Date of Report: 9/14/2022

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: SRF Lightning Complex

B. Fire Number: CA-SRF-000620

C. State: CA

D. County: Humboldt and Trinity Counties

E. Region: 05

F. Forest: Six Rivers

G. District: Lower Trinity Ranger District

H. Fire Incident Job Code: 0510 P5PY38

I. Date Fire Started: 08/05/2022

J. Date Fire Contained: 93% contained (no estimate of final)

K. Suppression Cost: $93.1 million

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

Total dozer line 74.8 and 46.8 other line. (“other” doesn’t include road used as line)
1. Fireline repaired (miles): 43.4 miles completed, with 3.2 miles where no repair is needed.
2. Other (identify): 10.5 miles completed, 13.7 no repair needed.

M. Watershed Numbers:

Table 1: Acres Burned by Watershed

HUC #	Watershed Name	Total Acres	Acres Burned	% of Watershed Burned
180102120504	Old Campbell Creek	14,850	10,335	63.3
180102120505	Mingo Creek-Trinity River	28,798	713	1.8
180102120502	Grouse Creek	36,244	367	0.8
180102111201	Willow Creek	27,766	41	0.1
180101020101	Noisy Creek-Redwood Creek	38,566	1	<0.1

HUC #	Watershed Name	Total Acres	Acres Burned	% of Watershed Burned
180102111206	Campbell Creek-Trinity River	31,089	7,630	22.1
180102111107	Sharber Creek-Trinity River	19,590	9,357	44.1
180102111202	Cedar Creek	16,752	12,987	73.6
180102111007	Bell Creek-New River	21,722	83	0.4
180102111203	Horse Linto Creek	25,301	172	0.5

N. Total Acres Burned:

Table 2: Total Acres Burned by Ownership

OWNERSHIP	ACRES
NFS	36,266
PRIVATE	5,420
TOTAL	41,687

O. **Vegetation Types:** Dominate vegetation types within the fire perimeter were characterized as mixed conifer hardwood forests. Common overstory species include Douglas fir (*Pseudostuga menziesii*), incense cedar (*Calocedrus decurrens*), madrone (*Arbutus menziesii*), black oak (*Quercus kelloggii*), Oregon white oak (*Quercus garryana*), canyon live oak (*Quercus chrysolepis*). Common understory species include tanoak (*Notholithocarpus densiflorus*), Pacific dogwood (*Cornus nutallii*), chinquapin (*Chrysolepis chrysophylla*), Hazelnut (*Corylus cornuta var.californica*), deer brush (*Ceanothus integerrimus*), snowbrush ceanothus (*Ceanothus velutinus*), huckleberry oak (Quercus vaccinifolia), sword fern (*Polystichum munitum*), and Oregon grape (*Berberis nervosa*). True fir forests of white fir (*Abies concolor*) are found at the upper elevation areas. Riparian areas generally consist of white alder (*Alnus rhombifolia*), big leaf maple (*Acer macrophyllum*), umbrella plant (*Darmera peltata*), chain fern (*Woodwardia finbriata*), coltsfoot (*Petasites frigidus*) and elks clover (*Aralia califomica*). Areas recovering from past fires are generally shrubby, dominated by sticky white-leaf manzanita (*Arctostaphylos viscida*), deer brush (*Ceanothus integerrimus*), and snowbrush ceanothus (*Ceanothus velutinus*).

P. **Dominant Soils:** Gravelly to very gravelly loams (incl. a few sandy loams and clay loams) weathered from metasedimentary rock: Clallam, Hugo, Maymen, and Holland families are dominant.

Q. Geologic Types:

The Six Rivers Lightning Complex primarily lies within the Permian to Jurassic Klamath Mountain and slightly within the Coast Ranges physiographic provinces and are underlain predominantly by the Rattlesnake Creek terranes of the western Paleozoic and Triassic belt, the Galice Formation of the western Klamath belt, the Picket Peak terrane of the Eastern Belt of the Franciscan Complex, and the Ironside Mountain pluton. Rock types are composed of accreted metasedimentary (slate, shale, sandstone, limestone, chert, and schist), granitic intrusive rock (diorite, and quartz diorite) from Jurassic volcanism, and Quaternary sediments in the valleys. Steep dissected slopes composed of dormant landslides and with smaller active landslides within their toe zones are the dominant geomorphic features. Most active landslides are on steep channel banks and can occur upslope within larger dormant landslides or in other upland areas. Several large earthflows are in the fire area. Current channels and resource aerial photography show that steeper drainages have evidence of past debris flows due to extreme weather events such as the 1964/65 and 1997 floods.

Table 3: Geology in the Burn area

Belt/Assemblage	Age	Terrane/Formation
Western Paleozoic & Triassic	Permian-Jurassic	Rattlesnake Creek terrane

Western Klamath Belt	Jurassic	Galice formation
Eastern Belt of the Franciscan Complex	Jurassic-Cretaceous	Picket Peak terrane
Plutons	Jurassic	Ironside Mountain
Pleistocene / Holocene Fluvial Deposits	Quaternary	Superjacent to Terranes in Canyons and Trinity River Valley

R. Miles of Stream Channels by Order or Class:

Table 4: Miles of Stream Channels by Order or Class

STREAM TYPE	MILES OF STREAM		
	AMMON	CAMPBELL	TOTAL
PERENNIAL	17	38	55
INTERMITTENT	15	48	63
EPHEMERAL	113	178	291
OTHER (DEFINE)			

S. **Transportation System:**
Trails: *National Forest (miles):* 13.5
Roads: *National Forest (miles):* 105.4

- ML1: 12.09
- ML2: 46.70
- ML3: 35.51
- ML4: 11.09

PART III - WATERSHED CONDITION

A. Burn Severity (acres):

Table 5: Burn Severity Acres by Ownership

Soil Burn Severity	NFS	Private	Total	% within the Fire Perimeter
Unburned	2,824	589	3,413	8%
Low	27,109	4,555	31,665	76%
Moderate	5,551	260	5,811	14%
High	782	16	798	2%
Total	36,266	5,420	41,687	100%

B. **Water-Repellent Soil (acres):** Repellency generally varied with texture: Loams have moderate to severe repellency with similar natural background levels; Sandy Loams have severe repellency with slight background levels; Clay Loams have very little to no repellency. Soil burn severity classes were not markedly different, due partly to limited accessible high-mod sampling points.

