Date of Report: October 26, 2020

BURNED-AREA REPORT

Introduction:

A USDA Forest Service (USFS) Burned Area Emergency Response (BAER) team was ordered on September 30, 2020 to evaluate the Holiday Farm Fire burn scar to assess its post-fire watershed response, and to perform an assessment of risks from post-fire conditions to critical values on National Forest System lands. The BAER team assesses risks to life and safety, property, and critical cultural and natural resources on burned areas of the National Forest by identifying critical values and threats to them from erosion, sedimentation, falling trees, rockfall, flooding, debris flows, and other natural hazards whose magnitude or effects have increased post-fire. The Bureau of Land Management (BLM), Army Corps of Engineers (ACOE), US Geological Survey (USGS), National Weather Service (NWS), State and Private Land Erosion Threat Assessment/Reduction Team (ETART) and Oregon Department of Transportation (ODOT) have worked collaboratively with the BAER team to assess values at risk outside the Forest boundary, using watershed response information generated by the BAER team. This synthesis of information is shared with cooperating agencies so that managers of all affected lands can determine what mitigation measures may be needed. Under BAER regulatory direction, the Willamette National Forest is authorized to treat to mitigate risks to critical values that are on USFS-managed land. Owners and managers of values at risk outside the USFS boundary may desire to apply treatments on USFS-managed lands to protect their values; they are responsible for planning, financing, and implementing those treatments under agreements with the Willamette National Forest.

National Forest lands in the burned area are, for the most part, very steep and often remote with critical values present such as roads, recreation sites and associated facilities, threatened and endangered species habitat, native and naturalized plant communities, and heritage and cultural sites. Off-Forest values include Federal flood control facilities (dams, reservoirs), municipal water supplies and power generation and transmission facilities, transportation facilities, private residences and businesses, recreational river corridors, communication sites, private timberlands, and other state and Federally-managed lands. Projects to mitigate unacceptable risks on the National Forest will represent only a fraction of the post-fire recovery work to be performed across the burned landscape. Mitigation work outside the National Forest boundary is the responsibility of the respective land managers, and is coordinated by ETART and their many cooperators, who will use information products from the Forest Service BAER assessment that cover the extent of the burned area to help define their own areas of interest. BAER team representatives and Forest managers are engaged with off-Forest partners (BLM, ACOE, ETART, and others) in information-sharing regarding post-fire watershed conditions, responsibilities, and actions, and will continue to do so in future agency and public meetings. The rapid nature of the BAER process precludes initial inclusion of all interested parties in the initial assessment but allows for significant communication and sharing of data once completed.

Cooperators include (partial list):

USFS BAER team
ACOE
Bonneville Power Administration (BPA)
BLM
ETART (Federal Emergency Management Administration)
Eugene Water and Electric Board (EWEB)
Lane County
McKenzie Watershed Council
Natural Resource Conservation Service (NRCS)
NWS
Omnibus research group including:
- Dr. Pete Robichaud – Rocky Mountain Research Station
- Dr. Josh Roering - University of Oregon

Oregon Department of Geology and Mineral Industries (DOGAMI)
ODOT
Oregon Marine Board
USGS Post-Fire Debris Flow group

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: Holiday Farm Fire

B. Fire Number: OR-WIF-200430

C. State: OR

D. Counties: Lane, Linn

E. Region: 6

F. Forest: Willamette National Forest

I. Date Fire Started: 9/7/2020

J. Date Fire Contained: (est.) 10/29/20, 96% containment on 10/16/2020

K. Suppression Cost: (est): $26,341,753 to date; projected Final Costs-$28,000,000

L. Fire Suppression Damages Repaired with Suppression Funds (estimates): unknown at this time

1. **Fireline repaired (miles):** 9 mi (dozer line), 10 miles (handline), 48 mi (road completed as line) identified for repair in suppression plan (10/10/20)
2. **Other (identify): N/A**

M. Watershed Numbers: The table show the total watershed acres for the 5th and 6th Hydrologic Unit Codes for all land ownerships in the Holiday Farm Fire area.

Table 1. Watershed Names, areas and fire impacts.

Watershed Name	HUC 10	Watershed Size (acres)	Acres Burned	Percent Burned
Blue River	1709000404	58,955	11,108	19%
Fall Creek	1709000109	123,855	170	0%
Little Fall Creek	1709000108	37,559	5,051	13%
McKenzie River	1709000407	165,321	93,591	57%
Mohawk River	1709000406	114,672	14,382	13%
Quartz Creek-McKenzie River	1709000405	47,786	31,010	65%
South Fork McKenzie River	1709000403	137,670	4,044	3%
Upper Calapooia River	1709000303	183,574	13,291	7%
Wiley Creek	1709000605	40,697	402	1%
	Total	**910,089**	**173,050**	**19%**

Table 2. Sub-watershed Names, areas and fire impacts.

Subwatershed Name	HUC12	Sub-watershed Size (acres)	Acres Burned	Percent Burned
Bigs Creek-Calapooia River	170900030302	15,595	1,668	11%
Cougar Creek-South Fork McKenzie River	170900040308	5,096	2,256	44%
Cougar Reservoir-South Fork McKenzie River	170900040307	19,499	1,788	9%
East Fork Deer Creek-McKenzie River	170900040702	38,897	35,924	92%
Elk Creek-McKenzie River	170900040502	20,828	16,533	79%
Gate Creek	170900040701	30,800	30,800	100%
Hands Creek-Calapooia River	170900030301	24,448	11,624	48%
Headwaters Mohawk River	170900040601	33,312	8,774	26%
Hehe Creek-Fall Creek	170900010903	20,925	170	1%
Holden Creek-McKenzie River	170900040704	14,132	1,331	9%
Jackson Creek-Wiley Creek	170900060502	29,766	402	1%
Lookout Creek	170900040401	15,725	331	2%
Lower Blue River	170900040403	12,789	10,453	82%
Mill Creek	170900040603	20,813	5,608	27%
Parsons Creek-Mohawk River	170900040604	18,798	0	0%
Quartz Creek	170900040501	26,924	14,477	54%
Ritchie Creek-McKenzie River	170900040703	30,670	25,536	83%
Upper Blue River	170900040402	30,399	324	1%
Upper Little Fall Creek	170900010801	22,318	5,051	23%
	Total	**431,733**	**173,050**	**40%**

N. Total Acres Burned:

Table 3. Ownership in the Holiday Farm Fire burned area.

Ownership	Acres	%
Bureau of Land Management	18,528	11%
Corps of Engineers	1,055	1%
Private	112,849	65%
U.S. Forest Service	39,954	23%
Undetermined	789	0%
Total	**173,175**	

O. Vegetation Types: The vegetation types within the Holiday Farm Fire burned area are comprised of Western hemlock (71%), mixed conifer (13%) non-forested (8%), Douglas-fir/mixed conifer (5%), true fir (1%) and mountain hemlock (0.1%). Understory composition is dominated by salal/Oregon grape/oceanspray/sword fern and Alaskan huckleberry. Many non-forested areas are considered unique and special habitats including wet, mesic and dry meadows, rock gardens, and wetlands which support rare and sensitive plant populations within them.

P. Dominant Soils: Soils are derived from Glacial Materials composed of tuffs, breccias and basalts. Slopes range from 0 to 70%, with an average of 35%. Soils are generally Inceptisols (Dystric Cryandepts) with loamy surface textures. Soil climate regimes are typically cryic. Soil depths range from 24 to 70 cm on mountain slopes to very deep in fluvial valleys. Pre-fire litter depth was typically 4 cm, and soils were largely covered with mosses and bryophytes.

