

August 22, 2022**OAK FIRE 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: Oak

B. Fire Number: CA-MMU-016149

C. State: CA

D. County: Mariposa

E. Region: 05 – Pacific Southwest

F. Forest: Sierra National Forest

G. District: Bass Lake Ranger District

H. Fire Incident Job Code: PNPWW9 - 1522

I. Date Fire Started: July 22, 2022

J. Date Fire Contained: 98% (as of 8/16/2022)

K. Suppression Cost: \$89.8 million (as of 8/19/2022)

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

USFS Land		Repair Status			
Item:	Unit	Amount Identified	Amount Repaired	No Repair Needed	Remaining
Completed Dozer Line	Miles	56.75	41.21	0.50	15.04
Completed Hand Line	Miles	8.17	0.78	0.58	6.81
Completed Mixed Construction Line	Miles	1.27	0.90		0.36
Access or Improved Road as Line	Miles	21.28	15.15	0.85	5.28
Retardant Drop	Miles	13.10	0.00	12.41	0.69
Dozer Push	Count	21	2	1	18
Drop Point	Count	6	1	2	3
Helispot	Count	3	0		3
Retardant in Avoidance Area	Count	32	0	4	28
Staging Area	Count	3	0		3

Non-USFS Land		Repair Status			
Item:	Unit	Amount Identified	Amount Repaired	No Repair Needed	Remaining
Completed Dozer Line	Miles	50.15	45.69		4.46
Completed Hand Line	Miles	4.21	0.91	0.09	3.21
Completed Mixed Construction Line	Miles	0.28	0.00		0.28
Access or Improved Road/Road as	Miles	12.54	6.46	0.35	5.73
Retardant Drop	Miles	10.34	0.00	10.22	0.12
Dozer Push	Count	9	6		3
Drop Point	Count	15	0	3	12
Mobile Retardant Base	Count	1	1		0
Staging Area	Count	2	0		2

M. Watershed Numbers:

Table 1: Acres Burned by Watershed Across all Land Ownerships

HUC 12#	Watershed Name	Total Acres	Acres Burned	% of Watershed Burned
180400080502	Bear Creek	14,465	3,768	26
180400080205	Devil Gulch	18,343	4,291	23
180400080206	Lower South Fork Merced River	32,078	0.08	trace
180400010502	Middle Fork Chowchilla River	10,800	0.51	trace
180400080501	Ned Gulch-Merced River	19,404	1,347	7
180400010501	West Fork Chowchilla River	36,024	8,677	24

N. Total Acres Burned:

Ownership	Acres	Percent
NFS	9,204	47
Private	10,221	53
BLM	55	<1
Total	*19,480	100

O. Vegetation Types:

*Total size of fire is higher than that reported by the Incident because the BAER analysis perimeter included several unburned islands (totaling approx. 220 acres) within the interior of the fire.

California Wildlife

Habitat Relationships

(CWHR) types (<https://wildlife.ca.gov/Data/CWHR>)

Vegetation Type (CWHR)	Soil Burn Severity									
	USFS Land					BLM and Private Land				
	High	Mod	Low	Unburned	Total FS Acres	High	Mod	Low	Unburned	Total Non-FS Acres
Annual Grassland		4	13	8	25	3	148	282	95	527
Barren		3	1		3	1	5	6	2	15
Blue Oak Woodland						16	240	539	175	970
Blue Oak-Foothill Pine	7	13	5	0	25	66	29	11	1	107
Chamise-Redshank Chaparral	48	86	55	22	211	17	56	59	13	145
Cropland							1	3	2	5
Closed-Cone Pine-Cypress	5	4			9					
Lacustrine						1	5	16	9	30
Mixed Chaparral	72	170	86	25	353	10	114	102	22	247
Montane Chaparral	12	36	14	8	70					
Montane Hardwood	614	1,176	693	295	2,778	708	1,541	1,402	291	3,942
Montane Hardwood-Conifer	634	1,167	327	99	2,228	476	1,078	538	100	2,192
Montane Riparian						12		7		19
Perennial Grassland								2	3	5
Ponderosa Pine	816	1,559	497	81	2,953	323	814	311	69	1,516
Sierran Mixed Conifer	116	345	67	9	537	49	85	10	6	150
Valley Oak Woodland						9	58	136	40	242
Vineyard							18	34	7	59
Wet Meadow	1	6	5	1	12		29	59	15	103
USFS Land Total:	2,324	4,570	1,763	547	9,204	1,679	4,230	3,516	850	10,276

All Land Ownerships:		Soil Burn Severity							
Vegetation Type (CWHR)	Acres Burned	High		Moderate		Low		Unburned	
		Ac	%	Ac	%	Ac	%	Ac	%
USFS Land Total:	9,204	2,324	25	4,570	50	1,763	19	547	6
BLM/Private Land Total:	10,276	1,679	16	4,230	41	3,516	34	850	8
Grand Total:	19,480	4,003	21	8,800	45	5,279	27	1,397	7

P. Dominant Soils:

Soils in the Oak fire area are derived from granitic and varied metasedimentary parent materials. Throughout the fire, the highest ridges and stable upper slopes hold residual Holland (granitic) or Neuns (slate) soils that have fine textures and low surface rock contents. Mid slope positions have the widest variety of soil types, depending on geomorphic position and parent material. Nedsgulch (deep) and Wallyhill (moderately deep) soils are found on colluvial deposits below metasedimentary rocks, and Musick soils occur on colluvial slopes below granitic rocks. Near slope bottoms, Stump Springs is found on gentle granitic terrain, and there are broad valleys on the West and southern sides of the fire with 'loamy alluvial land'.

The most common soil Map units are:

Map Unit	Soil Types	Acres	% Fire Area
142	Holland-Neuns families association, 15 to 45% slopes	3,579.8	18%
136	Holland family, 5 to 35% slopes	3,149.9	16%
8173	Nedsgulch-Wallyhill-Arpatutu complex, 30 to 60% slopes	2,305.8	12%
172	Ultic Haploxeralfs-Dystric Lithic Xerochrepts complex, 15 to 50% slopes	1,761.5	9%
Mff2	Musick rocky sandy loam, 15 to 50 percent slopes, eroded	1,437.5	7%

Q. Geologic Types:

The Oak Fire occurred on the west slope of the Central Sierra Nevada Mountain range. The physiography of the burned area is dominated generally by gentle to moderate slopes (0-40%) with some steeper slopes of 40+ percent. Relatively very small areas of the fire occupy very steep slopes of 60+ percent, with an exception in the northwest area of the fire, corresponding to the slopes above Skelton and Owl Creeks.

