Date of Report: 13 Nov 2023

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: Quarry Fire

B. Fire Number: CA-STF-001921

C. State: California

D. County: Tuolumne

E. Region:05

F. Forest: Stanislaus NF

G. District: Groveland and Mi-Wok

H. Fire Incident Job Code: P5QN3W

I. Date Fire Started: 9/9/2023

J. Date Fire Contained: 11/15/2023

K. Suppression Cost: $3,500,000

L. Fire Suppression Damages Repaired with Suppression Funds (estimates): Existing roads, and natural barriers such as rock outcrop were used for a majority of containment line. However, of the 4.9 miles of line that was constructed, no suppression repair occurred, nor is expected.

1. **Fireline repaired (miles):** None
2. **Other (identify): Unrepaired lines (as of 11/8/23) 4.9 miles**
   Suppression repair not completed as of 11/8/23. Handline and contingency lines are still present in fire footprint, unrepaired.
   3.4 mile handline
   1.5 miles dozer line

M. Watershed Numbers:

Table 1: Acres Burned by Watershed

HUC #	Watershed Name	Total Acres	Acres Burned	% of Watershed Burned
180400090802	Reed Creek	24,527	3,744	15.3
180400090404	Upper Cherry Creek	16,344	727	4.4
180400090801	Upper Clavey River	31,335	397	1.3
180400090403	West Fork Cherry Creek	26,149	1,106	4.2

N. Total Acres Burned:

Table 2: Total Acres Burned by Ownership

OWNERSHIP	ACRES
NFS	9,278
OTHER FEDERAL (LIST AGENCY AND ACRES)	
STATE	
PRIVATE	
TOTAL	9,278

O. **Vegetation Types:** Sierran Mixed Conifer, Red fir, and Montane Chaparral

P. Dominant Soils: Gerle family (granitic glacial debris), granitic rock outcrop, and McCarthy family (volcanic-derived).

Q. **Geologic Types:** Granodiorite of Poopenaut Valley, volcanic deposits of varying ages (Disaster Peak Formation and Eureka Valley Tuff), and glacial till deposits on the edges of Cherry and Bourland creeks (Tioga and Tahoe age).

R. Miles of Stream Channels by Order or Class:

Table 3: Miles of Stream Channels by Order or Class

STREAM TYPE	MILES OF STREAM
PERENNIAL	15.3
INTERMITTENT	10.5
EPHEMERAL	55.76
OTHER (DEFINE)	

S. **Transportation System:**
Trails: *National Forest (miles): 3.10* *Other (miles):* Unclassified trails: 0.65
Roads: *National Forest (miles):* 34.60 *Other (miles):* private roads: 4.09, unclassified roads: 0.37

PART III - WATERSHED CONDITION

A. Burn Severity (acres):

Table 4: Burn Severity Acres by Ownership

Soil Burn Severity	NFS	Other Federal (List Agency)	State	Private	Total	% within the Fire Perimeter
Unburned	3,299					36%
Low	4,608					50%
Moderate	1,201					13%
High	170					2%
Total	**9,278**					**100%**

The perimeter and analysis area used for the BAER assessment was an incident-generated perimeter from Nov. 2, 2023. This perimeter captured areas that had fire growth in two arms on the NE side of the fire near Bourland Meadow and the Critchfield Research Natural Area. The SBS shows these areas mostly as unburned because BARC imagery was taken 10/23/23. Burn severity is under-represented in areas of growth, and likely has more moderate SBS than is mapped. During a field visit on 11/5 in this area, the BAER team noted active fire behavior, including smoldering, consumption of ground fuels, and single tree torching.

For safety reasons, and due to incoming weather systems, including light snowfall on Nov. 6 & 7, we were unable to collect enough SBS points to properly adjust the SBS in these areas of fire growth after BARC acquisition.

B. **Water-Repellent Soil (acres): 130 acres**
No fire-induced water repellent soil was observed in low burn severity, but strong repellency was observed under high fuel loadings in high and moderate burn severity. These areas were very limited in size and were disconnected.

C. Soil Erosion Hazard Rating:
Very High: 63 acres (<1%)
High: 1,925 acres (21%)
Moderate: 3,886 acres (42%)
Low: 1,721 acres (18%)
Not rated (rock outcrop): 1,683 acres (18%)
In most of the fire, Soil Erosion Hazard Rating will not be elevated above natural background levels, as ground cover remains mostly intact over 86% of the fire area (low and unburned).

D. Erosion Potential:
Erosion modeling was not performed for this fire due to limited VARs. In 86% of the fire area (low and unburned), erosion potential is very similar to background levels and ground cover remains intact or has only patchy areas of forest floor consumption. In moderate burn severity under forest vegetation, needlecast potential is high because there was very little canopy loss from torching. Several patches of montane chaparral in the Cherry Creek and Reynolds Creek drainages have potential for a moderate increase in erosion potential where shrub cover was fully consumed and ground cover was reduced. In these patches (up to 60 acres in size), erosion will be elevated above base levels, but not enough to significantly impact soil productivity.

