Date of Report: 11/4/2021

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: KNP Complex

B. Fire Number: 2021-CAKNP-000122

C. State: California

D. County: Tulare/ Fresno

E. Region: 5

F. Forest: Sequoia

G. District: Hume

H. Fire Incident Job Code: PPN9UH (1522)

I. Date Fire Started: 9/11/2021

J. Date Fire Contained: 75% (11/4/2021)

K. Suppression Cost: $94,000,000 (11/4/2021)

L. Fire Suppression Damages Repaired with Suppression Funds (estimates):
Fireline repaired (miles): 31.68 miles completed

1. **Other (identify):** 4.92 need inspection
2. **Dozer line:** 5.26 in progress

M. Watershed Numbers:

Table 1: Acres Burned by Watershed

HUC #	Watershed Name	Total Acres	Acres Burned	% of Watershed Burned
180300070301	Dorst Creek	18,172	3,649	20%
180300070304	Middle North Fork Kaweah River	19,051	7,234	38%
180300100701	Tenmile Creek	24,788	202	0.81%
180300070601	Upper Dry Creek	12,289	180	1.5%
180300070302	Upper North Fork Kaweah River	19,975	19,470	97%

N. Total Acres Burned:

Table 2: Total Acres Burned by Ownership

OWNERSHIP	ACRES
NFS	7,193
BLM	1,790
STATE	307
PRIVATE	1,841
NPS	78,194
TOTAL	89,325

O. **Vegetation Types:** The KNP complex on NFS lands is mainly mixed conifer, on the east end its mixed conifer with Giant Sequoia, south west is mixed conifer hadwood, going to oak woodland and chaparral at the lowest elevations. In Stony/ Woodward area it's all red fir vegetation type.

P. **Dominant Soils:** Cannel-Kriest Family complex, Shaver-Holland association, Wind River Family-Shaver association, Chaix-Dome complex, Holland-Hotaw association, Auberry sandy loam, Monache Variant-Junipero family association, Cagwin-Toem complex.

Q. **Geologic Types:** Dominate underlying material consists of Cretaceous granodiorite of the Hartland series with minor occurrences of Mesozoic metasedimentary rock consisting schist and hornfels. Some surficial deposits of Quaternary alluvium can be found in the eastern part of the analysis area.

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

S. *Table 3: Miles of Stream Channels by Order or Class*

STREAM TYPE	MILES OF STREAM
PERENNIAL	7.8
INTERMITTENT	2.8
EPHEMERAL	84
OTHER (DEFINE)	N/A

T. **Transportation System:**
Trails: *National Forest (miles):* 0 *Other (miles):*
Roads: *National Forest (miles):* 25.8 *Other (miles):*

PART III - WATERSHED CONDITION

A. **Burn Severity (acres):**

Table 4: Burn Severity Acres by Ownership

Severity	BLM	Private	US Forest Service	National Park Service	State	Percentage
Unburned	331	126	449	9861.62	48	12%
Low	984	871	2172	39798.15	217	49%
Moderate	474	794	3593	23890.40	37	32%
High	1	50	979	4644.03	5	7%
Total	1790	1841	7193	78194.20	307	100%

B. **Water-Repellent Soil (acres):** 1021

C. **Soil Erosion Hazard Rating:** moderate- very high

D.-E: KNP BAER had no formal soil scientist. The team relied on a storm that happen before the team initiating. This storm was used as a surrogate to assess the future risk to BAER critical values.

F. Estimated Vegetative Recovery Period (years): 3-5 years for early serial species for vegetative ground cover and much longer in the mixed conifer/ Giant Sequoia's

G. Estimated Hydrologic Response (brief description): Hydrologic response is estimated by assuming an increased runoff commensurate with soil burn severity in terms of recurrence interval. This recurrence interval estimates the response of the newly burnt landscape to the design storm of interest. The French Fire is expected to respond to an average rainfall event differently for the unburned, low, moderate, and high soil severity burned areas.

The USGS regression equations for the Sierra Nevada (Gotvald et al., 2012) were calculated using StreamStats, a USGS geospatial model which delineates the watersheds upstream of the pour points and determines average precipitation and average elevation. StreamStats was run for the affected pour points to yield discharge in cubic feet per second for the Q2-Q100 return intervals and then divided by the size of the watershed to give a discharge in cubic feet per second per square mile, which was applied to each design storm by watershed size. These values were then multiplied by the area of soil burn severity (in square miles), which includes unburned lands, and then summed to provide an estimated post-fire discharge for the pour point drainages.

