Date of Report: 10/20/2021

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: Devils Knob Complex

B. Fire Number: OR-UPF-000450

C. State: Oregon

D. County: Douglas

E. Region: 6

F. Forest: Umpqua NF

G. District: Tiller RD, North Umpqua RD

H. Fire Incident Job Code: P6N7ND

I. Date Fire Started: August 3, 2021

J. Date Fire Contained: Est. Oct. 31, 2021

K. Suppression Cost: 59.5M as of 10/05/2021

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

1. **Fireline repaired (miles):** Across all ownerships, as of 10/05/2021, 36.7 miles of fireline repair completed out of a total of 68.9 miles. 24.2 miles of dozer line repair completed of 53.9 total miles and 12.5 miles of hand line repair completed of 15 total miles. 2.8 miles of fireline are showing as 'no repair needed'.
2. **Other (identify):** As of 10/05/2021, 12 repair points (dozer push, drop point, safety zone) out of 197 are completed. 5 locations are shown as 'no repair needed'. The number of culverts repaired to date is 43 out of a total of 233, of which 9 are listed as 'no repair needed'.

M. Watershed Numbers:

Table 1: Smith Fire Acres Burned by Watershed

HUC #	Watershed Name	Total Acres	Acres Burned	% of Watershed Burned
171003011001	Headwaters Little River	22,344	278	1.2%
171003011002	Black Creek	9,653	62	0.6%
171003011006	Upper Cavitt Creek	14,555	230	1.6%
171003020103	Quartz Creek	11,761	2071	17.6%

HUC #	Watershed Name	Total Acres	Acres Burned	% of Watershed Burned
171003020105	Skillet Creek-South Umpqua River	11,460	537	4.7%
171003020301	Boulder Creek	23,348	21513	92.1%
171003020302	Dumont Creek	19,848	16140	81.3%
171003020303	Ash Creek-South Umpqua River	14,081	8151	57.9%
171003020304	Francis Creek-South Umpqua River	12,772	1523	11.9%
171003020305	Deadman Creek	18,624	69	0.4%

Table 2: Big Hamlin Fire Acres Burned by Watershed

HUC #	Watershed Name	Total Acres	Acres Burned	% of Watershed Burned
171003020204	Beaver Creek	22,433	13,250	59.1%
171003020205	Lower Jackson Creek	28,441	7,847	27.6%
171003020304	Francis Creek-South Umpqua River	12,772	1	0.0%
171003020404	Lower Elk Creek	16,885	30	0.2%

N. Total Acres Burned:

Table 3: Smith Total Acres Burned by Ownership

OWNERSHIP	ACRES
NFS	50,482.0
OTHER FEDERAL (LIST AGENCY AND ACRES)	0
STATE	0
PRIVATE	92.2
TOTAL	

Table 4: Big Hamlin Total Acres Burned by Ownership

OWNERSHIP	ACRES
NFS	20,060.3
OTHER FEDERAL (LIST AGENCY AND ACRES)	0
STATE	0
PRIVATE	1067.4
TOTAL	

O. Vegetation Types: Western Hemlock (39937 ac); White-fir – Grand fir (21133 ac); Douglas-fir (8614 ac); Silver fir (1385 ac); and minor amounts of mountain hemlock, California red fir-Shasta red fir, meadow grasslands, hardwood communities, jeffrey pine, parklands, ponderosa pine, and pinyon-juniper-cypress communities.

P. Dominant Soils:
Soil data for the Devils Knob fire was accessed from the Soil Resource Inventory (SRI) for the Umpqua National Forest (Radtke and Edwards, Jr., 1976). Soil Resource Inventory maps (Figure 2) map units, erosion Hazard ratings, acres and percent are listed in Appendix B.

According to the SRI, the most common soils within the burn perimeter are on 15-60% slopes and are shallow to moderately deep. The parent material is mostly residuum and colluvium derived from an andesite, basalt and/or tuffaceous material. The surface and subsoil are mostly loamy and clay loam textures with 10-40 percent gravels and cobbles. Soil Resource Inventory Unit number 46 was the most dominant unit within the burn perimeter accounting for 30% of the burn area and included most of the higher burn severity. It is a shallow cobbly loam and clay loam residuum derived from tuff.

After unit 46 units 51 and 52 accounted for 10% and 18% of the burn area. They are similar soils in kind and origin of parent material with 51 being shallow and cobbly and 52 being moderately deep to deep. They are residuum and colluvium derived from andesite with loamy and clay loam textures. These 3 units accounted for almost 60% of the burn area and were all classified as moderate to low surface erosion hazard.

Q. Geologic Types: Volcanic formations of andesitic and dacitic tuff ash flow and andesitic and basaltic lava flows with Tertiary intrusive rock in the form of plugs, dikes, sill, domes, and pipes.

R. Miles of Stream Channels by Order or Class:

Table 5: Smith Fire Miles of Stream Channels by Order or Class

STREAM TYPE	MILES OF STREAM
PERENNIAL	132
INTERMITTENT	214
EPHEMERAL	0
OTHER (DEFINE)	0

Table 6: Big Hamlin Fire Miles of Stream Channels by Order or Class

STREAM TYPE	MILES OF STREAM
PERENNIAL	60.3
INTERMITTENT	109
EPHEMERAL	0
OTHER (DEFINE)	0

S. Transportation System:

Smith Fire
Trails: *National Forest (miles):* 25 *Other (miles):* 0
Roads: *National Forest (miles):* 249 *Other (miles):* 0

Big Hamlin Fire
Trails: *National Forest (miles):* 28.4 *Other (miles):* 0
Roads: *National Forest (miles):* 142 *Other (miles):* 0.78

PART III - WATERSHED CONDITION

A. Burn Severity (acres):

Table 7: Smith Burn Severity Acres by Ownership

Soil Burn Severity	NFS	Other Federal (List Agency)	State	Private	Total	% within the Fire Perimeter
Unburned	13,277.3			20.17	13,297.4	26.3
Low	19,989			58.84	20,047.3	39.7

Soil Burn Severity	NFS	Other Federal (List Agency)	State	Private	Total	% within the Fire Perimeter
Moderate	17,141			15.24	17,156.2	34
High	30.3			0	30.3	0.1
Total	50,437			93.89	50,531.2	

Table 8: Big Hamlin Burn Severity Acres by Ownership

Soil Burn Severity	NFS	Other Federal (List Agency)	State	Private	Total	% within the Fire Perimeter
Unburned	8558.2			132.5	8690.8	41.2
Low	6037.2			708.1	6745.2	32
Moderate	5450.5			218.3	5668.8	27
High	0.89			1.11	2.0	0
Total	20,046.8			1,060	21,107	

B. Water-Repellent Soil (acres): 13,385

C. Soil Erosion Hazard Rating:
Within the fire perimeter, 866 acres were mapped as having high soil erosion hazard ratings (HER). Only 156 acres with High EHR have a soil burn severity of moderate or high. These areas are likely to experience impacts to soil productivity and hydrologic function due to soil loss and increased erosion. However, these areas expected to recover naturally over time from factors such as needle cast, re-sprouting of native shrubs and trees.