E. Sediment Potential:
Similar to erosion potential, in most of the fire area the sediment potential is unchanged or only slightly elevated above normal conditions. Burn severity tended to be lowest along drainages and streams, leaving a well-vegetated buffer strip along most streambanks. In the glacial-scoured terrain of Cherry Creek, there is an increase in sediment potential below moderate and high burn severity due to lower vegetation cover, but the area burned relative to the size of the watershed is very small, so sediment increases should be minimal at a watershed-scale. The risk to water quality at the inlet of Cherry Lake is also anticipated to be low, as a relatively small percentage of the watershed burned. While streams may see some bulking with fine sediment, ash, and floatable debris in and downstream of the burned area, these impacts are anticipated to be minor and not impact beneficial uses of water.

F. Estimated Vegetative Recovery Period (years):
Recovery of early successional herbs and shrubs will be within the first few years in low and moderate severity, provided invasive plant colonization and drought years are minimal. Very little overstory forest cover was lost, but forest structure will be altered from thinning of understory trees. Montane chaparral burned at high severity will take the longest to recover due to the (relatively) high elevation and shallow soils, approximately 10-20 years.

G. Estimated Hydrologic Response (brief description):

Hydrologic modeling was conducted at 10 pour points. Nine of these were at road/stream crossings and the 10th one was where Cherry Creek flows into Cherry Lake, the backup water supply for the City and County of San Francisco. The modeling showed minimal increases in post-fire runoff, with the highest response at PP3 (Lower Tributary to Reynolds Creek at 3N01H). The percent increase in bulked flows at this location was estimated to be a 66% increase, which is less flow than a pre-fire Q5 event. This culvert crossing was assessed on the ground and found to be adequately sized. The risk to life/property is low at all modeled locations.

Table 5 shows the modeled results of post-fire increased runoff.

Table 5 – Pre- and post-fire changes in discharge for a 2-year 6-hour storm event.

Values at Risk		Q2 Discharge by Watershed (cfs)		Increase in Discharge (percent)	Q2 Bulked Discharge by Watershed (cfs)		Increase in Bulked Discharge (percent)
Pour Point Watershed	Affected WS Area (mi^2)	Pre-fire	Post-fire		Pre-fire	Post-fire	
PP1: Little Reynolds Creek at 3N01	1.12	27.7	30.5	9.6	27.7	33.9	22.4
PP2: Reynolds Creek at 3N01	2.73	59.7	71.8	20.3	59.7	86.6	45.1
PP3: Lower Trib to Reynolds Creek at 3N01H	0.12	3.0	4.0	33.7	3.0	4.9	65.8
PP4: Upper Trib to Reynolds Creek at 3N01H	0.69	17.5	19.3	10.3	17.5	22.7	30.0
PP5: Rock Creek at 3N17	2.27	50.5	50.8	0.6	50.5	52.7	4.3
PP6: Trib to Bourland Creek at 3N16	0.95	22.2	23.6	6.3	22.2	25.9	16.5
PP7: Paddle Creek at 3N01	0.50	12.8	13.0	1.3	12.8	18.9	8.8
PP8: Bourland Creek at 3N01	7.68	160.0	164.1	2.6	160.0	171.9	7.4
PP9: Lost Creek at 3N01	0.42	10.3	10.4	0.5	10.3	11.1	8.0
PP10: Cherry Creek at Cherry Lake Inlet	104.03	2100.0	2135.5	1.7	2100.0	2156.3	2.7

PART V - SUMMARY OF ANALYSIS

Introduction/Background

The Quarry Fire was one of 42 fires ignited by lightning strikes across the Stanislaus National Forest (STF) on September 9, 2023. The STF was managing the Quarry Fire to achieve multiple resource objectives, including restoring natural fire return intervals, increasing forest resiliency, and aiding in reducing catastrophic wildfire risk to communities. The BAER Team received a Burned Area Reflectance Classification (BARC) satellite imagery map of the Quarry Fire from the Geospatial Technology and Applications Center (GTAC) in Salt Lake City, Utah on October 23, 2023. The fire continued to grow after the BARC map was received, and the BAER assessment was based upon a fire perimeter of 9,278 acres on November 2, 2023. The BAER team began an assessment on November 5, 2023, and was comprised of a team leader/soil scientist, hydrologist, and botanist. Other resources specialists, such as an aquatic biologist, engineer, and archaeologist, were consulted but did not have resource concerns.

