Date: September 24, 2021

McFarland Fire Burned-Area Report

PART I - TYPE OF REQUEST

A. Type of Report

☒ 1. Funding request for estimated emergency stabilization funds

☐ 2. No Treatment Recommendation

B. Type of Action

☒ 1. Initial Request (Best estimate of funds needed to complete eligible stabilization measures)

☐ 2. Interim Request #___

☐ Updating the initial funding request based on more accurate site data or design analysis

PART II - BURNED-AREA DESCRIPTION

A. Fire Name: McFarland

B. Fire Number: CA-SHF-001175

C. State: CA

D. County: Shasta, Trinity, Tehama Counties

E. Region: 05 – Pacific Southwest

F. Forest: Shasta-Trinity

G. District: Yolla Bolly and Hayfork District

H. Fire Incident Job Code: P5N7AN (0514)

I. Date Fire Started: 07/29/2021

J. Date Fire Contained: 100% (as of 9/16/2021)

K. Suppression Cost: $54 million (as of 09/16/2021)

L. Fire Suppression Damages Repaired with Suppression Funds (estimates): as of 09/15/2021

Item	Unit	Amount Identified	Amount Repaired	No Repair Needed	Remaining
Mapped Dozer Line	Miles	132	13	0	119
Road as Control Line	Miles	24.4	0.9	0.8	22.7
Mapped Hand Line	Miles	14.4	0	0.9	13.5
Hand/Dozer Line	Miles	1.2	0.4	0	0.8
Spike Camps	Count	0	0	0	0
Drop Points	Count	24	0	1	23
Helispots	Count	4	0	0	4

M. Watershed Numbers:

Table 1: Acres Burned by Watershed

HUC #	Watershed Name	Total Acres	Acres Burned	% of Watershed Burned
180102120101	East Fork South Fork Trinity River	24,584	607	2.5
180102120202	Dubakella Creek-Hayfork Creek	32,507	16,115	49.5
180102120301	Salt Creek	36,830	866	2.4
180102120401	Rattlesnake Creek	29,904	7	0.0
180102120402	Smoky Creek-South Fork Trinity River	27,021	10	0.0
180201520101	South Fork Beegum Creek	21,790	19,558	89.7
180201520102	Upper Beegum Creek	18,997	15,277	80.3
180201520103	Lower Beegum Creek	16,129	5,564	34.5
180201520201	Harrison Gulch-Middle Fork Cottonwood Creek	23,712	4,426	18.6
180201520402	Devils Hole Gulch-South Fork Cottonwood Creek	22,063	273	1.2
180201520501	Upper Cold Fork	25,368	15,158	59.7
180201520502	Lower Cold Fork	13,966	813	5.8
180201520601	Wells Creek	18,306	17,997	98.2
180201520602	Upper Dry Creek	15,689	12,825	81.7
180201520603	Salt Creek	30,142	13,765	45.6
180201520604	Middle Dry Creek	15,916	34	0.2

N. Total Acres Burned: Based on September 15, 2921 Fire Perimeter

	Acres	Percent
NFS	66,506	54
BLM	5185	4
BIA	0	0
State	608	0.5
Private	50,997	41
Total	**123,296**	**100**

O. Vegetation Types:

Vegetation Type	Acres	Vegetation Type	Acres	Vegetation Type	Acres	Vegetation Type	Acres
Douglas-Fir/Canyon Live Oak	3677	Mixed Conifer - Fir/Oregon White Oak	43	Ponderosa Pine/Black Oak	223	Blue Oak	3461
Douglas-Fir/Blue Oak	1	Mixed Conifer - Fir/Black Oak	8	White Fir/Black Oak	2	Oregon White Oak	351
Douglas-Fir/Oregon White Oak	80	Mixed Conifer - Pine/Riparian Mixed Hardwood	88	Douglas-Fir	6794	Black Oak	1101
Douglas-Fir/Black Oak	182	Mixed Conifer - Pine/Canyon Live Oak	2094	Douglas-Fir - Ponderosa Pine	702	Valley Oak	2
Douglas-Fir/Willow	2	Mixed Conifer - Pine/White Alder	4	Douglas-Fir - White Fir	7997	Ultramafic Mixed Shrub	91
Douglas-Fir/Tanoak (Madrone)	12	Mixed Conifer - Pine/Oregon White Oak	10	Jeffrey Pine	1319	Chamise	6760
Douglas-Fir - Ponderosa Pine/Canyon Live Oak	1347	Mixed Conifer - Pine/Black Oak	173	Mixed Conifer - Fir	3445	Huckleberry Oak	2
Douglas-Fir - Ponderosa Pine/Blue Oak	4	Mixed Conifer - Pine/Tanoak (Madrone)	54	Mixed Conifer - Pine	20210	Wedgeleaf Ceanothus	33
Douglas-Fir - Ponderosa Pine/Oregon White Oak	166	Ultramafic Mixed Conifer/Canyon Live Oak	101	Ultramafic Mixed Conifer	7508	Lower Montane Mixed Chaparral	19070
Douglas-Fir - Ponderosa Pine/Black Oak	138	Ultramafic Mixed Conifer/Oregon White Oak	9	Gray Pine	1415	Scrub Oak	168
Douglas-Fir - White Fir/Canyon Live Oak	1248	Ultramafic Mixed Conifer/Black Oak	5	Ponderosa Pine	169	Upper Montane Mixed Chaparral	9478
Douglas-Fir - White Fir/Black Oak	344	Gray Pine/Canyon Live Oak	815	Red Fir	95	Mountain Whitethorn	6
Douglas-Fir - White Fir/Bigleaf Maple	0	Gray Pine/Blue Oak	11968	White Fir	1449	Manzanita Chaparral	6
Douglas-Fir - White Fir/Willow	2	Gray Pine/Oregon White Oak	128	Ponderosa Pine - White Fir	100	Annual Grasses and Forbs	2273
Jeffrey Pine/Canyon Live Oak	18	Ponderosa Pine/Canyon Live Oak	17	Riaprian Mixed Hardwood	15	Wet Meadows	6
Mixed Conifer - Fir/Canyon Live Oak	10	Ponderosa Pine/Oregon White Oak	192	Canyon Live Oak	5798	Barren	281

Source: Most recent USFS Region 5 Existing Vegetation layers from the Remote Sensing Lab
Does not include 27 acres of Urban/Developed Land and Perennial Lakes

