Date of Report: 10/16/2023

BURNED-AREA REPORT

Anvil Fire – Rogue River-Siskiyou National Forest Powers Ranger District

Figure 1: The Anvil Fire on September 14th.

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: Anvil

B. Fire Number: OR-RSF-000413

C. State: Oregon

D. County: Curry

E. Region: 06 Pacific Northwest

F. Forest: Rogue River-Siskiyou NF

G. District: Powers RD

H. Fire Incident Job Code: P6QLT0 (0610)

I. Date Fire Started: 08/25/2023

J. Date Fire Contained: 10/31/2023 (estimated)

K. Suppression Cost: $52,300,000 (10/13/2023)

L. Fire Suppression Damages Repaired with Suppression Funds (estimates):

1. **Fireline repaired (miles):**
   Access or improved road: 5.63
   Dozer line: 4.58
   Hand line: 7.36
   Mixed methods construction line: 0.05
   Road as line: 6.95
2. **Other (identify):** None reported as of BAER assessment completion. Suppression repair is expected to continue through October.

M. Watershed Numbers:

Table 1: Acres Burned by Watershed

HUC #	Watershed Name	Total Acres	Acres Burned	% of Watershed Burned
171003060202	Middle Sixes River	27,995	8,010	29%
171003060201	Upper Sixes River	41,707	1,827	4%
171003060301	Upper Elk River	36,096	8,655	24%
171003060302	Lower Elk River	22,300	3,660	16%

N. Total Acres Burned:

Table 2: Total Acres Burned by Ownership

OWNERSHIP	ACRES
NFS	21,334
BLM	108
STATE	0
PRIVATE	233
COQUILLE TRIBAL LANDS	475
NGO – ELK RIVER LAND TRUST	4
TOTAL	22,154

O. Vegetation Types: The vegetation within the Anvil Fire is dominated by mature mixed-conifer forest in the tanoak, hemlock, and tanoak/hemlock plant series. Douglas fir is the dominant species in all these associations, and the primary overstory tree species in the burned area. Other conifers include western red cedar, Port Orford cedar, western hemlock, grand fir, sugar pine, and knobcone pine. Hardwoods intermixed include tanoak, canyon live oak, madrone, myrtle, and chinquapin, and red alder and big leaf maple can be found in riparian areas. Common shrub and herbaceous species present include salal,

rhododendron, huckleberry, Oregon grape, beargrass, and sword fern, with manzanita in rockier areas and poison oak especially on south facing slopes.

P. Dominant Soils: Dominant soils within the Anvil Fire originate from colluvium and residuum weathered from either sandstone and siltstone or metasedimentary or metavolcanic rock. Soils range from a sandy loam to loam in the first mineral horizon. Rock fragment content ranges from 35 to 75 percent. Soils tend to be shallow to moderately deep with a depth to bedrock of 17 to 50 inches. These soils are classified as well drained with moderate to rapid permeability.

Q. Geologic Types: The Anvil Fire lies within the Western Klamath Terrane containing mostly sedimentary rocks with small inclusions of granite and diorite. Lithologies are predominated by Phanerozoic-Mesozoic-Cretaceous sedimentary rocks (95%). Additionally, Phanerozoic-Mesozoic-Jurassic granite and diorite are found to the southwestern edge (4%), and a small inclusion of Phanerozoic-Cenozoic-Tertiary Tyee Formation to the northern edge (<1%). A fault line runs north to south on the eastern portion of the fire.

R. Miles of Stream Channels by Order or Class:

Table 3: Miles of Stream Channels by Order or Class

STREAM TYPE	MILES OF STREAM
PERENNIAL	88
INTERMITTENT	13
EPHEMERAL	2
ARTIFICIAL PATH	3

S. Transportation System:

Trails: *National Forest (miles):* 0.2 *Other (miles):* 0

Roads: *National Forest (miles):* 11.2 *Other (miles):* 2.1

PART III - WATERSHED CONDITION

A. Burn Severity (acres):

Table 4: Burn Severity Acres by Ownership

Soil Burn Severity	NFS	BLM	NGO	Coquille Tribal Lands	Private	Total	% within the Fire Perimeter
Unburned	2,539.0	3.9	3.5	129.3	65.1	2,740.9	12.4%
Low	15,585.1	63.9	0.8	309.2	123.9	16,082.9	72.6%
Moderate	3,083.9	34.0	0	36.4	44.5	3,199.0	14.4%
High	126.2	5.8	0	0.2	0	132.2	0.6%
Total	21,334.4	107.7	4.4	475.1	233.5	22,154.9	100%

B. Water-Repellent Soil (acres): 3,651 acres (16%). Fire-induced water repellency levels were assessed based on field data observations. Natural water repellency was observed within the unburned areas as well as noted from local specialists. Natural strong water repellency was found in the first 0-2 cm of the first mineral horizon of the soil profile. In the low and moderate burn areas we found strong water repellency in the first 2 cm of mineral soil. In these areas it was likely due to the natural water repellency of the soil rather than from effects of the fire. In areas of low and moderate SBS the duff layer was not consumed by the fire and the natural water repellency was unaffected. Due to the inability to access high soil burn severity locations it was not observed if water repellency was found in this area. Estimates of water repellency for high soil burn severity was based on the BAER Soil Scientists professional experience from previous fires in the area. Majority of the acres of water-repellent soil are from moderate and high soil burn severity.

C. Soil Erosion Hazard Rating:

Table 5: Soil Erosion Hazard Rating Acreage by SBS classification

Soil Burn Severity	Erosion Hazard Rating						
	Slight	Moderate	Moderate or Severe	Severe	Severe or Very Severe	Very Severe	Total
Unburned / Very Low	17.3	5.7	398.9	0.5	95.0	2,220.2	2,737.6
Low	123.1	38.0	1,910.4	26.1	568.6	13,407.6	16,073.9
Moderate	5.4	5.4	301.6	2.8	178.8	2,703.3	3,197.3
High	0.0	0.0	10.0	0.0	16.0	106.1	132.2
Total	145.8	49.1	2,621.0	29.3	858.4	18,437.2	22,140.9

D. Erosion Potential: 16.2 – 24.2 tons/acre/year; average = 20.2 tons/acre/year. Analysis methodology included a review of modeled response to a 5- and 10-year storm event which have a 30 and 10 percent likelihood of occurrence, respectively, within the first two years post-fire. Average sediment delivery in the instance of a 10-year storm event is predicted to be 24.2 tons/acre/year for the entire fire area for the first two years post-fire. This is an increase from a pre-fire sediment prediction of 12.2 tons/acre/year for a 10-year runoff event. In the instance of a 5-year storm event within the first two years of post-fire recovery the average sediment delivery rate predicted for the fire area is 16.2 tons/acre/year. This is an increase from the pre-fire sediment prediction of 7.1 tons/acre/year for a 5-year runoff event.

E. Sediment Potential: 4,393.9 – 6,572.5 cubic yards/square miles/year; average = 5,483.2 cubic yards/square mile/year. It is assumed that 35 percent of sediment would be delivered based on slope roughness, surface rock fragments, and downed woody debris near streams that would function as sediment delivery interrupters. ERMiT estimates for sediment delivery erosion potential in tons per acre were converted to cubic yards per square mile.

F. Estimated Vegetative Recovery Period (years): Vegetation recovery will vary depending on plant association group, soil type, aspect, and soil burn severity. Grasses, shrubs, and forest understory are expected to recover in 1-3 years. The forest overstory is expected to recover in 20-30 years.

