

Date of Report: 11/4/2021**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: Middle Fork Complex****B. Fire Number: OR-WIF-210307****C. State: Oregon****D. County: Lane****E. Region: 6****F. Forest: Willamette****G. District: Middle Fork****H. Fire Incident Job Code: P6N669 (0618)****I. Date Fire Started: 7/29/2021****J. Date Fire Contained: not contained as of 10/27/2021 – suppression work completed****K. Suppression Cost: \$60,000,000 (10/09/2021)****L. Fire Suppression Damages Repaired with Suppression Funds (estimates):**

- 1. Fireline repaired (miles): 23.7 miles out of 45.1 miles identified for repair (as of 10/06/2021)
- 2. Other (identify): 40 point locations repaired out of 389 identified for repair (as of 10/06/2021)

M. Watershed Numbers:*Table 1a: Acres Burned by Watershed – Gales Fire*

HUC #	Watershed Name	Total Acres	Acres Burned	% of Watershed Burned
170900010904	Andy Creek-Fall Creek	22,997	25	0.1%
170900010901	Delp Creek-Fall Creek	19,097	11,842	62.0%
170900010607	Eighth Creek-North Fork Middle Fork Willamette River	15,366	110	0.7%
170900010903	Hehe Creek-Fall Creek	20,941	2,196	10.5%
170900010606	Lower Christy Creek	11,522	785	6.8%
170900010902	Portland Creek	13,613	7,503	55.1%
170900040501	Quartz Creek	26,943	1	0.0%

Table 2b: Acres Burned by Watershed – Kwis Fire

HUC #	Watershed Name	Total Acres	Acres Burned	% of Watershed Burned
170900010403	Lower Salmon Creek	35,270	1,250	3.5%
170900010303	Lower Salt Creek	20,948	6	0.0%

N. Total Acres Burned:

Table 3: Total Acres Burned by Ownership

Incident Name	Ownership	Acres
Gales	USDA Forest Service	29,356
Kwis	USDA Forest Service	1,485
Total Acres		30,841

O. Vegetation Types:

The vegetation types within the Middle Fork Complex are comprised of unique cohorts on the Gales and Kwis fire areas.

Gales Fire - Vegetation type is predominantly forested, of western hemlock vegetation type. 94% of the area is classified as western hemlock-Douglas fir series and 3% as western hemlock series. Understory composition is dominated by beaked hazelnut, dwarf Oregon grape, and salal, with lesser amounts of rhododendron. Less than 2 % is western hemlock series with other dominant understory plants such as Alaska huckleberry towards the higher elevations. A little over 1% of the area within the fire perimeter (407 acres) is comprised of unique, non-forested habitats, most of which are dry rock gardens (~185 acres), ~60 acres rock outcrops, 60 acres Sitka alder thickets, 8 acres mesic meadows, and <0.2 acres wet meadow.

Kwis fire - The vegetation type within the Kwis fire is predominantly forested. 66% is classified as Douglas fir- western hemlock/ dwarf Oregon grape series on “warm dry sites”, which gives way to western hemlock/ salal (31%) series as sites become more droughty, and Grand fir/dwarf Oregon grape (1%) on moister sites on steep rocky soil or deep clay. Two percent of the area is comprised of special habitats, including 11 acres of hardwood forests along Salmon Creek, ~ 8 acres dry meadows and 4 acres rock gardens toward Heckletooth Mountain on the southern edge, 3 acres of rock outcrops, and 4 acres mapped as wet meadow/ rock garden on the east edge of Salmon Creek.

P. Dominant Soils:

Soils across the burned areas of the two fires are dominated by sandy loam to loam textures, with some areas of finer textures, and are largely derived from glacial deposits, colluvial materials, or residuum derived from andesites, tuffs, and basalts. Clay loam surface textures are found in many drainageways and along toeslopes. Soil temperature regimes range from mesic to cryic, and moisture regimes are generally udic. Rock content varies from around 10 to 60%. The most common soils are generally classified as Typic Hapludands, Lithic Dystrudepts, and Typic Endoaquepts.

Q. Geologic Types:

The geologic setting of the Middle Fork Complex 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 Middle Fork Complex burned area falls within the Western Cascades geologic unit known as the Little Butte Volcanics, which are composed largely Miocene and Oligocene igneous rocks, ranging in age from 30 to 40 million

years. Rock types include primarily pyroclastic deposits such as ash-flow tuffs and lahars (volcanic mudflows); a mix of basalt, andesite, dacite lava flows; and volcaniclastic sedimentary rocks. A few unnamed ridgeline intrusive igneous bodies occupy a central portion of the burned area east of Gold Point. Younger Western Cascade volcanic rocks make up much of the remainder of the bedrock geology, and abundant unmapped Quaternary deposits, including fluvial deposits in the Fall Creek, Portland Creek and Salmon Creek canyon bottom, mantle 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.

Structurally, there is only one mapped, approximately located, northwest-trending fault, located south of Sinker Mountain to Logan Creek. The fault does not appear to displace any geologic units.

R. Miles of Stream Channels by Order or Class:

Table 4a: Miles of Stream Channels by Order or Class - Gales Fire

Stream Type	Miles Of Stream
Perennial	109.0
Intermittent	170.9

Table 5b: Miles of Stream Channels by Order or Class - Kwis Fire

Stream Type	Miles Of Stream
Perennial	4.78
Intermittent	7.44

The USGS debris-flow model identified 4.6 miles of channels within the burned area, the bulk of which are first-order ephemeral channels.

S. Transportation System:

Trails - National Forest (miles): 4.82 total trail miles in fire perimeter; 3.39 miles of trails in moderate/high soil burn severity.

Table 4: Miles of Trails – Gales and Kwis Fires

Trail Name	Unburned/ VeryLow	Low	Moderate	High	Grand Total
Gales					
ALPINE	0.06	0			0.06
FALL CREEK NATIONAL RECREATION		0.27	0.59		0.86
GOLD POINT	0.06	0.68	1.88	0.71	3.33
GOLD POINT TIE			0.17		0.17
Grand Total	0.12	0.96	2.64	0.71	4.42
Trail Name	Unburned/ VeryLow	Low	Moderate	High	Grand Total
Kwis					
EUGENE TO PACIFIC CREST	0.1	0.25	0.04		0.38
SALMON CREEK		0.02			0.02
Grand Total	0.1	0.26	0.04	0	0.4

Roads - National Forest (miles): 178.23 total road miles in fire perimeter; 30.09 road miles in moderate/high soil burn severity.

Operational Maintenance Level	Unburned	Low	Moderate	High	Grand Total
Gales					
1 - BASIC CUSTODIAL CARE (CLOSED)	18.17	24.66	6.33	0.70	49.86
2 - HIGH CLEARANCE VEHICLES	39.16	59.04	15.18	1.04	114.42
3 - SUITABLE FOR PASSENGER CARS	1.18	1.43	3.73	0.62	6.95
5 - HIGH DEGREE OF USER COMFORT		0.20	0.69		0.89
Grand Total	58.51	85.32	25.93	2.36	172.12

Operational Maintenance Level	Unburned	Low	Moderate	High	Grand Total
Kwis					
2 - HIGH CLEARANCE VEHICLES	1.80	2.46	1.74	0.06	6.06
4 - 3-Moderate DEGREE OF USER COMFORT	0.03	0.02			0.05
Grand Total	1.83	2.48	1.74	0.06	6.11

178.23

PART III - WATERSHED CONDITION

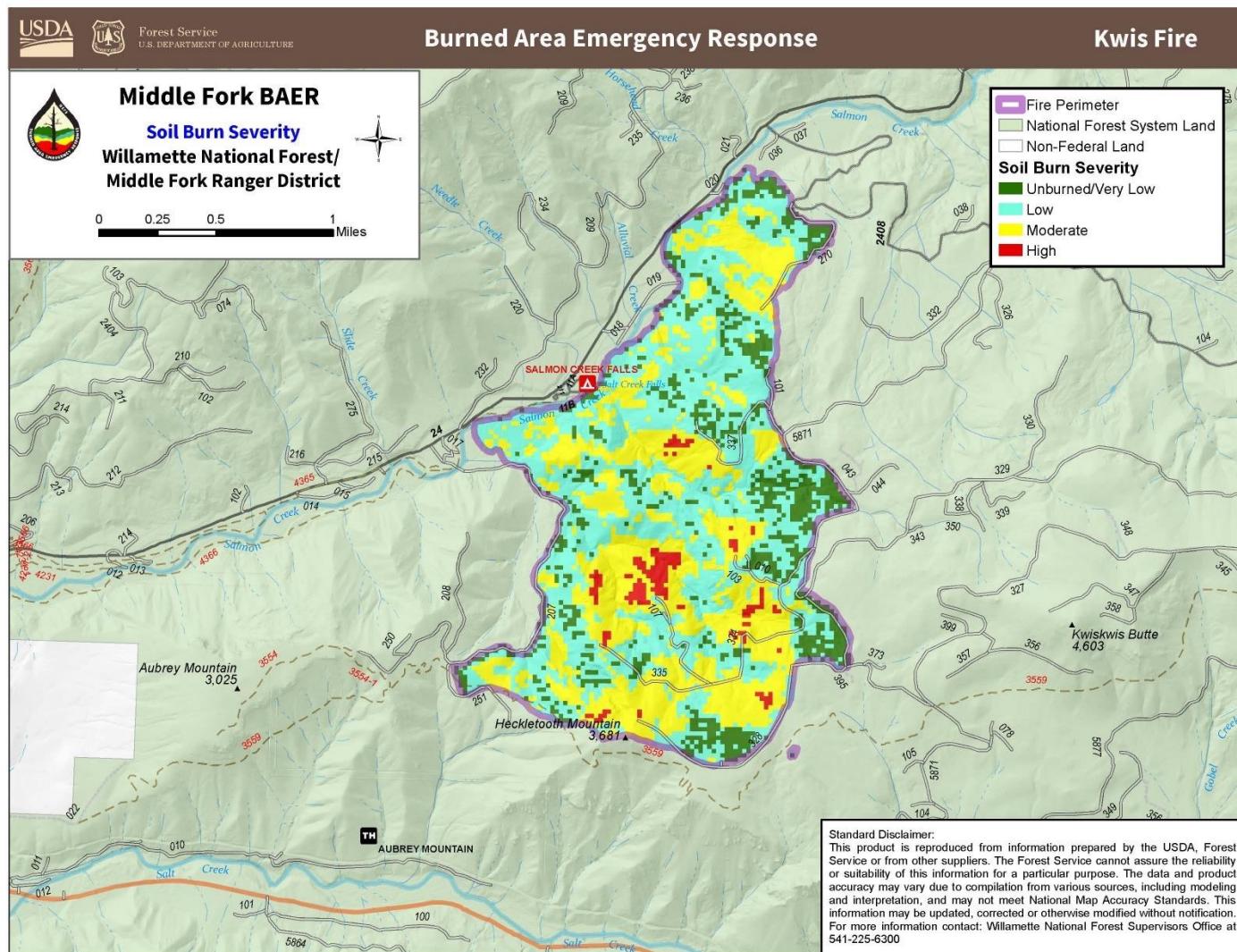
A. Burn Severity (acres):