P. Dominant Soils:

Soil Name	Acres	Slope in %	Texture
Parrish	21,889	30-50	Gravelly Loam
Neuns	11,638	30-50	Stony Loam
Lodo - Maymen	10,258	30-65	Loam
Colluvial land	5,592	15-65	Colluvial
Millsholm-Millsap Complex	5,529	30-50	Loam

Q. Miles of Stream Channels by Order or Class:

Stream Type	Miles of Stream
Perennial	142
Intermittent	354
Ephemeral	380*
Canal/Ditch	0

*Ephemeral Streams only mapped on FS Land

R. Transportation System:

Trails: *National Forest (miles):* 28.5 *Other (miles):* 0
Roads: *National Forest (miles):* 341.5 *Other (miles):* 4.2

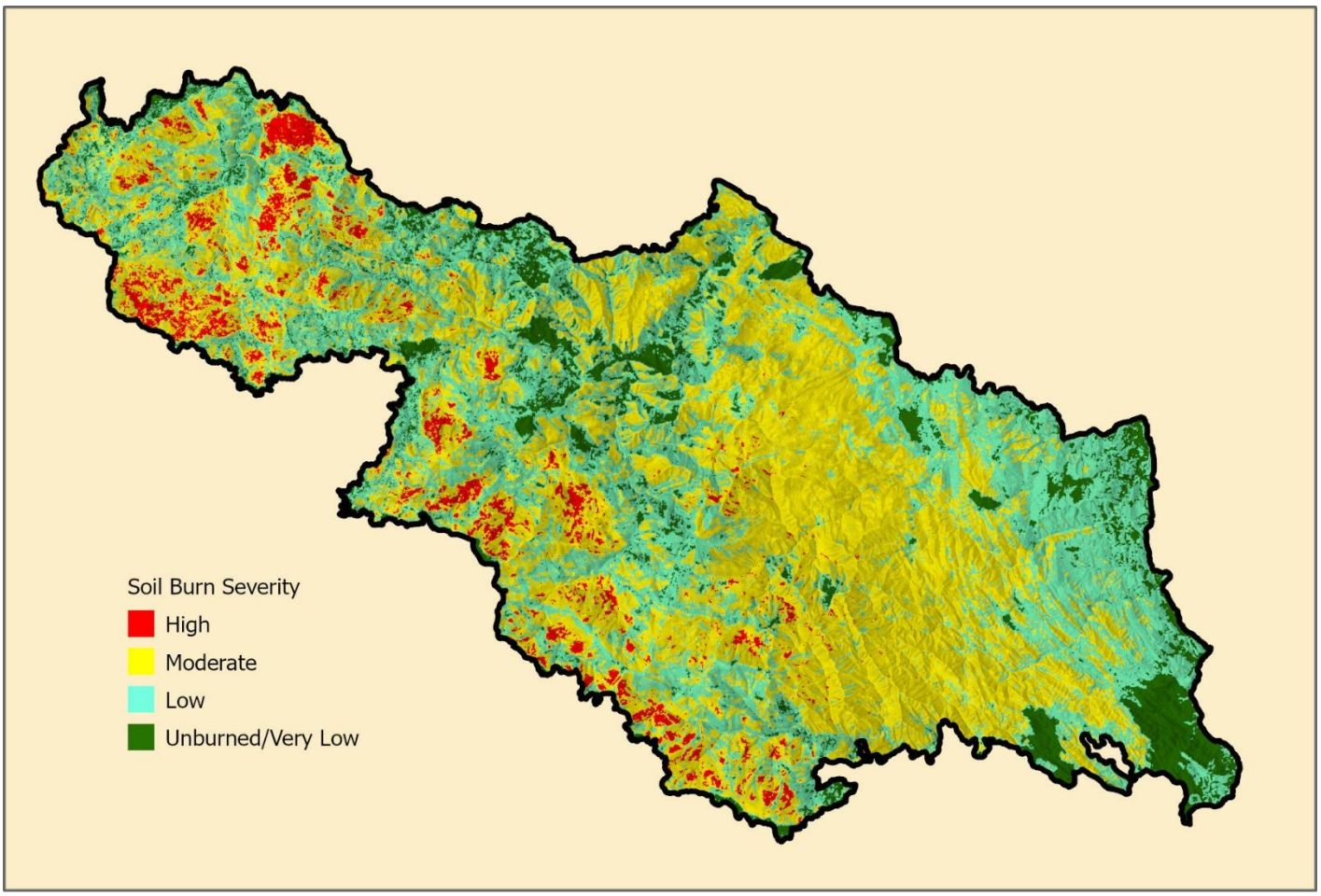
This includes the NFS roads/trails that are on private within the fire but not non-fs roads on private.

PART III - WATERSHED CONDITION

A. Burn Severity (acres):

Soil Burn Severity	NFS	BLM	State	Private	Total	Percent
Unburned	6,853	400	3	6247	13,504	11
Low	25,354	1,715	69	17,753	44,891	36
Moderate	28,606	3,045	532	26,530	58,712	48
High	5,693	25	4	467	6,189	5
Total	66,506	5,185	608	50,997	123,296	100

Soil Burn Severity map for the McFarland Fire.