Table 9: Soil Erosion Hazard Ratings by Soil Burn Severity Category

Soil Hazzard Erosion Rating				
	Soil Burn Severity (acres)			
Erosion Rating	**Unburned**	**Low**	**Moderate**	**High**
Low	9,399	10,718	7,131	9
Moderate	12,246	15,461	15,519	22
High	184	526	155	1
Total	21,829	26,705	22,806	32

D. **Erosion Potential:** Soil Scientist used the ERMit model to estimate erosion potential for the dominate soil types within the burn perimeters. The average soil erosion rate potential across all soils is 6 tons per acre. Rates for moderate and high burn severity are higher but estimated acreage for high burn severity is very low (32 acres). Within the moderate burn severities, substantial needle cast covers the surface and field assessments revealed only spotty and light hydrophobicity in larger areas of higher infiltration rates. Overall results from the modeling concurred with field observations. After a storm system moved through the area on September 28th, up to 1.5 inches of measurable precipitation fell on the area. Following the storm, field crews found no substantial areas of surface erosion.

E. Sediment Potential: 385 yd3/mi2

F. Estimated Vegetative Recovery Period (years): Vegetation recovery will vary depending on plant association group, soil type, aspect, and soil burn severity. Areas that burned at low severity will generally recover within the first two years. Areas that burned with moderate soil severity may recover the shrub layer, for the most part, in 3-5 years with canopy formation occurring much later. For sites with high soil burn severity and full vegetative stand- replacement, recovery may take decades.

G. Estimated Hydrologic Response (brief description):
The Devils Knob Complex burned primarily within the Boulder Creek, Dumont Creek, Beaver Creek, and Jackson Creek drainages of the South Umpqua River, with stand-replacing, moderate soil burn severity fire encompassing the majority of the Boulder Creek and Beaver Creek headwaters. A peak flow analysis was

conducted using the Wildcat5 model, with a 5-year 24-hour design storm calibrated to the fire area, expected to mimic peak flows primarily caused by the extra-tropical storms that tend to have relatively long durations with a broad geographic distribution. The Q5, or the storm event with a 20% chance of occurring annually, was estimated for pre-fire and post-fire conditions. The smaller basins modeled (< 800 acres) with a majority of moderate to high soil burn severity are expected to see peak flow increases 46-67% higher than the pre-fire condition. At the watershed scale, the South Umpqua had a mosaic of unburned to high soil burn severity, and the post-fire change in runoff response is expected to be much lower (approximately 19% higher for the 2-year event at Three C Rock).

In addition to increased peak flows, the watershed response will include an initial flash of ash and burned materials, temporary increase in turbidity, rill and gully erosion in drainages on steeper slopes in the burned area, increased sediment transport and deposition, higher potential for debris-laden flows, and increased stream temperatures from a lack of riparian canopy cover. These responses will likely lead to increased water quality concerns for critical fish habitat and impacts to transportation drainage infrastructure. Watershed responses are dependent on the storm occurrence and will likely be greatest with initial storm events. Greatest impacts are most likely to occur in the first year or two after the fire. Disturbances will become less evident as vegetation is reestablished, providing ground cover that reduces erosion and increases surface roughness to slow flow accumulation and increase infiltration. These processes will attenuate over time and should recover to pre-fire rates over the next 2-5 years.

PART V - SUMMARY OF ANALYSIS

Introduction/Background

The Devils Knob Complex Fires began following lightning storms between July 29 and August 1, 2021. The Complex includes several fires totalling approximately 71,000 acres. The BAER Assessment focuses on the two largest fires, the Smith Fire at approximately 50,500 acres and the Big Hamlin Fire at a little over 21,000 acres. The majority of fire growth occurred during the first two weeks of August during periods of excessive heat and high winds; fire growth abated toward the end of August with moderating temperatures and some precipitation with some flare ups from wind events until September rains cooled most parts of fire. The fires burned with a mosaic of unburned, low, and moderate soil burn severity with very little high severity observed. Within both the fire perimeters there are previously burned areas: the Boulder Fire in 2002 in Smith Fire area and the Whiskey Fire of 2013 within the Big Hamlin Fire. The reburn conditions may increase watershed response above predicted models following precipitation particularly in the more recent Whiskey burn scar; however, the rebun areas still show a strong potential for natural recovery, which will attenuate watershed response as vegetation continues to recover.

Describe Critical Values/Resources and Threats (narrative):

Table 10: 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 Value	Probability	Consequence	Risk Rating	Threat
People hiking along Beaver Creek Trail #1426, segment 1	Possible	Major	High	Exposed nails from burnt remnants of trail bridges
Public visitors at Three C Rock and South Umpqua Falls Day Use/swimming areas	Possible	Major	High	Flooding from high water runoff causing injury or vehicle damage.
People traveling along FSRs: 1610, 1610-400, 2500-780, 2700, 2719, 2719-525-, 2759, 2792, 2800, 2810, 2900, 2900-050, 2925, 2925-700, 2929, 3100-850, 3110, 3113	Possible	Moderate	Intermediate	Falling Debris on motorists travelling along NFS Roads
People traveling along FSRs: 2700-800, 2719-617, 2719-800, 2813-100, 2759-400, 3100-600, 3114-290, 3114-450, 3114-451, 3114-470	Likely	Major	Very High	Falling Debris on motorist travelling along NFS Roads
People travelling along FSRs: 2800, 2826	Likely	Major	Very High	Trees along route that were killed by recent fire within 1 times the tree height. Trees are along the South Umpqua River Corridor. Forest visitors congregate along this road to access the river. Additionally, this road accesses private residence
People visiting 35DO205	Possible	Major	High	fire-damaged tree collapse

