

Date of Report: 10/ 12 /21**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: Green Ridge Fire****B. Fire Number: OR-MUF-000659****C. State: Oregon****D. County: Garfield****E. Region: 06****F. Forest: Umatilla National Forest****G. District: Pomeroy Ranger District****H. Fire Incident Job Code: P6N5AV****I. Date Fire Started: 07/07/21****J. Date Fire Contained: Projected 10/20/21****K. Suppression Cost: \$43,000,000 (10/07/21)****L. Fire Suppression Damages Repaired with Suppression Funds (estimates): 3 miles/8 acres**

1. Fireline repaired (miles): 8
2. Other (identify): Drop points and spike camps 15 acres

M. Watershed Numbers:*Table 1: Acres Burned by Watershed*

HUC #	Watershed Name
170601070604	Cummings Creek
170601060310	First Creek
170601070501	Headwaters Pataha Creek
170601070601	Headwaters Tucannon River
170601060311	Lower Crooked Creek
170601070602	Panjab Creek
170601060309	Upper Crooked Creek
170601060306	West Fork Butte Creek

Subwatershed Name	Total Subwatershed		Subwatershed Outside the Fire	Soil Burn Severity							
				UnBurned or Very Low		Low		Moderate		High	
	Acres	%Burned	Acres	Acres	%	Acres	%	Acres	%	Acres	%
Cummings Creek	12,727	2.1%	12,412	221	1.7%	85	0.7%	9	0.1%		0.0%
First Creek	13,576	0.9%	13,440	104	0.8%	23	0.2%	0	0.0%		0.0%
Headwaters Pataha Creek	18,320	0.5%	18,208	41	0.2%	50	0.3%	21	0.1%		0.0%
Headwaters Tucannon River	24,508	68.9%	2,023	5,057	20.6%	11,817	48.2%	5,017	20.5%	595	2.4%
Lower Crooked Creek	16,922	1.4%	16,680	77	0.5%	158	0.9%	6	0.0%		0.0%
Panjab Creek	16,265	67.6%	2,719	3,533	21.7%	7,466	45.9%	2,440	15.0%	106	0.7%
Upper Crooked Creek	18,987	33.1%	12,402	3,600	19.0%	2,681	14.1%	276	1.5%	28	0.1%
West Fork Butte Creek	16,822	9.3%	15,109	492	2.9%	1,074	6.4%	143	0.8%	4	0.0%
Grand Total	138,128	32.7%	92,993	13,125	9.5%	23,355	16.9%	7,912	5.7%	734	0.5%

N. Total Acres Burned:

Table 2: Total Acres Burned by Ownership

OWNERSHIP	ACRES
NFS	45,2221 (USFS)
OTHER FEDERAL (LIST AGENCY AND ACRES)	0
STATE	0.64
PRIVATE	0
TOTAL	45,221

O. Vegetation Types: The Green Ridge Fire has impacted several different vegetation types on Forest Service lands. The higher elevation (5000-6300ft) burned area consists of cool moist upland forest dominated by subalpine fir (*Abies lasiocarpa*), grand fir (*Abies grandis*) and Englemann spruce (*Picea engelmannii*). Dominate understory shrubs are thinleaf huckleberry (*Vaccinium membranaceum*), sticky currant (*Ribes viscosissimum*) and Sitka alder (*Alnus viridis*) with forbs such as woodland strawberry (*Fragaria vesca*) and Carolina bugbane (*Trautvetteria caroliniensis*) intermixed. Areas that burned at lower elevation (3000-5000 ft) consists of warm dry upland forest and moist riparian areas dominated by Douglas fir (*Pseudotsuga menziesii*), ninebark (*Physocarpus malvaceus*) and western coneflower (*Rudbeckia occidentalis*).

P. Dominant Soils: A mosaic of soil depths, rock content, and volcanic ash content are located within the burn area. The following soil classifications are mapped for the burn area (non-wilderness), listed in order from most common to least common.

