Date of Report: October 1, 2020

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: Sheep (North Complex)

B. Fire Number: CA-PNF-001299

C. State: CA

D. County: Lassen/Plumas

E. Region: 5

F. Forest: Lassen and Plumas

G. District: Eagle Lake (LNF) Mt Hough (PNF)

H. Fire Incident Job Code: P5NGS4

I. Date Fire Started: 17 Aug 2020

J. Date Fire Contained: 12 Sep 2020

K. Suppression Cost:

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

1. **Fireline repaired (miles): 69.0 miles complete, 11.3 miles in progress, 93.0 miles needed**

2. **Other (identify):**

M. Watershed Numbers:

Table 1: Acres Burned by Watershed

HUC #	Watershed Name	Total Acres	Acres Burned	% of Watershed Burned
180800030801	Baxter Creek	26,968	220	0.82%
180800030406	Cheney Creek-Susan River	17,608	5,112	29.03%
180800030702	Gold Run Creek	15,187	8,569	56.42%
180800030704	Lake Leavitt-Susan River	37,628	1,492	3.96%
180800030705	Lassen Creek-Susan River	27,231	3,912	14.37%
180201220402	Middle Lights Creek	14,013	0.45	0.003%
180201220401	Upper Lights Creek	22,573	7,464	33.07%
180800030404	Willard Creek	18,673	2,775	14.86%

N. Total Acres Burned:

Table 2: Total Acres Burned by Ownership

OWNERSHIP	ACRES
NFS	9,134
OTHER FEDERAL (LIST AGENCY AND ACRES)	803 BLM
STATE	585
PRIVATE	19,023
TOTAL	29,545

O. **Vegetation Types:** Sierran mixed conifer, white fir, red fir, eastside pine, montane riparian, montane chaparral, perennial and annual grasslands.

P. **Dominant Soils:** Predominant soils on Forest Service lands in the Sheep Fire footprint are Psamments (34%) and Alfisols (30%). Psamments are the very sandy soils formed on granodiorite that have high infiltration rates but tend to flow when water moves across their surface. The Alfisols have formed on the variety of parent rocks in the fire footprint and show some soil development with modest clay accumulation in the subsoil. Other soil types are the Mollisols, which have substantial organic matter accumulation in the surface horizon, and Inceptisols, soils with very little soil development.

Q. **Geologic Types:** Bedrock in the Sheep Fire area includes a wide range of igneous, metamorphic and sedimentary rock. Focusing on forest service lands, the main formations are granodiorite, weakly to moderately consolidated tertiary conglomerate, volcanic rock ranging from rhyolite to andesite, plus gabbro, diorite, and metavolcanics. The conglomerate can be susceptible to mass movement, with several old landslides mapped in the fire area.

R. Miles of Stream Channels by Order or Class:

Table 3: Miles of Stream Channels by Order or Class

STREAM TYPE	MILES OF STREAM
PERRENIAL	29.34
INTERMITTENT	48.50
EPHEMERAL	111.43
OTHER (DEFINE)	

S. **Transportation System:**
Trails: *National Forest (miles):* 0 *Other (miles):*
Roads: *National Forest (miles):* 58.75 *Other (miles):*

PART III - WATERSHED CONDITION

A. Burn Severity (acres):

Table 4: Burn Severity Acres by Ownership

Soil Burn Severity	NFS	Other Federal (BLM)	State	Private	Total	% within the Fire Perimeter
Unburned	618	111	71	1,419	2,279	8%
Low	2,698	290	468	6,292	9,748	33%
Moderate	4,381	278	46	9,606	14,311	48%
High	1,437	64		1,706	3,207	11%
Total	9,134	803	585	19,023	29,545	100%

B. Water-Repellent Soil (acres): .
Water repellency was extremely variable and monitoring was inconclusive. Much more data would be needed to estimate acreage of water repellent soil. The only area with consistently strong hydrophobicity was in the upper Baxter Creek watershed, both in burned and unburned soils, but it represents a minor portion of the fire footprint.