2. Property (P):

Critical Value	Probability	Consequence	Risk Rating	Threat
FSR 2813	Likely	Moderate	High	Road 2813-100 pipe plugging, diverting, and/or washing out. Has potential to divert and damage or destroy road 2813. Post-fire flows expected to be 39-49% be higher than pre-fire.
3114 Culvert (MP 4.85)	Likely	Moderate	High	Crossing on Road 3114 becoming plugged causing road to be damaged or destroyed. Post fire flows increase 20%.
3114 Culvert (MP 3.66)	Likely	Moderate	High	Crossing on Road 3114 becoming plugged causing road to be damaged or destroyed. Post fire flows increase 54%.
3114 Culvert (MP 3.52)	Likely	Moderate	High	Plugging of existing riser (15', mostly buried), road washout/failure contributing sediment to waterbody. Post fire flows increase 46%.
3114 Culvert A (MP 1.00)	Likely	Moderate	High	Crossing on Road 3114 becoming plugged causing road to be damaged or destroyed. Post fire flows increase 51%.
2813 Culvert Straight Ck.	Likely	Moderate	High	Crossing on Road 2813 plugging and having road damaged or destroyed. Post-fire flows expected to be 54% higher than pre-fire. High debris flow risk.
2719 Culvert (MP 13.47)	Likely	Moderate	High	Crossing on Road 2719 plugging

				and having road damaged or destroyed. High debris flow risk.. Post-fire flows expected to be 49% higher than pre-fire.
2719 Culvert (MP 12.79)	Likely	Moderate	High	Crossing on Road 2719 plugging and having road damaged or destroyed. Moderate debris flow risk. Post-fire flows expected to be 28% higher than pre-fire.
2719 Culvert (MP 12.58)	Likely	Moderate	High	Crossing on Road 2719 plugging and having road damaged or destroyed. 98% of drainage burned. High debris flow risk.
2719 Culvert (MP 11.99)	Likely	Moderate	High	Crossing on Road 2719 plugging and having road damaged or destroyed. Post-fire flows expected to 53% be higher than pre-fire. High debris flow risk.
2719-700 (MP 0.40)	Likely	Moderate	High	Crossing on Road 2719-700 plugging and having road damaged or destroyed. Post-fire flows expected to be 53% higher than pre-fire, existing 30" pipe undersized for flow increase. High debris flow risk.
2719-800 (MP 1.19)	Likely	Moderate	High	Crossing on Road 2719-800 plugging and having road damaged or destroyed. Post-fire flows expected to be 26% higher than pre-fire. Low-moderate debris flow risk.
2700, 2719, 2800, 2813, 3114	Likely	Moderate	High	Ditches and catch basins becoming overwhelmed, causing drainage structures to fail and be destroyed in moderate severity burn
2700, 2827	Very Likely	Moderate	Very High	Cross Drain, Melted Currogated Polyethylene Pipe Culverts (6 count) leaving voids under the road that threatens the loss of the road prism
2800	Very Likely	Major	Very High	Stream Crossing, Melted Currogated Polyethylene Pipe Culvert (1 count) leaving voids under the road that threatens the loss of the road prism. Stream is intermittent
3114 Culvert (MP 4.49)	Unlikely	Moderate	Low	Crossing on Road 3114 becoming plugged causing road to be damaged or destroyed. Size adequate, debris flow risk low. Post fire flows increase 56%.
3114-290 (MP 0.42)	Possible	Moderate	Intermediate	Crossing on Road 3114 becoming plugged causing road to be damaged or destroyed
29 Road at Bullock Creek	Unlikely	Moderate	Low	Crossing on Road 29 plugging and having road damaged or destroyed. Post-fire flows expected to be 16% higher than pre-fire. Moderate DF risk.

2719 36" Culvert (MP 12.94)	Unlikely	Moderate	Low	Crossing on Road 2719 plugging and having road damaged or destroyed. No concerns with existing culvert condition and stream flow. Moderate debris flow risk.
Road Bridges: 2925 -Black Canyon, 2813 - Straight Creek, Upper Dumont Cr. 2719 - Upper Boulder, Slick Cr.,	Unlikely	Major	Intermediate	Danger trees and/or rocks striking the bridges, debris becoming lodge above bridge. Threats to the values analyzed in the field, determined to be outside the strike zone of the bridges
Segment 2 of Beaver Creek Trail #1426 from 473 rd to jct with 1426A	Very Likely	Moderate	Very High	Elevated erosion causing tread loss in moderate/high severity burn areas
Trail # 1426A	Likely	Moderate	High	Elevated erosion causing tread loss in moderate/high severity burn areas
Trail # 1426A/1426 Creek Crossings: Switchback and Beaver Creek Tributaries	Very Likely	Moderate	Very High	Elevated flows from post-burn runoff scouring armored crossing and eroding/downcutting stream channels
Trails 1575, 1575A, 1426 west of 1426A intersection, north section of 1426A, 1587, 1522E, 1522, 1523, 1586	Unlikely	Moderate	Low	Erosion causing tread loss. No to low severity fire impacts, not likely to produce erosion issues on these segments
Campgrounds and high use sites on the 2800 Rd	Unlikely	Minor	Very Low	Damage to facilities from flooding from high water runoff

3. Natural Resources (NR):

Critical Value	Probability	Consequence	Risk Rating	Threat
Soil Productivity	Possible	Minor	Low	Reduced nutrient availability, soil loss
Soil Hydrologic Function	Likely	Minor	Low	Increased surface runoff as a result of soil hydrophobicity in moderate and high soil burn areas
Water Quality (downstream of fires S. Umpqua R is drinking water source for Tiller area)	Likely	Minor	Low	Increased summer temperatures, sedimentation, nutrient enrichment and turbidity.
Hydrologic Function	Likely	Minor	Low	Sediment delivery into waterbodies, change in flow regime due to reduced inflitration and roughness
Beaver Ck Water quality @ 3114 MP 3.66 Culvert	Likely	Moderate	High	Plugging, road washout/failure contributing sediment to waterbody. Lot of large woody debris above inlet. Post fire flows increase 54%.
Dumont Ck Water quality @ 2813-100 (MP 5.46) and 2813 MP 0.86) Culvert (directly downstream fo the 2813-100)	Likely	Moderate	High	Plugging, road washout/failure contributing sediment to waterbody. Post-fire flows expected to 39-49% be higher than pre-fire
Boulder Ck Water quality @ 2719 MP 13.47 Culvert	Likely	Moderate	High	Plugging, road washout/failure contributing sediment to waterbody. Post-fire flows expected to be 49% higher than pre-fire.

