

**Date of Report: 11/14/20****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 **#1 (revised – Part 1 analysis area) and # 2 (Part 2 analysis area).**
  - ☒ Updating the initial funding request based on more accurate site data or design analysis. See note below. **Interim #2 analysis is indicated in RED FONT. The additional analysis area is referred to as "Part 2" throughout this document.**

**Note:** On October 5, 2020, the Sierra National Forest submitted a preliminary 2500-8 request to allow for immediate implementation of treatments to address the emergency conditions relative to Forest Service roads and hazardous materials. The Regional Forester approved expenditure of \$427,014 on October 7<sup>th</sup>. The **(Interim #1)** request is for the additional treatments that have been identified now that the assessment is completed. Due to the fire size and the lateness of the season, the Creek Fire BAER team started the assessment early when containment was relatively low in order to not delay implementation. As such, the fire continued to expand. The **(Interim #1)** assessment is based on the fire perimeter as of September 29<sup>th</sup> when the fire was 306,659 acres.

**Interim Request #2 covers the additional 44,490 acres between September 29<sup>th</sup> and October 18<sup>th</sup> (the date of a decent BARC image; subsequent images were obscured by smoke in the fire expansion areas). The Creek Fire has expanded an additional 28,353 acres since October 18<sup>th</sup>; as of 10/31/20 @ 10 am, the acreage is 380,002.**

**Please delete previous versions of Interim #1 and Interim #2. This version contains corrections and updated information/analyses.**

**PART II - BURNED-AREA DESCRIPTION****A. Fire Name:** Creek**C. State:** CA**E. Region:** 05**G. District:** Bass Lake and High Sierra**B. Fire Number:** CA-SNF-001442**D. County:** Fresno & Madera**F. Forest:** Sierra**H. Fire Incident Job Code:** P5NJ3F20

**A. Fire Name:** Creek**B. Fire Number:** CA-SNF-001442**I. Date Fire Started:** 9/4/2020 ~ 1800**J. Date Fire Contained:** 70% on 10/31/20.  
Estimated containment = 12/15/20.**K. Suppression Cost:** 168m+**L. Fire Suppression Damages Repaired with Suppression Funds (estimates)**1. **Fireline repaired (miles):** Approximately 341 miles of dozer line constructed; 173 miles repaired. (10/30/20 Inciweb data)2. **Other (identify):** Approximately 122 miles of hand line constructed; 34 miles repaired;  
Approximately 158 miles of road as line constructed; 83 miles repaired. (10/30/20 Inciweb data)**M. Watershed Numbers**

Note: The numbers displayed in Table 1 are for the entire Creek Fire area (as of 10/18/20); watersheds were added or that had increases in acreages in the Interim #2 BAER assessment are indicated in red.

HUC #	Watershed Name	Total Acres	Acres Burned	% of Watershed Burned
180400060206	Camp Sixty One Creek-South Fork San Joaquin River	31,066	3,929	13%
180400060204	Florence Lake – South Fork San Joaquin River	32,716	9	0.03%
180400060802	Jackass Creek	21,444	17,393	81%
180400061003	Jose Creek	19,302	16,785	87%
180400060801	Junction Butte-San Joaquin River	12,356	7,148	58%
180400060803	Kaiser Creek	29,863	7,564	25%
180400061301	Kerckhoff Lake-San Joaquin River	22,586	866	4%
180300100802	Lower Big Creek	26,020	3,256	13%
180400060904	Lower Big Creek	17,826	15,425	87%
180400060702	Lower Chiquito Creek	36,605	22,357	61%
180400060904	Lower Fish Creek	37,030	16	0.04%
180400060502	Lower Granite Creek	12,029	10,779	90%
180400060404	Lower Middle Fork San Joaquin River	13,770	927	7%
180400060120	Lower Mono Creek	28,109	1,114	4%
180400060804	Mammoth Pool Reservoir-San Joaquin River	21,277	14,422	68%
180400060902	Middle Big Creek	25,356	7,292	29%
180400060403	North Fork San Joaquin River	36,530	6,512	18%
180400060903	Pitman Creek	16,212	6,327	39%
180400061001	Rock Creek-San Joaquin River	38,470	36,534	95%
180400060601	Rock Creek-South Fork San Joaquin River	28,880	5,841	20%
180400060602	Rube Creek-South Fork San Joaquin River	26,165	15,548	59%
180400061004	Saginaw Creek-San Joaquin River	22,284	18,053	81%
180400061103	South Fork Willow Creek-Willow Creek	31,011	6,084	20%
180400061002	Stevenson Creek	22,733	9,987	44%
180300100804	Sycamore Creek	24,799	8,972	36%
180300100801	Upper Big Creek	20,509	167	1%
180400060901	Upper Big Creek	26,080	538	2%
180400060701	Upper Chiquito Creek	25,882	11,961	46%
180300100501	Upper Dinkey Creek	22,859	344	2%
180300090401	Upper Dry Creek	21,196	1,192	6%
180400060501	Upper Granite Creek	28,889	5,950	21%
180300100803	Watts Creek	16,073	11	0.1%
180400061102	Whisky Creek	14,700	10,259	70%

**N. Total Acres Burned**

<b>Table 2. Total Acres Burned By Ownership*</b>			
<b>Ownership</b>	<b>Acres – Part 1</b>	<b>Acres – Part 2**</b>	<b>Acres – Creek Fire Total***</b>
NFS	283,447	44,916	328,363
Bureau of Indian Affairs	33	0	33
Cal. Dept. Fish and Wildlife	516	0	516
State Lands Commission	121	0	121
Other/Private	22,542	75	22,617
<b>Total</b>	<b>306,659</b>	<b>44,990</b>	<b>351,649</b>
<p><i>* The discrepancy in acreage from the soil burn severity data (Table 6) and the actual area, ownership acreage (shown here), was due to the raster analysis; extraction, reclassification and mosaic to new raster dataset, along with converting to vector data and addition all analysis some of the "NoData" classification was dropped. These areas in general were steep rocky terrain that had shadows.</i></p> <p><i>**Acres as of 9/28/2020.</i></p> <p><i>***Acres as of 10/18/2020.</i></p>			

**O. Vegetation Types:** Dominant vegetation communities that were burned in the fire and damaged during suppression activities include Sierran mixed conifer forest, montane hardwood or hardwood-conifer forests, montane and foothill chaparral, red fir and white fir forests, ponderosa, Jeffrey and lodgepole pine forests, oak woodlands, annual and perennial grasslands, subalpine conifer forest, riparian and wet meadow habitats.

**P. Dominant Soils:** The burned area contains extensive acreages of all major Sierra National Forest soil types at a physiographic scale. Generally, the Forest soil landscape pattern is an archetype elevation gradient of soil development from moisture-limited to temperature-limited settings, with a Goldilocks soil development sweet spot at roughly the Holocene rain-snow interface (Huntington 1954, Dahlgren et al 1997). Soil forest productivity rates are among the highest in North America from well weathered regolith that provisions winter moisture through long hot summers. Granite colluvium and residuum dominate. Lower elevations are mostly moderately thick soils on dissected drainages with long slope lengths, while higher elevations tend towards gentler basins with thin and discontinuous soil mantle. Nearly all soils have been disturbed by legacy forestry activities and truncated soils are common in the most productive elevation bands.

*Interim #2: The additional Creek Fire acreage burned in wilderness and wilderness-fringe areas of the Sierra National Forest. Soils are entirely granitic residuum and colluvium with minimal legacy disturbance except near infrastructure. Most are moderately weakly-developed, cold climate Orthents with some Alfisols on low transport slopes and in joint fracture depressions. Shallow depth to bedrock is common. The predominance of rock outcrop and highly competent bedrock strongly limits erosion source materials, though localized erosion may occur where trails, roads, or infrastructure combine with topography to concentrate energy.*

**Q. Geologic Types**

The Creek Fire area occurred within the western slopes of the central Sierra Nevada. The geology is classic Sierra Nevadan reflecting its origins as a sedimentary mountain range intruded by granitic batholiths. Subsequent erosion removed most of the metamorphosed sedimentary bedrock except for a few rock masses remaining as roof pendants. This erosion also exposed large areas of igneous intrusive (granitic) bedrock from the numerous batholithic intrusions. Later volcanic and glacial activity has overlain the granitic terrain with isolated flows and deposits of moraine.

Most of the fire area is underlain with igneous intrusive rocks consisting of granodiorite, tonalite and granite. These rocks are predominantly from the Bass Lake Tonalite, Dinkey Creek Granodiorite and Whiskey Creek Granodiorite. The Granodiorite of Dinkey Creek is a medium-grained, equigranular, strongly foliated biotite-hornblende granodiorite and tonality. Contains abundant mafic inclusions. The Granodiorite of Whiskey Ridge is a medium-grained, biotite-hornblende granodiorite. The Bass Lake Tonalite is a medium-grained, biotite-hornblende tonalite; varies to granodiorite and quartz diorite.

There are several metasedimentary rock units in the fire that are remnants of roof pendants. Several of these roof pendants are located along FR 4S81 between Fish Creek and Upper Granite Creek and have been mined for tungsten. There are two small areas of glacial till that are in the north end of the fire area in the Granite Creek drainage and around Huntington Lake and in the Rancheria Creek drainage.

## R. Miles of Stream Channels by Order or Class

Table 3. Miles Of Stream Channels By Order Or Class			
Stream Type	Miles Of Stream – Part 1	Miles Of Stream – Part 2	Miles Of Stream –Creek Fire Total (As of 10/18/20)
Perennial	226	11	237
Intermittent	673	36	709
Ephemeral	4,130	175	4,305
<b>Total</b>	<b>5,029</b>	<b>222</b>	<b>5,251</b>

## S. Transportation System

Table 4. Miles of Road and Trail by Jurisdiction			
Type	Miles – Part 1	Miles – Part 2	Miles – Creek Fire Total (As of 10/18/20)
Trails (National Forest)	254	81	335
Trails (Non-NF)	n/a	n/a	n/a
Roads (National Forest)	1,032	25.4	106
Roads (Non-NF)	107	0.3	107

## PART III - WATERSHED CONDITION

### A. Burn Severity (acres)

*Interim #2:* BARC map accuracy suffered from significant smoke interference and it is assumed that large swaths of the coverage area are poor classified or effectively unclassified. Extensive areas of recurring rock outcrop and discontinuous fuels created a mixed spectral dNBR signal and highly patchy field Soil Burn Severity (SBS) patterns. All SBS data in un-sampled areas are low confidence and should be re-scrutinized using pre-existing areal imagery. High SBS is not reasonably represented. Re-modelling of the area with clear imagery is recommended.

Table 5. Burn Severity Descriptions		
SBS	Ground Condition	SBS Map Unit Purity
Unburned	Dis/continuous litter and canopy cover, dominantly unburned	High
Low	Mostly continuous litter with abrupt, patchy burn	Moderate
Moderate	High veg burn severity stands with continuous, moderate SBS Patches of strongly contrasting low/high SBS	Very Low
High	<i>Not visited or field sampled</i>	Assumed Moderate

<b>Table 6. Burn Severity Acres by Ownership*</b>				
<b>Soil Burn Severity</b>	<b>NFS</b>	<b>Non-FS</b>	<b>Total</b>	<b>% within the Fire Perimeter</b>
<b><i>Creek Fire Interim #1 Analysis Area**</i></b>				
No Data	424	3	427	0%
Unburned/Very Low	53,807	3,702	57,509	19%
Low	67,903	5,865	73,768	24%
Moderate	129,328	10,011	139,339	45%
High	31,834	3,782	35,616	12%
<b>Total</b>	<b>283,296</b>	<b>23,363</b>	<b>306,659</b>	
<b><i>Creek Fire Interim #2 Analysis Area***</i></b>				
No Data	5	0	5	0%
Unburned/Very Low	18,612	0	18,612	42%
Low	15,714	43	15,757	35.5%
Moderate	9,838	1	9,839	22%
High	210	0	210	0.5%
<b>Total</b>	<b>44,379</b>	<b>44</b>	<b>44,423</b>	
<b><i>Creek Fire – TOTAL</i></b>				
No Data	429	3	432	0.2%
Unburned/Very Low	72,419	3,792	76,121	22%
Low	83,617	5,908	89,525	26%
Moderate	139,166	10,012	149,179	49%
High	32,044	3,782	35,826	10%
<b>Total</b>	<b>327,675</b>	<b>23,497</b>	<b>351,082</b>	
<p><i>* The discrepancy in acreage from the soil burn severity data and the actual area (ownership acreage; Table 2) was due to the raster analysis; extraction, reclassification and mosaic to new raster dataset, along with converting to vector data and addition all analysis some of the "nodata" classification was dropped. These areas in general were steep rocky terrain that had shadows.</i></p> <p><i>**acres as of 9/28/2020.</i></p> <p><i>***acres as of 10/18/2020.</i></p>				

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

Water-Repellent Soil: 174,955 + ~211 acres (Part 2 area) = 175,166 acres

## **C. Soil Erosion Hazard Rating**

Inconclusive given the scale of this incident. EHR can be expected to vary non-systematically from none to very high.

## **D. Erosion Potential**

Erosion Potential: 25.4 T/ac (n = 7 pourpoints, 731 hillslopes). This was not specifically evaluated in the Part 2 assessment, but is likely similar.

## **E. Sediment Potential**

Sediment Potential: 11.4 T/ac (n = 7 pourpoints, 731 hillslopes). This was not specifically evaluated in the Part 2 assessment, but is likely similar.

## **F. Estimated Vegetative Recovery Period (years)**

Estimated vegetative recovery: In most vegetation types, where burn severity was low or moderate, soil cover should be close to normal in 1-10 years, barring severe drought. Higher elevation sites with high soil burn severity could take longer. Recovery to full pre-fire forested condition will take decades to hundreds of years.

*Interim #2: Within the large proportion of the Creek II area at elevations above 7,000' with low SBS or unburned, 2-15 years for soil cover to reestablish where mineral soil and ash are currently present (soil*

cover is still present in large area of this analysis area); and decades to hundreds of years in moderate SBS areas where dominant trees were killed to recovery to pre-fire forested conditions.

## G. Estimated Hydrologic Response (brief description)

### 1. Estimated Erosion Response

Estimated erosion response is indeterminate given the scale of this incident. Hydrologic response can be expected to vary non-systematically from low to very high. Refer to hydrology and debris flow summaries for proxy estimates.

### 2. Watershed Response

The greatest modeled increases in post-fire runoff (>150%) related to flood risk were at pour points 7 (Billy Creek picnic area), 8 (Upper and Lower Billy Creek Campground/Idylwilde Tract), 10 (Camp Sierra Tract), 11 (Clearwater Station), 13 (Fish Creek Campground), 18 (Huckleberry Tract/Huntington Road), 24 (Snowslide Tract), 26 (Sweetwater Campground), 36 (Jose Basin), and 39 (Placer Campground). Pour points 37 (Trail 26E01) and 38 (Trail 24E01) show high relative increases in flow, and although the flood risk is considered intermediate, the erosion risk to the trails is considered very high.

It is important to note that, although the increases are high relative to normal Q2 discharge, none of the pour points modeled reached the pre-burn Q10 discharge and only 7 of 39 reached or slightly exceeded the pre-burn Q5 discharge. Stream channels measured in the vicinity of Values at Risk during field review showed that most channels were incised, and flows would be confined during >Q50 (and in many cases >Q100) flood events. As such, risks from **flooding alone** are generally considered low for a 2-year, 6-hour design storm. Debris flows, on the other hand, pose a much greater threat in areas of steep terrain and moderate to high soil burn severity (for more information on debris flow potential, see geology report).

Table 7. Hydrologic Design Factors	
A. Estimated Vegetative Recovery Period	5-15 years
B. Design Chance of Success	80 %
C. Equivalent Design Recurrence Interval	2 years
D. Design Storm Duration	6 hours
E. Design Storm Magnitude	1.66 in
F. Design Flow	11.1 cfs / mi <sup>2</sup>
G. Estimated Reduction in Infiltration	44%
H. Adjusted Design Flow	32.13 cfs / mi <sup>2</sup>

Table 8. Pre- and post-fire changes in discharge for a 2-year 6-hour storm event						
Values at Risk		Discharge by Watershed (cfs)		Discharge by Watershed (cfs/mi <sup>2</sup> )		Percent Increase Water Yield
Pour Point Watershed	Affected WS Area (mi <sup>2</sup> )	Pre- fire	Post- fire	Pre-fire	Post-fire	
Browns Meadow (PP1)	0.24	8.98	19.64	37.4	81.85	118.8
Mammoth Pool Outlet (PP2)	1,002.80	9,640	11,107	9.6	11.08	15.2
Big Creek Powerhouse #1 (PP3)	30.06	457	622.14	15.2	20.70	36.1
Big Creek Powerhouse #2 (PP4)	129.82	1,670	2,327	12.9	17.93	39.4
Big Creek Powerhouse #8 (PP5)	133.40	1,690	2,414	12.7	18.09	42.8
Bear Creek Tract and Cavatee Campground (PP6)	1.48	29.8	34.06	20.1	23.01	14.3
Billy Creek Picnic Area (PP7)	0.28	6.22	18.52	22.2	66.16	197.8
Billy Creek Upper and Lower Campground and Idylwilde Tract (PP8)	0.69	14.7	44.44	21.3	64.40	202.3
Bowler Campground (PP9)	2.11	39	45.79	18.5	21.70	17.4
Camp Sierra Tract (PP10)	3.75	54.5	140.5	14.5	37.47	157.8

Table 8. Pre- and post-fire changes in discharge for a 2-year 6-hour storm event						
Values at Risk		Discharge by Watershed (cfs)		Discharge by Watershed (cfs/mi <sup>2</sup> )		Percent Increase Water Yield
Pour Point Watershed	Affected WS Area (mi <sup>2</sup> )	Pre- fire	Post- fire	Pre-fire	Post-fire	
Clearwater Station (PP11)	0.10	2	6.47	20	64.74	223.7
Dowville Tract and Picnic Area (PP12)	0.19	4.07	9.84	21.43	51.78	141.6
Fish Creek Campground (PP13)	4.80	81.8	234.45	17.0	48.84	186.6
Gaggs Campground (PP14)	3.88	113	187.33	29.1	48.28	65.8
Granite Creek Campground (PP15)	45.04	699	834.09	15.5	18.52	19.3
Home Creek Tract and Huntington Lake Resort (PP16)	6.40	125	243.68	19.5	38.07	94.9
Huckleberry Tract, Lower Line Creek Tract, and Camp Silver Fir (PP17)	7.13	143	185.3	20.1	25.99	29.6
Huckleberry Tract and Huntington Road (PP18)	0.77	16.3	52.83	21.2	68.61	224.1
Little Jackass Campground (PP19)	4.47	84.3	184.31	18.9	41.23	118.6
Lower Chiquito Campground (PP20)	59.73	1,020	1,335.3	17.1	22.36	30.9
Olijito Org Camp (PP21)	0.17	3.94	6.22	23.2	36.56	57.8
Rock Creek Campground (PP22)	10.61	211	439.02	19.9	41.38	108.1
China Peak Ski Area (PP23)	41.36	554	560.98	13.4	13.56	1.3
Snowslide Tract (PP24)	1.11	19.9	55.63	17.9	50.12	179.6
Soda Springs Campground (PP25)	16.72	358	591.67	21.4	35.39	65.3
Sweetwater Campground (PP26)	0.85	17.6	49.31	20.7	58.01	180.2
Upper Chiquito Campground (PP27)	3.67	79.1	85.36	21.6	23.26	7.9
Upper Line Creek Tract (PP28)	1.74	37.9	43.8	21.8	25.17	15.6
Whisky Falls Campground (PP29)	2.76	63	83.39	22.8	30.21	32.4
Portuguese Creek (PP30)	3.41	68.2	110.08	20	32.28	61.4
Meadow 516M68 (PP31)	0.08	2	2.31	25	28.89	15.6
Meadow 516M74 (PP32)	0.31	7.07	10.07	22.8	32.47	42.2
Monkeyflower Meadow (PP33)	0.20	4.1	5.25	20.5	26.26	28.1
Jackass Meadow (PP34)	9.77	158	232.34	16.2	23.78	47.1
Long Meadow (PP35)	0.60	13.6	19.84	22.7	33.06	45.9
Jose Basin (PP36)	25.6	286	717.39	11.2	28.02	150.8
26E01 Trail (PP37)	1.10	17.2	54.55	15.6	49.59	217.2
24E01 Isberg Trail (PP38)	0.35	5.5	19.33	15.7	55.22	251.4
Placer Campground (PP39)	0.12	2.62	6.87	21.0	55.0	162.3
Heitz Meadow Guard Station (PP40)	0.39	7.53	17.05	19.1	43.26	126.4

The Interim #2 BAER assessment evaluated an additional nine VARs. One was modeled as Pour Point 40, and the risk was narratively described for the remaining eight sites. The evaluation found that flooding as a result of post-fire increased runoff was unlikely for all sites.