Q. O. Geologic Types: The geologic setting of the burned area is the Western Cascades division of the Cascade Geologic Province. The Western Cascades are ancestral to the modern volcanic features of the High Cascades, and consist of lavas, pyroclastic and volcaniclastic deposits erupted from a volcanic range that preceded the eruption of recent and modern High Cascade lavas. The bulk of the burned area falls within the Western Cascades geologic unit known as the Little Butte Volcanics, which of composed largely Miocene and Oligocene igneous rocks, ranging in age from 30 to 40 million years. Rock types include lava flows, pyroclastic deposits such as ash-flow tuffs and lahars (volcanic mudflows), and volcaniclastic sedimentary rocks. An intrusive igneous body that is unusually large for the Cascades, known as the Nimrod Stock, occupies a central portion of the burned area, including a high-relief segment of the McKenzie River canyon around Jimbo Mountain and Bear Creek. Younger Western Cascade volcanic rocks make up much of the remainder the bedrock geology, with local ridge-capping lavas of the younger (Pliocene-Pleistocene) High Cascades present, and abundant Quaternary deposits, including glacial till and outwash, and fluvial deposits in the McKenzie River canyon bottom, mantling low-gradient areas.

The terrain of the Western Cascades, particularly in the eastern portion of the burned area, is over-steepened, with a deeply incised stream network. The current high relief of the Western Cascades is a consequence of regional uplift accompanying the emplacement of High Cascade magmatic systems beginning about 8 million years ago. While the mainstem McKenzie River canyon is broad and U-shaped east of Finn Rock, due to Pleistocene glacial advances from the High Cascades ice cap to the east, tributary canyons are steep and V-shaped, and appear structurally defined. In particular, the South Fork McKenzie River follows the north-northwest trend of the Cougar Fault, a normal fault that is the western bound of the High Cascades graben.

A related subsidiary fault appears to define the course of Quartz Creek, which enter the McKenzie River at Finn Rock, and drains very steep, long, and relatively planar canyon side slopes with well-defined headwall basins, linear first-order tributary drainages, and debris fans at the tributary outlets. Debris flow morphology is evident in this area, which is located largely on private timberlands that have been heavily logged, and experienced moderate to high soil burn severity. Similar steep and unstable hillslopes, with linear drainages, many of which experienced moderate to high burn severity, are present across much of the burned area. Instability is most pronounced where pyroclastic and volcaniclastic lithologies are dominant, and these rock types make up approximately 50% of the bedrock, including the steepest, most incised and unstable portions of the landscape in the central and eastern portions of the Holiday Farm burned area.

R. Miles of Stream Channels by Order or Class:

Table 4. Stream miles in the Fire area.

Stream Type	Soil Burn Severity				Grand Total
	High	Low	Moderate	Unburned	
Artificial Path	0	23	14	15	**53**
Ephemeral	0	0	0	0	**0**
Intermittent	62	207	497	109	**874**
Perennial	13	147	316	96	**572**
Grand Total	**75**	**377**	**828**	**220**	**1,500**

S. Transportation System: Trails: ***National Forest (miles):*** **1.31;** ***Other (miles):*** **N/A**

Table 5. Miles of Trail within the fire

Trail Number	Trail Name	Soil Burn Severity	Miles	Subtotal Miles
3304	BUCK MOUNTAIN	Low	0.63	0.90
3304	BUCK MOUNTAIN	Unburned	0.27	
3317	DELTA NATURE	Moderate	0.41	0.41
Grand Total			**1.31**	**1.31**

Roads: *National Forest (miles):* 123.9 *Other (miles):* 29.9

Table 6. Miles of Road by Maintenance Level (the highest mileage of roads are within moderate and low burn severity areas; however some roads that cross streams with anticipated post-fire changes in runoff and erosion/sedimentation rates were also identified for treatments.

Operational Maintenance Level	High	Moderate	Low	Unburned	Grand Total
1 - BASIC CUSTODIAL CARE (CLOSED)		1.3	1.2	0.4	**2.9**
2 - HIGH CLEARANCE VEHICLES	2.7	54.6	40.3	6.3	**103.9**
3 - SUITABLE FOR PASSENGER CARS		4.4	2.2	0.1	**6.8**
4 - MODERATE DEGREE OF USER COMFORT		1.5	0.9	0.1	**2.6**
5 - HIGH DEGREE OF USER COMFORT		3.0	4.3	0.4	**7.7**
NON-FS Roads (other Jurisdiction)	0.2	22.5	8.0	0.1	**29.9**
Grand Total	2.9	87.3	57.1	7.4	**154.7**

PART III - WATERSHED CONDITION

A. Burn Severity (acres): Soil burn severity totaled ~8% high, ~54% moderate and ~34% low, with ~3% unburned. See Map 1 and Table 7 for acreages.

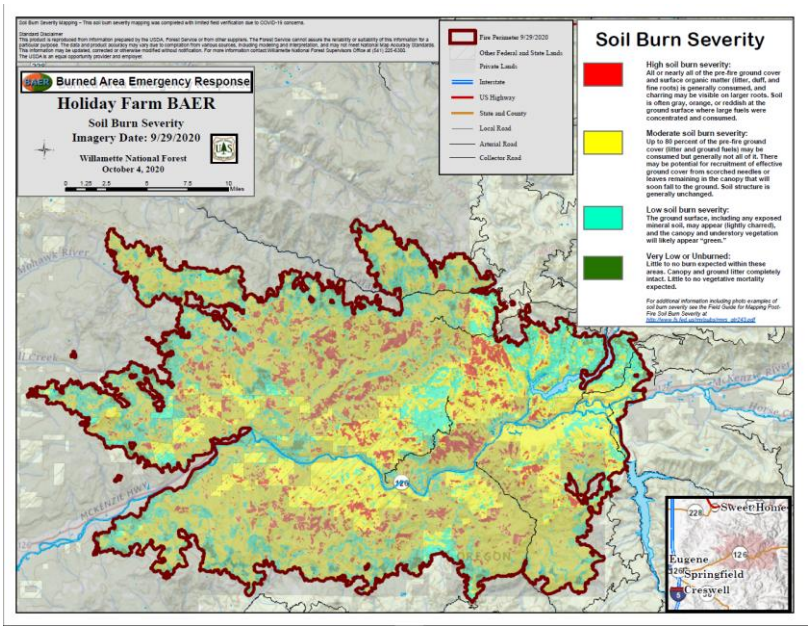


Figure 1. Shows the distribution of Soil Burn Severity classes across the fire area

Table 7. Soil Burn Severity

Soil Burn Severity	Acres	% Burn
High	2,608.67	8.3
Moderate	17,128.71	54.2
Low	10,802.74	34.2
Unburned	1,038.25	3.3
Grand Total	31,578.37	

Ownership acres were defined using the fire perimeter available upon completion of field verification on 10/6/20. The final perimeter and total acreage (173,393) were updated on 10/12/20, which accounts for the 393-acre difference between Table 8 and the final total acreage. The Holiday Farm Fire burned a total of ~31,578 acres on NFS lands, ~1,072 acres on Army Corps of Engineers lands, ~18,513 acres on BLM lands, and ~121,537 acres on private lands, including communities along the Highway 126 corridor and private timberlands in upland areas. The Holiday Farm Fire was a wind-driven fire with high vegetation mortality across ownerships, and there are distinct differences from west to east in forest management intensity, fuel loading, and forest canopy cover. Field validation was crucial in determining fire effects to the soils in this complex environment. Soil burn severity field validation was conducted across the fire, and cooperation with ACOE and BLM was crucial in gaining local knowledge to finalize the burn severity map.

Table 8. Soil Burn Severity acres by Ownership

Ownership	Soil Burn Severity	Acres	Percent
Army Corps of Engineers	High	12.17	0.0%
	Moderate	290.14	0.2%
	Low	730.36	0.4%
	Unburned	39.38	0.0%
Army Corps of Engineers Total		**1,072.05**	**0.6%**
Bureau of Land Management	High	1,964.19	1.1%
	Moderate	13,996.59	8.1%
	Low	2,389.79	1.4%
	Unburned	163.32	0.1%
Bureau of Land Management Total		**18,513.89**	**10.7%**
Private	High	11,519.31	6.7%
	Moderate	75,574.02	43.7%
	Low	28,208.79	16.3%
	Unburned	6,235.37	3.6%

	Private Total	**121,537.49**	**70.2%**
U.S. Forest Service	High	2,608.67	1.5%
	Moderate	17,128.71	9.9%
	Low	10,802.74	6.2%
	Unburned	1,038.25	0.6%
	U.S. Forest Service Total	**31,578.37**	**18.2%**
State/Undefined	Moderate	244.09	0.1%
	Low	101.31	0.1%
	Unburned	2.68	0.0%
	Undefined Total	**348.08**	**0.2%**
	Grand Total	**173,049.88**	**100.0%**

B. Water-Repellent Soil (acres): Natural hydrophobicity is present on almost all the soils within the fire perimeter and was found to be highly variable during field verification in unburned, low, and moderate burn severities. Fire-induced or -altered hydrophobicity occurred only in pockets of high-soil burn severity, totaling less than 8 percent of the burned area, including 2,526 NFS acres.