G. Estimated Hydrologic Response (brief description):

The Anvil Fire burned with a mosaic of mainly low and moderate SBS. Peak flow analysis was conducted at nine pour points using a modified regression equation. Modeling mimicked peak flows caused by long-duration frontal storms that typically occur during the wet season, approximately November through April. The 2-, 5-, and 10-year flow events were estimated for pre-fire and post-fire conditions. Model predictions including a bulking factor based on the percent of high, moderate and low SBS. Modeling indicated that peak flows at modeled drainages may increase by 1.0 – 1.4 times the pre-fire condition.

Hydrologic response in the Anvil Fire burned area will include reduced interception and infiltration of precipitation, increased runoff and erosion, higher stream flow volumes for a given precipitation input, and a more rapid rise of stream and river levels compared with those of unburned conditions. The loss of canopy cover, reduction in ground cover, and decreased infiltration rates within areas of moderate and high soil burn severity are expected to result in small increases in runoff. This increase can result in water quality degradation as ash and sediment move through the stream system.

Pre-fire peak flow modeling was completed using USGS Oregon StreamStats program that provides peak flow statistics with recurrence intervals of 2-, 5-, 10-, 25-, 50-, 100-, and 200-year floods. For each of the modeled drainages post-fire peak flow modeling was completed by first calculating the pre-fire discharge rate/surface area unit of measure (cfs/mi^2) for each recurrence interval flood. It is assumed that areas with unburned/very low and low soil burn severity will have similar watershed response to pre-fire conditions. The areas with moderate and high soil burn severity are assumed to have a cfs/mi^2 value equivalent to the next highest magnitude of flood. For example, when modeling response for the 2-year return interval flood areas with

moderate SBS is assumed to have a cfs/mi^2 response for a 5-year flood and high SBS areas are assumed to have the cfs/mi^2 value of a 10-year flood. A bulking factor was calculated to account for the increase in sediment and debris in post-fire flow events.

The table below shows the estimated percent increase of the 2-year, 5-year and 10-year flood event for each modeled drainage. In general the percent increase in post-fire flood events is approximately 15-25% above pre-fire flows, with the largest increase found in the smallest modeled drainage.

Table 6: Modeled flood discharge within the modeled drainages

Pourpoint Name	Percent Increase in 2-year flood event	Percent Increase in 5-year flood event	Percent Increase in 10-year flood event
Anvil Creek	29%	25%	25%
Bee Creek	29%	25%	25%
Butler Creek	24%	20%	20%
Dry Creek	31%	26%	27%
North Fork Dry Creek	25%	22%	22%
Red Cedar Creek	39%	32%	32%
Rock Creek	15%	13%	13%
Sunshine Creek	27%	24%	24%
Unnamed Trib to Elk River	45%	35%	36%

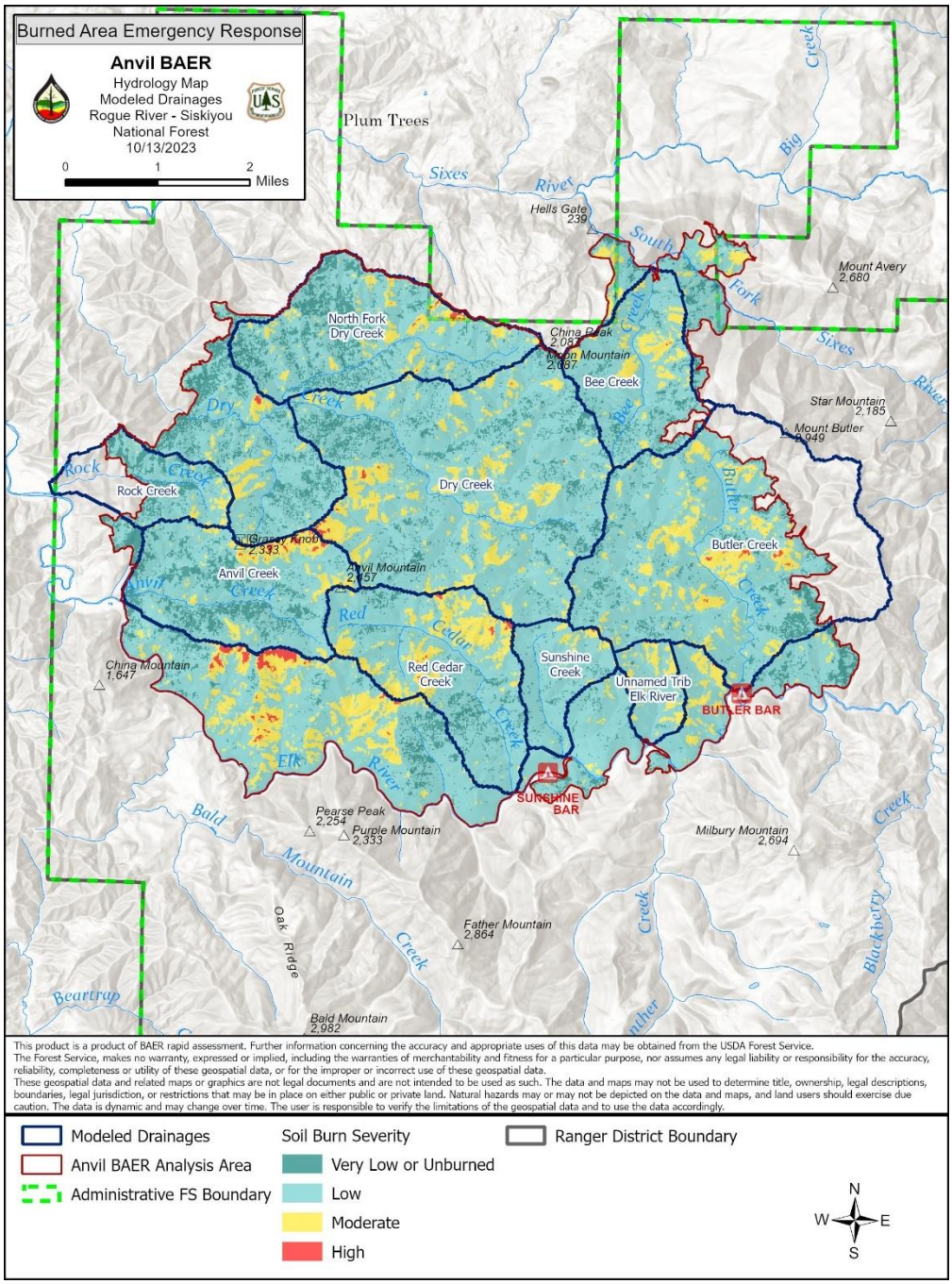

Figure 2. Modeled drainages within the Anvil Fire.

The USGS Post-Fire Debris-Flow analysis received from USGS on October 9, 2023, shows that majority of the Anvil fire has a combined hazard risk of low to moderate. There are isolated pockets of high risk for post-fire debris flows north of Butler Bar campground and west of the 5201 road. Another very isolated hillslope of high risk is located adjacent to the Dry Creek drainage north of Grassy Knob Road. Within the Anvil fire perimeter evidence of isolated mass wasting was observed such as rock fall and debris flows. It is assumed based on Google Earth imagery that some of these areas of mass wasting along Elk River were occurring prior to the start of the fire. Rock fall was observed along with other debris to fall onto Forest Service system roads. Overall, the combined hazard for the Anvil fire is low to moderate for majority of the fire.