This region is characterized by dissected ridge lines and drainages. The major (HUC 14) drainages in the fire area include: Skelton Creek, Plumber Creek, and Sweetwater Creek; all flowing north into the Merced River. Snow Creek and Jones Creek both flow south into the West Fork Chowchilla River, that eventually ends up in Eastman Lake. Elevations in the burned area range from about 2,500 feet above sea level (Where Snow Creek flows out of the burn area) to 4,615 feet above sea level at Sweetwater Point.

Slope instability features such as recent pre-fire debris slides, rock-falls and surface erosion features are for the most case absent in the burned area, a fact which is related to the nature/properties of the geological units and parent materials in the burn area, in addition to the orientation of bedding plane strike and dip with respect to slopes. In the burn area, for the most part, fluvial erosion processes have shaped the gentler valleys and ridges, forming a relatively smooth landscape, devoid of instability features.

Bedrock within the boundaries of the Oak Fire consists of four primary geological units: Rhyolitic dikes unit - rhyolite (Trh); Bass Lake Tonalite pluton - tonalite (Kbl); Sullivan Creek phyllites terrane, Briceburg formation - phyllite (JTrsb); and Sullivan Creek metavolcanics terrane, Bullion Mountain formation – greenstone (JTrsbm). Three other geological units that are exposed in limited areas in the burn area include: An unnamed pluton - diorite (KJdg); Calaveras terrane, Hite Cove unit – limestone (Trhls); and Calaveras terrane - argillite (cmp).

R. Miles of Stream Channels by Order or Class:

USFS Land	Miles of Stream by Soil Burn Severity				
Stream Type:	Total	High	Moderate	Low	Unburned
Ephemeral	101.43	33.90	48.87	14.27	4.39
Intermittent	25.29	6.70	11.62	5.13	1.84
Perennial	10.60	2.17	3.80	2.64	1.98
USFS Total:	137.32	42.77	64.29	22.04	8.21

Non-USFS Land	Miles of Stream by Soil Burn Severity				
Stream Type:	Total	High	Moderate	Low	Unburned
Ephemeral	75.63	14.25	30.80	25.09	5.50
Intermittent	16.53	2.32	6.60	5.62	1.99
Perennial	9.07	1.90	3.27	2.91	0.99
Non-Forest Total:	101.23	18.48	40.66	33.61	8.48
Grand Total:	238.55	61.25	104.95	55.66	16.69

S. Transportation System:

Trails: National Forest (miles):

Trails	Miles
ATV	1.23
Motorcycle	0.65
Non-Motorized	2.43
Grand Total	4.31

Roads: National Forest (miles):

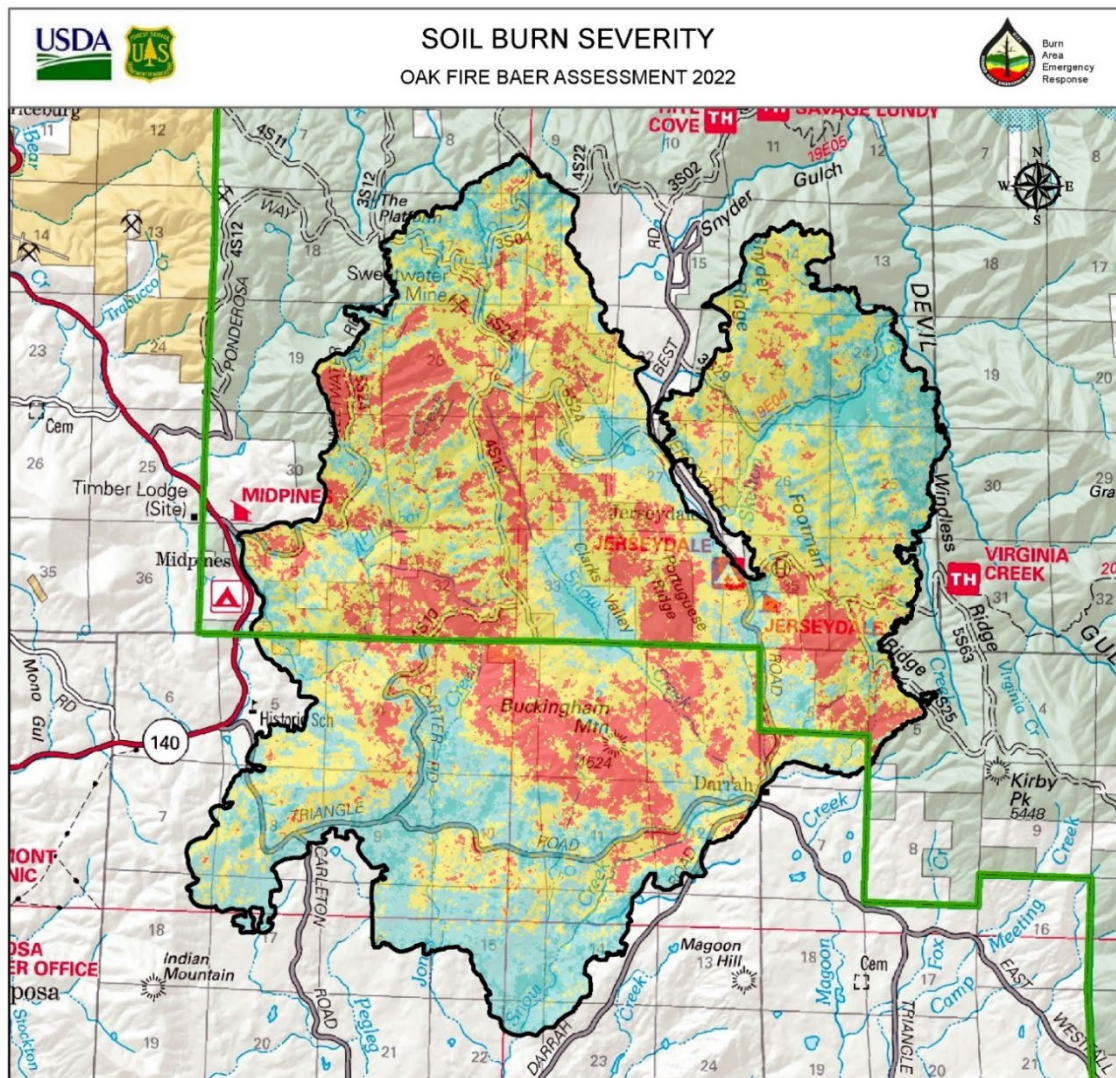
Roads	Miles
Forest Service	45.57
County	13.73
Private	3.15
Grand Total	62.45