- Loamy-skeletal, isotic, frigid Vitrandic Argixerolls
- Ashy over loamy-skeletal, amorphous over isotic, frigid Alfic Udivitrands
- Loamy-skeletal, mixed, superactive, frigid Lithic Haploxerolls
- Ashy over loamy-skeletal, amorphous over isotic Typic Vitricryands
- Loamy-skeletal, isotic Lithic Humicrypts
- Ashy-skeletal over loamy-skeletal, amorphous over isotic, frigid Alfic Udivitrands

Q. Geologic Types:

The Tucannon watershed is in the northern-most part of the steep north flank of the large anticline that is the Blue Mountains. The upper Tucannon is dominated by relatively flat lying Columbia River Basalt group and comprised of the Grande Ronde and Wanapum lava flows. Interbedded layers (10 to 30 feet thick) of lava flows contain fractured rock and old soil surfaces (1 to 5 feet thick) developed during periods of relative geologic inactivity. These can be sources of springs or sidehill seeps where moisture-living plant species may be found in an otherwise drier environment. Periodic release of soil and rock material is more likely from these less consolidated interbed areas as well, although rarely in large amounts. Overall, the watershed is quite stable with relatively little mass movement activity and upland events generally are limited to shallow small-scale debris flows and landslides. The periodic flush of accumulated rock fragments from side channels during extreme weather events has provided the most dramatic mass

movement in recent times being the debris-flow areas from the Dec 1996 - Jan 1997 and Feb 2020 rain-on-snow induced flood events.

R. Miles of Stream Channels by Order or Class:

Table 3: Miles of Stream Channels by Order or Class

Type	Miles
Intermittent Stream/Creek	93
Perennial Stream/Creek	80
Grand Total	173

S. Transportation System:

Trails:

Trails	Miles
Non-Wilderness	24
Wenaha-Tucannon Wilderness	42
Grand Total	66

Roads:

Maintenance Level	Miles
1 - BASIC CUSTODIAL CARE (CLOSED)	13
2 - HIGH CLEARANCE VEHICLES	16
3 - SUITABLE FOR PASSENGER CARS	7
4 - MODERATE DEGREE OF USER COMFORT	1
Decommissioned	4
Grand Total	41

PART III - WATERSHED CONDITION

A. Burn Severity (acres):

Table 4: Burn Severity Acres by Ownership

Soil Burn Severity	State Agency	U.S. Forest Service	Grand Total	Soil Burn Severity %
High Soil Burn Severity		735	735	1.6%
Moderate Soil Burn Severity		7,919	7,919	17.5%
Low Soil Burn Severity	0	23,414	23,414	51.8%
Unburned or Underburned	0	13,153	13,153	29.1%
Grand Total	1	45,221	45,221	100.0%
Ownership %	0.0%	100.0%		

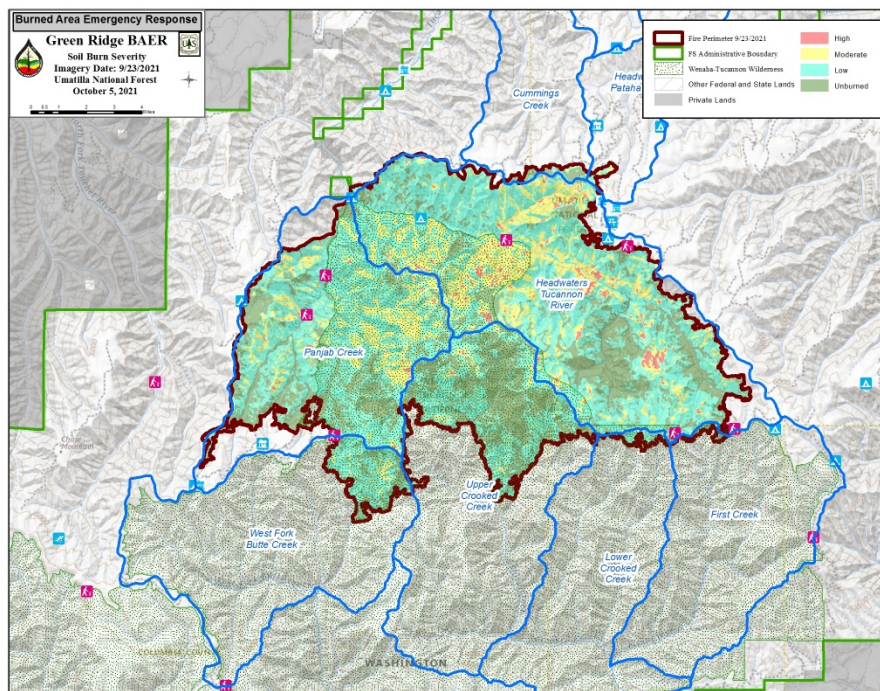
Table 5b: Burn Severity Acres Total for Green Ridge Fire

Soil Burn Severity	Acres	Soil Burn Severity %
High Soil Burn Severity	735	1.6%
Moderate Soil Burn Severity	7,919	17.5%
Low Soil Burn Severity	23,414	51.8%
Unburned or Underburned	13,153	29.1%
Grand Total	45,221	100.0%