C. Soil Erosion Hazard Rating: The table describes the Erosion Hazard rating for soils on NFS lands only.

Table 9. Acres Soil Erosion Hazard Rating for NFS lands

Soil Erosion Hazard	Sum of Acres (NFS lands) (ac)	Percent
Slight	**191**	**0.5**
Moderate	**9,394**	**27**
Severe	**25,174**	**72.5**

D. Erosion Potential: Pre-Fire Erosion Rate = less than 1 ton/acre/year; Post Fire Erosion Rate - average erosion rate = 26 ton/acre/year; with a range of 1-90 tons/acre/year (NFS acres): low SBS ranged from 0-20 tons/acre/year; moderate SBS ranged from 20-50 tons/acre/year; and high SBS ranged from 50-90 tons/acre/year. There are large areas of the fire where vegetation mortality was high, and the soils show a range of characteristics, including areas with retention of dead conifer foliage providing needle-cast, scorched intact litter, intact fine roots and good recovery potential. In other areas where the canopy cover has been reduced, soils will be exposed to rain-splash erosion, rilling, and concentrated surface flows until natural vegetation re-establishes.

Table 10. Post-fire Erosion Rate

SBS	tons/ac/yr	Cubic yds/ac/yr	Cubic yd/sq mi/yr
Low	0-20	0-74	0-22
Moderate	20-50	74-185	22-2751
High	50-90	185-333	2751-3539
	Ave 26	~96	~49

E. Sediment Potential: Pre-Fire Sediment Potential = less than 1 ton/acre/year; Post-Fire Sediment Potential Average = ~3 ton/acre/year; Range of <1 – 10 tons/acre/year (FS acres)

F. Estimated Vegetative Recovery Period (years): The estimated recovery time for the vegetative cover is anticipated to range between 2-5 years across areas of moderate soil burn severity. Some high severity spots with poorer site conditions may take longer to recover.

G. Estimated Hydrologic Response (brief description): The fire burned across 20 sub-watersheds, with Gate Creek, Ritchie Creek, East Fork Deer Creek, Lower Blue River all >80% burned.