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

A. Burn Severity (acres):

The burn boundary used in the BAER analysis (19,480 ac.) is approximately 220 acres greater than that mapped by the incident management team (19,260 ac.). The burn boundary BAER uses is created during the process of BARC creation. Because the BAER boundary is created using the same satellite imagery as the BARC, it includes very low burn signatures perhaps not identified by incident mappers. Lastly, the BAER boundary tends to include excluded unburned islands and smooths out deeply convoluted boundaries. Regardless, the intention of the BAER analysis boundary is for watershed analysis, not for public acreage reporting. It is important that we include all burned areas.

Soil Burn Severity	NFS	BLM	Private	Total	Percent
Unburned	547	2	849	4,003	7
Low	1,763	13	3,503	8,800	27
Moderate	4,570	17	4,213	5,279	45
High	2,324	23	1,656	1,397	21
Total	9,204	55	10,221	19,480	100



Oak Fire Soil Burn Severity :				Acres of Soil Burn Severity by Land Ownership		
Soil Burn Severity	%	Total Acres (Approx.)	USDA Forest Service	Bureau of Land Management	Private	
High	21	4,003.41	2,324.07	23.46	1,655.88	
Moderate	45	8,800.17	4,569.92	17.05	4,213.19	
Low	27	5,279.29	1,763.29	12.50	3,503.50	
Unburned	7	1,397.42	546.97	1.83	848.62	
Grand Total	100	*19,480.29	9,204.26	54.84	10,221.20	

*Total size of fire is different than that reported by the Incident because the BAER assessment perimeter includes several unburned islands (totaling approx. 240 acres) within the perimeter of the fire.

Bass Lake Ranger District, Sierra National Forest, Region 5

C. Water-Repellent Soil (acres): 7,407 acres (38% of the entire fire)

Water repellent soil was somewhat common in the Oak fire, but its distribution was highly variable. In high soil burn severity, it was present at all sampled locations, but the strength varied from weak to very strong. In moderate burn severity, water repellency was present at 2/3 of sampled locations, but was rarely strong or very thick. Generally, the hydrophobic layer was close to the surface in moderate and low (rarely found) burn severity, but in high burn severity it was often thick, and found deep in the profile, between 3 and 6 cm below the soil surface.

D. Soil Erosion Hazard Rating:

Hazard Ratings	Acres	Percent
High	399	2
Moderate	8,669	45
Low	6,866	35
Not Rated (Rock Outcrop/insufficient data)	3,547	18

E. Erosion Potential:

The Erosion Risk Management Tool (ERMiT) was used to model erosion and sediment potential within the entire fire perimeter. This model is a storm-based erosion potential model and 2-year (50 percent probability) and 5-year (20 percent probability) runoff events were modeled. Pre fire erosion rates average less than 2 tons/acre across the fire area, but a few very steep hillslopes above Devil Gulch exceed 10 tons/acre pre-fire. The post-fire erosion rates predicted for a 2-year storm event ranged from 1 to 43 tons per acre, and in a 5-year runoff event, erosion rates range from 1 to 90 tons/acre. Rates for 3 storm size events are compared pre and post fire in the BAER hydrology report. These rates and ranges are typical given the varied terrain and burn conditions within the Oak fire. Most of the soils are not naturally highly erosive, but on steeper terrain where ground cover is lost, substantially elevated erosion rates are expected. Predicted erosion rates are highest on the southwest-facing slopes below Buckingham Mountain, and above Devil Gulch and Skelton Creek in the NE corner of the fire.

Hillslope Erosion Potential, averaged fire-wide

	2-year Runoff Event (tons/acre)	5-year Runoff Event (tons/acre)	10-year Runoff Event (tons/acre)
Burned (Post-fire)	7.7	16.3	22.2

G. Sediment Potential: 3,962 (cubic yards / square mile) Total Sediment Tons: 172,278 (2-year runoff event).

H. Estimated Vegetative Recovery Period (years): 1-5 years (5 years in high SBS forested sites means that vegetation is covering soil adequately, not that forested types have reached their former condition).

I. Estimated Hydrologic Response:

Watershed Response: Hydrologic modeling for post-fire discharge was completed for burned watersheds for design storms of 2-, 5-, 10-, 25-, 50-, 100- and 200-year peak flows (see hydrology report). Because increased watershed response conditions tend to occur during the first five years post-fire, the 2-year (Q2) and 5-year (Q5) peak flow events are of particular concern. Based on results of hydrologic modeling, the watersheds predicted to have the highest post fire watershed response (up to 200 to 300 and above percent flow increases) are within the Plumbar Creek, Snow Creek and Jones Creek watersheds and tributaries (see Figure below). Post- fire runoff and sediment during storm events are likely to create impacts to Forest Road and trail infrastructure.

5.9 Interagency BAER Team

In their post-fire assessment of the Pines Fire, the Interagency Burned Area Emergency Response (BAER) Team (2002) describes their method for determining the bulked discharge.