Table 6c: Burn Severity Acres Non-wilderness and Wilderness

Soil Burn Severity	Acres	%Burn
Non-Wilderness	23603	52.2%
High Soil Burn Severity	449	1.0%
Moderate Soil Burn Severity	3865	8.5%
Low Soil Burn Severity	12911	28.5%
Unburned or Underburned	6379	14.1%
Wenaha-Tucannon Wilderness	21618	47.8%
High Soil Burn Severity	286	0.6%
Moderate Soil Burn Severity	4054	9.0%
Low Soil Burn Severity	10503	23.2%
Unburned or Underburned	6774	15.0%
Grand Total	45221	100.0%

Figure 1. Soil Burn Severity Map – Green Ridge Fire

**B. Water-Repellent Soil (acres):**

Soil Burn Severity (SBS)	SBS Acres	Estimated Water Repellent Acres
High	735	221
Moderate	7,919	792
Low	23,414	1171
Unburned	13,153	658
Total	45,221	2,841

An estimated 5 percent of the burn area has fire-induced water repellent soils (hydrophobic). The water-drop test for repellency was used across the range of soil burn severities (SBS) and on unburned areas. Based on field observations, weak water repellency is estimated on 30% of high SBS and 10% of moderate SBS areas. Weak water repellency was also observed infrequently in unburned and low SBS areas, indicating the presence of natural hydrophobicity in the fire area. Most hydrophobic changes in the burn area are very small in degree, extent and discontinuous. Besides hydrophobicity, the fire-induced loose, single-grain structure of some burned soils will shed water until either wetted, weak structure forms or crust forms. Some recovery from a water-repellent condition has also likely occurred in the months since many areas burned at the higher severities and this recovery is expected to continue.

C. Soil Erosion Hazard Rating: General ratings for post-fire condition across the burn area

High SBS – moderate to high
 Moderate SBS – low to moderate
 Low SBS – no to low
 Unburned – no to low

D. Erosion Potential: Increased erosion is expected in the burn area. High SBS areas have a moderate to moderate-high potential for erosion to occur, with increasing potential as slope steepness increases and on areas lacking down logs, surface rock or mixed topography to slow runoff and promote infiltration and deposition. Moderate SBS areas have a low to moderate-low potential for erosion with increasing potential in areas as described above and in areas connected to high SBS. Low SBS areas have no/low to low-moderate potential for erosion, with increasing potential in areas that are steeply sloping, lacking surface cover and roughness and adjacent to or in channel areas. Erosion potential is also expected to increase in moderate and high SBS areas where livestock use is common.

E. Sediment Potential: Sediment delivery increases are expected in the burn area. The potential for sediment delivery to streams is highly dependent on the erosion potential as previously described above, the proximity to stream channels, and riparian characteristics and condition. Areas with steep, long, and concave slopes adjacent to streams have the highest inherent sediment delivery potential, with increased potential as SBS increase from low to high. Riparian areas with high surface roughness, wide valley bottoms, lower angle slopes, and intact vegetation have higher effective sediment buffering potential compared to narrower and steeper valley bottoms with low covers and sparse vegetation. Riparian areas with high and moderate SBS decrease the riparian buffer effectiveness to varying extents due to the loss of soil cover and consumption of some of the surface roughness provided by downed wood and other organic material. Sheep Creek is an example of these areas of concern with very likely potential for increased sedimentation in the first year. The area below Horse Ridge with high and moderate SBS is likely for increased sediment to the stream system but due to the distance of high SBS from the stream is estimated to be less impactful to the system overall. It is recommended that the area be considered by fisheries and hydrology specialists to assess potential impacts to fish habitat and waterways as a result of this rating. Sediment potential is likely to very likely in moderate and high SBS areas where livestock use is common. Overall, the entire fire has a low risk for sedimentation to the stream system / habitat because after the

initial pulse of sediment, soil is expected to stabilize as vegetation sprouts, needle cast increases in areas, and ash stabilizes or is removed from the system.

F. Estimated Vegetative Recovery Period (years): Grassland habitats should recover in 1-3 years depending on SBS. Shrubland habitat should recover in 2-5 years depending on SBS as well as forested habitat with low severity. Forested habitat that endured moderate or high burn severity will take more than 5 years to recover.