C. **Soil Erosion Hazard Rating:** Custom post-fire EHR was not derived. Default soil survey values are mostly high to very high EHR owing to very steep terrain.

D. **Erosion Potential:** 4-40 tons/acre, average 14 tons/acre, estimated using ERMiT with custom PRISM climate and a few representative hillslopes.

E. **Sediment Potential:** Not assessed, but given dominantly very steep terrain, 80-90% of erosion potential is estimated as sediment delivery.

F. Estimated Vegetative Recovery Period (years): 3-5 years. Based on the final soil burn severity (SBS) map, it appears that sufficient seed sources remain throughout much of the burn area to assist with a rapid natural recovery.

G. Estimated Hydrologic Response (brief description):

Hydrologic Response

Pre- and Post-Fire Peak Flow Estimates:

Pre- and post-fire peak flows were modeled for all HUC 12 watersheds containing portions of the SRF Lightning Complex. The HUC 12 watersheds were modeled using the USGS regression equations for ungauged basins (Gotvald et al. 2012). These results were then adjusted for post-fire conditions using three different modifier approaches developed by USFS hydrologists over the last two decades from post-fire monitoring data. The modifiers use burn severity information to adjust streamflow for increases in runoff that will occur due to decreases in interception and evapotranspiration. The modifiers also include a 'bulking factor' intended to account for increased sediment and debris delivery and transport. Of the approaches employed it was determined that the method developed by Kuyumjian provided the best estimates for post-fire peak flows for catchments in the SRF Lighting Complex area.

Pre- and post-fire runoff predictions for the HUC 12 watersheds within or partly within the SRF Lightning Complex were very low in the six of the 10 HUC 12 watersheds that were modelled. Post-fire runoff predictions were very low for these six watersheds because they collectively only accounted for 3 percent of the total burn area. The total area burned in these watersheds is very low and will not result in an appreciable change in peak flows. Ninety-seven percent of the burn area occurred in the remaining four watersheds.

Ninety-seven percent of the burn area occurred in the remaining four watersheds. Of these four watersheds, projected runoff increases were not appreciable for Campbell Creek-Trinity River due to the unburned area in this watershed. The projected runoff for a 5-year event is expected to increase by factors of 1.2, 1.3, and 1.4 in the Old Campbell Creek, Sharber Creek-Trinity River, and Cedar Creek watersheds, respectively. Runoff increases are driven by the amount of moderate, and to a lesser extent, high severity burn area in each of these watersheds.

One pour point on the Hawkins Creek watershed was modelled because it contained the greatest proportion of moderate and high burn severity area within the SRF Lightning Complex and has the potential to affect critical values (i.e., Forest Service bridge on Road 7N02. Runoff from Hawkins Creek is expected to more than double or increase by a factor of 2.1 for a 5-year recurrence interval storm. This increase is appreciable for this small drainage and potentially could impact the Forest Service bridge on Road 7N02.

While the modelled flow increases are generally low for watersheds in the burn area, excepting Hawkins Creek, there is still a possibility that critical values including hydrologic function and road infrastructure could be affected by damaging storms in the burn area. The few road treatments identified in this assessment target the sites that have the greatest likelihood of being impacted by damaging storms. Potential impacts include culvert plugging, erosion of stream crossing fills, increased turbidity and sedimentation from the former sources, and impacts to road prisms where diversion potential exists (e.g. 7N31 road, tributary to Cedar Creek).

Geologic Response

The fire area is characterized by deeply incised channels with steep head walls varying in rock size from large cobbles to fine sediment. Numerous examples of recent dry ravel deposits and past examples of debris flow channels and aprons were present within the Six Rivers Lightning Complex during the BAER analysis indicating recent mass wasting activity in the area. The USGS debris flow model highlighted the following watersheds in order within the Six Rivers Lighting Complex as having the highest possibility of debris flow initiation: face drainages off Campbell Ridge, upper reaches of Cedar Creek, Hawkins Creek, Hudson Creek, and the upper reaches of Madden Creek. Hawkins Creek, the face drainages off Campbell Ridge, and Hudson Creek are the most hazardous due to their proximity private property and intersections with infrastructure.

Debris slides and flows and increased sediment production, debris recruitment, and increased flowing within Hawkins Creek, and on the SW Campbell Fire perimeter is likely.

PART V - SUMMARY OF ANALYSIS

Introduction/Background:
The SRF Lightning Complex is located on the Six Rivers National Forest on the Lower Trinity Ranger District and spans two counties: Humboldt and Trinity counties. The complex started on August 5, 2022 from multiple lightning strikes. This assessment focuses on the Ammon and Campbell fires within the complex. As of September 14, 2022, the fire was reported as 93% contained and stable at 41,687 acres. The fire resulted in the loss of one structure, evacuation orders of local communities, and a forest closure in the burn area.

The majority of the fire experienced low soil burn severity (% low SBS) with smaller isolated moderate to high soil burn severity islands (% mod and high SBS). The burn area has extremely steep slopes that have inherent slope instability. The risk of flooding, sediment-laden flows and erosion events will increase as a result of the fire, creating hazardous conditions within and downstream of the burn area.

Smoke inversion in the valley moderated fire behavior. The inversion negatively affected visibility and air quality for the local communities. The smoke inhibited acquiring a clear BARC, thus three different images were used for the assessment. The third was limited in extent (mainly for the lower part of Cedar Creek) and may still have been affected by smoke. Degree of smoke affecting the image is considered minimial as the image closerly mirrored field observations. Lack of visibility was one factor as to why the BAER team did not conduct an aerial reconnaissance.

A. Describe Critical Values/Resources and Threats (narrative):
A BAER team began assessing the area for post-fire emergencies on August 31, 2022. In that time the team has identified the following critical values and post-fire threats. The full list of critical values analyzed and risk determinations for these values is included in Appendix 3. Critical Values described in the sections below were identified by the assessment team as those with risk ratings appropriate for further evaluation and treatment recommendation (Risk ratings of “unacceptable” as defined by the BAER policy or specifically requested by leadership). The risk matrix below (Table 6), Exhibit 2 of Directive No.: 2500-2020-1 was used to evaluate the Risk Level for each value identified during Assessment.