Table 9. Predicted Increases in Post-Fire Flows for Potential Values at Risk – Creek Fire Interim #2 Area	
Potential Value at Risk	Predicted Increases in Post-Fire Flows
Ward Lake Campground (VAR #1)	None. No main drainages going through campground to potentially cause flooding risk.
Sample Meadow Campground (VAR #2)	Negligible. This watershed was delineated in StreamStats and was determined to be 6,445 acres. The soil burn severity from 10/18/20 showed only 65 acres of moderate soil burn severity and 0 acres of high soil burn severity in this watershed. Increases in peak flows expected to be negligible as only 1% of watershed had moderate or high soil burn severity.
High Sierra Pack Station (VAR #3)	None. No drainages adjacent to pack station facilities to pose flooding risk.
Bear Creek Campground (VAR #4)	Negligible. This watershed was delineated in StreamStats and was determined to be 3,796 acres. Soil burn severity was not determined, as the burn above the campground occurred after the 10/18/20 BARC map. The fire perimeter from



Table 9. Predicted Increases in Post-Fire Flows for Potential Values at Risk – Creek Fire Interim #2 Area	
Potential Value at Risk	Predicted Increases in Post-Fire Flows
	10/21/20 showed 35 acres burned within this watershed. Increases in peak flows expected to be negligible as only 1% of watershed within fire perimeter.
Vermilion Campground (VAR #5)	None. No drainages adjacent to or within campground to pose flooding risk.
Vermillion Valley Resort (VAR #6)	Negligible. Drainage that runs along edge of resort is the same drainage that is adjacent to Bear Creek Campground. Increases in peak flows expected to be negligible as only approximately 1% of watershed within fire perimeter.
Mono Hot Springs Resort (VAR #7)	None. No drainages adjacent to facilities at resort to pose flooding risk.
Mono Hot Springs Campground (VAR #8)	Negligible. This watershed was delineated in StreamStats and was determined to be 163,021 acres. The soil burn severity from 10/18/20 showed only 599 acres of moderate soil burn severity and 6 acres of high soil burn severity in this watershed. Increases in peak flows expected to be negligible as only 0.4% of watershed had moderate or high soil burn severity. In addition, this is a regulated system with Florence Lake upstream. Releases from Florence Lake have larger potential to impact campground than effects of fire. No fire occurred above Florence Lake.

### 3. Geology/Geologic Response

The Creek Fire affected the broad, westward draining slopes of the Sierra Nevada within the Sierra National Forest. The eroded remnants of the ancestral Sierra Nevada shaped a broad platform in the granitic batholiths. This platform is incised by the west-flowing rivers. Within these broad uplands, exposed granitic bedrock has formed domes and other characteristic landforms. The San Joaquin River and its tributaries have incised steep, inner gorge slopes due to rejuvenated down-cutting after regional uplift began along the western and eastern boundary faults. Active debris slides and debris flows were observed on the inner gorge slopes forming the canyon walls of the San Joaquin River and the steep slopes.

**Rock Fall:** The assessment of rockfall was guided by experience to methodically and consistently evaluate this geologic hazard within the knowledge currently available on this phenomenon (Santi et al., 2013; De Graff and Gallegos, 2012). While local specialists, especially from the engineering staff, could point out areas of chronic rockfall, there was a need to determine if the effect of the fire had increased rockfall activity at these locations or other which had not previously been a problem. The assistance of Mark Schug, BAER Team GIS Specialist was invaluable in producing a map product that showed segments of forest roads that had potential for rock fall hazards. A map showed the road segments which were downslope from areas affected by moderate or higher soil burn severity on slopes inclined more than 39% (see Figure 6 in Geology Report). Field survey consisted of assessing Minarets Highway and Stump Springs road and observing the size and number of rocks which had rolled onto the road during or since the fire. This information was used to establish whether the rockfall hazard was low, moderate or high. While all the designated roads could not be traveled due to the need to avoid active fire operations, blockage by trees (or rocks) or general safety considerations, these primary travel routes were reviewed during the survey. **Within the Interim #2 assessment area, some rockfall threats were identified along Florence Lake Road.**

**Debris Flow:** Assessing the probability and volume of debris flows draws upon empirical models developed from research in southern California and the Intermountain Western United States (De Graff et al., 2007; Cannon et al., 2010; De Graff and Gallegos, 2012). The assistance of the US Geological Survey (USGS) was obtained for assessing the debris flow hazard. Their ongoing research has developed empirical models for forecasting the probability of their occurrence and the likely volume of such an event. These are tied to a storm size consistent with the type of precipitation event which may occur within the first few years after the wildfire. The BAER Team provided the geospatial information on the fire perimeter for and the soil burn severity for the Creek Fire based on the September 26, 2020 fire perimeter. USGS



conducted a debris flow assessment and provided maps and a manuscript (Staley, 2020). The results of the debris flow assessment were analyzed for values at risk within the Creek Fire Area.

The debris flow assessment for the Creek Fire identified several areas with Very High (80-100%) and High (60-80%) probability (likelihoods) of debris flows occurring throughout the fire area (see Table 2 and Figure 3). The areas of most concern are Lower Big Creek, the east and west sides of the San Joaquin River up to Camp Creek and Soda Springs Campground on the east side and west side of the fire area, respectively and Jose Basin and Mill Creek. There are 455 road channel crossings with debris flow probabilities of 60-100%. Stump Springs Road (7S05) has 26 road channel crossing and Minarets Highway (4S81) has 34 road channel crossings with high debris flow probabilities and high risk of damage from a 1.44", 15 min-2-year storm event. In addition, some recreational cabin tracts and several organizational camps were assessed for threats from geologic hazards. Three AML sites were assessed for threats to public safety.

These areas are of the most concern because critical values are at risk in these areas.

<b>Table 10. Acres of Predicted Debris flow by Probability</b>	
<b>Probability of Debris Flows</b>	<b>Acres</b>
0-20%	83568
20-40%	72871
40-60%	52083
60-80%	44610
80-100%	49655
Total	302796

The Big Creek watershed was assessed in detail because the SCE Hydropower facilities are in the lower Big Creek watershed. The values at risk in this area are Powerhouse (PH) 2 and 2A, PH 3, Mammoth Pool PH, Mammoth Pool Reservoir, Canyon Road and the Railroad Grade Road.

The east side of the San Joaquin River was assessed between Saginaw Creek to Chiquito Creek because the Minarets Highway (FR 4S81) crosses numerous channels with crossing structures that are not designed to handle debris flows. The west side of the San Joaquin River was assessed between Sheep Thief Creek and Camp Creek because Stump Springs Road (FR 7S05) crosses numerous channels with crossing structures that are not designed to handle debris flows. These road channel crossings are at a high to very high risk of getting plugged with debris flow material and resulting in failure of the road at these locations. In addition, there are numerous maintenance level 2 roads that cross channels that have intermediate to very high risk for debris flows that could cause failure of the road at these road channel crossings.

Jose Basin and Mill Creek were assessed because numerous forest roads are in these watersheds and are at risk of road channel crossings failures. These failures could increase sediment loading of the channels and damage Foothill yellow-legged frog habitat.

Recreational cabin tracts and organizational camps at Huntington Lake and organizational camps and forest service campgrounds were assessed for threats from geologic hazards. Recreational cabin tracts of unburned and burned cabin sites were assessed in the Huckleberry Tract and Line Creek Tract. Burned and unburned buildings were assessed in organizational camps at Camp Kern, Camp Olijato, and Camp Mirimichi in the Huntington Lake area. Unburned and burned buildings at the Jack Ass Rock Organizational Camp were assessed on the north end of the fire area. All the campgrounds were assessed in the Huntington Lake area. Campgrounds and recreation sites assessed in the Bass Lake Ranger District include: Windy Point, Mammoth Pool Campground, Sweetwater Campground, Placer Campground and Placer Guard Station, and Mile Vista.

See the Creek BAER Geologic Report for more detailed discussion.

No debris flow concerns were identified within the Interim #2 assessment area.

## **PART IV - SUMMARY OF ANALYSIS**

### **Introduction/Background**

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

<b>Table 11. Critical Value Matrix</b>			
<b>Probability of Damage or Loss</b>	<b>Magnitude of Consequences</b>		
	Major	Moderate	Minor
	<b>RISK</b>		
Very Likely	<b>Very High</b>	<b>Very High</b>	<b>Low</b>
Likely	<b>Very High</b>	<b>High</b>	<b>Low</b>
Possible	<b>High</b>	<b>Intermediate</b>	<b>Low</b>
Unlikely	<b>Intermediate</b>	<b>Low</b>	<b>Very Low</b>

### **Introduction/Background**

Since the beginning of the year, there have been over 8,000 wildfires that have burned an unprecedented 4 million acres in California. Since August 15, when California's fire activity elevated, there have been 27 fatalities and over 7,000 structures destroyed. During the month of August 2020, California experienced 12,000 lightning strikes resulting in 560 new fires.

As one of the major fires of 2020, the Creek Fire started on September 4, 2020 in the Big Creek drainage near Shaver Lake, California. Rapid expansion of the fire was facilitated by strong northeasterly winds and more than 150 million dead trees following a recent unparalleled bark beetle infestation. Between September 4 and September 9, the fire "blew up" and was expanding between 20,000 to 50,000 acres per day. Two massive fire whirls or "firenadoes" were also recorded on September 5. One at Huntington Lake reached wind speeds of 125 mph uprooting conifers 30 inches in diameter; the other at Mammoth Pool reached 100 mph. The fire has spread through the San Joaquin River drainage and continues to burn to the north and east. The Creek Fire has burned over the 2013 Aspen Fire and the 2014 French Fire scars and was slowed somewhat by the 2017 Lion Fire burn scar at the northeast end of the Creek Fire in the Ansel Adams Wilderness. As of this writing (10/23/20), the fire has reached approximately 350,000 acres and is about 60% contained.

Interim #2: Since the submittal of the Interim #1 on 10/23/20, the Creek Fire continued to expand, primarily in high elevation wilderness areas on the north and east edges of the fire. As of 10/30/20, the fire has reached approximately 379,571 acres and is about 70% contained. It has moved onto the Inyo National Forest and into the John Muir and Ansel Adams Wildernesses. Fire behavior has moderated to some extent at the higher elevations with shorter day burning periods and colder temperatures as well as more rock outcrop areas.

#### **1) Human Life and Safety (HLS)**

The Creek Fire BAER Team has identified a high risk to human life and safety at several locations throughout the fire based on the threat of debris flows, landslides, flooding, rockfall, hazard trees, and other causes of injury or loss of life. Hazard trees are the most common risk to life and safety. It is recognized that many BAER critical values such as roads, trails, campgrounds and other Developed Recreations sites have post-fire threats to both Life and Safety and the built assets (Property). Details are also found in the resource specialist reports that address BAER Critical Values/threats and risks.

## Roads

- *Risk Assessment for Roads-* The risk assessment for roads is tied to site-specific conditions that can affect Life and Safety.
  - *Life and Safety:* As a result of the burned watersheds and the burned slopes above the road, an emergency condition exists for road users due to the potential for debris flows, hyperconcentrated flows, rock fall, hazard trees and washouts damaging the road prism.

Potential for debris flows, flooding and hyperconcentrated flows is likely the first winter due to the burned watershed on slopes above road segments on these roads. Potential damage to roads can pose a risk to public safety. Based on Travel Management, most of Forest Service roads are open from April 15 to December 31. There are some roads that open at an early timeframe (see Forest MVUM for details). These roads are open to wheel traffic during dry conditions and to oversnow vehicles during the winter. Many of the gates and signs were damaged during the fire, making it difficult to close every road at risk to users before winter storms.

Although the first winter has the highest potential for risk to life and safety, it is recommended for the home unit to assess the roads after the first winter to determine if the roads are safe for access. Proposed treatments include BAER warning signs, information signs, and gates at main entry points to caution road users of potential debris flow and flooding in the area.

*Emergency Determination for Life/Safety - Roads:* Risk to users and is considered **Very Likely** with Major consequences on roads with High to Moderate burned severity and/or areas with over 40% debris flow risk. Risk to road users is determined to be **Very High** with Major consequences on the Forest Service Roads with High and Moderate burned severity and/or areas with over 40% debris flow risk. **The risk assessment for the Creek Interim #2 assessment area is the same as for Interim #1 assessment area.**

*Treatments for Life/Safety - Roads:* Treatments are proposed to mitigate expected life and safety risks of using roads **in both assessment areas.**

BAER treatments are proposed for all human life and safety where the risk assessment is rated as Very High, High, and Intermediate.

- *Risk Assessment for Non-Motorized Trails*  
Life and safety of trail users may be at risk in areas within the burn area. In addition, loss of trails, or sections of trail, is likely. The critical values of all trails within the Creek Fire include life, safety, and property. The risk assessment for Non-Motorized trails is tied to site-specific conditions that can affect Life and Safety.
  - *Human Life and Safety – Non-Motorized Trails:* **The risk level varies from minor to very high by trail.** As a direct consequence of the fire, the greatest risk for trail user safety is from rolling rocks, debris slides, cut/fill slope failure, and hazard trees. The loss of soil stabilizing vegetation due to the fire has resulted in loose, unsupported trail tread and slopes above and below trail segments impacting trail segments within the fire perimeter. Where this is the case the **Probability** is *likely*; **Magnitude** of Consequences; *Major*. **The Risk is Very High.**

The risk assessment for life and safety for non-motorized trails for the Interim #2 assessment area remains the same.

*Treatments for Life & Safety – Non-Motorized Trails:* Treatments to protect life and safety are recommended for both the Part 1 and Part 2 assessment areas.

- *Life and Safety – Developed Recreation Sites:* Twenty burned vault toilets pose a risk of human waste exposure to the public and environment. There is an immediate risk of hazard trees within and adjacent to recreation facilities posing a threat to Recreational facilities infrastructure and posing life and safety threat to BAER treatment implementation members and public visitors.

The risk assessments for developed recreation sites for life/safety range from very high to low depending on individual locations. Hazard trees are plentiful in much of the burned area. Where that is the case the probability of is *likely*; Magnitude of consequences is *major*. **Risk is Very High.**

*Treatments for Life & Safety – Developed Recreation Sites:* Treatments are recommended on a site-specific basis due to the applicable conditions and risks.

- *Risk Assessment for Motorized Trails*

Life and safety of trail users may be at risk in areas within the burn area. In addition, loss of trails, or sections of trail, is likely. The critical values of all motorized trails within the Creek Fire include life, safety, and property.

- *Life and Safety – Motorized Trails:* **The risk level varies from minor to very high by trail.** As a direct consequence of the fire, the greatest risk for trail user safety is from rolling rocks, debris slides, cut/fill slope failure, and hazardous trees. The loss of soil stabilizing vegetation due to the fire has resulted in loose, unsupported trail tread and slopes above and below trail segments impacting trails segments within the fire perimeter. Where this is the case, the Probability is *likely*; Magnitude of Consequences; *Major*. **The Risk is Very High.**

The risk assessment for life and safety for motorized trails for the Interim #2 assessment area is: Probability is *unlikely*; Magnitude is *minor*. The Risk is **Very Low.**

*Treatments for Life & Safety – Motorized Trails:* Treatments to mitigate threats to life/safety are recommended in Part 1 assessment area. No Treatments are proposed on motorized trails in the Interim #2 assessment areas.

## 2) Property

BAER Critical Values at risk for property include forest roads, trails (motorized and non-motorized), recreation sites, and hydropower infrastructure.

### a) Roads

*Overview:* A rapid field survey was conducted from September 25th – October 18th (21 days) by the road engineers along with field coordination with the hydrology, soils, and archaeology specialists. Out of the 916 miles of roads located within the fire perimeter, the dominant Forest Service roads are; 04S81, 07S005, 08S051, 05S007, and 05S047. Twenty-two (22) road bridges and thirteen (13) trail/snowmobile bridges are within the fire perimeter too. A robust GIS analysis was performed, to characterize the roads and potential threats, due to the large number of roads and limited time.

The road segments surveyed were ML 4, ML 3, and ML 2 and have inside ditch, rolling dips, run-off ditches, low water crossings, side-drains, and culverts ranging from 18" to 96" in diameter.

Other secondary roads were also surveyed in the high to moderate burn severity for the purpose of this report.

**Property:** Damage to the invested road improvements, loss of road functions, denial of access to road users, grazing allotments, and private property owners. Downslope movement of fine ash, sediments and rock would affect the drainage features and function of the road system. There are also roads in the low burned severity have been determined to have High or Very High Risk, due to the burned hillslopes above the road. Diversion of uncontrolled water from road drainage courses on to the road surface, results in degradation and unacceptable erosion, gullies, and loss of road functions and inability of private property owners, permittees, Forest Service and forest user access.

There are 916 miles of Forest Service system roads within the Creek 1 Assessment Area. Of these, 497 miles were found within or downslope of areas with high or moderate burn severity. These miles are considered potentially at risk to damage from post-fire increases in flooding, debris flows, and hyperconcentrated flows with high amounts of debris. The assessment team screened and prioritized these miles as follows.

<b>Table 12. Miles of Road By Maintenance Level in High and Moderate Burn Severity Areas</b>		
<b>Maintenance Level</b>	<b>Definition</b>	<b>Miles</b>
1	Basic Custodial Care (Closed)	7
2	High Clearance Vehicles	406.1
3	Suitable for Passenger Cars	38.2
4	Suitable for Passenger Cars	45.8
<b>Total Miles</b>		<b>497.1</b>

**Risk to Roads Assessment Processes:** The BAER team addressed threats to roads as property using, three metrics: a) the Soil Burn Severity map b) the threat to the roads from debris flows and hyperconcentrated flows using the USGS debris flow model; and c) roads were assessed for accelerated hillslope erosion using ERMit modeling. In addition, threats were looked at from a watershed response basis.

- ❖ **Debris Flow Threats on NFS Roads:** The east side of the San Joaquin River was assessed between Saginaw Creek to Chiquito Creek because the Minarets Highway (FR 4S81) crosses numerous channels with crossing structures that are not designed to handle debris flows. The west side of the San Joaquin River was assessed between Sheep Thief Creek and Camp Creek because Stump Springs Road (FR 7S05) crosses numerous channels with crossing structures that are not designed to handle debris flows. These road channel crossings are at a high to very high risk of getting plugged with debris flow material and resulting in failure of the road at these locations. In addition, there are numerous maintenance level 2 roads that cross channels that have intermediate to very high risk for debris flows that could cause failure of the road at these road channel crossings.

Jose Basin and Mill Creek were assessed because numerous forest roads are in these watersheds and are at risk of road channel crossings failures from sediment laden (hyperconcentrated) flows

and debris throughout these watersheds. These failures could increase sediment loading of the channels and damage Foothill yellow-legged frog habitat.

**Of the 916 miles of FSR roads within the Creek 1 Fire area, 444 miles are at greater than 40% risk of debris or hyperconcentrated flows; of those, 147 miles had a greater than 80% risk.** 40% was chosen because the category from the USGS debris flow map is 40 – 60% probability (at the basin level), this mapping is considered a proxy indicator of basins with higher watershed response (steeper slopes, more erosion).

Of those 444 miles, approximately 310 miles are found within the following watersheds with greater than 50% moderate and high severity. The remaining miles are in watershed with less than 50% moderate and high Burn severity but still having an elevated risk of debris flow or hyperconcentrated flow threats.