G. Estimated Hydrologic Response (brief description): A peak flow analysis was conducted for a 10-yr, 24-hour storm with 2.75" of precipitation. Small headwater basins (< 3000 acres) with moderate to high SBS are expected to see peak flow increases up to 4 times the pre-fire condition. Smaller (< 500 acres) first order hillslopes with high SBS have a higher risk of localized debris flows that can have local effects on water quality and fish habitat. Larger basins include a mosaic of unburned to high SBS and the runoff response is expected to be up to lower due to the higher amounts of low and unburned landscape, although the initial erosion pulse will contain ash and fine soil particles that will cause a temporary increase in turbidity. These processes will attenuate over time and should recover to pre-fire rates over the next 3-5 years, until effective groundcover becomes re-established. The greatest impacts are most likely to occur in the first year or two after the fire.

PART V - SUMMARY OF ANALYSIS

Green Ridge fire started on July 7, 2021 around 9:15 pm as two individual fires caused by lightning strikes, Green Ridge and Turkey Tail. Fires started in steep terrain primarily consisting of grass and shrubs and spread rapidly by late afternoon winds and hot temperatures. Shortly after both fires were treated as a single fire. Closure of Forest Service roads on July 9, 2021 resulted in the evacuation of Tucannon River drainage campers and recreationists as the fire spread. The district closure was the result of dual firefighting efforts on Lick Creek fire approximately 6 miles north of Green Ridge fire. A few days later the entire forest was closed to the public due to high risk of more fires starting naturally and accidentally by recreationists.

Over 500 fire fighters were used on initial attack with 6 plus aerial vehicle support in the fires first month. Dangerous conditions due to steep slopes made it difficult to put the fire out. Fire lines were held for days and spotting across lines incrementally drove the fires progression. Much effort was made to keep fire out of the adjacent wilderness area because if it started in wilderness it was believed that it would burn all summer. Back burning was used in many areas inside and outside the wilderness. With all the fire fighter efforts to maintain growth incrementally, the fire spotted into the wilderness area. Fire fighter efforts with aerial support continued within the wilderness for a couple weeks. Approval for mechanical treatments in the wilderness was received the Regional Forester, which helped hold fire lines for additional days and weeks. By late August the fire had exceeded fire lines and crews were pulled from the wilderness area. The time used to hold fire growth allowed for weather to change and fire conditions to improve enough that fire growth through September slowed and was considered below catastrophic conditions. Fire growth outside of the wilderness area has remained contained since mid-September. Currently growth is slow in the wilderness and is expected to stop and go out with the first major precipitation event. As of October 5, 2021, the fire is at 60% containment.

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

Critical values identified during the BAER assessment that have the potential to be at risk as defined in FSM 2523.1. include human life and safety of Forest Service employees, the public, Forest Service property (ie., roads, trails, administrative facilities, recreation infrastructure), cultural and natural resources including Threatened and Endangered species and critical habitat, native plant communities and soil/water resources. The BAER team evaluated the risk to these critical values in accordance with FSM 2523.1. The Green Ridge Fire Critical Value table is attached as an appendix to this report.

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):

Human life/safety is at risk on NFS land from threats associated with post-fire related hazard trees, rock fall, increased flooding, debris flows, and loss of egress/access throughout the burned area, but particularly on roads and trails. Major access to the burn area for recreation is along 47 Road through Wooten State Wildlife Area that joins 4712 and 4713 roads on forest. Other access is by 64 Road, and 46 Road. Roads 46 and 64 follow ridge lines for the most part and have been cleared of danger/hazard trees as part of fire line preparation. 47 road follows the Tucannon River bottom and is prone to high water flow and debris or landslide action as seen in 2020 floods. Interagency coordination with WA State Wildlife Area will be critical in promoting human life and safety along 47 Road. Singage is proposed to notify land users as they enter the burn area of potential post fire dangers to reduce the risk to human life and safety. Currently road closures for 4712 and 4713 are still in effect.

2. **Property (P):** Damage to or loss of sections of road and trail could occur from increased runoff, erosion, flooding, and potentially debris flows within and downslope or downstream of areas of moderate and high soil burn severity on 4712 and 4713 roads. There are approximately 55 miles of trail within the fire perimeter with 21 miles needing tree clearing and minor surface tread maintenance. Most of the trails through high and moderate SBS are located within wilderness. Trails in wilderness are also high use but due to the status of the area's designation, preventative actions will only occur at trail heads. Pre-fire, all these trails are high use trails for hunting and recreation.

3. **Natural Resources (NR): Hydrologic Function:** Fire impacts proper functioning of hydrologic processes with the greatest and longest lasting impacts occurring from high soil burn severity and anthropogenic activities. Fire impacts within moderate, low, and very low burn areas are recoverable and expected to diminish as vegetation reestablishes. Most of the burn area resulted in low soil burn severity.