The bulked discharge, Q_B , is defined as:

$$Q_B = Q_{pre-fire} + Q_{pre-fire}(\%HighBurn*0.7 + \%ModerateBurn*0.5 + \%LowBurn*0.2) \quad (5.8)$$

where $Q_{pre-fire}$ is the peak discharge before the burn, %HighBurn is the percentage of the watershed with high soil burn severity, %ModerateBurn is the percentage of the watershed with moderate soil burn severity, and %LowBurn is the percentage of the watershed with low soil burn severity, all entered as fractions in the equation above (e.g, 0.25 instead of 25%). Note: These three soil burn severity percentages may not necessarily add up to 1 (or 100%) because a portion of the watershed may have been left unburned. Conversion of Equation 6.8 to a bulking factor yields:

$$BF = 1 + \%HighBurn*0.7 + \%ModerateBurn*0.5 + \%LowBurn*0.2 \quad (5.9)$$

Water Quality: Surface water flows within primary streams of the fire area tend to be seasonal in nature that are active in the winter and spring rain season and have sustained flows and typically become intermittent in the dry summer season or can go sub-surface. Some of the streams have all year intermittent flow and during years of above average precipitation are more sustained. Small reservoirs on private lands will have greater water quality impacts as they retain sediment and ash. Post-fire during storm events it is expected that streams will receive high amounts of runoff driven sediment, ash, and burned materials that will impair water quality. Between runoff events, these conditions will lessen and over time as initial loads of sediment and ash move off the fire area. The burned watershed

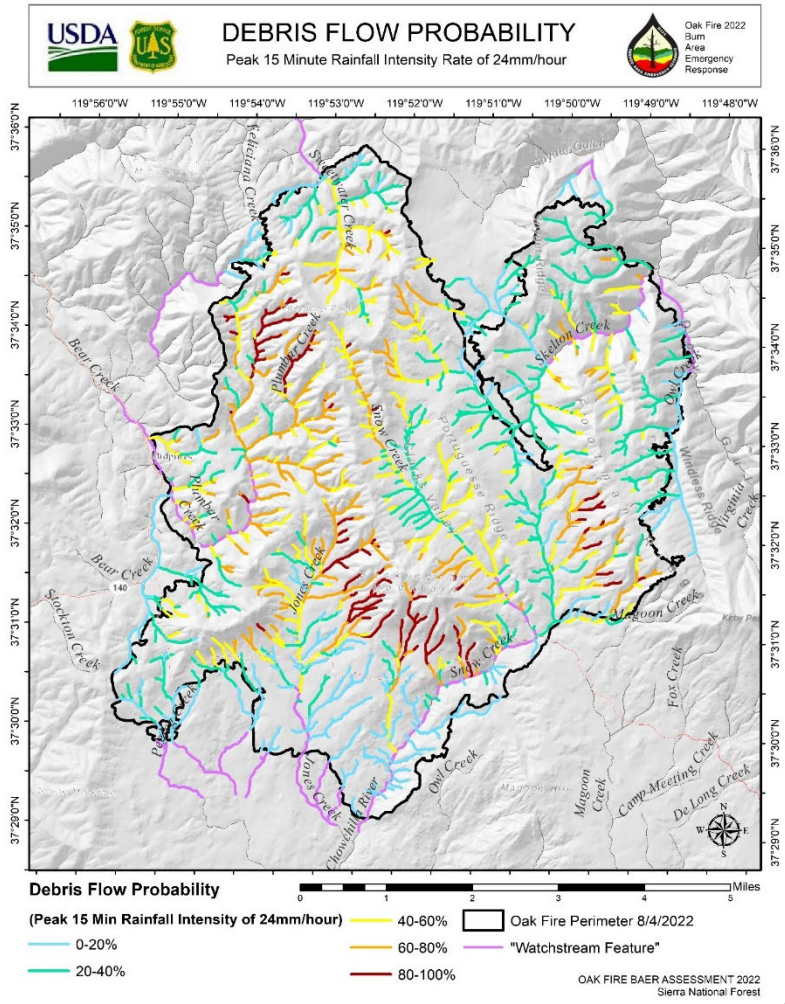
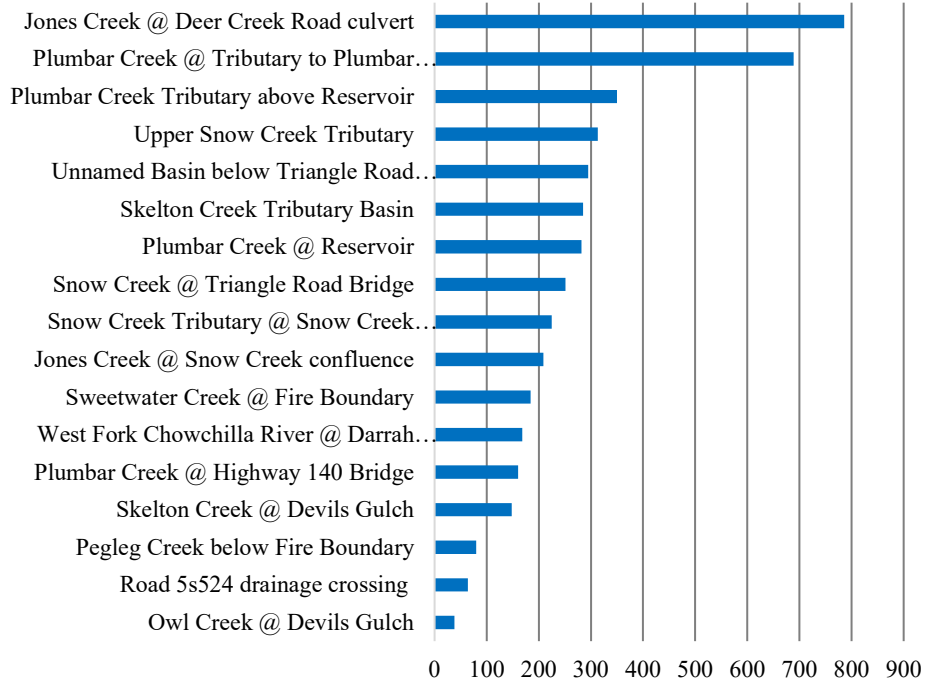
channels have existing amounts of stored sediment and debris that will likely mobilize downstream. Episodic events of high sediment and turbidity will likely occur to streams in the fire area particularly from the first large runoff events. Surface water within the fire area is not diverted for domestic use from Forest lands. The burned watersheds are connected to municipal water sources further downstream. It is likely water quality impacts will diminish before reaching these sources through attenuation of sediment but could still impact water quality.