The following table displays HUC 12 watersheds with over 50% high and Moderate Burn Severity and the mileages of maintenance level 4, 3, and 2 roads in Moderate/High severity in these watersheds. Road in these watersheds would be high priority for treatment.

<b>Table 13. Miles of Roads by Watershed, Soil Burn Severity, and Road Maintenance Level</b>					
<b>HUC 12 Watershed</b>	<b>% of Watershed with High/Moderate SBS</b>	<b>Miles in Moderate/High SBS</b>			<b>Total mileage</b>
		<b>ML 4</b>	<b>ML 3</b>	<b>ML 2</b>	
Rock Creek	83	16.9	3.9	92.9	113.7
Jose Creek	78			49.4	49.4
Lower Big Creek	74	3.5	.8	46.2	50.5
Lower Granite Creek	69	1.5	0.6	21.5	23.6
Saginaw Creek	55	4.1		31	35.2
Jackass Creek	52	2.7	1.2	33.5	37.3
<b>Totals</b>		<b>28.7</b>	<b>6.5</b>	<b>274.5</b>	<b>309.8</b>

- *Risk Assessment from Debris Flows for Roads (As Property) (Part 1)*
  - 472 miles (of the 916 miles total) are considered at *Possible* Probability of damage with *Moderate* Magnitude of consequences; resulting in an **Intermediate Risk** of debris flow damage due to lower (less than 40%) probability of debris flows impacting the road prism and drainage features.

*Treatment for Property - Roads (Part 1):* No treatments are proposed for the 472 miles of roads with Intermediate Risk of debris flow damage.

- 297 miles are considered at *Likely* Probability of damage with *Moderate* Magnitude of Consequences; resulting in a **High Risk**. Probability of debris flow is between 40 and 80% potentially impacting the road prism and drainage features.
- 147 miles are considered *Very likely* probability of damage with *Moderate* Magnitude of Consequences; resulting in a **Very High** risk given they have 80% and greater chance of a debris flow adversely affecting the road prism and drainage features.
- Thus, 444 miles of roads have a **High or Very High** risk of loss/damage due to debris flows and hyperconcentrated flows. These roads were further analyzed for hillslope/accelerate erosion risks (see below).

- ❖ Hillslope Erosion/Accelerated Erosion Threat on NFS Roads: Further stratification was done using ERMiT on the 497 miles of roads (Table 12) in or directly below Moderate and High burn severity areas. There is some, but not complete, overlap with the 444 miles found to have High/Very High risk from debris flows. Less than 5 tons/acre of erosion were predicted for 357 miles of roads. Greater than 5 tons/acre up to 35 tons/acre are predicted for 140 miles of roads. *Note: the miles of road at risk due to debris flow and those at risk of hillslope/accelerated erosion (ERMiT modeling) are close, but not exact matches.*

- *Risk Assessment from Hillslope/Accelerated Erosion for Property - Roads (Part 1)*
  - When combining the debris flow probability along with ERMiT results, 357 miles of road are considered having a probability of damage/losses as *Likely*. The Magnitude of Consequences is considered *Moderate*. Thus, there is a **High Risk** of property damage/losses. Generally, these areas have over a 40% probability of debris flow and less than 5 tons/acre erosion. These roads have extended source areas for runoff and erosion.
  - Of the 497 miles of roads in/below Moderate/High SBS areas, 140 miles are considered as having a *Very likely* probability of damage with *Moderate* Magnitude of Consequences, resulting in a **Very High Risk** to this Forest Service property. Generally, these areas are over 40% probability of debris flows and have 5 tons/acre up to 35 tons/acre erosion. These roads have extended source areas for runoff and erosion.

The Forest determined that approximately 165 miles of critical ML4, ML3, and ML2 Forest Roads are the main arteries that provide the highest level of mobility within the Sierra NF. These roads have heavy traffic from visitors, forest management, and partners (Southern California Edison, Pacific Gas & Electric), and provide access to over 50% of the Bass Lake Ranger District destinations, and 35% of the High Sierra Ranger District destinations (over 50 recreation sites; campgrounds, trailheads, and vista sites). These are critical roads scheduled to accommodate even more traffic due to the timber sales and landscape restoration projects expected for implementation in FY21 and FY22. For these reasons these roads are high priority assets to protect given the expected greater potential post-fire erosional impacts.

- Approximately 165 miles are **Priority 1** for treatment. These roads are in areas with a greater than 40% chance of debris flows, hyper-concentrated flows, rock fall, and washouts with the majority expecting to have between 5 tons/acre to 35 tons/acre hillslope erosion. Having functional and safe roads that provide access to the forest is as important as the preservation of these high priority assets. Probability of watershed response impacts is *likely*; Magnitude of Consequences; *Major*. The Risk is **Very High**.

*Treatment for Property - Roads (Part 1):* Additional storm proofing treatments including culvert inlets and risers and other treatments along with basic storm proofing treatments are proposed for these 165 miles of roads.

- Due to the moderate/high traffic and demand on the roads, connecting arteries with main recreation sites (over 50), timber sale projects, greater risk from debris flows, hyper-concentrated flows, washouts, and erosion impacts, 265 miles are considered **Priority 2** for treatment. These roads are moderate/high priority assets. These roads are downstream of flood source areas that can produce post-fire effects. Probability is *likely*; Magnitude of Consequences; *moderate*. The Risk is **High**.



- *Treatment for Property - Roads (Part 1):* Additional storm proofing treatments including culvert inlets and other treatments along with basic storm proofing treatments are proposed for these 265 miles of roads.

Approximately 44 miles have low to moderate usage and demand and are a lower priority asset. Even though lower priority, the protection of these roads is critical since they are the only way to access most of the timber sales and landscape restoration projects scheduled for implementation in FY21/22. There are threats from debris flows and hyper-concentrated flows however there is a lower threat from accelerated runoff, and potential washouts and are considered **Priority 3** for treatment. These roads are generally downstream of flood source areas. Probability is *likely*; Magnitude of Consequences; *moderate*. The Risk is **High**.

- *Treatment for Property - Roads (Part 1):* Basic storm proofing treatment including critical dips and cleaning culvert is proposed for the 44 miles of roads having a high risk of property damage/losses

Approximately 23 miles were dropped from proposed treatment in high and moderate burn severity areas, given they were less than .2 miles, small spurs or deadends with minimal use, and demand and are considered lower priority assets.

Interim #2 Update: The process and priorities for Part 2 of the assessment were the same as for Part 1. With fewer acres of High SBS in Part 2, the focus was on roads in and downslope/downstream from Moderate SBS areas.

Approximately 27 miles of roads are found in Creek Part 2. Of these only a little over 5 miles are found in areas affected by High and Moderate burn severity where we expect accelerated runoff and debris and an increase in hyperconcentrated flows.

Table 14. Maintenance Level and Miles of NFS Roads in Creek Fire – Part 2		
Maintenance Level	Definition	Miles
1	Basic Custodial Care (Closed)	2
2	High Clearance Vehicles	14.4
3	Suitable for Passenger Cars	5.6
4	Suitable for Passenger Cars	4.7
Total Miles		26.8

- *Risk Assessment from for Property - Roads (Interim #2)*
  - 22 miles are considered to have a *Possible* probability of damage with *Moderate* magnitude of Consequences, resulting in an **Intermediate Risk**. These roads are expected to have less than 5 tons/acre erosion response.

*Treatment for Property - Roads (Interim #2):* These roads are not proposed for treatment.

- The probability of damage for 5 miles is *Likely/Very Likely*, with *Moderate* magnitude of consequences, resulting in **High/Very High Risk**. These roads generally have 5 ton/acres to 35 ton/acre erosion response. These roads have extended source areas for runoff and erosion. These roads provide access to Edison and Florence lakes, are essential for Forest management and receive a high amount of public recreation use.

*Treatment for Property Roads (Interim #2):* These 5 miles of roads are proposed for emergency stabilization/storm proofing treatments.

*Treatment Summary for Property-Roads - Entire Creek Fire:* Treatments are proposed to mitigate expected road damages caused by the fire in both assessment areas. Proposed treatments are focused on roads and road segments in the High and Very High-risk categories.

#### **b) Property - Developed Recreation Sites**

Creek Fire – Part 1: The Creek Fire is a highly-developed recreation area that serves the public from many areas. There are 18 Developed Campgrounds and 10 Day Use Areas were within the fire area. Developed campgrounds and day use areas within the affected area each have highly developed infrastructure, including vault toilets, signage, barrier posts, site markers, interior roads, campfire rings, grills, and picnic tables.

As a direct consequence of the fire, two Developed Day Use Areas and eight Developed Campgrounds were burned over, receiving heavy damage to infrastructure and the loss of 20 double vault toilets. The other Campgrounds and Day Use Areas were left with hazard trees threatening the infrastructure and Forest Service property.

Creek Fire – Interim #2: For the Interim #2 assessment area, there are no emergencies concerning Forest Service developed recreation sites and special use permitted facilities, and no threat of hazardous materials releases because none of the sites assessed burned. Fire burn severity was generally low where sites are located and most instances there was no burning. Post-fire flooding threats are low to none at most of the sites due to low burn severity and lack of burning in watershed up slope. Except for one trailhead (discussed in the Trails section), there are few if any hazard trees caused by burning at any of the assessed sites. Except for a hazard tree treatment at a trailhead (discussed under the Trails section), no treatments to protect property, water quality and human safety are needed or proposed for developed recreation sites. Overall, the additional burned area of the Creek Fire (Creek – Interim #2 assessment) did not result in adverse impacts to Forest Service developed recreation sites.

- *Risk Assessment for Property - Developed Recreation Sites – Part 1*
  - *Property – Developed Recreation Sites:* Numerous hazard trees were observed at recreation facilities. They present a property risk to Recreation Facilities. There is risk of hazard trees coming down on Forest Service Developed Recreation infrastructure and buildings in the winter months.

The risk assessments for developed recreation sites for property *range from very high to low* depending on individual locations. Hazard trees are present in large in much of the burned area. Where that is the case the probability is *very likely*; Magnitude of consequences is *major*. **Risk is Very High.**

*Treatments for Property - Developed Recreation Sites (Part 1):* Treatments are recommended on a site-specific basis due to the applicable conditions, high value asset, and risks.

- *Risk Assessment for Developed Recreation Sites – Interim #2*
  - Risks for life/safety, water quality (hazmat), and property developed recreation sites in the Interim #2 analysis area have a probability of *Unlikely* because no structures burned, there is a low flood risk, fire-related hazard trees are not present, and there is no hazmat source. Magnitude of consequences is *minor*. **Risk is Very Low.**

*Treatments for Property - Developed Recreation Sites (Interim #2):* Treatments are not recommended for any of the developed recreation sites evaluated in Interim #2 of the Creek BAER process.

**c) Property - Recreational Special Uses**

Three categories of Special Use Permit recreation facilities are within the Creek Fire perimeter. Many were impacted by the fire.

Recreation Residences: These are privately-owned homes located on National Forest lands. The U.S. Forest Service land is leased by the occupant. The Recreation Residences on the High Sierra Ranger District on the south side of the San Joaquin River were heavily impacted. In all, 79 homes were destroyed, and four homes sustained damaged. There are eleven Residence Tract communities within the fire area, only five communities were heavily affected. Huckleberry Tract lost 44 homes, Dowville tract lost five homes and two were damaged, 21 homes were destroyed and two damaged at Upper Line tract, five homes at Lower Line Tract and Camp Sierra had four home destroyed. Damage to infrastructure and the threat is limited to hazard trees directly adjacent to public common areas. All Recreational Residence community locations affected by the fire have numerous hazard trees representing major threats to both life and property.

No recreation residence tracts were within the Part 2 phase of the Creek BAER assessment.

Organizational Camps: These are group facilities within the affected area that have varying levels of developed infrastructure, typically including main buildings, barracks, tent pads, dining facilities, restroom facilities, activity buildings (i.e. arts& crafts, game room), climbing walls, rope courses, zip lines, corrals & tack rooms, hiking trails (from camp to lake), campfire rings, amphitheaters, ball fields, and storage/maintenance sheds. Organizational camps that had substitutional losses were Camp Kern, who lost 49 structures and 5 damaged. Jackass Organizational Camp that lost 6 Structures and water tanks, Camp LaSalle (new name Kennolyn Camp) lost 19 structures. Oljato Org Camp lost one structure. Camp Mirimichi lost 2 structures. All Organizational Camp locations affected by the fire have numerous hazard trees representing major threats to both life and property. All other sites are affected by the presence of hazard trees, which threaten life and property in those areas.

No organizational camps were within the Part 2 phase of the Creek BAER assessment.

Special Use Resorts: These encompass a variety of different amenities. In general, a resort includes food service, retail sales, and other additional facilities. This small list shows the array of different kinds of resorts that were impacted by the fire. From a large Ski Resort: China Peak Ski Resort had 5 buildings destroyed, including a seasonal housing building and one structure damaged. Wagner's Resort Campground was heavily damaged, and all camping facilities and vault toilet burned. Huntington Lake Resort had no damages. During the Part 2 phase of the Creek BAER assessment, two additional resorts were evaluated: Mono Hot Springs and Vermilion Valley Resort. Neither of those resorts were damaged by the fire and post-fire effects are considered unlikely.

- *Risk Assessment for Recreation Special Uses*

The values at risk for Special Use facility in the burned area include life and safety and property. There is an immediate risk of hazard trees within and adjacent to Rec Residences, Org, Camps and Resorts pose a threat to Special Use infrastructure and posing life and safety threat to public visitors.

Due to Rights and Liabilities of the Special Use Permit there is no BAER treatment. The permit holder assumes all risk of loss to the authorized improvements. Loss to the authorized improvements may result from but is not limited to theft, vandalism, fire and any fire-fighting activities (including prescribed burns), avalanches, rising waters, winds, falling limbs or trees, and

acts of God. If authorized improvements in the permit area are destroyed or substantially damaged, the authorized officer shall conduct an analysis to determine whether the improvements can be safely occupied in the future and whether rebuilding should be allowed. If rebuilding is not allowed, the permit shall terminate.

The holder shall be liable for all injury, loss, or damage, including fire suppression or other costs resulting from rehabilitation or restoration of natural resources, associated with the holder's use and occupancy of the permit area. Compensation shall include but is not limited to the value of resources damaged or destroyed, the costs of restoration, cleanup, or other mitigation, fire suppression or other types of abatement costs, and all associated administrative, legal (including attorney's fees), and other costs.

*Treatments for Recreation Special Uses:* There are no BAER treatments due to the above rights and liabilities of the Special Use Permit.

**d) Property - Trails (Non-Motorized)**

Potential emergency conditions exist for specific trails and sections of trail within the burned area. These emergency conditions are based on threats associated with anticipated adverse post wildfire impacts to trails and trail users. Threats to trails include excessive erosion and degradation of the trail tread caused by capture and diversion of increased runoff from burned hillsides and drainages.

Sierra National Forest recreational trails located within the burn area range from well-maintained, groomed walking paths to rocky, rugged, unmaintained routes through the Forest's highest reaches providing spectacular scenery and solitude. The Forest trail system provides valuable recreational opportunities including day hiking, overnight backpacking, equestrian, mountain biking, OHV, and other trail uses. Trails are located throughout the burn area from 1,400 ft lower elevation oak pine woodland, mid elevation mixed coniferous Forest, to over 10,000 ft high country lodgepole, aspen, and red fir forest. Terrain ranging from rolling hills, flat meadows, deep canyons, and steep hillsides are found throughout the area with many areas being heavily wooded with significant amounts of standing dead trees. Sierra National Forest wilderness areas include the Ansel Adams, John Muir, Dinkey, Monarch, and Kaiser Wilderness areas. Several National Recreation Trails including Black Point, Kings River, and Rancheria Falls are within or near the burn area.

On-the-ground field assessments were completed on approximately 41.25 miles of trail out of a total 254 miles of National Forest System Trails within the burn area.

Trail assessment surveys were conducted based on burn severity with trail segments within moderate and high burn severity being priority focus. Assessments were conducted on the ground and with available trail information from Recreation/OHV staff, REAFs and various fire crews. Geological, Soil, and Hydrologic modelling aided in the assessment process as well.

Typical trail settings were identified from information collected during field assessments that provide an adequate trail sampling to extrapolate to fire impacted trails not field assessed. Of the total 254 miles of trail affected, 94 miles are identified as high risk of adverse damage and/or loss during the 2020/2021 winter and spring seasons. Temporary trail closure and storm proofing is recommended due to these identified risks.

*Interim #2 Non-Motorized Trail Assessment:* On-the-ground field assessments were completed on approximately 21 miles of trail out of a total 67.8 miles of National Forest System non-motorized trails

within Creek II area. Most trails are in areas with low soil burn severity with minimal or no adverse impacts observed or anticipated.

Of the total 67.8 miles of trail, 5.9 miles are identified as moderate to high risk of adverse damage and/or loss during the 2020/2021 winter and spring seasons. Storm proofing on trails 24E05 Jackass Lake and 27E44 Rattlesnake Creek and mitigation of approximately 50 dead and partially burned hazard trees within the Mono Crossing/Rattlesnake Creek Trailhead near Portal Forebay Campground off FR-7S80 is recommended due to these identified risks.

- *Risk Assessment For Property (Non-Motorized Trails)*

Of the 254 miles of non-motorized trails approximately 160 are in low or unburned areas; increased runoff, debris flows, and flooding is not expected; the Probability is *unlikely*; Magnitude of Consequences is *minor*. The risk is **Low**. No treatments are recommended.

The property at risk is segments of the trail system itself. As a direct consequence of the fire there is a high risk of damage to many trails and/or trail segments caused by the loss of water control. Accelerated erosion, flooding, debris flows and hyperconcentrated flows are expected due to loss of vegetation and soil cover. Accelerated erosion, et al. have a high potential to cause significant trail tread erosion and covering of trail tread bench with dry soil ravel, debris, and rocks. Trails that closely parallel and/or repeatedly cross intermittent stream channels are subject to increased probability of washouts and loss of trail tread.

94 miles of trails are within or downstream of high and moderate burn severity areas. Approximately 40 miles are in areas with a greater than 40% chance of debris and/or hyperconcentrated flows. Due to high demand for recreation use from the public these are trails are considered high priority assets, and greater potential post-fire erosional impacts, approximately 16 miles are deemed Priority 1 for treatment. Having a functional trail tread is important for these high priority assets. Probability of watershed response impacts is *likely*; Magnitude of Consequences; *Major*. The Risk is **Very High**.

Due to the moderate/high demand for recreation use and greater risk from debris and/or hyperconcentrated flows and erosion impacts 44 miles are deemed Priority 2 for treatment. These trails are moderate/high priority assets. These trails have source areas that can produce post-fire effects. Probability is *likely*; Magnitude of Consequences; *moderate*. The Risk is **High**.

The remaining approximately 34 miles have low to moderate recreation use and demand and are considered lower priority assets. They generally are outside the areas of high potential for debris flows and hyperconcentrated flows however are subject to accelerated runoff and debris are deemed Priority 3 for treatment. These trails are generally downstream of flood source areas. Probability is *likely*; Magnitude of Consequences; *moderate*. The Risk is **High**.

*Interim #2: The risk assessment for non-motorized trails as property for the Interim #2 assessment area remains the same.*

*Treatments for Property – Non-Motorized Trails:* Treatments are proposed to mitigate damage to or loss of trail drainage function and integrity in both the **Part 1 and Part 2 assessment areas**. A prioritized list of trails for treatment are found in Section H Treatments.

### e) Property - Trails (Motorized)

The motorized trail system includes OHV routes, snowmobile routes (over the snow), and motorcycle trails.

On-the-ground field assessments were completed on a portion of the National Forest Transportation System motorized trails within the burn area, focusing on those in high/moderate soil burn severity. Trails were identified via GIS/SBS maps. All trails within the high soil burn severity area incurred minor tread damage from fallen trees and burnt tree roots. They will likely need emergency treatment to reduce tread loss and water quality degradation due to erosion. Many of these trails are mid-slope and potentially will catch rainwater runoff and snow melt.