The greatest modeled increases in post-fire runoff (≥150%) related to flood risk were at pour points 3 (Log Corral Rd at Pierce Creek.), 4 (Pierce Creek near Cherry Rd), and 5 (Stock Pond near Pierce Creek). These pour points exceed a Q5 response for a Q2 storm. Although increases are high relative to normal Q2 discharge for the remaining pour points, none exceeded a pre-burn Q5 discharge. Most natural stream channels in this hydrophysiographic environment are somewhat entrenched with confinement to Q50 and in many cases Q100, so Q2-Q10 responses would not inundate BCVs adjacent to the stream channels. Increase flow could affect stream crossing if they are non-functional or of insufficient capacity to pass a Q10 event. In general, risks from ***clear water flooding alone*** are generally considered low for a 2-year, 6-hour design storm.

Table A-2 – Model output showing percent increase in water yield by pour point drainages for a 2 year-6 hour (Q2), 5 year-6 hour (Q5), and 10 year-6 hour (Q10) design storm.

Pour Point Watershed	Watershed Area (mi^2)	Percent Water Yield Increase		
		Q2	Q5	Q10
(PP1) Eshom Creek at Eshom Valley Rd.	2.60	103	49.9	43.2
(PP2) Eshom Creek at Eshom Valley Rd near Hartland	5.30	59.4	27.9	24.6
(PP3) Log Corral Rd at Pierce Creek	0.40	173.2	81.7	71.0
(PP4) Pierce Creek near Cherry Rd	5.70	185.9	94.7	74.9
(PP5) Stock Pond near Pierce Creek	0.20	261.6	133.1	106.1
(PP6) Unnamed Creek at Eshom Creek Campground	1.0	37.1	16.9	15.5
(PP7) Worden Rd at Pierce Creek	1.90	130.0	60.4	52.3

PART V - SUMMARY OF ANALYSIS

Introduction/Background

The KNP Fire has burned approximately 7,000 acres on the Sequoia National Forest, Giant Sequoia National Monument. The fire is located east of Dunlap, CA with its western extent terminating above Eshom Creek, and its eastern extent terminating at the Generals Highway. The fire burned as far North as Bacon Meadow, and south beyond the Park Service boundary. The terrain of the KNP Fire, where it burned within the Sequoia National Forest, ranges in elevation from 4,000 feet to 13,700 feet.

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

Table 5: 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):** Human life/safety is at risk on NFS land from threats associated with post-fire related hazard trees, rock fall, increased flooding and debris flows, and loss of egress/access throughout the burned area, but particularly on roads and where there are private inholdingd. A fair number of Forest Service roads intersect with Sequoia National Park lands. Interagency coordination with this land manager will be critical in promoting human life and safety. A large number of the primary two digit roads have already been snagged out thus greatly reducing the overhead hazards however the other roads have not been inspected for over head hazards. Treatments sure as closure and signage will be critical in protecting human life and safety. Currently there is a area closure and will be followed up with an annual winter closure of the Pierce area. Communication with Tulare County Roads department, private inholdings and Whitaker Forest will help in maintaing public safety.

2. **Property (P):**Damage to or loss of sections of road and could occur from increased runoff, erosion, flooding, and potentially debris flows within and downslope or downstream of areas of moderate and high soil burn severity. As a result of the burned watersheds, it has been determined through the BAER risk assessment process/matrix, that the risk to Forest Service Roads is considered Very High with Major consequences and there are also segments that were determined Very High with Moderate consequences. 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.

3. **Natural Resources (NR):**There are a number of invasive plant species known to be present in or near the portion of the KNP Complex Fire on Giant Sequoia National Monument (see Map 1). These include: Yellow-star thistle (*Centaurea solstitialis*), tocalote (*Centaurea melitensis*), bull thistle (*Cirsium vulgare*), and common mullein (*Verbascum thapsus*). Native vegetation communities were highly departed from natural fire regimes and this fire resulted in uncharacteristically severe effects in many of these areas. The severity of the fire will slow native vegetation recovery. Existing invasive plant populations previously contained to isolated areas by intact forests and shrublands are very likely to spread in the burned area. The consequences of new introductions or spread of existing populations could result in high density of invasives and/or type conversion, causing major irreversible consequences and putting plant communities at very high risk.
    b. Little effective equipment washing occurred during fire suppression operations and vehicles, including heavy equipment, operated in areas with known invasive plant populations. There was extensive use of dozers, excavators, and masticators throughout the Eshom area. 35 miles of dozer line was completed, including some through areas known to contain invasive plants. It is very likely that fire suppression activities spread existing and introduced new invasive plant species and that these species could cause permanent impacts to native plant communities. The magnitude of threat is significant because these communities are vulnerable to type conversion and associated degradation of ecosystem structure and function, biodiversity loss, and altered fire regimes. The risk to vegetative recovery is very high where suppression activities occurred.

