102	Augur Creek-Dairy Creek	11,697	3,592	31%
171200060103	Elder Creek	25,481	8,735	34%
1801020101	Jackson Creek-Williamson River	171,003	6,844	4%
180102010101	Headwaters Williamson River	32,923	6,844	21%
1801020201	Upper Sycan River	65,914	44,380	67%
180102020101	Paradise Creek	15,999	12,918	81%
180102020102	Long Creek	11,231	6,140	55%
180102020103	Headwaters Sycan River	38,684	25,322	65%
1801020202	Middle Sycan River	144,146	69,205	48%
180102020201	Chocktoot Creek	21,357	2,594	12%
180102020202	Coyote Creek	9,533	6,280	66%
180102020203	Log Spring	10,804	8,059	75%
180102020204	Calahan Creek-Long Creek	26,382	6,540	25%
180102020205	Shake Creek	13,279	13,279	100%
180102020206	Dry Creek	7,370	4,931	67%
180102020207	Sycan Marsh-Sycan River	55,420	27,522	50%
1801020204	South Fork Sprague River	121,678	26,480	22%
180102020402	Upper South Fork Sprague River	15,953	7,433	47%
180102020403	Brownsworth Creek	12,890	8,515	66%
180102020405	Deming Creek	14,119	8,200	58%
180102020406	Lower South Fork Sprague River	25,315	2,332	9%
1801020205	North Fork Sprague River	132,590	112,161	85%
180102020501	Upper North Fork Sprague River	29,208	23,378	80%
180102020502	Cain Creek-Meryl Creek	16,002	16,002	100%
180102020503	Long Creek-Meryl Creek	20,595	17,989	87%
180102020504	Upper Fivemile Creek	19,192	19,192	100%
180102020505	Huckleberry Draw	11,388	10,609	93%
180102020506	Lower Fivemile Creek	9,509	5,466	57%
180102020507	Lower North Fork Sprague River	26,696	19,525	73%
1801020206	Lower Sycan River	146,564	123,946	85%
180102020601	Merritt Creek	35,210	35,210	100%
180102020602	Silver Dollar Flat	10,044	7,032	70%
180102020603	Marsh Reservoir-Sycan River	39,059	33,634	86%
180102020604	Blue Creek	10,948	10,948	100%
180102020605	Snake River	15,275	9,259	61%
180102020606	Chester Spring-Sycan River	36,027	27,863	77%
1801020207	Sprague River	354,687	16,636	5%
180102020703	Tim Brown Spring	28,982	15,458	53%
180102020706	Knot Tableland-Sprague River	31,113	1,178	4%

N. Total Acres Burned:*Table 2: Total Acres Burned by Ownership*

OWNERSHIP	ACRES
NFS	269,044
OTHER FEDERAL (LIST AGENCY AND ACRES)	
STATE	282
PRIVATE	157,384
TOTAL	426,710

- O. Vegetation Types:** At lower elevations (generally below 5,000 ft) juniper shrub step (10%) is dominant. Ponderosa pine types (20%) are found within the juniper step community depending on site conditions and generally extend to approximately 5,500 ft elevation depending on slope and aspect. Lodgepole types (25%) are found on sandy soils and cold air drainages throughout the affected area. Dry mixed conifer (30%) occupies an elevation range of approximately 5,000-6,500 ft and is the most common vegetation type on the forest. At higher elevations moist mixed conifer (4%) and fir types are found. On ridge tops, typically over 7,000 ft white bark pine (1%) is the dominant conifer. Understory vegetation varies by aspect, elevation, and canopy cover, with big sage, bitter brush and native grasses in juniper step and ponderosa pine types. Dry and moist mixed conifer types have a variety of shrubs including ceanothus, manzanita and others. Non forested types make up 10% of the fire area consisting of shrub and grass lands dominated by big sage, bitter brush, native grasses and includes lava flows, meadows, and wet areas with riparian vegetation.
- P. Dominant Soils:** Dominant soils originate from volcanic ash or pumice overlying buried residuum and colluvium. Volcanic ash deposits originate from the Mount Mazama eruption over 7,700 years ago. Soils range from loamy sand to clay loam with varying amounts of rock content, generally increasing with depth. Soils range from being very shallow to very deep, depth to bedrock ranges from 5 to 75 inches with most of the soil types being 25 to 65 inches for depth to bedrock. The parent material of the residual soils is weathered from basalt, tuff, tephra, and volcanic rock. Bedrock ranges from soft to hard, reddish brown interbedded tuff to hard, gray basalt or andesite. These soils are generally poorly drained to excessively drained with very slow and rapid to very rapid permeability in ashy soils and slow to moderate permeability in buried soils.
- Q. Geologic Types:** Scattered within the area are Tertiary and Quaternary vent centers, shield volcanos, and mafic and silicic domes, giving the area its predominately igneous bedrock. Mount Mazama, one of the major volcanos in the Cascades Mountain province, is about 40 miles west of the fire perimeter. Approximately 7,700 years ago the volcano catastrophically erupted, depositing as much as three feet of ash and pumice on to the western side of the Bootleg Fire area.

Primarily Tertiary and Quaternary extrusive volcanic deposits with interfingering fluvio-lacustrine deposits compose the fire perimeter area. The oldest rocks in the area are Oligocene dacite flows overlain by a thick section of andesite and basalt flows and pyroclastics. Pliocene basalt, erupted from vents associated with scattered shield volcanoes, tuff cones, and cinder cones, dominate the area. Andesite, rhyolitic ash-flow tuff, and basalt flows also occurred in the Pleistocene. Additionally, throughout the area, dikes and sills intrude the extrusive igneous units.

Sedimentary layers of fluvio-lacustrine deposits, sandstone, and mudstone interlay between the various volcanic flows. Quaternary surficial deposits of various ages include fluvial, terrace, lacustrine, and alluvial deposits. The Sycan Marsh is presently an area of accumulation of peat as well as small amounts of sediments from surrounding hills.