Soil Burn Severity
High
Moderate
Low
Unburned/Very Low

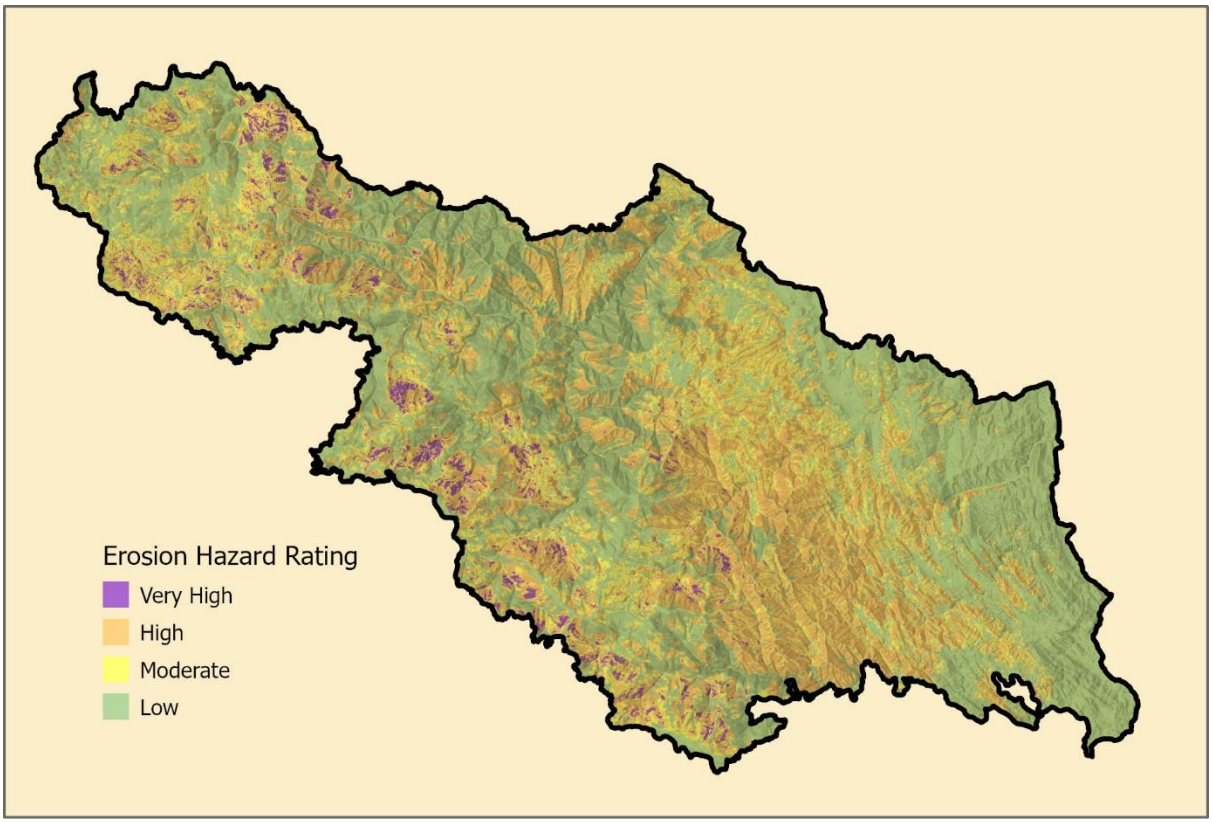
C. Water-Repellent Soil (acres):

Water repellency is a natural property that results from wax-like exudates from biological process that coat soil particles. These compounds are non-polar whereas water is a polar compound. Polar and non-polar compounds do not mix; the biological exudates repel water causing rainfall to bead up and resist infiltration. As stated, water repellency is a natural soil property, but heat from the fire vaporizes some of the compounds and they condense lower in the soil when it contacts cooler soil. This tends to make the water repellency stronger, or more severe. Approximately 30-50% (approximately 39,688 to 66,148 acres) of the soils within the McFarland fire have hydrophobicity traits of have had an increase.

D. Soil Erosion Hazard Rating:

	Erosion Hazard Ratings									
	Very High		**High**		**Moderate**		**Low**		**Total Acres**	**Percent**
SBS	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent		
High	3,217	3	2,090	2	727	1	155	0	6,189	5
Moderate			34,726	28	15,964	13	8,022	7	58,712	48
Low							44,891	36	44,891	36
Unburned/Very Low							13,504	11	13,504	11
Total	**3,217**	**3**	**36,817**	**30**	**16,691**	**14**	**66,572**	**54**	**132,296**	**100**

E. Erosion Potential:



Most soils with the absence of cover will produce significant erosion and sediment delivery to stream systems. Elevated post-fire flows and erosion/sediment loads will persist over 3-7 years or more, commensurate with rates of vegetation regrowth and soil cover establishment

F. Sediment Potential:

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

Belt/Assemblage	Age	Terrane/Formation	Rock type
Cretaceous Overlap	Jurassic / Cretaceous	Great Valley Group / Redding Formation	Sedimentary, Fluvial, Marine, Alluvium/Lacustrine
Pleistocene Alluvial Deposits	Quaternary	Superjacent to All Areas	Sedimentary, Alluvium/Colluvium
Western Paleozoic & Triassic	Paleozoic / Mesozoic	Western Hayfork and Sawyers Bar	Metavolcanics plus Metasediments Chert, Argillite, Meta-andesite, Tuff/Breccia, Limestone
Western Paleozoic & Triassic	Triassic	Rattlesnake Creek	Metavolcanics plus Metasediments, Peridotite
Western Paleozoic & Triassic	Triassic to Late Cretaceous	Western Klamath Pickett Peak	Metavolcanics, Metasediments, Micaceous Schist, Metagraywacke, Chert, Peridotite, Serpentinite
Plutons	Jurassic	Intrude the Western Hayfork and Rattlesnake Creek	Intrusive igneous, Intermediate to Mafic Diorite, Granodiorite, Gabbro, Pyroxenite, Amphibolite

Accelerated Hillslope Sediment Production by Fire – Given a 2 Year (average) Winter

Sediment Rate (tons/Acre)		Sediment Production (tons)		Delivery Potential (tons)	
Year 1	Year 2	Year 1	Year 2	Year 1	Year 2
13.05	8.25	115,896	73,262	22,020	13,920

Accelerated Hillslope Sediment Production by Fire – Given a 10 Year Winter

Sediment Rate (tons/Acre)		Sediment Production (tons)		Delivery Potential (tons)	
Year 1	Year 2	Year 1	Year 2	Year 1	Year 2
32.26	25.15	286,478	223,342	54,431	42,435

This estimate includes 'background' erosion rates for unburned portions of the fires, which averages about 4 tons/acre across all watersheds. Soil burn severity is accounted for throughout these modeled estimates.

G. Estimated Vegetative Recovery Period (years):

Shrubs will vigorously resprout 1-5 years post fire in high and some moderate soil burned severity (SBS) areas. Dry mixed conifer/oak may recover in low severity and very low severity as canopy is intact and can be a seed source for natural revegetation 2-25 years. In areas of high SBS mixed conifer/oak and plantations, those soils may take 50-100 years to fully recover and may likely convert to chaparral without restoration measures. There is a significant amount of contiguous moderate fire east of Tedoc Mt. into BLM and private lands that may also convert to more chapparal with an understory of European grass from current infestations in those lower elevations. Areas of rocky serpentine ultramaphic supported vegetation need further study for estimated years of fire recovery. North facing slopes of low and moderate SBS have hardwoods sprouting from the base of the deep burls.