PART V - SUMMARY OF ANALYSIS

Introduction/Background

The lighting caused Anvil Fire was discovered on Friday August 25th, burning in very rugged terrain within the Grassy Knob Wilderness approximately 8 miles east of Port Orford, Oregon. By the evening of August 27th, firefighters were able to construct containment line around 100% of the fire, which then measured 25.6 acres. On August 28th a hoist-capable rescue helicopter was ordered to medivac a severely injured firefighter from the incident. The rescue mission was a success however, rotor wash from the ship had pushed hot embers across the containment line. The gusting rotor winds fanned the fire across the drainage and upslope on the other side. Weather conditions and terrain aligned perfectly on Monday night to give the slop over an opportunity to gain a foothold. By Tuesday afternoon, the fire had continued to move around, challenging air and ground resources. On Wednesday, low relative humidities and optimal burning conditions allowed the fire to make a hard push toward the south.

Modest fire spread rates of up to approximately 200 acres per day occurred throughout the first two weeks of September. Fire activity significantly increased during the third week of September, which resulted in daily growth of 1,000 to 4,300 acres. Fire spread began to taper off with the arrival of significant precipitation during the last week of September. As of the writing of this report, numerous heat sources remain within the interior and expected to continue burning until season ending precipitation occurs.

The USFS BAER team began its assessment of the burn scar on October 8th. Soil Burn Severity (SBS) mapping was accomplished by ground truthing and adjusting an initial Burned Area Reflectance Classification (BARC) map using the methods outlined in RMRS-GTR-24. This resulted in a final field validated soil burn severity map (Figure 2). Additional field review and identification of threats to human life and safety, the NFS transportation system, soils, water quality, native vegetation communities, and cultural resources was completed by the BAER survey team.

The Anvil Burned Area Emergency Response Team coordinated with several federal, state, and local agencies as needed, as well as tribal groups. Coordination with the Coquille Tribe, Oregon Department of Fish & Wildlife (ODFW), and USGS was made throughout the timeline of the assessment of October 6th to October 12th.

The Natural Resources Director of the Coquille Indian Tribe initiated contact with the Powers District Ranger, in early October to coordinate an initial meeting to share information about the Burned Area Emergency Response (BAER) program and notify their interest in the Anvil BAER assessment. Anvil BAER Team Leads, Rogue River-Siskiyou National Forest BAER Coordinator, Anvil BAER Cultural Resource Specialist, and the Powers District Ranger held a meeting with the Tribal staff on October 6th. The above meeting objectives were met, and Anvil BAER Team Leads were instructed to share final assessment maps, such as the Final Soil Burn Severity and USGS Post-Fire Debris Flow Hazard Assessment Maps. Final assessment maps would help inform if post-fire threats were present on Coquille Tribal Lands. These products were shared with Tribal staff on October 12th, 2023.

A non-Forest Service value considered in the Anvil BAER Assessment was the Elk River Fish Hatchery managed by Oregon Department of Fish & Wildlife (ODFW). The Elk River Fish Hatchery is located 7.5 miles upriver from Highway 101 just north and east of the City of Port Orford. The Elk River Fish Hatchery was visited on October 8th, 2023, by BAER Team Hydrologist and Team Leads. ODFW staff provided a grounds facility tour and shared how the Elk River Hatchery operates.

To assess the probability and potential volumes of debris flows in the burned area the assistance of the US Geological Survey (USGS) - Landslide Hazards Program was obtained on October 10th, 2023. Their ongoing research has developed empirical models for forecasting the probability and the likely volume of such debris flow events. Summary results are presented in figure 3 and the hydrologic response section of this document. Detailed results can be found in the Anvil BAER Assessment project folder.

Ongoing coordination between the USFS, ODFW, Coquille Tribe, and NWS will be required to continue shared risk management responsibilities to protect non-FS critical values from flood and debris flow threats.

Threats to Non-Forest Service critical values within, downslope, or downstream of the burned area are limited.

The ODFW Elk River Fish Hatchery is located downstream of the burned area adjacent to the Elk River. The hatchery's water intake screens and pumps are threatened by the periodic flush of fine sediment and debris that is expected to occur during runoff producing precipitation events. The operators of the hatchery are aware of this threat and have already had to respond during the first post-fire rain events. Employees who live on-site are notified by an alarm that activates when the screens become clogged and require emergency cleaning that prevents damage to the water pumps behind the screens.

The Coquille Tribe manages timber lands on the north side of the burn scar. This land base includes a transportation system that is threatened by typical post fire threats (increased runoff, erosion, sedimentation, fire damaged trees, rockfall, etc.) Tribal land management staff is advised to review these threats along with the BAER team's soil burn severity data and the USGS' post-fire debris flow hazard assessment to determine if unacceptable risks are present.

The remainder of this report will focus on threats to Forest Service Critical BAER values identified in FSM 2523 – Emergency Stabilization – Burned Area Emergency Response. The risks resulting from these threats was calculated using the BAER Critical Value Matrix.

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

Table 7: 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):

a. Human life and safety of forest visitors utilizing the National Forest System roads and trails throughout the burned area is threatened by rockfall, hazard trees, fallen trees, and slumping and sloughing. The probability of damage or loss is **possible** given highly erodible soils, burned hillslopes, fire damaged trees, and the rate of speed at which users travel on the transportation system components. The magnitude of consequence is **major** because rockfall, shallow landslides, and tree strikes could result in serious injury or loss of life. The risk rating is **high**. BAER treatments are recommended. See treatments S1a, S1b, S3, and R7.

b. Human life and safety of forest visitors at the Sunshine Bar campground are threatened by hazard tree strikes at swimming areas on the Elk River. The probability of damage or loss is **possible** due to fire-weakened trees impacted by burned hillslopes and steep slopes directly above the campground. The magnitude of consequence is **major** because a tree strike would result in serious injury or loss of life. The risk rating is **high**. BAER treatments are recommended. See treatment S1b and S3.

c. Human life and safety of forest visitors at Butler Bar campground are threatened by hazard tree strikes at swimming areas on the Elk River. The probability of damage or loss is **very likely** due to fire-weakened trees impacted by low to moderate burned hillslopes and steep slopes directly above the campground. The magnitude of consequence is **major** because rockfall or a tree strike would result in serious injury or loss of life. The risk rating is **very high**. BAER treatments are recommended. See treatment S1b and S3.

d. Human life and safety of forest visitors at dispersed campsites throughout the burned area and Elk River swimming holes are threatened by rockfall, hazard trees, fallen trees, and debris flow. The probability of damage or loss is **possible** given the burned hillslopes, fire-weakened trees on steep slopes, and low to moderate hazard of debris flow initiation. The magnitude of consequence is **major** because rockfall and tree strikes could result in serious injury or loss of life. The risk rating is **high**. BAER treatments are recommended. See treatments S1a.

e. Human life and safety of forest visitors on the Grassy Knob Trail #1241 segment located on a ridgetop and constructed from an old roadbed is threatened by hazard trees, fallen trees, unstable trail tread, and rockfall. The probability of damage or loss is **likely** because the trail traverses moderate and high soil burn severity resulting in fire damaged trees. The magnitude of consequence is **major** because tree strikes, rockfall, unstable trail tread, and fallen trees could result in serious injury or loss of life. The risk rating is **very high**. BAER treatments are recommended. See treatments S1b.

f. Human life and safety of forest visitors at the Grassy Knob trailhead is threatened by tree strikes from the fire killed and fire weakened trees within and adjacent to the site. The probability of damage or loss is **likely** due to the fire killed and fire-weakened trees in a wind prone area and due to the extended amount of time that visitors spend at the parking area. The magnitude of consequence is **major** because a tree strike could result in serious injury or loss of life. The risk rating is **very high**. BAER treatments are recommended. See treatment S1b and S3.

g. Human life and safety of forest visitors recreating cross country (i.e. hunters) and Elk River fishing guide outfitters are threatened by rockfall, hazard trees, and debris flow. The probability of damage or loss is **unlikely** given that 73% and 12% of the fire area is low and unburned soil burn severity, access is restricted by steep slopes and limited road network into the Grassy Knob Wilderness exists, and local district knowledge shared there is low use by Forest visitors. Furthermore, there is low to moderate risk of debris flow initiation. The magnitude of consequence is **major** because rockfall, tree strikes, or debris flows could result in serious injury or loss of life. The risk rating is **intermediate**. BAER treatments are recommended. See treatments S1b.