Debris Flow Potential:

Based on USGS debris flow modeling it appears that under conditions of a peak 15-minute rainfall intensity storm of 24 millimeters per hour (0.95 inches/hour), quite a few channels in the burn area present high probabilities (60-80% and 80-100%) of initiation of debris flows. This rainfall event could happen in any given year. The majority of these channels are located at the headwaters of Plumber Creek, Jones Creek, channels flowing to the south and west of Buckingham Mountain, and some channels flowing west of Footman Ridge. Based on the model, debris flows are likely in many of the drainages above Triangle Road south of Buckingham Mountain. Most of the assessed burn area requires rainfall rates less than 32 mm/h to exceed a 50% likelihood of debris-flow occurrence. High hazard areas require modest rainfall rates between 16 and 28 mm/h to exceed a 50% likelihood of debris flow occurrence.

Based on ground surveys and a flight recon, it is our opinion that even though the USGS debris flow model predicts a relatively high response of the burn landscape to initiations of post-fire debris flows, the widespread lack of surface rocky materials associated with the parent material / geological units in the burn area present limited conditions for true destructive post-fire debris flow events. Rather than post-fire debris flows, it is our view that the majority of the area impacted by the Oak Fire has high potential to initiate hyper-concentrated flows, sediment-laden flows and other flooding events. These types of flooding events can be extremely hazardous to life and safety and in addition can cause substantial damage to roads, trails, and other

Post-fire 2-Year Peak Flow Percent Increase



Critical Values, but lack the extreme destructive nature of post-fire debris flows. These conditions leading potentially to the geological hazards described above will stay in effect until vegetation in the burned watersheds re-establishes itself, which depending on rain conditions, could take 2-5 years after the fire.

PART V - SUMMARY OF ANALYSIS

Introduction/Background

The Oak Fire started on July 22, 2022 in Mariposa County. The fire threatened the communities of Midpines, Mariposa, Triangle Road, Darrah, and Jerseydale. Approximately 107 single residences were lost and an additional 6 structures damaged. In addition, 66 outbuilding were lost and an additional 6 outbuilding were damaged. As of the report date, the fire is 98% contained at approximately 19,480 acres (see Part III, Soil Burn Severity, for an explanation of why this differs from the ICT’s figure of 19,260). A BAER assessment team began field reconnaissance of the burned area on August 8th to begin soil burn severity mapping, hydrologic response, and to identify geologic 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.

Note: Burn severity referred to throughout the following sections means Soil Burn Severity.

1. Human Life and Safety:

- *Forest Visitors Safety:*

The BAER team identified potential threats to Forest visitors/workers/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, that are at risk of elevated flooding and debris flows, 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-stream 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 **major**, as a tree 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*).

BAER recommends that human health and safety concerns on adjacent lands managed by the BLM or private entities as well as roads managed by the State of California or Mariposa County also be evaluated for risk from flooding and debris flows, hazard trees.

- *Jerseydale Campground:*

The Jerseydale campground is within the burn area. There is a human health and safety risk to visitors in the campground due to evaluated potential for flooding, nonconsolidated flows, and hazard trees. The probability of damage or loss is **possible** for campground visitors because increased post-fire runoff from areas of moderate and high SBS could restrict egress and could cover the campground.

- The magnitude of consequences is **major**, as loss of life is possible. The campground is going through major renovations with all newly installed infrastructure, including water system, bear boxes, picnic tables and fire rings, contributing to a substantial recent investment. This upgrade is expected to yield frequent use by the camping public. The resulting risk is **High**.
- BAER funds are requested to treat these risks (*Treatments PS-1*).
- *Hazardous Trees along trailheads and sites where stabilization measures will be performed.*
Fire weakened trees near trailheads and in areas where trail treatments are expected to be conducted pose a serious threat to people parking at the trailhead, and for staff performing stabilization measures. The probability of damage or loss is **possible** for these sites because risk increased as post-fire moderate and high SBS compromised trees, resulting in more than normally unpredictable timing of trees falling. The magnitude of consequences is **major**. Actualization of this threat could lead to loss of life or injury. The resulting risk is **High**.
 - BAER funds are requested to treat these risks (*Treatments PS-3*).
 - *Hazardous Materials.*
The “bone yard” at the Jerseydale work center is situated at the base of a hillslope with moderate and high soil burn severity. There is an ephemeral drainage that flows into the bone yard from the hillslope. Likewise, outbuildings near the Forest boundary at the Early mine were consumed during the fire. Uncontrolled hazardous materials and ash/soil/debris contaminated with hazardous materials exist at both these sites. There is a human health and safety risk to 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 probability of damage or loss is **possible** for both sites because increased post-fire runoff from areas of moderate and high SBS could mobilize hazardous materials. The magnitude of consequences is **major**. Impacts to this threat could lead to loss of life or injury. 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 is **High**.
 - BAER funds are requested to treat these risks (*Treatments PS-4*).
 - *Abandoned Miles Lands*
Six Abandoned Mines Lands (AML) were identified in near the Sweetwater and Early mines, where adit or pit closures or barriers were modified or destroyed by the fire and post-fire vegetation conditions enhance public visitation and pose a significant threat as unstable conditions enhance vulnerabilities to people falling in open adits. An unsuspecting visitor or curious staff member who approaches a mine opening in this condition, particularly a shaft, could be caught in an “hourglass” collapse of the unconsolidated surface material. The probability of damage or loss is **possible** as forest visitors may encounter open abandoned mines, adits, and pits. These areas are highly unstable and accidental falls into these structures are common. The magnitude of consequences is **major**. Impacts to this threat could lead to loss of life, entrapment in an adit or severe injury. The resulting risk is **High**.
 - BAER funds are requested to treat these risks (*Treatments PS-5*).

2. Property:

- *NFS Roads in burn area*
Of the approximately 45.6 miles of NFS roads in the burn area, there is a threat to the NFS road prisms from increased runoff, erosion, and debris flows across approximately 29 miles of roads. 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. 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 downslope from areas burned

at moderate and high severity. The magnitude of consequences is **major**. 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. Further, Forest Service roads are used as alternative egress routes if the Jerseydale road is compromised. The resulting risk is **very high**.