H. Estimated Hydrologic Response (brief description):

The McFarland Fire largely burned within the Beegum watershed, headwaters of Hayfork, Middle Fork Cottonwood, Wells, and Cold Fork creeks. Regional regression equations developed by the US Geological Survey (Gotvald et al, 2012) for California were used to determine pre-fire and post-fire runoff. The regression equations were developed from peak-discharge records at 630 gaging stations throughout the state. The Q2, or the storm event with a 50% chance of occurring annually, was estimated for pre-fire and post-fire conditions. Smaller headwater basins (< 1000

acres) with moderate to high SBS are expected to see peakflow increases approximately 2 times the pre-fire condition. Larger basins had a mosaic of unburned to high soil burn severity and the post-fire change in runoff response is expected to be lower (1.64-1.9).

In addition to increased peak flows, the post-fire watershed response will include an initial flash of ash and burned materials, temporary increase in turbidity, rill and gully erosion in drainages on steeper slopes, increased sediment transport and deposition, and higher potential for debris-laden flows. These responses will likely lead to increased water quality concerns for critical fish habitat and water uses such as downstream irrigation diversions. Watershed responses are dependent on the occurrence of rainstorm and rain-on-snow events from Jan- Mar and will likely be greatest with initial storm events, with greatest impacts most likely to occur in the first year or two after the fire. Disturbances will become less evident as vegetation is reestablished, providing ground cover that reduces erosion and increases surface roughness to slow flow accumulation and increase infiltration. These processes will attenuate over time and should recover to pre-fire rates over the next 3-5 years.

PART V - SUMMARY OF ANALYSIS

Introduction/Background

The McFarland Fire was started by lightning on July 29th near McFarland Ridge, south of Highway 36 near Wildwood, California. As of the report date the fire is mapped by the incident at 122,653 acres with 100% containment. BARC map indicted a boundary of 123,296 acres. The BAER team used the BARC map acreages in all the assessments within this report.

The fire made an over 40,000 acre run from August 16th to August 17th, primarily to the east/southeast of its origin point towards Platina, California. This push resulted in evacuation orders and evacuation warnings in the Platina area that has since been lifted. A damage assessment team has identified 24 residential structures and 22 other structures destroyed, and 1 residential structure damaged. A BAER assessment team began field reconnisance of the burned area on September 10 to begin burn severity mapping, hydrologic response, and to identify geological hazards.

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

Critical Value Matrix

Probability of Damage or Loss: *The following descriptions provide a framework to estimate the relative probability that damage or loss would occur within 1 to 3 years (depending on the resource):*
Very likely*. Nearly certain occurrences (90% - 100%)*
Likely*, Likely occurrence (50% - 89%)*
Possible*. Possible occurrence (10% - 49%)*
Unlikely*. Unlikely occurrence (0% - 9%)*

Probability of Damage or Loss	Magnitude of Consequences		
	Major	Moderate	Minor
	RISK		
Very Likely	Very High	Very High	Low
Likely	Very High	High	Low
Possible	High	Intermediate	Low
Unlikely	Intermediate	Low	Very Low

Magnitude of Consequences:
Major*. Loss of life or injury to humans; substantial property damage; damage to critical natural or cultural resources*
Moderate*. Injury or illness to humans; moderate property damage; damage to critical natural or cultural resources resulting in considerable or long-term effects.*
Minor*. Property damage is limited in economic value and/or too few investments; damage to critical natural or cultural resources resulting in minimal, recoverable or localized effects.*

1. Human Life and Safety:

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

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

BAER recommends that human health and safety concerns on adjacent lands managed by the BLM, State, or Counties also be evaluated for risk from flooding and debris flows, hazard trees.

- *Campgrounds, Dispersed Camping, Trailheads:*
  There are two campgrounds (North Beegum Creek and Beegum Gorge) in the burn area, and one campground immediately downstream of the burn area (Basin Gulch). Dispersed camping is also prevalent thought the burn area. There is a human health and safety risk to visitors to these campgrounds due to flooding and debris flow. In addition, there is damage related to vault toilets at Beegum Gorge and Rat Trap Gap Trailhead. The probability of damage or loss to human health and safety is **likely** for North Beegum Creek and Beegum Gorge campgrounds and **possible** for Basin Gulch campground and Rat Trap Gap Trailhead, because increased post-fire runoff from areas of moderate and high SBS could restrict egress and the increased risk of debris flows could lead to injury or loss of life. Further, open vault toilets could lead to entrapment and injury if someone falls into them. The magnitude of consequences is **intermediate to major**, as impacts to these threats could lead to loss of life or injury. The resulting risk to human health and safety is **Intermediate** (Basin Gulch), **High (Rat Trap and dispersed camping) and Very High** for North Beegum Creek and Beegum Gorge campgrounds**.**

  - BAER funds are requested to treat these risks (*Treatments PS-2*).

2. Property:

- *NFS Roads (27N05, 27N07, 27N11, 27N12, 27N13, 27N13A, 27N26, 27N36, 28N02, 28N05, 28N07, 28N09, 28N10, 28N10E, 28N10F, 28N13, 28N14B, 28N35, 28N35J, 28N36, 28N47, 29N06, 29N16, 29N22D, 29N25, 29N27, 29N28, 29N30, 29N31, 29N33, 29N34, 29N35, 29N37, 29N38, 29N39, 29N41, 29N43, 29N45, 29N45A, 29N83)*

  There are 341.5 miles of Forest Service system roads within the fire perimeter. Of these, 188.63 were evaluated for assessment. Approximately 77.1 miles are within or downslope of areas of high or moderate burn severity. These road prisms are at risk from increased runoff, erosion, and debris flows. Undersized and inadequate drainage structures are not expected to convey the expected increase in post-fire runoff and erosion and may damage Forest Service road infrastructure. Likewise, there are numerous burned stump and roots underneath the road surface that may cause road failure. Engineering assessment team prioritize the road miles as follows:

  - 111.1 miles were found to be located in or near ridgetops or within low and unburned burn severity. The probability of damage or loss is **Unlikely**, as post-fire processes should not greatly influence their condition. The magnitude of consequences is **moderate**. Increased runoff could lead to failure of these road segments, which could constitute a loss of Forest Service infrastructure and increased sediment delivery to streams downslope. The resulting risk is **low**.

    - BAER funds are NOT requested to treat these risks.