Figure 1a. Kwis Fire final soil burn severity

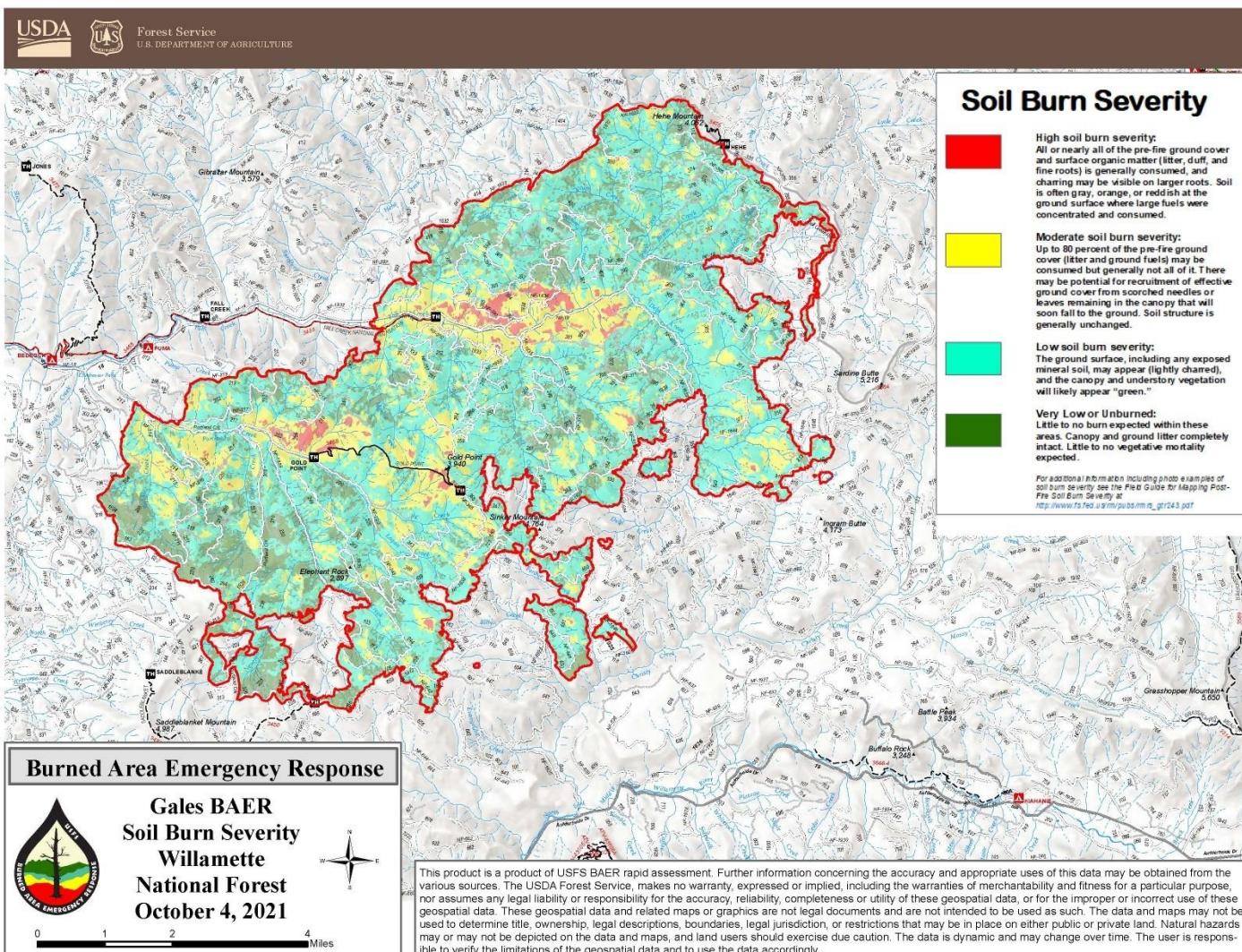


Figure 1b. Gales Fire final soil burn severity

Table 5a. Kwis Fire Burn Severity Acres by Ownership

Soil Burn Severity	NFS	Other Federal (List Agency)	State	Private	Total	% within the Fire Perimeter
Unburned	228	-	-	-	-	15%
Low	689	-	-	-	-	46%
Moderate	529	-	-	-	-	36%
High	38	-	-	-	-	3%
Total	1,484	-	-	-	-	100%

Table 5b. Gales Fire Burn Severity Acres by Ownership

Soil Burn Severity	NFS	Other Federal (List Agency)	State	Private	Total	% within the Fire Perimeter
Unburned	6,683	-	-	-	-	23%
Low	15,538	-	-	-	-	53%
Moderate	6,319	-	-	-	-	22%
High	604	-	-	-	-	2%
Total	29,144	-	-	-	-	100%

B. Water-Repellent Soil (acres): Field observations found limited evidence of hydrophobicity within both the Gales and Kwis fires. Moderate to strong fire-induced hydrophobicity was observed at the mineral soil surface and down to 1 cm in depth on only a few of moderate and high soil burn severity points that were sampled. Undisturbed soils within the fire perimeter were observed to have only weak to moderate natural hydrophobicity at the soil surface. Low soil burn severity had no change in natural hydrophobicity. Overall, lack of fire-induced hydrophobicity is likely associated with relatively short residency times and a recent precipitation event that brought approximately 4 inches of rain to the fires. Since hydrophobicity was quite variable in strength and spatial distribution, 20% of areas with moderate or severe burn severity were considered to have some sign of hydrophobicity, for a total of approximately 1,400 acres of fire-induced hydrophobicity for Gales and 120 acres of fire-induced hydrophobicity for Kwis. This hydrophobicity is expected to continue to decrease over time with each wetting event.

C. Soil Erosion Hazard Rating: Wildfire induced changes to soil properties have potential to alter erosion rates from the natural, unburned state. Areas with moderate or high burn severity have little to no canopy or ground cover to intercept rainfall and may have altered infiltration, both of which may lead to increased wind and water erosion. This erosion hazard generally persists through the first few years post-fire until hillslopes stabilize as vegetation recolonizes, infiltration capacity increases, and ground cover is recruited. Unburned areas and those with low severity have little to no erosion hazard in comparison. The Gales fire had approximately 7,000 acres of moderate to severe erosion hazard rating within the moderate and high soil burn severity areas. Within the Kwis fire, all areas of moderate and high soil burn severity had moderate to severe erosion hazard ratings for a total of roughly 600 acres.

Table 6a. Gales Fire Erosion Hazard Ratings

Gales Fire

Erosion Hazard Rating	Acres	Percent
Moderate	5,377	77.7%
Moderate to low	122	1.8%
Moderate to severe	112	1.6%
Severe to moderate	28	0.4%
Severe	904	13.0%
N/A	381	5.5%
Total	6,924	100.0%

Table 6b. Kwis Fire Erosion Hazard Ratings

Kwis Fire

Erosion Hazard Rating	Acres	Percent
Moderate	432	76.3%
Moderate to severe	134	23.7%
Total	566	100.0%

D. Erosion Potential: Modeled post-fire erosion rate increase for individual hillslopes in the Gales fire ranged from a minimum of 0 tons/acre, up to a maximum 50.4 tons/ acre, with an average post-fire erosion rate increase of 15.4 tons/acre across the burn. For the Kwis fire, modeled post-fire erosion rate increases ranged from a minimum of 0 tons/acre, up to a maximum 95.7 tons/acre, with an average erosion rate increase of 15.8 tons/ acre within the fire perimeter.

E. Sediment Potential: Total post-fire increases in delivered sediment across the Gales fire is estimated to be approximately 470,000 tons, based on a 10% exceedance probability model. Natural erosion estimates for the area are around 2,400 tons per year. Drainages with the highest predicted sediment production were Delp Creek-Falls Creek and Portland Creek; together these two sub-watersheds were predicted to

produce 86% of the total sediment delivered out of the burned area. The Kwis fire is predicted to have roughly 34,000 tons of post-fire delivered sediment given the 10% exceedance probability model. An estimated 24 tons of sediment are lost through natural erosion per year. Soils in the western half of the Kwis fire had the highest erosional increases.

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 severity will generally recover the understory vegetation within the first two to three years with average precipitation. Areas that burned with moderate soil severity may recover in 3-5 years, with canopy formation occurring much later. For sites with high soil burn severity and full vegetative stand-replacement, natural recovery may take many decades. Replanting of timber stands burned harvest units will accelerate conifer recovery, although it may be slowed in areas with shallow soils, compared to pre-fire conditions as these soils further erode and site potential is decreased.

G. Estimated Hydrologic Response: The Gales Fire, as displayed in Table 1 - Acres Burned by Watershed above, has two subwatersheds (Delp Creek-Fall Creek and Portland Creek) where over 50% of the watershed burned; in these two subwatersheds, 17-20% of the watershed area experienced moderate or high soil burn severity. The remainder of the subwatersheds in the Gales Fire were burned over 10% or less of their area; Hehe Creek-Fall Creek had less than 5% area burned at moderate to high soil burn severity, and the remainder were minimally affected by moderate to high soil burn severities, as shown in below in Table 7a.

In the Kwis Fire, the percent area burned in each of the two subwatersheds (6th-field or 12-digit HUC hydrologic units) is small (0-4% of total watershed area in each subwatershed, and the proportion of area burned at high or moderate burn severities, where noticeable effects to runoff and sediment delivery would be expected, is even lower (0-2%) (Table 7b).

Table 7a. Acreage and percentages of soil burn severity by subwatershed – Gales Fire

Soil Burn Severity	HUC12 Name	HUC12 Acres	SBS Acres in HUC12	Percent of HUC 12	Acres H-M SBS in HUC12	Percent H-M SBS of HUC12
Unburned/Very Low	Hehe Creek-Fall Creek	20,941	655	3.13%	872	4.16%
Low			1,324	6.32%		
Moderate			854	4.08%		
High			18	0.09%		
Unburned/Very Low	Lower Christy Creek	11,522	291	2.53%	90	0.78%
Low			696	6.04%		
Moderate			88	0.76%		
High			2	0.02%		
Unburned/Very Low	Delp Creek-Fall Creek	19,097	2,715	14.22%	3,231	16.92%
Low			8,610	45.09%		
Moderate			2,862	14.99%		
High			369	1.93%		
Unburned/Very Low	Andy Creek-Fall Creek	22,997	21	0.09%	3	0.01%
Low			22	0.10%		
Moderate			3	0.01%		
High			0	0.00%		
Unburned/Very Low		15,366	26	0.17%	25	0.16%

Low	Eighth Creek-North Fork Middle Fork Willamette River		84	0.55%		
Moderate			25	0.16%		
High			0	0.00%		
Unburned/Very Low	Quartz Creek	26,943	1	0.00%	0	0.00%
Low			1	0.00%		
Moderate			0	0.00%		
High			0	0.00%		
Unburned/Very Low	Portland Creek	13,613	2,975	21.85%	2,703	19.86%
Low			4,800	35.26%		
Moderate			2,488	18.28%		
High			215	1.58%		

Table 7b. Acreage and percentages of soil burn severity by subwatershed – Kwis Fire

Soil Burn Severity	HUC12 Name	HUC12 Acres	SBS Acres in HUC12	Percent of HUC 12	Acres H-M SBS in HUC12	Percent H-M SBS of HUC12
Unburned/Very Low	Lower Salmon Creek	35,270	226	0.64%	565	1.60%
Low			685	1.94%		
Moderate			527	1.49%		
High			38	0.11%		
Unburned/Very Low	Lower Salt Creek	20,948	2	0.01%	2	0.01%
Low			4	0.02%		
Moderate			2	0.01%		
High			0	0.00%		

Discussion of hydrologic response

Currently, sea surface temperatures are approaching La Niña conditions in the tropical Pacific, making it probable that a La Niña climate cycle be in place by this winter. Forecasters are predicting the most likely scenario to be a weak La Niña. NOAA modeling indicates that increased runoff is more likely during La Niña years. Typically, in the area of the Middle Fork Complex, the first damaging storms occur between fall and early winter. Historically, these damaging storms can occur in the form of atmospheric river events resulting in heavy sustained rainfall. A peak flow analysis was conducted for 10-year, 24-hour storm using an SCS Type 1a rainfall distribution, based on the climatic conditions discussed above.