Boulder Ck Water quality @ 2719 MP 11.99 Culvert	Likely	Moderate	High	Plugging, road washout/failure contributing sediment to waterbody. Post-fire flows expected to 53% be higher than pre-fire. High debris flow risk.
T&E Species; Northern spotted owl activiy centers, nest sites and critical habitat.	Very Likely	Moderate	Very High	Impacts from the fire including greater risk from blowdown, mass soil movement, flooding and insects and disease could result in additional mortality to remaining live trees and further reduce NSO suitable habitat and usable Critical Habitat and threaten the viability of owl sites.
T&E Species; Franklin's bumble bee habitat in areas of 50-100% burn severity.	Possible	Moderate	Intermediate	Loss of suitable habitat by invasive plant invasion in areas with 50-100% basal area loss.
Coho Salmon Critical Habitat in Dumont, Boulder, Beaver and Jackson Creeks	Likely	Minor	Low	Increased sedimentation, loss of large wood that burned, and elevated peak flows leading to degraded channel conditions, loss of shade leading to increased stream temperature.
Intact native plant communities	Very Likely	Moderate	Very High	Invasive plant invasion in areas with 50-100% basal area loss
Suppression Repair-Prevention of noxious weeds in intact plant communities	Very Likely	Moderate	Very High	Invasive plant invasion due to suppression disturbance.

All of the engineering and recreation locations that were modelled to determine threats to the property critical value from increased flows were also assessed through the Risk Matrix to determine potential risk to hydrologic function and water quality. Many of those points rated out as Low or Very Low Risk and are documented in the Devils Knob Critical Values Table in the project file. Those that rated out as High or Very High are shown in the table above.

4. Cultural and Heritage Resources:

Critical Value	Probability	Consequence	Risk Rating	Threat
35DO205	Very Likely	Major	Very High	Looting, erosion, fire-killed hazardous trees
35DO1076	Possible	Major	High	looting, damage from rock hounding in exposed areas

*Sites have been identified that are still in need of assessment: 35DO52; 35DO26; 35DO952; 35DO1491; 1502755; 15021010; 1506105;1506225. These may need to be addressed in an Interim Request.

A. Emergency Treatment Objectives:

Proposed Land Treatments

The objective of the land treatments are to:

a. Foster the recovery of intact native plant communities in the burned area by minimizing the proliferation of noxious weed populations (P1a).
b. Retard the spread of invasive weeds as a result of suppression activities (P1b).
c. No active land treatments are being proposed for soil productivity or water quality. Allowing for natural recovery is the recommended course of action. Many areas will have vegetation recovery within 1-5 years in moderate/high burn severity areas; low burn severities should have quicker vegetative recovery and provide a needle-cast for mulch to cover exposed soils. Moderate soil burn severity areas already show strong needle-cast for natural mulch. Soils contain a high percentage of rock cover and fragments which also protect soils from accelerated erosion. Due to the large

area of the fire impacting water quality, treatments would have to be applied across the watersheds and are unlikely to reduce the risk to an acceptable level at the watershed scale.

d. No active land treatments are being proposed for T&E habitat for wildlife, other than EDRR for native intact meadow habitats being proposed by Botany. Habitats were impacted by the fire and will take decades to recover habitat conditions, outside the scope of BAER.

Proposed Road and Trail Treatments

The Objective of the road and trail treatments are to:

a. Protect road and trail investments from damage or loss due to increased post-fire runoff and erosion (T1, R1, R3).
b. Improve road crossing drainage by increasing drainage structure capacity including cross drains, fortifying crossings including constructing fords at 2 locations along trails, and reducing potential for channel diversion, and increasing flow capacity by up-sizing culverts where lesser treatments would not effectively mitigate the risk to Forest Service property and downstream water quality (T1, T2, R1, R2b, R2c, R3, R4, R5, R11).
c. **NOTE:** Road/stream crossings that showed an elevated level of concern for failure through hydrologic modelling, were put through a prioritization process based on potential level of loss to road infrastructure, access to other critical infrastructure, and potential impacts to water quality and impacts to Coho critical habitat if they were to fail. Treatments focused on 7 high priority roads and 2 priority trails. Then treatment options were prioritized to determine least expensive treatment necessary to be reasonably successful in mitigating unacceptable risk. The most common recommendation is Storm Inspection and Response (R3) with 6 locations along FSR #3113, 6 locations along FSR#2719, and spot location along FSR#2800, #2700, and #2814. Other treatments include 6 locations for installation of Cross Drain pipes R2b and 1 stream crossing (R2c), one location up upsizing a culvert (R11) where it was deemed storm patrol would not be sufficient to mitigate risk, one location for installing an armored dip (R5), and finally several temporary road closures (R2) and 1 culvert removal (R4) to protect water quality and critical habitat.

Proposed Protection/Safety Treatments:

The objective of the protection/safety treatments are to:

a. Protect human life and safety by raising awareness through posting hazard warning signs at recreation sites and trailheads, and along roads entering the burned area to warn users of potential hazards resulting from post-fire conditions (S1a, S1b).
b. Protect Forest Service infrastructure and human life/safety in areas where we invite the public to congregate along major routes, as well as for worker safety by removing hazard trees associated with BAER treatments (S3).
c. Protect human life/safety by temporarily closing 11 road segments (S2) and removing burnt remnants with exposed nails on 4 trail bridges (S8).
d. Protect Forest Service infrastructure and human life/safety through stabilizing areas where culvert burn-outs could result road collapse of a critical ingress/egress road to private lands by replacing cross drain culverts (R2b) and one stream crossing failed culvert (R2c).
e. Protect cultural resources evaluating potential looting and changed conditions through remote camera and site visits, and working with BAER Implementation plans by completing Section 106 Compliance permits and processes (H1).

Proposed Channel Treatments: None proposed.

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

Land: 90
Channel: NA
Roads/Trails: 75
Protection/Safety: 90

D. Probability of Treatment Success

Table 11: Probability of Treatment Success

	1 year after treatment	*3 years after treatment*	*5 years after treatment*
Land	80	85	90
Channel	NA	NA	NA
Roads/Trails	80	85	90
Protection/Safety	90	90	95

E. Cost of No-Action (Including Loss): Approximately $13,079,300, based on road and trail loss and reconstruction, damage or loss of structures, injury, and expansion of noxious weeds. This does not put a value on the loss of irreplaceable cultural resources. Costs of loss of water quality, soil productivity, T&E species, or cultural resources were not quantified. See Cost Benefit analysis in project files.