Figure 2. Watersheds in the Holiday Farm Fire burned area

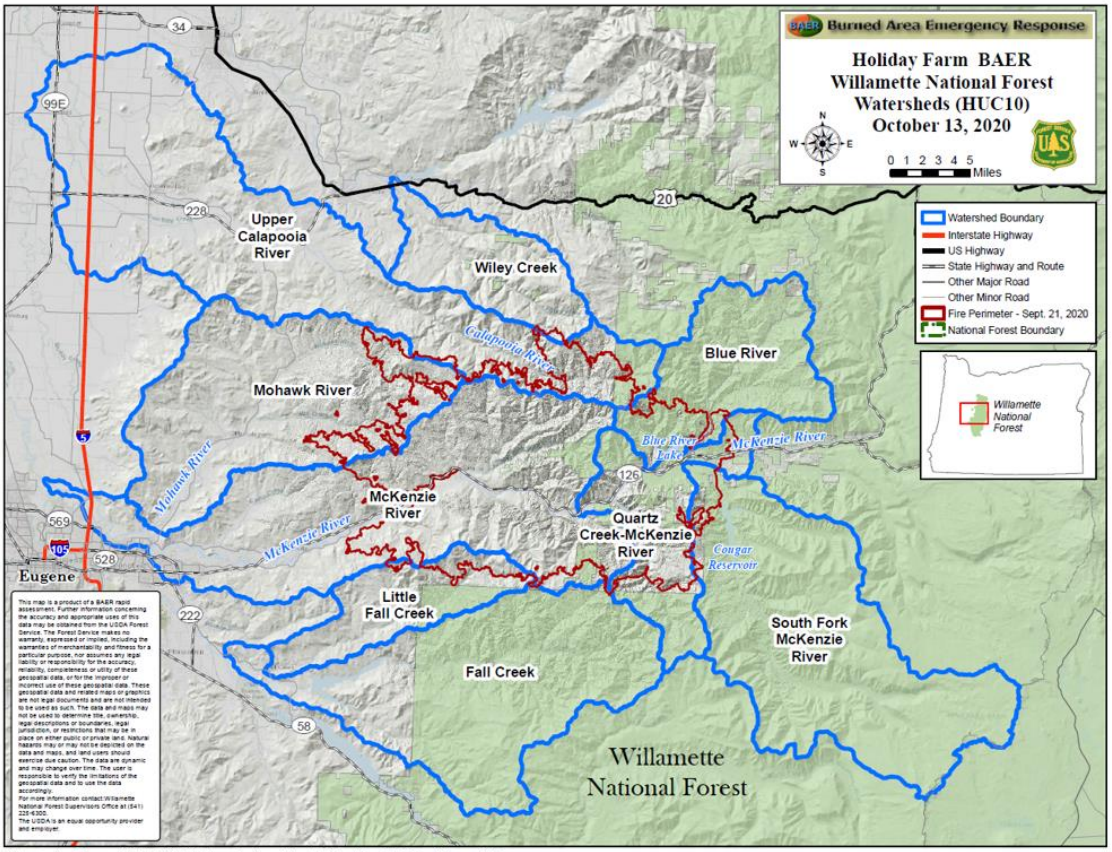


Figure 1. Map of HUC10 Watersheds affected by the Holiday Farm Fire

Table 11. Soil Burn Severity by Subwatershed

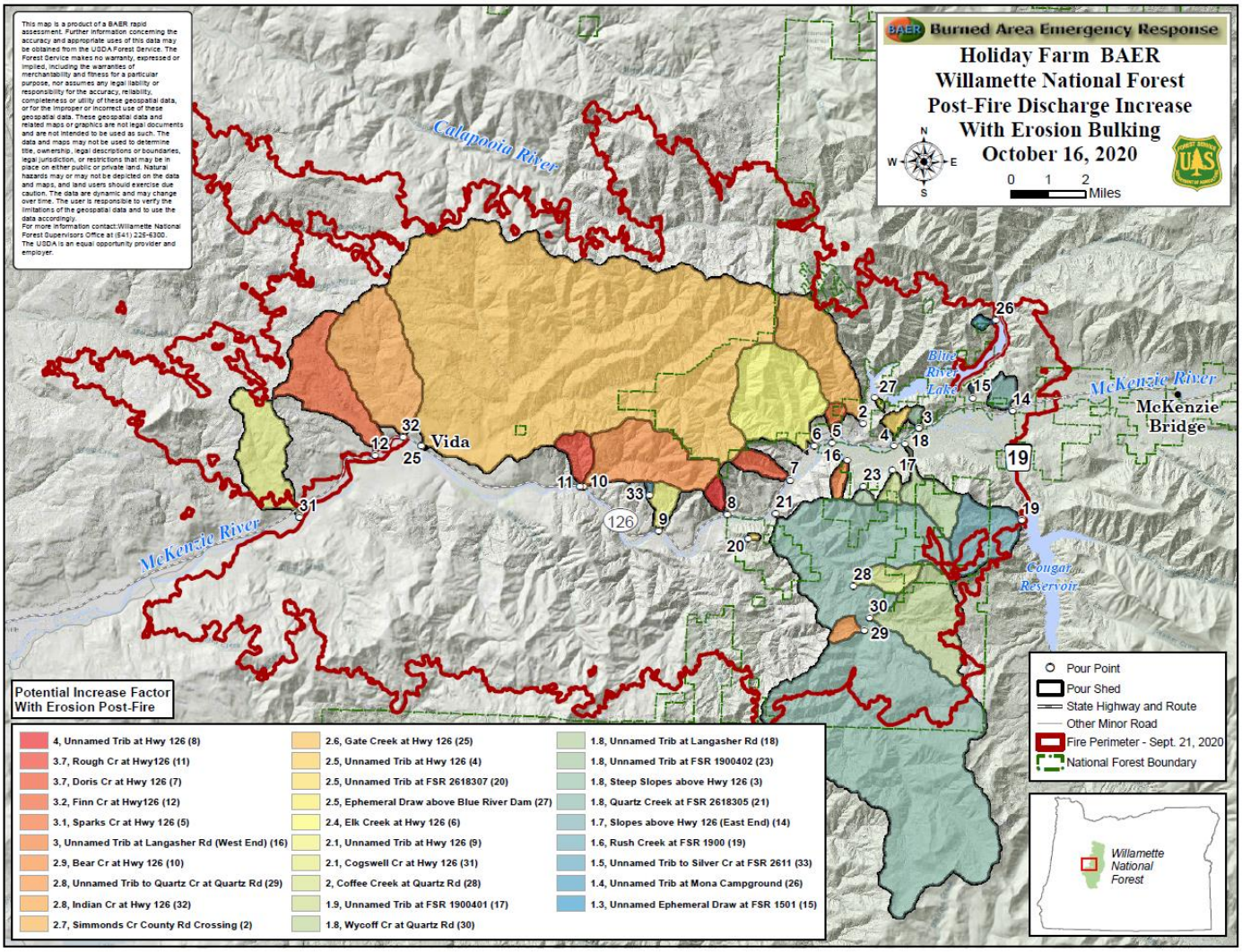
Subwatershed Name	Soil Burn Severity (SBS)								
	High	Moderate	Low	Unburned	Total Acres	SBS Percent	Outside Fire	% Outside Fire	Grand Total
Bigs Creek-Calapooia River	0	483	691	493	1,668	11%	13,927	89%	15,595
Cougar Creek-South Fork McKenzie River	21	1,487	743	5	2,256	44%	2,839	56%	5,096
Cougar Reservoir-South Fork McKenzie River	78	841	691	178	1,788	9%	17,711	91%	19,499
East Fork Deer Creek-McKenzie River	4,134	25,472	5,654	665	35,924	92%	2,972	8%	38,897
Elk Creek-McKenzie River	2,240	11,453	2,734	107	16,533	79%	4,294	21%	20,828

Gate Creek	5,010	20,029	5,387	374	30,800	100%	0	0%	30,800
Hands Creek-Calapooia River	366	5,544	4,685	1,028	11,624	48%	12,825	52%	24,448
Headwaters Mohawk River	197	4,732	3,018	827	8,774	26%	24,538	74%	33,312
Hehe Creek-Fall Creek	0	23	138	9	170	1%	20,755	99%	20,925
Holden Creek-McKenzie River	7	349	648	327	1,331	9%	12,801	91%	14,132
Jackson Creek-Wiley Creek	0	247	106	50	402	1%	29,364	99%	29,766
Lookout Creek	0	7	164	159	331	2%	15,394	98%	15,725
Lower Blue River	1,076	3,884	5,056	436	10,453	82%	2,336	18%	12,789
Mill Creek	54	1,635	2,837	1,082	5,608	27%	15,205	73%	20,813
Parsons Creek-Mohawk River	0	0	0	0	0	0%	18,798	100%	18,798
Quartz Creek	1,058	11,298	1,796	325	14,477	54%	12,446	46%	26,924
Ritchie Creek-McKenzie River	1,773	16,790	6,013	960	25,536	83%	5,134	17%	30,670
Upper Blue River	0	9	195	119	324	1%	30,075	99%	30,399
Upper Little Fall Creek	91	2,949	1,676	335	5,051	23%	17,267	77%	22,318
	16,104	**107,234**	**42,233**	**7,479**	**173,050**		**258,683**		**431,733**

The runoff response for the fire area was evaluated using a probable storm precipitation total and the Wildcat5 rainfall-runoff model. Wildcat5 is a model that uses a distributed runoff curve number approach. Runoff curve numbers were selected using the Wildcat5 User's manual, the posted "Burned Area Emergency Response Tools" https://forest.moscowfsl.wsu.edu/BAERTOOLS/ROADTRT/Peakflow/CN/supplement.html, professional judgment, and discussions with the NWS, local hydrologists and researchers at the H.J. Andrews Experimental Forest for reference. The pre-fire runoff from a 10-yr, 24-hr storm of 5.5 inches is approximately 178 cfs/square mile, with a post-fire flow model estimate of over 329 cfs/square mile. Post-fire runoff, especially in the first few precipitation events, will likely be bulked with ash, bedload, sediment and debris, and result in flows with a higher specific gravity due to ash in the water column. Flows may become hyper-concentrated flash floods until vegetation has re-established in the burned areas. Using a bulking factor of 25%, the estimated peak flows are displayed in Figure 3, showing peak flow increases from 1.3 to 4 times the pre-fire estimated flows, depending on drainage area, soil burn severity, soil erosion risk rating, slope and vegetative cover.

Widespread soil erosion as well as ash and sediment deposition are expected throughout and downstream of the burned area. These processes will attenuate over time, and should recover to pre-fire conditions over the next several years. The greatest impacts are most likely to occur in the first year or two following the fire, though a low-probability rainstorm (10-yr, 10%) any time in the next several years will have the potential of triggering a major erosion/sedimentation runoff event.

Figure 3. Post-fire Discharge Increase with (25%) sediment bulking factor.



PART V - SUMMARY OF ANALYSIS

Introduction/Background

The Holiday Farm Fire began at 7:45 pm on September 7, 2020 during a strong east wind event that passed through the McKenzie River Ranger District of the Willamette National Forest near McKenzie Bridge, OR. Pushed westward by strong winds, the fire moved through the communities of Blue River, Finn Rock, Nimrod, Vida and Leaburg, destroying over 400 of the 1,500 homes within the fire perimeter. The fire (as of 10/13/2020) encompassed 173,439 acres, primarily in mixed-conifer forest managed by Federal (35%) and private (65%) land managers. Given the droughty conditions of forest fuels before ignition, stand-replacement fire conditions are common throughout the fire, but soil burn severity is predominately moderate and low.

A. **Describe Critical Values/Resources and Threats (narrative):** The BAER assessment identified the overall soil burn severity for the Holiday Farm Fire as ~8% high, ~54% moderate and ~34% low, with ~3% unburned. The BAER Team reviewed the burned area to inventory and conduct risk assessments for the Critical Values to be Considered During Burned-Area Emergency Response, as defined in FSM 2523.1 (see below).

2523.1 – Exhibit 01

Critical Values to be Considered During Burned-Area Emergency Response

CRITICAL VALUES
HUMAN LIFE AND SAFETY
Human life and safety on National Forest System (NFS) lands.
PROPERTY
Buildings, water systems, utility systems, road and trail prisms, dams, wells or other significant Forest Service-owned investments on NFS lands.
NATURAL RESOURCES
Water used for municipal, domestic, hydropower, or agricultural supply or waters with special Federal or State designations on NFS lands.
Soil productivity and hydrologic function on NFS lands.
Critical habitat or suitable occupied habitat for federally listed threatened or endangered terrestrial, aquatic animal, or plant species on NFS lands.
Native or naturalized communities on NFS lands where invasive species or noxious weeds are absent or present in only minor amounts.
CULTURAL AND HERITAGE RESOURCES
Cultural resources which are listed on or potentially eligible for the National Register of Historic Places, Traditional Cultural Properties, or Indian Sacred Sites on NFS lands.

Evaluation of threats to critical values is performed according to a risk assessment matrix (see below), with accompanying definitions. Treatments to mitigate unacceptable risk are generally only considered when risk levels are assessed to be high or very high; treatments for intermediate risk may be considered where human life and safety are threatened.