R. Miles of Stream Channels by Order or Class:

Table 3: Miles of Stream Channels by Order or Class

STREAM TYPE	MILES OF STREAM
PERENNIAL	268
INTERMITTENT	606
EPHEMERAL	211
OTHER (ARIFICIAL PATH THRU WATERBODY)	9
OTHER (CANAL/DITCH)	20
TOTAL	1,114

S. Transportation System:

Trails: National Forest (miles): 142 miles (91 miles terra, 51 miles over snow) Other (miles):

Roads: National Forest (miles): 1,654 miles

Other (miles): 711 miles

Table 4: Miles of Road by Maintenance Level

ROADS: NATIONAL FOREST TOTAL (MILES)	1,654
1 - BASIC CUSTODIAL CARE (CLOSED)	839
2 - HIGH CLEARANCE VEHICLES	641
3 - SUITABLE FOR PASSENGER CARS	91
4 - MODERATE DEGREE OF USER COMFORT	83

OTHER (MILES)	711

PART III - WATERSHED CONDITION**A. Burn Severity (acres):**

Table 5: Burn Severity Acres by Ownership

Soil Burn Severity	NFS	Other Federal (List Agency)	State	Private	Total	% within the Fire Perimeter
Unburned	41,311	-	75	25,343	66,729	16%
Low	80,587	-	90	61,858	142,535	33%
Moderate	129,948	-	116	62,811	192,875	45%
High	17,198	-	0	7,373	24,571	6%
Total	269,044	-	282	157,384	426,710	100%

B. Water-Repellent Soil (Acres):

An estimated 106,678 acres within the Bootleg fire perimeter have weak inherent hydrophobicity. In areas of intense burn (moderate and high soil burn severity), strong hydrophobicity was induced 0-3 cm below the soil surface over approximately two-thirds of the area. This resulted in an additional 143,514 acres of hydrophobic soil. In total, water-repellent soils are estimated to exist over 250,191 acres, or about 59% of the fire-affected area.

Hydrophobicity Source	Pattern and Strength	Total Affected Soil Area	Percent Hydrophobic Area	Total Hydrophobic Acres
Natural	Discontinuous, weak water repellency soil surface, possibly drought-induced	426,710	25%	106,678

Fire-Induced	Discontinuous, moderate to strong water repellency 0-3 cm deep; most visible under heavy fuel accumulations	217,446 (Moderate and High Soil Burn Severity Area only)	66%	143,514
Total Post-Fire	Variable	426,710	59%	250,191

C. Soil Erosion Hazard Rating (Acres):

The inherent soil erosion hazard ratings within the Bootleg Fire were calculated in ArcGIS using the Fremont and Winema SRI. The breakdown is as follows:

- 19,417 acres of low (6%)
- 15,884 acres of low to moderate (5%)
- 104,076 acres of moderate (34%)
- 20,063 acres of moderate to high (7%)
- 84,199 acres of high (28%)
- 5,861 acres of severe (2%)

Approximately 18% of the burned area (56,580 acres) was not rated for soil erosion hazard. Most soils within the Bootleg Fire were rated moderate and high soil erosion hazard.

D. Erosion Potential:

Modeled soil erosion under a 10% exceedance probability scenario ranged from 0.0 tons per acre in low and very low soil burn severity areas, 1.88 tons per acre in steeper moderate soil burn severity areas, to 11.72 tons per acre in isolated high soil burn severity areas in the first year following the fire. Weighted by soil burn severity area, the average erosion rate for the Bootleg fire is 0.39 tons per acre, resulting in a 10% exceedance probability of up to 162,644 tons of eroded hillslope sediments in the first year following fire.

E. Sediment Potential:

Sediment potential ranges from 0 to 2,500 cubic yards per square mile in the first year following the fire. Weighted by soil burn severity (SBS) area, the average sediment potential rate for the Bootleg Fire is 83 cubic yards per square mile.

F. Estimated Vegetative Recovery Period (years):

Recovery will vary depending on plant association group, soil type, aspect, soil burn severity, and localized weather patterns. Areas that burned at low soil burn severity (SBS) will generally recover within the first two years with average precipitation. Areas that burned with moderate SBS may recover in 3-7 years with canopy formation occurring much later. Moderate SBS area recovery will be highly dependent upon precipitation and near-term climate change conditions. Some may never recover to pre-fire vegetative species composition. For sites with high SBS and full vegetative stand-replacement, recovery may take many decades. Due to the impacts of climate change and localized weather patterns some stands *may* convert to juniper shrub step with conifers not able to re-establish.

G. Estimated Hydrologic Response (brief description):

The Bootleg Fire largely burned within the headwaters of the Sycan and North Fork Sprague Rivers, with stand-replacing fire encompassing the majority of the North Fork Sprague River HUC10 watershed. A peak flow analysis was conducted using regression equations calibrated to rural, unregulated basins in Eastern Oregon, expected to mimic peak flows primarily caused by snowmelt and rain-on-snow events. The Q2, or the storm event with a 50% chance of occurring annually, was estimated for pre-fire and post-fire conditions. Smaller headwater basins (< 5000 acres) with moderate to high SBS are expected to see peak flow increases from 1-3.2 times the pre-fire condition. Larger basins had a mosaic of unburned to high soil burn severity and the post-fire change in runoff response is expected to be lower.

In addition to increased peak flows, the post-fire watershed response will include an initial flash of ash and burned materials, temporary increase in turbidity, rill and gully erosion in drainages on steeper slopes, increased sediment transport and deposition, and higher potential for debris-laden flows. These responses will likely lead to increased water quality concerns for critical fish habitat and water uses such as

downstream irrigation diversions. Watershed responses are dependent on the occurrence of rainstorm and rain-on-snow events from Jan - Mar and will likely be greatest with initial storm events, with greatest impacts most likely to occur in the first year or two after the fire. Disturbances will become less evident as vegetation is reestablished, providing ground cover that reduces erosion and increases surface roughness to slow flow accumulation and increase infiltration. These processes will attenuate over time and should recover to pre-fire rates over the next 3-5 years.