4. **Cultural and Heritage Resources:**Forty-two sites are within the Sequoia National Forest KNP burn area. Of these, nine were chosen for assessment using the BAER Risk Assessment Matrix. The remaining sites were not chosen because they were either not sensitive to post-fire effects, and/or were in medium to low burn severity areas. Four sites could not be visited due to poor access conditions and hazard tree safety concerns. Of the five sites visited and assessed, one warranted treatment.

B. Emergency Treatment Objectives:

Proposed Land Treatments
The objective of the land treatments is to:

1. Promote and protect native and naturalized vegetative recovery by reducing the spread of known population of noxious weeds. **(P1a, P1b)**

Note- No active land treatments are recommended for long-term soil productivity or hydrologic function. Allowing for natural recovery is the recommended course of action.

Proposed Road Treatments
The objective of the road treatments is to:

1. Protect road investment from becoming impassible and damaged due to increased post-fire runoff. **(R1, R3)**
2. Reduce sedimentation into streams degrading water quality. **(R1, R3)**

Proposed Protection/Safety Treatments:
The object if the protection/safety treatments are to:

1. Protect human life and safety by raising awareness through post hazard warning signs at road locations entering the burned area. **(S1a)**
2. Maintain area closure through the spring to allow for hazards to abate themselves and encourage natural recovery.
3. This treatment is essential to coordinate access between Sequoia National Park and Forest Service lands to coordinate public messaging between land managers. Park Service is planning on hiring several staff to work on public messaging so it will be essential the Forest is helping to provide this coordinated messaging. **(S10)**
4. Stabilize and conceal an important pre-historic cultural thus maintaining is cultural significance, research potential and inclusion in the National Register of Historic Places. **(H1)**

C. Probability of Completing Treatment Prior to Damaging Storm or Event:
Land: 85- EDRR is completed after the first spring
Channel: NA
Roads/Trails: 80
Protection/Safety: 80

D. Probability of Treatment Success

Table 6: Probability of Treatment Success

	1 year after treatment	*3 years after treatment*	*5 years after treatment*
Land	75	85	90
Channel	NA	NA	NA
Roads/Trails	85	90	90
Protection/Safety	90	90	90

E. **Cost of No-Action (Including Loss): $755,150** This value does **not** include loss of human life/ safety, native/ naturalized plant communities, cultural values, soil productivity and hydrologic function.

F. Cost of Selected Alternative (Including Loss): $147,087.30 (assuming 15% loss)

G. Skills Represented on Burned-Area Survey Team:

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

Team Leader: Kyle Wright
Email: kyle.wright2@usda.gov **Phone(s)** 458-292-6027

Forest BAER Coordinator: Andy Stone
Email: keith.stone@usda.gov **Phone(s):** 760-376-3871

Team Members: *Table 7: BAER Team Members by Skill*

Skill	Team Member Name
Team Lead(s)	Kyle Wright
Soils	Sam Prentice (DOI team)
Hydrology	Andy Stone
Engineering	Pablo Gonzalez, Antonio Cabrera
GIS	Wendy Rannals/ Sarubbi
Archaeology	Alex Verdugo
Weeds	Jeff Cordes
Recreation	Kyle Lane
Other	Marianne Emmendorfer (Silviculture)

H. Treatment Narrative:

Land Treatments:

P1a. Invasives EDRR-BAER: EDRR surveys are proposed to determine whether post-fire conditions in the burned area have facilitated spread of invasive plants due to seed bank stimulation and lack of competition. These surveys will focus on areas near known invasive populations adjacent to susceptible high value habitat (meadows, riparian areas, sequoia groves) especially in the 987 acres that burned at high severity.

P1b. Invasives EDRR- Suppression: EDRR surveys are proposed to determine whether ground disturbing activities related to fire suppression have resulted in new introductions or spread of invasive plant infestations on approximately 35 miles of dozer lines, 15 miles of road as line, 18 miles of handline, and at 30 point features (drop points, log decks/landings, staging areas, and dozer pushes. Over 6,000 acres are within the area impacted by suppression activities, which overlaps multiple known invasive plant populations.

Known invasive species in the area that need to be surveyed for, mapped and removed are yellow-star thistle (*Centaurea solstitialis*), tocalote (*Centaurea melitensis*), bull thistle (*Cirsium vulgare*), and common mullein (*Verbascum thapsus*). Yellow-star thistle is the priority for detection and removal.

Currently, there are no Forest or District Botanists on the Sequoia NF and force account botany technicians are very unlikely to be available for treatment implementation. As such, the proposed costs are to utilize contract or partner resources.

