

**Date: October 2, 2021**

## Monument Fire Burned-Area Report



Treloar Creek

Big Creek

### **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:** Monument**B. Fire Number:** CA-SHF-001187**C. State:** CA**D. County:** Trinity County**E. Region:** 05 – Pacific Southwest**F. Forest:** Shasta-Trinity, Six Rivers**G. District:** Hayfork District, Lower Trinity**H. Fire Incident Job Code:** P5N7GJ (0514)**I. Date Fire Started:** 07/30/2021**J. Date Fire Contained:** 67% (as of 9/25/2021)**K. Suppression Cost:** \$149.6 million (as of 09/26/2021)**L. Fire Suppression Damages Repaired with Suppression Funds (estimates):** as of 09/22/2021

Item	Unit	Amount Identified	Amount Repaired	No Repair Needed	Remaining
Mapped Dozer Line	Miles	252.9	5.4	0.3	51.8
Road as Control Line	Miles	339.9	0	22.2	156.4
Mapped Hand Line	Miles	31.9	0	0.8	21.0
Hand/Dozer Line	Miles	30.3	0	1.4	2.0
Spike Camps	Count	4	0	0	3
Drop Points	Count	71	0	5	63
Helispots	Count	5	0	1	4

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

HUC 12 Name	Total Acres	Acres Burned	% Watershed Burned
Barker Creek-Hayfork Creek (180102120205)	20,775	5,628	27
Bell Creek-New River (180102111007)	21,722	7,191	33
Big Bar Creek-Trinity River (180102111102)	21,097	21,083	100
Big Creek (180102111006)	12,282	5,063	41
Big Creek-Hayfork (180102120204)	17,447	16,081	92
Big French Creek (180102111103)	24,686	21,244	86
Butter Creek (180102120405)	23,391	962	4
Carr Creek (180102120203)	18,114	2,295	13
Conner Creek Trinity River (180102111101)	38,469	20,114	52
Corral Creek (180102120304)	23,156	9,281	40
Devils Canyon (180102111004)	17,649	562	3
Don Juan Creek-Trinity River (180102111105)	21,351	20,667	97
East Fork North Fork Trinity River (180102110904)	29,530	1,211	4
Eltapom Creek (180102120501)	12,548	1,407	11
Little French Creek-Trinity River (180102111104)	27,792	27,792	100
Lower Canyon Creek (180102110802)	22,650	15	0
Lower North Fork Trinity River (180102110905)	20,749	12,359	60
McDonald Creek-Trinity River (180102111106)	19,838	10,945	55
Olsen Creek-Hayfork Creek (180102120305)	34,937	19,015	54
Pelletreau Creek-South Fork Trinity River (180102120503)	36,669	3	0
Rusch Creek-Hayfork Creek (180102120303)	32,218	18,967	59
Sharber Creek-Trinity River (180102111107)	19,590	1,252	6
Tule Creek (180102120302)	14,909	1,551	10

**N. Total Acres Burned: Based on 9/24/2021**

	Acres	Percent
NFS	207,956	93%
SHASTA-TRINITY NF	206,708	92%
SIX RIVERS NF	1,256	1%
BLM	406	<1%
Private	11,831	5%
UNKNOWN	4,486	2%
<b>TOTAL</b>	<b>224,688</b>	<b>100</b>

**O. Vegetation Types:**

Vegetation Community	Acres	Vegetation Community	Acres	Vegetation Community	Acres
Annual Grasses and Forbs	923	Manzanita Chaparral	34	River/Stream/Canal	345
Barren	734	Mixed Conifer - Fir	1,739	Scrub Oak	45
Bigleaf Maple	133	Mixed Conifer - Pine	17,978	Subalpine Conifers	11
Black Oak	1,689	Montane Mixed Hardwood	427	Tanoak (Madrone)	2,723
Brewer Oak	18	Mountain Alder	23	Ultramafic Mixed Conifer	523
Canyon Live Oak	15,999	Non-Native/Ornamental Grass	3	Upper Montane Mixed Chaparral	5,917
Douglas-Fir - Ponderosa Pine	19,208	Orchard Agriculture	11	Upper Montane Mixed Shrub	6
Douglas-Fir - White Fir	25,660	Oregon White Oak	1,165	Urban/Developed (General)	56
Gray Pine	1,578	Pacific Douglas-Fir	119,337	Urban-related Bare Soil	209
Huckleberry Oak	2	Pastures and Crop Agriculture	0	Wedgeleaf Ceanothus	45
Interior Mixed Hardwood	65	Perennial Grasses and Forbs	33	White Alder	2
Intermittent Lake or Pond	6	Perennial Lake or Pond	8	White Fir	4,411
Jeffrey Pine	116	Ponderosa Pine	1,433	Willow	20
Knobcone Pine	308	Red Fir	593	Willow (Shrub)	19
Lower Mont. Mixed Chaparral	1,097	Riparian Mixed Hardwood	36		

**P. Dominant Soils:**

The Neuns soils are used primarily for timber production. Natural vegetation includes ponderosa pine, Douglas-fir, White fir, sugar pine, oak, deerbrush, chinquapin, manzanita, tanoak and squawcarpet, white thorn ceanothus. The

Neuns series consists of moderately deep, well drained soils that formed in slope alluvium and colluvium from metamorphosed igneous and sedimentary rocks. Neuns soils are on mountains and lava plateaus. Slopes range from 15 to 80 percent. Rock outcrop complexes also consist of about 23,599 acres. This means these areas are at least 50% rock outcrop mixed with soils. The rock content allowed these areas to be more resilient to erosion. Deadwood soils are shallow, somewhat excessively drained soils formed in material weathered from hard metasedimentary rocks. Holland soils are on linear backslope and footslope positions of hill and mountain slopes and are used mainly for commercial timber production. The Holland series consists of very deep, well drained soils that formed in material weathered from granitic rock. The Goulding series consists of shallow, somewhat excessively drained soils formed in material weathered from metavolcanic or metasedimentary rocks. Goulding soils are on mountains consist of a gravelly loam (25 percent fine gravel).

Soil Name	Acres	Slope in %	Texture
Neuns Family	66,735	40-60	Gravelly Loam
Rock Outcrop (Complexes)	23,599	40-60	Rock
Deadwood Family	21,484	40-60	Gravelly Sandy Loam
Holland Family	16,711	40-60	Sandy Loam
Goulding Family	13,527	50-80	Gravelly Loam

**Q. Miles of Stream Channels by Order or Class:**

Stream Type	Miles of Stream
Perennial	401.7
Intermittent	507.5
Ephemeral	596.4
Canal/Ditch	0

\*Ephemeral Streams only mapped on FS Land

**R. Transportation System:**

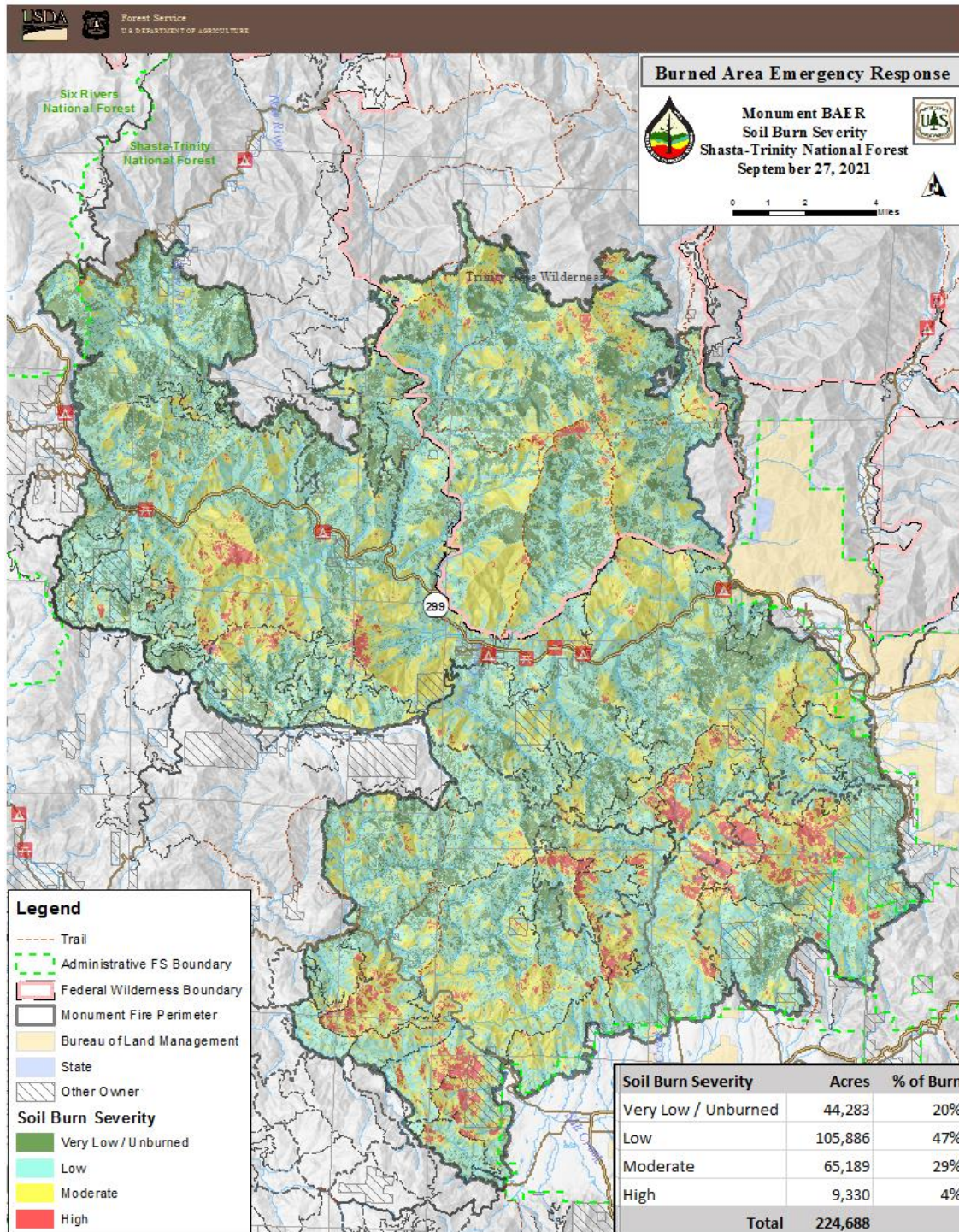
Forest	Trails	Roads	Other
Shasta-Trinity NF	48.5	572.58	
Six Rivers NF	0	3.77	
<b>Total</b>	<b>48.5</b>	<b>576.35</b>	