Table 6: 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):**
   Based on potential for flooding, sediment-laden flow, rock falls, burned trees and potential effects to infrastructure, there is a risk to the public and employees *in some areas of the fire*. These would be areas within and downslope of slopes with moderate to high soil burn severity, and burned areas with steep unstable slopes where understory has been removed. Other catchments which only have low to very low soil burn severity, are not expected to pose a significant threat to human life and safety although sediment delivery and woody debris may increase.
   Parts of the burn area have evidence of past hillslope instability, sediment-laden flows, and rock fall in the pre-fire environment. Risk of flooding, sediment-laden flows, and rock fall occurring in the previously unstable areas will be exacerbated by the fire. A blow down event last winter increased the number of hazardous hanging trees and branches as well as wood in channels. Most channels have woody debris (ranging from small branches to whole trees) that could be transported in peak flows, potentially plugging culverts and affecting road access. Impacts from the post-fire environment

on human life and safety within and downstream of the burn area is considered POSSIBLE with MAJOR consequences. This results in a HIGH risk to human life and safety from post-fire threats
.

a. **Roads**
These post-fire watershed responses may impact main access roads. Impacts to access could leave FS employees and forest users stranded, possibly exposed to poor weather, in areas with poor cell coverage, and/or areas subject to rockfall, increased runoff, and sediment-laden flows, especially if they try to pass through during storms. Some areas with higher risk are the roads located at drainage outlets, traversing steep slopes, or on depositional fans below steep burned catchments. Because of the variable burn severity, post-fire threats to life and safety vary depending on location on the landscape, proximity to higher soil burn severity, and steeper slopes. Stump holes pose a threat to drivers as drivers could lose control of their vehicle, resulting in an accident and posing a risk to human safety. Impacts from the post-fire environment on human life and safety within and downstream of the burn area is considered POSSIBLE to LIKELY with MAJOR consequences. This results in a HIGH to VERY HIGH risk to human life and safety on roads from post-fire threats.

b. **Trails**
There are 7 (motorized and non-motorized) trails within and near the burn area (see risk assessment for breakdown of each trail). Two trails are located upslope of the burn perimeter and are not at risk. The other 5 trails are primarily on ridges and in areas with low soil burn severity; however, segments transect steeper slopes below burned slopes and/or through areas with high and moderate soil burn severity. The steep burned slopes could produce rolling debris that can travel long distances. The areas with moderate and high SBS could produce rolling debris or have unstable snags and hazard trees. Most of these trails get light use, thus the probability of exposure is UNLIKELY to POSSIBLE with MAJOR consequences if someone gets hit with rolling debris or a falling tree. Watershed response in the fire environment poses an INTERMEDIATE to HIGH risk to human life and safety on trails within the burn area.

c. **Hazardous Materials:**
One FS structure (historic Ammon Guard Station) and one camper on NFS lands was burned in the fire. Both contain hazardous materials that could pose a risk to life and safety. Use of asbestos in building materials was fairly common pre-1970 and since has been limited in use. Asbestos used for building materials are particularly hazardous to human health when it is in a degraded, or friable condition and not much when intact. Particularly when burned, asbestos fibers become readily airborne and if inhaled by humans the micro fibers can permanently embed in the lungs and possibly lead to mesothelioma, emphysema or cancer. The burned structure is located adjacent to the main access road for the area. The burned camper has unknown hazardous material and is on the shoulder of a main access road. Transport off-site and exposure to hazardous material is POSSIBLE with a MODERATE to MAJOR consequence resulting in an INTERMEDIATE to HIGH risk.

2. **Property (P):**Roads-- Potential critical values assessed include Forest Service System Roads and related drainage features. Within the Fire there are 105.38 miles of Forest System roads. Only those Critical Values with an immediate threat are recommended for emergency response and are confined to FS roads both within the burn perimeter and downstream of highly impacted watersheds. Due to limited time and access, assessment was prioritized to roads that fell within areas shown on the BARC as high and moderate and road drainage crossing below watersheds of high to moderate burn severity. Primary threats include drainage issues with both crossings and road-side ditch capacity, fill slope and road embankment concerns due to burned stump holes, and safety due to hazard trees and road damage from stump holes. Likelihood of damage to roads is POSSIBLE to VERY LIKELY with a magnitude of consequence of MODERATE to MAJOR. Post-fire watershed response poses a HIGH to VERY HIGH risk to roads within and downstream of moderate to high SBS.

b. Trails—Trails within the burn area have minimal development and investment. While trails may experience increased runoff and erosion (POSSBLE), the magnitude of the consequence is MINOR with limited economic investment resulting in a LOW risk to trails.

3. **Natural Resources (NR):**Hydrologic Function— While impacts to hydrologic function are likely in some drainages and channels prone to debris flows, hillslopes burned at low severity will recover rapidly and the probability of debris flows and hillslope erosion should return to pre-fire levels within 2 years of the fire. Impacts to the hydrologic function of stream channels will be short term with the exception of channels that experience debris flows. Recovery in the latter may be more long-term and will be dependent on the degree of alteration from debris flows resulting in a MODERATE magnitude of consequence in those areas. Loss of drainage control on roads that could result in road diversion, washed out roads, and gullies down hillslopes are LIKELY in some areas of the fire. The magnitude of the consequence is MODERATE as gully damage could be long-term. The risk to hydrologic function is HIGH.
    b. Soil Productivity—Soil productivity from soil erosion is POSSIBLE in areas of moderate and high SBS; however, those areas are limited in extent and distribution. The majority of the burn area resulted in low SBS, which has minimal impacts to soils. Given the limited extent of areas with high SBS, the magnitude of consequence is MINOR posing a LOW risk to soil productivity.
    c. Aquatic T&E Species
    Coho salmon: The values at risk assessed were coho salmon habitat and the post fire effects on fish populations in Cedar Creek, Madden Creek (Old Campbell Creek) and Peckham Creek. All three of these systems provide important spawning and rearing habitat for coho salmon. Recent fish surveys by the Six Rivers National Forest revealed a high density of coho salmon utilizing the lower reach of Peckham Creek.
    Post-fire threats to coho salmon habitat includes compromised water quality, increased solar radiation and water temperature due to reduced riparian cover. Additional concerns include increased sedimentation, loss of large woody material and changes in streambed/pool habitat due to geomorphic movement (e.g., debris flows). The probability of damage or loss to fish habitat is POSSIBLE (10-49%) in Madden Creek and Peckham Creek and LIKELY (50-89%) in Cedar Creek, given the amount of moderate and high soil burn severity observed in the upper watershed. These combined impacts may lead to high turbidity events and short-term alteration of suitable stream habitat in Cedar Creek. The magnitude of consequences is MINOR (recoverable and localized) for Madden Creek and Peckham Creek. The magnitude of consequences is MODERATE (considerable or long term) for Cedar Creek. The intact and functioning riparian vegetation observed on the Ammon Fire and Campbell Fire will help alleviate some of the sedimentation, ash run-off and debris flow coming from the headwaters and hill slopes. The headwaters in high and moderate burn severity are expected to take longer for recovery, but it is not irreversible and is expected to recover. Recovery of the stream channels will not take place until fine sediment loads move through these systems, and pool-riffle-run sequences are recreated through the return of complex substrates, and sufficient riparian cover to reduce water temperatures and provide sufficient allochthonous input for fish prey (e.g., shredders and detritivores) including the return of a diverse food web. Risk to Coho salmon in Peckham and Cedar Creek is LOW and HIGH in Cedar Creek.