2. **Property (P):**National Forest System Roads 5105, 5325-180, 5201-010, and 5201-390 within the burn perimeter and in drainages immediately downstream of the burned area are threatened by fire weakened and fire damaged trees, rockfall, slumping and sloughing, elevated runoff from moderate and high SBS areas. The probability of damage or loss is **unlikely** because these roads are located on the ridgetop, moderate and high SBS is generally below the roads, the road traverses the majority of low SBS, and the risk of damage from post-fire runoff was found to be low to intermediate for all road segments. The magnitude of consequence is **moderate** because there is a potential for moderate property damage to the NFS roads identified. Furthermore, NFSR 5325-180 contains drainage structures which drain to Coho critical habitat and could impact aquatic habitat if road failure was to occur. The risk rating is **Low**. BAER treatments are not recommended.

b. National Forest System Road 5201 within the burn perimeter and in drainages immediately downstream of the burned area are threatened by fire weakened and fire damaged trees, rockfall, and slumping and sloughing, and elevated runoff. The probability of damage or loss is **possible** because very steep and burned hillslopes exist above the road, the presence of fire weakened and fire damaged trees, and rockfall hazard. However, the road prism traverses low and unburned SBS so probability of damage is reduced. The magnitude of consequence is **moderate** based on the cost to repair the threatened road segment should the damaging event occur. The risk rating is **intermediate**. BAER treatments are not recommended.

c. The road prism of NFSR 5201 at MP 21.66 is threatened to collapse due to a burnt over high-density polyethylene (HDPE) culvert. The probability of damage or loss is **very likely** because the HDPE culvert was partially to fully consumed due to the fire. The magnitude of consequence is **moderate** due to the expected cost to repair the damage to this segment of road if the relief culvert were to fail. The risk rating is **very high**. BAER treatments are recommended. See treatment R7.

d. National Forest System Road 5201-011 within the burn perimeter and in drainages immediately downstream of the burned area are threatened by fire weakened and fire damaged trees, rockfall, and slumping and sloughing, and elevated runoff. The probability of damage or loss is **possible** because there are short segments of road traversing moderate SBS. However, the road is located on a ridgetop and most of the road traverses low SBS. The magnitude of consequence is **moderate** based on the cost to repair the threatened road segment should the damaging event occur. The risk rating is **intermediate**. BAER treatments are not recommended.

e. National Forest System Road 5201-396 within the burn perimeter and in drainages immediately downstream of the burned area is threatened by fire weakened and fire damaged trees, rockfall, and slumping and sloughing, and elevated runoff. The probability of damage or loss is **unlikely** because the road traverses low and unburned SBS. The magnitude of consequence is **minor** due to the potential for damage to the road that will result in modest loss of the constructed road features. The risk rating is **very low**. BAER treatments are not recommended.

f. National Forest System Road 5201-397 within the burn perimeter and in drainages immediately downstream of the burned area are threatened by fire weakened and fire damaged trees, rockfall, and slumping and sloughing, and elevated runoff. The probability of damage or loss is **possible** because there are small areas of moderate SBS above the road, but most of the road traverses unburned or low SBS. The magnitude of consequence is **minor** due to the potential for damage to the road that will result in modest loss of the constructed road features. The risk rating is **low**. BAER treatments are not recommended.

g. The Elk River Bridge on FSR 5201 is threatened by the potential for post fire flooding and debris flows to impact or damage the substructure from floatable material mobilized during storm events. The probability of damage or loss is **unlikely** because post-fire flood flows are not predicted to increase significantly due to upslope areas of low and unburned SBS above the bridge, and the bridge clearance is sufficient to pass debris and wood. The magnitude of consequence is **major** due to the substantial potential damage and economic value of the bridge. The risk rating is **intermediate**. BAER treatments are not recommended.

h. One 48” culvert on NFSR 5201 is threatened by increased runoff resulting in debris-bulked flood flows originating from moderate and high SBS areas. The probability of damage or loss from these threats is **unlikely** because there is no moderate or high soil burn severity upslope of the stream crossing. The magnitude of consequence is **moderate** due to the expected cost to repair flood and debris flow damage to these high value stream crossing structures. The risk rating is **intermediate**. BAER treatments are not recommended.

i. The Grassy Knob trail (NFST 1241) is threatened by hazard trees, hazard tree uprooting, increased runoff, and rockfall, and shallow landslides. The probability of damage or loss is **possible** because the trail is located on a ridgetop in wind prone areas and traverses moderate to high soil burn severity. Soils are also rated a very severe soil erosion hazard rating. The magnitude of consequence is **minor** as the trail is being stabilized during fire suppression repair and any potential damage is likely to be localized and low in cost. The risk rating is **low**. BAER treatments are not recommended.

j. Campground infrastructure at the Sunshine and Butler Bar CGs are threatened by hazard trees. The probability of damage or loss is **unlikely** because most hazards have been mitigated during fire suppression activities and burned trees within the CG are not within striking distance of infrastructure investments. The magnitude of consequence is **major** because the expected damage to buildings and improvements will result in substantial property damage to the NFS asset if it was to occur. The risk rating is **intermediate**. BAER treatments are not recommended.

3. **Natural Resources (NR):** Soil productivity in the post-fire environment is threatened by accelerated erosion. The probability of damage to soil productivity is **likely** given the Anvil fire resulted in mostly a low SBS (73%). However, the terrain steepness throughout the burned area and higher increases where water repellency occurs in isolated locations mapped as high SBS may increase erosion potential. The magnitude of consequence is **minor** because the overall burn was a mosaic that allows for areas of sediment capture. It was observed that in addition to the duff layer remaining mostly intact in areas of moderate SBS there was a needle cast mat either developing or available in the standing vegetation. Needle cast, like the duff layer, downed woody debris, and surface rock fragments, will protect soils from erosion. Resprouting of trees, grasses, and shrubs were observed in areas of low and moderate SBS and will provide short-term stabilization to the landscape. The risk rating is **low**. BAER treatments are not recommended.

b. Hydrologic function in the post fire environment is threatened by increased watershed response from precipitation events due to high and moderate SBS within the fire. The probability of damage or loss is **possible** because the Anvil Fire burned with a mosaic of mainly low (73%) and moderate (14%) SBS. Field observations found a good vegetative buffer along most of the channels that will protect the streams from changes in hydrologic function. Post-fire runoff modeling also indicates increases in peak flows at 29% for the 5-year storm (20% chance of damaging event). The magnitude of consequence is **minor** because increased flows will be localized and short-term. Fire is a natural process, and the hydrologic processes are expected to recover within the next 1-3 years. The risk rating is **low**. BAER treatments are not recommended due to the acceptable level of risk.

c. Soil erosion as well as ash and sediment deposition are expected throughout and downstream of the burned area impacting water quality and the Wild and Scenic Elk River, which lists water quality as an outstandingly remarkable value. The probability of damage or loss is **likely** given the increased likelihood of ash and sediment during the first large storms following the fire. These processes will attenuate over time and should recover to pre-fire conditions over the next 1-3 years. The magnitude of consequence is **minor** because the water quality degradation will be a short term, recoverable that persists for minimal amounts of time immediately following high intensity precipitation events. The risk rating is **low**. BAER treatments are not recommended.