F. Cost of Selected Alternative (Including Loss): Approximately $5,338,700. This does not put a value on the loss of irreplaceable cultural resources. Costs of loss of water quality, soil productivity, T&E species, or cultural resources were not quantified. See Cost Benefit analysis in project files.

G. Skills Represented on Burned-Area Survey Team:

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

Team Leader: Joni D. Brazier
Email: joni.brazier@usda.gov **Phone(s)** 541-471-6760

Forest BAER Coordinator: Joseph Blanchard
Email: joseph.blanchard@usda.gov **Phone(s):** 541-957-3356

Team Members:*Table 12: BAER Team Members by Skill*

Skill	**Team Member Name**
Team Lead(s)	Joni Brazier, Rebecca Lloyd (t)
Soils	David Watson, Ryan Sparhawk
Hydrology	Amy Rusk, Leah Tai
Engineering	Luis Palacios, Robert Lee
GIS	Upekala Wijayratne, Mathew Vandermolen (t)
Archaeology	Chris Kelly, Oliva Ellis, Kelsey Knox
Weeds	Kailey Clarno, Stacy Johnson (t)
Recreation	Wayne Chevalier, Lance Sargent
Other	Sheila Colyer (Wildlife)

H. Treatment Narrative:

Land Treatments:

P1a. / P1b. Invasives EDRR and Invasives EDRR Suppression:

Early Detection, Rapid Response Invasive Plant Treatments

Prevention, combined with early detection and rapid response, is the most effective means of controlling invasive plants and protecting native plant communities. Post-fire non-native invasive plant detection monitoring is recommended the first year “to determine the post-fire presence of invasive species” on fire lines and burned areas. This is consistent with Forest Service Manual direction of BAER treatment of invasive plants. (FSM2523.2(f)) (USDA, 2017). Detection surveys will be focused in areas of increased probability of infestation including areas with 50-100% basal area mortality with invasive plant populations nearby. EDRR is prioritized on 908 acres. Invasive plant control methods will be determined based on existing NEPA coverage.

Recommended Suppression Repair Treatments

Areas with suppression damage without prior large invasive plant infestations will be the focus of suppression damage EDRR treatments. EDRR is proposed on 52 miles of dozer lines, 8 miles of hand line, 34.5 miles of road opened by dozer, 15 miles of mixed construction line, 11 helispots, 3 safety zones, 7 staging areas, 49 dozer pushouts, and 37 landings or log decks on NFS lands on the Tiller Ranger District.

Treatment	Units	Unit Cost	# of Units	Total Cost
P1a. - Invasives EDRR	Acres	~$29.16	908	$26,480
P1b. – Suppression EDRR	Acres	~$38.83	346.4	$13,450

Channel Treatments: None proposed.

Roads and Trail Treatments:
Only those FS roads and trails within or below areas that burned at moderate or high SBS and have increased risk of damage resulting from post-fire conditions are recommended for emergency response. Proposed treatments will improve drainage at stream crossings and along adjacent slopes in order to remove higher levels of runoff from trails and roads before extensive damage or loss of infrastructure can occur. Roads and trails proposed treatments follow practical and economic designs to mitigate existing risk to acceptable levels. Treatment cost estimates reflect rates for implementation by the Forest Service Road Crew or by contacting using existing BPA for road maintenance or construction. The Forest will determine which is the fastest and most effective method during implementation.

R1. Storm proofing existing drainage features: Storm proof drainage features identified for critical value roads that are susceptible to damage or failure due to increase post-fire flows. Activity will include cleaning culverts, enhancing ditches, catchment basin and lead-out ditch capacity where they exist, road berm or ditch slump removal, and replacement of burn-out drop inlet covers as necessary to handle post-fire flows, sediment and debris.

Devil's Knob Treatment R1. Storm Proof	Unit	Unit Cost	#Units	Total $
Overtime for Implementation	GS11	$400/day	10	$4000
Road Crew Work	Mile	$1,200	11.93	$14,316
Obstruction Removal	Occurrence	$2500	10	$25,000
Total				**$43,316**

R2b and R2c. Install new drainage features-Cross Drain Pipe and Other: There is an immediate and future threat to property roads within the burned area, identified in the table below, due to fire burned culverts that have left voids beneath the road surface. The roads are still open and drivable; however, these voids are highly susceptible to erosion and have an extremely high risk of collapsing the road and destroying it. The recommended treatment is to replace the damaged culverts with corrugated steel pipe. Pulling back the road surface and closing the roads is not an acceptable treatment as Road 2827 is a road that accesses private parcels of land in Sections 20, 21, and 28. Road 2700 has the same private access concerns, it is one of the primary roads between the Tiller and North Umpqua Ranger Districts, and it provides primary access to the Quartz Mountain Private Mining Patents. Closing Road 2800 is not an option as it provides ingress/egress to private residence in the Ash Valley Neighborhood and Andriaff (sp) Meadows Neighborhood as well as primary road connecting Tiller and Diamond Lake Ranger Districts. Road 2800 is Maint. Level 4 Road. 2826 is a Maint. Level 2 Road, but it is the only route into the residence.

Devil's Knob R2b and c. Treatment	Unit	Unit Cost	#Units	Total $
Road Crew Work (3 Operators)	Day for 3 Crew	$1,100	5	$5,500
18" Alzd CSP 16 ga., Length 30'	CMP	$650	1	$650
24" Alzd CSP 16 ga., Length 30'	CMP	$700	5	$3500
30" Alzd CSP 16 ga., Length 50'	CMP	$2000	1	$2000
Bands/Gaskets/Harward	Lump			$350
Delivery Lump Sum	Lump			$1100
Excavator: $45/hour x 9 hrs/day x 5 days	Hour	45	45	$2025
Dump Truck: $2/mile x 2 Trucks x 300 miles	Mile	2	600	$1200
Loader: $30/hour x 9 hrs/day x 5 days	Hour	$30	45	$1350
Miscellaneous Compaction Equipment Rental Lump Sum	Lump			$200
Total				**$17,875**

R3. Storm Inspection and Response: Increases in storm flows will pose a threat to the existing crossings which may result in plugging drainage structures or exceeding their maximum flow capacity. If these flows plug drainage structures the result could be massive erosion and debris torrents further down the drainage due to the culvert and road failure. Storm inspection/response keeps culvert and drainage structures functional by cleaning sediment and debris from the inlet between or during storms. This work will be accomplished through Forest Service Road Crew, equipment rental, and general labor.