C. Soil Erosion Hazard Rating for Forest Service Lands:

	Low	Moderate	High	Very High
Acres	1885	2764	1885	3601
%	21	30	21	39

The large percentage of very high erosion hazard is due to the presence of highly erodible soils on steep slopes where soil burn severity is high and moderate.

D. Erosion Potential: The Forest Service Water Erosion Prediction Project (WEPP) Post-fire model was run for 4 different catchments on Forest Service land. Erosion rates ranged from 1.2 to 8.6 tons per acre, averaging 4.1 tons per acre hillslope soil loss for a 5-year storm.

E. **Sediment Potential:** Sediment potential from the burned area is about 37449 tons for a 5-year storm.

F. Estimated Vegetative Recovery Period (years): Based on post-fire monitoring conducted on the Lassen NF about 50% plant cover can be expected within one year. Full cover is expected within five years.

F. Estimated Hydrologic Response (brief description):
The USGS Regression equation method incorporated into the USGS StreamStats website was used to estimate pre fire discharge and the Skalkaho equation was used to estimate post-fire flows based on a 2 and 5 year occurrence interval over a 15 minute duration. Due to hillslope gradient and loss of vegetation, the first, large runoff-producing storms will likely increase surface flows in many streams within the Sheep Fire. The highest increases are predicted at Lassen Creek immediately upstream of a constriction at the base of an agricultural valley, Gold Run Creek above privately owned bridges, Gold Run Creek above County Road 203, Cheney Creek immediately upstream of the confluence with the Susan River, and Lights Creek upstream of Morton Creek at 1.9, 1.8, 1.7, 1.8, and 1.7 times increases respectively. The highest amounts of sediment yields from the burned watersheds are expected during the first year after the fire and reducing over time as vegetation recovers.

The Sheep Fire burned in a highly mosaic pattern where nearly 59% of the fire burned with moderate to high soil severity. In areas of low and unburned soil severity significant patches of intact riparian vegetation, ground cover, and standing dead and dying trees that will contribute needle cast as ground cover remain. Threats to watershed condition and water quality were considered very high due to the disturbance to recovering soils impairing recovery from erosion and sedimentation within affected watersheds with moderate and high burn severity, increased runoff resulting in higher concentrations of runoff on roads, resulting in exacerbated erosion of road fill slopes, and surrounding land, sedimentation of streams, increasing magnitude of flooding and potential for debris flows reduction in water quality, and degraded channel condition and bank erosion from increased flows.

PART V - SUMMARY OF ANALYSIS

Introduction/Background

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):

- One short section of guardrail burned (existing very likely damage) above a culvert wall along 29N43. The risk to the public is moderate as vehicles may run off the edge and down the embankment at the location. The overall risk is very high.
- A compromised and failed warped multi-plate arch culvert with cracked concrete footings on 28N30 poses a likely occurrence of further damage caused by increased burn area runoff storm flows. The magnitude of the consequence is major as a further failed structure will cause a hazardous and dangerous crossing for the public. The overall risk is very high.

2. Property (P):

- 29N07 Baxter creek road has a section at the top of the road that burned hot. The section has little to no drainage features along the road which makes the probability of fire damage very likely. Magnitude of the consequence is moderate as several washouts are expected with increased runoff from the burned slopes. Overall risk is very high.
- 29N43, 29N07, 29N03, 28N64, 28N30, 28N08, 28N02 all have either plugged culverts or culverts needing work. Approximately 231 culverts were able to be surveyed which does not include all the roads or all the culverts that are existing. Out of the 230+ culverts identified, 53 are recommended to be cleaned. Plugged culverts redirect burn area runoff flows either over the roadway causing a washout or doubling the flow impact to the next culvert down the road causing a cascading culvert failure effect. Due to the number of culverts at risk, the chance of culverts failing/plugging is likely. The consequence is moderate with the potential of wash outs or the next culvert/drainage feature being overwhelmed. The overall risk is high to the transportation infrastructure..