Many trails are located at the headwaters to many watersheds. The increase erosion on the trails can threaten water quality and potentially lead to loss of trail segments. Additionally, the standing dead trees pose a serious threat to public and staff safety.

**Interim #2 Motorized Trail Assessment:** On-the-ground field assessments were completed on approximately 6.9 miles of motorized OHV/OSV trail out of a total 13.42 miles of National Forest System Motorized Trails within the Creek II area. Most trails are in areas with low soil burn severity minimal or no adverse impacts observed or anticipated.

Of the total 13.42 miles of trail, none were identified as high risk of adverse damage and/or loss or a high potential safety risk to trail users during the 2020/2021 winter and spring seasons.

- *Risk Assessment for Property (Motorized Trails)*
  - **The risk level varies from minor to very high by trail.** The property at risk is segments of the trail system itself. As a direct consequence of the fire there is a high risk of damage to the trail caused by the loss of water control. Increased flow rates can be anticipated due to loss of vegetation and soil cover with high potential to cause significant trail tread erosion and covering tread with debris and rocks. Trails that closely parallel and/or repeatedly cross intermittent stream channels are subject to increased probability of washouts and loss of trail tread. Where this is the case the Probability is *likely*; Magnitude of Consequences; *Major*. **The Risk is High/Very High.** Approximately 4.2 miles were rated as High/Very High risk.

The risk assessment for property for motorized trails for the Interim #2 assessment area is **Low**; the probability is *Unlikely* due to the areas around the motorized trails experiencing low SBS; and, the Magnitude would be *Moderate*.

*Treatments for Property – Motorized Trails:* The Forest will reassess motorized trails in the spring/summer. The Forest may choose to do an interim at that point. Treatments for trail stabilization are not recommended at this point. **No Treatments are proposed on motorized trails in the Interim #2 assessment areas.**

### f) Non-Forest Service Property: Hydropower Infrastructure

**SCE San Joaquin Hydropower Facility:** Watershed response in the Creek Fire burned watersheds can change significantly as compared to pre-fire conditions. With some of the hillslopes in the moderate to high soil burn severity areas mostly devoid of vegetation and groundcover, the first large runoff producing storms will likely create increased surface flow volumes and velocities that can transport available sediment and ash from the slopes and along the channel bottoms. Streams will be bulked with fine sediment, ash, and floatable debris from the burned area, and most of these streams are tributary the San Joaquin River. Increases in turbidity from fine sediment and ash in smaller tributary channels as well as the San Joaquin River could have short term impacts to identified beneficial uses, stream temperatures and dissolved oxygen. Bulking of ash, debris, and sediment can also impact hydroelectric infrastructure. Affects



to SCE infrastructure at Mammoth Pool, Big Creek Powerhouse #1, #2, and #8 could result from turbid water clogging the cooling systems, causing overheating of the turbines. Potential impacts to SCE facilities from a landslide/debris flow include some loss of reservoir capacity.

The above threats will be the most acute during the first runoff-producing storms, which typically occur November through April (with an increased likelihood of rain-on-snow events December through March) with occasional thunderstorms in late summer to early fall, which can produce short duration, but high intensity precipitation events. There will be a higher level of flood and erosion risk during the next three to five years until there is sufficient vegetative recovery to mitigate increased runoff. *Continued coordination regarding impacts to access and infrastructure are recommended.*

### 3. Natural Resources (NR)

#### a) Beneficial Uses of Water For Domestic, Municipal, Hydropower Or Agricultural Supply

Wildfires primarily affect water quality through increased sedimentation. As a result, the primary water quality constituents or characteristics affected by this fire include color, sediment, settleable material, suspended material, and turbidity. Floods and debris flows can entrain large material, which can physically damage infrastructure associated with the beneficial utilization of water (e.g., water conveyance structures; hydropower structures; transportation networks). The loss of riparian shading and the sedimentation of channels by floods and debris flows may increase stream temperature. Fire-induced increases in mass wasting along with extensive tree mortality can result in increases in floating material – primarily in the form of large woody debris. Post-fire delivery of organic debris to stream channels can potentially decrease dissolved oxygen concentrations in streams. Fire-derived ash inputs can increase pH, alkalinity, conductivity, and nutrient flux (e.g. ammonium, nitrate, phosphate, and potassium), although these changes are generally short lived. Recreation residences burned adjacent to Huntington Lake, for example, can deliver contaminants to the water. Post-fire increases in runoff and sedimentation within the fire perimeter may also lead to increases in chemical constituents, oil/grease, and pesticides.

Flash flooding and debris flows are natural watershed response for this area. Ash and sediment are likely during storm events in stream channels for several years after the fire. Water Quality can impact Threatened/Endangered species. See the Wildlife report for additional information.

- *Risk Assessment:* Probability: Possible (ash and sediment from burned structures will degrade water quality in drainages and can adversely affect hydropower machinery). Magnitude: Moderate. Risk: **Intermediate**.  
*Interim #2: The risk assessment is the same.*
- *Treatments for Beneficial Uses of Water: Continued coordination regarding impacts to access and infrastructure are recommended.*

#### b) Hazardous Materials – Threat to Water Quality and Soil Productivity (lesser threat)

During the Creek Fire BAER assessment, 182 structures burned on Forest lands were assessed for hazmat contamination concerns. When residential and outbuilding structures burn, the concentrated ash and residual materials (refuse) are considered hazardous to humans and the environment per State of California EPA environmental regulations and must be treated and disposed as hazardous materials. Several thousand cubic yards of refuse are now exposed, and fine ash and waste is ready to be mobilized off site when storm runoff occurs. Various locations were surveyed during the field assessment; permitted organizational camps, large recreation residence tracts, a Forest Service Fire Station/work center and several developed recreation sites. Of the 182 burned structures surveyed, 131 have a moderate to high potential for hazardous materials within the burned refuse and ash to move off-site and contaminate soil, waterbodies and streams.



**Interim #2 Assessment:** During Part 2 of the Creek BAER assessment, developed recreation and recreation special use sites were also visited. None of the sites assessed had any burned structures. As such, no threats/risks from hazardous materials were identified in that portion of the fire; no treatments are recommended.

- *Risk Assessment:* Probability: Likely (hazardous materials from burned structures will mobilize in runoff. Magnitude: Moderate. Risk: **High**.  
**Interim #2:** Because there were no burned structures in the Interim #2 assessment area, the Risk is **Very Low**.
- *Treatments for Hazardous Materials:* To ensure that hazardous materials stay onsite, stabilization treatments need be implemented.  
**Interim #2:** Because there were no burned structures in the Interim #2 assessment area, no stabilization treatments are needed.

### c) **Soil Productivity and Hydrologic Function**

*Soil Productivity:* The Creek Fire is too large to adequately characterize a scalable resource setting for post-fire management. Broadly speaking, the burned area contains extensive acreages of all major Sierra National Forest soil types at a physiographic level. The dominant pattern is an archetype elevation gradient of soil development from moisture-limited to temperature-limited settings, with a Goldilocks soil development sweet spot at roughly the Holocene rain-snow interface (Huntington 1954, Dahlgren et al 1997). Soil forest productivity rates are among the highest in North America from sufficiently thick regolith that provisions winter moisture through long hot summers. Granite colluvium and residuum dominate. Lower elevations are mostly dissected drainages with long slope lengths, while higher elevations tend towards gentler basins with discontinuous soil mantle. Nearly all soils have been disturbed by legacy forestry activities and truncated soils are common in the most productive elevation bands.

During the assessment, two landscape patterns were identified but the bulk of acres were not adequately differentiated due to lack of capacity and limited timeframe. Accelerated erosion will occur in the high and moderate burn severity areas, with greatest losses in post-fire years 1 and 2 then decreasing significantly and localize around erosion scars or road-related failures that become chronic sources of sediment. Erosion will decrease soil water holding capacity. Soil losses in mod or high severity reburned areas (French Fire) will re-impact and potentially deplete soil seed banks.

- *Risk Assessment for Soil Productivity:* Probability of damage or loss: Likely. Magnitude of Consequences: Moderate. Risk Level: **High**. **Interim #2:** Same as Interim #1.
- *Treatments:* Treatments to specifically address soil productivity are not proposed; however, some treatment recommendations (road and trail storm proofing, evaluating allotment management strategies and closures to motorized vehicles) may help protect soil productivity. **Interim #2:** Same as Interim #1.

*Hydrologic Function:* The primary watershed responses of the Creek Fire are 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) floods with increased peak flows and sediment deposition, and 4) possible debris flows during precipitation events.

Initial erosion of ash and surface soil during the first storm events will reduce slope roughness by filling depressions above rocks, logs, and remaining vegetation. The ability of the burned slopes to detain water and sediment will be reduced accordingly. This will aid in the potential for floods and will increase the distance that eroded materials are transported. The major concern for vegetative

recovery and in turn hydrologic recovery is in the high severity burn areas. These responses are expected to be greatest in initial storm events, and will become less evident as vegetation is reestablished, providing ground cover, increasing surface roughness, and stabilizing and improving the infiltration capacity of the soils. The estimated vegetative recovery for watersheds affected by the Creek Fire is expected within 5 to 10 years as observed in other watersheds within the Sierra National Forest. See the Hydrology specialist report for additional information.

- *Risk Assessment for Hydrological Function:* Probability: Very likely: Ash and sediment will degrade water quality and stream structure in drainages. Magnitude: Moderate. Rill and gully erosion on the hillslopes could damage critical values such as Forest Roads and Trails and affect off-Forest values. Risk: **High**.  
**Interim #2: Same as Interim #1.**
- *Treatments for Hydrological Function:* Treatments to specifically address hydrological functioning are associated with other values at risk. Road and trail protection treatments are intended to at least indirectly apply. Some treatment recommendations (evaluating allotment management strategies and closures to motorized vehicles) may help protect hydrologic functioning. **Interim #2: Same as Interim #1.**

#### d) Geologic Hazards

Four geologic hazards were assessed for the Creek Fire: rock fall, debris slides, debris flows, and sediment-laden flows. See the discussion in Part III above for an overview.

- *Risk Assessment for Geologic Hazards:* The risk assessment for geologic hazards is tied to site-specific conditions.
  - An emergency exists for threat of life or injury to individuals and vehicles using many segments of the Stump Springs Road (FR 7S05) and the Minarets Highway (FR 4S81). This threat stems from both rockfall and debris flow activity attributable to the changed conditions created by the wildfire.
  - An emergency also exists for the SCE PH2 and PH2A, PH3, PH8 and Mammoth Pool Reservoir from the risk of debris flows into the forebays and afterbays.
  - An emergency exists to the many Maintenance level 2 roads located in Very High and High Debris Flow Probability areas below Whiskey Ridge and Chiquito Ridge and in Jose Basin and the Mill Creek watersheds.
  - **Interim #2: An emergency exists Forest Road 7S01 (Florence Lake Road) due to geologic hazards.**
- *Treatments for Geologic Hazards:* Treatments to mitigate expected geologic hazards are proposed for specific sites and tied those with critical values. Road protection treatments are intended to at least indirectly apply.  
**Interim #2: Treatments are proposed to mitigate geologic hazards on Forest Service roads.**

#### e) Terrestrial Wildlife

Suitable habitat for one federally-listed endangered species, the Southern Sierra Nevada (SSN) Distinct Population Segment (DPS) of fisher (*Pekania pennant*), and one federally proposed endangered species, the Sierra Nevada (SN) red fox (*Vulpes vulpes necator*) is present within the Creek Fire perimeter. There is

no designated or proposed critical habitat for SSN DPS fisher or SN red fox to date. **Habitat for Sierra Nevada (SN) bighorn sheep (*Ovis canadensis sierrae*) is found in the Interim #2 Creek Fire analysis area; it is also listed as federally-endangered. There is critical habitat designated within the Sierra National Forest, but not within the Creek Fire perimeter as of 10/21/20.**

**Fisher:** Fisher habitat could be negatively affected by the predicted flooding, loss of water quality, debris flows, and rock falls due to the abundance of fisher habitat lying within the >75% basal area mortality. Erosion effects to fisher, if occurring during the winter, are expected to be lower due to their high mobility and, therefore, a greater chance of them escaping the hazards listed above. The risk would be considered moderate to high; however, if hyper concentrated flooding or debris flows occur near den trees during the breeding season, where there is a likelihood of non-mobile young being present within den trees.

**Sierra Nevada Red Fox:** Recent sightings of Sierra Nevada red fox in 2018 and 2019 in the Mono Creek drainage in the John Muir Wilderness confirms their presence on the Sierra National Forest. These sightings are not within the Creek Fire perimeter to date. The Creek Fire entered the western edge of Sierra Nevada red fox habitat in the Ansel Adams Wilderness east of Granite Creek Campground. Preliminary RAVG data for Sierra Nevada red fox habitat appears to have burned in a mosaic as of 9/28/20. There is 87.37 acres >75% basal area mortality and 141.15 acres with moderate to low basal area mortality (<75%). Denning habitat within California is noted to be within boulder pilings, among talus slopes, or within granite outcroppings at the base of slopes. Erosion effects to Sierra Nevada red fox, if occurring, are expected to be lower due to their denning ecology and high mobility and, therefore, a greater chance of them escaping erosion hazards that may occur within the wilderness.

**Sierra Nevada Bighorn Sheep:** Critical habitat was designated for SN bighorn sheep within California in Tuolumne, Mono, Fresno, Inyo, and Tulare counties. Recovery units were designated by California Department of Fish and Wildlife (CDFW). The Convict Creek and Wheeler Ridge units overlap the Sierra National Forest to some extent (Map 8 in the Specialist Report for Terrestrial Wildlife). The Creek Fire has not burned into critical habitat as of 10/21/2020. Sierra Nevada Bighorn Sheep habitat is rough, rocky, and steep. It also encompasses alpine meadows, summit plateaus, and hanging meadows fed by springs within escape terrain. This landscape affords them an advantage in avoiding predation through easy access to escape terrain adjacent to areas where more forage may be available. Erosion effects to SN bighorn sheep, if occurring, are expected to be lower due to their habitat preferences and calving ecology as well as their high mobility. There is a greater chance of them escaping erosion hazards that may occur within the wilderness.

- **Risk Assessment for Terrestrial Wildlife:** Probability: Unlikely. Magnitude: Major. Risk: **Intermediate.** There were no changes to the risk assessment for the additional species and areas covered in Interim #2 of the assessment.
- **Treatments for Terrestrial Wildlife:** Due to the low likelihood of occurrence during the breeding season, the low risks, and the low feasibility of treatments with a high predictability of success, no treatments are proposed. However, proposed treatments of area, road, or trail 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. **There were no changes to the proposed treatments as a result of the additional species and areas covered in Part 2 of the assessment.**

**f) Aquatic Wildlife**

There are three federally-listed species within the fire area; Lahontan cutthroat trout (Threatened), Sierra Nevada yellow-legged frog (Endangered), and Yosemite toad (Threatened). Yosemite toad designated Critical Habitat also occurs within the fire area, totaling approx. 21,500 acres. There is one State listed species in the fire area; the foothill yellow-legged frog (State Endangered). Several watersheds were addressed for post-fire threats to the federally listed Lahontan cutthroat trout, Sierra Nevada yellow-legged frog, and Yosemite toad.

*Lahontan Cutthroat Trout @ West Fork Portuguese Creek:* West Fork Portuguese Creek on the Bass Lake Ranger District has occupied habitat for Lahontan cutthroat trout. This population has been monitored annually since 1994 and is the only population of LCT on the District. A total of 778 acres representing 39% of the watershed burned at moderate and high Soil Burn Severity (SBS) including the entire occupied reach. This watershed is anticipated to have a 61% increase in flow under a two-year storm event. This falls to a 28% increase when modeling a 10-year event. There is a 20-40% probability of a debris flow occurring in the watershed; however, some channels, including tributaries to WF Portuguese, were identified through modeling of having a greater risk of debris flows.

Post-fire effects to Lahontan cutthroat trout habitat may include increased water flow, sediment and debris delivery that may scour riparian vegetation, reduce bank stability, and lead to aggradation of pools and sedimentation of spawning gravels (redds). Increased sedimentation in deep water and spawning habitats, loss of riparian cover, reduced stream shading, and increased water temperatures will diminish habitat suitability for Lahontan cutthroat trout. Impairments to spawning habitats will effectively limit recruitment of young-of-the-year trout into the population for a year or two. Elevated levels of sedimentation will also impact the diversity and abundance of food resources (aquatic macroinvertebrates).

High water flows with increases in floatable debris and fine sediment/ash will impact water quality and may lead to death or injury of animals present in the water. Water quality changes could lead to higher pH, nutrient levels, cloudiness of water (turbidity), and severe declines in available instream food. Events that occur during the reproductive season have the potential to smother or wash away eggs. For Lahontan cutthroat trout, the post-fire effects may lead to extirpation or further genetic “bottlenecking” of this occurrence.

**Interim #2: As no additional habitat for this species was affected in the Part 2 analysis area, there are no changes to the Interim #1 information.**

- *Risk Assessment for Lahontan Cutthroat Trout:* Probability: Very Likely: Based on the Soil Burn Severity adjacent to the occupied reach and predicted watershed response, impacts to Lahontan cutthroat trout are anticipated. Magnitude: Major: The Lahontan cutthroat trout occurrence in WF Portuguese Creek is small and a reduction in numbers and suitable habitat could impact their viability. There is potential for the post-fire response to result in extirpation of this occurrence. Risk: **VERY HIGH.**
- *Treatments:* No effective treatments are feasible to address the short-term risk to this species.

Sierra Nevada Yellow-Legged Frog @ Long Meadow: Long meadow has occupied habitat for Sierra Nevada yellow-legged frog (E). A total of 137 acres representing 24% of the watershed burned at moderate and high SBS and is anticipated to have a 46% increase in flow under a two-year storm event. This falls to a 19% increase when modeling a 10-year event. There is a 0-20% probability of a debris flow occurring in the watershed however some channels, including tributaries to Long Meadow Creek, were identified through modeling of having a greater risk of debris flows.

Post-fire effects to SNYLF habitat may include increased flows, sediment and debris delivery that may scour riparian vegetation and lead to aggradation of pools. SNYLF tadpoles take 2 to 3-years to metamorphose into frogs and require deep pools for overwintering. Debris flows and high-water flows with increases in floatable debris and fine sediment/ash will impact water quality and could lead to death/injury of frogs and reduction in macroinvertebrates and aquatic insect food sources. Events that occur during the reproductive season have potential to smother or scour away egg masses.

**Interim #2: As no additional habitat for this species was affected in the Part 2 analysis area, there are no changes to the Interim #1 information.**

- *Risk Assessment for Sierra Nevada Yellow-Legged Frog:* Probability: Possible: Based on the predicted watershed response, downstream impacts to Sierra Nevada yellow-legged frog may occur. Magnitude: Moderate: The SNYLF occurrence in Long Meadow is small and a reduction in numbers and suitable habitat could impact their viability. It is possible but unlikely for the post-fire response to result in extirpation of this occurrence. Risk: **Intermediate.**
- *Treatments for Sierra Nevada Yellow-Legged Frog:* Treatments are recommended to mitigate post-fire watershed responses to this species; Long meadow is occupied by Yosemite Toad also (see below) The Risk assessment for Yosemite Toad is **High.**

Yosemite Toad - Occupied Meadow Habitat: The Creek fire perimeter contains **38 meadows (35 in the Creek Part 1 analysis area and 3 additional in the Interim #2 analysis area)** occupied by Yosemite toad. Storm flow modeling was performed on four occupied Yosemite toad meadows that had moderate or high soil burn severity within 1250 meters (toad dispersal distance) and were outside of Wilderness.

Jackass meadow has occupied habitat for Yosemite toad (Federally-Threatened). A total of 348 acres representing 14% of the watershed burned at moderate and high SBS and is anticipated to have a 47% increase in flow under a two-year storm event. This falls to a 21% increase when modeling a 10-year event. There is a 0-20% probability of a debris flow occurring in the watershed, however some channels, including tributaries to Jackass and Norris Creeks, were identified through modeling of having a greater risk of debris flows.