PART V - SUMMARY OF ANALYSIS

Introduction/Background

The Bootleg Fire started on July 6th, 2021, approximately 15 miles northwest of the town of Beatty, OR, on the Fremont-Winema National Forest. The fire primarily burned on National Forest Systems lands (269,044 acres) and private lands (157,384 acres). The BAER assessment started on August 9th, 2021, with the final close-out completed on August 21st, 2021. The BAER Critical Values Spreadsheet in the project file summarizes the BAER Critical Values, associated threats, risk level, and identifies where a BAER emergency exists that warrants treatment. The risk assessment focused on the most probable damaging storm events.

A. Describe Critical Values/Resources and Threats (narrative):

Table 6: Critical Value Matrix

Probability of Damage or Loss	Magnitude of Consequences		
	Major	Moderate	Minor
	RISK		
Very Likely	Very High	Very High	Low
Likely	Very High	High	Low
Possible	High	Intermediate	Low
Unlikely	Intermediate	Low	Very Low

- 1. Human Life and Safety (HLS):** Human life/safety is at risk on NFS lands from threats associated with post-fire related hazard/danger trees, rock fall, increased potential for flooding and debris flows, and loss of egress/access throughout the burned area particularly with roads, trails, campgrounds and trailheads. A fair number of Forest Service roads access private land and small communities and cannot be closed. Communities include Sycan Estates, Lakeview Estates, Sprague River Valley, as well as other private inholdings such as Green Diamond Resource Company Lands. Most roads have post-fire safety concerns that need to be addressed to some degree to allow for safe travels. Treatments such as warning and regulatory signage, closures, guardrail damage hazard barriers, cattleguard stabilization and recreational site waste containment will be critical in protecting human life and safety at locations with unacceptable risks.
- 2. Property (P):** There are 1,654 miles of NFS roads and 142 miles of NFS trails within the fire, some of which have unacceptable risks of damage or loss due to high and moderate post-fire burn severities upslope (generally > 30% slope). Threats include increased runoff, erosion, rockfall, flooding and potential localized debris flows. In addition there are several recreational facilities that have unacceptable risks from adjacent burned hazard trees. Treatments such as storm proofing, storm inspection and response, installation of critical dips and a low water crossing, trail drainage stabilization, and infrastructure protection (felling hazard trees) will be critical in protecting property with unacceptable risks.
- 3. Natural Resources (NR):Hydrologic Function:** Fire impacts to hydrologic function within moderate, low, and very low soil burn severity areas are recoverable and expected to diminish as vegetation reestablishes. Most of the burn area resulted in low (33%) and moderate (45%) soil burn severity.

The primary threat to values at risk for hydrology are associated with flooding, debris flows, and

sedimentation as a result of altered soil hydrologic function and slope stability associated with burned soils and vegetation. Hydrologic changes induced by wildfire that can impact critical values include reductions or elimination of rainfall interception, transpiration, litter storage of water, and infiltration. These reductions typically result in greater runoff, increased overland flow, increased streamflows, increased water yields and increases in stormflow. In addition to increased flows, as root strength is lost from wildfire induced tree mortality, slope stability decreases leading to higher susceptibility for erosion, sedimentation and landslides or debris flows.

These responses will likely lead to increased water quality concerns for T&E Fish and Critical Habitat and water uses such as downstream irrigation diversions. Watershed responses are dependent on the occurrence of rainstorm and rain-on-snow events from Jan - Mar and will likely be greatest with initial storm events, with greatest impacts most likely to occur in the first year or two after the fire. Disturbances will become less evident as vegetation is reestablished, providing ground cover that reduces erosion and increases surface roughness to slow flow accumulation and increase infiltration. These processes will attenuate over time and should recover to pre-fire rates over the next 3-5 years.

- b. Native and Naturalized Plant Communities:** There are many unique plant communities within the fire perimeter including documented populations of nine plant species on the R6 Regional Forester's Sensitive Species Plant List that provide important habitat and ecological values for wildlife and human uses. One additional taxa, *Heckelia mundula*, was considered for this review because it is expected to be added to the Regional Forester's sensitive list in Fall 2021 and the only known location on the Forest is within the Bootleg Fire perimeter. These communities, where invasive species or noxious weeds are absent or present in minor amounts, are at risk of invasion by documented and newly introduced non-native invasive species. Many of these invasive plants are on the Oregon Department of Agriculture's noxious weeds list and are adjacent to areas that burned with high and moderate intensity and soil burn severity, or within and along areas disturbed by suppression activities. Noxious weed infestations pose a serious threat to the composition, structure, diversity and function of native plant communities. Crown canopy was highly reduced, to eliminated, for much of the area (RAVG data showing >75% vegetative mortality); as was shrub and forb cover in the understory. These disturbed areas are now highly vulnerable to noxious weed spread from existing infestations or adjacent sources, as well as to the introduction of new invaders brought in by suppression equipment and activities. Invasive plants of concern include Musk thistle, Canada thistle, knapweeds, and annual grasses including medusahead rye and ventenata.
- In addition, Whitebark pine (*Pinus albicaulis*) is a species of concern within the fire area and is a proposed for listing under the Federal Endangered Species Act, currently under review by US Fish & Wildlife Service. There are approximately 53,400 acres of mapped Whitebark pine habitat in the Bootleg fire perimeter, much of which burned. Whitebark pine populations are declining nearly range-wide, primarily from the exotic fungal pathogen that causes white pine blister rust (WPBR). Climate change is expected to exacerbate these declines by decreasing climatically suitable areas. The other threat is invasive plants rapidly colonizing the burned habitat and competing with seedlings trying to germinate and establish post fire. EDRR treatments in high priority Whitebark pine habitat are proposed to reduce this risk.
- c. Threatened and Endangered Species – Fisheries:** Species of concern include Bull Trout (*Salvelinus confluentus*), which are federally listed as a threatened species. Increased habitat degradation and juvenile and sub-adult mortality of Bull Trout is possible due to accelerated sedimentation, loss of stream shade and large wood, and potential accelerated channel erosion. Critical Habitat within the fire perimeter occurs in the Sycan River and Upper Sprague Core Areas. The Upper Sprague core area critical habitat has been designated in the North Fork Sprague River and tributaries including Boulder Cr., Dixon, Cr, Gearhart Cr., Nottin Cr., Hole Cr., Dead Cow Cr., and Gold Cr. The South Fork Sprague River is also designated as critical habitat and several of its tributaries including Deming Cr., Leonard Cr., Brownsworth Cr., Camp Cr., and Corral Creek. The Sycan River Core Area critical habitat occurs in Long Cr., Coyote

Cr., Upper Sycan River, and Rifle Cr. Fisheries specific actions are more long-term where strategic assessments are needed to inform actions, including those surrounding cattle grazing. There are no specific treatment recommendations for fisheries at this point, other than those already recommended by hydrology, engineering and recreation (i.e. storm proofing and construction of road drainage features, storm inspection and response and trail stabilization).