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

BAER recommends that roads on adjacent lands managed by Mariposa County or private, also be evaluated for risk from flooding and debris flows, and hazard trees.

- *NFS Trails*

There is a threat to approximately 2.43 miles of non-motorized trail and 1.88 miles of motorized Trail in the burn area (Skelton Creek hiking trail 19E04, Footman Loop Motorcycle trail 19E367, and Windlass Ridge OHV trail 50" 19E224. Moderate and high SBS occurred on 0.69 miles of the Skelton Creek trail, 0.57 along the Footman Loop Motorcycle trail, and 0.73 miles along the Windlass Ridge OHV trail, placing these systems at risk of post-fire erosional processes. The probability of damage or loss is **very likely**, because modeled increases of post-fire runoff from areas of moderate and high SBS could damage trail prisms. The magnitude of consequences is **moderate**. The trail system is maintained on a yearly basis, contributing to a substantial investment. Increased runoff could lead to erosion of the trail prism. The resulting risk is **very high**.

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

- *Jerseydale Campground*

The Jerseydale campground received moderate and high soil burn severity. The campground received major renovations with all newly installed infrastructure, including water system, bear boxes, picnic tables and fire devices, contributing to a substantial recent investment. The probability of damage or loss is **likely** for the campground infrastructure because fire weakened trees are located in the campground above this new infrastructure, and may fall in whole or branches, damaging the infrastructure. The magnitude of consequences is **moderate**, as tree strikes could result in the destruction of infrastructure, requiring replacement. Facilities replacement could exceed \$20,000. The resulting risk is **High**.

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

3. Natural Resources:

- *Recovery of Native Vegetation - Fire Suppression-Related*

The spread and introduction of invasive and noxious weeds within approximately 472 acres disturbed by suppression impacts (dozer lines, hand lines, drop points, staging areas, dozer pushes, helispots, etc.) poses a threat to the recovery of native vegetation. The probability of damage or loss is **very likely**, because existing infestations of invasive weeds were spread along some dozer lines and likely within or from other suppression features. It is very likely that new infestations and/or new invasive weed species were introduced because there was little to no equipment or vehicle washing done prior to deployment to firelines. No records of inspection for cleanliness are available in the READ report or elsewhere, thus it is assumed that any piece of equipment or any engine or vehicle may have introduced seeds or plant parts of harmful weeds. The magnitude of consequences is **moderate**. Spread and introduction of invasive weeds along repeatedly disturbed dozer lines without prompt detection and control brings a high risk that recovery of native vegetation will be prevented or impeded within dozer lines proper and on steep, vulnerable slopes adjacent to them. Some dozer lines have been re-disturbed within a relatively short timeframe (2013 Carstens, 2018 Ferguson, 2019 Briceburg incidents) - this reduces the time needed for plant recovery between major soil disturbance events and repeatedly opens up bare soil that invasive weeds colonize at the expense of native plants. The resulting risk is **very high**.

- BAER funds are requested to treat these risks (*Treatments LD-1, LD-2*).

- *Recovery of Native Vegetation – BAER/Watershed*
 There is a threat of spread of weeds due to fire especially in high and moderate soil burn severity areas near known infestations and adjacent to the transportation system within the burned area. Approximately 75% (6,894 acres) of the SBS for the Oak fire was moderate and high. This high percentage opens an unprecedented amount of suitable areas for invasive plant incursion. The probability of damage or loss is considered **likely**. Invasive weed seeds were deposited along roads and will spread via wind, wildlife, and water into un-infested native vegetation. The species of greatest concern are yellow starthistle, which is abundant along county roads in the vicinity of the fire; French broom, which has been spreading quickly on and east of Sweetwater ridge and along road 5S24 due east of Sweetwater Point. The magnitude of consequences is **moderate**, because spread and establishment of invasive weeds could have long term negative effects on re-establishment of native vegetation that protects the steep slopes within the Oak Fire. Forest Service direction seeks to minimize the establishment of non-native invasive species to prevent unacceptable habitat degradation of burned areas, while allowing for the recovery of the native plant community. The resulting risk is **high**.
 - BAER funds are requested to treat these risks (*Treatments LD-3*).

- *Natural Resources Soil and Water*
 There is a threat of impacts to water quality from NFS lands, 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. In a 5-year storm event, there is potential for widespread erosion rates exceeding 15 tons/acre. Very little of the moderate burn severity has potential for needlecast, leaving 66% of the fire area without effective ground cover. Erosion and sedimentation will occur with smaller storm events (such as the 2 year), but widespread damage to soil from erosion is mostly possible in larger storms (~20% chance). Thus, the probability of damage or loss is considered **possible** for soil productivity and **likely** for water quality, as erosion and transport of sediment, ash, and nutrients are expected to occur. The magnitude of consequences is **minor** (for water quality) and **moderate** (for soil productivity), as topsoil loss and loss of soil productivity affects ecosystem function. Areas that burned at high and moderate severity, especially on steep slopes and in the Carstens and Ferguson reburns could see a long-term loss of soil productivity and infiltration rates (due to surface structure damage). Altered water quality should be short-term, and prevalent primarily during storm events. The resulting risk is **intermediate** for soil productivity and **low** for water quality.
 - BAER funds are NOT requested to treat these risks. Natural Recovery is recommended.

BAER recommends the private landowners and the county evaluate water quality issues where surface water is used for agriculture or other purposes.

- *Threatened and Endangered Species, Southern Sierra Nevada Distinct Population Segment of Fisher (SSN DPS Fisher)*
 There are 1,692 acres of reproductive habitat for SSN DPS Fisher and 177 acres of occupied denning habitat that are within the Oak Fire footprint. The acreage overlaps for these two elements completely. The probability of damage or loss from erosion events to SSN DPS fisher are **unlikely**, due to their high mobility and, therefore, a greater chance of them escaping discrete hazards. There are no known hazmat concerns located upstream of fisher denning habitat within the Oak Fire. The magnitude of consequences is **major**, since the fisher is a federally endangered species. The overall risk to fisher is **intermediate** because fishers tend to den higher up in trees and erosion would have little effect on den trees unless catastrophic in scale. Likewise, there is a low risk of catastrophic erosion within the area of fisher den habitat clusters where the Oak Fire burned at moderate to low intensity.
 - BAER funds are NOT requested to treat these risks. Natural Recovery is recommended.