Gales Fire – The Gales Fire predominately experienced low soil burn severity, though proportions of soil burn severity varied for each modeled drainage. The modeled results for post-fire peak runoff showed increases from 0% to 285% compared to pre-fire peak discharge. Overall, for all but the largest drainages, increases in flows are expected within the modeled drainages during the 10-year, 24-hour storm event. Fall Creek and Portland Creek are two moderately large drainages, in the middle range of modeled drainages affected by the Gales Fire. Both intermediate-size drainages show increases relative to pre-fire conditions, and the modeled percentage increases are also intermediate relative to the small and large modeled pour sheds. The modeled small drainages are expected to see the highest increase in postfire runoff, with the highest increases associated with the moderate and high burn severity portions of the modeled drainages, especially the A and B hydrologic soil groups. In an unburned condition, soils in these groups have moderately low runoff potential. However, when soils within these groups experience moderate to high soil burn severity, reductions in infiltration can be expected, resulting in increased runoff rates.

Kwis Fire - The Kwis Fire predominately experienced low soil burn severity, though proportions of soil burn severity varied for each modeled drainage. The modeled results for post-fire peak runoff showed increases from 1% to 64% compared to pre-fire peak discharge. Overall, for all but the largest drainages, increases in flows are expected within the modeled drainages during the 10-year, 24-hour storm event. The modeled small drainages are expected to see the highest increase in postfire runoff, with the highest increases associated with the moderate and high burn severity portions of the modeled drainages, especially the A and B hydrologic soil groups. In an unburned condition, soils in these groups have moderately low runoff potential. However, when soils within these are groups experience moderate to high soil burn severity, reductions in infiltration can be expected, resulting in increased runoff rates.

In some portions of the burned area of both fires, flow volumes and sediment discharge are likely to be enhanced by sediment bulking from headwater source area channel erosion, resulting in debris flows or hyper-concentrated flows. Debris-flow processes and modeling are discussed below.

Landslide and debris-flow processes, potential and model estimates

The Middle Fork Complex burned areas are located within a zone of high to very high landslide susceptibility (Calhoun, 2020). Steep and unstable hillslopes with linear outflow channels are present across much of the burned area, and are especially prevalent on slopes that experienced moderate to high soil burn severity. Instability is most pronounced where pyroclastic and volcaniclastic lithologies are dominant, and these rock types make up approximately 75% of the bedrock, including the steepest, most incised, and unstable portions of the landscape throughout the Middle Fork Complex burned area. The Statewide Landslide Information Database for Oregon (SLIDO) has 11 historic landslide points and one mapped landslide polygon within the Gales Fire burned area. One historic landslide point is located in the Kwis Fire burned area. Many pre-fire small landslide and slump features were recognized during BAER field investigation in both burned areas. Two unmapped, moderately large pre-fire landslides on the northwest flank of Sinker Mountain were identified within the Gales Fire burned area. Based on the high susceptibility to landslides and predicted La Niña (often wetter than normal) winter, new landslides are likely to develop within the burned areas over the next 10 years in the moderate to high burn severity areas.

Debris flows

Steep linear channels, upper hillslope hollows and depositional fans are evident at several sites within the burned areas, often coinciding with areas of concentrated moderate and high soil burn severity, and appear to constitute debris-flow dominated geomorphic systems. The US Geological Survey Landslide Hazards Program has developed empirical models for forecasting the probability and the likely volume of post-fire debris flow events, and ran their debris-flow model for the Gales and Kwis Fires. The model uses geospatial data related to basin morphometry, burn severity, soil properties, and rainfall characteristics to estimate the probability and volume of debris flows that may occur in response to a design storm (Staley, 2016). The USGS provided estimates of debris-flow likelihood, volume, and combined hazard for several design storms with a range of peak 15-minute rainfall intensity rates between 12-40 millimeters per hour (mm/hr) (0.5-1.6 inches/hour). We selected a design storm of a peak 15-minute rainfall intensity of 24 mm/hr to evaluate debris flow potential and volumes, based on these factors:

- Post-fire debris flows are frequently triggered by high-intensity, short-duration bursts of rain.
- A 24 mm/h rain burst is likely to happen in most areas of the western U.S. (i.e. a 1-5-year recurrence interval).
- A 24 mm/h rain burst is known to trigger debris flows at USGS monitoring sites in burned areas.
- The USGS suggests using the 24-mm 15-min rainfall intensity value when evaluating probabilities. This value is at the low end of most western US convective thunderstorms and at the upper end of intensities for the stratiform rainfall typical of western Oregon.

Post-fire debris flow formation processes in the Cascades may be triggered by shallow landslides, or by the infiltration-excess surface runoff process that the USGS model directly addresses. Observed characteristics of the Middle Fork Complex hillslopes appear to suggest that shallow landsliding originating in colluvial hollows or related to inherently unstable geology are the dominant triggering processes in this area.

Based on empirical data, the largest basin area we have identified as likely to produce a debris flow is eight square kilometers.

The debris-flow model was originally developed to model events in Southern California and the Intermountain West, and is undergoing additional calibration in other areas of the western United States, including the Cascade Mountains. Due to the model's potential inaccuracies, it is just one tool used to help focus on areas where critical values are potentially at risk. Other tools to evaluate debris-flow hazards include LiDAR, aerial photos, known past debris-flow occurrences, and other historical information.

Gales Fire debris-flow model results

Model outputs indicate that with a 15-minute rainfall intensity of 24 mm/hr (0.95 inch/hr), the probability of debris flows occurring is high (60-80%) to very high (80-100%) in several channels in the Gales Fire burned area, particularly in tributaries to Logan Creek, the headwaters of PK Creek, and into the mainstem of Fall Creek. High predicted volumes (in excess of 10,000 cubic meters, with relatively low likelihood) may occur in the main channels of Rubble Creek, Gales Creek, PK Creek, Marine Creek, Gold Creek, and unnamed tributaries of Delp Creek. The highest combined hazard (likelihood x predicted volume) occurs in the Logan Creek, PK Creek and Fall Creek tributaries (Figure 2a). Debris flows that occur in these channels may have short-to medium-term effects to water quality, road and trail infrastructure, and life and safety. Debris-flow runout and deposition may be limited to the immediate downstream channels, or may extend further to impact drainage structures along Road 18. The USGS model does not predict the extent of debris-flow runout.

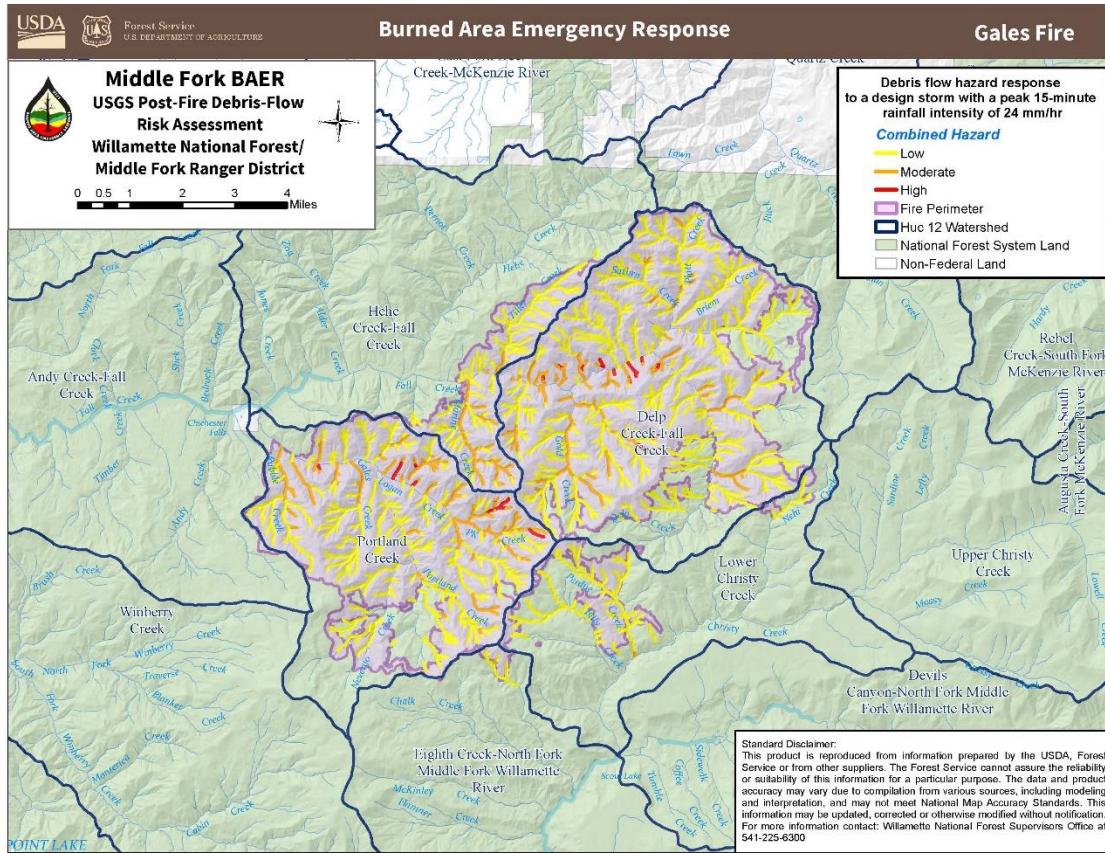


Figure 2a. Gales Fire Channel segment debris-flow combined hazard (24 mm/hr-15-min.)

Kwis Fire debris-flow model results

Model outputs indicate that with a 15-minute rainfall intensity of 24 mm/hr (0.95 inch/hr), the probability of debris flows occurring is low (20-40%) to moderate (40-60%) in several of the major tributaries to Salmon Creek. High likelihood (60-80%) is only predicted in some small headwater channels tributary to these larger streams. However, high (>10,000 cubic meters) volumes are predicted in the lower reaches of the major tributary channels, resulting in a moderate estimated combined hazard (Figure 2b.). Debris flows emanating from these channels may cause sedimentation and aggradation of the Salmon Creek channel in the short-to-

medium-term, and would have the potential to create water-quality concerns for the Salmon Creek fish hatchery, which is a short distance downstream of the burned area on Salmon Creek.