***This includes the NFS roads/trails that are on private within the fire but not non-fs roads on private.***



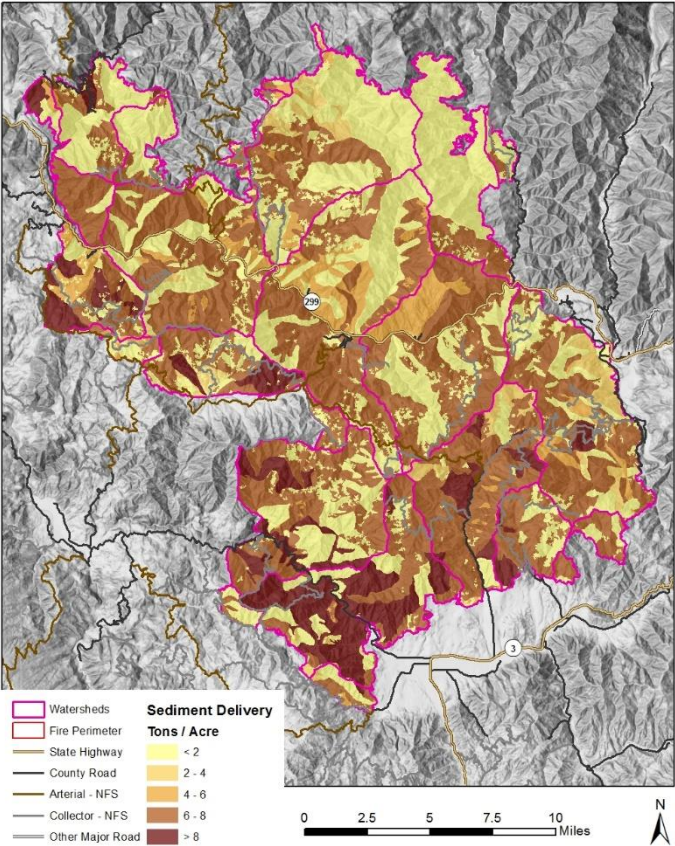
**PART III - WATERSHED CONDITION****A. Burn Severity (acres):**

	National Forest						
Soil Burn Severity	Shasta-Trinity	Six Rivers	BLM	Private	Unknown	Total	Percent
High	8,669	1	3	483	175	9,330	4%
Moderate	60,693	130	91	3,158	1,117	65,189	29%
Low	96,287	543	194	6,236	2,627	105,886	47%
Very Low/Unburned	41,060	583	119	1,955	567	44,283	20%
Total	206,708	1,256	406	11,831	4,486	224,688	





Pre- Fire Erosion Rates for 5-Year Event



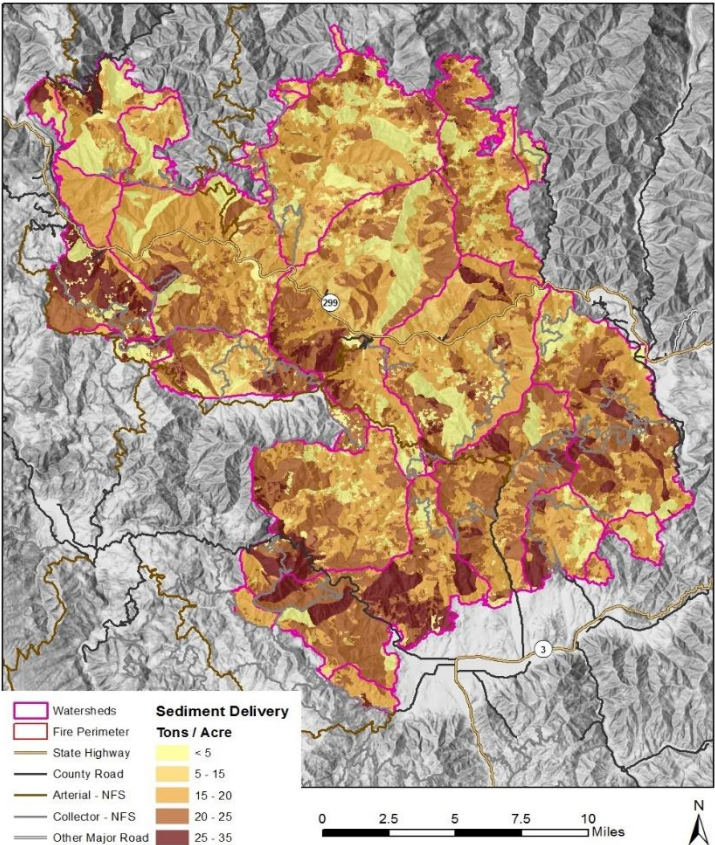
C. Water-Repellent Soil (acres):

Water repellency is a natural property that results from wax-like exudates from biological process that coat soil particles. These compounds are non-polar whereas water is a polar compound. Polar and non-polar compounds do not mix; the biological exudates repel water causing rainfall to bead up and resist infiltration. As stated, water repellency is a natural soil property, but heat from the fire vaporizes some of the compounds and they condense lower in the soil when it contacts cooler soil. This tends to make the water repellency stronger, or more severe. Approximately 30-50% (approximately 67,406 to 112,344 acres) of the soils within the Monument fire have hydrophobicity traits or have had an increase in these traits.

D. Soil Erosion Hazard Rating:

Soil Burn Severity	Slope Class	Erosion Hazard Rating	Acres
Very Low / Unburned	All	Low	44,283
Low	All	Low	105,886
Moderate and/or High	<10%	Low	907
Moderate	10-20%	Low	2,173
High	10-20%	Moderate	258
Moderate	20-35%	Moderate	8,029
High	20-35%	High	1,185
Moderate	>35%	High	54,158
High	>35%	Very High	7,809
			224,688

Post- Fire Erosion Rates for 5-Year Event



E. Erosion Potential:

We looked specifically at modeled response to a 5-year and 10-year storm event which have a 30 and 10 percent likelihood of occurrence, respectively, within the first-year post fire. Average sediment delivery in the instance of a 5-year storm event is predicted to be 14.8 tons/acre for the entire fire area. This is an increase from pre-fire sediment yield predictions of 3.6 tons/acres for a 5-year runoff event. This post-fire rate of erosion exceeds the tolerable soil loss threshold for continued productivity for the majority of soils in this area. In the instance of a 10-year storm event within the first year of post-fire recovery the average sediment delivery rate predicted for the fire area is 26.22 tons/acre. This is an increase from 14.78 tons/acre in pre-fire conditions for a 10-year runoff event.

**F. Sediment Potential:**

It is assumed 50% of sediment would be delivered based on slope roughness, surface rock fragments and downed large woody debris near streams that would function as sediment delivery interrupters. ERMiT estimates for erosion potential in tons per acre were converted to cubic yards per square mile

Comparison of pre- and post-fire sedimentation rates from modeled five- and ten-year storm events for HUC 12 watersheds within the fire perimeter. Interpreted acres for those that were adjusted from the original BARC image that was taken Sept. 20th and received by the BAER team on Sept. 20th. \*Acres are estimates based on the size of the fire at the time of analysis. Acreage estimates may vary slightly due to rounding error and method of geospatial analysis.

Watershed Name	Total Acres*	Acres Burned	Extent Burned (%)	5-Yr. Storm Event Average Sediment Delivery (tons / acre)		10-Yr. Storm Event Average Sediment Delivery (tons / acre)	
				Pre-Fire	Post-Fire	Pre-Fire	Post-Fire
Barker Creek – Hayfork Creek	20,775	5,628	27	5.5	12.2	17.7	32.2
Bell Creek – New River	21,722	7,191	33	2.6	7.7	9.4	17.6
Big Bar Creek – Trinity River	21,097	21,083	100	3.8	10.0	12.8	25.2
Big Creek – North end of Fire	12,282	5,063	92	3.3	9.2	11.9	23.2
Big Creek – South end of Fire	17,447	16,081	41	5.5	13.2	18.8	34.5
Big French Creek	24,686	21,244	86	2.6	10.7	13.4	25.7
Butter Creek	23,391	962	4	3.7	12.5	17.0	35.2
Carr Creek	18,114	2,295	13	3.5	10.5	14.0	28.6
Conner Creek – Trinity River	38,469	20,114	52	4.2	12.0	16.3	31.4
Corral Creek	23,156	9,281	40	4.2	11.3	14.8	27.3
Devils Canyon	17,649	562	3	2.4	11.7	13.5	23.5
Don Juan Creek – Trinity River	21,351	20,667	97	4.1	10.0	13.4	27.1
East Fork North Fork Trinity River	29,530	1,211	4	2.0	7.9	9.2	17.0
Eltapom Creek	12,548	1,407	11	4.0	13.8	16.4	27.8
Little French Creek – Trinity River	27,792	27,792	100	3.5	10.5	14.0	28.6
Lower Canyon Creek	22,650	15	0.07	0.0	0.0	0.0	0.0
Lower North Fork Trinity River	20,749	12,359	60	1.2	10.2	12.5	22.0
McDonald Creek – Trinity River	19,838	10,945	55	4.8	12.3	15.1	27.8
Olsen Creek – Hayfork Creek	34,937	19,015	54	4.4	11.4	15.6	30.0
Pelletreau Creek – South Fork Trinity River	36,669	3	0.01	4.1	9.0	14.0	22.2
Rusch Creek – Trinity River	32,218	18,967	59	5.7	13.8	18.9	34.0
Sharber Creek – Trinity River	19,590	1,252	6	5.4	14.3	18.9	31.4
Tule Creek	14,909	1,551	10	3.6	11.6	14.9	30.2

**Geology and Geomorphology:** The assessment area of the Monument Fire lies within the Klamath Mountains Physiographic Province and is underlain predominantly by Paleozoic and Mesozoic metavolcanic and metasedimentary rock, along with minor amounts of Tertiary and Quaternary sediments. Tectonic processes have created sedimentary formations and plutons and have accreted numerous terranes to the western margin of North America. Four of these distinct geologic bodies occur within the fire area: The Weaverville Formation, the Western Hayfork, Sawyers Bar, and Rattlesnake Creek Terranes.

Belt/Assemblage	Age	Terrane/Formation	Rock type
Cenozoic	Tertiary	Weaverville Formation	Sedimentary, Fluvial, Glacial, Alluvium/Lacustrine
Pleistocene Alluvial Deposits	Quaternary	Superjacent to All Areas	Sedimentary, Alluvium/Colluvium
Western Paleozoic & Triassic	Paleozoic / Mesozoic	Western Hayfork and Sawyers Bar	Metavolcanics plus Metasediments Chert, Argillite, Meta-andesite, Tuff/Breccia, Limestone
Western Paleozoic & Triassic	Triassic	Rattlesnake Creek	Metavolcanics plus Metasediments, Peridotite
Plutons	Jurassic	Intrude the Western Hayfork and Rattlesnake Creek	Intrusive igneous, Intermediate to Mafic Diorite, Granodiorite, Gabbro, Pyroxenite, Amphibolite

**G. Estimated Vegetative Recovery Period (years):** Vegetation recovery rate for trees and shrubs is 5 to 10 years, soils 20 to 30 years. Areas with very low, low soil burn severities which constitutes 67% of the SBS in the fire, will have a faster natural recover time, especially in vegetation types with dominant hardwoods of white oak, black oak, canyon live oak, and madrone

**H. Estimated Hydrologic Response (brief description):**

The watershed response of the Monument Fire is expected to include: 1) an initial flush of ash, 2) rill and gully erosion in drainages and on steep slopes within the burned area, 3) flooding with increased peak flows and sediment deposition, and 4) increased suspended sediment that will extend beyond the fire perimeter. These responses are expected to be most evident during initial storm events immediately after the fire. Thereafter, responses are expected to become less evident as vegetation reestablishes, providing ground cover, increasing surface roughness, and stabilizing and improving the infiltration capacity of the soils.