The runoff response for the fire area was evaluated using a probable storm precipitation total and the Wildcat5 rainfall-runoff model. Wildcat5 is a model that uses a distributed runoff curve number approach. Runoff curve numbers were selected using the Wildcat5 User's manual, the posted "Burned Area Emergency Response Tools" <https://forest.moscowfs.wsu.edu/BAERTOOLS/ROADTRT/Peakflow/CN/supplement.html>, and professional judgment. The pre-fire runoff from a 10-yr, 24-hr storm of 2.75 inches is approximately 25 cfs/square mile, with a post-fire flow model estimate of 50 cfs/square mile averaged across 6 modelled pour-sheds. Post-fire runoff, especially in the first few precipitation events, will likely be bulked with ash, bedload, sediment and/or debris, and result in flows with a higher specific gravity due to ash in the water column. Flows may become hyper-concentrated flash floods until vegetation has re-established in the burned areas. Using a bulking factor of 20%, the estimated peak flow increases from 1.4 to 4.5 times the pre-fire estimated flows, depending on drainage area, soil burn severity, soil erosion risk rating, slope and vegetative cover. The greatest impacts are most likely to occur in the first year or two following the fire.

The primary threat to values at risk for hydrology are associated with flooding, debris flows, and sedimentation as a result of altered soil hydrologic function and slope stability associated with burned soils and vegetation. Hydrologic changes induced by wildfire that can impact values at risk include

reductions or elimination of rainfall interception, transpiration, litter storage of water, and infiltration. These reductions typically result in greater runoff, increased overland flow, increased stream flows, increased water yields and increases in stormflow. In addition to increased flows, as root strength is lost from wildfire induced tree mortality, slopes stability decreases leading to higher susceptibility to landslide or debris flows.

Small first order headwater drainage basins (< 500 acres) with high SBS are expected to exhibit the highest amount of runoff on a unit basis (cfs/mi²). The downstream accumulation of flow is not proportionately additive, because as the drainage area increases in the downstream direction, more and more of the area becomes dominated by unburned to low SBS, which would not alter runoff processes. Depending on the intensity, amount and duration of rainfall immediately post-fire, there could be pulses of sediment-laden flows that can cause localized impacts to stream channels, such as excess scour and deposition. This is expected to be a short-term effect that will persist for the next three to five years and natural recovery is recommended as the most effective and low-cost treatment.

- b. **Plant Communities:** Where invasive species or noxious weeds are absent or present in minor amounts, are at risk of invasion by documented and newly introduced non-native invasive species. Many of these invasive plants are on the State of Washingtons noxious weeds list and are adjacent to areas of high and moderate SBS, and areas disturbed by suppression activities. Noxious weed infestations pose a serious threat to the composition, structure, diversity and function of native plant communities. Crown canopy was highly reduced to eliminated (moderate to high intensity burned areas); as was shrub and forb cover in the understory. These disturbed areas are now highly vulnerable to noxious weed spread from existing infestations or adjacent sources, as well as to the introduction of new invaders brought in by suppression equipment and activities. Invasive plants of concern include spotted and diffuse knapweed, Canada thistle, houndstongue, common St. Johnswort, dalmation toadflax, scotch thistle, yellow starthistle, sulphur cinquefoil and annual grasses including cheatgrass, medusahead rye, and ventenata.
- c. **Threatened and Endangered Fish or Wildlife:** There are no federally listed wildlife species within the Green Ridge fire perimeter. There are three threatened fish species (Bull Trout, Steelhead, Coho Salmon) with critical habitat affected by Green Ridge wildland fire.

The Green Ridge Fire had a range of impacts on Federally listed aquatic species and their Designated Critical Habitats. There were approximately 4.46 miles of occupied Bull trout habitat and 4.45 miles of Bull trout Designated Critical Habitat affected by the fire. The Green Ridge Fire affected approximately 2.26 miles of occupied Snake River Basin Steelhead habitat and 1.93 miles of their Designated Critical Habitat. Those affected stream miles had Soil Burn Severity ratings of moderate to high. The loss of canopy as a result of fire burning in the RHCAs could result in an increase in stream temperatures and sedimentation. Below is a table showing the Soil Burn Severity within each PacFish RHCA Category.