3. Natural Resources (NR):

It is likely that invasive species were spread into un-infested areas through: (1) the use of equipment and personnel staged within known infestations, (2) the disturbance of known noxious weeds within and adjacent to the burn area, (3) the reactivation of dormant seed banks, and (4) the exposure of open, bare ground that is now vulnerable to invasion. The consequences are moderate because spread and introduction of noxious weeds would cause long-term damage to the critical natural resource values associated with native plant communities and endemic, sensitive plant habitat.

4. Cultural and Heritage Resources: N/A

B. Emergency Treatment Objectives:

Land Treatments: Retard the spread of invasive weeds into areas of high and moderate severity where few to no weeds currently exist. Retard the spread of invasive weeds as a result of suppression repair activities, mainly dozer lines.

Proposed Road and Trail Treatments: Protect and stabilize Forest Service infrastructure at risk of damage as a result of increased sedimentation, stream diversion, and erosion from the fire.

Proposed Protection/Safety Treatments: Caution recreating forest visitors and administrative users about the potential hazards that exist within the burned area.

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

Land: 95%
Channel:
Roads/Trails: 75%
Protection/Safety: 90%

D. Probability of Treatment Success

Table 6: Probability of Treatment Success

	1 year after treatment	*3 years after treatment*	*5 years after treatment*
Land	80	75	70
Channel	NA		
Roads/Trails	70	80	90
Protection/Safety	85	90	90

E. Cost of No-Action (Including Loss): $679,475.00

F. Cost of Selected Alternative (Including Loss): $87,725

G. Skills Represented on Burned-Area Survey Team:

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

Team Leader: Luke Rutten
Email: luke.rutten@usda.gov **Phone(s)** 530-478-6249

Forest BAER Coordinator: Doug Peters
Email: douglas.w.peters@usda.gov **Phone(s):** 530-251-6432

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

Skill	**Team Member Name**
Team Lead(s)	Luke Rutten
Soils	Doug Peters
Hydrology	Becky Biglow, Jesse Merrifield
Engineering	Todd Orange
GIS	Jim Schmidt, Lauren Enriquez
Archaeology	Jake Martin, Noel Jones
Weeds	Erin Lonergan, Natalie Pyrooz
Recreation	
Other	

H. Treatment Narrative:

Land Treatments:

- *Suppression Related Treatments* – Early Detection Rapid Response (EDRR) surveys and treatments will be conducted in 2021 for target invasive plant species in areas disturbed during fire suppression activities. Fire lines, drop points, staging areas, and other suppression disturbances will be surveyed for new infestations and treated to prevent establishment. A map of specific locations to be surveyed is provided in Appendix A.

- *Burn Related Treatments* – Early Detection Rapid Response (EDRR) surveys will be conducted in 2021 within sensitive plant communities located adjacent to known infestations. Newly discovered infestations will be mapped and treated. A map of specific locations to be surveyed/ treated is provided in Appendix A. Existing infestations which had previously been controlled or near eradication will be treated in order to limit fire-induced expansion, specific infestations to be treated are included in Appendix B.

Roads and Trail Treatments:

- *Property*- 29N07 Baxter creek road has a section at the top of the road that burned hot. The section has little to no drainage features along the road which makes the probability of fire damage very likely. Magnitude of the consequence is moderate as several washouts are expected with increased runoff from the burned slopes. Overall risk is very high and installation of rolling dips is recommended to minimize damage to the road structure. Additionally, a four blade-wide fire line along 29N07 will cause a compounding problem along with the burned slopes for stormwater runoff onto the road structure. In the instance suppression repair on the fire line fail, the runoff from burned slopes and the fire line will have a major impact on the roadway.
- *Property*- 29N43, 29N07, 29N03, 28N64, 28N30, 28N08, 28N02 all have either plugged culverts or culverts needing work. Approximately 231 culverts were able to be surveyed which does not include all the roads or all the culverts that are existing. Out of the 230+ culverts identified, 53 are recommended to be cleaned. Plugged culverts redirect burn area runoff flows either over the roadway causing a washout or doubling the flow impact to the next culvert down the road causing a cascading culvert failure effect. Due to the number of culverts at risk, the chance of culverts failing/plugging is likely. The consequence is moderate with the potential of wash outs or the next culvert/drainage feature being overwhelmed. The overall risk is high to the transportation infrastructure.