d. Critical habitat for Southern Oregon and Northern California Coho Salmon, as well as Oregon Coast Coho Salmon present in the Elk River and Sixes River, respectively, are threatened in the post-fire environment from infrastructure failure due to increased watershed response, debris flows, or other sediment delivery mechanisms. The probability of damage or loss is **unlikely** given the low soil burn severity, low risk of post-fire debris flow within or upstream from designated critical habitat, and the lack of infrastructure (roads) within the burned perimeter. The magnitude of consequence is **minor** because wildfire is a natural disturbance process that has historically provided structural inputs of large wood and gravel to stream channels. Pulses of fine sediment associated with fire are expected to be short-term and limited in magnitude due to the relatively small amount of high soil burn severity, particularly adjacent to stream channels. The risk rating is **very low**. BAER treatments are not recommended.

e. Critical habitat or suitable occupied habitat for Northern Spotted Owl, Coastal marten, and Marbled murrelet, species listed as threatened under the Endangered Species Act, are threatened in a post-fire environment from blowdown, mass soil movement, flooding and insect and disease which could result in additional mortality to remaining live trees and shrubs. The probability of damage or loss is **possible** given that much of the burned area is within 0-50% basal area mortality. Potential loss of habitat from blowdown and fire damaged trees may increase mortality during the first year. The magnitude of consequence is **moderate** because post-fire effects to critical habitat or suitable occupied habitat will result in long term effects in areas of high and moderate basal area mortality. The risk rating is **intermediate**. BAER treatments are not recommended. Seasonal restrictions for species will be implemented to reduce disturbance if possible. See Wildlife Report for specific dates pertaining to each species. Felling of hazard trees will need to be consulted with the wildlife biologist prior to falling.

f. There is a threat to native plant communities on NFS lands where invasive species or noxious weeds are absent or present in only minor amounts due to soil disturbing fire suppression activities such as line construction, landing construction, spike camp establishment, and dozer push outs into previously undisturbed areas. The probability of damage to native or naturalized plant communities is **very likely** because suppression activities caused soil disturbances, removed vegetation, reduced canopy, and were completed with unwashed vehicles/equipment passing through infested areas into suppression activity areas. Gorse establishes dense thickets rapidly in areas with increased sunlight. The magnitude of consequences is **moderate** because damage will cause considerable long-term effects to native plant community due to ability of gorse to outcompete and crowd out native plants. The risk is **very high**. BAER treatments are recommended. See treatments P1b.

g. There is a threat to native plant communities on NFS lands where invasive species or noxious weeds are absent or present in only minor amounts in burned areas with 50-100% basal area mortality. The probability of damage to native or naturalized plant communities is **likely** given the proximity to known populations of noxious weeds, such as thistles, tansy, gorse, and English ivy. The loss of canopy cover and basal area mortality will increase light to the ground enabling establishment of wind- and animal-distributed invasive species. The magnitude of consequences is **moderate** because damage will cause considerable long-term effects to native plant communities that have been previously undisturbed in sensitive habitats such as TESP plant populations, meadows, and Wilderness. The risk is **high**. BAER treatments are recommended. See treatments P1a.

4. **Cultural and Heritage Resources:** The Grassy Knob Lookout Site is a potentially eligible cultural resource site for the National Register of Historic Places (NRHP) and is threatened by the loss of site characteristics from hazard trees. The probability of damage or loss is **likely** because the tree roots of fire damaged trees in this wind-prone location are embedded within stacked rock features and the structure's foundation. The magnitude of consequence is **major** because the damage would be irreversible, which would lead to the loss of a potentially eligible cultural resource. The risk rating for the site is **very high**. BAER treatments are recommended. See treatment H1.

b. Site 06102800456 is a potentially eligible cultural resource site for the National Register of Historic Places (NRHP) and is threatened by the loss of site characteristics from erosion. The probability of damage or loss is **possible** because moderate soil burn severity is found upslope (>40% slope) from site 06102800456. The magnitude of consequence is **minor** because minimal or localized effects from erosion are expected. The risk rating for the sites is **low**. BAER treatments are not recommended.

B. Emergency Treatment Objectives: Limit loss of life or injury to forest visitors, raise awareness of postfire hazards throughout the burned area, minimize postfire damage to the NFS transportation system, minimize the establishment of invasive plants and noxious weeds, minimize damage to recreation site infrastructure, minimize damage to cultural resources.

C. Probability of Completing Treatment Prior to Damaging Storm or Event:
Land: 90%
Channel: N/A
Roads/Trails: 80%
Protection/Safety: 95%

D. Probability of Treatment Success

Table 8: Probability of Treatment Success

	1 year after treatment	***3 years after treatment***	***5 years after treatment***
Land	85%	90%	90%
Channel	N/A	N/A	N/A
Roads/Trails	90%	90%	90%
Protection/Safety	90%	80%	70%

E. Cost of No-Action (Including Loss): $573,200. Assumes the following: 50% chance of loss of the threatened segment of the NFS transportation system which includes 0.5 miles of high value ML2 road (substantial cuts and fills, built on a steep slope in a remote area) valued at $500,000/mile; 3 years of weed management activities beginning in 2025 costing an estimated $448,200.

F. Cost of Selected Alternative (Including Loss): $181,600. Assumes the following: 10% chance of loss of the threatened segment of the NFS transportation system which includes 0.5 miles of high value ML2 road (substantial cuts and fills, built on a steep slope in a remote area) valued at $500,000 mile; 3 years of weed management activities beginning in 2024 costing an estimated $149,400.

G. Skills Represented on Burned-Area Survey Team:

☒ Soils ☒ Hydrology ☐ Engineering ☒ GIS ☒ Archaeology
☒ Weeds ☒ Recreation ☒ Fisheries ☒ Wildlife
☐ Other:

Team Leader: Brendan Waterman, Lizeth Ochoa (t)
Email: brendan.waterman@usda.gov; lizethochoa@usda.gov **Phone(s)** 385-377-4338; 971-601-0458

Forest BAER Coordinator: Joni Brazier
Email: joni.brazier@usda.gov **Phone(s):** 541-471-6760

Team Members: *Table 9: BAER Team Members by Skill*

Skill	Team Member Name
Team Lead(s)	Brendan Waterman, Lizeth Ochoa(t)
Soils	Leslee Crawford, Jerome Barner (t)
Hydrology	Jamie Krezelok
Engineering	Unstaffed – Donald Kay (consulted)
GIS	Steve Penny
Archaeology	Michael Boero
Weeds	Teresa Bird
Recreation	Lance Sargent
Wildlife	Sheila Colyer
Fisheries	Steve Brazier

H. Treatment Narrative:

The following narratives summarize the response actions recommended to decrease risks to BAER Critical Values. It is important to note that these treatments are not designed to eliminate risk. They are designed to reduce risk to an acceptable level, per FSM 2523.1 - Exhibit 02. Detailed specifications, cost estimates, and maps identifying the spatial location for the treatments are in the BAER Assessment project record. The documents can be obtained by contacting the Forest BAER Coordinator.

All treatment costs were conservatively estimated based on the assumptions that local unit Agency personnel would require overtime to complete implementation prior to damaging events, off-forest agency personnel would need to be resource ordered to a BAER implementation incident, and/or contract crews would be implementing the authorized treatments. If personnel from the local unit are identified for implementation, current BAER salary and expense guidance regarding the use of NFSE funds a BAER H-codes would be adhered to (base time would be charged to NFSE). Project budgets represent the best estimate of the BAER assessment team and may be adjusted with interim funding authorization requests to reflect current market values at the time of contracting and implementation.