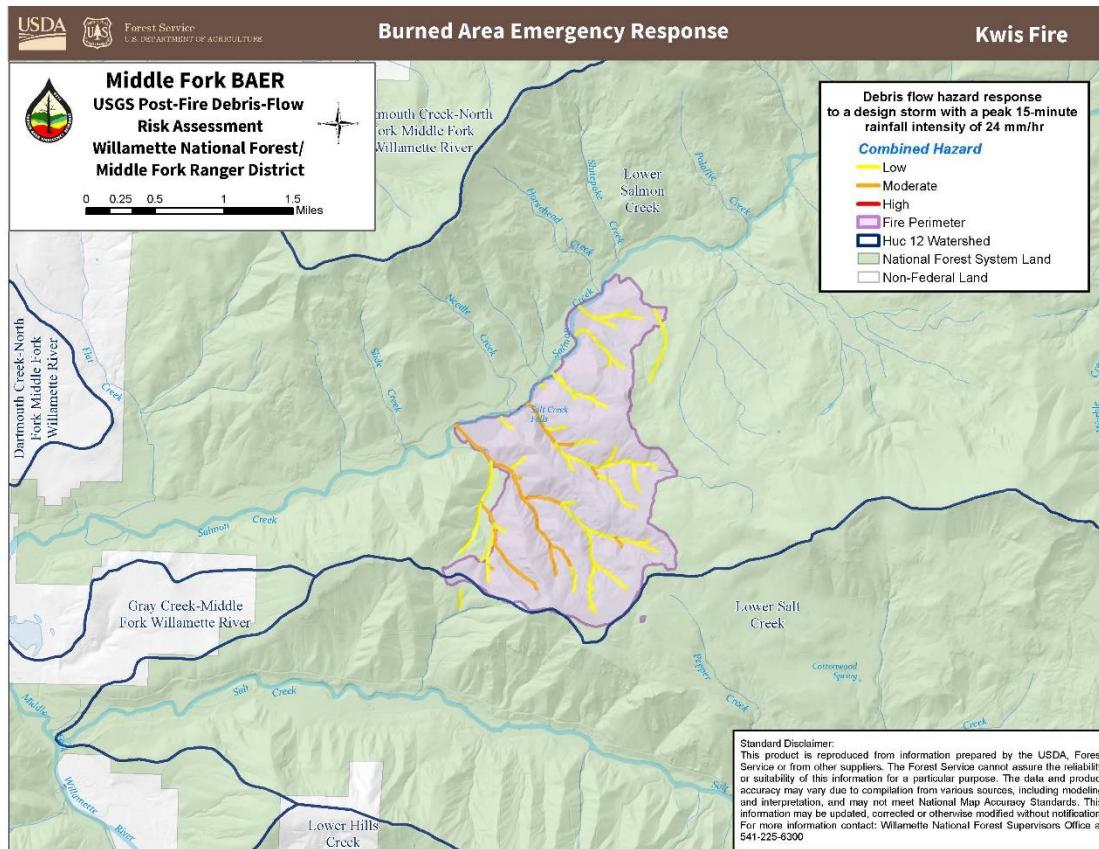


Figure 2b. Kwis Fire channel segment debris-flow combined hazard (24 mm/hr-15-min.)

Rockfall

Rockfall within burned areas commonly increases due to removal of stabilizing vegetation and organic litter in the first year following a wildfire, and then declines in following years. Rockfall processes involve loose or fractured rock that becomes dislodged and rolls, slides or bounces downslope until the kinetic energy is dissipated on lower gradient slopes. Rockfall can dry-ravel in the absence of water, but the process is often accelerated by precipitation and tree-throw. Rockfall may be considered likely, with the potential to block roads and cause pavement and road prism damage across much of the burned area of both fires, particularly where fractured rock outcrop is exposed in roadcuts and on steep roadside hillslopes in areas of moderate to high soil burn severity. Roads with high rockfall potential include Roads 1800, 1833, 1834, 1835, and 1835-220 in the Gales Fire burned area, and Roads 2400-207, 2408-270, 5871-334 and 5871-335 in the Kwis Fire burned area.

PART V - SUMMARY OF ANALYSIS**Introduction/Background**

The Middle Fork Complex and Kwis Fires began via lightning strikes on July 29, 2021, during a thunderstorm.

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

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 8: 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 can 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 can exist for travel on roads below areas of moderate and high burn severity. Watershed-related threats caused by the fire tend to be 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 river recreation sites within and below the burned area; and occupants of recreation residences on NFS lands located within floodplains or threatened by debris flows.

a. Municipal Water Supply

There are multiple points of diversion for water uses, including municipal water sources downstream of the fires. However, most are also downstream of major reservoirs which would attenuate potential impacts.

The Gales Fire intersects the municipal watersheds for the Eugene Water and Electric Board (EWEB), the Springfield Utility Board and the City of Westfir. Only one acre of low severity burn from the Gales Fire occurred within EWEB's municipal watershed and therefore would have no impact on water quality. The point of diversion for the Springfield Utility Board is located many miles downstream of the fire near the city of Springfield, downstream of Fall Creek Lake, a reservoir on the Middle Fork of the Willamette River. The extremely small percentage of the total municipal watershed draining to the Springfield Utility Board point of diversion, along with the buffering effect of the reservoir, makes the potential water quality impacts negligible at this point of diversion. Finally, the City of Westfir has a point of diversion downstream of the fire in the North Fork of the Middle Fork of the Willamette River near the town of Westfir.

Overall, the Gales fire burned 1,209 acres of the City of Westfir municipal watershed that total approximately 156,160 acres. Of this, 2 acres were high and 112 acres were moderate soil burn severity. The point of diversion for the Westfir water supply was modeled for post-fire flow increases. The results were found to be minimal, with an increase of 17 cfs for a 10-year, 24-hour storm. The calculated flows for this storm go from 16,000 cfs to 16,017 cfs. The Gales fire is unlikely to impact this water source.

The Kwis Fire intersects the municipal water supply for the City of Lowell. The point of diversion is located downstream of multiple reservoirs, including Lookout Point Reservoir, on the Middle Fork of the Willamette River near the town of Dexter. Similar to the point of diversion for the Springfield Utility Board and the Gales Fire, an extremely small percentage of the total municipal watershed draining to the City of Lowell point of diversion, along with the buffering effect of the reservoir, makes the potential water quality impacts negligible at this point of diversion.

b. 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 Fall Creek and Salmon Creek drainages. 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.

2. Property (P): Critical Forest Service infrastructure threatened by postfire erosion and debris-laden flows include National Forest System roads, trails, and bridges.

a. Roads

The Middle Fork Complex and Kwis Fires includes 178.2 miles of Forest Service roads. Post-fire conditions, in combination with the expected watershed response, indicate there will be an increased risk of road damage or failure due to rock fall, debris flow and drainage structure failure. Due to fire damage, several of the roads in these fires were inaccessible and will require future assessment. Treatment recommendations include road closures on FS Roads 1835, 1835-220, 1835-226, 1835-243, 1835-244, 5871, 5871-334, 2400-207, and 2408-270.

Additionally, we recommend removing culverts on FS Roads 1835-220, 1835-226, 1835-243 and 1835-244 to best protect the road infrastructure from likely catastrophic failure. This will also help provide protection for downstream values at risk. On the roads that are to remain open, we recommend road drainage improvements (storm-proofing), drainage structure modifications (armored drainage dips, drop inlet structures and/or culvert upsizing) and storm inspection and response for 23 miles; and 6 road hazard signs.

Table 9: Affected FS Roads by Maintenance Level

Operational Maintenance Level	Unburned	Low	Moderate	High	Grand Total
Gales Fire					
1 - BASIC CUSTODIAL CARE (CLOSED)	18.17	24.66	6.33	0.70	49.86
2 - HIGH CLEARANCE VEHICLES	39.16	59.04	15.18	1.04	114.42
3 - SUITABLE FOR PASSENGER CARS	1.18	1.43	3.73	0.62	6.95
5 - HIGH DEGREE OF USER COMFORT		0.20	0.69		0.89
Grand Total	58.51	85.32	25.93	2.36	172.12

Operational Maintenance Level	Unburned	Low	Moderate	High	Grand Total
Kwis Fire					
2 - HIGH CLEARANCE VEHICLES	1.80	2.46	1.74	0.06	6.06
4 - 3-Moderate DEGREE OF USER COMFORT	0.03	0.02			0.05
Grand Total	1.83	2.48	1.74	0.06	6.11

178.23

a. Trails

The Fall Creek National Recreation Trail #3455, Gold Point Trail #3468, and Eugene to Crest Trail #3559 are high-use recreational travel routes for hikers, bikers, and backpackers. Sections of the Fall Creek National Recreation Trail and the Eugene to Crest Trail received low to moderate burn severity impacts, while the full extent of the Gold Point Trail received moderate to high burn severity impacts. Use of these trails directly contributes to the economies of the Oakridge, Westfir and Lowell communities. Risk to human health and safety, as well as damage to property, is present due to the impacts of the fire on the trail. We acknowledge the likelihood that increased risks and further damage may occur, and we provide treatment recommendations for accomplishing risk and damage mitigation. In doing so, the risks to safety and property damage will be decreased, while allowing for a more successful pursuit of maintaining the trail in its original footprint as the cheapest and most-cost-effective option to the public and government.

b. Campgrounds

No campgrounds were directly impacted by the Gales or Kwis Fires. However, the Salmon Creek Falls Campground sits adjacent to the Kwis Fire perimeter where dead or dying trees may fall and create risk to user safety. The fire burned up to Salmon Creek and a steep rock slope across from the campground. While it appears that much of the fire behavior in that area was low severity, there are a number of trees that have either died or will die as a result of the burn. This may be due to either too much heat for that species, or the loss of understory vegetation that will now make the slope unstable.

3. Natural Resources (NR):

a. Native Plant Communities

Where invasive species or noxious weeds are absent or present in minor amounts, native plant communities 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 intensity resulting in greater than 70% vegetation mortality, and 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 false brome, African wire grass, spotted knapweed, meadow knapweed, herb Robert, shiny geranium, sulfur cinquefoil, Canada thistle, Scotch broom, and Armenian blackberry.

b. Threatened and Endangered Species - Fish and Wildlife

Fisheries

Critical BAER 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 two ESA-Threatened fishes and their designated Critical Habitat – bull trout and Upper Willamette River spring Chinook salmon. Streams within and downstream of the burned area provide the following habitat use by species (Table 6). 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 10. Types of Critical Habitat by species within the burned area.

Species	Habitat Use Within and Downstream of Burned Area
Bull Trout	<ul style="list-style-type: none"> • Foraging • Overwintering • Migrating
Upper Willamette River Spring Chinook Salmon	<ul style="list-style-type: none"> • Spawning • Rearing • Overwintering • Migrating
Upper Willamette River Steelhead	<ul style="list-style-type: none"> • Spawning • Rearing • Overwintering • Migrating

Wildlife

Gales Fire -

Critical habitat, suitable occupied habitat, and nesting territories for ESA-listed northern spotted owl (NSO) (*Strix occidentalis caurina*) are the Critical BAER Values. Threats to these values are stress from the fire, including greater risk from blowdown, mass soil movement, flooding and insects and disease, which 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. The fire is estimated to have removed a moderate amount of suitable owl habitat, all within designated critical habitat. Forty-five spotted owl territories were affected by the fire area. Additional suitable habitat is expected to be lost due to future tree mortality. A secondary focus was to assess if proposed BAER activities could affect spotted owl nest sites. Some BAER activities, if within the disruption distance of known nest sites that are likely to be occupied, may result in disruption of nesting if conducted during the critical breeding season from March 1-July 15.