- d. **Soil Productivity:** The probability of damage or loss to soil productivity is likely in areas that burned at moderate to high severity. There are loose soils with weak structure in much of the moderate and high soil burn severity. Very fine to fine roots were observed to either be fully consumed or scorched. In low soil burn severity burned areas roots were either dry and brittle or unaffected by the burn. Furthermore, in unburned areas within and outside the fire perimeter generally there was 100% groundcover either by needles, rock, or fine and coarse woody material. Observations in high and moderate soil burn severity showed a high percentage of ground cover had been lost. However, most of the terrain is less than 30% slope, which is expected to slow runoff, hence ameliorating adverse effects of potential erosion and sediment movement compared to areas of steep slopes without breaks in the terrain. The primarily moderate and low burn severity and mosaic burn patterns aid in providing buffers that can capture or interrupt runoff. There is also low annual precipitation, and the fire area exhibits a low amount of high soil burn severity at six percent. The magnitude of consequences was rated moderate due to the large spatial extent of the fire coupled with the loss of forest canopy, which is expected to detrimentally affect soil productivity. In addition, to assess the potential loss of soil productivity, soil erosion rates were compared to the tolerable soil loss (T) estimates published by NRCS. The T factor estimates the maximum amount of erosion at which the quality of a soil as a medium for plant growth can be maintained in tons per acre. Since NRCS data was only available through the Winema TEUI data in the fire area, the T factor given here was 1-5 tons/acre/year was used. Moderate SBS in flat areas generally were within the tolerable soil loss range, however in high SBS where there were isolated patches of steep slopes the modeled erosion rate exceeded the tolerable soil loss by a factor of 2-3. A potential vegetation community shift may occur due to a dry climate regime exacerbated by drought conditions and loss of ash and soil reducing water holding capacity.

4. **Cultural and Heritage Resources:** Prehistoric sites include lithic scatters, temporary camps, and habitation sites. Historic period sites include range improvements (driveways, fences, guzzlers), cabin sites, Forest Service guard stations, and fire lookouts. The cultural resource sites which hold the most significant risk of fire damage tend to be historic structures made of combustible material, notably wood. Also at risk are Native American sites that may be impacted by vandalism, looting, flooding, debris flows, and erosion; all are irreplaceable resources. Of the many cultural resource sites within the fire perimeter, 24 were selected a priority for the BAER assessment. Two NRHP sites (Ingram and Currier Guard Stations) are at risk to structural loss due to burned adjacent hazard trees. One burned tree has already fell on the roof corner of Currier Guard Station. Other losses as they pertain to looting of other cultural resources are possible, but the reestablishment of vegetation and low erosion potential will reduce the probability of loss or damage over the next several years. For other BAER treatments (ie roads, trails, signage post installation) it is essential to ensure cultural resource S106 compliance using the Region 6 Programmatic Agreement where appropriate to address potential effects.

B. Emergency Treatment Objectives:

Proposed Land Treatments

The objective of the land treatments are to:

1. Promote and protect native and naturalized vegetative recovery by reducing the spread of known populations of noxious weeds (**P1a, P1b, P2**).

Note - No active land treatments are recommended for long-term soil productivity and hydrologic function. Allowing for natural recovery is the recommended course of action.

Proposed Road and Trail Treatments

The objective of the road and trail treatments are to:

1. Protect road and trail investments from becoming impassible and damaged due to increased post-fire runoff (**R1, R3, R5, R8, T1**).
2. Reduce sedimentation into streams degrading water quality that is important for T&E Fish species (**R1, R3, R5, R8, T1**).
3. Provide for safe travel across compromised cattleguards on roads that cannot be closed (**R14**).

Proposed Protection/Safety Treatments:

The objective of the protection/safety treatments are to:

1. Protect human life and safety by raising awareness through posting hazard warning signs at recreation sites and trailheads (**S1b**).
2. Warn users of potential hazards resulting from post-fire conditions by posting hazard warning signs along various Forest Service Roads and Trails and placing Hazard Barriers along damaged guardrail (**S1a-1, S1a-3, S1b**).
3. Protect worker and public safety by removing hazard trees associated with BAER treatments and within the vicinity of road, trail and human waste containment areas at BAER treatment sites (**included within R1, R5, R8, S6, T1**).
4. Protect Forest Service recreation infrastructure and culturally significant infrastructure by falling hazard trees and temporarily weather-proofing a compromised NRHP structure. Also includes protecting cultural values through Section 106 consultation (**S7a, S7b, H1**).
5. Protect human life and safety by installing gates on high use areas that have unacceptable risks as well as replacing regulatory signs and posts (**S2a, S2b, S1a-2**).
6. Protect human life and safety from hazardous human waste exposure (**S6**).
7. Protect human life and safety from post-fire compromised cattle guards (**R14**).

Proposed Treatment Effectiveness Monitoring:

The objective of treatment effectiveness monitoring is to:

1. Evaluate the effectiveness of seeding and mulching to reduce post-fire invasive weed spread into native plant communities and sensitive plant habitat (**M1**).

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

Land: NA- EDRR not necessarily influenced by damaging storm or event.