Meadow 516M74 and 516M75 have occupied habitat for Yosemite toad (T). A total of 215 acres representing 25% of the watershed burned at moderate and high SBS and is anticipated to have a 42% increase in flow under a two-year storm event. This falls to a 19% increase when modeling a 10-year event. There is a 20-40% probability of a debris flow occurring in the watershed.

Meadow 516M39 (Mushroom Rock) could not be modeled due to small watershed size above the meadow, however based on levels of high and moderate SBS surrounding the meadow, is anticipated to

have similar response to the above sites. Probability of a debris flow occurring in the watershed is 80-100%.

Monkeyflower Meadow and Meadow 516M68 are anticipated to have 28% and 16% increase in flow under a two-year storm event, falling to 12% and 7% for a 10-year event. Meadows 516M680 and 516M68 (Coyote area) could not be modeled due to small watershed size, however based on levels of high and moderate burn severity surrounding the meadows are anticipated to have similar response to the above sites. There is a 0-20% probability of a debris flow occurring in these watersheds.

Post-fire concerns include degraded water quality once egg masses are laid and sedimentation of breeding habitats. Depth of water in breeding habitat is a critical element in successful annual recruitment, or the transformation from a tadpole to a metamorph. Most meadows have low levels of concern for habitat degradation, but some have an elevated risk, and need to be monitored in the coming years to assess habitat conditions. Also, coordination with range personnel is critical to ensure the success of excluding livestock during the early season, pre-metamorphosis period. **Approximately 23,525 acres of Critical Habitat was also affected (21,500 acres in the Part 1 analysis area; an additional 2,025 acres in the Interim #2 analysis area),** but most essential elements were maintained.

- *Risk Assessment for Yosemite Toad in Occupied Meadows:* Probability: Possible, based on the predicted watershed response, downstream impacts to Yosemite toad may occur. Magnitude: Moderate: The YT occurrences in the meadows assessed above are small and a reduction in numbers and suitable habitat could impact their viability. It is unlikely the post-fire response in these meadows would result in extirpation of these occurrences. Risk: **Intermediate.**
- *Risk Assessment for Yosemite Toad in Occupied Meadows – Interim #2 Analysis Area:* Probability: Possible, based on the predicted watershed response, downstream impacts to Yosemite toad may occur. Magnitude: Moderate: The YT is a federally-listed species. It is unlikely the post-fire response in these meadows would result in extirpation of these occurrences. Risk: **Intermediate.**
- *Treatments for Yosemite Toad (Occupied Meadows):* No site-specific treatments are recommended for these Yosemite toad locations.

*Yosemite Toad (Breeding Habitat @ Jackass Meadow) & Sierra Nevada Yellow-Legged Frog (@Long Meadow):* The Creek fire burned critical range management infrastructure at Jackass meadow and Long meadow. Loss of this fencing allows for direct access to occupied breeding habitat which is in violation of Forest Plan Standards and Guidelines. Initial concerns from rangeland management include damage to structural range improvements such as fences, gates and corrals. The loss of structural range improvements is costly, and repair will be required before turn-out (if approved) of livestock next grazing season (2021). It is imperative that fences assigned to livestock permittees are maintained and up to standard before each grazing season begins in order to ensure livestock are managed according to Term Grazing Permit, site specific NEPA and allotment management plans and to be good stewards of the natural resources.

Based on field verification and analysis of critical infrastructure, where there is also a nexus with TES habitat concerns, it was determined that approximately 6.76 miles of pasture and enclosure fencing that meets these criteria was impacted by the Creek Fire. This structural infrastructure is required to meet land management objectives for authorized grazing while providing protection for TES species including



Yosemite toad, a threatened species (Jackass Meadow Subunit-South Jackass Allotment) and Sierra Nevada Yellow-legged frog, an endangered species (Long Meadow Holding Field-Chiquito Allotment).

- *Risk Assessment for Yosemite Toad @ Jackass Meadow and Sierra Nevada Yellow-Legged Frog @ Long Meadow:* Probability: Likely: Loss of fencing would allow direct cattle access to occupied breeding areas within Jackass Meadow (Yosemite toad (T)) and Long Meadow (Sierra Nevada yellow-legged frog (E)). Magnitude: Major: The species occurrences in these meadows are small and impacts to breeding habitat would likely impact their viability. Risk: **High**.
- *Treatments for Yosemite Toad @ Jackass Meadow and Sierra Nevada Yellow-Legged Frog @ Long Meadow:* Treatments are recommended at Jackass Meadow and Long Meadow to mitigate post-fire watershed responses to these two species.

#### g) **Botanical Resources**

*Threatened/Endangered Plants:* Two occurrences of the federally-threatened plant species Mariposa pussypaws (*Calyptidium pulchellum*) were burned over in Jose Basin. Both occurrences occupy small areas of granitic outcrop and gravel, and both have been fenced for over 15 years. The site that READs were able to visit looks fine in photographs. The fence is intact, and the plants were in the soil as dormant seeds when the fire went through. No negative effects are expected, but both occurrences will be monitored in spring 2021, and any fence repairs or replacement will be proposed once the second site can be assessed.

- *Risk Assessment for Threatened/Endangered Plants:* Probability: Unlikely. Magnitude: Major: Risk: **Intermediate**.
- *Treatments for Threatened/Endangered Plants:* No site-specific treatments are recommended.

Interim #2: No federally-listed, proposed, or candidate plant species occur within the Interim #2 assessment area. Whitebark pine (*Pinus albicaulis*), a candidate for federal listing, occurs in the subalpine zone just above the analysis boundary, but not within it.

#### h) **Non-Native Invasive Plants as a Threat to Native Vegetative Recovery**

The Creek Fire area features an array of vegetation typical to the central Sierra Nevada: it is valuable for countless reasons, utilitarian, ecosystem-related, and for its beauty. All vegetation in the burn area evolved with fire, but not with invasive non-native plants from Eurasia and other continents. These plants (e.g., yellow starthistle, broom, medusahead, klamathweed) pose the most serious threat to the successful recovery of the vegetation. During fire suppression, 203 miles of dozer line, 111 miles of road as completed line, and 44 miles of hand line were constructed on National Forest System lands alone (totals for the entire incident are much higher). These constructed areas serve as weed seed dispersal corridors for spread via the firelines as well as from the firelines deep into the burned areas away from suppression activities (via wind, water, birds, etc.). Dozens of event points such as helispots, staging areas, drop points, safety zones and more were placed throughout the Forest.

Dispersal of weeds from boots, fire engines, vehicles, and firefighter gear likely occurred to at least some degree over such an enormous incident with over 3000 firefighters at the peak. In addition to dozers, other heavy equipment such as feller-bunchers, loaders, masticators, chippers, and excavators were used at a variety of locations throughout the fire. On burned slopes far from suppression activities, changes are



good that the fire burned through existing invasive weed infestations that are now poised to spread extremely quickly.

***Integrity and Recovery of Native Vegetation – Fire Suppression:*** An emergency exists with respect to vegetation recovery as a result of the threat of invasive weed introduction and spread. The introduction and dispersal via heavy equipment of invasive weeds into areas disturbed by fire suppression and suppression repair activities will result in the establishment of large and persistent weed populations. Where firelines were constructed through existing weed infestations there is little doubt that infestations were spread beyond their pre-fire footprint. Because invasive plants are opportunistic, without treatment they will rapidly increase in the burn area due to mechanical soil disturbance and their release from competition with native plant species along freshly cleared firelines.

**Interim #2 Assessment:** An emergency exists with respect to vegetation recovery as a result of the threat of invasive weed introduction and spread. The risk is somewhat lower in the Interim #2 assessment area because there are fewer miles of fire suppression related disturbance (~8 miles of road as line, 8 miles of dozer line, and 24 miles of hand line; as well as 14 event points where soil disturbance occurred and/or people concentrated). Suppression lines constructed between 9/29 and 10/18 outside of the analysis area, or road as line (like the Kaiser Pass Road) added after 9/29 may provide vector connectivity with unburned areas and areas considered under Phase 1 analysis.

- ***Risk Assessment - Invasive Non-Native Plants (Suppression-Related):*** Probability is Very Likely. Ground disturbance and vehicle traffic associated with fire suppression activities are highly likely to promote invasive plant introduction and spread. Disturbed ground is vulnerable to invasive weed establishment as described above. Introduction of new invasive weed species or introductions of existing weed species from outside the Forest to new sites is highly likely with a total of 358 miles of fireline on NFS lands, along with the numerous event points (drop points, helispots, staging areas, etc.). Although both ICPs had weed wash stations in place within a week or two of the fire, information is scarce on the proportion of heavy equipment, engines, and vehicles that were washed prior to deployment. More washing upon demob seems to have occurred than upon arrival, based on interviews with the weed wash contractor for the North Zone. Regardless, the weed wash stations reduce risk somewhat, but not enough to change overall level of risk. Magnitude: Major. Invasive plants can spread quickly once established, preventing or impairing the post-fire recovery of native vegetation adjacent to suppression features. There is a high density of suppression features in vulnerable low-elevation vegetation types. **Risk: VERY HIGH**

***Interim #2 Risk Assessment:*** The Probability is considered Likely. The rationale is the same as that described for the Creek Interim #1 assessment. Magnitude is considered Major. The Interim #2 assessment area is 82% wilderness and considered relatively “clean” from invasive plants; establishment of aggressive high-elevation weed species would be serious. Treatment in the remote areas with limited access is difficult; thus, important to detect and treat early. **Risk: Very High.**

- ***Treatments for Integrity and Recovery of Native Vegetation (Fire Suppression Areas) - Both Assessment Areas:*** Treatments are proposed to mitigate risk of weed species introduction and spread.

***Integrity and Recovery of Native Vegetation – Burned Area:*** Additionally, recovery of native vegetation over the vast acreage of burned slopes distant from suppression features is at risk. Newly burned wildland

areas are well documented to be perfect seed beds for aggressive non-native plants that could be deposited by birds, water, or wind. Areas such as vulnerable riparian habitat types, stands of FS sensitive tree-anemone, freshly burned slopes adjacent to known infestations, fuel breaks, recent burns like the 2013 Aspen and 2014 French fires) may be impaired by invasive plant incursion. The introduction of new invasive plant species (or new infestations from outside the Forest) and expansion of the 287 mapped existing weed populations could affect the structure and function of native plant communities if left unchecked. It is expected that most native vegetation adapted to moderate or infrequent high severity fire would recover well, and often benefits from fire if weed invasions are minimized.

**Interim #2 Assessment: Same as described above.**

- *Risk Assessment - Invasive Non-Native Plants (Burned Area):* Probability is considered Likely. Where the fire has reduced canopy cover and exposed mineral soil, native vegetation recovery is highly vulnerable to invasive plant introduction and spread. Erosion and runoff may also impede the establishment and recovery of native vegetation, as well as carrying weed seeds form infestations upslope. Magnitude: Major. Invasive plants can spread quickly from existing occurrences into burned habitat, impairing the post-fire recovery of native vegetation. Risk: High.

*Interim #2 Risk Assessment:* The Probability is considered Possible. The probability is higher than pre-fire for rapid establishment and spread of non-native invasive plant seeds that happen to be brought in by wind, runoff, erosion, or wildlife. Immediately post-fire there is an abundance of water, mineral soil, sunlight, and nutrients; non-native invasive plants can outcompete natives quickly in this setting. The Magnitude of Consequences if non-native invasive plants were spread/introduced into the analysis area and can expand is considered Major. The higher elevations of the Sierra NF (7,000' and above) are notably free of invasive weeds and keeping this land "clean" is paramount. Of concern are aggressive weeds adapted to high elevations (e.g., spotted knapweed, Canada thistle) that could impede native vegetation recovery if undetected and quickly become a long-term control challenge the Sierra NF. **Risk: High**

- *Treatments for Integrity and Recovery of Native Vegetation (Burned Area) - Both Assessment Areas:* Treatments are proposed to mitigate risk of weed species introduction and spread. Early detection and rapid treatment are critical to ensure aggressive non-native species do not spread/establish in the burned areas.

## **A. Cultural Resources**

There are 2,090 total sites within the perimeter of the Creek Fire. This includes 1500+ in the high and moderate Soil Burn Severity. Due to time, a priority strategy was used and only 55 sites were physically field assessed. Threats to these sites include erosion, hazard trees falling and damaging features, damage due to the loss of pre-fire protection measures such as vehicle barriers, loss of eligibility from other BAER treatment measures, loss due to looting and damage from cattle on fragile site surfaces.

Cultural resources were assessed based on their potential eligibility for listing on the NRHP. Criteria for an emergency determination included susceptibility to damage based on site type or components, topographic location, and surrounding burn severity resulting from the Creek Fire and predicted watershed events.

According to the records available at the time of this assessment, 2,090 cultural resources have been documented within the burn perimeter, with the following breakdown:

- ❖ 24 sites have been formally listed on the National Register of Historic Places (NRHP).
- ❖ 18 sites have been determined to be eligible for the NRHP
- ❖ The remaining resources (2,013) have not been evaluated to determine their eligibility for the NRHP and are considered potentially eligible.

Interim #2: There are 126 total sites within the perimeter of the Creek Fire 2 analysis area. This includes 14 in the high and moderate Soil Burn Severity. Due to time, a strategy of visiting high burn severity and significant cultural assets was used and only 32 sites were physically field assessed. Threats to these sites include erosion, hazard trees falling and damaging features, loss of eligibility from other BAER treatment measures, loss due to looting and damage from cattle on fragile site surfaces.

For Part 2 of the Creek Fire assessment, 126 cultural resources have been documented within the analysis area, with the following breakdown:

- ❖ 5 sites have been formally listed on the National Register of Historic Places (NRHP).
  - ❖ 7 sites have been determined to be eligible for the NRHP
  - ❖ The remaining resources (104) have not been evaluated to determine their eligibility for the NRHP and are considered potentially eligible.
- *Risk Assessment for Cultural Resources:* The probability of cultural resource damage or loss ranges among the sites assessed from high to very high because of the threats described above. The magnitude of the consequence is moderate to major. **The overall risk is high to very high.**  
The risk assessment is the same for the cultural resources in the Interim #2 assessment area.
  - *Treatments for Cultural Resources:* Due to these findings, treatments are recommended for some of the high risk sites for both assessment areas.

## B. Emergency Treatment Objectives

- Provide for public safety
- Limit damage to property
- Limit loss of soil productivity and provide for natural vegetative recovery
- Early detection and rapid response of nonnative invasive plants
- Road and trail treatments to protect investment in infrastructure and limit post-fire watershed response
- Conserve threatened and endangered species habitat

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

- **Land:** EDDR: N/A; other land treatments 80%
- **Channel:** n/a
- **Roads/Trails:** See write up for priorities/tiers

## D. Protection/Safety

Table 15. Probability of Treatment Success			
Type of Treatment	Time After Treatment		
	1 year	3 years	5 years
Land	85	95	100
Channel	n/a	n/a	n/a
Roads/Trails	85	95	100
Protection/Safety	90	100	100

## E. Cost of No-Action (Including Loss)

Using VAR Lite Cost/Benefit tool, Unacceptable risks to life and safety, and Forest assets such as roads, trails and Dev. Recreation areas. Loss of use of roads, trails and Dev. Recreation areas. Loss of access for Private landowners and Southern California Edison, Forest staff and users. Cost/Benefit spreadsheet is included in 2500-8 approval package.

Table 16. Cost of No-Action	
Total Treatment Cost	\$ -
Expected Benefit of Treatment	\$13,568,000
Implied Minimum Value	\$ -

## F. Cost of Selected Alternative (Including Loss)

Using VAR Lite Cost/Benefit tool: Costs are justified. Along with minimizing risks to Life and Safety. Cost/Benefit spreadsheet is included in 2500-8 approval package.

Table 17. Cost of Selected Alternative	
Total Treatment Cost	\$ 6,425,000
Expected Benefit of Treatment	\$ 13,568,000
Implied Minimum Value	\$ 15,706,607

## G. Skills Represented on Burned-Area Survey Team

Table 18. BAER Team Skills				
<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/Botany	<input checked="" type="checkbox"/> Recreation	<input checked="" type="checkbox"/> Fisheries/Aquatics	<input checked="" type="checkbox"/> Wildlife	<input checked="" type="checkbox"/> Trails
<input checked="" type="checkbox"/> Other: PAO	<input checked="" type="checkbox"/> Geology			
Table 19. BAER Team Members by Skill*				
Skill	Team Member Name			
Team Lead(s)	Todd Ellsworth. <a href="mailto:todd.ellsworth@usda.gov">todd.ellsworth@usda.gov</a> ; Phone(s) 760-937-2033			
Assistant Lead(s)	Jim Frazier, Robin Eliason (Logisitics/Admin)			
Forest BAER Coordinator	Antonio Cabrera. <a href="mailto:antonio.cabrera@usda.gov">antonio.cabrera@usda.gov</a> ; 559-297-0706 ext. 4842			
Soils	Sam Prentice, Ryan Adams, Tom Giambra			
Geology	Alan Gallegos			
Hydrology	Tracy Weddle, Andy Stone, Mike Wiese			
Engineering	Antonio Cabrera, Pablo Gonzalez, Sandy Tarvin, Lisa Bonilla			
GIS	Mark Schug			
Archaeology	Kathy Strain, Megan Krietsch, Allison Stevenot, Jim Moak, Melinda Benton, Jennifer Leonard			
Botany/Weeds	Joanna Clines, Kirsten Bovee			
Recreation	Cori Hayth, Chuck James, Kevin Woods, Curtis Kvamme			
Hazmat	Casey Shannon			
Wildlife	Theresa Lowe			
Aquatic Wildlife	Anae Otto, Steve Holdeman			
PAO	Cathleen Thompson			
*Team Members participating in the Part 2 assessment are indicated in red font; they were also part of the Part 1 team.				

## H. Treatment Narratives

### Land Treatments

#### 1) Land Treatment #1: Invasive and Noxious Weeds Early Detection and Response

Because a 306,659 acre fire with 358 miles of fireline and dozens of event points on NFS lands is more than the Forest could survey and treat with EDRR, the following land treatments describe a sampling and prioritization strategy that will be developed into an implementation plan for 2021.

Land Treatment 1a - Fire Suppression-Related Early Detection, Rapid Response: Early Detection and Rapid Response (EDRR) treatments are proposed for suppression related disturbance features including 203

miles of dozer line, 111 miles of road as line, and 44 miles of hand lines. Because is unrealistic to conduct EDRR on a total of 358 miles of fire line in one year, a sampling of firelines will be surveyed as follows:

- At least 35% of dozer lines will have EDRR.
- Some lengths of road as line are lower priority than others (e.g., where fuels were cleared by hand rather than heavy equipment). Where road as line is traveled to access dozer lines or handlines, higher priority road as line where dozers cleared alongside the road will be surveyed. The proportion of road as line that can be covered is unknown.
- Lines that traversed known infestations of invasive weeds will be high priority (e.g., yellow starthistle and medusahead in the Beal Fire Road and Burrough Mountain area).
- A sampling of at least 30% of event points such as dozer push areas, drop points, helispots and staging areas will be surveyed.

Rapid response week control will be manual, except where NEPA has been done for the use of herbicides. Herbicide treatments are proposed to treat approximately 20 acres of invasive plant species associated with suppression activities (as per guidance in FSM and other BAER direction) (see [herbicide treatment table](#)).

Survey work will include documentation and hand pulling new invasive plant occurrences at the time of inspection. New invasive plant occurrences will be pulled to root depth, placed in sealed plastic bags, and properly disposed.

*Documentation:* New infestations will be documented by:

- Mapping perimeter of new infestations
- Describing methods
- Filling out Invasive Plant Occurrence Form (Appendix A)
- Filling out Invasive Plant Eradication Form (Appendix B)
- Incorporating data into local GIS spatial database
- Entering data into National Resource Information System (NRIS) database
- Entering data into FACTS database
- Evaluating success of treatment in subsequent inspections

Invasive plant control will be considered warranted weeds are found:

- Species known to be invasive in that habitat type
- Species that is not widespread throughout the immediate area
- Species that is feasible to effectively control by manual methods (cutting, clipping seed heads, hand-pulling).