Streamflow is expected to increase post fire during the vegetation recovery period, with the largest flow increase expected in the first year after the fire. Watersheds with higher total burned areas or higher intensity burned areas may have a greater flow increase than watersheds with lower burn intensities or less watershed area burned. As a result, increases in turbidity are expected within streams across the burned area and increased flow may also contribute to the ability for debris flows or local erosion events to mobilize downstream. In low and moderate severity burn areas, evidence of unburned plant roots provide evidence that plant recovery may begin in the first few years after the fire, reducing the potential for erosion. However, high severity areas generally do not have plant roots present and will be at risk for a longer period.

We assessed the upstream watershed burn severity and changes to flow at specific locations where critical values were potentially at risk. This analysis is critical information for evaluating the risk of a critical value both on and off NFS lands and the results of this analysis can be found in the Hydrology Report. Flow increases at pour point analysis locations are expected to increase as much as 4.3 times pre-fire flow. See the Tables below. In low acreage/runoff areas, the increase in flow will likely not damage infrastructure in comparison to higher flow areas within the burned area.

In addition to increased peak flows, the post-fire 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, increased sediment transport and deposition, and higher potential for debris-laden flows. These responses will likely lead to increased water quality concerns for critical fish habitat and water uses such as downstream irrigation diversions. Watershed responses are dependent on the occurrence of rainstorm throughout the year, and rain-on-snow events from Jan- Mar and will likely be greatest with initial storm events, with greatest impacts 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 3-5 years.

**Elevation and Average Annual Precipitation for Select Pour Points.**

Select Pour Points	Max Elevation (ft)	Min. Elevation (ft)	Average annual precip (in)	% above 6,000 ft
Big Creek Diversion	6,226	2,655	51	0%
Canadian Creek	5,283	4,173	57	0%
Big French Creek HUC12	7,503	1,129	61	3%
Lower North Fork Trinity River HUC12	7,262	1,392	54	2%
Big Bar Ranger Station	4,277	1,232	44	0%
Jud Creek Hyampom Road	9,260	4,799	74	68%
McKinney Gulch Private Residences	4,411	2,092	47	0%

**Comparison of pre- and post-fire peak flow related to the 2-year return interval**

			2 yr. RI Peak Flow				
HUC 10 Watershed	Modeled Pour Point	% of Mod & High SBS	Pre-Fire Q (CFS)	Post-Fire Q (CFS)	Post-Fire Bulk Q (CFS)	Bulked Q Compared to Pre-Fire Q (Time increase)	Flood Hazard Rating
1) Big Creek-Hayfork	Big Creek Diversion	54%	1,510	3,298	4,123	2.7	High
2) Don Juan Creek-Trinity River	Canadian Creek	61%	701	1,785	2,232	3.2	High
3) Big French Creek	Big French Creek	21%	2,830	3,491	4,364	1.5	Mod
4) Lower North Fork Trinity River HUC12	Lower North Fork Trinity River	19%	2,070	2,727	3,409	1.6	Mod
5) Little French Creek-Trinity River	Big Bar Ranger Station	88%	782	2,591	3,239	4.1	High
6) Rusch Creek-Hayfork Creek	Jud Creek Hyampom Road	85%	870	2,852	3,565	4.1	High
7) Conner Creek-Trinity River	McKinney Gulch Private Residences	80%	543	1,856	2,320	4.3	High

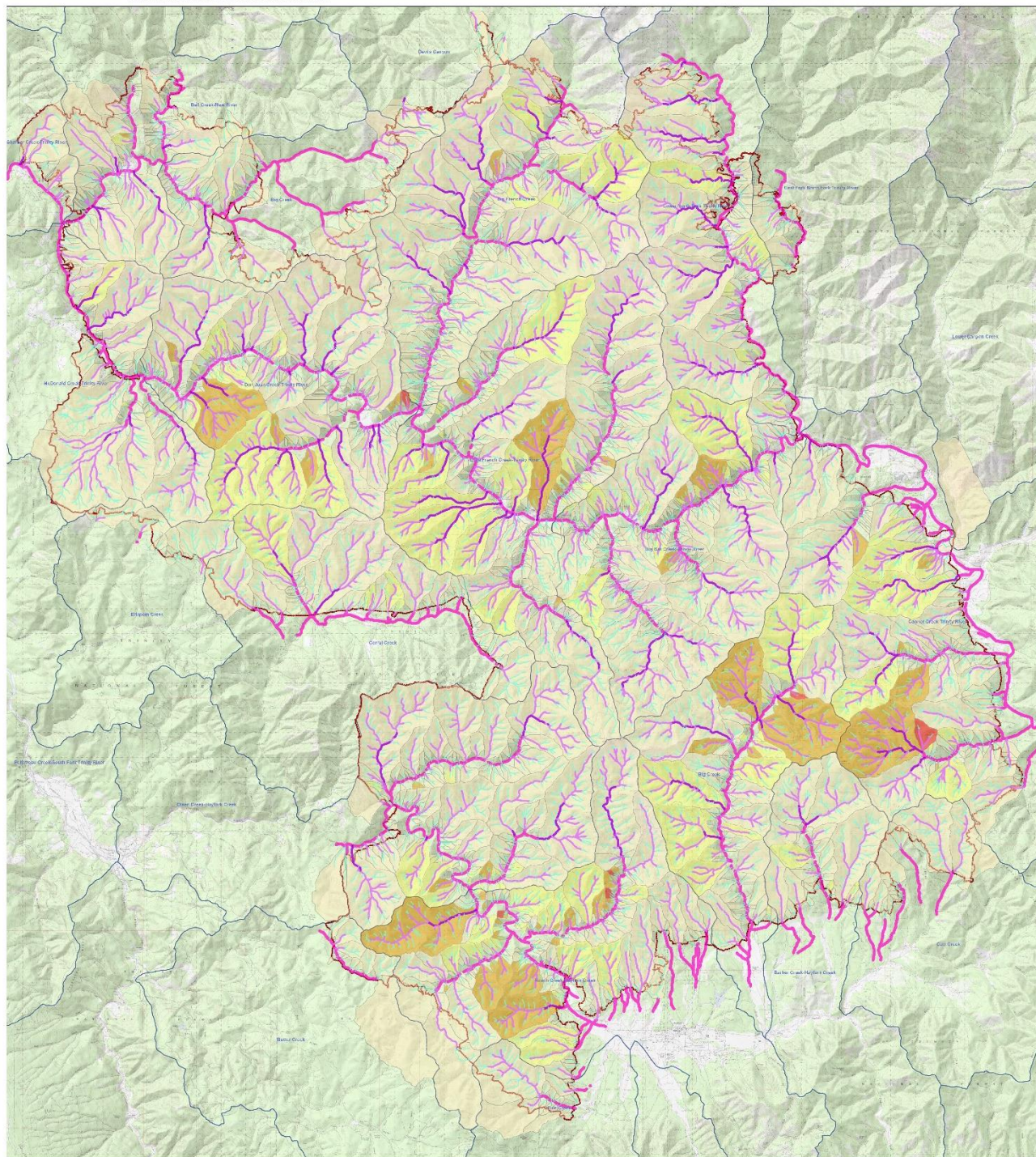
Debris flow potential was assessed for the Monument Fire area by on-the-ground examination of selected areas within the Monument Fire, observation of evidence of or lack of evidence of past debris flows within burn scars of previous fires in the area, the Lime Complex (2008), the Stafford Fire (2012), and the Helena Fire (2017), aerial reconnaissance, and USGS post-fire debris flow modeling of the Monument Fire. The probability of debris flow occurrence in the first years after the fire is high, and the potential volume of debris flow-mobilized sediment, large rock and woody debris could be up to or greater than 100,000 cubic meters in some locations within and downstream of the Monument Fire, depending on rainfall intensities and vegetation recovery. See USGS Post-Fire Debris Flow Model Results Maps for rainfall intensities of 16 mm/hr, 24 mm/hr., and 32 mm/hr. of 15-minute duration for the Monument Fire, which represent 1-2 year recurrence interval storms across the fire area. The USGS Post-Fire Debris Flow Model calculates estimated debris flow volume and probability for watersheds less than 8 square km in area. The USGS also identifies streams that have the potential to experience flooding and debris flows downstream of the modeled tributary basins <8 sq. km. However, the complete length of streams segments affected by potential post-fire flooding and debris flows is likely to extend beyond the stream segments highlighted on the USGS Post-Fire Debris Flow Model Results Maps for cumulative flooding and debris flow potential. Flooding and potential debris flows are anticipated to affect stream channels and floodplains within and downstream of the fire. Locations that are closer to the burned area will experience greater effect from post-fire flooding and potential debris flows than locations further from the fire area. Infrastructure and structures located in stream channels and floodplains are subject to potential damage from flooding and debris flows.



**Monument Fire**

United States Geological Survey  
Post-Fire Debris Flow Model Results

Estimated Probability & Volume of Debris Flows  
modeled for a rain event of  
15-minute duration, 16 mm/hr rainfall rate



Debris Flow Estimates Generated by  
US Geological Survey  
Landslides Hazards Program

Monument Fire BAER Assessment  
Shasta-Trinity National Forest  
September 27, 2021