- 77.1 miles were found to be associated with high and moderate soil burn severity with significant upslope source area that will result in increased runoff and sediment delivery. The probability of damage or loss is **likely**, because the identified NFS road prisms are expected to receive increased overland flow and accelerated erosion concentrating on route segments. The magnitude of consequences is **moderate**. Increased runoff could lead to failure of these road segments, which could constitute a loss of Forest Service infrastructure and increased sediment delivery to streams downslope. These roads also provide access to recreation and private land The resulting risk is **high.**

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

- *NFS Trails*
  Current trail conditions are degraded, leaving the trail nonfunctional. Post-fire related processes will cause erosion and additional trail damage. The probability of damage or loss is **possible** because increased post-fire runoff from areas of moderate and high SBS could result in additional erosion and landslides, accelerating the damage. The magnitude of consequences is **moderate**. The trail system is disrepair and is not currently being used due to its poor condition. The resulting risk is **intermediate.**

    - BAER funds are NOT requested to treat these risks.

- *NFS Campgrounds and Post Creek Lookout Cabin.*
  There are threats to North Beegum Creek, Beegum Gorge, and Basin Gulch campgrounds and Post Creek Lookout Cabin that could alter the integrity of the infrastructure. The probability of damage or loss is **possible or likely** for the campgrounds, and **unlikely** for the Lookout. The possible effects of flooding, sedimentation, and debris flow caused by increased post-fire runoff from moderate and high burn severity above or upstream from the campground, could cause losses to campground facilities. Likewise, hazard trees could fall on infrastructure, as well on the Lookout Cabin, contributing to the demise of infrastructure. The magnitude of consequences is **minor** for the campgrounds, **and moderate** for the Lookout Cabin. The campgrounds have minor amount of infrastructure, and flooding is not expected to dramatically impact infrastructure. Hazard trees are not immediate threats to the cabin, but there may be post-fire die off. The resulting risk is **low**.

    - No BAER property treatments are requested for these campgrounds or the cabin.

3. **Natural Resources:** Native and naturalized plant communities where invasive noxious weeds were absent or in trace amounts.
   - *Fire Suppression Activities*
     High likelihood of spread and introduction of invasive and noxious weeds into areas disturbed by suppression impacts (dozer lines, hand lines, drop points, helispots, etc.) which pose a threat to native and naturalized plant communities. The probability of damage or loss is **likely**, because suppression activities resulted in about 72 miles of newly constructed dozer lines and 2.2 acres of drop point, staging areas and helispots. The removal of canopy cover and competing vegetation during suppression activities creates conditions prime for invasion by invasive species which are often adapted for quick colonization of disturbed sites. A weed wash was not recorded as present on the incident. Introduction and spread of invasive species infestations into un-infested lands is likely due to the disturbance of known infestations by suppression related activities, creation of newly disturbed habitat, and the use of contaminated equipment throughout the burn area. The primary concern is focused on dozer constructed fire lines. The magnitude of consequences is **moderate.** Introduction and expansion of weeds can suppress native vegetation recovery and lead to a loss of native and naturalized plant communities. Vegetation type conversion to annual grasslands and expansion of weeds into areas disturbed by fire suppression and within the burned area are likely; potentially increasing fire frequency. The resulting risk is **high.**

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

- *Non-Suppression Activities (BAER-Specific)*
  Prior to the McFarland Fire, the impacted area contained at least 94 occurrences of rare botanical species. Invasive species in the burn perimeter were limited, occupying only 0.1% (6.2 acres) of the burn area. As such, the probability of damage or loss is considered **unlikely.** Although infestations were limited prior to the fire. The magnitude of consequences is **moderate.** If weeds are introduced to the fire area, they can colonize new areas and suppress natural recovery. Loss of native and naturalized plant communities to annual grasslands and expansion of weeds into the burn area can reduce ecological integrity and increase fire frequency. This risk is slightly reduced as habitats on ultramaphic soils burned low to very low and will likely recover naturally. The resulting risk is **low.**

    - BAER funds are NOT requested to treat these risks. Forest staff will assess in the spring and summer following the fire.

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

    - BAER funds are NOT requested to treat these risks. Natural Recovery is recommended.

- *Threatened and Endangered Species*
  There are no Threatened and/or Endangered botanical or terrestrial species.

- *Central Valley steelhead, chinook salmon critical habitat*
  The values at risk considered were Central Valley (CV) steelhead, chinook salmon critical habitat and effects of increased sediment, debris and ash (water quality) on fish populations in Beegum Creek, Middle Fork Cottonwood Creek, Hayfork Creek and Cold Fork. Beegum Creek is significantly important given it is one of just a few undammed tributaries to the Sacramento River (via Cottonwood Creek) and is located on the west side of the Sacramento valley. California Department of Fish and Wildlife data on Beegum Creek revealed a high of 477 adult CV spring-run chinook counted in 1998 to a low of 0 (1982, 1989, 1997, 2008, 2009).

  Post-fire threats to these species habitat includes compromised water quality and changes in water chemistry due to ash delivery and inputs of ammonium, nitrate, phosphate, potassium and increased alkalinity, increased solar radiation and water temperature due to reduced riparian cover, increased sedimentation, loss of woody debris and complex substrates, scouring of riparian/aquatic vegetation, and changes in streambed/pool habitat due to geomorphic movement (debris flows), and impacts to fish including extirpation. The probability of damage or loss to fish habitat is **very likely**, given the potential for debris flows, flooding and sedimentation. Potential for sediment is high given 53% of the fire burned at moderate and high soil burn severity. These combined impacts will lead to high turbidity events and short-term loss altercation of suitable stream habitat in Beegum Creek, Middle Fork Cottonwood Creek, Hayfork Creek and Cold Fork. The magnitude of consequences is **moderate** for Beegum Creek, Hayfork Creek, Middle Fork Cottonwood Creek and Cold Fork**.** Inside the fire perimeter there is 7.5 miles of designated critical habitat for CV spring-run chinook salmon and 1.3 miles for CV steelhead. Increase turbidity, altered water chemistry and high debris flows are expected to occur with the first rain event, however, the riparian vegetation is still mostly intact along

all of these drainages. The intact riparian vegetation will help alleviate some of the sedimentation, ash run-off and debris flow coming from the headwaters and hill slopes. The headwaters in high and moderate burn severity are expected to take longer for recovery, but it is not irreversible and is expected to comeback. Recovery of the main steam channels will not take place until fine sediment loads move through these systems, and pool-riffle-run sequences are recreated through the return of complex substrates, and sufficient riparian cover to reduce water temperatures and provide sufficient allochthonous input for fish prey (e.g., shredders and detritivores) including the return of a complex food web. These local impacts include reduced habitat quality for CV steelhead and chinook salmon from increased sediment flow directly into these mainstem channels as well as from tributaries affected by the fire. The resulting risk is **very high.**

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

4. Cultural and Heritage Resources:

- *Hazard trees*. There is a threat of damage or destruction to historical features present within cultural resource sites eligible or potentially eligible for listing in the National Register of Historic Places (NRHP) due to the potential of hazard trees falling on these features. The probability of damage or loss is **possible**, because fire has affected trees on site increasing the possibility for them to fall and impact features. The magnitude of consequences is **moderate** as trees can cause standing features to fall over or other features to break from impact. Damage to these features would be an irretrievable loss of traces of the past. Cultural resources are non-renewable. The resulting risk is **Intermediate**. The Heritage team will work with a local fire crew to remove the hazards/threats within the site.