*Treatment Timing for both Parts 1 and 2:* The invasive plant detection survey should will vary depending on temperatures and the timing of rainfall, so should be determined by a qualified botanist and timed to maximize the success of detection and control.

Table 20. Land Treatment 1a - Suppression-Related Early Detection, Rapid Response (EDRR)				
Item	Unit	Unit Cost	# of Units	Cost
<b><i>Invasive Plant Detection &amp; Treatment</i></b>				
GS-6 Bio Tech Crew Members (4 people)	Days	\$186	220	\$40,920
<b><i>Administration, Travel, and Materials</i></b>				
1 GS-11 Botanist (hiring, training, supervising, agreements, coordination)	Days	\$400	5	\$2,000
2 4WD trucks (lease or holdover)	Months	\$1,000	3	\$3,000
Vehicle miles at \$0.58/mi; ave. trip 100 mi./day	Days	\$58	42	\$2,436
Supplies	Each	\$1,000	1	\$1,000
<b>Total Cost</b>				<b>\$49,356</b>

Interim #2 Assessment: Land Treatment 1a (Part 2) - Fire Suppression-Related Early Detection, Rapid Response: Early Detection and Rapid Response (EDRR) treatments are proposed along approximately 20 miles of road as line used for suppression, 8 miles of dozer line, at 14 event points where soil disturbance occurred and/or people concentrated, and along a sampling of the 24 miles of hand line within the analysis area. Weed control will be manual, unless herbicide treatment is indicated for the small areas of Creek II that are covered under NEPA. Any herbicide treatment for areas in the Part 2 area would be included in the costs displayed in herbicide treatment table that follows.

<b>Table 21. Land Treatment 1b (Part #2) - Suppression-Related* Early Detection, Rapid Response (EDRR) in Part 2 Analysis Area</b>				
<b>Item</b>	<b>Unit</b>	<b>Unit Cost</b>	<b># of Units</b>	<b>Cost</b>
<b><i>Invasive Plant Detection &amp; Treatment</i></b>				
GS-6 Bio Tech Crew Members	Days	\$186	40	\$7,440
<b><i>Administration, Travel, and Materials</i></b>				
GS-11 Botanist (hiring, training, supervising, agreements, coordination)	Days	\$400	4	\$1,600
Vehicle miles at 0.58/mi; ave. trip <b>150 mi./day</b>	Days	\$87	10	\$870
M&IE for field locations requiring camping	Days	\$50	30	\$1,056
Supplies	Each	\$200	1	\$300
<b>Total Cost</b>				<b>\$11,266</b>
<i>*Treatment Along Firelines and at Event Points</i>				

Land Treatment 1b and 1c - Burned Area-Related Early Detection, Rapid Response Treatment: Early Detection and Rapid Response treatments are proposed within the burned area in areas with high probability for non-native invasive species introductions or expansion. Priority areas for EDRR include vulnerable low-elevation habitat types, fuel breaks, riparian areas, and stands of FS sensitive tree anemone and associated species. To a certain extent, random areas will be surveyed. Control will be manual unless invasive weeds are found in sites with previous NEPA, thus up to 23 acres of herbicide treatment is proposed.

<b>Table 22. Land Treatment #1b - Burned Area-Related Early Detection and Rapid Response</b>				
<b>Item</b>	<b>Unit</b>	<b>Unit Cost</b>	<b># of Units</b>	<b>Cost</b>
<b><i>Invasive Plant Detection &amp; Treatment</i></b>				
GS-6 Bio Tech Crew Members (4 people)	Days	\$186	120	\$22,320
<b><i>Administration, Travel, and Materials</i></b>				
1 GS-11 Botanist (hiring, training, supervising, agreements, coordination)	Days	\$400	3	\$1,200
2 4WD trucks (lease or holdover)	Months	\$1,000	2	\$2,000
Vehicle miles at \$0.58/mi; ave. trip 100 mi./day	Days	\$58	14	\$812
Supplies	Each	\$500	1	\$500
<b>Total Cost</b>				<b>\$26,832</b>

Interim #2 Assessment: Land Treatment 1b (Part 2) - Burned Area-Related Early Detection, Rapid Response Treatment: EDRR treatments are proposed within the burn, away from suppression activities, in areas with high probability for invasive plant introductions or expansion. Priority will be near areas where seeds may have originated (resorts, campgrounds, trailheads, trails, pack stations) and 3-5 days of randomly selected transects, locations to be specified in the BAER Implementation Plan.

<b>Table 23. Land Treatment 1b (Part 2) - Burned Area-Related Early Detection and Rapid Response in Part 2 Assessment Area (Primarily Wilderness)</b>				
<b>Item</b>	<b>Unit</b>	<b>Unit Cost</b>	<b># of Units</b>	<b>Cost</b>
<b><i>Invasive Plant Detection &amp; Treatment</i></b>				

<b>Table 23. Land Treatment 1b (Part 2) - Burned Area-Related Early Detection and Rapid Response in Part 2 Assessment Area (Primarily Wilderness)</b>				
<b>Item</b>	<b>Unit</b>	<b>Unit Cost</b>	<b># of Units</b>	<b>Cost</b>
GS-6 Bio Tech Crew Members	Days	\$186	40	\$7,440
<b>Administration, Travel, and Materials</b>				
GS-11 Botanist (hiring, training, supervising, agreements, coordination)	Days	\$400	5	\$2,000
Vehicle miles at 0.58/mi; <b>ave. trip 150 mi./day</b>	Days	\$87	12	\$1,044
Commercial stock support for surveys in Ansel Adams, Kaiser, and John Muir Wilderness areas - either with SNF stock support or commercial packer.	One way trip	\$500	10	\$5,000
M&IE for field locations requiring camping, including wilderness trips	Days	\$50	30	\$1,500
Supplies	Each	\$500	1	\$500
<b>Total Cost</b>				<b>\$17,484</b>

<b>Table 24. Land Treatment 1b - Herbicide Treatment (for Both Part 1 and Part 2)</b>				
<b>Item</b>	<b>Unit</b>	<b>Unit Cost</b>	<b># of Units</b>	<b>Cost</b>
<b>Herbicide Treatment</b>				
Herbicide Contract for treatment of approx. 43 acres of invasive weeds @ approx \$300/acre	Contract	\$15,000	1	\$15,000
<b>Administration</b>				
1 GS-11 Botanist (agreements, coordination)	Days	\$400	10	\$4,000
<b>Total Cost</b>				<b>\$19,000</b>
<i>Herbicide treatment of invasive weeds spreading from suppression features (approx. 20 acres) or found in the burned area away from suppression features (23 acres) – where NEPA was completed prior to the Creek Fire.</i>				

## 2) Land Treatment #2: Cultural Resources Protection Treatments

Treatments needed for cultural sites include using existing dead trees along contours to keep artifact/features/soil from going off the edge or moving dramatically. Remove hazard trees that may strike fragile features. Replace previous vehicle barriers that burned. It is recommended to close high/moderate SBS burn area to public and grazing to protect sites from looting and fragile site surfaces.

<b>Table 25. Land Treatment #2: Cultural Treatments Land Treatments</b>				
<b>Item</b>	<b>Unit</b>	<b>Unit Cost</b>	<b># of Units</b>	<b>Cost</b>
Erosion Control	Each	1,067	7	\$7,475
Hazard Tree Removal	Each	725	3	\$2,175
Vehicle Barrier Replacement	Each	1,850	2	\$3,700
High/Moderate SBS Public/Grazing Closure	-	-	-	TBD
<b>TOTAL</b>				<b>\$13,350</b>

### **Interim #2 Assessment: Land Treatment #2a (Part 2): Cultural Resources Protection Treatments**

Treatment was only recommended for one site within this analysis area. This treatment was to strategically disperse a combination of existing heavy and light materials from the area in and around a drainage channel to prevent/lessen the potential for erosion within a significant cultural property, which would impact the sites constituents. This treatment was already implemented by an available unit, and only requires funding for the monitoring of the treatment's effectiveness. Section 106 clearance and monitoring for other disciplines (i.e. roads) BAER treatments is required.

### **Channel Treatments**

No channel treatments are proposed for the Creek Fire.



## Roads and Trail Treatments

### 1) ROADS

#### Road Treatment Summary

Road drainage features are at risk from adjacent burned watersheds. Increased runoff and sediment from the burned areas can negatively affect the road prism, damaging the road, eroding land downslope of the road and routing flow and sediment directly to stream channels. Road failure can also contribute to failure of infrastructure downstream. Culverts associated with these roads are at risk of plugging from debris carried down channels from burned watersheds. Proposed road treatments include: drainage structure cleaning, reestablishing rolling dips and leadoff ditches, installation of overside drains, culvert removal and upsizing, reshaping low water crossings, installation of riprap armoring and spillways, culvert inlet basin cleaning, berm removal, outsloping, and riprap armoring at strategic locations. Approximately 543 miles of Forest Service roads are proposed for treatments that are in the High to Moderate burn severity areas.

Property (ML 4 and ML 3 Roads): Proposed BAER treatments to mitigate the emergency to invested road improvements, road functions, and assure access are; restore drainage functions on selected locations, enlarge inlet catch basin, culvert inlet modifications (metal end sections), over-side drains w/flume to protect fill slopes.

Property (ML 2 Roads): Proposed BAER road treatments to mitigate the emergency to road improvements, road functions, and assure access to road users in segments of high burned severity on ML-2 roads are; Installing drainage armor (riprap), critical dips, armor dips, over size drains w/flume to protect fill slopes, armor low water crossings, culvert inlet modifications (metal end sections and risers), and restore drainage functions on some segments.

#### Accepted BAER road treatments along these road segments include:

- ❖ Entrance Barriers on (ML 1 roads).
- ❖ Install Drainage Armor (class 2).
- ❖ Hazard Tree Removal (selected locations).
- ❖ Install Critical Dips.
- ❖ Install Over-side Drains (for road fill protection).
- ❖ Install Low Water Crossing w/ Drainage Armor (class 2).
- ❖ Install Culvert Inlet Modifications (metal end sections & risers).
- ❖ Restore Drainage Functions (culvert inlets and outlets, roadway ditch lines rolling dips and water bars w/ run-off-ditch, maintain cross slopes of roads in-slope & out-slope).
- ❖ Storm Inspection and Response.

#### Treatment Objectives

The primary objectives of the road and infrastructure treatments are to:

- a. Protect and stabilize Forest Service infrastructure at risk of damage as a result of increased sedimentation, stream diversion, and erosion from the fire.
- b. Reduce risk to water quality and other natural resources by reducing risk of infrastructure contamination, damage, and failure.
- c. Mitigate public safety hazards along NFS roads.
- d. Reduce risk to downstream infrastructure where possible.
- e. Protect road crews from the threat of falling trees.

An excel spreadsheet is available that details costs per treatment and costs per road per maintenance level.

### Road Treatment Prioritization

Based on limited time before winter, and the large number of roads within the fire area, the Forest and BAER team prioritized roads for treatment. Access to Private land, Southern California Edison (SCE) infrastructure and Develop Recreation Sites are mainly on ML 4 and 3 roads.

The ML 4 and 3 roads were identified as the SNF's highest priority for treatment implementation prior to adverse winter weather and conditions. Due to high demand and use, potential post-fire erosional impacts, and limited available time for completion of treatment implementation; complete Fall 2020. Storm proofing on ML 2 roads is the next priority, which the Forest believes the majority can be accomplished in Fall 2020 also. Completing storm proofing on ML 2 roads in Jose Basin is a priority over other ML 2 roads. Road treatments in Jose Basin will limit the hydrologic response to heritage sites and critical wildlife habitat.

Minaret road (Forest Hwy. 81), Stump Springs road (Forest Hwy. 5), Grizzly Road, and 8S08 (railroad grade) are the highest priority for treatment; they provide critical access to SCE infrastructure and Developed Recreation Sites and other Forest management activities.

Storm proofing native surface ML-2 roads will reduce post-fire hydrologic response. Closing the roads will not mitigate expected impacts from post-fire runoff and increased debris. Hydrologic damage is likely to occur without treatment due to culverts plugging, water overtopping the road damaging the road prism. Modifying the road prism through critical dips and ensuring existing rolling dips and lead-offs are fully functional to pass expected increases in post-fire flows is the minimum necessary to achieve risk reduction objectives.

Road treatments in the Portuguese Creek watershed have a secondary benefit of limiting hydrologic response and sediment to Portuguese Creek which contains Lahontan Cutthroat trout.

ML 4 Roads: There are approximately 46 miles of ML 4 roads within or downstream of Moderate and High severity areas proposed for treatment. They include: 04S081, 07S005 and 08S051. *Proposed Treatment costs for ML 4 roads: \$943,905*

ML 3 Roads: There are approximately 38 miles of ML 3 roads (45 roads) within or downstream of Moderate and High burn severity areas proposed for treatment. *Proposed treatment costs for ML 3 roads: \$437,880.*

ML 2 Roads: There are approximately 390 miles (211 roads) within or downstream of Moderate and High burn severity areas proposed for treatment. *Proposed treatment costs for ML 2 roads: \$2,427,992.*

The Forest has worked diligently with contracting and potential contractors that are on IDIQ contracts. Through experience, they believe they can accomplish 30 miles a day utilizing 4-5 contractors completing the work in a timely manner.

The Forest received \$410,264 in the initial 2500-8 these costs are reflected in Table 26. However, this amount is subtracted out in the Engineering spreadsheet and BAER spreadsheet to avoid double subtraction as the BAER spreadsheet does it automatically.

Specialist costs for clearances and resource protection during road treatment implementation are reflected in the overhead costs.

See the Engineering spreadsheet for additional information.

**a) Road Treatment #1: Road Storm-Proofing/Stabilization**

Based on limited time before winter, the Forest and BAER team prioritized roads for treatment.

ML4, ML3 and ML2 (arterials) were identified as the SNF's highest priority for treatment implementation prior to adverse winter weather and conditions. Since these roads provide access over 50% of the Bass Lake Ranger District and 35% of the High Sierra Ranger District, potential post-fire erosional impacts, and limited available time for completion of treatment implementation; complete Fall 2020. This work will be accomplished through contractor equipment and labor. In addition, this treatment includes felling of hazard trees in forested areas that pose a threat to crews

<b>Table 26. Priority 1 Roads for Treatment</b>				
<b>Item</b>	<b>Unit</b>	<b>Unit Cost</b>	<b>Quantity</b>	<b>Cost</b>
Install BAER Warning Signs*				
Information Signs*				
Install Critical Dip	EA	\$920	63	\$ 57,960
Install Trash Rack	EA	\$9,100	14	\$127,400
Install Drainage Armor (Class I)	C.Y.	\$275	1277	\$351,230
Increase Inlet Catch Basin	EA	\$445	243	\$108,135
Increase Inlet Catch Basin 42" CMP	EA	\$1,000	91	\$91,000
Install 24" riser	LF	\$2,700	51	\$137,700
Install 36" riser	LF	\$3,500	28	\$98,000
Gate*				
Rock Barrier*				
Install metal end section 18"	EA	\$1,260	99	\$124,740
Restore Drainage Function	Mile	\$3,950	120.2062	\$474,814
Restore Drainage Function (Asphalt)	Mile	\$3,400	45.80	\$155,720
Hazard Tree removal	Day	\$950	15	\$14,250
Storm Inspection and Response*				
Archeological Monitoring**	Day	\$500	8	
Aquatics Monitoring**	Day	\$500	3	
Terrestrial Monitoring**	Day	\$500	2	
Administration	5%			\$87,047
Mobilization	8%			\$139,276
Traffic Control	3%			\$52,228
<b>Subtotal</b>				<b>\$2,019,500</b>
Initial Forest Authorization – Previously approved (reflected in spreadsheet) not counted here				\$ (410,264)
<b>Total</b>				<b>\$2,019,500</b>
* Items previously approved				
** Costs are included in Administration Costs				

ML2 roads (collectors) connecting arteries with main recreation sites (over 50) that provide connection from arteries to recreational sites and timber sale projects were identified as **Priority 2**. The use of these roads is moderate/high. Areas near ridgetops and areas with small flood source areas will be avoided during implementation. The proposal is to implement these treatments after priority 1 is complete in FY21 Q2 and Q3.

Table 27. Priority 2 Roads for Treatment				
Item	Unit	Unit Cost	Quantity	Cost
Install BAER Warning Signs*	EA	\$ 575		
Information Signs*	EA	\$ 460		
Install Critical Dip	EA	\$ 920	189	\$173,880
Install Drainage Armor (Class I)	C.Y.	\$ 310	160	\$49,600
Increase Inlet Catch Basin	EA	\$ 400	80	\$32,000
Increase Inlet Catch Basin 42" CMP	EA	\$ 1,000	36	\$36,000
Gate*	EA	\$ 13,500		
Rock Barrier*	EA	\$ 3,900		
Install metal end section 18"	EA	\$ 1,260	42	\$52,920
Restore Drainage Function	Mile	\$ 4,000	225.74	\$902,957
Hazard Tree removal	Day	\$ 950	15	\$14,250
Storm Inspection and Response*	Day	\$ 1,900		
Archeological Monitoring**	Day	\$ 500	10	
Aquatics Monitoring**	Day	\$ 500	5	
Terrestrial Monitoring**	Day	\$ 500	1	
Administration	5%			\$63,094
Mobilization	8%			\$100,951
Traffic Control	3%			\$37,857
<b>Total</b>				<b>\$1,463,789</b>
* Items previously approved				
** Costs are included in Administration Costs				

Miles of ML2 roads were identified as **Priority 3**. They are at lower risk from post-fire erosional impacts; these roads are mainly needed for the projects already scheduled to for implementation in FY21/22 are low/moderate. Even though lower priority, the protection of these roads is critical since they are the only way to access most of the timber sales and landscape restoration projects scheduled for implementation in FY21/22. Areas near ridgetops and areas with small flood source areas will be avoided during implementation. The recommendation is to implement treatments in FY21 Q3.

Table 28. Priority 3 Roads for Treatment				
Item	Pay Unit	Unit Cost	Quantity	Cost
Install BAER Warning Signs*	EA	\$ 575		
Information Signs*	EA	\$ 460		
Install Critical Dip	EA	\$ 920	144	\$ 132,480
Gate*	EA	\$ 13,500		
Rock Barrier*	EA	\$ 3,900	3	
Restore Drainage Function	Mile	\$ 4,000	84.41	\$ 337,628
Storm Inspection and Response*	Day	\$ 1,900		
Archeological Monitoring**	Day	\$ 500		
Aquatics Monitoring**	Day	\$ 500		
Terrestrial Monitoring**	Day	\$ 500		
Administration	4%			\$ 23,505
Mobilization	8%			\$ 37,609
Traffic Control	3%			\$ 14,103
<b>Total</b>				<b>\$ 545,325</b>
* Items previously approved				
** Costs are included in Administration Costs				

**b) Road Treatments #2: Storm Inspection/Response**

Storm inspection/response will keep culvert and drainage features functional by cleaning sediment and debris from in and around features between or during storms. This work will be accomplished through contractor equipment and labor. Cost includes mobilization, and overhead.

Table 29. Road Treatments #2: Storm Inspection/Response				
Item	Unit	Unit Cost	# of Units	Cost
Storm Inspection and Response	Days	\$2,187	60	\$ 131,250
<b>TOTAL</b>				<b>\$131,250</b>

**Road Treatments – SUMMARY (Interim #1)**

A brief cost/benefit analysis was conducted. Below is a breakdown of cost/mile of roads proposed for treatment and replacement/average road value cost/mile. Based on the analysis, the roads in the Creek Fire's High to Moderate burn areas have a value of over \$98 million. The cost of the recommended treatments to protect that investment and provide for safety is \$4.3 million.