0 0.5 1 2 3 4 Miles

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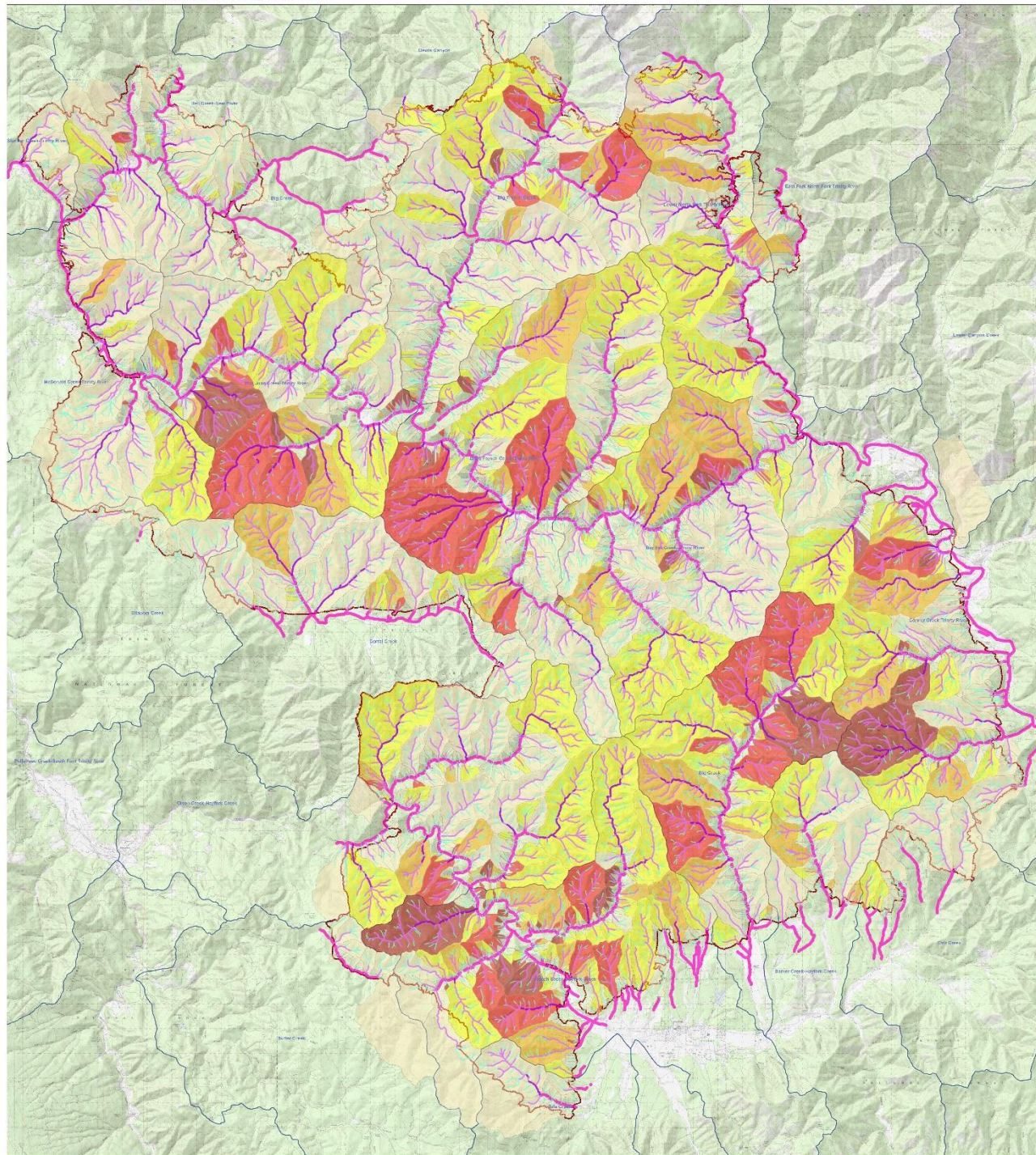
Estimated probability and debris flow volume modeled by USGS using a 16 mm/hr, 15 min. duration rainfall event (0.12 inches of rain in 15 minutes).



**Monument Fire**

United States Geological Survey  
Post-Fire Debris Flow Model Results

**Estimated Probability & Volume of Debris Flows**  
modeled for a rain event of  
15-minute duration, 24 mm/hr rainfall rate



**USGS Debris Flow Model Results**  
24 mm/hr, 15-minute duration rain

Volume (cubic meters)

- 1,000-10,000
- 10,000-100,000
- >1,000,000

Probability

- <2%
- 2-9%
- 10-49%
- 50-99%
- ≥99%

Streams with cumulative flood and debris flow potential  
Landing and debris flow risk areas  
Shaded areas in debris flow potential  
Monument Fire Perimeter as of 9/23/2021  
USGS 1:250,000 Watershed Boundaries

Debris Flow Estimates Generated by  
US Geological Survey  
Landslides Hazards Program

Monument Fire BAER Assessment  
Shasta-Trinity National Forest  
September 27, 2021

0 0.5 1 2 3 4 Miles

1:48,000



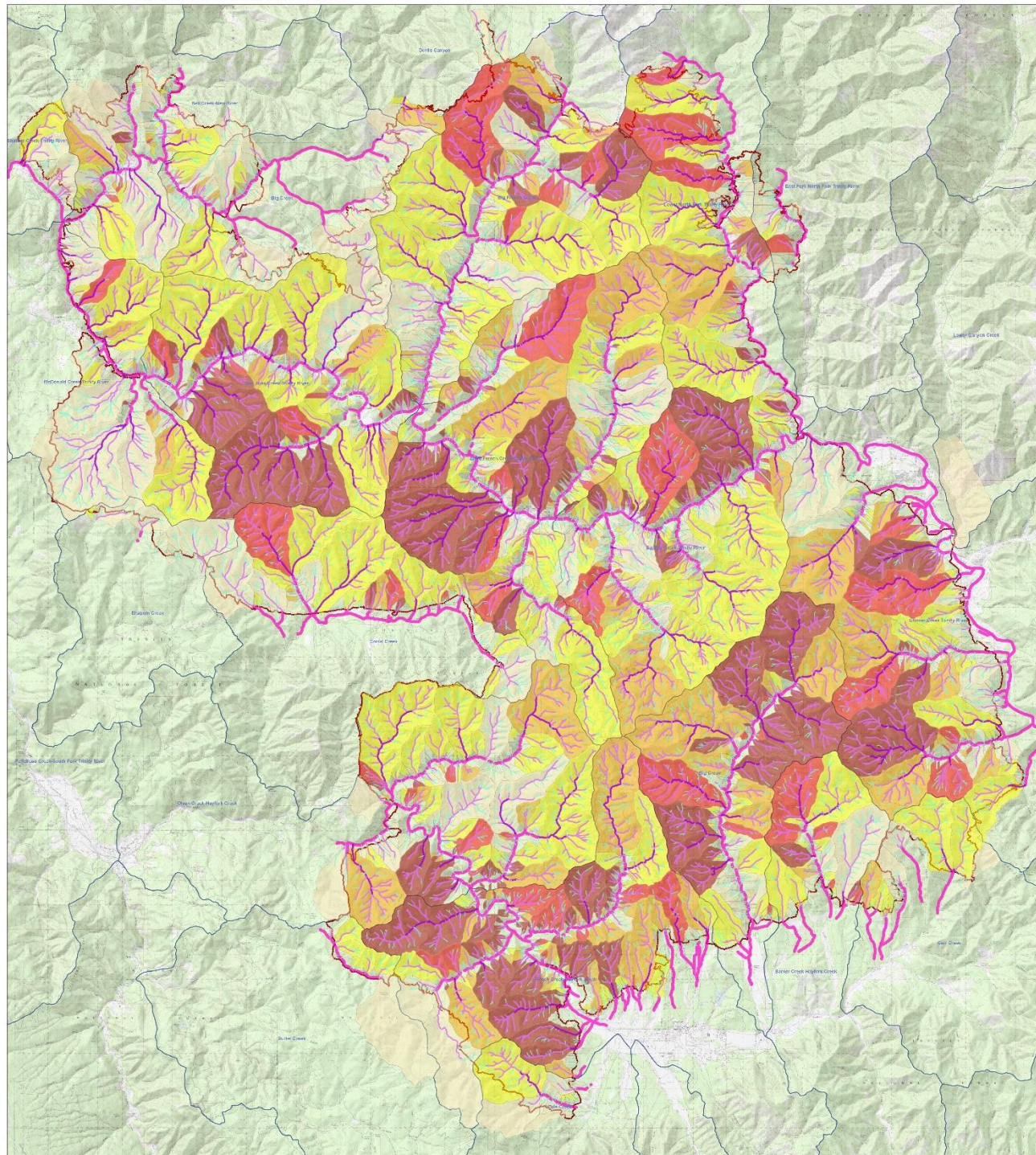
Estimated probability and debris flow volume modeled by USGS using a 24 mm/hr, 15 min. duration rainfall event (0.23 inches of rain in 15 minutes).



## monument fire

United States Geological Survey  
Post-Fire Debris Flow Model Results

Estimated Probability & Volume of Debris Flows  
modeled for a rain event of  
15-minute duration, 32 mm/hr rainfall rate



Debris Flow Estimates Generated by  
US Geological Survey  
Landslides Hazards Program

Monument Fire BAER Assessment  
Shasta-Trinity National Forest  
September 27, 2021

0 0.5 1 2 3 4 Miles

1:48,000



Estimated probability and debris flow volume modeled by USGS using a 32 mm/hr, 15 min. duration rainfall event (0.31 inches of rain in 15 minutes).



## PART V - SUMMARY OF ANALYSIS

### Introduction/Background

The Monument Fire is a lightning-caused fire that was first reported on Friday, July 30, 2021 at approximately 6:00 pm after a series of thunderstorms moved through the area. The fire was discovered near Monument Peak, south of Highway 299 near Del Loma. By August 4, the fire had spread to approximately 15,000 acres. As of the report date, inciweb indicates the fire is 291,423 acres, and 67% contained. The BARC map indicated a boundary of 224,688 acres. The BAER team used the BARC map acreages in all the assessments within this report.

A BAER assessment team began field reconnaissance of the burned area on September 20 to begin burn severity mapping, hydrologic response, and to identify geological hazards.

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

#### *Critical Value Matrix*

#### **Probability of Damage or Loss:**

*The following descriptions provide a framework to estimate the relative probability that damage or loss would occur within 1 to 3 years (depending on the resource):*

***Very likely.*** Nearly certain occurrences (90% - 100%)

***Likely,*** Likely occurrence (50% - 89%)

***Possible.*** Possible occurrence (10% - 49%)

***Unlikely.*** Unlikely occurrence (0% - 9%)

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

#### **Magnitude of Consequences:**

***Major.*** Loss of life or injury to humans; substantial property damage; damage to critical natural or cultural resources

***Moderate.*** Injury or illness to humans; moderate property damage; damage to critical natural or cultural resources resulting in considerable or long-term effects.

***Minor.*** Property damage is limited in economic value and/or too few investments; damage to critical natural or cultural resources resulting in minimal, recoverable or localized effects.

### 1. Human Life and Safety:

- Forest Visitors Safety:***

The BAER team identified potential threats to Forest visitors/recreating public, and agency personnel (visiting or post-fire treatments) that are within or downstream/downslope of burned slopes, especially those with a moderate-high burn severity, from flooding, debris flows, rock fall, hazard trees, loss of ingress and egress along/at roads, trails, and permitted sites. The probability of damage or loss is **possible or likely**, resulting from hazard trees along travel routes within the burn area have not been mitigated. Likewise, there are numerous road-drainage crossings within the burn area or directly below moderate/high burn severity that are now at risk from flooding, debris flows, and rockfall. The magnitude of consequences is **moderate or major**, as a tree, debris, or rock strike or entrapment could lead to serious injury or loss of life. As such, the risk is considered **high/very high**.

- BAER funds are requested to treat these risks (*Treatments PS-1*).

- *Campgrounds, Recreation Sites, and River Access Points:*

There are five campgrounds (Hayden Flat, Big Bar, Skunk Point, Big Flat, and Pigeon Point Campgrounds) in the burn area, and three river access points or picnic area along the Trinity River. There is a human health and safety risk to visitors to these campgrounds due to flooding, rolling rocks, stump holes, and debris flow. The probability of damage or loss to human health and safety is **possible** for these campgrounds and recreation sites, and river access points. The magnitude of consequences is **major**, as impacts to these threats could lead to loss of life or injury. The resulting risk to human health and safety is **High**.

  - BAER funds are requested to treat these risks (*Treatments PS-1*).
- *Limestone Creek Bridge*

There is a risk to human health and safety for individuals attempting to cross the Limestone Creek Bridge on 33N47. A burned hazard tree fell on the guard rail, compromising the integrity of the wooden guardrail. The probability of damage or loss to human health and safety is **likely** because this crossing receives high use for community ingress and egress and forest visitors. The compromised guard rail does not have the capacity to absorb shock from a collision, which could result in an approximately 10 ft drop from the bridge. The magnitude of consequences is **major**, as impacts to this threat could lead to loss of life or injury. The resulting risk to human health and safety is **very high**.