    d. Terrestrial T&E Species:
    The northern spotted owl (NSO), *strix occidentalis caurina*, listed as threatened, has 36 Activity Centers (AC) primarily in the Madden Creek and Cedar Creek drainages. Both fire boundaries have AC, Campbell (21 AC) and Ammon (15 AC). The 15 AC burned in the Ammon fire are also in FS Region 5 Willow Creek Study Area (WCSA) that is a “density” study area encompassing 113 square miles where the entire area is surveyed each year. Initiated in 1985 by Alan Franklin as a long- term monitoring study of the population dynamics of NSO. The WCSA Report from 2021 documents NSO declining at a rate estimated at 3.1/per year and predicted extirpation within 10 to 20 years.
    Post-fire threats to NSO are hazardous toxicants at trespass cannabis cultivation sites. NSO exposure to toxicants such as rodenticides, fertilizers, and banned pesticides is documented. Grow sites visited in Region 5 have an 80% likelihood of containing hazardous toxicants such as pesticides, carbofuran, methamidophos and anticoagulant rodenticides. At

least 12 AC contain grow sites in their territory where 2 adults and 2 fledglings would be expected on a good year. The probability of damage or loss is LIKELY (50-89%) because heat and fire can quickly compromise containers and packaging of stored toxicants at grow sites resulting in a high increase for exposure and contamination to wildlife, soil, and aquatic systems post fire. The magnitude of consequences is MODERATE resulting in considerable or long-term effects to NSO. NSO are prey specific; rodents and lagomorphs compose 81–96% of an NSO diet. In fact, their prey is the specific target many pesticides (rodenticides) are used for at grow sites. Burned or compromised packaged rodenticide attract and increase rodent exposure. Post-fire initially results in less ground cover for rodents, increasing opportunity to forage and hunt prey by NSO ultimately increasing exposure and contamination to NSO. Research shows NSO had been exposed at a rate of 70% while barred owls at 40%. The half-life of these toxicants' bioaccumulation in NSO and transfer to egg embryos. Owls show signs of poor health similar to other wildlife poisonings. The recent ESA listing of fisher was based on decline directly related to these toxicants and is likely contributing to the decline of NSO. Treatments to immediately contain, secure, and mitigate these hazardous materials would mitigate the threat to NSO. The risk to NSO is HIGH.

e. Native Vegetation Communities and Invasive Weeds:
Most at risk native plant communities are the white oak/California fescue woodlands from star thistle and knapweed infestation and riparian communities from Himalayan blackberry infestations. Grassland communities and forested areas with significant canopy reduction due to higher fire severity or suppression disturbance are susceptible to invasive plant invasion. When invasive plant propagules are inadvertently introduced into disturbed areas by fire suppression activities, they will often populate before native plant communities can recover. This disruption to natural communities can cause long-term and irrecoverable degradation of the ecosystem, which has potential to worsen with time as infestations spread. Following wildfire and associated suppression activities, native communities are at a greater risk for invasion and establishment by invasive species due to the loss of competing vegetation, canopy cover, and duff layers. Several miles of fire line were disturbed by fire suppression. One of two staging areas did not have a weed wash to prevent transport of weeds from other locations. Equipment was mobilized across the fire without requiring passing through the weed wash. The possibility of introducing weeds and replacing native vegetation in areas disturbed by fire suppression activities is LIKELY and could cause MAJOR consequences resulting in a VERY HIGH risk to native plant communities.

4. **Cultural and Heritage Resources:**Within the burned area, 23 known archaeological sites were prioritized for BAER assessment using the following criteria:
    a. Located within high or moderate burn severity,
    b. Eligible/potentially eligible for listing on the National Register of Historic Places (36 CFR 60.4).

Eleven (11) of these sites were identified as being potentially threatened as a result of the fire. Seven (7) were visited or attempted to be visited for BAER assessment. Threats to these sites include damage from falling hazard trees as well as loss due to looting. According to the BAER Risk Assessment Matrix, damage to any character defining aspect of an archaeological site would lead to irreversible damage and constitute a MAJOR Magnitude of Consequence. The threats from hazard trees and looting have an UNLIKELY Probability of Loss. This results in an INTERMEDIATE risk for heritage resources. According to the matrix this does not warrant a BAER emergency. In addition to the known archaeological sites, the fire perimeter also contained critical habitat for the threatened, Coho salmon which is an important resource for the local Tribal communities.

B. Emergency Treatment Objectives:

- Protect life and safety within and affected by the Six Rivers Lightning Complex.

- Protect and stabilize NFS roads at risk of damage from loss of water control, soil erosion, increased runoff, and sediment-laden flow.
- Mitigate public safety hazards from hazardous materials.
- Detect, eradicate, and map new infestations of non-native invasive plants introduced during suppression activities to prevent degradation or loss of ecosystem structure and function.
- Coordinate post-fire response with other agencies and interested parties.