Per the BAER direction, storm patrols are intended for use at the following locations:

1. Road crossings where loss of control of water or exceedance is identified.
2. Road access is necessary throughout the storm season.
3. Road crossings where high sediment and debris is anticipated.
4. Roads susceptible to landslides.
5. Roads with all-season surfacing (aggregate or asphalt).

Other roads within the fire perimeter may be patrolled as necessary depending on the storm magnitude and location

Devil's Knob Treatment	Unit	Unit Cost	#Units	Total $
Road Crew Work (4 Operators)	Day	$1500/day	5	$7500
Overtime for Inspectors (GS-9)	Day	$500	5	$2,500
Total				**$10,000**

R4. Culvert Removal: A culvert failure would have a high potential of damaging Road 2813. Only 1 mile of Road 2813-100 currently exists because the remainder of the road template was decommissioned in 2013. Removal of the existing culvert and fill material will protect the FSR# 2813 from damage resulting from the increased watershed response at the crossing of the 2813-100. The failure of FSR#2813-100 could lead to the failure of FSR#2818, which would degrade adjacent Coho habitat because of the increased sedimentation from road failures. The minimal treatments required to remedy these issues is to remove the existing drainage structure and reshape channel to match existing steam channel in grade and width.

Devil's Knob Treatment	Unit	Unit Cost	#Units	Total $
Road Crew Work (3 Operators)	Day	$1100/day	2	$2200
Excavator	Hour	$45	18	$810
Dump Truck	Mile	$2	400	$800
Loader	Hour	$30	18	$540
Total				**$4,350**

R5. Critical Dip: Drain dips and waterbars are recommended for roads downslope or within the moderate-high SBS areas with inadequate drainage for post-fire short-term increased storm runoff. These have been identified at risk for gullying, loss of adequate water distribution, possible fill or ditch failure, and loss of surfacing. Critical dips are recommended in locations where the existing culvert is undersized for post-fire short-term increased runoff. The site, FSR 2719-700 MP 0.40 identified by the Devil's Knob Hydrologist and Engineers is at risk of plugging and then overtopping the road leading to potential road prism failure. Installation of an armored critical dip will provide increased capacity and reduce the associated risk to road infrastructure from channel diversion onto the road causing failure. The armor will consist of rip rap placed where runoff would cause erosion to the road surface and fill-slope.

Devil's Knob Treatment R5. Critical Dip	Unit	Unit Cost	#Units	Total $
Road Crew Work (3 Operators)	Day	$1100/day	3	$3300
Excavator	Hour	$45	27	$1,215
Dump Truck	Mile	$2	400	$800
Loader	Hour	$30	27	$810
Compaction Equip Rental	Lump			$300
Total				**$6,425**

R11. Up-sized Culvert: Culvert up-sizing will address damaged and significantly undersized crossings. This crossing located on FSR 2719 MP 13.47, is at increased probability of failure and the magnitude of consequences warrant replacement. Less expensive treatments were considered and deemed infeasible or not effective for this site. Road grade will not facilitate rolling dips, current condition will not allow slotted riser to be installed and effective. Road 2719 is a major throughway on the Tiller Ranger District and it connects it to the North Umpqua Ranger District. Closure is not an option because this main arterial

route provides access for Initial Attack resources into an area that experiences an abundance of lightening activity. Additionally, this road has two other recommended treatments, Storm Proofing and Storm Inspection and Response.

Devil's Knob Treatment R11. Up-sizing Culvert	Unit	Unit Cost	#Units	Total $
Overtime for Contract Survey Design and Prep	Forest Staff/Day	$500	10	$5,000
Overtime for Contract Implementation	Forest Staff/Day	$500	5	$2,500
40" Alzd CSP 16 ga., Length 50' and Hardware	CMP	$4500	1	$4500
Culvert Extraction	Lump			$4000
Mobilization	Lump			$2,500
Load, Haul, and Place	Lump			$5,000
Stream Diversion	Lump			$3,000
Armor Inlet and Outlet	Lump			$1,000
Surfacing	Lump			$2,500
Total				**$30,000**

T1. Trail Drainage Stabilization: The identified trail sections have steeper slopes combined with enough burn severity to warrant emergency treatments to prevent erosion and protect the resource at risk. The minimal treatments necessary to protect these resources are:

1. Construction of rolling dips as necessary to divert water flow off the trail surface. These dips shall use soil from the already established trail bed corridor, removing material from the up-trail side of the dip and placing it in the down-trail side, so as to create a diversion point in the trail tread.
2. Berm removal on all trail outer edges on side-sloped trails where erosion is imminent. This berm soil shall be pulled into or pushed away from the existing trail bed depending on the need for soil to elevate the existing trail bed or not.
3. Perform out-sloping of all trail in the prescribed areas that is unlikely to drain sufficiently the expected increased water flow.

These treatments will prevent erosion and further failure of the trail tread. Where access to work areas will require repeated travel by crews, tread repair and logout will be performed to allow safe access. These actions should limit loss of Forest Service investment in trail infrastructure. Forest Service crews will implement all treatments.

Devil's Knob Treatment T1. Trail Drainage Stabilization	Unit	Unit Cost	#Units	Total $
Seasonal USFS crew labor GS-08-06 @ $28.86/hour for 90 hours FY2022	Hour	$28.86	90	$2,597.40
Seasonal USFS crew labor GS-05-03 @ 19.23/hour for 90 hours FY2022	Hour	$45	27	$1730.70

Total				**$4,328.10**

T2. Trail Structure Stabilization: The 2 identified trail sections, creek fords located on #1426 and #1426A, at Beaver Creek and Switchback Creek trail crossings, have steeper slopes combined with enough burn severity to warrant emergency treatments to prevent erosion and protect the resource at risk. These treatments will prevent erosion and further failure of the trail tread. Where access to work areas will require repeated travel by crews, tread repair and logout will be performed to allow safe access. The purpose of the proposed treatment is to bolster the fords to withstand high flows of water runoff. The two fords in question will both be enhanced with firmer footings and a more stable creek bed landing to protect the crossing from higher flows and bank erosion. Crews will harvest local rock and imbed it into the trail tread corridor and ford to secure the trail approaches to the creek. Drainage will be added on each side of the approaches to ensure a stable tread condition leading into the crossings.