- *Threatened and Endangered Species, Proposed Critical Habitat, SSN DPS Fisher*
The probability of damage or loss from erosion events to SSN DPS fisher Proposed Critical Habitat is **possible**. Debris flow modeling indicates moderate flow capability in a sizeable portion of the PCH with the Skelton Creek drainage being a basin to watch. The PCH burned at moderate intensity four years ago within the Ferguson Fire (2018). 1,115/1,156 acres of PCH burned again at a moderate to high intensity with the Oak Fire. The area has not had time to recover habitat sufficiently to create much, if any, possible denning structure for fisher within this proposed critical habitat. The magnitude of consequences is **minor** for this area, even though it is proposed critical habitat for a federally endangered species. The resulting risk is **low** even though there is moderate debris flow capability within proposed critical habitat. The hazmat contamination of waterways is not predicted for the proposed critical habitat
 - BAER funds are NOT requested to treat these risks. Natural Recovery is recommended.

BAER recommends habitat monitoring, and suppression repair/rehabilitation for roads, trails, and dozer lines within PCH and reproductive fisher habitat elements in the Oak Fire perimeter. Proposed treatments of areas, roads, and trails as well as seasonal/intermittent closures and enforcement patrols would help with recovery of suitable habitat for Threatened, Endangered, and Sensitive animals by reducing the compounding and cumulative effects of OHV incursions, non-native species spread/introductions, and reducing human disturbance during the period where animals are stressed and vulnerable due to lack of cover and forage.

4. Cultural and Heritage Resources:

- *Unauthorized artifact collection.* There is a threat of increased runoff, debris flows, and erosion/sedimentation in moderate to high soil burn severity. In addition, hazard trees may fall onto sensitive features; and other BAER treatments could impact site NRHP (National Register of Historic Places) eligibility and there is potential for increased looting due to increased visibility. The probability of damage or loss is **possible**. Sites in the footprint are not readily visible, so they are less vulnerable to metal detectorists and artifact collectors. However, there is a slight chance of damage due to BAER treatments from other specialties, specifically Roads. The magnitude of consequences is **minor**, providing the implementation of roads rehabilitation has an archaeological monitor present and/or archaeological clearance from the local specialist. Road work could also impact NRHP eligibility for unevaluated sites. Working with local District Archaeologist will mitigate this effect. The resulting risk is **low**.
 - BAER funds for Archaeological monitor of key areas addressed under AML (Abandoned Mines Lands), Roads, Trails, and Campground treatments to treat these risks. Natural Recovery is recommended.

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, felling of hazard trees in work areas, improving road and trail drainage and stream crossings, and communicate hazard of flooding, and debris flows. Communicate to cooperating agencies and community groups.
- Protect Forest Service employees and the public from exposure to hazardous material contamination created or exposed by the fire and minimize environmental impacts to downstream surface water which may require emergency stabilization treatment measures.
- Mitigate and protect, to the extent possible, threats to personal injury or human life of forest visitors and Forest Service employees of open AML adits and pits, by preventing direct access to AMLs, and by communicating hazards of falling and entrapment.

- Protect or minimize damage to NFS investments in roads and trail infrastructure by installing drainage features capable of withstanding potential increased stream flows and/or debris flows. Minimize damage to key NFS travel routes.
- Protect or mitigate potential post-fire impacts or from stabilization practices to critical cultural resources within the burned area.
- Treat invasive plants that are a threat to native vegetation recovery by minimizing the expansion of existing populations in the burned area and controlling expected invasion of invasive/noxious weeds within and adjacent to areas where soils and vegetation were 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 n/a % Channel na % Roads/Trails 90 % Protection/Safety 100 %

*EDRR treatments would be conducted in the spring/summer 2023.

D. Probability of Treatment Success

Probability of Treatment Success

	1 year after treatment	3 years after treatment	5 years after treatment
Land	80	50	35
Channel	N/A	N/A	N/A
Roads/Trails	75	90	100
Protection/Safety	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 29 miles of road is approximately \$1,533,782. Accounting for a 25% loss, the benefit of stabilization practices provides at least a 11 benefit/cost ratio. This does not include the lost value to project management, fire suppression, and recreation.

Likewise, there has been substantial investment into the trail network damaged by the Fire. The Forest maintains the trail network and the recreation economy is a big driver for Mariposa County. The cost of not fixing the proposed 2 miles of trail is \$60,000. Including 20% reduction in probability of loss, the stabilization efforts represent at least 11.9 benefit/cost ratio.

Infrastructure at the would be protected camp sites in Jerseydale Campground with the stabilization efforts. The new infrastructure cost over \$20,000. Including 20% reduction in probability of loss, the stabilization efforts represent at least 14.2 benefit/cost ratio.

Land Treatments - Native Vegetation Recovery: Treating invasive plants once they become established would exceed approximately \$910,860. As such, the benefit/cost ratio exceeds 17%, (considering loss).

F. Selected Alternative Treatments

Human Health and Safety:

“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.

Property:

RD-1 NFS Road Treatments. Stabilization treatments on 27.89 miles of road (See Appendix A for road numbers).

TR-1 NFS Trail Treatments: Non-Motorized Trail- (0.69 miles For 190E04 Skelton Creek; Motorized trail - 0.73 miles for 19E224 Windlass Ridge Trail v50, and 0.56 miles for 19E367 19E367 Footmant Loop (MC).

CG-1 Jerseydale Campground, fall hazard trees that may impact campground infrastructure

Natural Resources:

Recovery of Native Vegetation

Suppression related EDRR funding is requested for a total of 472 acres: 45 of the 57 miles of dozer line (435 acres, assuming average width of 80’) and 3 of the 8 miles of handline (4 acres assuming average width of 10’) will be surveyed and invasives promptly treated as practical. An average of 1 acre per relevant event point is assumed for 6 drop points, 3 staging areas, 3 helispots, and 11 of the 21 dozer pushes; totaling 30 acres. Up to 3 acres may be treated at Jerseydale admin site, where yellow starthistle was dozed near the helipad.