Table 12. 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):** Critical values on NFS lands include life and safety of visitors, employees, permitted users and other users of NFS lands within and below the burned area. Falling trees and rock hazards exist for travel on roads below areas of moderate and high burn severity. Watershed-related threats caused by the fire are primarily flooding and debris flows that threaten users of NFS roads and trails, visitors at campgrounds, recreation sites, and other structures and sites on NFS lands, users at dispersed swimming sites within and below the burned area, and occupants of recreation residences on NFS lands located within floodplains or threatened by debris flows.

   Safety on Priority Roads

   There is high risk to human life and safety on Forest Service land within and downstream of the burned area. Risk to forest personnel and forest users is elevated based on potential impacts from flooding, debris flows, hazard trees, and rockfall along trails and roads in the McKenzie River drainage. Individuals who may find themselves in portions of the burn area along any of the drainages or roads affected by fire are at risk during storm events.

All of the runoff modeling for the areas of the fire shows an increase in runoff with the selected storm of 5.5 inches in 24 hours; and areas with the highest potential for increased flows include drainages with large amounts of high and moderate burn severity, especially along multiple smaller unnamed drainages just north of the Highway 126 corridor between Cogswell Creek, Gate Creek and Doris Creek; small unnamed tributaries of Quartz Creek, and steep drainages upslope of Langasher Road. The Simmonds Creek drainage shows an estimated 2.7 factor of increase compared to pre-fire peak flows and crosses the access to the Army Corp's Saddle Dam via County Road/Forest Service Rd 1500-125 (See Hydrology report for more details). USFS, ACOE and Lane County are coordinating an approach to managing the increased runoff potential here.

Debris flows hazard in these areas presents a risk to life and safety for forest visitors and workers, and to property including roads. Forest roads may be impacted by flooding and debris where floodwaters cross them. These hazards are present anywhere a road crosses a stream and are more likely to occur at tributary road-stream crossings upstream of their confluences with the McKenzie River.

Treatments to reduce risk on NFS lands include hazard warning signs; road, trail, and campsite closures; road drainage improvements; trail storm-proofing; and road and trail storm inspection and response. Hazard warning signs and installation of temporary markers will occur where guardrails were affected by fire. In order to reduce damage to new installations from hazard trees and rockfall, guardrail repair and replacement will be postponed until 2021.

Boater Safety/Water Hazards

The mainstem McKenzie River flowing through and downstream of the burned area is a high-use recreational boating river, which experienced moderate to high tree mortality on its banks and canyon slopes. Rafting, fishing, guiding, kayaking and other river activities support the economies of the McKenzie River communities. Wood obstructions in the mainstem can be hazardous to boaters, but instream wood is also a critical part of natural ecosystem processes and functions. We acknowledge the likelihood that wood presenting a hazard to boaters will need to be removed or relocated, and we provide treatment recommendations for accomplishing wood manipulation with ecological benefit, while maintaining river navigational safety as a priority.

Municipal Water Supply, Flood Control

The burned area watersheds, including those wholly or partially on NFS lands, provide high-quality and valuable water supplies for a number of purposes including beneficial uses and public benefits, including drinking water for Eugene, Springfield, and other downstream communities. ACOE facilities on NFS lands, including Cougar and Blue River dams and reservoirs, provide valuable flood control services for these communities and for agricultural interests in the Willamette Valley. Municipal water supplies are a BAER critical value, but as they are resources downstream of NFS lands, and not subject to risk assessment or mitigation under BAER policy, no risk or treatment evaluations are provided in this BAER report. As mentioned above, soil, hydrologic and geologic products developed by the BAER team will be shared with emergency managers and land management partners and neighbors to assist them in risk assessment.

2. **Property (P):** Critical Forest Service infrastructure threatened by postfire flooding and debris-laden flows include National Forest System roads, trails, bridges, campgrounds, and other developed recreation areas. Table 13 - Roads by Maintenance Level (ML) Surveyed shows that ~30% of the total roads in the fire were surveyed, and follow-up assessment is recommended for the ML4 and ML2 roads to verify the condition of road investments. Treatments recommended to reduce risk to roads on NFS lands include road drainage improvements and road and trail storm inspection and response.

Table 13. Roads Surveyed by ML

Objective Maintenance Level	Total Miles in Burn Area	Miles Surveyed	Miles Non-Surveyed
1 - BASIC CUSTODIAL CARE (CLOSED)	4.48	0.00	4.48
2 - HIGH CLEARANCE VEHICLES	114.93	23.48	91.45
3 - SUITABLE FOR PASSENGER CARS	8.34	8.34	0.00
4 - MODERATE DEGREE OF USER COMFORT	3.10	0.00	3.10
5 - HIGH DEGREE OF USER COMFORT	10.07	10.07	0.00
TOTALS:	140.92	41.88	99.03

3. Natural Resources (NR):

Water Quality for Fish

Potential threats to critical habitat and suitable occupied habitat for federally listed threatened or endangered aquatic species exist within multiple streams throughout the burned area.

Potential threats to hydrologic function on NFS lands within the burned areas exist on areas of moderate and high soil burn severity. The presence of hydrophobic soils, loss of canopy cover, loss of ground cover, and loss of channel-stabilizing riparian vegetation all have the potential to contribute to altered hydrologic function and watershed response to precipitation events within burned watersheds.

Soil Productivity and Hydrologic Function

Loss of ash cap and surface soil through erosion and debris flows is very likely to occur on steep burned slopes throughout the burned area. Loss of soil cover and other surface soils is not recoverable, but effects to soil hydrologic function are likely to be short-term, as fire-induced water repellency recovers naturally. No erosion control treatments (mulching, seeding, etc.) are recommended to manage increased risk for soil erosion, but road and trail treatments will reduce overall sedimentation of stream channels within and downstream of the burned area.

Potential threats to hydrologic function on NFS lands within the burned areas exist on areas of moderate and high soil burn severity. The presence of hydrophobic soils, loss of canopy cover, loss of ground cover, and loss of channel stabilizing riparian vegetation all have the potential to contribute to altered hydrologic function and increased watershed response to precipitation events within burned watersheds.

Treatments to reduce risk on NFS lands include road drainage improvements; trail storm-proofing; and road and trail storm inspection and response, as described above, to help mitigate the potential for increased runoff and sediment delivery from the transportation system.

Native Plant and R6 Sensitive Plant Communities: Invasive plant spread and establishment is very likely to occur following the fire. Fire suppression activities such as construction of dozer lines and staging areas exacerbate this threat significantly. Within the burned area, there are 90.4 acres of dozer line, staging areas, and roads that were used as contingency lines, on which significant ground disturbance (blading) has occurred. The probability that noxious weeds could become established or spread in these areas is high to very high. Early Detection-Rapid Response (EDRR) treatments are recommended to manage establishment and/or spread of noxious weeds in these areas. There are 292.5 acres of EDRR and 20 acres of seeding proposed to mitigate the spread of invasives in non-suppression areas of the fire.

Threatened and Endangered Species - Fish and Wildlife

Fisheries

BAER Critical Values only include designated Critical Habitat or suitable occupied habitat for federally listed Threatened or Endangered fishes on National Forest System (NFS) lands, and therefore this report solely focuses on those species and their habitat. Streams within and immediately downstream of the fire support three ESA-Threatened fishes and their designated Critical Habitat – bull trout, Upper Willamette River spring Chinook salmon, and Upper Willamette River Steelhead. Streams within and downstream of the burned area provide the following habitat use by species (Table 14).

Disturbances such as wildfires affect many physical characteristics of forested upslope and riparian environments, including opening the canopy, providing opportunities for regeneration, and creating a matrix of successional communities, including the potential spread of noxious weeds (Flitcroft *et al*, 2015). Wildfires can reduce canopy shade and increase insolation, potentially increasing stream temperature, while concurrently enhancing primary productivity. Wildfires can be the mechanism for pulsed delivery of habitat-forming materials, sediment and wood, to stream channels through landslides, debris flows, gullying, and stream adjacent tree fall and bank scour. Potential post-fire effects also include increased peak flows, channel scour and deposition, and inputs of other organic matter and nutrients that may alter geomorphic and habitat conditions within Critical Habitat both positively and negatively.