Land Treatments:

P1a. Early Detection Rapid Response (EDRR) BAER: Survey and eradication of new or expanding invasive plant/noxious weed infestations associated with the Anvil wildfire will be conducted during 2024 in native plant communities with little to no noxious/invasive plant species present prior to the fire. Implementation personnel will survey and mechanically treat any newly detected invasive plants or noxious weeds immediately upon detection. BAER funded surveys will be completed within one year of fire containment. Survey, monitoring or treatment activities that extend beyond the first year will be accomplished through non-BAER funding sources.

Detection surveys will be limited to NFS lands. The treatments will be focused on meadows, sensitive plant sites, and wilderness areas that burned with 50-100% basal area loss, are

located within one mile of a motorized access point, and do not require river crossings or cross-country travel on excessively steep slopes. These areas were prioritized to focus the EDRR efforts on locations with the highest risk of noxious weed invasion (moderate to severely burned over areas in proximity to potential seed vectors) while providing for implementation crew safety. These areas were identified from the post-fire Rapid Assessment of Vegetation Condition after Wildfire (RAVG) data, site visits, and the proximity to other weed populations and vector sources such roads and trails. There is a potential for weed infestation to occur in other areas of moderate and high SBS and moderate to high basal area loss throughout the burn scar, however the overall risk is lower given the distance from known threats/vectors such as existing infestations and designated motorized travel corridors.

EDRR BAER activities will be conducted at the identified locations at an intensity/frequency necessary to identify the occurrence and spread of weed infestations. Treatments will focus on newly discovered populations of gorse, thistles, tansy, and ivy. Specific information (e.g., species, location, size, photos) regarding identified infestations will be collected and added to the appropriate database of record. Emergency response surveys will allow for new or expanding weed infestations to be identified, and proper measures implemented for eradication/control to protect native plant communities where invasive plants are currently absent or present in minor amounts.

Table 10: P1a EDRR BAER Costs

Item	UOM	Unit Cost	# of Units Treated	Total Treatment Cost
P1a EDRR – BAER	acre	$66.18	408	$27,000

P1b. Early Detection Rapid Response (EDRR) Suppression: Surveys and treatment for new or expanding invasive plant and noxious weed infestations associated with fire suppression activities will be conducted as needed during 2024. EDRR activities that extend beyond the first year will be accomplished through non-BAER funding sources. EDRR Suppression efforts will only occur on NFS lands, along areas that were disturbed by unmitigated suppression activities and suppression repair, including areas of hand line construction, dozer line construction, landing construction, spike camp establishment, heli-spot construction, and dozer pushouts adjacent to roads that created new soil disturbance beyond the existing road features. These areas were delineated by the BAER Weeds Specialist using suppression disturbance lines, points, and polygons provided by the IMT. In an effort to accurately capture the actual size of the on the ground disturbance including any side-cast material, the points and lines were buffered into polygons that most accurately represent the newly disturbed area using field data provided by the Lead Resource Advisor. The buffer assigned to the GIS line and point features varied by feature type. The dozer lines are assumed to have a 10’ total disturbance width, handlines are assumed to have a 2’ total disturbance width. Treatment is not proposed beyond the extent of the newly created soil disturbance associated within the control features.

EDRR suppression activities will be accomplished by hand crews that will use herbicides where an existing NEPA decision has authorized use and hand-pulling where herbicides cannot be used. The invasive species of concern in these suppression areas are gorse, thistles, tansy, and ivy. The EDRR suppression surveys will be focused on disturbed areas that were free of weeds or only contained small, discrete populations that were disturbed during control line construction.

EDRR Suppression costs have been estimated based on recent verbal quotes from local contractors. EDRR Suppression cost per acre is significantly higher than the EDRR BAER treatment because the targeted acres are mostly composed of long, linear features that will

require significantly more time to treat and chemical herbicides would be used where authorized.

Table 11: P1b EDRR – Suppression Costs

Item	UOM	Unit Cost	# of Units Treated	Total Treatment Cost
P1b EDRR – Suppression	acre	$380	60	$22,800

H1. Heritage and Cultural Resource Protection: Fire weakened and fire killed trees adjacent to the Grassy Knob Lookout site will be directionally felled away from the site. This will prevent damage to the lookout that could occur if the trees were to naturally fall over resulting in uprooting or tree strikes that could cause damage to the foundation, rock wall, and rock steps that remain intact.

Table 12: H1 Heritage and Cultural Resource Protection Costs

Item	UOM	Unit Cost	# of Units	Total Treatment Cost
H1 Heritage and Cultural Resource Protection	site	$1,440.60	1	$1,440.60

Channel Treatments: None proposed.

Roads and Trail Treatments:

R7. Relief Culvert: Installation of a new 24” x 50’ ditch relief culvert is needed in NFSR 5201 to protect the road from collapse and failure. The previously installed plastic culvert melted during the fire. Replacement is needed to ensure the road fill does not collapse under the weight of vehicles or erode when runoff from the drainage ditch enters the void left in the road prism. This treatment addresses numerous accumulated values at the site including: protecting the safety of travelers; preventing potential vehicle damage should a fill collapse occur; preventing the loss of road infrastructure; preventing downstream sedimentation of eroded material; maintaining motorized access for ongoing permitted uses, forest visitor recreation, forest management, and fire suppression activities.

Table 13: R7 Relief Culvert Costs

Item	UOM	Unit Cost	# of Units	Total Treatment Cost
R7 Relief Culvert	Site	$7,400	1	$7,400

Protection/Safety Treatments:

S1. Burned Area Warning Signs: The purpose of the Burned Area Warning signs is to reduce risks to human life and safety by informing forest visitors of potential dangers and/or hazards when entering burned watersheds on NFS lands. Entering the Anvil Fire burned areas presents an intermediate to very high risk to human and life and safety, with increased threats from post-fire effects such as falling trees, rolling rocks, slope failures, and debris flows. Burned area warning signs will be installed to inform the public of the possible dangers associated with the burned area along roadways at major entry points into the burned area, at trailheads, and at developed recreation sites. Lump sum costs include signs, posts, hardware, and installation.

Table 14: S1a Road Burned Area Warning Signs

Item	UOM	Unit Cost	# of Units	Total Treatment Cost
S1a Road Burned Area Warning Signs	Sign	$558.33	6	$3,350

Table 15: S1b Trail/Rec Site Burned Area Warning Signs

Item	UOM	Unit Cost	# of Units	Total Treatment Cost
S1b Trail/Rec Site Burned Area Warning Signs	Sign	$190.85	15	$2,862.80

S3. Hazard Tree Falling: Use a qualified Tier 2 Hazard Tree Inspector to document fire-weakened and fire-killed trees with a high failure and damage potential around developed recreation sites. Inspection and treatment may need to occur multiple times within the first year. Burned areas at developed recreation sites experienced varying Soil Burn Severity (SBS), but hazard trees must be individually assessed and can become fire-weakened or killed in all SBS levels.

Hazard trees will be assessed and mitigated at Grassy Knob Trailhead, Sunshine and Butler Bar Campgrounds. Sunshine and Butler Bar Campgrounds did not experience direct impacts from the Anvil Fire but the Wilderness side of the Elk River was burned where the public regularly access the river to swim and fish. These trees are within striking distance of the perimeter of the developed campgrounds. The south side of Forest Road 5325 road adjacent to Sunshine Bar CG was also burned.

Identify and fall hazard trees at Grassy Knob Trailhead. The wilderness boundary is 33 feet from the road on either side so some trees will lie within wilderness and need to be treated with traditional tools.

Identify and fall hazard trees at Sunshine Bar Campground. Directionally fall trees into rivers or streams when safe to do so, and when it is not obstructing river access sites. Trees on the north side of the river must be treated with traditional tools (Crosscut Saws), trees on the south side of road 5325 can be treated with chainsaws as they are outside of wilderness.