  - BAER funds are NOT requested to treat these risks.

- *Erosion and sedimentation.* There is a threat to the cultural resources eligible or potentially eligible from listing in the NRHP from increased runoff, erosion, and debris flows. The probability of damage or loss is **likely**. Field observation and burn severity models reflect many areas within the fire perimeter are at risk of erosion/sedimentation due to vegetation loss and landscape position. Landscape variables and observed past erosion support the likely probability (50-89%) of damage to cultural resources that, while it may not result in large scale obliteration of all sites within the fire area, could damage certain features and destroy the context of certain site types. The magnitude of consequences is **moderate**. In most cases, damage to cultural resource sites represents an irretrievable loss of traces of the past. Cultural resources are non-renewable. The remaining integrity of cultural resources is at risk from increased post-fire erosion and would represent damage to critical resources with considerable and long-term effects. The resulting risk is **high.**

  - BAER funds are NOT requested to treat these risks. However, road treatments will reduce sedimentation into cultural and heritage resources. Forest Staff should monitor cultural resource integrity.

- *Unauthorized artifact collection.* There is a threat of loss of historic context and contents due to unauthorized artifact collection at cultural resources eligible or potentially eligible for listing in the National Register of Historic Places (NRHP). The probability of damage or loss is **possible**, because archaeological and historic sites are vulnerable to metal detectorists and artifact collectors in the area. The fire has exposed several known cultural sites. This exposure makes artifacts and features susceptible to damage from unauthorized collection. The magnitude of consequences is **moderate**. In most cases, damage to cultural resource sites represents an irretrievable loss of traces of the past. Cultural resources are non-renewable. Removed artifacts from historic contexts degrade the meaning of historic sites and features and their potential to provide important information about the past to this and future generations. The nature of unauthorized collection means that impacts resulting in

total irretrievable loss of a site or feature are expected but unpredictable and also are likely to occur over time. A moderate consequence rating appropriately addresses the likelihood of these types of damage based on their nature and potential for significant impact. The resulting risk is **Intermediate.**

- BAER funds are NOT requested to treat these risks.

B. Emergency Treatment Objectives:

- Mitigate and protect, to the extent possible, threats to personal injury or human life of forest visitors and Forest Service employees by raising awareness through posting hazard warning signs on roads and trails, reinforcing road and trail tread, improving road and trail drainage and stream crossings, and communicate hazard of flooding, and debris flows. Communicate to cooperating agencies and community groups.

- Protect or minimize damage to NFS investments in roads and trail infrastructure by installing drainage features capable of withstanding potential increased stream flows and/or debris flows. Minimize damage to key NFS travel routes.

- Protect or mitigate potential post-fire impacts to critical cultural resources within the burned area.

- Treat invasive plants that are a threat to native and naturalized ecosystems by minimizing the expansion of existing populations in the burned area and control of expected invasion of noxious weeds within and adjacent to the area where soils/vegetation was disturbed as a result of the fire and fire suppression activities.

- Assist cooperators, other local, State, and Federal agencies with the interpretation of the assessment findings to identify potential post-fire impacts to communities and residences, domestic water supplies, public utilities and other infrastructure.

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

*Land **n/a** % Channel **na** % Roads/Trails **70** % Protection/Safety **100** %

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

D. Probability of Treatment Success

Probability of Treatment Success

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

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

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

Property: The cost to rebuild sections of the road after they are washed out, eroded, or buried includes estimates to bring in material to build up the damaged roads. The cost of not restoring the proposed 77.1 miles of road is approximately $1,951,880 (30% loss), providing at least a 4.6 benefit/cost ratio. This does not include the lost value to project management, fire suppression, and recreation.

Land Treatments - Native and Naturalized Plant Communities: Deferring EDRR treatments along suppression disturbed sites could result in approximate $1,185,750, assuming a 10% loss. As such, the benefit/cost ratio exceeds 15%.

Cultural and Heritage Resources: Cultural and heritage resource stabilization actions are tied to road stabilization. Economic values can not be placed on the loss of cultural and heritage resources. The cultural or historic resource at risk is eligible, or potentially eligible, for listing on the National Register of Historic Places (NRHP). Delaying emergency treatment could permanently remove the cultural significance of sites.

F. Cost of Selected Alternative (Including Loss):

Human Health and Safety Treatments:

"Entering Burned Area" signs are needed to alert the public of possible threats to their life and safety that exist within or downstream of a burned area. The signs contain language specifying items to be aware of when entering a burn area such as falling trees and limbs, rolling rocks, and flash floods. Signs are placed in entry points that are expected to receive high use, either around residential areas or popular roads used for recreation.

Total human health and safety treatment costs: **$16,484**

PS-1 *Hazard Warning Signs Cost Estimate.*

Item	Unit	Unit cost	# of units	Total Cost
Hazard Warning Signs (Roads)	Each	1000	6	6,000
Rock Fall Hazard Signs	Each	500	6	3,000
Crew OT for Sign Placement	Built into costs above			
Vehicle mileage	Mile	0.32	600	192
Total Cost:				**9,192**

PS-2 *Campgrounds, Dispersed Camping, Trailheads*

Item	Unit	Unit cost	# of units	Total Cost
Closed Warning Signs	each	500	5	2500
Place Barrier to restrict vehicle access.	each	3000	1	3000
Construct barricade around toilet at Rat Trap Gap, and Beegum Gorge Campground	each	300	2	600
Pump Vault toilet at Rat Trap Gap	Toilet	1000	1	1000
OT for GS-09 barrier placement	Built into costs above			
Vehicle mileage for implementation	miles	0.32	600	192
Total Cost:				**7,292**

Property:

NFS Road Treatments

Item	**Unit**	**Unit cost**	**# of units**	**Total Cost**
Road Treatments (see below)	Miles		77.1	407,640
GS-11, Engineer, Overtime	Days	633.17	10	6,332
Section 106 of NHPA				
GS-11, Archeologist, Overtime	Days	700	4	2,800
GS-7, Arch Tech, Overtime	Days	382	4	1,528
Total Cost:				**418,300**

Treatments by priority roads:

NFSR by Priority	Total Cost To Treat	Install Culvert Riser (each)	Restore Drainage (mile)	Burned Hole Repair (each)	Construct Dip (each)	Armor Drainage Crossing (each)	Armor Fill Slope (cubic yd)	Storm Inspection /Response (mile)
29N30	8,520		2.84					2.84
29N45	13,650		4.55					4.55
28N36	12,870	3			2			3.78
28N10	94,250	36		2	13			8.30
28N35	40005	16		1				4.67
29N06	21,290		3.83			100		3.83
29N28	16,510	5			5			2.34
29N27	12,455	4			4			1.37
27N13	13,560	3	1.72		4			1.72
29N31	3,285							2.19
27N07	20,550	5		2	8			2.50
29N33	10,400		2.14	3			10	2.14
29N38	3,400		0.80	1				0.80
29N25	13,630	1	2.81	2	2			2.81
27N26	15,600	4	1.20	1	5			1.20
29N41	7,930		1.31	4				1.31
28N36A	2,075			2				0.05
29N39	3,450		0.75		2			0.75
29N34	11,320		2.32		4		20	2.32
27N05	4,050		1.35					1.35
27N12	5,580		1.86					1.86
28N02	15,390		5.13					5.13
28N05	9,960		3.32					3.32
28N13	10,500		3.5					3.5
29N22D	1,530		0.51					0.51
29N43	2,130		0.71					0.71
27N11	660		0.22					0.22
27N13A	1,410		0.47					0.47
27N36	1,230		0.41					0.41
28N07	3,750		1.25					1.25
28N09	2,970		0.99					0.99
28N10E	3,030		1.01					1.01
28N10F	2,160		0.72					0.72
28N14B	1,350		0.45					0.45
28N35J	1,770		0.59					0.59
28N47	2,580		0.86					0.86
29N16	1,740		0.58					0.58
29N37	2,970		0.99					0.99
29N43	2,130		0.71					0.71
29N45A	3,630		1.21					1.21
29N83	2,370		0.79					0.79
Total Cost	**407,640**	77	51.9	18	49	100	30	77.1

Native and Naturalized Plant Communities:
Total native and naturalized plant community costs: **$77,500**

LD 1 - Suppression Repair EDRR

Item	Unit	Unit Cost	# of Units	Cost
EDRR surveys (agreement) Dozer Lines	Miles	1000	72	72,000
EDRR surveys (agreement) Drop points, safety	Acres	1000	2.2	2,200
GS-11 Botanist, Overtime, Agreement Mods,	Days	5	660	3,300
Total Treatment Costs:				**77,500**

LD 2- BAER-Specific EDRR - No Treatment Costs

F. Skills Represented on Burned-Area Survey Team:

☒ Soils ☒ Hydrology ☒ Engineering ☒ GIS ☒ Archaeology
☒ Weeds ☒ Recreation/Trails ☒ Fisheries ☒ Wildlife
☒ Interagency Coordination

Team Leader(s): Kendal Young & Meagan Carter (T)
Email: kendal.young@usda.gov **Phone(s)** Cell: 775-276-4659
Email: meagan.carter@usda.gov **Phone(s)** Cell: 775-720-2038

Forest BAER Coordinator: Brad Rust
Email: brad.rust@usda.gov **Phone(s):** 530-226-2427

Team Members: *BAER Team Members by Skill*

Skill	Team Member Name
Team Lead(s)	Kendal Young
	Meagan Carter
Soils	Anna Plumb
	Brad Rust
Hydrology	Hilda Kwan
Geology	Dennis Veich
Engineering	Alvin Sarmiento
GIS	Jonna Dushey
Archaeology	Kim Stahl
	Robin Hopkins
Botany/Weeds	Lusetta Sims
	Ashley Knight
Recreation	Brad Rust
Fisheries	Dan Teater

Treatment Narrative:

Human Health and Safety:

Entering Burn Area Warning Signs

"Entering Burned Area" signs are needed to alert the public of possible threats to their life and safety that exist within or downstream of a burned area. The signs contain language specifying items to be aware of when entering a burn area such as falling trees and limbs, rolling rocks, and flash floods. Signs are placed in entry points that are expected to receive high use, either around residential areas or popular roads used for recreation.

Campground Treatments:

North Beegum Creek and Beegum Gorge would be temporary closed until hazardous conditions are assessed and mitigated. Beegum Gorge would be closed by closing the gate at the top of the hill. North Beegum Creek campground entry location would be barricaded with a constructed beam across road, or boulders. The barricade would ensure motorized traffic does not enter campgrounds. Closure signs will also be posted at both closed locations. The vault toilet would be barricaded to ensure people can not fall into open hole. T-posts with fencing material could be used.

Property:

Roads Treatments:

Treatments considered for the transportation system includes the following:

- Culvert Riser Installation – Keep culverts from plugging from debris
- Dip Construction – To facilitate drainage of water off the road
- Drainage Crossing Armoring – Reduce road failure and impacts to fish habitat downstream of road
- Repair Fill Slope – Prevent road failure and erosion of existing roadbed
- Restore Drainage – Includes road blading, ditch cleaning, and culvert cleaning to allow drainage of the road and reduce road failure.

These road treatments are recommended for approximately 77.1 miles of the National Forest System Roads. Natural recovery is used as a treatment for the remainder 111.5 miles of roads.