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

Table 6: Critical Value Matrix

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

1. **Human Life and Safety (HLS):**
    a. Post-fire flood flows are not anticipated to be significantly higher than pre-fire conditions and there are minimal stream crossings or values at risk near drainages below the fire. Thus the risk of debris flows and sediment flows are not substantially elevated beyond normal levels.
    Probability: Unlikely Magnitude: Major Risk: **Intermediate**
    b. Roadside hazard trees were minimal within the Quarry Fire footprint. The soil burn severity was primarily low or very low/unburned (86%), and large swaths of roadside snags were not seen during the field assessment. Thus risk to human life and safety from hazard trees are not substantially elevated beyond normal levels.
    Probability: Unlikely Magnitude: Major Risk: **Intermediate**
2. **Property (P):**National Forest System roads are the only possible property value at risk within the Quarry Fire. Road/stream crossings were evaluated in the field and modeled to estimate post-fire flows. The watershed response is expected to be low; the BAER team does not expect significant damage potential to road infrastructure.
    Probability: Unlikely Magnitude: Minor Risk: **Very Low**
3. **Natural Resources (NR):** Native Plant Communities: The presence of exposed soil and recorded noxious weed populations, specifically *Cirsium vulgare* (bull thistle), poses a risk of damage or loss of native plant communities. Without thorough invasive plant survey records for the Quarry Fire and surrounding area, its unknown what other invasive plant species may occur, as well as the locations or densities of those infestations. Plant propagules from nearby invasive populations may have spread due to fire traffic. In addition, due to lack of vehicle cleaning prior to entering the burn area, new invasive weed species propagules may have been introduced to the area. This may result in colonization of weed species, especially in areas of ground disturbance and high and moderate soil burn severity locations. Fire expansion beyond the BARC extent likely resulted in underestimated moderate soil burn severity in those areas of recent fire growth, leading to greater EDRR survey needs than reflected by the SBS map. There are long-term potentially permanent adverse effects from the invasion of non-native invasive plants colonizing sensitive native plant communities.
    Probability: Possible Magnitude: Major Risk: **High**
    b. Hydrology and Soil Productivity: The erosion and hydrologic response in the Quarry Fire are expected to be mild, with only minor increases above pre-fire conditions. Erosion and sedimentation will occur but are not significant enough to threaten beneficial uses of water or decrease soil productivity.
    Probability: Unlikely Magnitude: Minor Risk: **Very Low**
    c. Threatened and Endangered Species (aquatics): Sierra Nevada Yellow-legged Frog (*Rana sierrae*) was listed as endangered by USFWS in 2014. Approximately 57 acres of *Rana sierrae* critical habitat fell within the fire perimeter. Due to the low soil burn severity in the impacted area, the Forest Aquatic Biologist was not concerned about potential post-fire impacts to the habitat.
    Probability: Unlikely Magnitude: Minor Risk: **Very Low**
    d. Threatened and Endangered Species (botany): The Quarry Fire burn area is lower than the expected elevation of the Federally Threatened species, *Pinus albicaulis* (white bark pine), on the Stanislaus National Forest. No other Federally listed Threatened, Endangered, or Proposed plant species or their designated critical habitat have potential to occur in the burn area.
    Probability: Unlikely Magnitude: Minor Risk: **Very Low**
4. **Cultural and Heritage Resources:** Groveland District Archaeologist Jim Moak, and Forest Heritage Program Manager Kathy Strain were consulted about post-fire threats to heritage resources. Based on the BAER team's assessment of the limited watershed response, they both thought there was not a need to perform a full BAER assessment of heritage resources. Additionally, heritage READs were present on the fire and worked with the incident management team to mitigate direct effects to heritage resources from suppression and backburning, and indirect impacts from the fire. Thus, the risk of damage or loss was not substantially altered due to changed conditions caused by the fire.
    Probability: Unlikely Magnitude: Minor Risk: **Very Low**

B. **Emergency Treatment Objectives:** Natural Resources: The BAER risk assessment shows a high risk to native plant communities from spread of invasive plant populations. This risk will be mitigated with Early Detection Rapid Response (EDRR) surveys to determine whether ground disturbing activities related to the Quarry Fire have resulted in the expansion of non-native invasive plants. For other critical values, the risk assessment has not identified a need for treatments to protect human life and safety, property, cultural and heritage resources, or other natural resources because risk levels were very low, low, or intermediate.