Channel: NA

Roads/Trails: 75%

Protection/Safety: 90%

D. Probability of Treatment Success

Table 7: Probability of Treatment Success

	1 year after treatment	3 years after treatment	5 years after treatment
Land	75	85	90
Channel	NA	NA	NA
Roads/Trails	85	90	90
Protection/Safety	90	90	90

E. Cost of No-Action (Including Loss): \$1,894,000. This value does not include loss of human life and safety, but does include potential damage and losses to roads, trails, Threatened Bull Trout, native and naturalized plant communities, infrastructure, cultural values, and soil productivity and hydrologic function.

F. Cost of Selected Alternative (Including Loss): \$744,623 (assuming 15% loss)**G. Skills Represented on Burned-Area Survey Team:**

<input checked="" type="checkbox"/> Soils	<input checked="" type="checkbox"/> Hydrology	<input checked="" type="checkbox"/> Engineering	<input checked="" type="checkbox"/> GIS	<input checked="" type="checkbox"/> Archaeology
<input checked="" type="checkbox"/> Weeds	<input checked="" type="checkbox"/> Recreation	<input checked="" type="checkbox"/> Fisheries	<input checked="" type="checkbox"/> Wildlife (consulted)	<input checked="" type="checkbox"/> Geology

☒ Range
(consulted)

Team Leader: Rob Tanner**Email:** robert.tanner@usda.gov**Phone(s)** 503-812-3221**Forest BAER Coordinator:** Robert (Mike) Reed**Email:** robert.m.reed@usda.gov**Phone(s):** 530-398-5795**Team Members:** *Table 8: BAER Team Members by Skill*

Skill	Team Member Name
<i>Team Lead(s)</i>	Rob Tanner
<i>Asst Team Lead(s)</i>	Kyle Wright, Peggy Fisher
<i>Soils</i>	Megan McGinnis, Lizeth Ochoa, Leslee Crawford
<i>Hydrology</i>	Leah Tai, Hilda Kwan, Hazel Wood
<i>Engineering</i>	Bryan Kurtz, Danielle Berman, Terry Orton, Julie Gott-Benedetti
<i>GIS</i>	Dorothy Thomas, Zachery Adams, Dolores Weisbaum
<i>Archaeology</i>	Steve Highland, Paul Claeysens, Michelle Durant
<i>Invasives/Botany</i>	Krista Farris, Mike Crumrine, Erin Rentz
<i>Fisheries</i>	Rich Pyzik
<i>Geology</i>	Bart Wills, Keifer Nace
<i>Recreation</i>	Anthony Benedetti, Nate Crabtree, Nicholas Nguyen
<i>PIO</i>	Kassidy Kern
<i>Safety / BAER Liaison</i>	Brandon Brown
<i>Other - Consulted</i>	Wildlife: Cheran Cavanaugh Range: Benjamin Goodin

H. Treatment Narrative:**Land Treatments:**

P1a. Invasives EDRR - BAER: Early Detection and Rapid Response (EDRR) treatments of high priority non-native invasive plant species are proposed for R6 listed sensitive plant habitat that burned resulting in greater than 75% mortality and had documented priority weed infestations within 100 feet of sensitive habitat (293 acres). EDRR treatment is also proposed for a portion of Whitebark pine (*Pinus albicaulis*) habitat that has a high probability of being invaded by non-native invasive plants because the habitat burned with greater than 75% mortality and there are mapped invasive plants within 100 feet (64 acres). Whitebark pine is currently under review as a candidate for listing as threatened under the Federal Endangered Species Act. Rapid spread of non-native plants into newly burned Whitebark pine habitat could reduce Whitebark pine seedling establishment and further degrade habitat.

EDRR is also proposed along borders of the Augur Creek RNA to reduce the risk of non-native invasives moving into the Research Natural Area from the northwest boundary by Dead Horse and Campbell Lakes recreation area and the southeast boundary that is adjacent to private land (137 acres). In total EDRR is proposed on less than 1% of the NFS acres within the fire perimeter.

P1b. Invasives EDRR - Suppression: Above and beyond the Incident Suppression Repair efforts, BAER EDRR for dozerlines, staging areas, drop points and other ground disturbing areas caused by fire suppression activities will be essential to protect native and naturalized communities. The likelihood that heavy equipment working on the fire brought in propagules from outside the Fremont-Winema National Forest is high. Early detection and treatment will help prevent new invasive species from getting established in these disturbed areas. EDRR for suppression is proposed on 0.5% of the NFS acres within the fire perimeter.

P2. Preventative Seeding/Mulching for Invasives - Suppression: EDRR treatment as well as manual seeding with native grasses (and associated mulching) on 33 acres is proposed for Forest Service roadsides used for fire suppression activities that burned with greater than 75% mortality and have non-native invasive plant infestation within 100 feet. Roads are major vectors for the introduction and spread of invasive plants. Early detection and rapid treatment, as well as quickly establishing native grasses, will help prevent new infestations from invading newly burned ground. As part of the seeding effort, mulch will be applied. Mulching with weed free straw over seeded areas will improve germination and establishment success in dry areas. Mulching will help cover seed spread in the fall to protect seed from being eaten by birds and rodents as well as increase soil moisture and add important organic matter to soils that have recently burned. See M1 Monitoring for an additional \$2,500 request to monitor the effectiveness of this treatment.

Most of the EDRR work is expected to go into an existing agreement with Lake County Cooperative Weed Management Area to implement. This agreement includes Klamath County as well.

Treatment	Units	Unit Cost	# of Units	Total Cost
P1a. Invasives EDRR - BAER	Acres	120	494	\$59,280
P1b. Invasives EDRR - Suppression	Acres	120	1416	\$169,920
P2. Preventative Seeding / Mulching for Invasive Species - Suppression	Acres	455	33	\$15,015
			TOTAL	\$244,215

Roads and Trail Treatments:

Only those FS roads and trails within or below areas burned at moderate or high SBS and have increased risk of damage due to post-fire conditions are recommended for emergency response. Proposed treatments are designed to improve drainage at drainage crossings and along adjacent slopes to remove higher levels of runoff from roads and trails before extensive damage or loss of infrastructure can occur. Roads and trails were designed to be practical and economic treatments to mitigate risk to acceptable levels.