	RHCA Category and Acres Affected		
SBS	1	2	4
Unburned	1522.3	451.5	248.1
Low	1768.3	539.3	331.1
Moderate	835.0	474.1	474.1
High	38.2	12.9	7.4

- d. **Soil Productivity:** Reduced vegetative ground cover, altered surficial soil structure resulting in reduced water infiltration, and slight increase of soil hydrophobicity following wildfire

increases the risk of soil erosion and mass wasting in the area. Most soils in the area naturally have a slightly decomposed plant horizon (Oa or Oe horizons) that provides a protective covering to the mineral soil from erosion due to rain fall, sheet erosion, or gullyng. High and moderate soil burn severity (SBS) areas have lost the protective organic horizon. Absence of the organic horizon increases the potential for sheet and rill erosion, isolated debris and mud flows, and slumping that decreases soil productivity in the area and contribute to erosion and sediment delivery in streams to some degree. In some cases, the risks may persist for several years after fire.

Low SBS are considered to have no elevated risk of erosion, runoff, or impaired soil productivity due to organic material and soil structure being near or at undisturbed levels. Low SBS areas serve as buffers between high and moderate SBS areas. High and moderate SBS areas cause the greatest concern for decreased soil productivity and sediment delivery to streams, especially when they connect surrounding backslopes to the stream system. Moderate and High SBS categories show a notable decrease in surface organic matter and loss of surface horizon structure. High and moderate SBS disturbance resulted in changes to the first 0.5 to 3 cm of surface soil structure. The depth of soil burn was predominately light/shallow and most commonly limited to less than 1 cm depth of mineral soil, leaving unaltered soil structure and below. Surface soil structures altered by fire to loose, single grain structure and organic ash from consumed vegetation are the greatest sources of erosion from mountain backslopes. Primary erosion potential is from the top 1 to 2 cm on high SBS soils but as energy increases down slope, erosion can scour deeper into the soil profile increasing sediment movement. Landforms in the area holding thick Mazama volcanic ash deposits most commonly have slopes less than 35%, and mixed ash-influenced soil more common on the steeper slopes. Steeper slopes hold thinner soil profiles and are more susceptible to soil erosion and have greater negative effects to soil productivity due to their thin nature. Anticipated mass wasting events on steep slopes should be small and isolated due to the discontinuous nature of soil development on the landscape with regular rock outcrop and repeated changes in slope from the mountain tops to drainages.

Areas of high soil burn severity and steep slopes have geomorphic surface features that add to and detract from soil erosion throughout the burn area. Some areas have a high rock cover content protecting and holding loose soil to the local area, while others lack the protective rock content on the surface or in the upper soil profile. Areas previously burned during the School and Columbia complex fires (2005, 2006) generally had moderate to high amounts of Coarse Woody Debris (CWD) due to standing dead trees becoming deadfall since the old fires. This will help to decrease the amount of sedimentation and erosion during overland flow by roughing up the soil surface. Areas unburned during those fires showed little-no CWD. Standing dead in these areas will eventually fall to become down CWD, but that may not occur for several years. Some steep slope areas with high SBS contain small 1-foot-wide benches behind vegetative growth that hold and accumulate soil erosion. These areas have a greater potential for maintaining soil productivity as sprouted vegetation continues to grow. Areas with high soil moisture content, stream beds, springs, etc. already displayed new growth, even in areas recently burned at High SBS. Shrubs with extensive root systems that were not entirely consumed were also showing signs of regrowth during site visit. This indicates revegetation potential is high and should reduce the amount of time increased runoff, erosion and sedimentation will be expected. Areas that have burned at moderate and high SBS in both the 2005-2006 fires and the Green Ridge fire are expected to have a longer delay in revegetation.

If areas of the burn are considered for salvage sales, the effects of the Green Ridge Fire should be considered and guide activities. Soil disturbance in areas where slopes exceed 35% and lack ample rock cover or dead and down cover are inherently at risk for negative effects to soil productivity and increased sediment delivery to the streams during and after

harvest regardless of SBS rating. Areas with less-steep slopes and low to moderate SBS mosaic burn are generally suitable for salvage and resilient to the associated soil disturbance. Maintaining a disconnected distribution of soil disturbance provides areas for soil deposition before sediment can reach the stream system.

Areas of concern for increased erosion and sedimentation in streams are drainages with large, continuous areas of moderate-high SBS with no buffer of low-no SBS before the stream, such as the Sheep Creek drainage. It is recommended that Sheep Creek be further analyzed by fisheries and hydrology resources to assess impacts to fish habitat and waterways.

Other areas of increased erosion and sedimentation that may have undesirable effects are locations where erosion, rock, debris, and sedimentation have the potential to gradually plug/fill culverts and road/trailside drainages (ditches, waterbars, dips).