Identify and fall hazard trees at Butler Bar Campground. Directionally fall trees into rivers or streams when safe to do so, and when it is not obstructing river access sites. Trees on the north side of the river must be treated with traditional tools (crosscut saws).

Crosscut falling is a specialized skill and is likely to require travel from another location. Two inspection and treatment cycles are planned and budgeted in this specification.

Purpose of this treatment is to protect human life and safety at sites that will be difficult to keep the public out of once the fire closure area is changed. Due to the location of sites these areas are likely to re-open before the end of 2023. Political pressure, and the arterial nature of the road systems will make physical closure of site unlikely to stay in place once the fire is contained. Outfitter and Guide Services are also active in the area.

Table 16: S3 Hazard Tree Falling Costs

Item	UOM	Unit Cost	# of Units	Total Treatment Cost
S3 Hazard Tree Falling	Site	$2,393.97	3	$7,181.90

I. Monitoring Narrative:

Forest personnel will periodically review safety signs to ensure they are not being vandalized. Road drainage stabilization treatment will be inspected after high intensity rainfall to ensure installation is functioning as intended. EDRR treatments will be monitored during follow up early detection surveys to ensure new weed infestation expansion is minimized.

PART VI – EMERGENCY STABILIZATION TREATMENTS AND SOURCE OF FUNDS

			NFS Lands				Other Lands				All
		Unit	# of		Other		# of	Fed	# of	Non Fed	Total
Line Items	Units	Cost	Units	BAER $	$		units	$	Units	$	$
A. Land Treatments											
P1a EDRR BAER	acre	66	408	$27,000	$0			$0		$0	$27,000
P1b EDRR Suppression	acre	380	60	$22,800	$0			$0		$0	$22,800
H1 Heritage Site Protection	site	1,441	1	$1,441	$0			$0		$0	$1,441
Insert new items above this line!				$0	$0			$0		$0	$0
Subtotal Land Treatments				$51,241	$0			$0		$0	$51,241
B. Channel Treatments											
none				$0	$0			$0		$0	$0
Insert new items above this line!				$0	$0			$0		$0	$0
Subtotal Channel Treatments				$0	$0			$0		$0	$0
C. Road and Trails											
R7 Relief Culvert	site	7,400	1	$7,400	$0			$0		$0	$7,400
Insert new items above this line!				$0	$0			$0		$0	$0
Subtotal Road and Trails				$7,400	$0			$0		$0	$7,400
D. Protection/Safety											
S1a Road Warning Signs	sign	558	6	$3,350	$0			$0		$0	$3,350
S1b Trail Warning Signs	sign	191	15	$2,863	$0			$0		$0	$2,863
S3 Hazard Tree Falling	site	2,394	3	$7,182							$7,182
Insert new items above this line!				$0	$0			$0		$0	$0
Subtotal Protection/Safety				$13,395	$0			$0		$0	$13,395
E. BAER Evaluation											
Initial Assessment	Report	$54,137		---	$0			$0		$0	$0
				$0	$0			$0		$0	$0
Insert new items above this line!				---	$0			$0		$0	$0
Subtotal Evaluation				$0	$0			$0		$0	$0
F. Monitoring											
				$0	$0			$0		$0	$0
				$0	$0			$0		$0	$0
Insert new items above this line!				$0	$0			$0		$0	$0
Subtotal Monitoring				$0	$0			$0		$0	$0
G. Totals				$72,036	$0			**$0**		**$0**	**$72,036**
Previously approved											
Total for this request				**$72,036**							