R1. Storm Proofing (storm proofing existing drainage features): This treatment includes storm proofing drainage features identified on critical value roads that have an unacceptable risk to damage or failure due to increased post-fire flows. Activity will include cleaning culverts, removing debris from ditches, and enhancing ditches and catchment basin capacity and will be conducted on less than 1% of the total FS road network within the fire perimeter. Work is concentrated below moderate to high soil burn severity areas along a given road section. Primary identified routes include:

- ~ 0.5 miles of ditchline directly east of Pikes Crossing Bridge located on FSR 30.
- 25% of the ditchline, catchbasins, and culvert inlets along FSR 3372 from Jct FSR 34 to FSR 3411.
- 25% of the ditchline, catchbasins, and culvert inlets along FSR 3411 from Jct Campbell Road to FSR 3372.
- 100% of ditchline, catchbasins, and culvert inlets along FSR 3462-027 (road to Spodue Mountain Communication Site and Lookout).

Treatment	Units	Unit Cost	# of Units	Total Cost
R1. Storm Proofing	Miles	\$2053	12.75	\$26,176

(Clean CMP, Ditch Cleaning)				
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R3. Storm Inspection and Response: Storm inspection and response will keep culverts and other drainage features functional by cleaning sediment, rockfall and debris from in and around features between and/or during storms. Increase the frequency of storm inspections and availability of equipment to clean out culvert inlets and ditches in response to local weather forecasts. Recommend installing “snow” poles or markers to help in locating the culvert inlets if they become plugged. This work will be accomplished through Forest Maintenance Contract, equipment rental, and/or general labor. Work is concentrated on ML3 & ML4 roads within moderate to high soil burn severity areas. FSRs identified include:

- Roads identified for R1 Storm Proofing (FSR 30, 3372, 3411, and 3462-027)
- Other roads identified include but are not limited to: FSR 27, 28, 30, 3239, 3323, 3372, 3380, 34, 3411, 3445, 3462, 44, 4450, 4452 and the access road to the hydro plant on the North Fork Sprague River (no current road #).

Treatment	Units	Unit Cost	# of Units	Total Cost
R3. Storm Inspection & Response	Day	\$ 3,138	10	\$ 31,380

R5. Critical Dip: Treatment will increase capacity of existing culvert at risk of overtopping due to short-term increased post-fire flows within existing stream channels (intermittent, ephemeral or perennial). The critical dip will designate where overtopping will occur to prevent loss of road infrastructure and increased sedimentation. Two locations have unacceptable risks.

- FSR 3462-027: Recommended at the existing 36” culvert which is undersized for post-fire short-term increased runoff. This site is at risk of plugging, overtopping and road prism failure. Installation of this features provide increased capacity and reduce the associated risk to road infrastructure. Road accesses critical Communication Site which provides service to Klamath County, Pacific Corp, Verizon, and FS. This treatment was costed out utilizing boulders already onsite for riprap armoring.
- FSR: 3462-162: Recommended at the existing 12” CMP at MP 0.01. Washout of this crossing could compromise the Spodue Mountain Road (FSR 3462-027) to the lookout and communication site.

Treatment	Units	Unit Cost	# of Units	Total Cost
R5. Critical Dip	Each	\$5,421	2	\$10,842

R8. Low-Water Crossing: Treatment will replace the existing multiple culverts at the crossing of FSR 3000-019 and the intermittent channel which drains Squaw Flat with a low-water crossing. Current crossing shows signs of overtopping and plugging. Failure of this crossing has the potential to increase the sediment transported to the Sycan River, critical Bull Trout habitat. The topography directly downstream of this crossing will activate additional sediment. Installation of this feature provides increased capacity and reduces the associated risk of sediment delivery into the Sycan River and critical Bull Trout habitat.

Treatment	Units	Unit Cost	# of Units	Total Cost
R8. Low-Water Crossing	Each	\$9,050	1	\$9,050

R14. Other Road Treatment – Fill in Cattle Guards with Aggregate: Treatment adds temporary structural support to cattle guards until fire damaged (structurally compromised) cattle guard wooden bases can be permanently replaced. Support comes from filling in the cattle guard with gravel, which will make these structures ineffective as cattle guards but safe for public travel. These roads cannot be closed and this is the most cost effective treatment in the short-term. Work should be completed immediately. The Forest is requesting permanent repair funds under the Minor Facility and Infrastructure Pilot Program. Locations include:

- Double lane cattle guard base on FSR 27 (paved road) at ~MP 31.5 - Near Sycan Estates
- Single lane cattle guard base on FSR 3462 (paved approaches) at ~MP 5.9 - Near Sycan Estates

Treatment	Units	Unit Cost	# of Units	Total Cost
R14. Other Road Treatment – Fill in Cattle guards	Each	\$1,100	2	\$2,200

T1. Trail Drainage: Based on site visits and analysis of high and moderate burn severities of the trail corridors and adjacent areas, a total of 37.6 miles (of 142 miles total trail or 26%) are at unacceptable post-fire risk to loss or damage. Trail protection will consist of improving and installing rolling grade dips, armored drain crossings, and stabilizing tread to mitigate unacceptable risks. \$2,580 per mile is proposed for trail stabilization work. This cost was generated utilizing established trail contract costs, given the Fremont-Winema does not maintain a seasonal trails crew. Work may be completed with Integrated Resource Crews - PSEs.

Treatment T1. Trail Drainage Stabilization				
Site	Units	Cost	# of Units	Total Cost
Gearhart Mountain Trail #100, #101	Miles	\$2580	14.1	\$36,378
Deadhorse Loop Trail #140, 139, 141, 148	Miles	\$2580	23.5	\$60,630
Fremont Intertie Trail NRT #160	Miles	\$2580	0	\$0
Rails to Trail OC&E Woods Line	Miles	\$2580	0	\$0
			TOTAL	\$97,008

Protection/Safety Treatments:

Treatments are specifically designed to protect the public, FS employees and contractors from unacceptable risks as a result of the fire. Threats include hazard trees, rock fall, potential flood and debris flows, and hazardous materials.

S1a. Road Hazard Signs: Signs will inform users of the dangers associated with entering and recreating within the burned area. Location of signs are shown on the Treatment Map.