Devil's Knob Treatment T2. Trail Drainage Stabilization	**Unit**	**Unit Cost**	**#Units**	**Total $**
Seasonal USFS crew labor GS-08-06 @ $28.86/hour for 50 hours FY2022	Hour	$28.86	50	$1,413.00
Seasonal USFS crew labor GS-05-03 @ 19.23/hour for 90 hours FY2022	Hour	$45	50	$961.50
Total				**$2,374.50**

Protection/Safety Treatments: Treatments are designed to protect the public, employees, and contractors from immediate threats as a result of the increased watershed response following the fire, as well as protect monetarily valuable Forest Service infrastructure, recreation facilities, and heritage resources. Threats include hazard trees with weakened root structures that may fall because of increased runoff in burned areas, rock fall, damaged paved road surfacing, potential flood and debris flows, and harm from burned structure remnants.

S1a. Road Hazard Signs: Road Hazard Signs (S1a) will alert people including those accessing private lands, forest users, and forest staff to the potential dangers when driving through the burned areas.

Devil's Knob Treatment S1a. Road Hazard Signs	**Unit**	**Unit Cost**	**#Units**	**Total $**
Seasonal Labor (GS-4 @ $2000/day * 3 days)	Day	$2000	3	$6000
Signs with Posts and Hardware for BURNED AREA warnings	Sign/Post	$100	23	$2300
Totals				**$8300**

S1b. Trail Hazard Signs: The possibility of a high water flooding event on the 2800 Road corridor has been increased due to the consequences of the fire. South Umpqua Falls and 3 C Rock day use areas are heavily frequented by recreational users that may see a sudden increase in flow during a significant

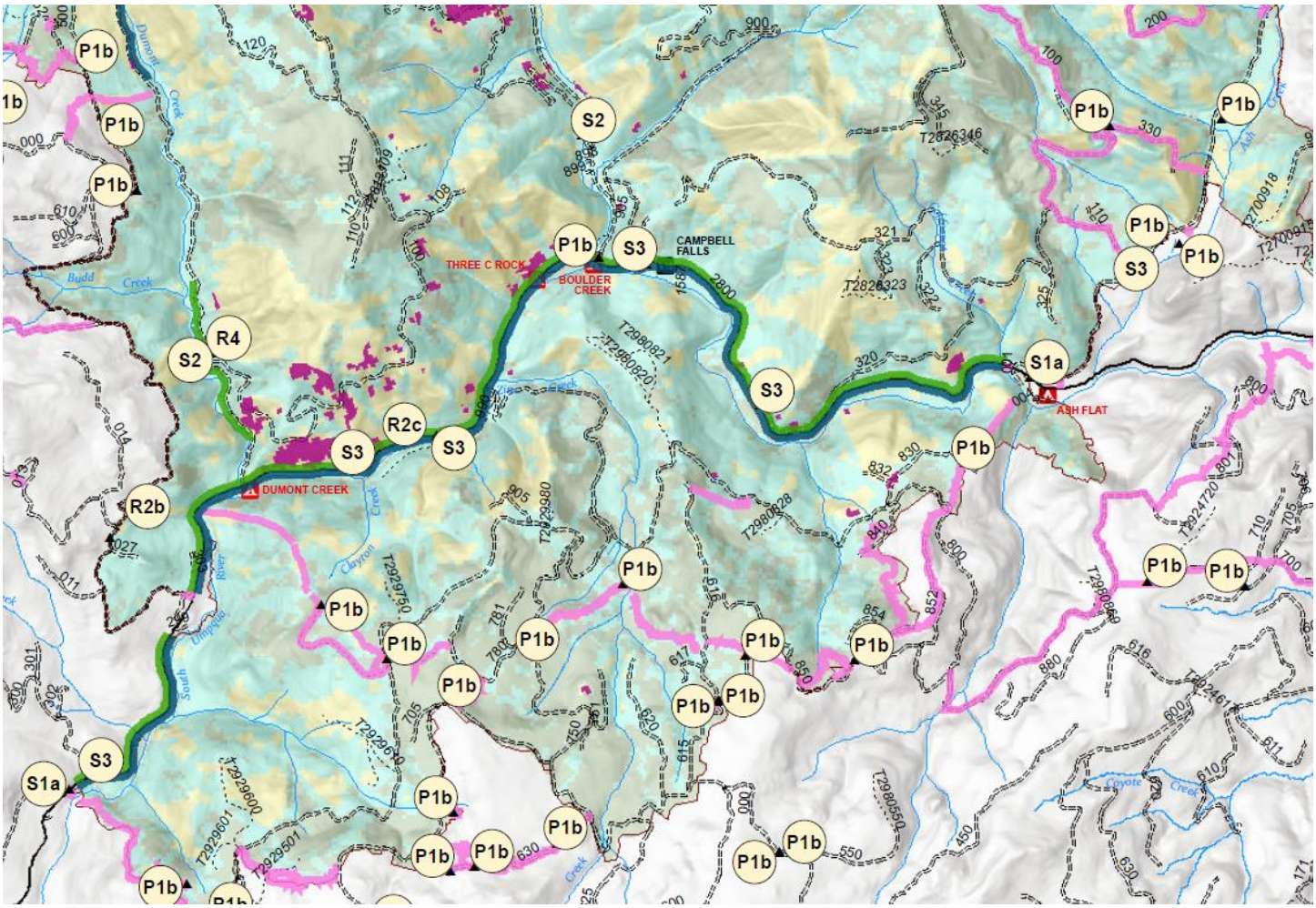
rain event and be unaware they are downstream of a burned area. The signage would reflect the possibility of sudden high water flows occurring with the intent of increasing caution in forest users.

Devil's Knob Treatment S1b. Trail Hazard Signs	Unit	Unit Cost	#Units	Total $
8 caution signs @ $60.00/sign	Sign	$800	8	$480
8 posts and hardware @ $40.00/sign	Post	$40	8	$320
Seasonal USFS crew labor GS-05-03 @ 19.23/hour for 20 hours FY2022				$385
Totals				**$1,184.8**

S2. Physical Closure Devices: With the loss of vegetation normal storm frequencies and magnitudes can more easily initiate erosion on the slopes and it is likely that this runoff will cover the roads or cause washouts at drainage facilities (culverts) or stream crossings. These events make for hazardous access to forest roads and put the safety of users at risk. Emergency road closures mitigate hazards to protect human life, safety, and property, and is being proposed on 11 ML2 roads.