Table 14. Types of Critical Habitat by species within the burned area.

Species	Habitat Use Within and Downstream of
Bull Trout	• Foraging • Overwintering • Migrating
Upper Willamette River Spring Chinook Salmon	• Spawning • Rearing • Overwintering • Migrating
Upper Willamette River Steelhead	• Spawning • Rearing • Overwintering • Migrating

Table 15. Miles of Critical Habitat by species, sub-basin, watershed, and land ownership within the burned area.

Miles of Directly Affected Critical Habitat	Bureau of Land Management	Corps of Engineers	Private (Other)	U.S. Forest Service	Grand Total
Bull Trout	**0.5**	**1.1**	**22.2**	**6.5**	**30.4**
MCKENZIE	**0.5**	**1.1**	**22.2**	**6.5**	**30.4**
BLUE RIVER	NONE	0.9	0.9	NONE	1.7
LOWER MCKENZIE RIVER	0.5	NONE	21.3	2.7	24.6
SOUTH FORK MCKENZIE RIVER	NONE	0.3	0.0	3.8	4.1
Spring Chinook Salmon	**3.9**	**0.3**	**44.9**	**7.8**	**56.9**

MCKENZIE	**3.9**	**0.3**	**42.8**	**7.8**	**54.9**
LOWER MCKENZIE RIVER	3.9	NONE	24.9	NONE	28.9
MCKENZIE RIVER/QUARTZ CREEK	NONE	NONE	17.9	3.5	21.3
SOUTH FORK MCKENZIE RIVER	NONE	0.3	0.0	4.4	4.7
MIDDLE FORK WILLAMETTE	**NONE**	**NONE**	**0.2**	**NONE**	**0.2**
LITTLE FALL CREEK	NONE	NONE	0.2	NONE	0.2
UPPER WILLAMETTE	**NONE**	**NONE**	**1.8**	**NONE**	**1.8**
CALAPOOIA RIVER	NONE	NONE	1.8	NONE	1.8
Winter Steelhead	**NONE**	**NONE**	**5.1**	**1.6**	**6.7**
UPPER WILLAMETTE	**NONE**	**NONE**	**5.1**	**1.6**	**6.7**
CALAPOOIA RIVER	NONE	NONE	5.1	1.6	6.7

Wildlife
Critical BAER Value: Northern Spotted Owl Critical Habitat, Occupied Suitable Habitat and Nesting Territories.

Threat: Stress from the fire including greater risk from blowdown, mass soil movement, flooding and insects and disease could result in additional mortality to remaining live trees and further reduce NSO suitable habitat and usable Critical Habitat, as well as threaten the viability of nesting territories.

A secondary focus was to assess if proposed BAER activities could affect spotted owl nest sites or result in disruption of nesting if conducted during the critical breeding season from March 1-July 15.

4. **Cultural and Heritage Resources:** There are 31 cultural or heritage sites identified in the fire perimeter, and 25 were assessed. Site conditions need further review as access to some sites was limited.

B. Emergency Treatment Objectives: The primary objective of this initial Burned Area Emergency Response Report is to recommend immediate actions deemed reasonable and necessary to effectively protect, reduce or minimize significant threats to human life and safety.

C. Probability of Completing Treatment Prior to Damaging Storm or Event:
Land: 90
Channel: N/A
Roads/Trails: 90
Protection/Safety: 90

D. Probability of Treatment Success

Table 16: Probability of Treatment Success for Hazard Warning signs, gates, road safety treatments, EDRR

	1 year after treatment	***3 years after treatment***	***5 years after treatment***
Land	80	85	90
Channel	N/A	N/A	N/A
Roads/Trails	80	85	90
Protection/Safety	80	90	90

(Road and Trails-storm proofing success based on 10-yr storm risk of return, 90% success first year, 75% at 3 years, 60% at 5 years https://www.fs.fed.us/biology/nsaec/assets/sn_10_98.pdf)

G. Skills Represented on Burned-Area Survey Team:

☒ Soils ☒ Hydrology ☒ Engineering ☒ GIS ☒ Archaeology
☒ Weeds ☒ Recreation ☒ Fisheries ☒ Wildlife

☒ Soils ☒ Hydrology ☒ Engineering ☒ GIS ☒ Archaeology ☒ Geology

Team Leader: Molly Hanson
Email: molly.hanson@usda.gov **Phone(s)** 509-664-9330

Forest BAER Coordinator: Fred Levitan
Email: frederick.levitan@usda.gov **Phone(s):** 541-731-2593

Team Members: *Table 15: BAER Team Members by Skill*

Skill	Team Member Name
Team Lead(s)	Molly Hanson, Johan Hogervorst, Jason Gritzner
Soils	Lynn Khuat, Wendy Peterman
Hydrology	Diane Hopster, Zig Napkora
Engineering	Walt Hislop, Kyle Yee, Mario Isaias-Vera
GIS	Dorothy Thomas, David Keenum, Rosana Costello
Archaeology	Annemarie Kmetz
Weeds	Krista Farris
Recreation	Emily Long
Facilities/HAZMAT	Mario Isaias-Vera
Wildlife	Esmeralda Bracamonte, Ruby Seitz
Fisheries	Kate Meyer, Matt Helstab
Geology	Fred Levitan

H. Treatment Narrative: The following descriptions of emergency treatments provide the specifics of where and how they will be applied, and what they are intended to do.

Land Treatments: Post-fire non-native invasive plant detection is recommended the first year “to determine the post-fire presence of invasive species” moving from road, trails and fire lines into burned areas. This is consistent with Forest Service Manual direction of BAER treatment of invasive plants. (FSM2523.3). Priority areas for invasive treatments will focus on areas disturbed by suppression, those affected by fire, and known weed populations.

L1a. Invasive plants EDRR is prescribed on 292.5 acres, for non-suppression areas of the burned area, and focuses on areas where early detection-rapid response (EDRR) survey and treatment of listed noxious weeds would be effective. EDRR is proposed in riparian restoration areas that burned with moderate to high severity along the South Fork McKenzie River. Stage Zero channel and riparian restoration was implemented along the South Fork downstream of Cougar Dam over the past three years, with extensive floodplain construction in critical habitat for listed fish. These areas were heavily disturbed and regraded as part of the restoration efforts, and then planted with native riparian species. The Holiday Farm Fire burned through the restoration site with moderate and high burn severity, killing most of the native plantings. Because of the previously disturbed nature of the site, it is highly likely that noxious weeds will be the first species to recolonize the burned floodplain, and it is critical to survey for and treat new invaders before they establish and outcompete the native riparian vegetation.

EDRR is also prescribed for portions of road systems with moderate to high intensity burn severity across the road prism, excluding road segments already covered with treatments for suppression-related activities. (see treatment map below). All major travel corridors including roads 1500, 1501,1900, 2026, 2600, 2611, 2618, 2620, 2633, and their spurs have patches of high-priority weed infestations along their shoulders; since these road segments burned over and the native understory was removed, it is very likely that weed seeds and propagules will quickly establish and colonize the adjacent burned areas, outcompeting native plants. Invasive species such as spotted knapweed readily resprout after fire, have wind-blown seeds that

can travel great distances, and chemically inhibit the germination and establishment of native plant species. Scotch broom also readily resprouts after fire, has a prolific and long-lived seed bank, and once established can aggressively outcompete even tree seedlings and saplings that are regenerating post-fire. False brome is shade-tolerant, and once established can persist in the understory even after the canopy re-establishes. If left untreated, high-priority noxious weeds can suppress natural regeneration, and ultimately alter species composition from native to non-native invasive plant communities.

L1b. Invasives EDRR suppression for 90.4 acres (new infestations may not be detected until spring/summer 2021); treatments are prescribed for suppression-related impacts only.

Cultural Treatments

Limited cultural and heritage site surveys were completed, due to safety concerns in the fire perimeter, and follow-up evaluation is recommended for monitoring and assessment after it is safe to enter the area. Interim BAER assessment is recommended to accomplish this objective.