Kwis Fire -

Critical habitat, suitable occupied habitat, and nesting territories for ESA-listed northern spotted owl (*Strix occidentalis caurina*) are the Critical BAER Values. Threats to these values are stress from the fire, including greater risk from blowdown, mass soil movement, flooding and insects and disease, which 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. The fire is estimated to have removed a low amount of suitable owl habitat all within designated critical habitat. Six spotted owl territories were affected by the fire area. A small amount of suitable habitat is expected to be lost due to future tree mortality. A secondary focus was to assess if proposed BAER activities could affect spotted owl nest sites. Some BAER activities if within the disruption distance of known nest sites that are likely to be occupied may result in disruption of nesting if conducted during the critical breeding season from March 1-July 15.

c. Soil Productivity and Hydrologic Function

The BAER critical value for the soil resource is soil productivity. Lack of vegetative ground cover in the post-fire environment contributes to soil loss through erosion processes. Evaluation of potential soil erosion loss is critical in determining whether soil productivity and hydrologic function have been compromised under Forest Service BAER policy (FSM 2523).

Loss of soil productivity and hydrologic function through erosion is expected on the NFS lands within the burned area. Model estimates averaged across all burn severity classes indicate that there will be a mean hillslope erosion increase of 22.3 tons per acre in the Gales Fire burned area, and a mean increase of 28.4 tons/acre in the Kwis Fire burned area. The effects are somewhat reduced on a per acre basis when considered across subwatersheds, due to unburned portions of watersheds outside the fire perimeters. It is likely that only a portion of that sediment will be delivered to the base of hillslopes, based on field observations of slope roughness, high coverage of surface rock fragments, and prevalent remnant downed large woody debris, all of which would function to trap and impede movement of hillslope sediment. The high burn severity areas are mostly surrounded by areas of moderate and low burn severity, providing a buffer for sediment delivery. These estimated sediment outputs, along with the low proportion of high burn-severity areas, as well the mosaic pattern of the burn, indicate that a large-scale sediment response should not be expected.

No erosion control treatments (mulching, seeding, etc.) are recommended to manage increased risk for soil erosion. Under some slope gradient, soil fertility and seasonal climatic conditions, post-fire soil loss can be mitigated by the application of areal surface treatments such as mulch. Given the steep, dissected landscape of the Gales and Kwis Fires, however, only small, isolated areas would be deemed feasible for mulching, which therefore would have a negligible effect on sediment delivery to streams, and would not meaningfully protect soil productivity. Natural recovery is the recommended treatment because of limited active treatment options that are both economically viable and effective for slowing erosion and mitigating mass movement (debris flows or landslides).

d. Cultural and Heritage Resources

BAER critical values for Heritage Resources includes properties listed on or potentially eligible for the National Register of Historic Places (NRHP), Traditional Cultural Properties, or Indian Sacred Sites on NFS lands. No sites listed on the NRHP are located within the Gales or Kwis Fires. For the Gales Fire, twenty-one potentially eligible sites were evaluated for BAER treatments and nine were determined to need field assessments. Four sites could not be field checked due to safety concerns. The seven field-checked sites do not need BAER treatments and no mitigations are recommended.

The review of the Kwis Fire identified twenty-one potentially eligible sites which were evaluated for BAER assessment. Only one site is within the boundary of the Kwis, the rest were downslope of unburned/low to moderate burn severity with no potential for impacts. No field checks of these sites were necessary and no treatments to mitigate impacts are needed.

Table 11. GALES FIRE - FS Critical Value Table

		High / Very High Risk							
		Intermediate Risk							
		Low / Very Low Risk							
Life/ Property/ Resources	Critical Value	Threat to Value	Probability of Damage or Loss	Magnitude of Consequence	Risk	Treatment	Other Treatment Recommendations (outside of BAER)	Notes	
NFS Roads, Bridges, and Culverts									
Life & Safety	Road 1800	Hazard trees, rock fall, increased sedimentation, debris flows, road diversion, crossing structure failure; Threat to road prism, drainage features, and crossings	Likely	Moderate	High	Keep temporary closure in place through first seasonal rain periods or longer if needed; Signage	Suppression Repair, Hazard Tree work	Arterial Road	
Property- Roads	Road 1800	Hazard trees, rock fall, increased sedimentation, debris flows, road diversion, crossing structure failure; Threat to road prism, drainage features, and crossings	Likely	Moderate	High	Storm Inspection & Response, Culvert Modification (R6)	Suppression Repair, Hazard Tree work	Arterial Road	
Life & Safety	Road 1833	Hazard trees, rock fall, increased sedimentation, debris flows, road diversion, crossing structure failure; Threat to road prism, drainage features, and crossings	Likely	Moderate	High	Keep temporary closure in place through first seasonal rain periods or longer if needed; Signage	Suppression Repair, Hazard Tree work	Collector Road	
Property- Roads	Road 1833	Hazard trees, rock fall, increased sedimentation, debris flows, road diversion, crossing structure failure; Threat to road prism, drainage features, and crossings	Likely	Moderate	High	Storm Proofing (storm proofing existing drainage features); New Drainage Feature - Drainage Dip; Up-sized Culvert;	Suppression Repair, Hazard Tree work	Collector Road	
Life & Safety	Road 1834	Hazard trees, rock fall, increased sedimentation, debris flows, road diversion, crossing structure failure; Threat to road prism, drainage features, and crossings	Very Likely	Major	Very High	Keep temporary closure in place through first seasonal rain periods or longer if needed; Road Closure Device (gate,etc)	Suppression Repair, Hazard Tree work	Collector Road; 2 Culverts that need to be upsized (Back up plan critical dip with armored fill slope. Plan C. Close road pull Pipes)	
Property- Roads	Road 1834	Hazard trees, rock fall, increased sedimentation, debris flows, road diversion, crossing structure failure; Threat to road prism, drainage features, and crossings	Very Likely	Major	Very High	Alternative 1: Pull pipes, 2. Drop inlets & Armored Dips(5) and Relief Culvert (R6)	Suppression Repair, Hazard Tree work	Collector Road; 2 Culverts that need to be upsized (Back up plan critical dip with armored fill slope. Plan C Close road pull Pipes)	
Life & Safety	Road 1835	Hazard trees, rock fall, increased sedimentation, debris flows, road diversion, crossing structure failure; Threat to road prism, drainage features, and crossings	Likely	Major	Very High	Keep temporary closure in place through first seasonal rain periods or longer if needed; Maintain road closure order 18-2014-10-02 between 1835-365 and 1835-240 junction	Suppression Repair, Hazard Tree work		
Property- Roads	Road 1835	Hazard trees, rock fall, increased sedimentation, debris flows, road diversion, crossing structure failure; Threat to road prism, drainage features, and crossings	Likely	Major	Very High	Storm Inspection & Response; Storm Proofing (ditch and culvert inlet cleaning through high/moderate SBS); Drop Inlet Armored Dip	Suppression Repair, Hazard Tree work	Significant length in moderate/high SBS	
Life & Safety	Road 1839	Hazard trees, rock fall, increased sedimentation, debris flows, road diversion, crossing structure failure; Threat to road prism, drainage features, and crossings	Possible	Moderate	Intermediate	Road Hazard Signs	Suppression Repair, Hazard Tree work		
Property- Roads	Road 1839	Hazard trees, rock fall, increased sedimentation, debris flows, road diversion, crossing structure failure; Threat to road prism, drainage features, and crossings	Possible	Moderate	Intermediate	Storm Inspection Response; Stream Crossing Protection, Critical Dip	Suppression Repair, Hazard Tree work	One culvert in moderate/High that needs looking at.	
Life & Safety	Road 1844	Hazard trees, rock fall, increased sedimentation, debris flows, road diversion, crossing structure failure; Threat to road prism, drainage features, and crossings	Unlikely	Moderate	Low	No treatment	Suppression Repair, Hazard Tree work	one undersized pipe but won't overtop road with design flow	

Property- Roads	Road 1844	Hazard trees, rock fall, increased sedimentation, debris flows, road diversion, crossing structure failure; Threat to road prism, drainage features, and crossings	Unlikely	Moderate	Low	No treatment	Suppression Repair, Hazard Tree work	
Life & Safety	Road 1825-214	Hazard trees, rock fall, increased sedimentation, debris flows, road diversion, crossing structure failure; Threat to road prism, drainage features, and crossings	Possible	Moderate	Intermediate	Keep temporary closure in place through first seasonal rain periods or longer if needed	Suppression Repair, Hazard Tree work	Crossing at beginning of road(first half-mile); very high aquatic risk; critical habitat a begin of road
Property- Roads	Road 1825-214	Hazard trees, rock fall, increased sedimentation, debris flows, road diversion, crossing structure failure; Threat to road prism, drainage features, and crossings	Possible	Moderate	Intermediate	Storm Inspection Response for open segments in high/mod SBS and/or areas with high rock fall potential	Suppression Repair, Hazard Tree work	
Life & Safety	Road 1835-220	Hazard trees, rock fall, increased sedimentation, debris flows, road diversion, crossing structure failure; Threat to road prism, drainage features, and crossings	Possible	Major	High	Road Closure Device/Signs	Suppression Repair, Hazard Tree work	
Property- Roads	Road 1835-220	Hazard trees, rock fall, increased sedimentation, debris flows, road diversion, crossing structure failure; Threat to road prism, drainage features, and crossings	Very Likely	Major	Very High	Pull Pipes	Suppression Repair, Hazard Tree work	Note: Critical Habitat downstream
Life & Safety	Road 1835-226	Hazard trees, rock fall, increased sedimentation, debris flows, road diversion, crossing structure failure; Threat to road prism, drainage features, and crossings	Possible	Minor	Low	No treatment	Suppression Repair, Hazard Tree work	
Property- Roads	Road 1835-226	Hazard trees, rock fall, increased sedimentation, debris flows, road diversion, crossing structure failure; Threat to road prism, drainage features, and crossings	Possible	Moderate	Intermediate	Pull Pipes	Suppression Repair, Hazard Tree work	Critical Habitat
Life & Safety	Road 1835-243	Hazard trees, rock fall, increased sedimentation, debris flows, road diversion, crossing structure failure; Threat to road prism, drainage features, and crossings	Possible	Moderate	Intermediate	No treatment	Suppression Repair, Hazard Tree work	
Property- Roads	Road 1835-243	Hazard trees, rock fall, increased sedimentation, debris flows, road diversion, crossing structure failure; Threat to road prism, drainage features, and crossings	Possible	Moderate	Intermediate	Pull Pipes	Suppression Repair, Hazard Tree work	2 undersized culverts, one with possible road failure; critical habitat downstream
Life & Safety	Road 1835-244	Hazard trees, rock fall, increased sedimentation, debris flows, road diversion, crossing structure failure; Threat to road prism, drainage features, and crossings	Possible	Moderate	Intermediate	Road Closure; Storm Inspecation/Response	Suppression Repair, Hazard Tree work	
Property- Roads	Road 1835-244	Hazard trees, rock fall, increased sedimentation, debris flows, road diversion, crossing structure failure; Threat to road prism, drainage features, and crossings	Possible	Moderate	Intermediate	Road Closure; Storm Inspecation/Response	Suppression Repair, Hazard Tree work	
NFS Trails, Trailheads, and Recreation Sites								
Life & Safety	Gold Point Trail	Mod/high SBS: Missing/non-existent trail tread due to tree and rock fall/root burn out/moisture removal from soil; hazard trees falling; debris and rock fall	Possible	Major	High	Suggest emergency long-term trail closure for full-extent of trail; install non-permanent, yet not easily movable barriers, signage at trailheads		
Property	Gold Point Trail	Missing/non-existent trail tread due to tree and rock fall/root burn out/moisture removal from soil; falling trees could rip out remaining trail bed; debris and rock fall could further gouge trail bed; the trail is a major attractant for visitors from all over and is a significant economic driver for the local economy	Possible	Major	High	Ancillary removal of downed woody debris across original trail footprint at key sections to retain soil and limit loss through runoff; some hazard tree work will be necessary to protect staff during erosion control efforts		
Life & Safety	Fall Creek National Recreation Trail	Low/Mod SBS: Missing/non-existent trail tread due to tree and rock fall/root burn out/moisture removal from soil; hazard trees falling; debris and rock fall	Possible	Major	High	Suggest emergency short-term trail closure for section; install non-permanent, yet		