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

D. Probability of Treatment Success

Table 7: Probability of Treatment Success

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

E. Cost of No-Action (Including Loss):
Human Health and Safety: A market value is not place don human life, but a cost of injury can exceed $1,000,000, providing a substantial benefit/cost ratio.
Property—Roads: The cost to rebuild ML4 level roads after they washout or are undermined is substantial. Other roads could be eroded, buried, or washed out as well. Costs would include importing material (road fill), equipment, asphalt (where appropriate), labor, and slope stabilization with estimates of up to $100,000 per mile for native surface roads and up to $300,000 for every mile of asphalt road. This amount does not include the lost value to project management, fire suppression, and public use. Replacing a compromised bridge could be as high as $2,000,000 or as much as $100,000 to stabilize a compromised pier. The lower cost was used in the cost/benefit analysis.
Natural Resources—Native Plant Communities, Threatened Northern Spotted Owl protection, and Hydrologic Function: An implied minimum value is used to evaluate these resources. It is significantly less costly to maintain preferred conditions and prevent impacts than to attempt to restore or address later. Preventing invasive weed expansion is less costly than waiting until weeds have established and spread. Preventing damage to NSO would be less costly than attempting to recover the species later. Effects are expected to be long-term for NSO.

F. Cost of Selected Alternative (Including Loss):
The total cost of the recommended treatments is $395,110.
The expected benefit/cost ratio for roads is expected to be 9:1 ratio because of the significant cost of repair for a compromised bridge, ML4 and ML3 roads in the event they failed.
Although there is still a risk of some loss, the implied benefit for non-market resources is still less expensive than the cost to wait and repair damages later.

G. Skills Represented on Burned-Area Survey Team:

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

Team Leader: Emily Fudge, Cleveland National Forest
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Forest BAER Coordinator: Aaron (AJ) Donnell, Six Rivers National Forest
Email: aaron.donnell@usda.gov **Phone(s):**

Team Members: *Table 8: BAER Team Members by Skill*

Skill	Team Member Name	*Home Forest*	*Email address*
Team Lead(s)	Emily Fudge	Cleveland National Forest	emily.fudge@usda.gov
Soils	Dave Young	Regional Office	david.young1@usda.gov
Hydrology	Steve Bachmann	Regional Office	steve.bachmann@usda.gov
Geology	Derek Beal	Klamath National Forest	derek.beal@usda.gov
Engineering	Justin Nettleton	Ochoco National Forest	justin.nettleton@usda.gov
GIS	Marilyn Porter	Los Padres National Forest	marilyn.porter@usda.gov
Archaeology	Jacob Batisky	Stanislaus National Forest	jacob.batisky@usda.gov
Aquatic Biologist	Daniel Teater	Tahoe National Forest	daniel.teater@usda.gov
Wildlife Biologist	Kary Schlick	Inyo National Forest	kary.schlick@usda.gov
Weeds	John McRae	Six Rivers National Forest	john.mcrae3@usda.gov
PIO	Cathleen Thompson		cathleen.thompson@usda.gov

H. Treatment Narrative:

The proposed treatments are intended to minimize but cannot entirely mitigate the effects of the fire. The treatments included in this request are the most effective on NFS lands given the local setting including topography, access, and local setting.

Personnel costs and travel are estimated on time required to complete tasks by contractors, partners, or overtime for existing staff (no NFSE base time is included in the totals). Vehicle and mobilization costs are included to support potential partners or contractors that might be hired to complete this work.

Land Treatments:

Land Treatment #1: EDRR Surveys and treatment—Suppression Related Disturbance

Areas for suppression related EDRR surveys and treatments are suppression features along dozers lines within a mile of a road, near known invasive plant occurrences; and/or connected to main roads. It was known that one fire camp did not have a weed wash station and equipment was mobilized across the fire increasing risk of spread. Historically, aggressive weeds have persisted and spread in areas disturbed by fire suppression that were not treated. Early detection and rapid response (EDRR) will be conducted and target non-native invasive plant species in the spring/summer of 2023 along 62 miles of dozer lines. (Estimate of acres using 50 ft wide dozer line.)

Total EDRR survey and treatment for Suppression related disturbance is $62,000.

Features on NFS Lands	Unit Cost	Totals
Dozer Line	62 Mi at *$1000/mile or 375 acres at ~$145	$62,000
Hand Line	Not treated	-
Road-as-Line	Not treated	-
Drop points, Helispots, and Staging Area	Incidental to Dozer Line surveys	-
Total		$62,000

* $1000/mile of dozer line is consistent with EDRR cost estimate used by Klamath and Shasta T. NFs

Project Name:	SRNF Lightening Complex ED/RR Inventory and Treatment Agreement		
Project Estimates: Partner Staff time (Agreement estimates for treatment of 62 miles or 375 acres)			
Additional Unit Capacity Needs (e.g. detailers/seasonals/OT):			**ESTIMATES OF COST**
Grade	**Cost/day**	**Days needed**	**$**
GS 11 Botanist (agreement prep and management OT)	$ 800	3	$ 2,400

Project Coordinator	$ 520.00	10	$ 5,200
2 Field Crew Specialists	$ 500.00	46	$ 23,000
2 Field Crew Assistants	$ 400.00	46	$ 18,400
2 Vehicles	$ 70.00	46	$ 3,220
4 Field Crew Per Diem	$ 46.00	92	$ 4,232
Other Materials and Services (including contracting costs):			
Item	**Cost/unit**	**Units needed**	**$**
Overhead Rate 10%			$ 5,405
		Estimate:	**$ 61,857**

Land Treatment #2: Hazardous Chemical Stabilization and Removal—Trespass Marijuana Grow-sites
There are 21 total sites that pose a HIGH risk to NSO. Treatment to mitigate the risk includes working with LEI to keeping locations confidential. As there are hazardous materials that could also be impactful to human health, only qualified individuals can conduct the work. Typical erosion control and capping will not be sufficient to reduce exposure risk. Least cost treatment involves a site visit, evaluation, field mitigation, and removal. Removal is essential to completely mitigate the risk. Leaving containers exposed at site could leave them susceptible to debris flows or other post-fire watershed effects, especially in areas downslope or in drainages below steep slopes with moderate and high soil burn severity. Further disturbance of materials could expand the contaminated footprint, increasing risk of exposure to NSO. Map is confidential. Available upon request on a need-to-know basis.