Channel Treatments: N/A

Roads and Trail Treatments: Road and trail treatments mitigate the fire's effect on the transportation infrastructure and protect life, safety, property, and critical natural or cultural resources. These treatments work in conjunction with land, channel, and protection/safety treatments (BAER Guidance Paper-Roads and Trails).

There are ~140 miles of road within the fire perimeter, with 42 miles surveyed during field assessment. Local knowledge and information gathered from the fire suppression repair process helped BAER engineers develop a list of 57 miles of road conditions that warranted treatments, based on the team's risk assessment. Due to the widespread risk from increased runoff, erosion and debris flows, storm-proofing and storm inspection and response was selected as the most effective treatments for high-priority access roads where road closure was not possible. Damaged bridge curbs and guardrail-bridge transition structures are also proposed for repair at two locations, where major threats to human life and safety are present in the post-fire condition. See the proposed treatment map (attachments) for spatial details of treatment locations. Tables below specify locations by road and milepost of proposed treatments. Details of cost calculations may be found in the BAER Engineering Report, Appendix 3.

RT1a. Road Drainage improvement

Storm-proofing or improving existing road drainage features to accommodate post-fire conditions will be focused on cleaning culvert inlets and catch basins on roads, removing slough/slide/debris from ditches to facilitate positive drainage, and repairing damaged culverts (jacking open crushed inlets). This treatment was determined to be the most effective, least-cost alternative, as armored and relief dips are not an appropriate treatment on paved roads.

This treatment is prescribed in the following locations (see attached treatment map):

RT1a. Road Drainage (storm proofing existing drainage features) (Features: 13, Selected: 0)

Description	SiteName
Storm Inspection and Response Clean inlet of existing culvert	FSR 1900 MP 55.52
Storm Inspection and Response Clean ditch	FSR 1900 MP 55.69
Storm Inspection and Response Replace culvert	FSR 2618 MP
Storm Inspection and Response Replace culvert	FSR 2620107 MP 0.63
Storm Inspection and Response	FSR 2620107 MP 0.58
Storm Inspection and Response Clean ditch on either side of ford	FSR 1900415 MP 1.37
Storm Inspection and Response Clean culvert	FSR 1900415 MP 0.73
Storm Inspection and Response Replace damaged culvert	FSR 1900r15 MP 0.74
Storm Inspection and Response Remove debris accumulated from culverts	FSR 1900415 MP 0.55
Storm Inspection and Response Replace culvert.	FSR 1900416 MP 0.68
Storm Inspection and Response Maintenance Clean culvert	FSR 1900 MP 55.73
Storm Inspection and Response Clean culvert	FSR 2611 MP 1.78
Storm Inspection and Response Clean inlet, pull/restablish ditch to overflow cmp 100'	FSR 1900401 MP 1.00

RT2. Storm Inspection and Response

This treatment is prescribed where moderate to high burn severity and noted erosion hazards exist upslope of road segments or upslope of road-stream crossings, and threaten road prism integrity, road passage and road drainage structures. Crews drive the roads during or immediately after storms, checking sediment and debris accumulations and performing rapid but thorough inspection of road-drainage features, culverts, and other structures. The crew is responsible for maintaining culvert function by opening culvert inlets and removing debris.

Storm inspection and response will be broken into two parts: inspection and response. Inspection will be conducted by District engineering staff for each monitoring patrol. Response will require: Equipment rental (a backhoe and dump truck transport, including operator, fuel and maintenance), and contract inspection. All work to be performed shall conform to FP14-Standard Specifications for Construction of Roads and Bridges on Federal Highway Projects, and accompanying Forest Service Supplements.

This treatment is prescribed in the following locations (see attached treatment map):

RT1a/RT2. Road Drainage & Storm Inspection and Response - Line (Features: 10, Selected: 0)

Treatment_Recommended	Description
Storm Inspection and Response 2611000 MP 0-4.68	Maintain road, clean ditches, clean culvert catch*
Storm Inspection and Response 1900000 MP 53.39-55.69	Ditch is full with slough from burn above road
Storm Inspection and Response 2618000 MP 0-8.22	Clean culvert catch basins, clean ditches, monito*
Storm Inspection and Response 2618307 MP 0-3.1	Clean ditches and inlet basins. Considering addi*
Storm Inspection and Response 1900401 MP 1-1.02	Clean inlet, pull/restablish ditch to overflow cm*
Storm Inspection and Response 1900415 MP 1.35-1.37	Clean ditch on either side of ford
Storm Inspection and Response 1900416 MP 0.61-0.7	Basic maintenance.
Storm Inspection and Response 1900000 MP 55.69-55.73	Maintenance, storm patrol
Storm Inspection and Response 2618000 MP 4.47-4.7	
Storm Inspection and Response 1900415 MP 0-3.2	Clean re-establish ditch, improve drainage and cl*
Storm Inspection and Response 1500120	Inspect and clean culvert in campground

RT12. Infrastructure Protection (fillslope stabilization/retaining wall)

Fill Slope Stabilization

On ML5 Rd 1500-000 (Blue River Road) which accesses HJ Andrews Research Forest and the USACOE Saddle Dam, a 75-ft long wooden retaining structure attached to guardrail was damaged (burned) during the fire. The guardrail in this section was also damaged by fire and falling trees. The damage to the retaining structure has threatened loss of the outboard fillslope and consequently the necessary road width on this high-priority ML5 road. In assessing the site, BAER engineers looked at 2 options: replacing the guardrail and wood retaining structure in kind, or replacing it with different retaining structure (method 2 fill repair) which would allow the damaged guardrail to be removed and not replaced. The method 2 fill repair treatment was determined to be the most effective, least-cost alternative, as a new wooden retaining structure would require replacement of the guardrail. Administrative closure of the road is not possible, and there is imminent threat of loss of the existing roadway and/or safe passage without immediate repairs. This work will involve a public works task order using the R6 Construction Contract for demolition of the existing guardrail and wooden retaining structure and installation of a new retaining structure with paving. All work to be performed shall conform to FP14-Standard Specifications for Construction of Roads and Bridges on Federal Highway Projects and Forest Service Supplements. Specific danger tree mitigation may be necessary to provide for safe access and work site conditions.

RT15. Bridge Curb Repair, Bridge Concrete Repair

Two bridges on high-priority roads were damaged by fire and/or falling burned trees, and present unacceptable safety hazards in their post-fire condition. Treatments to repair them for safe public travel are detailed below.

FSR 1900-000, MP 55.7 – South Fork Bridge – The guardrails on the approaches to this bridge on a major ML5 road (Aufderheide Drive, an all-year paved National Scenic byway, providing access to Cougar Dam and Reservoir, Terwilliger Hot Springs, and a key travel route between the Highway 126 corridor and Highway 58 in the Oakridge-Westfir area) were damaged by fire and falling burned trees. As these are legacy structures, upgrades to the damaged facilities (guardrail and bridge rail tie-in) are necessary to meet current AASHTO construction standards and provide an acceptable level of traffic safety. As part of the Forest Bridge Program Manager's site assessment, the need for a bridge approach transition concrete rail section was required to transition from "soft" guardrail to "rigid" existing bridge concrete guardrail following Forest Service Directive 7722.12, which says that "for a bridge on a maintenance level 5 road, the railing system is the most stringent required with a requirement of a TL-3". As the road cannot be closed, this is the least-cost treatment to make the road safe for travel and has been costed accordingly.

RT15b. Bridge Curb Replacement

FSR 2618-000, MP 4.80 – Sugar Creek Bridge - The timber curbs on this bridge burned and present an unacceptable safety risk. This ML3 Rd (Quartz Creek Road) is the main access to private (Campbell Global) timberlands and has easement sections. The Sugar Creek Bridge had treated timber curbs which were damaged during the fire such that they no longer function for public safety. The Forest Bridge Program Manager assessed this site and recommended replacement with concrete curbs. Additional direction from the R6 Bridge Engineer was “for timber curbs, replacement in kind is not appropriate on a bridge. Curbs need to be a minimum of 18 inches above the wearing surface to meet current standards. Timber curbs at 18" above wearing surface may not be possible to install to meet TL-1 railing requirements.” Road closure is not an option, so curb replacement is the least-cost effective option to protect human life and safety.