Areas of soil productivity concerns also include Moderate-high SBS areas that fall within active grazing allotments. Livestock can have potential additive effects contributing to degradation of the soil resource post-fire where soil structure and organic matter has been damaged or lost

- 4. Cultural and Heritage Resources:** Cultural resources at risk include traditional use areas, prehistoric lithic scatters, rock shelters, mining and railroad camps, mills and historic trails. Of those that qualify as BAER Critical Values, there are no sites that are at risk to looting and/or degradation from erosion.

B. Emergency Treatment Objectives:

The primary objective of this BAER assessment is to recommend treatments to manage identified unacceptable risk from imminent post-fire threats to human life, safety, property, natural and cultural resource on National Forest System Lands. These treatment recommendations should substantially reduce the probability of damage to BAER critical values.

The objectives of the land treatments are to promote and protect native and naturalized vegetative recovery by reducing the spread of noxious weeds (**Pa1, Pa2**). The objective of road and trail treatments is to protect road and trail investments from becoming impassible and damaged due to increased post-fire runoff (**R1, R3**), and reduce sedimentation into streams degrading water quality important to T&E fish species (**R1, R3**). The objective of proposed safety treatments is to protect human life and safety by raising awareness through posting hazard warning signs at recreation sites, trailheads and roads (**S1a, S1b**) and to access between WDFW and NFS in order to coordinate public messaging between land managers. This treatment will help in the coordination and communication of rangeland management between the USFS and WDFW (**S10**).

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

Land: 90

Channel: NA

Roads/Trails: 90

Protection/Safety: 90

D. Probability of Treatment Success

Table 8: Probability of Treatment Success

	1 year after treatment	3 years after treatment	5 years after treatment
Land	90	70	50
Channel	N/A	N/A	N/A
Roads/Trails	80	90	90
Protection/Safety	90	100	100

E. Cost of No-Action (Including Loss): \$1,080,000

G. F. Cost of Selected Alternative (Including Loss): \$ 94,275**H. Skills Represented on Burned-Area Survey Team:**

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

Team Leader: Anne Poopatanapong / Brien Park (t)

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Forest BAER Coordinator: Brien Park

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Team Members: Table 9: BAER Team Members by Skill

Skill	Team Member Name
<i>Team Lead(s)</i>	Anne Poopatanapong; Brien Park (t)
<i>Soils</i>	Andre Snyder; Austin Wrem (t)
<i>Hydrology</i>	Zig Napkora
<i>Engineering</i>	Hailu Gabriel (t); Chase Cimina (t)
<i>GIS</i>	Robbin Harris Biggs (t) ;Chris Strobl
<i>Archaeology</i>	Will Marquardt
<i>Weeds</i>	Chance Appleford
<i>Recreation</i>	Andy Augir / Kenny Bott
<i>Other</i>	Bill Dowdy (Fish), Megan Chapman (Botany), Holly Harris (Wildlife),

I. Treatment Narrative:**Land Treatments:****P-1a; P-1b Early Detection Rapid Response EDRR**

Preventing invasive (non-native, noxious) plant establishment in weed-free burnt areas is the most effective and least costly management treatment. This can be accomplished through early detection and rapid eradication by careful monitoring of burned areas.

P-1a Early Detection Rapid Response EDRR: EDRR is needed in spring and fall of 2022 within the Green Ridge burn perimeter. Early detection and treatment of invasives is critical to prevent the establishment of these species on the national forest. Treatment is most effective when infestations are small and before the plant species produce seed heads. EDRR will be used to survey, treat, and monitor invasive species in moderate to high severity burn areas adjacent to existing invasive populations, and along roads, trails, dozer line, drop points, staging areas identified by the forest. There is 30 acres of prescribed BAER EDRR treatment within the Green Ridge fire. This work will be performed by the local botanists and staff and their local knowledge of invasive plant populations.

P-1b Suppression Impact to BAER: Approximately 26 acres of dozer lines/landings/staging areas etc. that were utilized during suppression activities.

ITEM	Cost/acre	Acres	Total Cost	Description of Cost
BAER EDRR	\$100/acre	30	\$3,000	Spring 2022 and Fall 2022 Early detection rapid response surveys and treatment along roadsides that experienced Mod/High severity burns and is adjacent to known invasive weed populations.