Project Name: Hazardous Chemical Stabilization and Removal—Trespass Marijuana GS			
Project Estimates:			
Additional Unit Capacity Needs (e.g. detailers/seasonals/OT):			**ESTIMATES OF COST**
Grade	**Cost/day**	**Days needed**	**$**
GS 11 Biologist (coordination, COR, and management OT)	$ 800	10	$ 8,000
Other Materials and Services (including contracting costs):			
Item	**Cost/site**	**# Sites**	**$**
Contract: 2-3 personnel, 40hr hazwoper requiring 3-4 visits per site. Site evaluation and containment.	$ 8,000	21	$ 168,000
Contract for hazmat contractor for removal (4 days)	$ 9,000	4	$ 36,000
		Project total:	**$ 212,000**

Channel Treatments: NONE.

Roads and Trail Treatments:

Within and downslope of the burn area there are several roads that could be compromised by woody debris, increased sediment, and increased peak flows during a 2-year storm event. Dry ravel down steep slopes, even in some areas with low soil burn severity, was observed filling channels. Some roads have undersized culverts with a history of plugging, have diversion potential, and transportable wood near the culvert inlets. Other roads have burned out roots and logs that could funnel runoff under the asphalt leading to collapse. To mitigate against increased runoff, sediment, and woody debris below steep slopes and areas with moderate and high SBS, multiple road treatment types are recommended.
Roads requested for treatment include 13.15 miles of ML2, 30.18 miles of ML3 roads, and 7.43 of ML4.

Road Treatments #1: Road Stormproofing

Road stormproofing involves cleaning out and preparing existing drainage structures to help ensure roads continue to drain properly and control runoff. This work will be accomplished through a contract. Some felling may need to occur for the safety of the operator. **Total road stormproofing treatment is $29,755**.

Project Name:	SRF Lightning Complex Storm Proofing		
Project Estimates (add lines if needed):			
Additional Unit Capacity Needs (e.g. detailers/seasonals/OT):			
Grade	**Cost/day**	**Days needed**	**$ 8,000**
Engineer for COR/prep of all road treatment contracts (OT)	$800	10	$ 8,000
Other Materials and Services (including contracting costs):			
Item	**Cost/unit**	**Units needed**	**$ 21,755**
Mobilization, equipment rental and contract operator (stormproofing)	1,900	8.45 miles	$ 16,055
Mobilization, equipment rental and contract operator (individual catch basin cleaning)	1,900	3 sites	$ 5,700
Total funding requested:			**$ 29,755**

Road Treatments #2: Storm Inspection and Response

Many of the roads in the burn area are well designed; however, could struggle to function properly with the estimated increase in sediment, runoff, and woody debris. Storm inspection and response will keep culvert drainage functioning by cleaning post-fire sediment and woody debris around drainage control structures between and during storm events. Work will be accomplished with a contractor. **Total storm inspection and response is $18,812.**

Project Name:	SRF Lightning Complex inspection and response		
Project Estimates (add lines if needed):			
Additional Unit Capacity Needs (e.g. detailers/seasonals/OT):			
Grade	**Cost/day**	**Days needed**	**$ 9,832**
Engineer COR for field review	$ 1,004	8	$ 8,032
Engineer for COR/Inspection of response work (OT)	$ 900	2	$ 1,800
Other Materials and Services (including contracting costs):			
Item	**Cost/unit**	**Units needed**	**$ 9,000**
Mobilization, equipment rental and contract operator	4,500	2	$ 9,000
Total funding requested:			**$ 18,832**

Road Treatments #3: Drainage Improvement and Stabilization

Install rip-rip armoring around bridge pier that could be undermined. Rip rap is typically installed by an excavator and may need to be keyed into place. Seven other sites require improvements to pass post-fire flows and woody debris (installation of riser and critical dips). **Total drainage improvement and stabilization treatment is $44,200.**

Project Name:	SRF Lightning Complex Drainage Improvement and Stabilization

Project Estimates (add lines if needed):			
Additional Unit Capacity Needs (e.g. detailers/seasonals/OT):			
Grade	**Cost/day**	**Days needed**	**$ 1,600**
Engineer COR for field review	$ 800	2	$ 1600
Other Materials and Services (including contracting costs):			
Item	**Cost/unit**	**Units needed**	**$ 42,600**
Contracted Critical dip construction	4,000 ea	7	$ 28,000
Mobilization	2,000 ea	1	$ 2,000
Supply and install culvert riser	2,500 ea	1	$ 2,500
Mobilization	1,000 ea	1	$ 1,000
Materials, equipment rental and contract operator for Bridge work	81 cy	100	$ 8,100
Mobilization	1000 ea	1	$ 1,000
Total funding requested:			**$ 44,200**

Road Treatments #4: Patching Burned Out Stump-holes

Approximately 30 locations have burned out stump holes that can compromise both user safety and road integrity. Treatment involves filling and patching stump holes to prevent increased runoff from further eroding the holes and causing increased road damage. **Total fill and patch stump hole treatment is $23,400.**

Project Name:	SRF Lightning Complex Stump hole Fill and Patch		
Project Estimates (add lines if needed):			
Additional Unit Capacity Needs (e.g. detailers/seasonals/OT):			
Grade	**Cost/day**	**Days needed**	**$ 2,400**
Engineer COR for field review	$800	3	$ 2,400
Other Materials and Services (including contracting costs):			
Item	**Cost/unit**	**Units needed**	**$ 21,000**
Mobilization, equipment rental and contract operator	700 ea	30	$ 21,000
Total funding requested:			**$ 23,400**

Protection/Safety Treatments:

Protection and Safety Treatments #1: Signage

Warning signs need to be installed to alert Forest users (roads, trails, dispersed use) of the unmitigated dangers present in the burned area. Treatment includes posting signs in critical ingress and egress areas of the burned area to alert the public and USFS staff to potential dangers such as falling trees, increased runoff, and hazardous rockfall that are present in a burned area. Work will be accomplished through force account. **Total warning sign treatment is $2,670.**

Project Name:	Life and Safety Warning Signs		
Project Estimates (add lines if needed):			
Additional Unit Capacity Needs (e.g. detailers/seasonals/OT):			

Grade	Cost/day	Days needed	$ 270.00
GS5 Forestry/Rec tech (1039)	$ 135.00	1	$ 135.00
GS5 Forestry/Rec tech (1039)	$ 135.00	1	$ 135.00
GS-9 Rec Officer	0	0.5	$ -
Other Materials and Services (including contracting costs):			
Item	**Cost/unit**	**Units needed**	**$ 1,200.00**
Metal Signs	50	20	$ 1,000.00
T-posts	10	20	$ 200.00
Total funding requested:			**$ 2,670.00**

Protection and Safety Treatments #2: Stabilization of hazardous material from burned structure

Asbestos poses a threat to human health. If inhaled, the microfibers can permanently embed in the lungs and possibly lead to mesothelioma, emphysema, or cancer. When burned, asbestos is released into the environment in a hazardous form covering surfaces in the vicinity. The main threat to human health is if the material becomes airborne, either with wind or from physical disturbance. The recommended treatment includes stabilizing the material and preventing transport off-site until cleanup can occur.