Land Treatments:

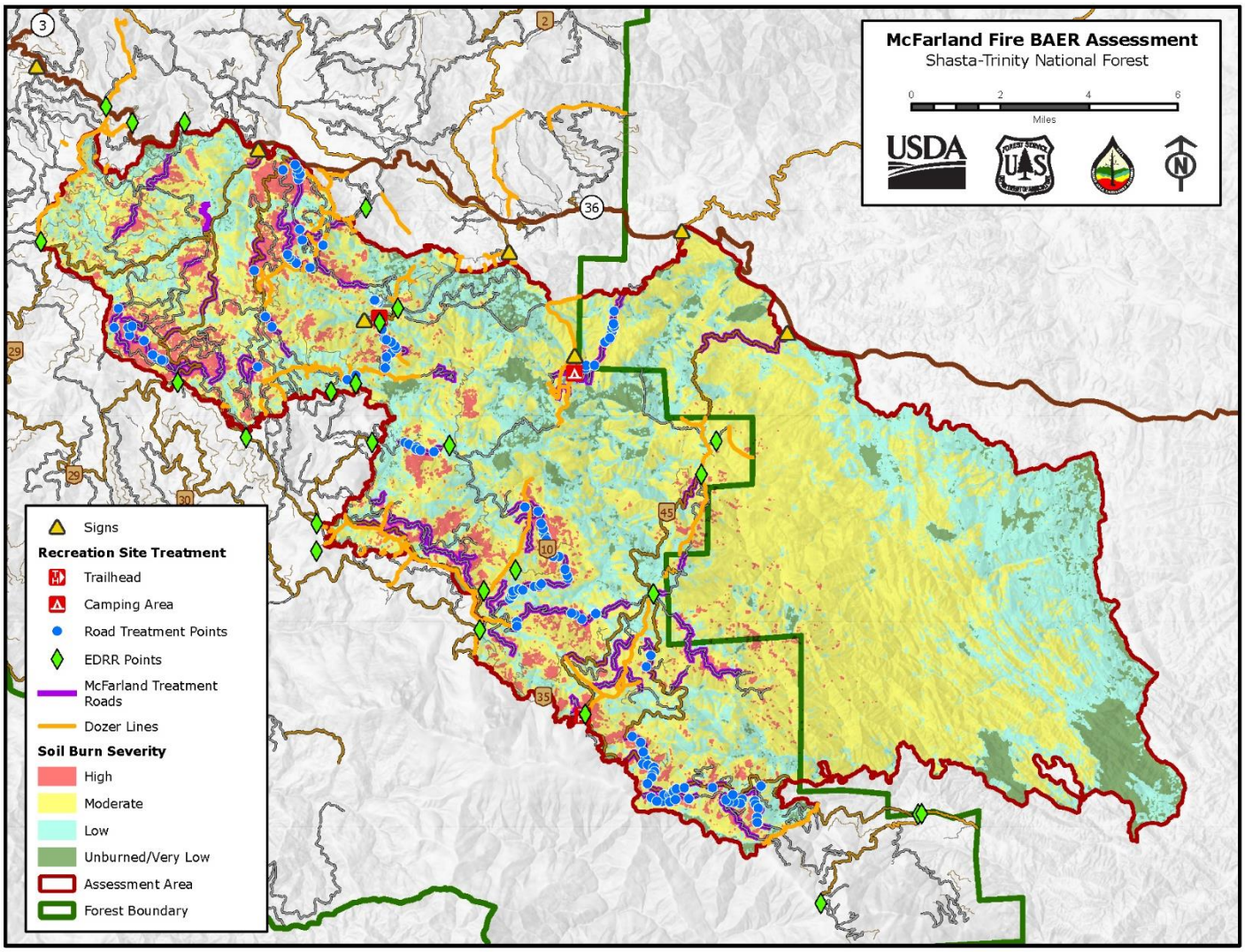
Native and Naturalized Plant Communities: EDRR surveys on 72 miles of National Forest lands based on values at risk, areas that were disturbed by suppression activities, and the risk of plant incursion, resulting in unacceptable risks to natural resources. The weed risk to native plant community recovery can be mitigated at low cost by implementing EDRR within the first year after the fire. New, small weed infestations located during EDRR surveys will be manually treated upon discovery. Existing infestations found to be expanding due to the fire or fire suppression activities would be re-mapped and evaluated for treatment.

Cultural Resources: Erosion and sedimentation causing data loss are the highest observed threats to cultural resources eligible or potentially eligible for listing in the NRHP. Cultural resources of particular concern are the 10 sites specifically addressed in this assessment. There are numerous other cultural resources potentially eligible for listing in the NRHP within the fire area. Road treatment emergency stabilization activities will be implemented to manage risk these sites. In addition, BAER Critical Values treatments are not exempt from Section 106 of NHPA, and thus require consideration, avoidance or mitigation of potential effects to cultural resources prior to implementation (FSM 2523.2.2.d; Section 106 of the National Historic Preservation Act (NHPA). The costs for compliance with Section 106 of the National Historic Preservation Act can be covered for all authorized treatments and are listed in the appropriate treatment sections. Section 106 compliance includes the minimum required documentation to implement the approved treatments. Although BAER treatments are considered "emergency undertakings" according to the provisions of the National Historic Preservation Act [36CFR800.12(d)], a reasonable effort shall be made to inventory ground-disturbing project areas for previously unknown cultural resources. Impacts to cultural resources shall be avoided whenever possible.

Channel Treatments: None

I. Monitoring Narrative: N/A

McFarland BAER Treatment Map



PART VI – EMERGENCY STABILIZATION TREATMENTS AND SOURCE OF FUNDS

			NFS Lands			Other Lands				All
		Unit	# of		Other	# of	Fed	# of	Non Fed	Total
Line Items	Units	Cost	Units	BAER $	$	units	$	Units	$	$
A. Land Treatments										
LD-1 EDRR - Suppression	Project			77,500			0		0	$ 77,500
LD-2 EDRR- Non-Suppression	Project			0	0		0		0	$ -
					0		0		0	$ -
Subtotal Land Treatments				77,500	0		0		0	$ 77,500
B. Channel Treatments										
				-	0		0		0	$0
Subtotal Channel Treatments				-	0		0		0	$0
C. Road and Trails										
RD-1 Road Stabilization	Project			418,300	0		0		0	$418,300
Subtotal Road and Trails				418,300	0		0		0	$418,300
D. Protection/Safety										
PS-1 Hazard Warning	Project			9,192			0		0	$9,192
PS-2 Campground Mitigations	Project			7,292			0		0	$7,292
Subtotal Protection/Safety				16,484	0		0		0	$16,484
E. BAER Evaluation										
Initial Assessment	Report			101,066	0		0		0	$101,066
Subtotal Evaluation				101,066	0		0		0	$101,066
F. Monitoring										
Subtotal Monitoring				-	0		0		0	$0
G. Totals				512,284	0		0		0	$512,284
Previously approved										
Total for this request				512,284						

PART VII - APPROVALS

1. _____ 9.29.21
Forest Supervisor Date