Devil's Knob Treatment S2. Road Closure	Unit	Unit Cost	#Units	Total $
Labor	GS4	1000/day	4	$4000
Jersey Barriers		Lump		$6500
Road Closure Signs 10x50	Sign/Posts	Lump		$500
Total				**$11,000**

S3. Hazard Tree Felling: Danger tree felling along FSR 2800 and 2826 is being proposed in strategeic locations along these routes where there is an imminent risk to human life and safety. These routees are major access routes, and also have numorous areas along them where people park and congregate for river access, and are access routes to private communities. Road closure is not possible because of the importance of the roads for access to either private lands or access to critical Forest management activities including implementation of BAER treatments. Six locations along 2800 and 2826 have been targeted for treatment (see map below). At these sites, pockets of danger trees exist near road pullouts or areas where visitors are known to stop or congregate. These are 100% fire killed, with compromised roots or other defects and are leaning towards the pullouts.



Locations of the S3 Danger tree treatment along the FS 2800 and 2826 roads

Devil's Knob S3. Hazard Tree Treatment	Unit	Unit Cost	#Units	Total $
Overtime Contract preparation and Implementation	GS12	$650/day	5	$3,250
Faller Team Implementation	Site	$4,000	6	$24,000
Total				**$27,250**

S8. Infrastructure Removal: The purpose of the proposed treatment is to make the trail safe for Forest users and BAER trail implementation crews. Four small bridges had their decking slabs burned off but the stringer beams are still partially present with nails sticking up out of them on each structure. The partially burnt stringers need to be removed. Burnt hazard trees in the area need to be fallen in order for the crews to safely work at the bridge sites. Approximately twenty three hazard trees will be dropped in the area of the structures. Forest crews will do the work.

Devil's Knob S8. Infrastructure Removal	Unit	Unit Cost	#Units	Total $
Seasonal USFS crew labor GS-08-06 @ $28.86/hour for 30 hours FY2022	Hour	$28.86	30	$865.80

Seasonal USFS crew labor GS-05-03 @ 19.23/hour for 30 hours FY2022	Hour	$19.23	30	$576.90
Total				**$1,442.7**

H1. Heritage and Culural Resource Protection: Fire effects include complete vegetation removal which has increased visibility, prospective erosion, and looting/vandalism potential. Treatments are intended to provide protection of the exposed cultural resource sites and assess changes in condition following post-fire storm events. In addition, Section 106 Compliance will be required to successful implement other ground disturbing treatment proposed to protect BAER Critical Values. Forest Archaeologist will be required to secure Section 106 compliance efforts for these treatments.

Devil's Knob H1. Cultural Resource Protection	Unit	Unit Cost	#Units	Total $
Seasonal USFS crew labor 2 GS-05 @ $16.90/hour for 8 hours during 6 site visits FY2022	Hour	$16.90	96	$1,622
Seasonal USFS crew labor GS-12 @ 42.08/hour for 8 hours during 3 visits FY2022	Hour	$42.08	24	$1,009.92
Seasonal 106 Compliance 2 GS-05 @ $16.90/hour for 40 hours during FY2022	Hour	$16.90	80	$1,352
Overtime for 106 Compliance GS-12 @ 42.08/hour for 8 hours	Hour	$42.08	8	$336.64
Wildlife Cameras	Camera	$250	4	$1,000
Total				**$5,320.96**

I. Monitoring Narrative:

PART VI – EMERGENCY STABILIZATION TREATMENTS AND SOURCE OF FUNDS

			NFS Lands				Other Lands				All
		Unit	# of		Other		# of	Fed	# of	Non Fed	Total
Line Items	Units	Cost	Units	BAER $	$		units	$	Units	$	$
A. Land Treatments											
P1a. Invasives EDRR	acres	29	908	$26,480	$0			$0		$0	$26,480
P1b.Suppression EDRR	acres	39	346.4	$13,450	$0			$0		$0	$13,450
Insert new items above this line!				$0	$0			$0		$0	$0
Subtotal Land Treatments				$39,930	$0			$0		$0	$39,930
B. Channel Treatments											
Insert new items above this line!				$0	$0			$0		$0	$0
Subtotal Channel Treatments				$0	$0			$0		$0	$0
C. Road and Trails											
R1. Storm Proofing	Miles	3,631	11.93	$43,316	0			0		0	43316
R2b/R2c. New Drainage Fea	Each	2,554	7	$17,875							17875
R3. Storm Inspection/Respo	Miles	973	10.28	$10,000							10000
R4. Culvert Removal	Each	4,350	1	$4,350	0			0		0	4350
R5. Critical Armored Dip	Each	6,425	1	$6,425	0			0		0	6425
R11. Up-size Culvert	Each	30,000	1	$30,000	0			0		0	30000
T1. Trail Drainage Stabilizati	Miles	1,443	3	$4,328	$0			$0		$0	$4,328
T2. Trail Structure Stabilizati	Each	1,188	2	$2,375	$0			$0		$0	$2,375
Insert new items above this line!				$0	$0			$0		$0	$0
Subtotal Road and Trails				$118,669	$0			$0		$0	$118,669
D. Protection/Safety											
S1a. Road Hazard Signs	Each	361	23	$8,300	$0			$0		$0	$8,300
S2. Road Closure	Each	1,000	11	$11,000	$0						$11,000
S3. Hazard Tree Felling	Days	4,542	6	$27,250	$0						$27,250
H1. Cultural Resource Prote	Site	1,816	2	$3,632							$3,632
H1. Sec. 106 Compliance R	Hours	35	48	$1,689	$0			$0		$0	$1,689
S1b. Rec Hazard Signs	Each	148	8	$1,185	$0			$0		$0	$1,185
S8. Infrastructure Removal	Each	361	4	$1,443	$0			$0		$0	$1,443
Insert new items above this line!				$0	$0			$0		$0	$0
Subtotal Protection/Safety				$54,499	$0			$0		$0	$54,499
E. BAER Evaluation											
Initial Assessment	Report	$84,475	1	---	$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
Insert new items above this line!				$0	$0			$0		$0	$0
Subtotal Monitoring				$0	$0			$0		$0	$0
G. Totals				$213,098	$0			**$0**		**$0**	**$213,098**
Previously approved											

PART VII - APPROVALS

1. ALICE CARLTON Digitally signed by ALICE CARLTON Date: 2021.10.20 12:40:22 -07'00' 10/20/21

Forest Supervisor Date