- S1a-1. Road Hazard Signs – Warning
 - Warning signs will be located along entrance roads into the fire areas.
 - The Forest will work in conjunction with Klamath and Lake Counties on potential posting along county roads entering the Forest.
 - Sign configuration (wording, color and size) was coordinated with the Regional Sign Coordinator, Yigiang (Kevin) Gu, in hopes of developing consistent signage across the Region.
- S1a-2. Road Hazard Signs – Regulatory
 - Treatment replaces fire damaged regulatory signs and posts. This includes “Stop” and “Yield” signs. This treatment does not replace all signs, but only those where known signs existed at major intersections. These roads cannot be closed, so replacement of these destroyed regulatory signs is the most effective immediate treatment. Requesting a total of six (6) Stop signs and two (2) Yield signs. Install to meet MUTCD.
 - Recommend that the Forest submit for replacement of destroyed “Curve Ahead” signs, “Bridge Ahead” signs, the carsonite delineators on cattleguard corners, and other signs under the Minor Facility and Infrastructure Pilot Program.
- S1a-3. Road Hazard Signs – Type II Barricades
 - Treatment installs Type II Barricades (in conjunction with cones) as warning devices to inform the public of the fire damaged approach guardrail on both ends (downstream lane) of the North Fork Sprague River Bridge on FSR 3411.
 - Recommend that the Forest submit for replacement of destroyed guardrail under the Minor Facility and Infrastructure Pilot Program.

Treatment	Units	Unit Cost	# of Units	Total Cost
S1a-1. Road Hazard Signs - Warning	Each (Sign & Post)	\$242	19	\$4,598
S1a-2. Road Hazard Signs – Regulatory	Each	\$182	8	\$1,456
S1a-3. Road Hazard Signs – Type II Barricades	Each	\$73	8	\$584

S1b. Trail/Recreation Hazard Signs

Trail and recreation hazard signs will be posted at designated Forest Service recreation sites and trailheads to inform the public of post-fire hazards related to hazard trees, flooding, rock fall and debris flows.

Treatment S1b. Trail/Recreation Hazard Signage				
Location	Units	# of Units	Unit Cost	Total Cost
Campbell Lake TH	sign/ install	1	\$70	\$70
Campbell Lake Day Use Area	sign/ install	1	\$70	\$70
Deadhorse TH	sign/ install	3	\$70	\$210
Auger Creek TH	sign/ install	1	\$70	\$70
Demming Creek TH	sign/ install	1	\$70	\$70
North Fork Sprague TH	sign/ install	1	\$70	\$70
Horseglades TH	sign/ install	1	\$70	\$70
Lee Thomas TH	sign/ install	1	\$70	\$70
Deadhorse CG	sign/ install	1	\$70	\$70
Campbell Lake CG	sign/ install	1	\$70	\$70
Gearhart Access Trail (3411 road)	sign/ install	1	\$70	\$70
Corral Cr CG/Lookout Rock TH	sign/ install	1	\$70	\$70
Clear Springs Forest Camp	sign/ install	1	\$70	\$70
Happy Camp Campground	sign/install	1	\$70	\$70
TOTAL		16		\$1,120

S2. Physical Closure Devices (gates): Treatment installs gates to detour vehicular access into three primary recreation sites that have extensive hazard trees. The Forest anticipates that the need to have these sites closed to the public will extend beyond the current fire closure set to expire in early winter.

- S2a. Physical Closure Device – Powder River Type Gate
 - Located on the FSR 3400-012 just past Corral Creek Campground
 - This treatment blocks vehicular access to both the Lookout Rock Trailhead and the Lookout Rock Lookout. Lookout structural members were burned during the fire and have weakened the structure. The intent is to discourage the public from accessing both the trailhead with overhead hazards and the Lookout which has been structurally compromised
- S2b Physical Closure Device – Angeles Style Gate (metal tubular gate)
 - Two gates are needed to adequately close access to Campbell Lake Campground due to the looped double lane access road. One gate will be placed at the two junctions of FSR 2800-033 and FSR 2800-056 which loops around the lake. A trailhead warning sign will be installed at the boat launch road.
 - One gate is needed to close access to Dead Horse Campground just past the junction of FSR 2800-447 and FSR 2800-033

- Both sites have unacceptable risks associated with hazard trees as a result of the fire.

Treatment	Units	Unit Cost	# of Units	Total Cost
S2a. Physical Closure Device – Powder River Style Gate (single lane)	Each	\$2,500	1	\$2,500
S2b. Physical Closure Device – Angeles Style Gate (double lane)	Each	\$12,000	3	\$36,000

S6. Recreation Site – Human Waste Containment: Burnt toilet cabs expose open vaults and human waste to rodents, humans, and other animals. Rain/Snow can fill vault and overflow releasing human waste as overland flow. Treatment is designed to mitigate unacceptable risks as they pertain to exposure to and transport of human waste.

- S6. Recreation Site – Human Waste Containment
 - The cabs of two toilets were burned in the fire, Campbell Lake CG toilet and Lookout Rock LO toilet. The Lookout Rock LO toilet was not in use and therefore had no human waste to dispose of. Forest will cover the vault access with local funds as the BAER Risk Assessment found no unacceptable risk and hence no treatment.
 - This treatment will pump the Campbell Lake CG toilet (which was in use prior to the fire) and temporarily cover the vault access with heavy plywood. The Forest is not filling in the vault since they are requesting cab replacement funds under the Minor Facilities and Infrastructure Pilot Program.

Treatment	Units	Unit Cost	# of Units	Total Cost
S6. Recreation Site – Human Waste Containment	Each	\$812	1	\$812

S7a. Infrastructure Protection – Hazard Tree Removal: This treatment will mitigate dead and dying hazard trees from damaging or destroying critically identified infrastructure with significant cost and economic value to the agency such as vault toilets, a recreation rental, corrals, buildings, and shelters.