Treatment	Units	Unit Cost	# of Units	Total Cost
P1a. Invasives EDRR - BAER	Acres	$280	56	$15,680
P1b. Invasives EDRR - Suppression	Acres	$280	98	$27,440
			TOTAL	$

Channel Treatments: No Channel Treatments Proposed

Roads Treatments:
R1. Storm Proofing: This treatment includes storm proofing drainage features identified on critical value roads that have an unacceptable risk to damage or failure due to increased post-fire flows. Treatments include enlarge inlet catch basin, culvert inlet modifications (metal end sections), rolling dips, protect leadoffs and over-side drains w/flume to protect fill slopes.

Install Critical Dip	EA	$920	9	$8,280

Install Drainage Armor (Class I)	TON	$260	150	$39,000
Increase Inlet Catch Basin 18-24" CMP	EA	$500	16	$8,000
Install metal end section 18"	EA	$1,100	5	$5,500
Install metal end section 24"	EA	$1,500	1	$1,500
Mobilization	EA		1	$7,300

Treatment	Units	Unit Cost	# of Units	Total Cost
R1. Storm Proofing	Miles	$5,079	13.7	$69,580

R3. Storm Inspection and Response: Storm inspection and response will keep culverts and other drainage features functional by cleaning sediment, rockfall and debris from in and around features between and/or during storms. Increase the frequency of storm inspections and availability of equipment to clean out culvert inlets and ditches in response to local weather forecasts. Recommend installing "snow" poles or markers to help in locating the culvert inlets if they become plugged. This work will be accomplished through Forest Maintenance Contract, equipment rental, and/or general labor.

Treatment	Units	Unit Cost	# of Units	Total Cost
R3. Storm Inspection and Response	Days	$2,000	4	$8,000

Protection/Safety Treatments:
Treatments are specifically designed to protect the public, agency employees and contractors from unacceptable risks as a result of the fire. Threats include hazard trees, rock fall, potential flooding and debris flows.

S1a. Road Warning Signs: Signs will inform users of the dangers associated with entering and recreating within the burned area.

Treatment	Units	Unit Cost	# of Units	Total Cost
S1a. Road Warning Signs	Sign/Post	$500	5	$2,500

S10. Interagency Communication: This treatment is essential to coordinate access between Sequoia National Park and Forest Service lands to coordinate public messaging between land managers. Park Service is planning on hiring several staff to work on public messaging so it will be essential the Forest is helping to provide this coordinated messaging. The cost is requested in addition to base salary.

Treatment	Units	Unit Cost	# of Units	Total Cost
S10. Interagency Communication	Days	$500	5	$2,500

M1. Heritage/ Cultural Site Protection: Site protection will be achieved by limiting erosion by installing straw wattles above the site to deflect water and soil away from the site. Site has significant potential for impacts.

Treatment	Units	Unit Cost	# of Units	Total Cost
H1. Heritage/Cultural Site Protection	Lump	$2,200	1	$2,200

I. Monitoring Narrative:

PART VI – EMERGENCY STABILIZATION TREATMENTS AND SOURCE OF FUNDS

Line Items	Units	Unit Cost	# of Units	BAER $	Other $	# of units	Fed $	# of Units	Non Fed $	Total $
A. Land Treatments										
P1a. Invasives EDRR-BAER	acres	280	56	$15,680	$0		$0		$0	$15,680
P1b. Invasives ERDD-Suppression	acres	280	98	$27,440	$0		$0		$0	$27,440
Insert new items above this line!				$0	$0		$0		$0	$0
Subtotal Land Treatments				$43,120	$0		$0		$0	$43,120
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										
R1. Storm Proofing	Miles	5,079	14	$69,582	$0		$0		$0	$69,582
R3. Storm Inspection and Respons	Miles	2,000	4	$8,000	$0		$0		$0	$8,000
Insert new items above this line!				$0	$0		$0		$0	$0
Subtotal Road and Trails				$77,582	$0		$0		$0	$77,582
D. Protection/Safety										
S1a. Road Warning Signs	Sign/Post	500	5	$2,500	$0		$0		$0	$2,500
S10. Interagency Communication	Days	500	5	$2,500	$0		$0		$0	$2,500
H1. Heritage/ Cultural Site Protecti	Lump	2,200	1	$2,200	$0		$0		$0	$2,200
Insert new items above this line!				$0	$0		$0		$0	$0
Subtotal Protection/Safety				$7,200	$0		$0		$0	$7,200
E. BAER Evaluation										
Initial Assessment	Report			$15,000	$0		$0		$0	$0
				$0	$0		$0		$0	$0
Insert new items above this line!				—	$0		$0		$0	$0
Subtotal Evaluation					$0		$0		$0	$0
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				$127,902	$0		$0		$0	$127,902
Previously approved										
Total for this request				$127,902						

PART VII - APPROVALS

1. Teresa Benson — Forest Supervisor — 11/15/2021 — Date