						not easily movable barriers, signage at trailheads		
Property	Fall Creek National Recreation Trail	Missing/non-existent trail tread due to tree and rock fall/root burn out/moisture removal from soil; falling trees could rip out remaining trail bed; debris and rock fall could further gouge trail bed; the trail is a major attractant for visitors from all over and is a significant economic driver for the local economy	Likely	Moderate	High	Ancillary removal of downed woody debris across original trail footprint at key sections to retain soil and limit loss through runoff; some hazard tree work will be necessary to protect staff during erosion control efforts		
Municipal Water Supply and Wild and Scenic River								
Life & Safety	City of Westfir Water Supply	Sediment, nutrients, ash, algal blooms; intake on NFS lands in North Fork Middle Fork Willamette River watershed; water supply system is non-NFS property	Unlikely	Minor	Very Low	Communication with City of Westfir		
Life & Safety	North Fork Middle Fork Willamette Wild and Scenic River	Increased flows and sedimentation	Unlikely	Major	Intermediate	No treatment; hydro modeling indicates the small acreage and low SBS would result in negligible increase in flow and sedimentation		
Soil Productivity								
Resources	Soil productivity and hydrologic function in moderate and high severity burn areas	Increased erosion due to loss of forest floor and vegetative cover; weakened soil structure and organic matter loss resulting in long-term erosion susceptibility; destabilization due to progressive tree mortality and failure; reduced water holding capacity and increased thermodynamic variability may slow vegetation recovery	Likely	Moderate	High	Natural recovery in areas where other critical values are not threatened by erosion/soil loss	Rationale for probability: Topsoil loss already evident in some locations, signs of pedestaling in moderate and high severity areas; slopes are steep; significant loss of overstory; evidence of past slope failures; multiple drainages had 60-100% debris flow probability in USGS maps; needle cast and remaining coarse woody debris will aid in surface protection.	Rationale for magnitude: Soils in these landscapes are inherently susceptible to erosion and mass failure under native conditions. Post-fire conditions will exacerbate this and result in long-term impacts, but soil productivity will be recoverable in most areas.
ESA-Threatened Fish and Critical Habitat								
Resources	Spring Chinook Salmon	Fall Creek, Portland Creek, Logan Creek - important for spawning and rearing; Elevated risk of erosion and runoff, debris flows, and road failures could deliver large amounts of sediment which could have detrimental effects to eggs, fry, parr, and adults	Likely	Moderate	High	Treatments that reduce risk of road/crossing failures will help mitigate impacts. Treatments that reduce the risk of spread of invasive riparian plants will help mitigate impacts		

Resources	Spring Chinook Salmon Critical Habitat	Fall Creek, Portland Creek, and Logan Creek are important for spawning and rearing. Increased temperature, flows, sediment, debris flows, and nutrient loads may impact habitat and water quality. Reduction in quality of CH and loss of native plant communities through the spread of noxious weeds. Post-fire inputs of sediment, nutrients, and wood are natural processes that help replenish and create complex, high-quality fish habitat. Native fisheries have adapted to these processes and need them for long-term persistence. There may be short-term impacts to fish and fish habitat, but long-term habitat benefits are expected.	Likely	Moderate	High	Treatments that reduce risk of road/crossing failures will help mitigate impacts. Treatments that reduce the risk of spread of invasive riparian plants will help mitigate impacts	
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ESA-Endangered Wildlife and Critical Habitat

Resources	Northern Spotted Owl Critical Habitat, Suitable Habitat, LSR and NSO Territories	Continued loss of habitat from post-fire stress, wind and storm events and post-fire insect and disease and disturbance from implementation of BAER acitvities during the nesting season.	Possible	Moderate	Intermediate	No treatment; Seasonal Restriction, March 1-July 15 for activities in and near the nest patch (75 ft from edge of patch)		Overall low and moderate severity fire. Thirty four Activity Centers and eleven territories affected. Three Activity Centers lost a substantial amount of habitat. Consequence is thought Moderate due to fire impacts on Activity Centers.
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Heritage Resources

Resources	Heritage Resources	No known NRHP listed sites within the fire boundary. Most sites located in low or moderate burn severity in locations unlikely to be impacted by natural post-fire processes.	Possible	Minor	Low	No treatment		Consult with District Archaeologist before implementing any ground disturbing treatments recommended by other Resource areas.
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Botanical Resources

Resources	Native and Naturalized Plant Communities - Rare Plants within Burned Area	R6 listed plants and their associated special habitats that were burned over are susceptible to invasion by non-native invasive plant species that are wind blown or animal dispersed.	Very Likely	Major	Very High	EDRR detecting and eradicating non-natives before they can get established in rare plant habitat in 2022.		Gold Point Romanzoffia thompsonii populations. Cimicifuga elata population along Fall Creek.
Resources	Native and Naturalized Plant Communities - Invasives within Burned Area	Areas of high and moderate vegetation mortality are highly susceptible to invasion by high priority noxious weed species. Road system in fire perimeter has periodic, small infestations of high priority weed species which provide seed sources into newly fire disturbed areas.	Very Likely	Moderate	Very High	Monitor and EDRR in areas of high and moderate soil burn severity within the fire perimeter and adjacent to FS system roads in 2022.		
Resources	Native and Naturalized Plant Communities - Fire suppression disturbance areas	High priority noxious weed populations occur patchily along the road systems developed as primary and contingency line for the Gales fire. These plants were in full seed at the time of mechanical treatment along these road systems and the disturbance created by the large equipment spread seed as well as opened areas for invasion to high priority noxious weeds. Firefighter equipment and gear likely carried seed from other locations, including known populations at fire camp.	Likely	Moderate	High	EDRR treatment and monitoring of road systems in the fire suppression area in 2022		Populations of annual invasive grasses, African wire grass (<i>Ventenata dubia</i>) and medusahead rye (<i>Taeniatherum caput-medusae</i>) were discovered during the establishment of fire camp and have a high likelihood of transportation by and introduction from fire fighter gear and equipment.

Table 12. KWIS FIRE - FS Critical Value Table

High / Very High Risk		Intermediate Risk		Low / Very Low Risk					
Life/ Property/ Resources	Critical Value	Threat to Value	Probability of Damage or Loss	Magnitude of Consequence	Risk	Treatment	Other Treatment Recommendations (outside of BAER)	Notes	
NFS Roads, Bridges, and Culverts									
Life & Safety	Road 2400-207	Hazard trees, rock fall, increased sedimentation, debris flows, road diversion, crossing structure failure; Threat to road prism, drainage features, and crossings	Possible	Major	High	Keep temporary closure in place through first seasonal rain periods or longer if needed; Signage at Road 2400 junction	Continue to monitor road for debris flow hazard beyond 1 year; notify DOGAMI of possible study site	The first crossing on 207 road is Aubrey Bridge on Salmon Creek - functioning well, plenty of capacity; possible debris flow risk (with high volume) at large culvert; local road; high and moderate SBS	
Property- Roads	Road 2400-207	Hazard trees, rock fall, increased sedimentation, debris flows, road diversion, crossing structure failure; Threat to road prism, drainage features, and crossings	Possible	Major	High	Storm Inspection & Response	Continue to monitor road for debris flow hazard beyond 1 year; notify DOGAMI of possible study site	The first crossing on 207 road is Aubrey Bridge on Salmon Creek - functioning well, plenty of capacity; possible debris flow risk (with high volume) at large culvert; local road; high and moderate SBS	
Life & Safety	Road 2408-270	Hazard trees, rock fall, increased sedimentation, debris flows, road diversion, crossing structure failure; Threat to road prism, drainage features, and crossings	Possible	Major	High	Keep temporary closure in place through first seasonal rain periods or longer if needed; Maintain existing barrier as needed; Signage at bottom of Road 2408		Local road; moderate SBS	
Property- Roads	Road 2408-270	Hazard trees, rock fall, increased sedimentation, debris flows, road diversion, crossing structure failure; Threat to road prism, drainage features, and crossings	Possible	Moderate	Intermediate	No treatment		Local road; moderate SBS	
Life & Safety	Road 5871-334	Hazard trees, rock fall, increased sedimentation, debris flows, road diversion, crossing structure failure; Threat to road prism, drainage features, and crossings	Possible	Major	High	Keep temporary closure in place through first seasonal rain periods or longer if needed; Signage at bottom of Road 5871 at Hwy 58 and 5871-327 junton near Eugene to Crest trail and fire perimeter		Local road; high and moderate SBS; coordinate signage with Recreation specialist	
Property- Roads	Road 5871-334	Hazard trees, rock fall, increased sedimentation, debris flows, road diversion, crossing structure failure; Threat to road prism, drainage features, and crossings	Likely	Minor	Low	No treatment		Local road; high and moderate SBS	
Life & Safety	Road 5871-335	Hazard trees, rock fall, increased sedimentation, debris flows, road diversion, crossing structure failure; Threat to road prism, drainage features, and crossings	Possible	Major	High	Keep temporary closure in place through first seasonal rain periods or longer if needed; Signage at bottom of Road 5871 at Hwy 58 and 5871-327 junton near Eugene to Crest trail and fire perimeter		Local road; high and moderate SBS	
Property- Roads	Road 5871-335	Hazard trees, rock fall, increased sedimentation, debris flows, road diversion, crossing structure failure; Threat to road	Possible	Major	High	No treatment		Local road; high and moderate SBS	

		prism, drainage features, and crossings						
NFS Trails, Trailheads, and Recreation Sites								
Life & Safety	Eugene to Crest Trail	Low/Mod SBS: Missing/non-existent trail tread due to tree and rock fall/root burn out/moisture removal from soil; hazard trees falling; debris and rock fall	Possible	Major	High	Suggest emergency short-term trail closure for section; install non-permanent, yet not easily movable barriers, signage at trailheads		
Property	Eugene to Crest Trail	Missing/non-existent trail tread due to tree and rock fall/root burn out/moisture removal from soil; falling trees could rip out remaining trail bed; debris and rock fall could further gouge trail bed; the trail is a major attractant for visitors from all over and is a significant economic driver for the local economy	Likely	Moderate	High	Ancillary removal of downed woody debris across original trail footprint at key sections to retain soil and limit loss through runoff; some hazard tree work will be necessary to protect staff during erosion control efforts	Suggest pursuit of suppression repair funds to pull tread back in after bull dozer work and naturalize path where saw teams cut new routes that might get confusing for recreationists. Soil stabilization from suppression work will need to be increased.	
Life & Safety	Salmon Creek Falls Campground	Campground sits just outside the Kwis Fire perimeter but hazard trees along the perimeter pose a threat to human life and safety	Possible	Major	High	Suggest some strategic hazard tree work to remove trees along Kwis Fire perimeter where it parallels the campground boundary		
Property	Salmon Creek Falls Campground	Campground sits just outside the Kwis Fire perimeter but hazard trees along the perimeter pose a threat to campground property	Likely	Moderate	Intermediate	Suggest some strategic hazard tree work to remove trees along Kwis Fire perimeter where it parallels the campground boundary		
Soil Productivity								
Resources	Soil productivity and hydrologic function in moderate and high severity burn areas	Increased erosion due to loss of forest floor and vegetative cover; weakened soil structure and organic matter loss resulting in long-term erosion susceptibility; destabilization due to progressive tree mortality and failure; reduced water holding capacity and increased thermodynamic variability may slow vegetation recovery	Likely	Moderate	High	Natural recovery in areas where other critical values are not threatened by erosion/soil loss	Rationale for probability: Topsoil loss already evident in some locations, signs of pedestaling in moderate and high severity areas; slopes are steep; significant loss of overstory; evidence of past slope failures; needle cast and remaining coarse woody debris will aid in surface protection. Rationale for magnitude: Soils in these landscapes are inherently susceptible to erosion and mass failure under native conditions. Post-fire conditions will exacerbate this and result in long-term impacts, but soil productivity will be recoverable in most areas. Other treatments considered: mulching, seeding, point sediment barriers; these potential treatments are not feasible and/or not highly effective on steep slopes.	
ESA-Threatened Fish								