Table 30. Cost/Mile for Sierra National Forest			
Area	Miles Treated	Cost / Mile	Cost of Treatments
Roads in High to Moderate Burned Areas	474	\$8499.18	\$4,028,613

Table 31. Sierra Cost Benefit Matrix – Roads (By Maintenance Level) In High to Moderate Burn Severity Areas					
Maintenance Level	Miles Treated	Cost of Treatments	Average		Potential Value at Risk
			Cost/Mile	Road Value/Mile	
1	7	\$13,125	\$1,875	\$55,000	\$385,000
2	383	\$2,427,992	\$6,130	\$55,000	\$22,335,500
3 & 4	84	\$1,381,785	\$20,087	\$900,000	\$75,600,000
<b>TOTALS</b>		<b>\$4,028,613</b>			<b>\$98,320,500</b>

Note: Contract Administration costs are for Contract Officer Representative (COR) and inspector costs. The Forest will likely bring personnel in from off-forest to assist in this effect.

Table 32. Road Treatment Summary	
Treatments	Cost
Road Stabilization (includes admin. +mob)	\$4,028,613
Storm Inspection and Response	\$ 131,000
<b>TOTAL</b>	<b>\$4,159,613</b>

**Road Treatments – Part 2 Assessment area***Proposed BAER Treatments*

- ❖ Place Drainage Armor
- ❖ Construct Critical Dips
- ❖ Restore Drainage Functions (culvert inlets and outlets, roadway ditch lines rolling dips and water bars w/ run-off-ditch, maintain cross slopes of roads in-slope & out-slope)
- ❖ Storm Inspection and Response.

The probability of these accepted and economically proposed road treatments is at the 80 to 90 percent success rate, dependent on the 2020/21 winter storm cycles and implementation schedule.

**Property (ML 4 and ML 3 Roads)** - Proposed BAER treatments to mitigate the emergency to invested road improvements, road functions, and assure access are; restore drainage functions on selected locations and install drainage armor on critical dips.

#### **Road Treatment #4 (Part 2): Road Storm-Proofing/Stabilization**

This work will be accomplished through contractor equipment and labor. Costs include mobilization, and overhead (including specialist costs).

<b>Table 33. Road Treatments #4 (Part 2) Road Stabilization Treatment</b>	
<b>Treatments</b>	<b>Cost</b>
Storm Proofing (5.3 miles)	\$40,875.00
<b>Total</b>	<b>\$ 40,875.00</b>

#### **Road Treatments #5 (Part 2): Storm Inspection/Response**

Storm inspection/response will keep culvert and drainage features functional by cleaning sediment and debris from in and around features between or during storms. This work will be accomplished through contractor equipment and labor. Cost includes mobilization, and overhead.

<b>Table 34. Road Treatments #5 (Part 2): Storm Inspection/Response</b>				
<b>Item</b>	<b>Unit</b>	<b>Unit Cost</b>	<b># of Units</b>	<b>Cost</b>
Storm Inspection and Response	Days	\$2,188	3	\$ 6,562
<b>TOTAL</b>				<b>\$6,562</b>

#### **Road Treatments – SUMMARY FOR INTERIM #2**

A brief cost/benefit analysis was conducted. Below is a breakdown of cost/mile of roads proposed for treatment and replacement/average road value cost/mile. Based on the analysis, the roads in the Creek Fire's High to Moderate burn areas have a value of over \$3.1 million. The cost of the recommended treatments to protect that investment and provide for safety is \$51,562.

<b>Table 35. Summary - Cost/Mile for Interim #2 Road Treatments</b>			
<b>Area</b>	<b>Miles Treated</b>	<b>Cost of Treatments</b>	<b>Cost / Mile</b>
Roads Within the Burned Area with High to Moderate	5.3	\$ 51,562	\$ 9,729

<b>Table 36. Sierra Cost Benefit Matrix – Interim #2 Road Treatments</b>					
<b>Areas</b>	<b>Miles Treated</b>	<b>Cost of Treatments</b>	<b>Average</b>		<b>Potential Value at Risk</b>
			<b>Cost/Mile</b>	<b>Road Value/Mile ML 3 &amp; 4</b>	
Roads Within the Burned Area with High to Moderate	5.3	\$ 51,562	\$ 9,729	\$600,000	\$3,180,000

<b>Table 37. Road Treatment Summary – Interim #2 Road Treatments</b>	
<b>Treatments</b>	<b>Cost</b>
Road Stabilization	\$40,875
Storm Inspection and Response	\$6,562
<b>TOTAL</b>	<b>\$47,437</b>

## **2) TRAILS**

### **Trail Treatment Summary**

Trail (non-motorized trails) treatment work will include the installation of drainage features (out sloping, rolling grade dips, water bars) and snagging trees as appropriate for worker safety. This work is necessary

to protect the trail asset by diverting anticipated increases in surface runoff off the trail. This request also includes felling of hazard trees along the portion of trail to be worked on in order to mitigate safety concerns as necessary. The trail work will be conducted by contract crews (ACE, CCC or other) and administered and supervised by Forest Service personnel.

**a) Non-Motorized Trail Treatment #1**

Trail treatments are recommended for sections of trail deemed most at risk, when those treatments can be accomplished in a timely manner.

To provide for implementation crew safety, hazard trees should be removed at sites where crews need to camp. All recommended trail treatments include log outs necessary to make the work sites accessible and to allow for safe crew egress in case of emergency.

Due to intense dry raveling and immediate concern of rock fall and/or slumping damaging or closing the trail, trail condition surveys will be needed to perform updated and ongoing trail status monitoring. The trail condition surveys should be conducted after significant weather events. Minor post-fire related issues should be corrected and repaired by the condition survey crew with more severe issues being documented and reported in order to prepare a response strategy.

After field assessments; Treatment sections within areas of mostly high and moderate burn severity with slopes where watershed response is expected to be high and trail impacts likely were selected. The trail sections selected are located within high and moderate burn severity areas in steep terrain with little to no ground cover or vegetation remaining after the fire. Trails currently have sections that are incised and conducive to channelization of runoff furthering erosion and need additional drainage features installed. Trail storm proofing and grade stabilization of 94 miles of the trail has been identified to prevent loss of trail tread, trail structure and to reduce soil erosion on slopes. Prior to implementation of treatments, trail specialists will perform specific trail surveys on identified trails. The result of the survey will dictate subsequent detailed storm proofing treatment recommendations and identification of hazard trees in need of removal for crew safety. The trails will be monitored post-implementation after winter rain season to determine effectiveness and maintenance needs, and if additional treatments are necessary.

Based on limited time before winter, the Forest and BAER team prioritized trails for treatment.

Ten non-motorized trails were identified as the SNF's highest priority for treatment implementation prior to adverse winter weather and conditions. Due to high demand and use, potential post-fire erosional impacts, and limited available time for completion of treatment implementation; complete Fall 2020.

<b>Table 38. Priority 1 Trails</b>		
<b>Trail</b>	<b>Trail name</b>	<b>Miles</b>
24E01	Isberg	3.63
24E12	Fernandez Access	0.45
24E25	Norris Lake	0.58
24E41	Frog Meadow	0.72
25E43	Huntington Shore	1.24
25E44	Black Point NRT	0.6
26E01	Mammoth	5.5
27E44	Rattlesnake Creek	3.09
<b>TOTAL</b>		<b>15.81</b>

Ten trails that are at risk from post-fire erosional impacts were identified as **Priority 2**. The demand and visitor use are moderate/high. Areas near ridgetops and areas with small flood source areas will be avoided during implementation. The proposal is to implement these treatments after priority 1 trails are complete in Fall 2020 and in Spring/Summer 2021.



Table 39. Priority 2 Trails		
Trail	Trail Name	Miles
24E03	California Riding and Hiking	13
24E08	Shuteye Pass	2.85
24E20	Walton	2.28
24E26	Miller Meadow	1.28
24E40	Clover Meadow	1.5
25E01	Stevenson	2.5
25E04	Cora Creek	2.28
25E07	Pack Station	1.62
25E36	Hells Half Acre	1.52
25E41	Marys Meadow	1.73
26E06	Kaiser Loop	9.95
<b>TOTAL</b>		<b>44.55</b>

Six trails were identified as **Priority 3**. They are at lower risk from post-fire erosional impacts; demand and visitor use are low/moderate. Areas near ridgetops and areas with small flood source areas will be avoided during implementation. The recommendation is to implement treatments in spring/summer 2021

Table 40. Priority 3 Trails		
Trail	Trail name	Miles
25E08	Coursegrass Meadow	4.21
25E60	Mammoth Pool Dam	1.91
26E16	French	21.5
26E38	Miller Creek	2.5
26E39	McCreary Cutoff	0.55
26E63	Millers Crossing	3.87
<b>TOTAL</b>		<b>34.51</b>

See treatment map for specific trail treatment locations identified.

**b) Trail Treatment #1: Storm-Proofing of Non-Motorized Trails**

Trail stormproofing involves cleaning or armoring of existing drainage structures to help ensure Trail drainage performs optimally. This work will be accomplished through contractor equipment and labor. Storm proofing treatment including repair and cleanout of existing drainage structures (rock, log, dips), and as needed add drainage structures (rolling dips), armor drainage outlets, out slope tread, remove berms, tread dry raveling/debris removal, clear (buck out) down trees. In addition, this treatment includes felling of hazard trees in forested areas that pose a threat to crews. Specialist clearances and implementation monitoring (where needed) are included in the Overhead costs.

Table 41. Trail Treatments #1: Storm-Proofing of Non-Motorized Trails				
Item	Unit	Unit Cost	# of Units	Cost
<b>Trail Storm-Proofing Priority 1</b>				
Implementation layout, Storm proofing - trail stabilization treatments. (includes Mobilization) – <b>Adjusted per WO review</b>	Miles	\$2,420	15.81	\$37,994
<b>TOTAL – Priority 1</b>				<b>\$37,994</b>
<b>Trail Storm-Proofing Priority 2</b>				
Implementation layout, Storm proofing - trail stabilization treatments. (includes Mobilization)	Miles	\$1,431	44.5	\$63,700
Hazard Tree Felling – mitigation for the crew, including camp	Lump	\$22,000	1	\$22,000
<b>TOTAL – Priority 2</b>				<b>\$85,700</b>
<b>Trail Storm-Proofing Priority 3</b>				

<b>Table 41. Trail Treatments #1: Storm-Proofing of Non-Motorized Trails</b>				
Implementation layout, Storm proofing - trail stabilization treatments. (includes Mobilization)	Miles	\$1780	34.5	\$61,425
Hazard Tree Felling – mitigation for the crew, including camp	Lump	\$12,000	1	\$12,000
<b>TOTAL – Priority 3</b>				<b>\$73,425</b>
<b>GRAND TOTAL</b>				<b>\$197,119</b>

**c) Trail Treatment #2: Storm Inspection/Response for Non-Motorized Trails**

This treatment involves cleanout of drainage structures after major storm events, document. Storm inspection/response of treated trails will keep drainage features on trails functional by cleaning sediment and debris from in and around features, conduct minor trail repair and maintenance, between or during storms. This work will be accomplished through force account.

<b>Table 42. Trail Treatment #2: Storm Inspection/Response for Non-Motorized Trails</b>				
Item	Unit	Unit Cost	# of Units	Cost
Storm Response + response – GS-7 Trails	Days	\$ 300	20	\$6,000
<b>Total</b>				<b>\$6,000</b>

**d) Treatment #4 – Stabilization/Storm Proofing of Non-Motorized Trails for Interim #2 Assessment Area**

Recommended measures include storm-proofing, hazard tree mitigation, and storm inspections. Overhead costs include specialist time for clearances and implementation monitoring (if needed).

<b>Table 43. Property/Protection/Safety Treatment #4: Non-Motorized Trails (Part 2 Assessment Area)</b>								
Trail #	Trail Name	Miles	Treatment Type	Crew (days)	Crew (#)	Crew Cost/ Person*	Total Cost	Priority #
24E05	Jackass Lakes	2.68	SP	2	5	\$ 350	\$ 3,500	1
27E44	Rattlesnake	3.23	SP	3	5	\$ 350	\$ 5,250	2
27E24	Mono Crossing/ Rattlesnake TH (7S80)	0.5	HT	2	5	\$ 350	\$ 3,500	1
Hazard Tree Mitigation (Trails)			HT	0	5	\$ 350	\$ -	
Hazard Tree Mitigation (Crew Camp)			TM	0	5	\$ 350	\$ -	
Storm Inspections/response			TM	2	5	\$ 350	\$ 3,500	
<b>Total</b>		<b>6.41</b>	<b>Total</b>	<b>9</b>		<b>Total</b>	<b>\$ 15,750</b>	
<b>Overhead 10%</b>							<b>\$ 1,575</b>	
<b>Mobilization 20%</b>							<b>\$ 3,150</b>	
<b>Grand Total</b>							<b>\$ 20,475</b>	
<i>* Includes salary/per diem/mileage (\$1750/day Crew Costs)</i>								
<b>Treatment Types</b>								
<b>SP</b> - Storm proofing treatment including repair and cleanout of existing drainage structures (rock, log, dips), and as needed add drainage structures (rolling dips), armor drainage outlets, out slope tread, remove berms, tread dry raveling/debris removal, clear (buck out) down trees.								
<b>TM</b> - Trail monitoring and patrol including cleanout of drainage structures after major storm events, conduct minor trail repair and maintenance.								
<b>HT</b> - Hazard tree mitigation								
<b>Notes:</b> 2 trails identified as high priority treatment (5.9 miles) and Mono Crossing/Rattlesnake Trailhead (27E24/FR-7S80 Portal Forebay)								

Table 43. Property/Protection/Safety Treatment #4: Non-Motorized Trails (Part 2 Assessment Area)								
Trail #	Trail Name	Miles	Treatment Type	Crew (days)	Crew (#)	Crew Cost/ Person*	Total Cost	Priority #
<b>Trail Storm Proofing Treatment Priority</b>								
<b>Priority 1: \$9,100 (2 Trails)</b> - Highest Forest priority for treatment implementation prior to adverse winter weather and conditions; due to high demand and use, potential post-fire erosional impacts, and limited available time for completion of treatment implementation; complete Fall 2020.								
<b>Priority 2: \$6,825 (1 Trail)</b> - At risk from post-fire erosional impacts; demand and visitor use is moderate/high; implement after priority 1 trails are complete Fall 2020 and Spring/Summer 2021.								
<b>Priority 3: \$0 (0 Trails)</b> - Lower risk from post-fire erosional impacts; demand and visitor use low/moderate; implement spring/summer 2021.								
<b>Note:</b> Priority 1, 2, and 3 costs above include 30% overhead and mobilization costs.								

## Protection/Safety Treatments

### 1) Protection/Safety Treatment #1: Stabilization Treatments for Burned Structure Hazardous Material

The BAER Team surveyed 182 burned structures, 131 have a moderate to high potential for hazardous materials within the burned refuse and ash to move off-site and contaminate soil, waterbodies and streams. To ensure that hazardous materials stay onsite, stabilization treatments are required. These treatments include installing straw wattles, absorbent chemical socks and silt fencing downslope from the burned structures to capture and slow contaminated runoff and sediment originating from the refuse areas. All site work is done by hand crews and treatments are placed just outside of the waste sources. Many of the burned structures are located on slopes along the shoreline of Huntington Lake, a large water body with many beneficial uses, pose an elevated threat to water quality if stabilization treatments are not applied in a timely fashion. These treatments are necessary as final cleanup and refuse removal actions by permit holders may likely take a long period of time or may not be completed before runoff producing storms occur.

#### a) Protection/Safety Treatment #1a: Burned Structure Hazmat Stabilization

*Sites proposed for treatment include:* Huckleberry, Upper- and Lower-Line Creek, Dowville, and Camp Sierra Recreation Residence Tracts; LaSalle, Silver Fir, Kern, Jackass Rock, Olijato, and Mirimichi Organization Camps, and Forest Service Minarets Work Center (Fire Station and residences).

Table 44. Protection/Safety Treatment #1a: Burned Structure Hazmat Stabilization				
Item	Unit	Unit Cost	# of Units	Cost
Hazmat Stabilization Materials (Straw Wattles, Absorbent Chemical sock booms, Silt Fencing and Wood Stakes, Misc. tools and materials, plus contingency at 15%)	Lump Sum	\$ 25,923	1	\$26,083
<b>Labor - Force Account, Forest Service</b>				
GS-7 Crew of 10	\$275 day	10	\$2,750	\$27,500
2 GS-9 Crew leads	\$350 day	10	\$700	\$7,000
GS-11 Implementation lead	\$425 day	10	\$425	\$4,250
GS-11 Forest BAER Coordinator	\$425 day	4	\$425	\$1,700
Vehicle Mileage F.O.R. (4 vehicles)	Miles	\$0.75	2500	\$1,875
<b>TOTAL</b>				<b>\$68,408</b>

#### b) Protection/Safety Treatment #1b: Exposed Septic Tank Pumping - Burned Structures Stabilization

Five septic tanks damaged in the fire associated with burned recreation residence structures and now exposed to surface runoff are filled with waste and need to be pumped as runoff can easily enter the tanks and cause the contents to overflow off site and threaten water quality and cause soil contamination.

*Sites proposed for treatment include:* Kern Organization Camp, Huckleberry Tract and Upper Line Creek Tract, in the Huntington Lake area.

<b>Table 45. Protection/Safety Treatment #1b: Exposed Septic Tank Pumping at Burned Structures</b>				
Item	Unit	Unit Cost	# of Units	Cost
Remove Contents of 5 Septic Tanks & Dispose – Septic Tank Pumping	Lump	\$500	5	\$2,500
Mobilization – 15% - standard for this area	Lump	\$375	1	\$ 375
<b>TOTAL</b>				<b>\$2,875</b>

<b>Table 46. SUMMARY - Protection/Safety Treatments for Burned Structure HazMat Stabilization</b>	
Item	Cost
Treatment #1a (Structure hazmat)	\$68,408
Treatment #1b (Exposed septic tanks)	\$2,875
<b>GRAND TOTAL - HAZMAT</b>	<b>\$71,283</b>

- 2) **Protection/Safety Treatment# 2: Roads - Life and Safety (FS Roads 04S81, 07S005, 08S051, 05S007, 05S047):** Proposed BAER treatments to mitigate the emergency for these roads are: Install BAER warning signs at main entry points of road; install information sign; install entrance barriers on road 25S07 to discourage use; inspect road after damaging storms for debris flows and washouts; identify problem areas; and, respond as needed with personnel and equipment to insure road is safe to access

Life and Safety (ML 2 Roads): Proposed BAER road treatments to mitigate the emergency for ML-2 roads are: install information signs at main entry points of roads; install gates at selected locations; install rock barriers adjacent to existing gates to discourage OHV usage; inspect road after damaging storms for rock fall; debris flows and washouts; identify problem areas; and, respond as needed with personnel and equipment as needed when road opens during Spring time and safe to access.

7 miles of level 1 roads proposed for blocking; potential damage to the road can pose a risk to public safety; Debris flows, and hyperconcentrated flows can overtop culverts washing out the fillslope creating gully's and other hazards.

Accepted BAER road treatments along these road segments include

- ❖ Install Standard Traffic Gates (04S081, 07S005, 06S001, 08S009).
- ❖ Install Information and BAER Warning Signs on (ML 4, ML 3, and ML 2) see map for location.

Costs include mobilization and overhead including specialist costs.

<b>Table 47. Protection/Safety Treatment #2: Roads – Life &amp; Safety</b>	
Treatments	Cost
Install BAER Warning Signs and Information Signs	\$30,000.00
Install Standard Traffic Gate.	\$ 135,000.00
Boulder Barriers	\$13,125.00
<b>Total</b>	<b>\$178,125</b>

**Protection and Safety Treatment #2a: Roads – Part 2 Assessment Area (FS Roads 05S080, 07S001, 09S009, 09S069, 07S079):** The proposed BAER treatment to mitigate the emergency for these roads is: Install BAER warning signs at main entry points of road.

<b>Table 48. Protection/Safety Treatment #2a (Part 2): Roads – Life &amp; Safety</b>	
Treatments	Cost
Install BAER Warning Signs and Information Signs	\$ 2,250
<b>Total</b>	<b>\$ 2,250</b>

- 3) **Protection/Safety Treatment #3: Motorized and Non-Motorized Trails:** Recommended measures include trail closure and signage for the first winter at a minimum to provide for public safety. This could be

accomplished as part of an area closure and should be accompanied by patrolling and monitoring for effectiveness.