Suppression EDRR	\$100/acre	26	\$2,600	Spring 2022 and Fall 2022 Early detection and rapid response surveys and treatments in dozer line/drop points/staging areas.
Total treatment cost:		56 acres	\$5,600	

Channel Treatments: n/a

Roads and Trail Treatments:

R1. Storm Proofing: This treatment includes storm proofing 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 and 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. Includes FS Roads parts of 4712 and 4713.

ITEM	Cost/ Mile	Miles	Total Cost	Description of Cost
Storm Proofing	\$3,150	3	\$9,450	Culvert cleaning below high and moderate SBS areas, or where partially infilled. Cleaning of infilled ditches, catchment basin and lead out ditch, slump removal, and removal of vegetation or debris.

R3. Storm Inspection and Response: Storm inspection and response will keep culvert and drainage features functional by cleaning sediment and debris from in and around features between and/or during storms. Increase the frequency of storm inspections and availability of equipment to clean out culvert inlets based on local weather forecasts. This work will be accomplished through Forest Maintenance Contract, equipment rental, and general labor. Includes FS Roads 47, 4712, and 4713.

ITEM	Cost/ Mile	Miles	Total Cost	Description of Cost
Storm Inspection and Response	\$1,200	9	\$10,800	Regular inspection of culverts, ditches, catchment basins between or during storm events. Included cost for compensation additional to base pay.

Protection/Safety Treatments:

S1a- # BAER Warning Signs

Install warning signs for flash flooding and/or potential debris flow. Install "Entering Burned Area" signs where necessary to properly alert travelers of the dangers ahead.

ITEM	Cost/ Unit	# of Units	Total Cost	Description of Cost
Road Hazard Signs	\$800	10	\$8,000	Sign notification for visitors as they enter the burn area for recreation or hunting activities.

S1b- # BAER Warning Signs

Install warning signs at trail heads indicating potential for tree fall for flash flooding and/or potential debris flow. Install "Entering Burned Area" signs where necessary to properly alert travelers of the dangers ahead.

ITEM	Cost/ Unit	# of Units	Total Cost	Description of Cost
Trail Hazard Signs	\$350	10	\$3,500	Sign notification for visitors as they enter the burn area for recreation or hunting activities.

S10 Interagency Coordination

This treatment is essential to coordinate access between WDFW and NFS in order to coordinate public messaging between land managers. This treatment will help in the coordination and communication of management of rangeland between the Forest Service and WDFW. This cost was requested in addition to base salary.

ITEM	Units	# of Units	Unit Cost	Total Cost	Description of Cost
S10. Interagency Communication	Days	5	\$500	\$2,500	Communication with adjacent land agencies, Governments, county groups, and the public

I. Monitoring Narrative: Implementation monitoring will occur on roads. Utilize storm patrol to monitor road drainage structures after any significant storm events to ensure the maximum drainage capacity is maintained until natural recovery of the fire area has occurred. Monitoring, survey, and treatment are all included as part of Early Detection and Rapid Response (EDRR) treatments for invasive plants (noxious weed). This will occur for the first year following the containment of the Green Ridge fire and will occur in moderate and high severity burn areas adjacent to roads, trails and dozer lines. All of the described monitoring has been accounted for in the treatment costs therefore no additional monitoring funding is being requested for the Green Ridge fire.

P1a. EDRR Suppression	26	100	26	\$2,600
<i>Insert new items above this line!</i>				\$0
<i>Subtotal Land Treatments</i>				\$5,600
B. Channel Treatments				
				\$0
<i>Insert new items above this line!</i>				\$0
<i>Subtotal Channel Treatments</i>				\$0
C. Road and Trails				
R3. Storm Inspection & Response	9	1,200	9	\$10,800
R1. Storm Proofing	3	3,150	3	\$9,450
<i>Insert new items above this line!</i>				\$0
<i>Subtotal Road and Trails</i>				\$20,250
D. Protection/Safety				
S1a. Road Hazard Signs	10	800	10	\$8,000
S1b. Trail/Rec Hazard Signs	10	350	10	\$3,500
S10. Interagency Coordination		2,500	1	\$2,500
<i>Insert new items above this line!</i>				\$0
<i>Subtotal Protection/Safety</i>				\$14,000
E. BAER Evaluation				
Initial Assessment	Report			\$54,425
				\$0
<i>Insert new items above this line!</i>				---
<i>Subtotal Evaluation</i>				\$54,425
F. Monitoring				
				\$0
				\$0
<i>Insert new items above this line!</i>				\$0
<i>Subtotal Monitoring</i>				\$0
G. Totals				\$94,275
Previously approved				
Total for this request				\$94,275

1. _____
Deputy Forest Supervisor Date