  - BAER funds are requested to treat these risks (*Treatments PS-2*).
- *Hazardous Materials at Big Bar Ranger District*

Hazardous materials, ash, soil, and debris associated with a burned over upper dynamite storage area and boneyard at the Big Bar Ranger Station are in very close proximity to Treloar Creek, which flows into Trinity River. Trinity River, a designated Wild and Scenic River, has numerous beneficial uses including T&E Coho Salmon, recreation, and agricultural/municipal/domestic supply, among others.

The watershed above the Big Bar Ranger District is predominately moderate burn severity in the entire watershed. Modeled debris flow rates indicate a large potential of debris flow during and after a rain event. As such, the probability of damage or loss to human health and safety is **possible** because facilities at the ranger district are occupied with Forest Service staff. Debris flows may entrap people on the property as well as disperse hazardous material. The magnitude of consequences is **major**, as uncontrolled hazardous materials and ash/soil/debris contaminated with hazardous materials pose significant threats to public health through inhalation of dust and particulates and contamination of surface water that may be used for potable water. The hazardous materials, ash and debris generated by burned debris will impact human health, contaminate soil, and impact air and water quality. The resulting risk to human health and safety is **high**.

  - BAER funds are requested to treat these risks (PS-3). Entrapment risk do not require funds, as treatment options require short-term evacuation of facilities occupants.
- *Hazardous Materials at Ironside Lookout.*

Hazardous materials associated with the burned Ironside Mountain Lookout are located atop a rocky peak. Broken glass, burned debris, and fasteners have filled crevices of the rocky peak. Appliances, solar panels, fiberglass portable toilet and metal pipe were observed in the burned debris. Radio equipment and approximately three (3) absorbed glass mat batteries were on-site prior to the fire but are unidentifiable amongst the debris. As such, the probability of damage or loss to human health and safety is **possible** because these burned materials will be transported off site and into the drainages below the burned area during heavy rainfall events. Lead and asbestos present in burned debris/soil remaining onsite may become airborne if disturbed by untrained personnel or members of the public. The magnitude of consequences is **major**, as impacts to this threat could lead to loss of life or injury. Uncontrolled hazardous materials and ash/soil/debris contaminated with hazardous materials pose significant threats to public health through inhalation of dust and particulates and

contamination of surface water that may be used for potable water. The hazardous materials, ash and debris generated by burned debris will impact human health, contaminate soil, and impact air and water quality. The resulting risk to human health and safety is **high**. Removal and disposal of the hazardous materials contamination associated with the burned lookout tower will eliminate continued employee/public exposure to toxic hazardous materials associated with lead from lead-based painted surfaces/lead acid batteries, asbestos associated with burned flooring and insulation and hazardous materials stored in the lookout before prior to burning.

- BAER funds are requested to treat these risks (PS-3).

## 2. Property:

- *NFS Roads (See Appendix A of Roads Report)*

There are 576 miles of Forest Service system roads within the fire perimeter. Of these, 74.45 miles are at risk from increased runoff, erosion, and debris flows. Undersized and inadequate drainage structures are not expected to convey the expected increase in post-fire runoff and erosion and may damage Forest Service road infrastructure. Likewise, there are numerous burned stump and roots underneath the road surface that may cause road failure. The probability of damage or loss is **likely**, because the identified NFS road prisms are expected to receive increased overland flow and accelerated erosion concentrating on route segments. The magnitude of consequences is **moderate**. Increased runoff could lead to failure of these road segments, which could constitute a loss of Forest Service infrastructure and increased sediment delivery to streams downslope. These roads also provide access to recreation and private land. The resulting risk is **high**.

- BAER funds are requested to treat these risks (*Treatment RD-1*).

- *NFS Trails*

There are 48.5 miles of Forest System Trails within the Monument Fire burned area. These trails greatly vary in development and use, from Class 1 low development trails to Class 4 and 5 asphalt highly developed trails. In total 18 miles of trail is located within or below areas of moderate and high SBS. The trail tread on these trails are at risk from increased runoff, erosion, and debris flows. Most of these trails were found to have inadequate drainage structures are not expected to convey the expected increase in post-fire runoff and erosion. Recreation and Trails assessment team prioritize the trail miles as follows:

- There is a total of 35.8 miles of trails either located in *low* or *unburned* SBS or were currently in disrepair and low development scale before the Monument Fire. The probability of damage or loss is **unlikely**, as post-fire processes should not greatly influence their condition. The magnitude of consequences is **moderate**. Increased runoff could lead to failure of these trail segments, which could constitute a loss of Forest Service infrastructure and increased sediment delivery to streams downslope. The resulting risk is **low**.

- BAER funds are NOT requested to treat these risks

- There is also a threat to approximately 12.6 miles of trails within the burned area that occur within or below *moderate* and *high* SBS on steep terrain (>40%) and have a higher development scale at least Class 3 or higher. Post-fire related processes will cause erosion and additional trail damage. The probability of damage or loss is **very likely** because these trail segments have inadequate drainage structures to convey the expected increase in post-fire runoff and erosion resulting from the areas of *moderate* and *high* SBS, which will lead to trail failure and loss. The magnitude of consequences is **moderate**, as the trail network is extensive and is well used by wilderness hikers and represent nearly \$500,000 investment. The resulting risk is **very high**.

- BAER funds are requested to treat these risks (*Treatment TR-1*)



- *Hayden Flat Campground*  
There is an immediate threat to the Hayden Flat Campground where several fire weakened hazard trees could fall onto a vault toilet building, and several concrete picnic tables during the first winter. A tree strike on any of these would result in destruction of the infrastructure. The probability of damage or loss is **likely** for Hayden Flat Campground. The magnitude of consequences is **moderate**. The campground infrastructure is well maintained annually as it received a high volume of use. Replacement cost for these facilities is greater than \$70,000. The resulting risk is **high**.
  - BAER funds are requested to treat these risks (*Treatment CG-1*)
- *Big Bar Ranger District and Facilities*  
There are threats to infrastructure at the Big Bar Ranger District and associated facilities from flooding and debris flows originating in Treloar Creek. The probability of damage or loss is **possible** as 85% of this watershed burned at moderate to high severity. The overall gradient is approximately 20% and the post-fire stream flow is approximately 4.1 times greater than pre-fire conditions. The magnitude of consequences is **major**. The Ranger District and facilities, including storage buildings, gas tanks, and an engine bay that may be impacted during a flood or debris event. These events could result in the destruction of infrastructure, requiring full replacement. The resulting risk is **high**.
  - BAER funds are requested to treat these risks to property (*Treatment BB-1*).

### 3. Natural Resources:

- *Fire Suppression Activities - Native and naturalized plant communities where invasive noxious weeds were absent or in trace amounts.*  
There is a threat of the spread and introduction of invasive and noxious weeds into areas disturbed by suppression impacts (242 miles of dozer lines; hand lines, drop points, helispots, etc.) which pose a threat to native and naturalized plant communities. On 72.5 miles, the probability of damage or loss is **likely** because invasive species may have been spread into un-infested, native plant communities through: (1) the use of equipment and personnel staged within known infestations, (2) the disturbance of known noxious weeds adjacent to the burn area, and (3) the exposure of open, bare ground that is now vulnerable to invasion. The primary concern is focused on dozer constructed fire lines. The magnitude of consequences is **moderate**. Introduction and expansion of weeds can suppress native vegetation recovery and lead to a loss of native and naturalized plant communities. Vegetation type conversion to annual grasslands and expansion of weeds into areas disturbed by fire suppression and within the burned area are likely. The resulting risk is **high**.
  - BAER funds are requested to treat these risks (*Treatments LD-1*).
- *Non-Suppression Activities (BAER-Specific) - Native and naturalized plant communities where invasive noxious weeds were absent or in trace amounts.*  
The incursion of invasive species within the fire perimeter may threaten the recovery of native plant communities. There are at least 130 occurrences of rare botanical species, and one occurrence of a TESP within .25 miles of priority noxious weed proposed. Invasive species presence was limited to along the road systems. Although infestations were limited prior to the fire, the invasive and noxious species present are known to significantly increase in size and density following wildfire. Spread is most likely to occur in areas with moderate-high burn severities as competing vegetation and duff layers have been removed. It is likely that invasive species infestations were spread into native plant communities that burned with moderate-high vegetative severities through the disturbance of known infestations and the transport of propagules from fire camp or surrounding access roads. As such, the probability of damage or loss is considered **likely**. The magnitude of consequences is **moderate**. If weeds are introduced to the fire area, they can colonize new areas and suppress natural recovery. Loss of native and naturalized plant communities to annual grasslands and expansion of weeds into the burn area can reduce ecological integrity and increase fire frequency. The resulting risk is **high**.
  - BAER funds are requested to treat these risks (*Treatments LD-2*).

- *Natural Resources Soil and Water*

There is a threat of impacts to water quality from increased sediment/nutrient loading following high intensity rain events. Likewise, there is the threat of the loss of soil productivity and reduced hydrological function. The probability of damage or loss to water quality and agricultural supply water on NFS lands, including Big Bar, is considered **likely**, as erosion and transport of sediment, ash, and nutrients are expected to occur. The probability of damage or loss to soil productivity is considered very likely, as low ground cover, steep terrain, and hydrophobicity is expected to increase erosion and sedimentation across the entire burn area, with moderate to high precipitation. For water quality, the magnitude of consequences is **minor**, as water quality would be tied to rain events and have a short-duration recovery. The magnitude of consequences for soil productivity is considered **moderate**, as topsoil loss is linked to important ecosystems function and type conversion. The resulting risk to water quality is **low**. The resulting risk to soil productivity is **high**.

- BAER funds are NOT requested to treat these risks. Natural Recovery is recommended, and treatments proposed to stabilize road systems will also assist in the stabilization of these resources.

- *Steelhead, Chinook and Coho salmon critical habitat*

Southern Oregon/Northern California Coast (SONCC) Coho salmon and steelhead and Chinook salmon critical habitat is threatened from effects of increased sediment, debris and ash (water quality) and stream increased temperatures on fish populations in Hayfork Creek and the South Fork Trinity River. There are 131 miles of designated critical habitat for SONCC Coho salmon in the fire perimeter. No critical habitat is listed for the sensitive stocks of Chinook salmon or steelhead trout. Increased turbidity, altered water chemistry, and high debris flows are expected to occur with the first rain event, particularly in areas with high burn severity. Areas with low burn severity indicate riparian vegetation still mostly intact. These areas will help alleviate some 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 not longer than 3 years. Recovery of the main stream channels will not take place until fine sediment loads move through and pool-riffle-run sequences are recreated through the return of complex substrates and sufficient riparian cover. Vegetation recovery will help reduce water temperatures and support aquatic invertebrate production, vital to salmonid rearing success. These local impacts include the mainstem channels as well as their tributaries affected by the fire. As such, the probability of damage or loss to fish habitat is **likely**, given the potential for debris flows, flooding and sedimentation. Potential for sediment is moderate given only 33% of the fire burned at moderate and high soil burn severity. These combined impacts will lead to short-term high turbidity events and loss/alteration of suitable stream habitat. The magnitude of consequences is **moderate**. Riparian vegetation can recover relatively quickly, but immediately adjacent areas experiencing high soil burn severity and the loss of mature trees will take longer to recover. Change in fine sediments and spawning gravel embeddedness that could occur will likely result in short-term effects. The resulting risk is **high**.