<b>Table 49. Protection/Safety Treatment #3a: Non-Motorized Trails</b>				
<b>Item</b>	<b>Unit</b>	<b>Unit Cost</b>	<b># of Units</b>	<b>Cost</b>
<b>Trail Storm-Proofing Priority 1</b>				
Hazard and Warning Signs + labor	Each	\$100	10	\$1,000
<b>TOTAL – Priority 1</b>				<b>\$1,000</b>
<b>Life and Safety Priority 2</b>				
Hazard and Warning Signs + labor	Each	\$100	30	\$3,000
<b>TOTAL – Priority 2</b>				<b>\$3,000</b>
<b>Life and Safety Priority 3</b>				
Hazard and Warning Signs + labor	Each	\$100	12	\$1,200
<b>TOTAL – Priority 3</b>				<b>\$1,200</b>
<b>GRAND TOTAL</b>				<b>\$5,200</b>

Motorized: Treatment includes caution/hazard signs, including the Whiskey ridge area and on the High Sierra District.

<b>Table 50. Protection/Safety Treatment #3b: Non-Motorized Trails</b>				
<b>Item</b>	<b>Unit</b>	<b>Unit Cost</b>	<b># of Units</b>	<b>Cost</b>
Caution/Hazard/Signs – including Whisky Ridge area and High Sierra RD + labor	each	\$100	50	\$5,000
<b>Total</b>				<b>\$5,000</b>

*Interim #2:* Human Life and Safety risk for all trails within burn perimeter can be attributed mostly to unstable trail tread, hazard trees, and rockfall and debris slides. These critical values can be mitigated by trail closure.

Temporary closure of all trails within the Part 2 area is recommended for the 2020/2021 winter and spring seasons. Conditions following any implemented closure period should be re-evaluated to determine if continued trail closure is warranted for ongoing trail user safety and protection of resources.

Issuance of a forest closure order for specific trails or the general fire area and posting of closure and warning signs is recommended for successful implementation of the closure. Prior to the rescinding of any issued closure order(s), trail caution/warning signs should be posted at each trail access point and all trailheads advising users of post-fire trail hazards and potential risks of trail use.

Enforcement of trail closures is essential in ensuring critical values including human life and safety, hydrologic function, soil productivity and native plant community protection are protected. Warning signs are proposed for: 27E33 Mono Crossing/Rattlesnake Cr TH, 24E03 Calif, Ride and Hike Trail, 27E71 Mono Hot Springs, 27E21 Mono Mdw Trail, 24E25 Norris Lake Trail, and 24E05 Jackass Lake Trail.

<b>Table 51. Protection/Safety Treatment #3c (Part 2): Trails (Motorized and Non-Motorized)</b>				
<b>Item</b>	<b>Unit</b>	<b>Unit Cost</b>	<b># of Units</b>	<b>Cost</b>
Caution/Hazard/Signs	each	\$100	15	\$1,500
<b>Total</b>				<b>\$1,500</b>

#### 4) **Protection/Safety Treatment #5: Developed Recreation Sites**

This treatment has several components needed to provide for protection/safety and protection of Forest Service facilities and investments.

Protection/Safety Treatment #5a: Temporary Site Closure And Enforcement

Install appropriate signs, barricades at access points, take appropriate administrative action (Forest Order), open when hazard has been removed or mitigated. Forest Closure Orders and enforcement. Objective is to mitigate safety concerns, and allow for implementation treatments. These sites have a gate that can be closed.

Locations

- *Developed Campgrounds:* Billy Creek, Lower CG, Billy Creek, Upper CG, Bowler CG, Catavee CG, China Bar CG, Clover Mdw CG, Fish Creek CG, Gaggs CG, Granite Creek CG, Little Jackass CG, Lower Chiquito CG, Mammoth Pool CG, Placer CG, Rock Creek CG, Soda Springs CG, Sweetwater CG, Upper Chiquito CG and Whisky Falls CG.
- *Day Use Areas:* Billy Creek Picnic Area, Coyote Sno Park, Dowville Picnic Area, Mile High Vista, Mammoth Pool Boat Launch, Fernandez Trailhead, Ross Cabin, Arch Rock and Redinger Overlook.

Protection/Safety Treatment #5b: Signs – Recreation Sites Closed, Warning Signs, Traffic Barricades

Install warning signs, Closure Signs and traffic control barriers. Objective is to alert public and working personnel to hazards resulting from burned areas.

Protection/Safety Treatment #5c: Treatment Of Hazard Trees (Abatement)

Identify and remove compromised trees adjacent to recreation sites. Protect implementation members, public and recreation site infrastructure from falling trees compromised by fire.

*Tier 1 treatments:* would occur before winter to ensure hazard trees don't damage expensive infrastructure in campgrounds. It's more cost effective to mitigate hazard trees than replace Vault Toilets and other infrastructure.

*Tier 2 treatments:* would occur next spring/summer mitigating the remaining hazard trees for public and worker safety.

Locations

- *Developed Campgrounds:* Bowler Group Camp Gaggs Campground, Granite Creek Campground, Little Jackass Campground, Soda Springs Campground, Sweetwater Campground, and Whisky Falls Campground
- *Day Use Areas:* Fernandez Trailhead and Ross Cabin

Protection/Safety Treatment #5d: Capping and Sealing Exposed Vault Toilets

Remove burned infrastructure to facilitate capping, remove human waste, seal. Objective is to remove damaged infrastructure and mitigate safety concerns at damaged vault toilets

Locations

*Developed Campgrounds:* Bowler Group Campground, Coyote Sno Park, Mammoth Pool CG, Placer CG, Rock Creek Campground, Soda Springs CG and Sweetwater Campground

Protection/Safety Treatment #5e: Campground Gates

Install Gates at Recreation Sites. Objective is to prevent public from traveling into burned Recreation Areas. These site currently do not have gates or barriers.

Locations

- *Developed Campgrounds:* Whisky Falls CG, Placer Campground, Little Jackass Campground, Bowler Group Campground, Coyote Sno Park, Granite Creek Campground, Mammoth Pool Campground and Upper Chiquito Campground.

<b>Table 52. Protection/Safety Treatment #5 Treatment Costs</b>				
<b>Item</b>	<b>Unit</b>	<b>Unit Cost</b>	<b># of Units</b>	<b>Cost</b>
Forest Closure Orders and enforcement (GS-7 & GS-09)	Pay Period	\$6,500	1.5	\$8,500
Closure Signs and installation	Lump	\$500	28	\$14,000
Traffic Control Barriers	Barrier	\$125	60	\$7,500
Gate and Installation	Rec Site	\$9,500	8	\$76,000
Capping/Sealing of vault	Vault	\$800	20	\$16,000
Hazard Tree Mitigation Phase 1 –Winter including mobilization and specialist consultation	Rec Site	\$7,000	9	\$63,000
<b>Adjusted per WO review</b>				
				<b>\$185,000</b>

##### 5) **Protection/Safety Treatment #6: Interagency/Partner/Permittee Coordination**

Many non-Forest Service entities, partners and permittees (*e.g.*, Southern California Edison, Fresno County Department of Public Works, NOAA NWS, NRCS, US Army Corp of Engineers private landowners, etc.) that have infrastructure in the fire area are actively repairing damaged infrastructure and/or implementing mitigations to reduce post-fire damage. The BAER team's findings were shared and will continue to be shared with those entities so that they can plan measures to protect/prepare infrastructure from post-fire watershed response events. This cost is to get the Forest started with coordination and facilitation of emergency treatments from partners and permittees.

The BAER Team participated in the Fresno County post-fire flood Task force and the Cal OES Debris Flow task force. Fresno County is preparing a collaborative Flood response plan that the Forest is participating in developing based on BAER Team results and findings.

The Forest Service plans on continuing to collaborate and communicate with partnering agencies, other entities and organizations and the public.

<b>Table 53. Protection/Safety Treatment #7: Interagency/Partner/Permittee Coordination Treatment</b>				
<b>Item</b>	<b>Unit</b>	<b>Unit Cost</b>	<b># of Units</b>	<b>Cost</b>
GS-11 Forest Hydrologist/Watershed Specialist	Days	\$450	10	\$4,500
<b>Total Cost</b>				<b>\$4,500</b>

##### **Protection/Safety Treatment #7: Treatment Implementation Leader**

The suite of proposed treatments needs dedicated staff to properly guide implementation recommended by the Creek BAER Team.

<b>Table 54. Protection/Safety Treatment #8: Treatment Implementation Leader</b>				
<b>Item</b>	<b>Unit</b>	<b>Unit Cost</b>	<b># of Units</b>	<b>Cost</b>
Team Leader for logistics – salary	Days	\$475	20	\$ 9,500
Per Diem and vehicle costs				\$4000
<b>Total Cost</b>				<b>\$ 13,500</b>

<b>Table 55. Protection/Safety Treatment #8: Treatment Implementation Leader – Creek 2</b>				
<b>Item</b>	<b>Unit</b>	<b>Unit Cost</b>	<b># of Units</b>	<b>Cost</b>
Team Leader for logistics – salary	Days	\$475	5	\$ 2,375
Per Diem and vehicle costs				\$1000
<b>Total Cost</b>				<b>\$ 3,375</b>



**I. Monitoring Narrative****Treatment Effectiveness Monitoring**

Effectiveness Monitoring: Monitoring the effectiveness of the other BAER treatments (as described above) will be used to determine if additional treatments are needed. The 2500-8 report requests funds to monitor the effectiveness of road treatments on Creek Fire roads. The following form or similar form will be filled out to assess the roads.

1) Road Treatment Effectiveness Monitoringa. *Monitoring Questions*

☐ Is the road-tread stable?

☐ Is the road leading to concentrating runoff leading to unacceptable off-site consequences?

b. *Measurable Indicators*

☐ Rills and/or gullies forming of the road

☐ Loss of road bed.

c. *Data Collection Techniques*

☐ Photo documentation of site

☐ Inspection Checklist (attached)

d. *Analysis, Evaluation, And Reporting Techniques*

- ☐ Monitoring will be conducted after storm events. If the monitoring shows the treatment to be ineffective at stabilizing road and there is extensive loss of road bed or infrastructure an interim report will be submitted. A several page report would be completed after the site visit. The report would include photographs and a recommendation on whether additional treatments are necessary.

Road Inspection Checklist (Example)			
Date		Time	
Inspector			
Forest			
Road #/Name			
Portions of Road Inspected			
Describe locations reviewed during inspection			
Road Damage?	Yes	No	
If yes, GPS coordinates of repair site			
Describe damage and cost to repair			
Photo taken of road damage			
Recommended actions to repair			
Other Notes			

Table 56. Monitoring Treatment #1: Road Treatments				
Item	Unit	Unit Cost	# of Units	Cost
GS-11 Engineer or Hydrologist	Day	\$475	5	\$2375
Mileage	LS	\$200	1	\$200
<b>Total Cost</b>				<b>\$2500</b>

2) Recreation Sites Treatment Effectiveness Monitoringa. *Monitoring Questions*

- Are there hazard trees?
- Have condition worsened?

b. *Measurable Indicators*

- Trees uprooting
- Trees failure?
- Property ok?

c. *Data Collection Techniques*

- Photo documentation of site
- Inspection Checklist (attached)

d. *Analysis, Evaluation, And Reporting Techniques*

- Monitoring will be conducted after storm events. If the monitoring shows the treatment to be ineffective at stabilizing Recreation Area and there is damaged infrastructure, an interim report will be submitted. A several page report would be completed after the site visit. The report would include photographs and a recommendation on whether additional treatments are necessary.

Recreation Site Inspection Checklist (Example)			
Date		Time	
Inspector			
Forest			
Site Name			
Area Inspected			
Describe locations reviewed during inspection			
Damage?	Yes	No	
If yes, GPS coordinates of repair site			
Describe damage and cost to repair			
Photo taken of damage			
Recommended actions to repair			

Table 57. Monitoring Treatment #2: Developed Recreation Sites				
Item	Unit	Unit Cost	# of Units	Cost
GS-7 Recreation Technician	Day	\$300	10	\$3,000

3) Hazmat containment Effectiveness Monitoringa. *Monitoring Questions*

- Is material contained?
- Are materials concentrating runoff leading to unacceptable off-site consequences?

b. *Measurable Indicators*

- Visual migration of materials
- Integrity of containment features (Fiber rolls, Silt Fence, etc.

c. *Data Collection Techniques*

- Photo documentation of site

- Inspection Checklist (attached)
- d. Analysis, Evaluation, And Reporting Techniques
  - Monitoring will be conducted after storm events. If the monitoring shows the treatment to be ineffective at containing materials and there is extensive migration of material additional treatment maybe recommended. A several page report would be completed after the site visit. The report would include photographs and a recommendation on whether additional treatments are necessary.

Table 58. Monitoring Treatment #3: HAZMAT containment				
Item	Unit	Unit Cost	# of Units	Cost
GS-11 Resource Specialist	Day	\$475	5	\$2,375

#### 4) In Channel Log Placement Effectiveness Monitoring

- e. *Monitoring Questions*
  - Is sediment and material captured?
  - Is sediment and ash runoff leading to unacceptable off-site consequences?
- f. *Measurable Indicators*
  - Visual inspection of treatment
  - Sediment entrainment.
- g. *Data Collection Techniques*
  - Photo documentation of site
- h. Analysis, Evaluation, And Reporting Techniques
  - Monitoring will be conducted after storm events. If the monitoring shows the treatment to be ineffective at reducing sediment additional treatment maybe recommended. A several page report would be completed after the site visit. The report would include photographs and a recommendation on whether additional treatments are necessary.

Table 59. Monitoring Treatment #4: In-Channel Log Placement				
Item	Unit	Unit Cost	# of Units	Cost
GS-11 Resource Specialist	Day	\$475	3	\$1,425

#### 5) Cultural Site Effectiveness Monitoring

- a. *Monitoring Questions*
  - Is site stable?
  - Is post-fire flooding or looting leading to unacceptable off-site consequences?
- b. *Measurable Indicators*
  - Visual inspection of the site
  - Integrity of the site and site features
- c. *Data Collection Techniques*
  - Photo documentation of site
  - Inspection Checklist
- d. Analysis, Evaluation, And Reporting Techniques
  - Monitoring will be conducted after storm events. If the monitoring shows the treatment to be at stabilizing the site (s) and/or looting is happening, additional treatment maybe recommended A several page report would be completed after the site visit. The report would include photographs and a recommendation on whether additional treatments are necessary.

**Table 60. Monitoring Treatment 5 (Interim #2): Cultural Site Monitoring**

Item	Unit	Unit Cost	# of Units	Cost
GS-11 Resource Specialist	Day	\$475	3	\$1,425

**6) Trail treatment Effectiveness Monitoring****a. Monitoring Questions**

- ☐ Is the trail-tread stable?
- ☐ Is the trail leading to concentrating runoff leading to unacceptable off-site consequences?
- ☐ Are there trail incursions?

**b. Measurable Indicators**

- ☐ Rills and/or gullies forming of the trail
- ☐ Loss of trail prism.

**c. Data Collection Techniques**

- ☐ Photo documentation of site
- ☐ Inspection Checklist (attached)

**d. Analysis, Evaluation, And Reporting Techniques**

- ☐ Monitoring will be conducted after storm events. If the monitoring shows the treatment to be ineffective at stabilizing road and there is extensive loss of Trail tread or prism an interim report will be submitted. A several page report would be completed after the site visit. The report would include photographs and a recommendation on whether additional treatments are necessary. Monitoring should take place at key road and trail entrances into the fire area to monitor for unauthorized access and any effects to critical values at risk and assess the need for additional enforcement and/or installation of additional barriers.

Trail Inspection Checklist (Example)			
Date		Time	
Inspector			
Forest			
Trail #/Name			
Portions of Trail Inspected			
Describe locations reviewed during inspection			
Trail Damage?	Yes	No	
If yes, GPS coordinates of repair site			
Describe damage and cost to repair			
Photo taken of trail damage			
Recommended actions to repair			
Other Notes			

**Table 61. Monitoring Treatment #6 (Interim #2): Trail Treatment Monitoring**

Item	Unit	Unit Cost	# of Units	Cost
GS-11 Trails Specialist or Hydrologist	Day	\$475	2	\$950
Mileage	LS	\$200	1	\$200
<b>Total Cost</b>				<b>\$1,150</b>

**PART VI – EMERGENCY STABILIZATION TREATMENTS AND SOURCE OF FUNDS**

Line Items	Units	Unit Cost	NFS Lands		Other \$	Other Lands				All Total \$
			# of Units	BAER \$		# of units	Fed \$	# of Units	Non Fed \$	
<b>A. Land Treatments</b>										
EDRR	days	1,731	55	\$95,189	\$0		\$0		\$0	\$95,189
EDRR	Days	719	40	\$28,750						\$28,750
Heritage	days	1,200	7	\$8,400	\$0		\$0		\$0	\$8,400
				\$0						
				\$0						
<i>Insert new items above this line!</i>				\$0	\$0		\$0		\$0	\$0
<i>Subtotal Land Treatments</i>				\$132,339	\$0		\$0		\$0	\$132,339
<b>B. Channel Treatments</b>										
				\$0	\$0		\$0		\$0	\$0
<i>Subtotal Channel Treatments</i>				\$0	\$0		\$0		\$0	\$0
<b>C. Road and Trails</b>				\$0	\$0		\$0		\$0	\$0
Road Storm Proofing	miles	8,499	474	\$4,028,526	\$0		\$0		\$0	\$4,028,526
Road Storm inspection	Miles	2,187	60	\$131,250						\$131,250
Road Storm Proofing	Miles	7,990	5	\$42,350						\$42,350
Road Storm inspection	Miles	2,188	3	\$6,564						\$6,564
Trail Storm Proofing	Miles	2,022	98	\$197,145	\$0		\$0		\$0	\$197,145
Trail Storm Proofing	Miles	2,925	7	\$20,475						\$20,475
Trail Storm inspection	Days	300	20	\$6,000						\$6,000
				\$0						
<i>Subtotal Road and Trails</i>				\$4,432,310	\$0		\$0		\$0	\$4,432,310
<b>D. Protection/Safety</b>										
Hazmat containment	Each	71,283	1	\$71,283	\$0		\$0		\$0	\$71,283
Dev. Rec. Sites	each	185,000	1	\$185,000	\$0		\$0		\$0	\$185,000
Road- Safety	each	181,250	1	\$181,250						\$181,250
Road - Signs	Lump	2,250	1	\$2,250						\$2,250
			1	\$0						
Trail - Safety	each	10,200	1	\$10,200						\$10,200
Trail - Signage	Lump	1,500	1	\$1,500						\$1,500
Interagency coordination	each	450	10	\$4,500						\$4,500
				\$0						
implementation lead	days	675	20	\$13,500	\$0		\$0		\$0	\$13,500
Implementation lead	Days	675	5	\$3,375						\$3,375
<i>Subtotal Protection/Safety</i>				\$472,858	\$0		\$0		\$0	\$472,858
<b>E. BAER Evaluation</b>										
Initial Assessment	Report	392,000	1	---	\$392,000		\$0		\$0	\$392,000
				---	\$0		\$0		\$0	\$0
<i>Subtotal Evaluation</i>				\$0	\$392,000		\$0		\$0	\$392,000
<b>F. Monitoring</b>										
Treatment Monitoring	Days	\$1,590	5	\$7,950	\$0		\$0		\$0	\$7,950
Treatment Monitoring	Days	\$858	3	\$2,574	\$0		\$0		\$0	\$2,574
<i>Insert new items above this line!</i>				\$0	\$0		\$0		\$0	\$0
<i>Subtotal Monitoring</i>				\$10,524	\$0		\$0		\$0	\$10,524
<b>G. Totals</b>				\$5,048,091	\$392,000		\$0		\$0	\$5,048,091
Previously approved				\$427,014						\$427,014
Total for this request				\$4,621,077						\$4,621,077

**PART VII - APPROVALS**

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Forest Supervisor  
Dean Gould, Sierra National Forest

Date