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

D. Probability of Treatment Success

Table 7: Probability of Treatment Success

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

E. Cost of No-Action (Including Loss): Implied Market Value is $47,345

F. Cost of Selected Alternative (Including Loss): Cost of proposed treatment is $13,231

G. Skills Represented on Burned-Area Survey Team:

☒ Soils ☒ Hydrology ☐ Engineering ☐ GIS ☐ Archaeology
☒ Weeds ☐ Recreation ☐ Fisheries ☐ Wildlife
☐ Other:

Team Leader: Curtis Kvamme
Email: curtis.kvamme@usda.gov **Phone(s):** 209-288-6320

Forest BAER Coordinator: Curtis Kvamme
Email: curtis.kvamme@usda.gov **Phone(s):** 209-288-6320

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

Skill	**Team Member Name**
Team Lead(s)	Curtis Kvamme
Soils	Curtis Kvamme
Hydrology	Tracy Weddle
Engineering	
GIS	
Archaeology	
Weeds	Autumn Coffey
Recreation	
Other	

H. Treatment Narrative:

Land Treatments: Early detection and rapid response (EDRR) invasive plant surveys to determine whether ground disturbing activities related to the Quarry Fire have resulted in the expansion of noxious weeds is requested for the first year.

All areas associated with suppression activities such as drop points and staging areas are an EDRR priority and the request is for complete surveys. As seen in Table 9 below, acreage for point suppression activities is estimated at 16.0 acres and mileage for line features such as handlines and road repair is estimated at 12.2 miles, or 30.5 acres.

Table 9: Suppression Features by type

Suppression Activity Type	Total Miles	Count	Estimated Total Acres
Hand Line	3.4		1.2
Road Repair	7.3		26.5
Dozer Line	1.5		2.7
Drop point		3	3
Helispot		4	4
Unimproved landing area		1	0.5
Spike camp		4	5
Drafting site		2	1
Mobile Weather Unit		1	1
Other (includes UAS staging area)		3	1.5

The focus for general burn area EDRR surveys shall be within special land designations where there were suppression activities nearby and where the soil burn severity was moderate or high (e.g. the helispot area in the Emigrant Wilderness). Sensitive meadow and lava cap rare plant habitat types shall be surveyed where roads occur within 150 feet (estimated distance *Cirsium vulgare* seeds can travel) of the sensitive area where the soil burn severity was moderate and high.

Surveying will include walking through the priority areas, documenting invasive plant species, and hand pulling new weed occurrences. New weed occurrences will be pulled to root depth, placed in sealed heavy-duty plastic bags, and properly disposed of.

Documentation and treatment of new infestations will include:

- Mapping species, infestation extent, and density using the Invasive Species Mobile application
- Treatment method utilized
- Entering surveyed area, infestation data, and treatments into the National Resource Information System (NRIS) database

The STF does not currently have a permanent botanist. To complete the EDRR, it is anticipated that a botanist on a 120-day detail or a botanist ordered on a BAER implementation incident will coordinate and lead the EDRR effort. A 2-person weed crew staffed by 1039 techs or Great Basin Institute (GBI) crews would complete the EDRR. There are also anticipated costs for supplies (weed bags, hand tools, and gloves) and vehicle mileage. A breakdown of budget can be found in the Rare and Invasive Plant Species BAER report.

Channel Treatments: N/A

Roads and Trail Treatments: N/A

Protection/Safety Treatments: N/A

I. Monitoring Narrative: No monitoring is proposed for the Quarry Fire BAER.

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										
Invasive weeds EDRR fire suppression activities (linear features)	ac	139	31	$4,300	$0		$0		$0	$4,300
Invasive weeds EDRR fire suppression activities (area features)	ac	145	16	$2,316			$0		$0	$2,316
Invasive weeds EDRR burn area	ac	144	46	$6,616	$0		$0		$0	$6,616
Insert new items above this line!				$0	$0		$0		$0	$0
Subtotal Land Treatments				$13,231	$0		$0		$0	$13,231
B. Channel Treatments										
				$0	$0		$0		$0	$0
				$0	$0		$0		$0	$0
Insert new items above this line!				$0	$0		$0		$0	$0
Subtotal Channel Treatments				$0	$0		$0		$0	$0
C. Road and Trails										
				$0	$0		$0		$0	$0
				$0	$0		$0		$0	$0
Insert new items above this line!				$0	$0		$0		$0	$0
Subtotal Road and Trails				$0	$0		$0		$0	$0
D. Protection/Safety										
				$0	$0		$0		$0	$0
				$0	$0		$0		$0	$0
Insert new items above this line!				$0	$0		$0		$0	$0
Subtotal Protection/Safety				$0	$0		$0		$0	$0
E. BAER Evaluation										
Initial Assessment	Report	$12,471	1	$12,471	$0		$0		$0	$12,471
				$0	$0		$0		$0	$0
Insert new items above this line!				---	$0		$0		$0	$0
Subtotal Evaluation				$12,471	$0		$0		$0	$12,471
F. Monitoring										
				$0	$0		$0		$0	$0
				$0	$0		$0		$0	$0
Insert new items above this line!				$0	$0		$0		$0	$0
Subtotal Monitoring				$0	$0		$0		$0	$0
G. Totals				$13,231	$0		**$0**		**$0**	**$25,702**
Previously approved										

PART VII - APPROVALS

1. _____ 11/14/23
Forest Supervisor Date