Resources	Spring Chinook Salmon	Salmon Creek upstream of hatchery - no spawning and rearing; Willamette Hatchery - very important for rearing hatchery Chinook; Mass wasting or road failure/diversion could deliver large amounts of sediment and nutrients (including ash) which could have detrimental effects to eggs, fry, and juveniles;	Possible	Moderate	Intermediate	Treatments that reduce risk of road/crossing failures will help mitigate impacts. Treatments that reduce the risk of spread of invasive riparian plants will help mitigate impacts; Notify Willamette Hatchery of potential water quality and infrastructure impacts		
Resources	Spring Chinook Salmon Critical Habitat	Increased temperature, flows, sediment, debris flows and nutrient loads may impact habitat and water quality; Mass wasting or road failure/diversion could deliver large amounts of sediment which could have long-term impacts to Critical Habitat; Because Salmon Creek is not important for spawning, magnitude of consequences would be Minor	Possible	Moderate	Intermediate	Treatments that reduce risk of road/crossing failures will help mitigate impacts. Treatments that reduce the risk of spread of invasive riparian plants will help mitigate impacts		
Resources	Bull Trout	Salmon Creek/Middle Fork Willamette River - foraging, migrating, overwintering only; Mass wasting or road failure/diversion could deliver large amounts of sediment and nutrients (including ash) which could have detrimental effects to fry, juveniles, sub-adults, and adults	Unlikely	Moderate	Low	Treatments that reduce risk of road/crossing failures will help mitigate impacts. Treatments that reduce the risk of spread of invasive riparian plants will help mitigate impacts		
Resources	Bull Trout Critical Habitat	Increased temperature, flows, sediment, debris flows and nutrient loads may impact habitat and water quality; Mass wasting or road failure/diversion could deliver large amounts of sediment which could have long-term impacts to Critical Habitat; Because Salmon Creek is not important for spawning, magnitude of consequences would be Minor	Unlikely	Moderate	Low	Treatments that reduce risk of road/crossing failures will help mitigate impacts. Treatments that reduce the risk of spread of invasive riparian plants will help mitigate impacts		
ESA-Endangered Wildlife								
Resources	Northern Spotted Owl Critical Habitat, Suitable Habitat, and NSO Territories	Continued loss of habitat from post-fire stress, wind and storm events and post-fire insect and disease and disturbance from implementation of BAER activities during the nesting season.	Possible	Minor	Low	Seasonal Restriction, March 1-July 15 for activities in and near the nest patch (75 ft from edge of patch)		Overall low-intensity fire. Six territories marginally affected by the fire and additional post-fire tree mortality should not significantly affect the ability of these territories to support nesting. Consequence is thought minor due to low burn severity and AC still expected to support owls.
Heritage Resources								
Resources	Heritage Resources	No previously identified sites within the fire's boundary. Exterior sites unlikely to be impacted by natural post-fire processes	Unlikely	Minor	Very Low	No treatment		No known sites within fire; consult with archeologist prior to any ground disturbing BAER treatment activities
Botanical Resources								

Resources	Native and Naturalized Plant Communities	High priority noxious weeds occur in patches within and adjacent to the fire perimeter and are at a high risk of introduction and spread into the burned area with negative impacts to native plant communities. Especially in dry meadow and oak woodland special habitats along the fire perimeter which are located along major travel routes and fire line construction.	Very Likely	Moderate	Very High	Monitoring of special habitat areas along the fire perimeter (Heckletooth Mountain and Salmon Creek oak habitat).	
Resources	Native and Naturalized Plant Communities	Areas of high and moderate vegetation mortality are highly susceptible to invasion by high priority noxious weed species. Road system in fire perimeter has periodic small infestations of high priority weed species which provide seed sources into newly fire disturbed areas.	Likely	Moderate	High	Monitor and EDRR in areas of high and moderate soil burn severity within the fire perimeter and adjacent to FS system roads in 2022.	
Resources	Native and Naturalized Plant Communities - Fire suppression disturbance areas	High priority noxious weed populations occur patchily along the road systems developed as primary and contingency line for the Kwis fire. These plants were in full seed at the time of mechanical treatment along these road systems and the disturbance created by the large equipment spread seed as well as opened areas for invasion to high priority noxious weeds. Firefighter equipment and gear likely carried seed from other locations, including known populations at fire camp.	Likely	Moderate	High	EDRR treatment and monitoring of road systems in the fire suppression area in 2022	Populations of annual invasive grasses, African wire grass (<i>Ventenata dubia</i>) and medusahead rye (<i>Taeniatherum caput-medusae</i>) were discovered during the establishment of Hills Creek fire camp and have a high likelihood of transportation by and introduction from fire fighter gear and equipment.

- 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 critical BAER values, including human life and safety, property, and natural, cultural and heritage resources on National Forest System lands.

Protection and Safety – The objectives of the specified protection and safety treatments are to protect members of the public, Forest Service employees, partners and contractors from imminent threats to life and safety posed by post-fire conditions, including hazard trees, rockfall, flooding and debris flows that may impact roads and trails that passthrough or adjacent to the burned area.

Native and naturalized plant communities - Propagation and spread of invasive, non-native plants in fire-and fire-suppression-disturbed areas is a threat to native and naturalized plant communities. Post-fire non-native invasive plant detection is recommended in the first post-fire year “to determine the post-fire presence of invasive species” moving from roads, trails and firelines into burned areas. This is consistent with Forest Service Manual direction for BAER treatment of invasive plants (FSM2523.3). The priority focus for invasive weed treatments will be areas disturbed by suppression, those affected by fire, and preventing known weed populations in proximity to burned and disturbed areas from invading and colonizing those areas.

Road and Trail Treatments - The objectives of road and trail treatments are to:

1. Protect road and trail investments from becoming impassible and/or damaged by increased post-fire runoff (Storm Inspection and Response, Stormproofing and other drainage improvements – Roads – see below for details; Trail Infrastructure Protection - Fall Creek National Recreation Trail 3455, Gold Point Trail 3468 and Gold Point Tie 3468-1, Eugene to Pacific Crest 3559).
2. Reduce sedimentation into streams to reduce water quality degradation (Stormproofing drainage, Storm Inspection and Response, Drainage modifications, Trail Drainage, Trail Infrastructure Protection).

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

Land: 90

Roads/Trails: 75

Protection/Safety: 90

D. Probability of Treatment Success

Table 13: Probability of Treatment Success

	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	95	95	95
Protection/Safety	90	95	95

E. Cost of No-Action (Including Loss): \$600,000

F. Cost of Selected Alternative (Including Loss): \$450,000

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"/> Botany | <input checked="" type="checkbox"/> Recreation | <input checked="" type="checkbox"/> Fisheries | <input checked="" type="checkbox"/> Wildlife | |
| <input checked="" type="checkbox"/> Geology | | | | |

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Forest BAER Coordinator: Fred Levitan
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(541) 731-2593 cell

Team Members: *Table 14: BAER Team Members by Resource Area*

Skill	Team Member Name
<i>Team Lead(s)</i>	Fred Levitan, Kate Meyer
<i>Soils</i>	Kelsey Martin
<i>Hydrology</i>	Diane Hopster, Dustin Walters
<i>Fisheries</i>	Kate Meyer
<i>Wildlife</i>	Esmeralda Bracamonte
<i>Engineering</i>	Ryan Brown (t)
<i>GIS</i>	Janice Naylor, Matt Helstab (t)
<i>Archaeology</i>	Annmarie Kmetz, Cayla Kennedy (t), Lexi Blanchard (t)
<i>Botany</i>	Krista Farris, Jennifer Moore, Sarah Uebel
<i>Recreation</i>	Emily Long
<i>Geology</i>	Barton Wills, Jered Hogansen (t)

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.

L1a./ L1b./ L2. Invasives EDRR and Invasives EDRR Suppression:

Early Detection Rapid Response (EDRR) treatment of high priority non-native invasive plant species is proposed along roadsides that burned resulting in greater than 50% mortality and had documented priority weed infestations in close proximity. Rapid spread of non-native plants into newly burned riparian areas could reduce native plant regeneration and further degrade habitat. Finally, EDRR treatment is proposed for Forest Service roadsides used for fire suppression activities (direct access roads) and interior roads that burned with greater than 50% mortality and have non-native invasive plant infestation in close proximity. Roads are major vectors for the introduction and spread of invasives, and early detection and treatment will help prevent new infestations from invading newly burned ground.

EDRR for roads used as containment lines, staging areas, drop points and other ground disturbance caused by fire suppression activities is also proposed under suppression EDRR. The likelihood that firefighters' vehicles and equipment brought in propagules from outside the Willamette National Forest is high. Early detection and treatment will help prevent new invasive species from becoming established in these disturbed areas.

Table 15. BAER non-suppression botany treatments L1a.

Line items	units	Unit cost	# of units	Total \$
Native plant community adjacent to high priority roads EDRR				
Weed Surveys along roads with moderate and high burn severity (60 ac Kwis, 602 ac Gales)	Acres	\$20	662	\$13,240
Weed Treatments (est. based on nearby infestations pre-fire included TES/shab sites)	Roadside acres	\$200	70	\$14,000
Total				\$31,240
Grand total (non-suppression)				\$27,240

Table 16. Invasives EDRR-Suppression L1b. (treatments for suppression-related impacts only)

Line items	units	Unit cost	# of units	Total \$
Dozerlines, staging areas, drop points, roads as containment, danger tree removal areas				
Weed surveys	acres	\$23	636	\$14,850
Treatments (est. based on proximity of existing infestations. 93 ac. Gales, 2 ac. Kwis)	acres	\$400	95	\$38,000
Total				\$52,850
Grand Total (suppression)				\$80,090

Road Treatments:

R1 – Storm Proofing: Storm-proofing or improving existing road drainage features to accommodate post-fire conditions will be focused on cleaning culvert inlets and catch basins, removing slough/slide/debris from ditches to facilitate positive drainage, and repairing damaged culverts (reshaping damaged inlets/outlets) on roads in the moderate/high severity burn area. This is especially imperative for roads with asphalt concrete pavement surfaces. Hazard tree falling to be authorized where response by FS crews would otherwise be unsafe.