Treatment S7a. Infrastructure Protection – Hazard Tree Removal				
Site	Units	# of Units	Cost	Total Cost
Sandhill Crossing CG	Hazard Trees	4	\$90	\$360
Campbell Lake CG	Hazard Trees	12	\$90	\$1,080
Deadhorse Lake CG	Hazard Trees	10	\$90	\$900
North Fork Sprague TH	Hazard Trees	6	\$90	\$540
Demming Creek TH	Hazard Trees	3	\$90	\$270
Ingram Cabin - Cultural	Hazard Trees	18	\$90	\$1,620
Corral Creek CG	Hazard Trees	4	\$90	\$360
TOTAL		57		\$5,130

S7b. Infrastructure Protection – NRHP Cultural Structures: This treatment will mitigate dead and dying hazard trees from damaging or destroying several National Register of Historic Places structures (6) at Currier Guard Station/Recreation Rental. Timing is critical as one such occurrence has already happened when a fire weakened tree fell on the Recreation Rental Cabin in early August. As a result, it damaged the roof exposing the inside of the cabin to the elements including water damage and rodent infestation. The objective of this treatment is to not only fall hazard trees around 6 structures at this location, but also temporarily weatherproof (ie plywood and tarp) the damaged roof of the cabin thus stabilizing the structure from further damage until a permanent fix can be implemented. The Forest is going to request funding from the Minor Facilities and Infrastructure Pilot Program for the permanent fix.

Treatment	Units	Unit Cost	# of Units	Total Cost
S7b. Currier Guard Station / Recreation Rental Structure Protection	Lump	\$3,500	1	\$3,500

H1. Heritage and Cultural Resource Protection: This request is for expedited cultural resource Section 106 compliance completion by a qualified archaeologist using the Region 6 Programmatic Agreement where appropriate. This request will address potential archaeological effects of other proposed BAER treatments pertaining to recreation, roads, and sign-post installation.

Treatment	Units	Unit Cost	# of Units	Total Cost
H1. Heritage and Cultural Resource Protection	OT Hrs	\$65	80	\$5,200

I. Monitoring Narrative:

M1 Level I Treatment Effectiveness: Seeding and mulching treatments will be monitored for effectiveness in 50 plots. Monitoring will assess germination and establishment success and determine if seeding with native grasses is effective at preventing non-native invasive species from becoming established along roadsides that burned with high severity and had existing noxious weed infestations within 100 feet.

Treatment	Units	# of Units	Unit Cost	Total Cost
M1. Level 1 Monitoring of P2	Plots	50	\$50	\$2,500

PART VI – EMERGENCY STABILIZATION TREATMENTS AND SOURCE OF FUNDS

			NFS Lands				Other Lands				All
		Unit	# of		Other	# of	Fed	# of	Non Fed	Total	
Line Items	Units	Cost	Units	BAER \$	\$	units	\$	Units	\$	\$	
A. Land Treatments											
P1a. Invasives EDRR	Acres	\$120	494	\$59,280	\$0		\$0		\$0	\$59,280	
P1b. Invasives EDRR Suppression	Acres	\$120	1416	\$169,920	\$0		\$0		\$0	\$169,920	
P2. Preventative Seeding / Mulching	Acres	\$455	33	\$15,015	\$0		\$0		\$0	\$15,015	
Subtotal Land Treatments				\$244,215	\$0		\$0		\$0	\$244,215	
B. Channel Treatments											
NA				\$0	\$0		\$0		\$0	\$0	
Subtotal Channel Treatments				\$0	\$0		\$0		\$0	\$0	
C. Road and Trails											
T1. Trail Drainage Stabilization	Miles	\$2,580	37.6	\$97,008	\$0		\$0		\$0	\$97,008	
R1. Storm Proofing	Miles	\$2,053	12.75	\$26,176	\$0					\$26,176	
R3. Storm Inspection and Response	Days	\$3,138	10	\$31,380	\$0					\$31,380	
R5. Critical Dip	Each	\$5,421	2	\$10,842	\$0					\$10,842	
R8. Low-Water Crossing	Each	\$9,050	1	\$9,050	\$0					\$9,050	
R14. Other - Fill Cattleguard	Each	\$1,100	2	\$2,200	\$0					\$2,200	
Subtotal Road and Trails				\$176,656	\$0		\$0		\$0	\$176,656	
D. Protection/Safety											
S1a-1. Road Hazard Signs	Each	\$242	19	\$4,598	\$0		\$0		\$0	\$4,598	
S1a-2. Road Regulatory Signs	Each	\$182	8	\$1,456	\$0					\$1,456	
S1a-3. Road Hazard Barricades	Each	\$73	8	\$584	\$0					\$584	
S1b. Trail/Rec Hazard Signs	Each	\$70	16	\$1,120	\$0		\$0		\$0	\$1,120	
S2a. Closure Device (Standard Gate)	Each	\$2,500	1	\$2,500	\$0					\$2,500	
S2b. Closure Device (Heavy Gate)	Each	\$12,000	3	\$36,000	\$0					\$36,000	
S6. Rec Site-Human Waste Contain	Each	\$812	1	\$812	\$0					\$812	
S7a. Infrastructure Protection	Trees	\$90	57	\$5,130	\$0					\$5,130	
S7b. Infrastructure Protection-Historic	Lump	\$3,500	1	\$3,500	\$0					\$3,500	
H1. Heritage/Cultural Protection S106	OT Hrs	\$65	80	\$5,200						\$5,200	
Subtotal Protection/Safety				\$60,900	\$0		\$0		\$0	\$60,900	
E. BAER Evaluation											
Initial Assessment	Report	\$156,614	1	---	\$0		\$0		\$0	\$0	
				\$0	\$0		\$0		\$0	\$0	
Subtotal Evaluation				\$0	\$0		\$0		\$0	\$0	
F. Monitoring											
M1. Level I Seeding Effectiveness	Plots	\$50	50	\$2,500	\$0		\$0		\$0	\$2,500	
Subtotal Monitoring				\$2,500	\$0		\$0		\$0	\$2,500	
G. Totals				\$484,271	\$0		\$0		\$0	\$484,271	
Previously approved											
Total for this request				\$484,271							

PART VII - APPROVALS

1. _____
 Forest Supervisor Date