- BAER funds are NOT requested to treat these risks. However, road treatments will reduce sedimentation into critical habitat. Natural Recovery is recommended.

#### 4. Cultural and Heritage Resources:

- *Hazard trees.* There is a threat of damage or destruction to historical and precontact features present within cultural resource sites eligible or potentially eligible for listing in the National Register of Historic Places (NRHP) due to the potential of hazard trees falling on these features. The probability of damage or loss is **possible** because fire has affected trees on site increasing the likelihood for them to fall and impact features. The magnitude of consequences is **moderate** as cultural resources are non-renewable and damage to these features would be an irretrievable loss of traces of the past. The resulting risk is **intermediate**.

- BAER funds are NOT requested to treat these risks.

- *Erosion and sedimentation.* There is a threat to the cultural resources eligible or potentially eligible from listing in the NRHP from increased runoff, erosion, and debris flows. The probability of damage or loss is **possible**. Field observation and burn severity models reflect many areas within the fire perimeter are at risk of erosion/sedimentation due to vegetation loss and landscape position. Landscape variables and observed past erosion support the likely probability (50-89%) of damage to cultural resources that, while it may not result in large scale obliteration of all sites within the fire area, could damage certain features and destroy the context of certain site types. The magnitude of consequences is **major**. In most cases, damage to cultural resource sites represents an irretrievable loss of traces of the past. Cultural resources are non-renewable. The remaining integrity of cultural resources is at risk from increased post-fire erosion and would represent damage to critical resources with considerable and long-term effects. The resulting risk is **high**.
  - BAER funds are NOT requested to treat these risks. There will be a considerable amount of Section 106 consultation and compliance costs associated with treatments in and around the Big Bar Ranger Station. These costs are reflected in their treatment costs.
- *Unauthorized artifact collection or feature degradation.* There is a threat of loss of historic context and contents due to unauthorized artifact collection or feature degradation at cultural resources eligible or potentially eligible for listing in the National Register of Historic Places (NRHP). The probability of damage or loss is **possible**, because archaeological and historic sites are vulnerable to metal detectorists, artifact collectors, and recreation activity in the area. The fire has exposed several known cultural sites. This exposure makes artifacts and features susceptible to damage from unauthorized collection. The magnitude of consequences is **major**. In most cases, damage to cultural resource sites represents an irretrievable loss of traces of the past. Cultural resources are non-renewable. Removed artifacts from historic contexts degrade the meaning of historic sites and features and their potential to provide important information about the past to this and future generations. The nature of unauthorized collection means that impacts resulting in total irretrievable loss of a site or feature are expected but unpredictable and are likely to occur over time. On particularly sensitive sites, the exposure of features resulting from consumed vegetation can lead to irretrievable loss of site integrity by exposing sensitive site features to recreation activities. Additionally, certain site features require yearly vegetation growth to serve as a stabilization method. A major consequence rating appropriately addresses the likelihood of these types of damage based on their nature and potential for significant impact. The resulting risk is **high**.
  - BAER funds are requested to treat these risks (CR-1).

## **B. Emergency Treatment Objectives:**

- Mitigate and protect, to the extent possible, threats to personal injury or human life of forest visitors and Forest Service employees by raising awareness through posting hazard warning signs on roads and trails, reinforcing road and trail tread, improving road and trail drainage and stream crossings, and communicate hazard of flooding, and debris flows. Communicate to cooperating agencies and community groups.
- Protect or minimize damage to NFS investments and key travel routes (roads and trail infrastructure) by installing drainage features capable of withstanding potential increased stream flows and/or debris flows.
- Protect or mitigate potential post-fire impacts to critical cultural resources within the burned area.
- Treat invasive plants that are a threat to native and naturalized ecosystems by minimizing the expansion of existing populations in the burned area and control of expected invasion of noxious weeds within and adjacent to the area where soils/vegetation was disturbed as a result of the fire and fire suppression activities.
- Assist cooperators, other local, State, and Federal agencies with the interpretation of the assessment findings to identify potential post-fire impacts to communities and residences, domestic water supplies, public utilities and other infrastructure.



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

\*Land 100% % Channel na % Roads/Trails 75 % Protection/Safety 100 %

\*EDRR treatments would be conducted in the spring/summer 2022.

**D. Probability of Treatment Success**

	<i>1 year after treatment</i>	<i>3 years after treatment</i>	<i>5 years after treatment</i>
<i>Land</i>	80	50	35
<i>Channel</i>	N/A	N/A	N/A
<i>Roads/Trails</i>	75	90	100
<i>Protection/Safety</i>	85	95	100

**E. Cost of No-Action (Including Loss):****Human Health and Safety:** Human

Life and Safety do not have a market value, but an injury would exceed \$1,000,000, providing a substantial benefit/cost ratio.

**Property:** The cost to rebuild sections of the road after they are washed out, eroded, or buried includes estimates to bring in material to build up the damaged roads. The cost of not restoring the proposed roads is approximately \$1,483,325 (which includes a 15% assumed loss), providing at least a 5.3 benefit/cost ratio. This does not include the lost value to project management, fire suppression, and recreation.

If the trail system in and below moderate and high SBS areas is lost, the trails would require a full reconstruction. At an estimated \$5 per foot for new trail construction, replacement for the entire trail system would cost **\$1,272,000**. Thus, at a 40% effectiveness/loss the cost of not reconstructing these trails would be approximately \$508,800, providing a 1:10 cost benefit ratio.

Recreation infrastructure at risk of destruction from hazard trees include 1 double vault toilet and 3 picnic tables. The replacement cost for all of these facilities is estimated at \$73,000 and would have a very low loss rate and high effectiveness. With a treatment cost of removing hazard trees of \$950, cost benefit ratio is 73:1.

**Land Treatments**

**Native and Naturalized Plant Communities:** Deferring EDRR treatments along suppression disturbed sites could result in approximate \$1,542,240, assuming a 10% loss. As such, the benefit/cost ratio exceeds 15%.

**Cultural and Heritage Resources:** Economic values cannot be placed on the loss of cultural and heritage resources. The cultural or historic resources at risk are eligible, or potentially eligible, for listing on the National Register of Historic Places (NRHP). Delaying emergency treatment could permanently remove the cultural significance of sites.

**F. Cost of Selected Alternative (Including Loss):****Human Health and Safety Treatments:**

Total human health and safety treatment costs: **\$117,595**

***PS-1 Hazard Warning Signs Cost Estimate.***

<b>Item</b>	<b>Unit</b>	<b>Unit cost</b>	<b># of units</b>	<b>Total Cost</b>
Hazard Warning Signs (Roads)	Each	700	<b>20</b>	\$14,000
Hazard Warning Signs (Trails)	Each	300	<b>6</b>	\$1,800
Hazard Warning Signs (Rec Sites and River Access Points)	Each	300	<b>5</b>	\$1,500
Rock Fall Hazard Signs	Each	700	<b>2</b>	\$1,400
Crew OT for Sign Placement	Built into costs above			
<b>Total Cost:</b>				<b>\$18,700</b>

## PS-2 Limestone Creek Guard Rail

Item	Unit	Unit cost	# of units	Total Cost
Repair Guard Rail	Each	\$5,700	1	\$5,700
GS-11, Arch Section 106. Overtime	Hour	\$60	5	\$300
<b>Total Cost:</b>				<b>\$6,000</b>

## PS-3 Hazardous Material at Big Bar Ranger District and Ironstone Lookout.

Item	Unit	Unit Cost	# of Units	Cost
Program Manager	Hours	170	16	2,720
Project Manager	Hours	140	40	5,600
Contract (Administrative)	Hours	82	8	656
Environmental Technicians	Hours	88	120	10,560
Mobilization/Demobilization	Lump Sum	3,000	1	3,000
Work Plan/Health and Safety Plan	Lump Sum	5,000	1	5,000
Hazmat Testing (Ash, Burned Debris, Soil)	Lump Sum	3,750	1	3,750
Removal/Disposal of Propane Tanks	Each	1,000	3	3,000
Removal/Disposal of Hazmat at Ironside Mountain Lookout	Lump Sum	15,000	1	15,000
Removal/Disposal of Hazmat at Big Bar Ranger Station	Lump Sum	6,000	1	6,000
Removal and Disposal of Contaminate Ash/Soil at Ironside Mt	Lump Sum	8,500	1	8,500
Removal and Disposal of Contaminate Ash/Soil at Big Bar RD	Lump Sum	105,00	1	10,500
<b>Subtotal</b>				<b>74,286</b>
Overhead 15%				11,143
<b>Contract Total</b>				<b>85,429</b>
Off-Unit FS Project Manager	DAYS	3	500	1,500
Off-Unit FS Contract Administration Specialist	DAYS	3	650	1,950
Off-Unit FS COR Inspectors	DAYS	3	500	1,500
Section 106 consultation GS-11, Overtime	Hour	60	48	2,880
<b>Total Cost:</b>				<b>93,259</b>

**Property:**RD-1: NFS Road Treatments (*Shasta Trinity NF*): **\$276,989**

Item	Unit	Unit cost	# of units	Total Cost
Restore Drainage	Mile	7000	27.67	\$193,710
Replace Drop Inlet Lid	Each	350	33	\$11,550
Burned Hole Repair	Each	1000	46	\$46,000
Storm Inspection and Response	Mile	550	46.78	\$25,729
<b>Total Cost:</b>				<b>\$276,989</b>

RD-1: NFS Road Treatments (*Six Rivers NF; Denny Road*): **\$3,265**

Item	Unit	Unit cost	# of units	Total Cost
Restore Drainage	Mile	7,000	0.3	\$2,100
Burned Hole Repair	Each	1,000	1	\$1,000
Storm Inspection and Response	Mile	550	0.3	\$165
<b>Total Cost:</b>				<b>\$3,265</b>

Treatment and cost per road for Shasta-Trinity NF. FS Roads 33N47, 33N84, and 4N16 represent the highest implementation priority.