Sites known to have asbestos should be cleaned up by licensed hazmat contractors, but force account can install wattles or wood fiber logs with safety measures in place. Additionally, to prevent the asbestos from becoming airborne, the site should be hydro-mulched. **Total hazmat stabilization is $2,255**.

Project Name:	**Hazmat Stabilization of Ammon Guard Station and burned trailer**		
Project Estimates (add lines if needed):			
Additional Unit Capacity Needs (e.g. detailers/seasonals/OT):			
Grade	**Cost/day**	**Days needed**	**$ 405.00**
GS-5 Forestry Tech (1039)	$ 135.00	1.5	$ 202.50
GS-5 Forestry Tech (1039)	$ 135.00	1.5	$ 202.50
GS-9 Forestry Tech (base)	0	0.5	$ -
Other Materials and Services (including contracting costs):			
Item	**Cost/unit**	**Units needed**	**$ 1,850.00**
Wood straw logs	50	13	$ 650.00
Stakes	5	40	$ 200.00
Hydromulch by Contractor (contractor, transport, hydromulch, application)	1000	1	$ 1,000.00
Total funding requested:			**$ 2,255.00**

Protection and Safety Treatment #3: Special Uses Permittee Notifications

Notification letters should be sent to alert special uses permittees of identified threats that may affect life and safety and/or their infrastructure on NFS lands. Water systems could be threatened by increased runoff, woody debris, debris flows, and ash/sediment from post-fire watershed response. Notification made by local Forest staff will be charged to base time. No funds requested.

Protection and Safety Treatments #4: Interagency Coordination Treatment

Entering the winter season there may be a need to continue interagency coordination with local agencies such as the County, NRCS, F&W, NOAA, NWS, and others. Interagency Coordination by local Forest staff will be charged to base time. No funds requested.

I. Monitoring Narrative: **None**

PART VI – EMERGENCY STABILIZATION TREATMENTS AND SOURCE OF FUNDS

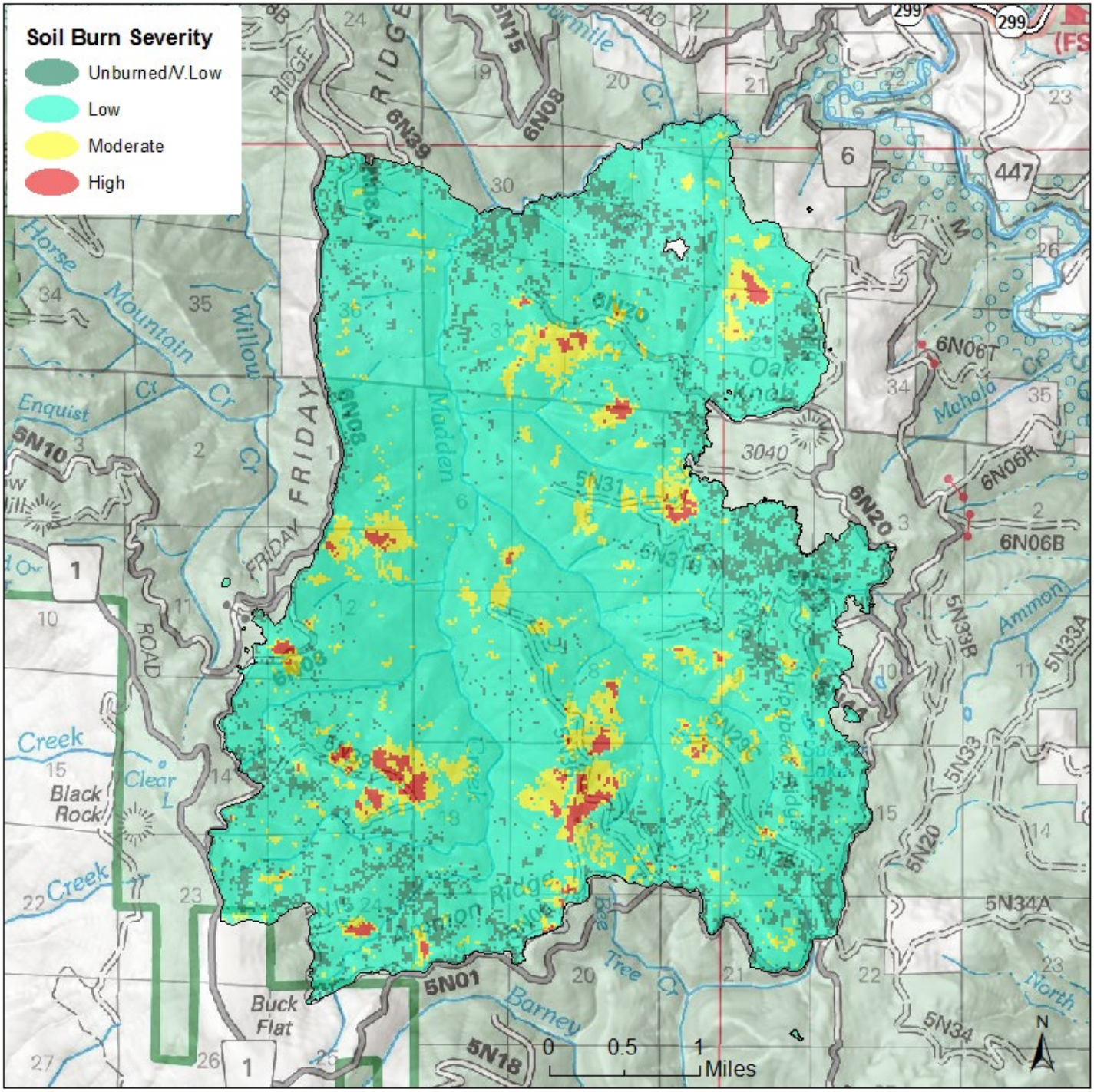
Line Items	Units	Unit Cost	# of Units	BAER $	Other $	# of units	Fed $	# of Units	Non Fed $	Total $
A. Land Treatments										
1) EDER -Fire suppression	acre	165	375	$62,000	$0		$0		$0	$62,000
2) Grow -Site Clean-up	site	10,095	21	$212,000	$0		$0		$0	$212,000
Insert new items above this line!				$0	$0		$0		$0	$0
Subtotal Land Treatments				$274,000	$0		$0		$0	$274,000
B. Channel Treatments										
NA				$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										
1) Road Stormproofing	mile	3,521	8	$29,752	$0		$0		$0	$29,752
2) Storm Inspection/Resp.	mile	371	50.76	$18,832	$0		$0		$0	$18,832
3) Drainage Improvements	site	6,314	7	$44,200	$0		$0		$0	$44,200
4) Road Fill and Patch	site	780	30	$23,400	$0		$0		$0	$23,400
Insert new items above this line!				$0	$0		$0		$0	$0
Subtotal Road and Trails				$116,185	$0		$0		$0	$116,185
D. Protection/Safety										
1) Warning signs	each	134	20	$2,670	$0		$0		$0	$2,670
2) Hazmat Stabilization	each	1,128	2	$2,255	$0		$0		$0	$2,255
3) Special Uses Notification				$0	$0		$0		$0	$0
4) Interagency Coordination				$0	$0		$0		$0	$0
Insert new items above this line!				$0	$0		$0		$0	$0
Subtotal Protection/Safety				$4,925	$0		$0		$0	$4,925
E. BAER Evaluation										
Initial Assessment	Report	######		---	$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				$395,110	$0		**$0**		**$0**	**$395,110**