Protection/Safety Treatments:

- *Life and Safety*- One short section of guardrail burned (existing very likely damage) above a culvert wall along 29N43. The risk to the public is moderate as vehicles may run off the edge and down the embankment at the location. The overall risk is very high. The guardrail is recommended to be replaced and until then, safety warning barricades/signs are recommended to be placed at the beginning and end of the burnt guardrail section.
- *Life and Safety*- A compromised and failed warped multi-plate arch culvert with cracked concrete footings on 28N30 poses a likely occurrence of further damage caused by increased burn area runoff storm flows. The magnitude of the consequence is major as a further failed structure will cause a hazardous and dangerous crossing for the public. The overall risk is very high and road closure barricades are recommended to close the crossing structure to the public.

- *Life and Safety*- Storm response and hazard tree remediation will help ensure culverts are free from debris, catch basins are free of sediment, drainage features function properly, and fallen road hazard trees are cleared. Storm inspection will help detect the hazards such as fallen trees across the road and culverts needing to be cleaned.

I. Monitoring Narrative: No monitoring is planned

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											
LNF Weed EDRR - Suppression				$5,825	$0			$0		$0	$5,825
PNF Weed EDRR - Suppression				$3,800							$3,800
LNF Weed EDRR - Burn Area				$5,825	$0			$0		$0	$5,825
PNF Weed EDRR - Burn Area				$6,975							$6,975
Subtotal Land Treatments				$22,425	$0			$0		$0	$22,425
B. Channel Treatments (none)											
C. Road and Trails											
LNF Install rolling dips	ea	$1,500	5	$7,500	$0			$0		$0	$7,500
LNF Clean culverts	ea	$500	30	$15,000	$0			$0		$0	$15,000
PNF Clean culverts	ea	$500	23	$11,500	$0			$0		$0	$11,500
LNF Storm insp., response, haz trees	week	$2,000	4	$8,000				$0		$0	$8,000
PNF Storm insp., response, haz trees	week	$2,000	4	$8,000				$0		$0	$8,000
LNF Mobilization	per move	$500	7	$3,500				$0		$0	$3,500
PNF Mobilization	per move	$500	3	$1,500				$0		$0	$1,500
LNF Overhead/Administration	LS	$4,000	1	$4,000				$0		$0	$4,000
PNF Overhead/Administration	LS	$3,000	1	$3,000				$0		$0	$3,000
Subtotal Road and Trails				$62,000	$0			$0		$0	$62,000
D. Protection/Safety											
LNF Warning signs and barricades	ea	$300	6	$1,800	$0			$0		$0	$1,800
PNF Warning signs and barricades	ea	$300	5	$1,500	$0			$0		$0	$1,500
Subtotal Protection/Safety				$3,300	$0			$0		$0	$3,300
E. BAER Evaluation											
Initial Assessment	Report			$39,569	$0			$0		$0	$0
Subtotal Evaluation				$39,569	$0			$0		$0	$0
F. Monitoring (none)											
G. Totals				$127,294							**$87,725**
										LNF Total	**$51,450**
										PNF Total	**$36,275**

PART VII – APPROVALS

1. Deb Bumpus — Oct-8, 2020
Deb Bumpus, Forest Supervisor, Lassen NF — Date

2. Barbara Drake — 10/19/2020
for Chris Carlton, Forest Supervisor, Plumas NF — Date