PART VII - APPROVALS

1. /s/ Jacob Winn — October 16, 2023
   Forest Supervisor — Date

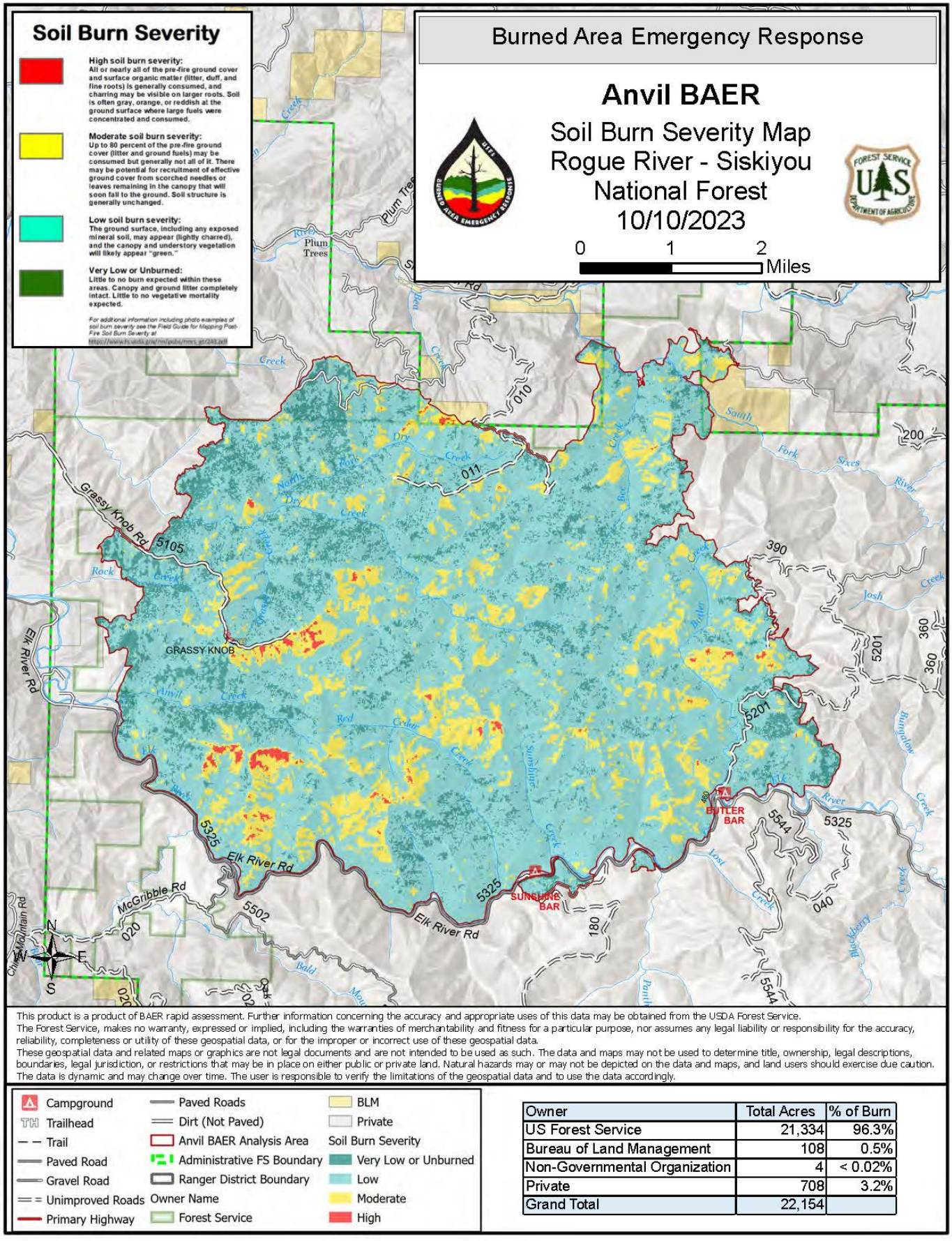

Figure 3: Anvil Fire Soil Burn Severity

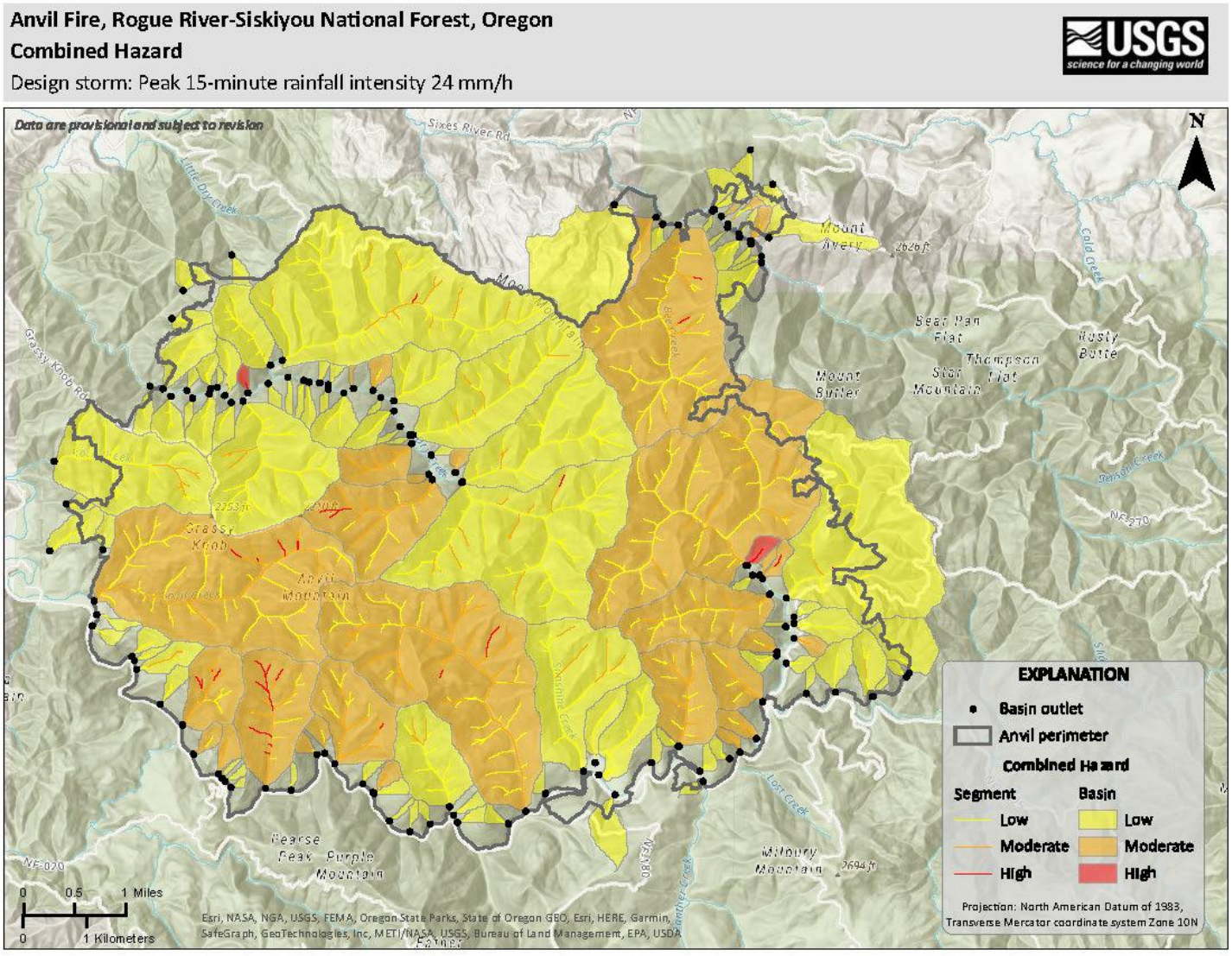

Figure 4: Anvil Fire Post-Fire Debris Flow Hazard Assessment

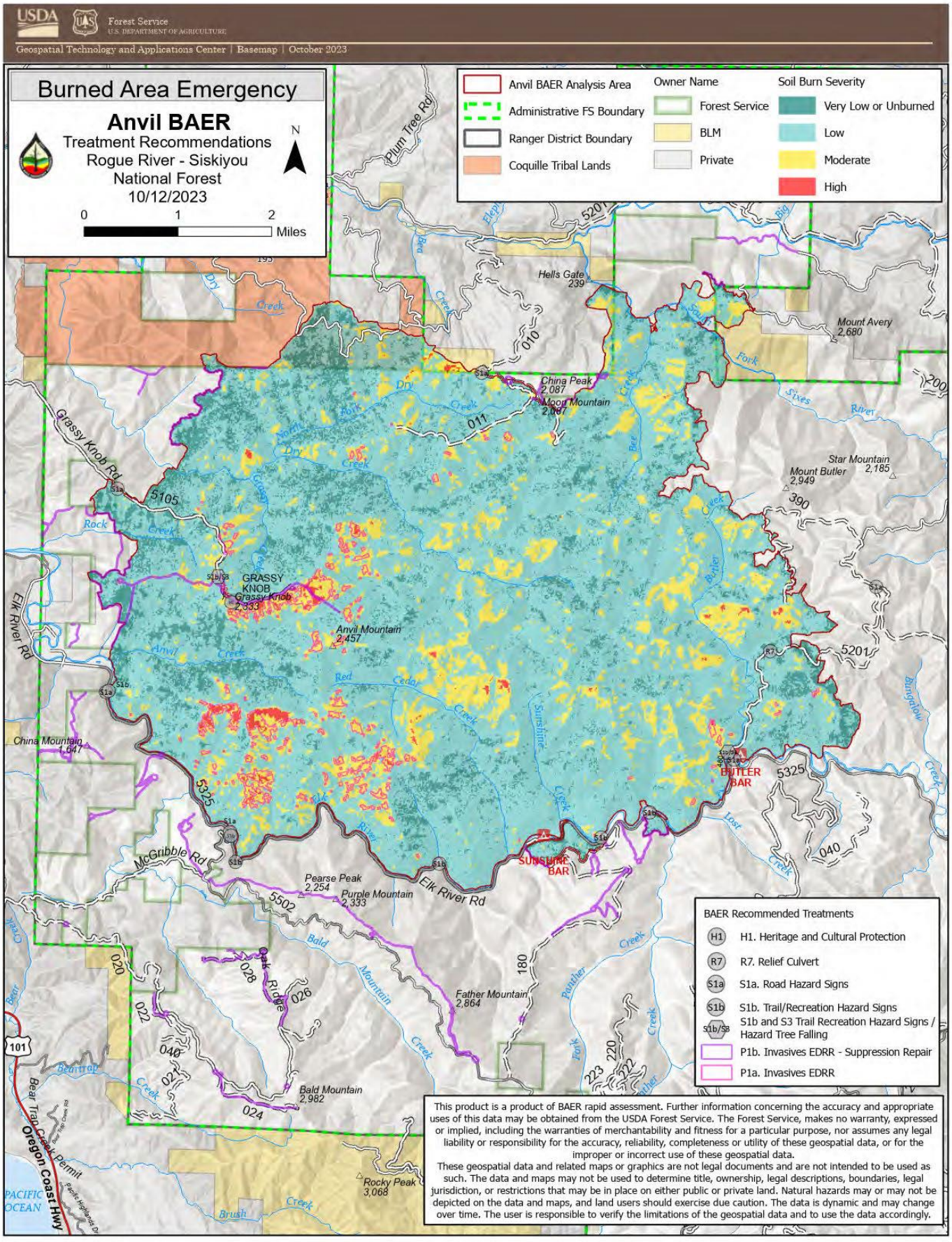

Figure 5: Anvil Fire Recommended BAER Treatments