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

FSR: 1800, 1825-214, 1832, 1833, 1834, 1834-390 and 2400-207

R2a – Armored Dip: Addition of armored dips will reduce the chances of the culvert and road being overtapped, and ensure protection of the remaining road infrastructure. This will also ensure protection of downstream values at risk of large quantity of sedimentation deposits from road failure.

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

FSR: 1833, 1834, 1834-390 and 1835

R3 – Storm Inspection and Response: Storm inspection/response is selected for 23.13 miles of road where high predicted post-fire erosion or rockfall hazards exist related to moderate to high burn severity. Hazards are upslope or upstream of road segments or road-stream crossings where they would threaten road prism integrity, road passability, and/or and drainage structures. Crews will drive selected roads during or immediately after storms checking for slides and/or debris accumulations and performing rapid but thorough inspection of drainage features and other structures. The crews will keep culvert and drainage features functional by cleaning sediment and debris from in and around features between or during storms. The inspection will be accomplished by District Engineering staff to identify areas needing response, and the District Road Crew will accomplish the response portion through equipment rental (backhoe and dump truck transport, including operator, fuel and maintenance), and general labor. All work performed shall conform to FP-14 Standard Specifications for Construction of Roads and Bridges on Federal Highway Projects and applicable Forest Service Supplements.

FSR: 1800, 1825-214, 1832, 1833, 1834, 1834-390, 1835, 1835-244 and 1839 - 23.13 miles in moderate and high burn severity

R4 – Culvert Removal: Culvert removal will reduce the chances of culverts and roads being overtapped by high water events and/or debris accumulation at inlets of drainage features, and so provide protection for the remaining road infrastructure. This will also help protect downstream values at risk from large quantity of sediment deposition, by helping prevent crossing and road prism failure.

This treatment is prescribed in the following locations, on roads in storage: (maintenance level 1) (see attached treatment map)

FSR: 1835-226, 1835-243 and 1835-244

R6 – Culvert Modifications: Proposed culvert modifications are the addition of drop inlet systems. These are installed to ensure positive drainage with increased runoff and debris accumulation.

FSR: 1800, 1833, 1834, and 1835 roads, 23 total drop inlet installations

S1a – Road Hazard Signs: Signage will be placed on roads leading into perimeter of burn area. These locations are listed in the VAR table, and in Table 17.

Table 17. Post-Fire Hazard Warning Sign Locations

FSR	No. of Signs	Location(s)
1800	2	At Jct. FSR 1825 and Termini 1800, located by District Engineering.
1900	1	At Jct. FSR 1910, located by District Engineering.
240020	1	At Jct. FSR 2400, located by District Engineering.
240827	1	At Jct. FSR 2400, located by District Engineering.
5871	1	At Jct. HWY 58, located by District Engineering.

S2 – Physical Closure Devices: Several temporary road closure gates or barricades (jersey barriers) have been placed to provide closure of the fire area, eliminating or discouraging through-traffic while there is still a threat to Human Life and Safety. The gates will be inspected periodically during storm inspection and response activities, and repaired as needed. Once the threat is no longer present and the closure is lifted, the gates and barricades shall be removed and relocated back to Flat Creek Work Center. Several existing gate and barrier locations are listed below – three additional gates are included for as-yet undetermined locations as needed.

Recommended Gate/Barricade Locations:

Gate 1 – Road 1800 MP 15.67

Gate 2 – Road 1834 MP 0.10

Gate 3 – Road 1835 MP 0.10

Gate 4 – Road 1835 MP 15.99

Gate 5 – Road 2400-207 MP 0.10

Barricade 1 – Road 5871 MP 4.80

Barricade 2 – Road 2408-270 MP 0.00

Table 18. Engineering Cost Estimates - Road Treatments (Gales & Kwis Fires)

Line items: Gales & Kwis Fires	Units	Unit cost	# of Units	Total \$
Roads and Trails				
R1 Road Drainage (Storm proofing)	Miles	\$2,300	23	\$53,000
R2a Armored dip	Each	\$1,500	5	\$7,500
R3 Storm Inspection and Response	Miles	\$800	23	\$18,500
R4 Culvert Removal	Each	\$300	19	\$5,700
R6 Culvert Modifications	Each	\$2,500	23	\$57,500
Total				\$142,200
Protection and Safety				
S1a Road Hazard Signs	Each	\$750	8	\$6,000
S2 Physical closure devices Inspect gates, repair as needed.	Each	\$900 (Gate)	8	\$7,200
S2 Physical closure devices Inspect temporary barriers, return to Flat Creek Work Center when no longer needed.	Each	\$500 (Barricade)	4	\$2,000
Total				\$12,500
Grand total				\$154,700

Trail Drainage (T1): Treatment Description – Work will include tread leveling and repair, including removal of soil deposits from erosion and runoff, and trail re-benching and/or out-sloping. This work is necessary to retain the investment in the trail prism - replacement costs if lost would greatly exceed the cost of temporary stabilization. Trail program manager and crew lead time for coordination with partners and contractors regarding trail conditions is included. Work will be completed with force account labor (reduced cost) if that is available at the time implementation is necessary, but should be completed before the onset of the winter rainy season. These activities include ancillary removal of downed woody debris that currently lies across the trail footprint and placement between the trail and the river in key segments. This will allow for increased of soil retention and reduced erosion loss. Trail stabilization retaining sediment prior to winter precipitation will enhance the likelihood of successful trail repair following BAER treatments, and reduce the chance of complete loss of the trail tread and prism.

Treatment Cost- (trail segments in high and moderate burn severity - one mile of the Fall Creek National Recreation Trail #3455, three and a half miles of Gold Point Trail #3468 and Gold Point Tie #3468.1, one-half mile of Eugene to Crest Trail #3559):

Table 19. Trail drainage cost estimate

Costs Estimate				
Item	Cost	Quantity (Day)	Total	Notes
USFS Trail Crew	\$597	42	\$25,074	Project Implementation
Total:				\$25,074

Trail Infrastructure Protection (T2): Includes temporary retaining walls to replace the wooden cribwalls burned in the fire. Absent these, the trail prism would quickly be eroded away during winter runoff from the moderate soil burn severity area upslope. The Forest would later replace these temporary supports with permanent structures using minor infrastructure pilot funds. Trail program manager and crew lead time for coordination with partners and contractors regarding trail conditions is

included. Work will be completed with force account labor (reduced cost) if that is available at the time implementation is necessary, but should be completed before the onset of the winter rainy season.

Treatment Cost- (two miles of the Fall Creek National Recreation Trail #3455, three and a half miles of Gold Point Trail #3468, two and a half miles of Eugene to Crest Trail #3559):

Table 20. Trail infrastructure protection cost estimate

Costs Estimate				
Item	Cost	Quantity (Day)	Total	Notes
USFS Trail Crew	\$597	42	\$25,074	Project Implementation
Total:				\$25,074

Protection/Safety Treatments:

Recreation Hazard Signs (Developed Rec sites) (P1b) - *Treatment Description* – Install warning signs to alert visitors of burned area post-fire effects on affected trails, at Salmon Creek Falls Campground, and include trailheads for the Fall Creek National Recreation Trail #3455, Gold Point Trail #3468, and Eugene to Crest Trail #3559). Install two temporary barriers at Gold Point trailheads (upper and lower).

Treatment Cost: The unit cost of the sign includes labor cost for ordering and installation. Estimated 1 day needed for total sign installation time. Program management costs are also included in the unit costs.

Table 21. Recreation hazard signage and safety mitigation cost estimate

Treatment	Units	# of Units	Unit Cost	Total Cost
Trail warning signs for trailheads	Each	16	\$400	\$6,400
Temporary trail closure barriers for Gold Point Trail	Each	2	\$800	\$1,600
Total Cost:				\$8,000

Protect human life and safety by raising awareness through posting hazard warning signs at recreation sites, trailheads and when entering the burned area (Road Hazard Signs, Trail/Recreation Hazard signs).

BAER Implementation/Coordination:

BAER Implementation Coordinator (M4) – Salary and expenses for a detailer to provide coordination and oversight of BAER project implementation, including workforce, project planning, procurement, and coordination of project work with other District post-fire priority work. Likely supplemental funding for additional days for this detail to come from minor infrastructure pilot, P-code danger tree and other district post-fire work.

Cost Estimate				
Item	Cost	Quantity (Day)	Total	Notes
FS Detailer	\$500	20	\$10,000	Implementation Coordinator

I. Monitoring Narrative: N/A

PART VI – EMERGENCY STABILIZATION TREATMENTS AND SOURCE OF FUNDS

Line Items	Units	NFS Lands			\$	Other Lands				All \$
		Unit	# of	BAER \$		# of	Fed	# of	Non Fed	
		Cost	Units	\$		units	\$	Units	\$	
A. Land Treatments										
L1a. Invasives EDRR	Acres	41	662	\$27,240	\$0		\$0		\$0	\$27,240
L1b. Invasives EDRR suppression	Acres	71	743	\$52,850	\$0		\$0		\$0	\$52,850
<i>Subtotal Land Treatments</i>				\$80,090	\$0		\$0		\$0	\$80,090
B. Channel Treatments										
N/A				\$0	\$0		\$0		\$0	\$0
<i>Subtotal Channel Treatments</i>				\$0	\$0		\$0		\$0	\$0
C. Road and Trails										
R1 Road Drainage (Stormproofing)	Miles	2,300	23	\$53,200	\$0		\$0		\$0	\$53,200
R2a Armored dip	Each	1,500	5	\$7,500	\$0					\$7,500
R3 Storm Inspection and Response	Miles	800	23	\$18,500	\$0					\$18,500
R4 Culvert Removal	Each	300	19	\$5,700	\$0		\$0		\$0	\$5,700
R6 Culvert Modifications	Each	2,500	23	\$57,500	\$0		\$0		\$0	\$57,500
T1 Trail Drainage	day	595	42	\$25,000						\$25,000
T2 Trail Infrastructure Protection	day	595	42	\$25,000						\$25,000
<i>Subtotal Road and Trails</i>				\$192,400	\$0		\$0		\$0	\$192,400
D. Protection/Safety										
S1a Road Hazard Signs	Each	750	8	\$6,000	\$0		\$0		\$0	\$6,000
S2 Physical closure devices (gates)	Each	900	8	\$7,200	\$0		\$0		\$0	\$7,200
S2 Physical closure devices (barricades)	Each	500	4	\$2,000	\$0		\$0		\$0	\$2,000
S1b Recreation hazard signs	Each	400	16	\$6,400			\$0		\$0	\$6,400
S2 Physical closure device (barriers)	Each	800	2	\$1,600	\$0		\$0		\$0	\$1,600
<i>Subtotal Protection/Safety</i>				\$23,200	\$0		\$0		\$0	\$23,200
E. BAER Evaluation										
Initial Assessment	Report (estimate)			\$75,000			\$0		\$0	\$75,000
<i>Subtotal Evaluation</i>				\$75,000	\$75,000		\$0		\$0	\$75,000
F. Coordination and Monitoring										
M4. BAER Implementation/Coordination	Days	500	20	\$10,000	\$0		\$0		\$0	\$10,000
<i>Subtotal Coordination and Monitoring</i>				\$10,000	\$0		\$0		\$0	\$10,000
G. Totals										
Previously approved				\$305,690	\$75,000		\$0		\$0	\$380,690
Total for this request				\$305,690						

PART VII - APPROVALS

1.

11/9/2021

Forest Supervisor

Date

Appendices.

A. Treatment Maps