This work will likely be accomplished in the same contract as the P4 Guardrail Repair. All work to be performed shall conform to FP14-Standard Specifications for Construction of Roads and Bridges on Federal Highway Projects and Forest Service Supplements.

Protection/Safety Treatments:

Forest Engineers have been in communications with ODOT, Lane County and Army Corps of Engineers regarding post-fire risk management for the Highway 126 corridor and county roads, regarding hazard mitigation priorities for managing risks, concurrent with the Forest Service danger tree mitigation plan. Removal of danger trees and rockfall hazards may be conducted by partners on Forest Service lands adjacent to the state highway and county roads, under agreement with the Forest Service.

P1a. Road Hazard Signs

Due to the prevalence of steep roadside hillslopes, and moderate to high burn severity on most NFS lands within the burned area, significantly increased risks to Human Life and Safety are present for travel on priority access routes, from threats of falling trees and limbs, rolling rocks, and flooding and debris flow. This treatment will design and install burned area warning signs to caution motorists and visitors entering the burned area. Warning signs alert drivers and recreational users of existing or potentially hazardous conditions created by wildfire incidents. Warning signs use universal symbols and follow Sign and Poster Guidelines for the Forest Service (EM-7100-15). The signs identify the immediate threats to public safety, or limit access to protect treated or recovering areas. Specific locations identified for road hazard warning sign placement include:

Table 16. Post-fire Hazard Warning Sign locations

FSR No.	No. of Signs	Location(s)
1500-000	2	At Jct. Hwy 126 and near MP 4.80 (Jct FSR 1510) located by District Engineering.
1900-000	2	At Jct. Hwy 126 and near MP 54.32 (located by District Engineer).
2611-000	1	At Jct. Hwy 126.
2618-000	2	At Jct. Hwy 126 and near MP 8.32 (located by District Engineer).
2620-125	1	At Jct. with County Road (located by District Engineer).
2633-000	1	At Jct. Hwy 126.

P1b. Recreation Hazard Signs (Developed Rec sites) and Navigational Hazards (Boater Safety)

- Specific locations are identified for recreation-site-related post-fire hazards include hazard tree warnings at the Delta Campground and Old Grove Trailhead (where closure is also recommended – Treatment P2 below with gate placement). The fire burned 12.5 miles of McKenzie River streambanks, with high tree mortality that has greatly increased the likelihood of tree-fall into the McKenzie River,

creating navigational hazards, and necessitating warning signage upstream of the affected reach. Program manager coordination and public affairs/media communication are included.

The following locations are proposed for:

- Hazard warning signs (Delta CG entrance; closure of campground and Old Grove trailhead due to hazard trees), Mona campground (hazard trees, flooding and debris),
- Navigational water hazard signs for Forest Service boat ramps along riverbanks, to communicate new in-water hazards for boaters.

P1b. Recreation Hazard Signs (Features: 16, Selected: 0)

TreatmentRecommended	Description	SiteName
P1b. Trail/Recreation Hazard Signs	Boater safety awareness sign	McKenzie Bridge Boat Launch
P1b. Trail/Recreation Hazard Signs	Boater safety awareness sign	McKenzie River Trail Lower
P1b. Trail/Recreation Hazard Signs	Boater safety awareness sign	Paradise Boat Launch
P1b. Trail/Recreation Hazard Signs	Boater safety awareness sign	Olallie Boat Launch
P1b. Trail/Recreation Hazard Signs	Boater safety awareness sign	Frissell Boat Launch
P1b. Trail/Recreation Hazard Signs	Boater safety awareness sign	Bruckart Boat Launch
P1b. Trail/Recreation Hazard Signs	Boater safety awareness sign	Saddle Dam Boat Launch
P1b. Trail/Recreation Hazard Signs	Boater safety awareness sign	Lookout Boat Launch
P1b. Trail/Recreation Hazard Signs	Boater safety awareness sign	Mona Campground
P1b. Trail/Recreation Hazard Signs	Boater safety awareness sign	Mona Campground
P1b. Trail/Recreation Hazard Signs	Boater safety awareness sign	South Fork Social Access Point
P1b. Trail/Recreation Hazard Signs	Boater safety awareness sign	Hamlin Boat Landing - FSR 15
P1b. Trail/Recreation Hazard Signs	Boater safety awareness sign	Blue River Boat Launch
P1b. Trail/Recreation Hazard Signs	Boater safety awareness sign	Belknap Springs Boat Launch
P1b. Trail/Recreation Hazard Signs	Boater safety awareness sign	Deer Creek Social Launch
P1b. Trail/Recreation Hazard Signs	Recreation hazard sign	Delta Campground

P2. Road Closure Devices

Closing roads is the safest and most effective treatment when threats to human life are identified. Gate installation and use for administrative closure, complemented by sign and closure enforcement, are proposed for two locations within the fire area to mitigate risks to Forest visitors and employees.

- FS Rd 1900-408: A gate to be placed to provide for administrative access (BPA and private), because the road has multiple crossings that are at high risk of debris flow and flooding damage and has an increased risk for life and safety.
- Install a gate and boulder barrier at Delta campground entrance. To protect life and safety at the Delta campground and adjoining Old Grove trailhead, closure of the site is recommended, with warning signs posted (treatment P1b above) to communicate hazard tree risks at the site.

P4. Guardrail Repair

Multiple lengths of road guardrail were damaged in the fire. Field review determined that burned debris and damaged guardrail does not provide adequate safety for road travel and prescribed a strategic spot treatment approach to fixing the most needed lengths of guardrail, removal of some sections that were not deemed

necessary to provide for the least cost most effective treatment to meet safety standards. Delineators and guardrails will be replaced as the FS 1500, 1500-105,1900, 1993, 2618-305 roads must remain open and an emergency was identified. Road delineators are reflective devices (“candlesticks”) mounted in a series at the side of a roadway to help indicate the roadway alignment and ensure driver safety until replacement is completed. Specific danger tree mitigation may be necessary to provide for safe access and work site conditions.

P8. Early Warning System Permitting and Support
This treatment provides Forest Service support for permitting and installation of precipitation gages by cooperators to provide early hazard warnings of flooding or debris flow events. The Forest Service would process special use permits for placement of monitoring equipment and assist in site clearance and preparation. Facilitate installation of Early Warning systems in conjunction with USGS and NWS. Proposed locations are a new installation at the Mt. Hagan communications site, and retention or replacement of the incident RAWS weather stations in Minney Creek and Wycoff Creek.

P10 McKenzie River Navigational Hazard Tree Mitigation – Repositioning or relocating of in-river navigational hazard trees in the mainstem McKenzie River adjacent to NFS lands is expected to mitigate the risk of boater collision/hang up with in-river trees to allow for safe passage, while minimizing disturbance of associated aquatic habitat.

Review of the possible risk and mitigation of boater collision/hang up with in-river trees following fires along the mainstem McKenzie River for public health and safety should be undertaken. Due to the degree to which the local rural economy relies on boating activities year-round, a single Spring survey will not properly mitigate risks to the public. This requires continuous mitigation for public health and safety into Summer of 2021. Those trees deemed to be unsafe for raft and kayak passage will be repositioned or relocated to allow for safe passage, while minimizing disturbance of associated aquatic habitat. [Hazard signage at FS boat ramps will also be installed; see Recreation Report for details]

Treatment work will include monitoring of in-river hazard trees, implementation coordination with agencies and stakeholders, contract development and administration, implementation, implementation and effectiveness monitoring, and communication and outreach. Forest staff will communicate known risks and implementation plans for in-water hazard risk mitigation actions in coordination with Oregon Marine Board, PAO, other boat launch operators and Special Use Permittees to provide for boater safety through burned area.

I. Monitoring Narrative:
No specific monitoring is proposed. This assessment was limited in scope due to time and focus on life and safety treatments, and we recommend more BAER assessment over the next year, focused on road segments and cultural sites that were not surveyed during the initial assessment. Post-winter assessment is recommended for road-stream crossings in flood- and debris-prone locations.