PART VII - APPROVALS

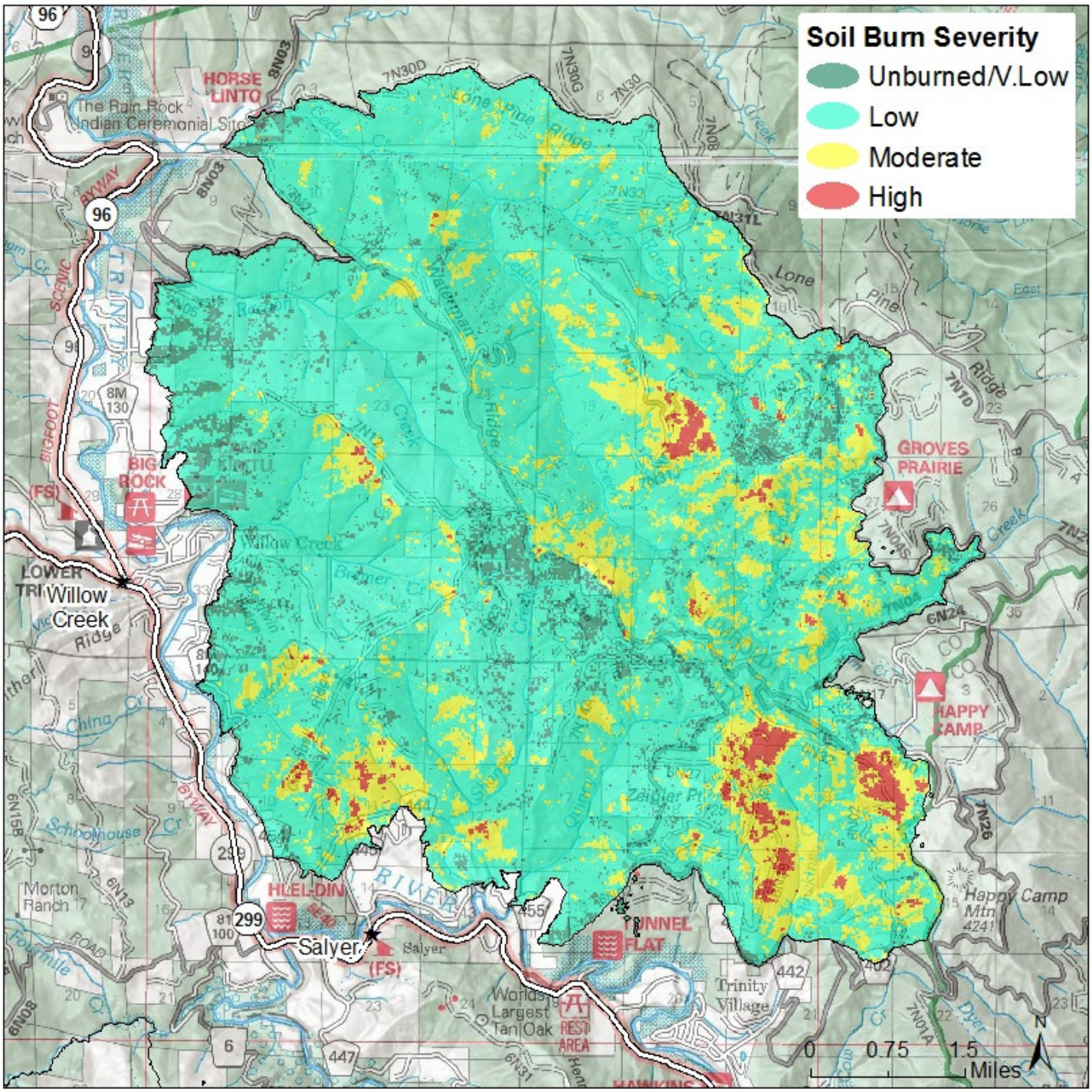
Digitally signed by Kari Otto
Date: 2022.09.20 16:28:58 -07'00'

KARI OTTO, Acting Forest Supervisor — 9/20/2022 Date

Attachment 1: Soil Burn Severity Map for Six Rivers Lightning Complex
Ammon Fire



Attachment 2: Soil Burn Severity Map for Six Rivers Lightning Complex
Campbell Fire



Attachment 3: Critical Value Table.

Separate Document

(also available at https://usfs.app.box.com/folder/170830144651)

Attachment 4: Treatment Map for Six Rivers Lightning Complex
(excludes hazmat cleanup for marijuna due to confidentiality issues)