LD 1 - Suppression Related EDRR

LD 2 - Suppression Related EDRR – Jerseydale Admin Site (Helipad) Treatment

LD 3- BAER-Specific EDRR

BAER funding is requested for EDRR over 20% of the 6,894 acres of moderate and high SBS ($\pm 1,379$ acres). Treatment map indicates initial areas to focus survey attention.

Cultural and Heritage Resources:

No Cultural and Heritage Resource Protection treatments recommended

F. Skills Represented on Burned-Area Survey Team:

- | | | | | |
|--|---|---|--|---|
| <input checked="" type="checkbox"/> Soils | <input checked="" type="checkbox"/> Hydrology | <input checked="" type="checkbox"/> Engineering | <input checked="" type="checkbox"/> GIS | <input checked="" type="checkbox"/> Archaeology |
| <input checked="" type="checkbox"/> Weeds | <input checked="" type="checkbox"/> Recreation/Trails | <input type="checkbox"/> Fisheries | <input checked="" type="checkbox"/> Wildlife | |
| <input checked="" type="checkbox"/> Interagency Coordination | | | | |

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Team Members: *BAER Team Members by Skill*

Skill	Team Member Name
<i>Team Lead(s)</i>	Kendal Young Marco Rios
<i>Soils</i>	Curtis Kvamme
<i>Hydrology</i>	Casey Shannon
<i>Geology</i>	Jonathan Schwartz
<i>Engineering</i>	Pablo Gonzalez
<i>GIS</i>	Tracy Tennant
<i>Archaeology</i>	Megan Krietsch
<i>Botany/Weeds</i>	Joanna Clines
<i>Recreation</i>	Cori Hayth
<i>Wildlife</i>	Theresa Lowe
<i>Interagency Coordinating</i>	Todd Ellsworth
<i>Public Information</i>	Cathleen Thompson
<i>Abandoned Mine Lands</i>	Kellen Takenaka, Casey Shannon
<i>Hazardous Materials</i>	Casey Shannon

Treatment Narrative:

Human Health and Safety:

Entering Burn Area Warning Signs (21)

“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, including trails and campgrounds. Signs will be attached to t-posts and removed once hazards are mitigated or past. Motorized and non-motorized trails will have a short-term closure to allow for fire compromised trees to fall. Likewise, ML-1 roads would be temporarily closed with boulders until reassessed. Road 05S024 would be gated until hazardous tress can be reassessed.

Hazard Tree Removal

Remove hazard trees/logs that may fall on individuals or vehicles in the trailhead parking area and in work areas associated with erosion stabilization on the trails.

Hazardous Material Stabilization #1. Burned Structure Hazmat Stabilization Actions

The Oak Fire BAER Team surveyed two sites with burned structures that have a moderate to high potential for hazardous materials within the burned refuse and ash to move off-site and contaminate soil and streams. Sites that burned are located at Jerseydale Work Center (fire station) in areas of higher burn severity where a large storage outbuilding and assorted materials burned, and a residential building/outbuildings site located on private property (Early Mine) that is located very close to FS land boundary just downslope near a stream channel where hazardous waste can easily mobilize to FS lands and into the Snow Creek channel directly below. To ensure that hazardous materials stay onsite, these sites need to be stabilized. Stabilization consists of the installation of weed free non-plastic netting wood fiber wattles and chemical absorbent rolls on the contour downslope from the burned structures and refuse to capture and slow contaminated runoff and hazardous waste originating from the burned structures. All site work is done by hand crews. The burned structure refuse poses an elevated threat to water and soil contamination if stabilization treatments are not applied in a timely manner before runoff producing storms occur. Crews need to avoid direct contact with the burned refuse while working at sites.

Protection/Safety Treatment: Mine Shaft Hazard Abatement

Six mine shafts at two abandoned mine sites (Early Mine/Sweetwater Mine) on FS lands have been exposed due to the Oak fire burning vegetation that once covered the shaft openings. The exposed shafts need to be fenced or barricaded to protect the public from possibly falling into the shafts, which could lead to serious injury or death. Due to the proximity of these mine shafts to roads and being located at abandoned mine sites that tend to draw the interest of the public, site visits are likely. The open mine shafts will be fenced using 7 ft. long metal t-posts and

using heavy duty, 5 ft high welded hog wire fencing to be attached to the t-posts above around the perimeter of the shaft to alert the public of its presence and prevent the public from inadvertently walking or falling into the shaft. Approximately 75 linear feet of welded wire fencing will be needed for each of the sites. Two hazard warning signs will be installed on the fencing at each site to alert the public of the hazard. An archeologist has been included in the cost to be onsite during implementation to ensure that treatments do not impact any existing cultural/historic resources.

Property:Roads Treatments:

Treatments considered for the transportation system include natural recovery, storm inspection and response, road closures, road drainage structures, preparing ditches for increased runoff, culvert cleaning, and fillslope armoring. Specific treatments and road numbers are in the engineering BAER report.

Trail Treatments: Storm proof trail system in areas of high and moderate burn severity classes where slopes can concentrate runoff onto the trail prism. Storm proofing includes creating run off ditches, water bars and removing side bars where needed.

Campground Treatments: Remove hazardous trees that may fall on new campground infrastructure.

Land Treatments:

Recovery of Native Vegetation: Allow timely vegetation recovery by minimizing spread and establishment of invasive non-native plants through early detection, rapid response (EDRR): **Suppression-related:** Minimize the expansion of existing infestations associated with fire suppression and promptly detect and treat new infestations and/or species introduced by suppression activities. **BAER:** Survey and control invasives on high risk burned slopes in a sampling of moderate and high SBS areas where roads, trails, water, wind, animals, and people are most likely to spread seeds to vulnerable newly burned soil. Please see text preceding cost tables for LD-1, LD-2, and LD-3 for acres proposed for treatment.

Cultural Resource Stabilization: None

Channel Treatments: None

I. Monitoring Narrative: N/A