			Replace Drop Inlet Lid	Restore Drainage	Burned Hole Repair in Road	Storm Inspection and Response
NFSR	ML	Total Cost To Treat	ea	mi	ea	mi
31N10	2	\$2,000			2	
31N50	2	\$1,000			1	
32N11	2	\$2,000		0.63	2	
32N23	2	\$1,000		0	1	
32N25	2	\$1,000		0.18	1	
33N48	2	\$8,000		4.18	8	
3N07	2	\$6,000		3.28	6	
3N22	2	\$2,761				5.02
4N11	2	\$3,000			3	
4N11A	2	\$1,000			1	
5N09	2	\$4,000			4	
5N21	2	\$3,000			3	
07N26	3	\$699		0.08		0.26
32N03	3	\$81				0.15
33N01Y	3	\$20				0.04
33N44	3	\$1,058		0.11		0.54
33N47	3	\$24,449	5	1.6	7	8.18
33N52	3	\$9,522	4	1.04		1.48
33N61	3	\$12		0		0.02
33N84	3	\$52,688	8	6.74	1	3.05
34N07Y	3	\$3,363	1	0.3		1.66
34N59	3	\$44				0.08
3N08	3	\$960				1.75
4N08	3	\$16,433	2	1.92		4.13
4N16	3	\$19,321	3	2.31		3.8
4N29	3	\$1,168		0.04		1.57
4N41	3	\$4,491	3	0.44		0.61
4N47	3	\$1,690		0.05		2.46
5N04	3	\$7,768	2	0.66		4.41
5N13	3	\$9,394	2	0.69	1	5.24
5N22	3	\$25				0.04
5N23	3	\$154		0.01		0.18
6N04	3	\$5,964		0.69		2.12
4N16	4	\$22,160	3	2.59	3	
5N60	4	\$2,874		0.12	2	
<b>Total</b>		<b>\$276,989</b>	<b>33</b>	<b>27.67</b>	<b>46</b>	<b>46.78</b>

*TR-1: NFS Trail Treatments*

Item	Unit	Unit cost	# of units	Total Cost
Trail Treatments – Drainage Stabilization (see trail priority below)	Miles	\$4,164.81	12.6	\$52,560
GS-09 – FS Trail Specialist, Overtime	Included in Cost Above			
FS Stock Packing Support	Included in Cost Above			
Total Cost:				<b>\$52,560</b>

Cost per trail (by priority) for Shasta-Trinity NF.

Trail Priorities	Number	Miles	Priority	Cost
Waldorff Crossing	11W13	<b>6.31</b>	1	\$26,280
Green Mountain	12W09	<b>1.51</b>	2	\$4,790
Manzanita Ridge	12W15	<b>2.56</b>	3	\$10,662
Raymond Flat	11W12	<b>0.41</b>	4	\$1,708
Horne Access	11W11	<b>0.21</b>	5	\$875
Bear Creek	12W22	<b>1.62</b>	6	\$6,747
Total Cost:		12.62		<b>\$52,560</b>

*CG-1: Hayden Flat Camp Ground, Hazard Tree Falling*

Item	Unit	Unit cost	# of units	Total Cost
Saw Team Overtime (3 – GS-05 Forestry Techs)	Sites	\$144	5	\$720
GS-11 – Arch Section 106. Overtime	Hour	\$60	5	\$300
Total Cost:				<b>\$1,020</b>

*BB-1: Big Bar Ranger Station*

Item	Units	Number of Units	Cost per Unit	Cost
Remove hazardous materials stored in sheds and sheds in the storage area.	Acres			No Cost
Move Fuel Tank	Tank	1	25,000	25,000
Remove Road Fill and Concrete Culvert	Yards <sup>3</sup>	2000	23.4	46,800
Remove shed and contents that is on the old-abandoned highway road-stream crossing of Treloar Creek.	Shed	1	10,000	10,000
Coordinate with Cal-Trans to aid planning for Highway 299 crossing of Treloar Creek.				No Cost
Install Rails/Blocks	100 ft	3	5,500	16,500
Storm Inspection and response, clean culvert to ensure the Big Bar Ranger Station does become inundated	Culvert	1	1,000	1,000
Removal of dead woody debris in channel	Acres	2	1,000	2,000
Section 106 consultation (contract)	Hour	100	50	5,000
Total Cost				<b>\$106,300</b>

### Native and Naturalized Plant Communities:

Total native and naturalized plant community costs: **\$100,800**

LD 1 - Suppression Repair EDRR

Item	Unit	Unit Cost	# of Units	Cost
EDRR surveys (agreement) Dozer Lines	Miles	1000	72.5	\$72,500
EDRR surveys (agreement) Drop points,	Acres	1000	25	\$25,000
GS-11 Botanist, Overtime, Agreement	Days	660	4	\$2,640
Total Treatment				<b>\$100,140</b>

LD 2- BAER-Specific EDRR

Item	Unit	Unit Cost	# of Units	Cost
EDRR surveys, GS-11 Botanist, Overtime	Days	660	1	\$660
Total Treatment				<b>\$660</b>



**Cultural and Heritage Resources:**Total Cultural and Heritage Resource Protection Costs: **\$682**

## CR-1 Cultural Resource Site Implementation

<b>Personnel Services:</b>	<b>Cost</b>
One GS-11 (Archaeologist) or equivalent @ \$60/hr (OT Rate) x 5 hours	\$300
Three GS-5 (Forestry Technician) or equivalent @ \$25.43/hr (OT Rate) x 5 hours	\$382
Total Treatment Costs:	<b>\$682</b>

**F. Skills Represented on Burned-Area Survey Team:**

- ☒ Soils                      ☒ Hydrology            ☒ Engineering        ☒ GIS            ☒ Archaeology  
☒ Weeds                      ☒ Recreation/Trails    ☒ Fisheries            ☒ Logistics  
☒ Public Information

**Team Leader(s):** Kendal Young & Meagan Carter (T)**Email:** [kendal.young@usda.gov](mailto:kendal.young@usda.gov)**Phone(s)** Cell: 775-276-4659**Email:** [meagan.carter@usda.gov](mailto:meagan.carter@usda.gov)**Phone(s)** Cell: 775-720-2038**Forest BAER Coordinator:** Brad Rust**Email:** [brad.rust@usda.gov](mailto:brad.rust@usda.gov)**Phone(s):** 530-226-2427**Team Members:** *BAER Team Members by Skill*

<b>Skill</b>	<b>Team Member Name</b>
<i>Team Lead(s)</i>	Kendal Young Meagan Carter
<i>Soils</i>	Anna Plumb Brad Rust Lizeth Ochoa Leslee Crawford
<i>Hydrology</i>	John Kelley Jesse Merrifield Rebecca Biglow
<i>Geology</i>	Dennis Veich
<i>Engineering</i>	Molly Breitmun Benjamin Molitor Micah Kittel Samuel Marano Lawrence Arrington
<i>GIS</i>	Elaine Elliot
<i>Archaeology</i>	Robin Hopkins Jacob Batisky James Moak
<i>Botany/Weeds</i>	Lusetta Sims
<i>Recreation</i>	Patrick McGervey
<i>Fisheries</i>	Pete Schneider
<i>Public Information</i>	Cathleen Thompson
<i>Logistics</i>	Cathy Carlock

**Treatment Narrative:****Human Health and Safety:**Entering Burn Area Warning Signs

“Entering Burned Area” signs are needed to alert the public of possible threats to their life and safety that exist within or downstream of a burned area. The signs contain language specifying items to be aware of when entering a burn area such as falling trees and limbs, rolling rocks, and flash floods. Signs are placed in entry points that are expected to receive high use, either around residential areas or popular roads used for recreation. 20 Road locations were identified within or entering the burned area to facilitate notifying the public of possible threats. 6 Trail locations were identified within or entering the burned area to alter the public of hazards likely to be encountered on trails in the burned area. In addition 5 locations are identified at recreation sites and river access points to alter the public using shorelines and traveling on water craft along the Trinity River of the hazards associated with increased potential for wood debris entrapments.

Limestone Creek Guardrail

The damaged section of the guardrail would be replaced to minimize the potential of a vehicle striking the guard rail and landing in Limestone Creek.

Hazardous Material at Ironside Lookout and Big Bar Ranger Station

Because of the location of the hazardous materials, stabilization methods contained in the 2006 BAER catalogue will NOT: (1) prevent the infiltration of rainwater into the hazmat contamination created during the fire, (2) prevent runoff into the creeks below and (3) prevent hazardous materials contamination from being washed downstream during heavy rainfall or flood events. Recommendation treatments for the burned Big Bar Ranger Station dynamite storage area and boneyard as well as for the burned Ironside Mountain Lookout include:

- Ensure hazardous waste and materials are managed properly characterized and managed prior to disposal. Hazardous materials and waste surveys must be prepared to identify waste streams that may include the following: asbestos containing materials, polychlorinated biphenyls, lead-based paint, mercury, and hazardous wastes. Hazardous waste must be properly labelled and stored on site until transported to disposal facility.
- Remove and properly dispose of burned hazardous building materials (asbestos, lead based paint, treated wood etc.) and hazardous materials burn ash/soil and debris piles at Ironside Mountain Lookout burned location to protect human health (employees and public) and the environment. Remove and dispose of burned equipment, propane tanks, metal truck boxes, burned asbestos transite pipe etc., present in the Big Bar Ranger Station boneyard that will be transported to Trinity River during heavy rainfall. Ash/debris/soil contaminated with hazardous materials at the Big Bar Ranger Station and Ironside Mountain locations will likely become airborne during windy periods at the burned areas and should be removed from the site and properly disposed. Sample ash/debris/soil in the burned areas to ensure proper removal and disposal. Analyze the burn ash for metals, asbestos, polychlorinated biphenyls, pesticides, polycyclic aromatic hydrocarbons (PAHs) including dioxins and volatile organic compounds.
- Relocate non-hazmat (inert) burned debris located at the Big Bar Ranger Station boneyard to prevent the debris from being washed off site and transported downstream of the burned station, via heavy rainfall/flood events. Inspect (annually or after major weather events) non-hazmat burned debris left in place to ensure containment measures are working as required.
- Empty and dispose of propane tanks observed at both burned locations.

**Property:**Roads Treatments:

Treatments considered for the transportation system includes the following:

- Replace Drop Inlet Lid – Keep culverts from plugging from debris
- Burn hole repair in road – Reduce road failure and impacts to fish habitat downstream of road
- Storm Inspection and response – Prevent road failure and erosion of existing roadbed
- Restore Drainage – Includes road blading, ditch cleaning, and culvert cleaning to allow drainage of the road and reduce road failure.

**Big Bar Ranger District and Facilities:**

Treatment proposed at the Big Bar Ranger Station are intended to stabilize infrastructure by temporary removing them from debris flow pathways, or by creating a barrier to redirect the debris flow. Treatments include:

- Remove hazardous materials stored in sheds and sheds in the Big Bar Ranger Station storage area.
- Empty and remove fuel/gasoline tanks from Big Bar compound. Relocate these items for a minimum of 3 years duration, to accommodate the vegetation and watershed stabilization period.
- Remove road fill of old abandoned highway crossing of Treloar Creek and concrete box culvert within this abandoned road-stream crossing, located adjacent to the Big Bar Ranger Station and upstream of the Highway 299 crossing of Treloar Creek.
- Remove shed and contents that sits atop the old, abandoned highway road-stream crossing of Treloar Creek from the vicinity.
- Coordinate with CalTrans to aid planning for Highway 299 crossing of Treloar Creek.
- Install K-rails upslope of engine bay building and other valued buildings remaining in the debris flow deposition zone to protect structures from impacts from rock, sediment, and large wood debris material that may damage buildings.
- Remove dead and down large woody material from the channel of Treloar Creek in the vicinity of the Big Bar Ranger Station compound without disturbance to live riparian vegetation and living trees along Treloar Creek.
- Conduct Section 106 consultation on actions.

**Recreation Site Treatments:**

To protect recreation infrastructure treating with Hazard Tree Falling is identified. Work includes removal of multiple Madrone trees above the lower Toilet and above picnic tables in sites 34, 35, 14, 15, and 16. All work will take place within Hayden Flat Campground. Resulting slash and vegetation in the upper portions of the campground (sites 14, 15, & 16) should be used to stabilize an archeology site, with coordination of the unit Archeologist.

**Trail Treatments:**

Trail stabilization is recommended to protect trail infrastructure within the burned area. Minimal work should be done to maintain and improve drainage features in some trail segments to prevent total loss. Total trail loss would not only require total reconstruction, but once the alignments are undetectable the entire trail would need a total redesign and layout. Not all segments of trails would be cost effective for treatment nor have a strong probability for success or effectiveness. The only segments of trails recommended for treatment are segments that would have a high probability of success from trail stabilization response. Lower developed trails (Trail Class 2 and below) are not considered for treatment. Proposed treatments would include reconstruction of drainage dips, water and earthen waterbars on trail segments in high and moderate SBS. This should be done rapidly to maintain efficiency and improve or maintain as many drainage features as possible in these areas. Other damage and tread work should be bypassed and dealt with in future post-fire rehabilitation efforts. See trail treatment map for specific locations.

**Land Treatments:**

**Native and Naturalized Plant Communities:** Threats to native and naturalized plant communities from invasive plants can be minimized with early detection and rapid response (EDRR) surveys. Prevention and early detection of invasive, nonnative plant species are the principal strategies to successful management. Eradication efforts are most successful for infestations less than 2.5 acres in size. Once infestations are more than 250 acres, eradication efforts are largely unsuccessful, costly, and unsustainable. The U.S. Congress, Office of Technology Assessment stated that the environmental and economic benefits of supporting prevention and early detection initiatives significantly outweigh any incurred costs, with the median benefit-to-cost ratio being 17:1 in favor of being proactive. The weed risk to native plant community recovery can be mitigated at low cost by implementing EDRR within the first year after the fire. Out of the 242 miles of dozer line, 72.5 miles have been identified on National Forest lands in need of EDRR surveys based on areas that were disturbed by suppression activities and the risk of plant incursion, resulting in unacceptable risks to natural resources. New, small weed infestations located during EDRR surveys will be manually treated upon discovery. Existing infestations found to be expanding due to the fire or fire suppression activities would be re-mapped and evaluated for treatment.

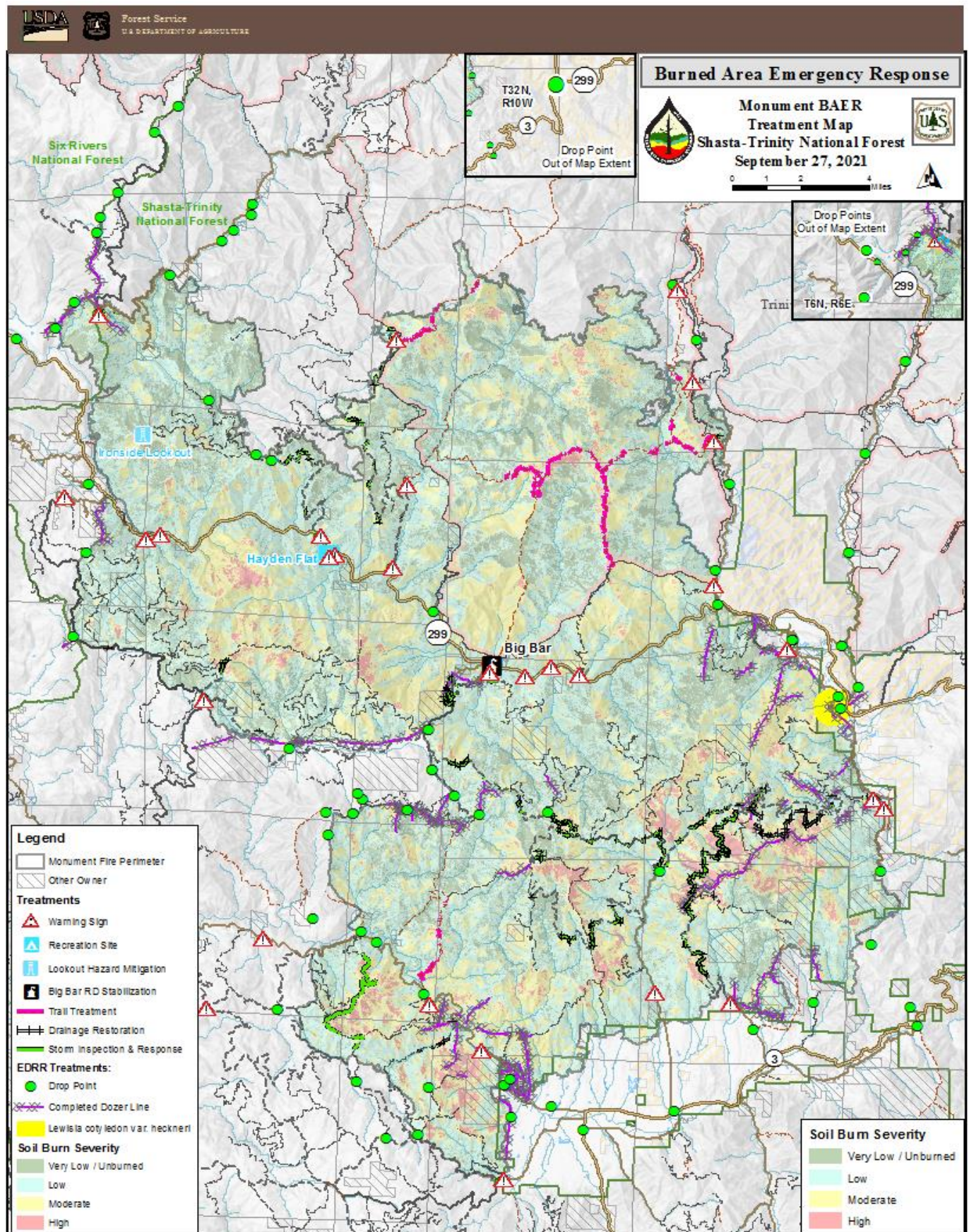
**Cultural Resources:** Exposure of cultural resources from vegetation loss and erosion/sedimentation causing data loss are the highest observed threats to cultural resources eligible or potentially eligible for listing in the NRHP. Cultural resources of particular concern are: 1) one site with a proposed lop and scatter of hazard trees felled to reduce infrastructure damage as described in other resource reports. Funding is requested only for overtime for personnel to scatter material, 2) two sites that will be heavily addressed by other specialists which requires a significant amount of interdisciplinary coordination. There are numerous other cultural resources potentially eligible for listing in the NRHP within the fire area. The Forest should conduct site visits to document changes to the sites in terms of artifact and feature composition that indicate archaeological looting, runoff, and flash flooding is occurring and could affect site integrity. Emergency stabilization activities implemented to manage risk to any BAER Critical Values require consideration, avoidance or mitigation of potential effects to cultural resources prior to implementation (FSM 2523.2.2.d; Section 106 of the National Historic Preservation Act (NHPA) as implemented with programmatic agreements or standard procedures under 36CFR800). BAER treatments are not exempt from Section 106 of NHPA. One of the first requirements for BAER team Heritage personnel is to address the provisions of 36CFR800.12. These provisions are designed to enable NHPA compliance to proceed and be completed in an expedited fashion. The costs for compliance with Section 106 of the National Historic Preservation Act can be covered for all authorized treatments. Section 106 compliance includes the minimum required documentation to implement the approved treatments. Although BAER treatments are considered “emergency undertakings” according to the provisions of the National Historic Preservation Act [36CFR800.12(d)], a reasonable effort shall be made to inventory ground-disturbing project areas for previously unknown cultural resources. Impacts to cultural resources shall be avoided whenever possible.

**Channel Treatments:** None

**I. Monitoring Narrative:** N/A



## Monument BAER Treatment Map





**PART VI – EMERGENCY STABILIZATION TREATMENTS AND SOURCE OF FUNDS****Shasta Trinity National Forest**

			NFS Lands				Other Lands				All
		Unit	# of		Other		# of	Fed	# of	Non Fed	Total
Line Items	Units	Cost	Units	BAER \$	\$		units	\$	Units	\$	\$
<b>A. Land Treatments</b>											
LD-1 EDRR - Suppression	Project			100,140				0		0	\$ 100,140
LD-2 EDRR- Non-Suppression	Project			660	0			0		0	\$ 660
CR-1 Cultural Site Protection	Project			682	0			0		0	\$ 682
					0			0		0	\$ -
<i>Subtotal Land Treatments</i>				101,482	0			0		0	\$ 101,482
<b>B. Channel Treatments</b>											
				-	0			0		0	\$0
<i>Subtotal Channel Treatments</i>				-	0			0		0	\$0
<b>C. Property</b>											
RD-1 Road Stabilization	Project			276,989	0			0		0	\$276,989
TR-1 Trail Stabilization	Project			52,560							\$52,560
CG-1 Hayden Flat Campground	Project			1,020							\$1,020
BB-1 Big Bar RD Stabilization	Project			106,300							\$106,300
<i>Subtotal Road and Trails</i>				436,869	0			0		0	\$436,869
<b>D. Protection/Safety</b>											
PS-1 Hazard Warning	Project			18,700				0		0	\$18,700
PS-2 Limestone Guard Rail	Project			6,000							\$6,000
PS-3 Hazardous Materials Stabilization	Project			93,259				0		0	\$93,259
<i>Subtotal Protection/Safety</i>				117,959	0			0		0	\$117,959
<b>E. BAER Evaluation</b>											
Initial Assessment	Report			165,311	0			0		0	\$165,311
<i>Subtotal Evaluation</i>				165,311	0			0		0	\$165,311
<b>F. Monitoring</b>											
<i>Subtotal Monitoring</i>				-	0			0		0	\$0
<b>G. Totals</b>											
Previously approved				656,310	0			0		0	\$656,310
Total for this request				656,310							

**PART VI – EMERGENCY STABILIZATION TREATMENTS AND SOURCE OF FUNDS****Six Rivers National Forest**

			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											
					0		0		0	\$ -	
Subtotal Land Treatments				0	0		0		0	\$ -	
B. Channel Treatments											
				-	0		0		0	\$0	
Subtotal Channel Treatments				-	0		0		0	\$0	
C. Property											
RD-1 Road Stabilization	Project			3,265	0		0		0	\$3,265	
Subtotal Road and Trails				3,265	0		0		0	\$3,265	
D. Protection/Safety											
PS-1 Hazard Warning	Project			0			0		0	\$0	
Subtotal Protection/Safety				-	0		0		0	\$0	
E. BAER Evaluation											
Initial Assessment	Report			1,670	0		0		0	\$1,670	
Subtotal Evaluation				1,670	0		0		0	\$1,670	
F. Monitoring											
Subtotal Monitoring				-	0		0		0	\$0	
G. Totals				3,265	0		0		0	\$3,265	
Previously approved											
Total for this request				3,265							

**PART VII - APPROVALS**

1. \_\_\_\_\_  
Shasta-Trinity NF, Forest Supervisor Date
2. \_\_\_\_\_  
Six Rivers NF, Forest Supervisor Date