Date of Report: August 30, 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: Beckwourth

B. Fire Number: CA-PNF-001064

C. State: California

D. County: Plumas

E. Region: 05

F. Forest: Plumas

G. District: Beckwourth (01)

H. Fire Incident Job Code: P5N4MK (0511)

I. Date Fire Started: July 2, 2021

J. Date Fire Contained: 98% (as of Aug, 1 2021)

K. Suppression Cost: $56,042,099 (as of Aug 9, 2021)

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

1. **Fireline repaired (miles):** 40 miles (as of Aug 9, 2021)
2. **Other (identify):**

M. Watershed Numbers:

Table 1: Phase-1 Acres Burned by Watershed

HUC # (HUC6)	Watershed Name (HUC7)	Total Acres	Acres Burned	% of Watershed Burned
180201220101	Dixie Creek	19,187	41	0.2
180201220102	Upper Red Clover Creek	20,535	591	2.9
180201220201	Ferris Creek-Last Chance Creek	22,871	2,005	8.8
180201230101	Lookout Creek-Little Last Chance Creek	23,407	20,318	86.8
180201230102	Frenchman Lake-Little Last Chance Creek	37,715	32,512	86.2
180201230308	Mapes Canyon	12,192	2,341	19.2
180201230309	North Channel Little Last Chance Creek	28,025	9,520	34.0
180201230310	Sierra Valley Channels	80,817	382	0.5

HUC # (HUC6)	Watershed Name (HUC7)	Total Acres	Acres Burned	% of Watershed Burned
180800031204	Zamboni Hot Springs-Long Valley Creek	36,140	11,162	30.9
180800031301	Rhodes Creek	15,488	11,825	76.3
180800031302	Robinson Canyon-Long Valley Creek	23,310	7,631	32.7
180800031303	Chimney Canyon-Long Valley Creek	31,807	7,583	23.8

N. Total Acres Burned:

Table 2: Total Acres Burned by Ownership

OWNERSHIP	ACRES
NFS	75,820
OTHER FEDERAL (USDI - BLM)	7,377
STATE	300
PRIVATE	22,481
TOTAL	105,978

O. Vegetation Types: Dominant vegetation types within the Beckwourth Complex include eastside pine forest (40%); sagebrush (26%, primarily on non-NFS lands), Sierran mixed conifer forest (13%); along with lesser representation of montane chaparral, montane hardwood-conifer forest, montane hardwood, white fir, rock outcrop (barren), wet meadow, aspen, montane meadows, lacustrine, and red fir vegetation types.

P. Dominant Soils: The majority of soils within the Beckwourth Complex fire perimeter were derived from granitic or volcanic breccia/andesite parent materials. The volcanic soils are mostly in the western two thirds of the fire perimeter and the granitic soils are mostly in the eastern third of the fire perimeter. The volcanic derived soils are generally finer textured than those derived from granitics. The majority of the soils in the western portion of the fire area are gravelly loam in texture on the hillslopes and sandy loam in texture in the drainage areas. In the central portion of the fire area surrounding Frenchman Lake, where the terrain is gently sloping, soils are generally loamy in texture with lower coarse fragments present. In the eastern portion of the fire on the steeper hillslopes and in the far southern portion of the fire area, the soils are sandier with textures ranging from stony or gravelly sandy loam to coarse sandy loam to loamy sand in portions. Bedrock is commonly a component of many of the soil map units comprising approximately four percent of the fire area but is a component of 18 percent of the soil map units. The most dominant soil map units are: Glenbrook-Graufels-Rock outcrop complex, 30 to 60 percent slopes; Sattley-Franktown families compex, 0 to 30 percent slopes; Fopiano-Franktown families complex, 0 to 30 percent slopes; Wapi family, 10 to 50 percent slopes; Wind River-Grove-Waterman-Felton families complex, 30 to 70 percent slopes; and Toiyabe-Haypress families complex, 30 to 50 percent slopes.

Q. Geologic Types: The eastern third of the fire consists of granitic rocks, a mix of quartz-diorite and granodiorite, which form the most rugged and highest points in the fire. Terrain on the west side of the fire is mostly andesitic volcanic rocks, or basic volcanic breccia, which are cemented pyroclastic flows of tertiary age. The Diamond mountains, the ridge in the eastern part of the fire is part of the basin and range province. The broad valleys on either side of this ridge are filled with mixed alluvium, the eroded volcanic rocks that formerly covered much of the landscape, and granitics eroded from the Sierra batholith as it uplifted.

R. Miles of Stream Channels by Order or Class:

Table 3: Phase-1 Miles of Stream Channels by Order or Class

STREAM TYPE	MILES OF STREAM
PERRENIAL	65
INTERMITTENT	228
EPHEMERAL	854

STREAM TYPE	MILES OF STREAM
OTHER (CONNECTOR/PIPE/ARTIFICIAL)	4.9

S. **Transportation System:**
Trails (motorized): *National Forest (miles):* 7 *Other (miles):* 1 (non-motorized)
Roads: *National Forest (miles):* 159 *Other (miles):* 11 (County); 4 (State)

PART III - WATERSHED CONDITION

A. Burn Severity (acres):

Table 4: Phase-1 Burn Severity Acres by Ownership

Soil Burn Severity	NFS	Other Federal (USDI-BLM)	State	Private	Total	% within the Fire Perimeter
Unburned	2,882	572	32	1,442	4,928	4.7%
Low	23,821	5,458	216	12,286	41,781	39.4%
Moderate	41,933	1,302	52	7,985	51,272	48.4%
High	7,184	45	0	768	7,997	7.5%
Total	75,820	7,377	300	22,481	105,978	100.0%

B. Water-Repellent Soil (acres): Water repellent soil (hydrophobicity) was not common in the Beckwourth Complex fire. In high soil burn severity, it was present at most sampled locations, but was weak or moderate in strength. In moderate burn severity, water repellency was highly variable, being strong at 1 sampled location, but was weak or moderate at 30% of the remaining samples. Generally, the hydrophobic layer was close to the surface, 1-3 cm in depth, and rarely below 4 cm. Repellency was rare at low burn severity sites, possibly 15% of the area, and is similar to background levels (not fire induced).

C. Soil Erosion Hazard Rating (acres):

Low: 23,340 (22%); Moderate: 33,437 (32%); Severe: 34,000 (32%); Very Severe: 6,205 (6%)
Not Rated (Riverwash / Rock Outcrop: 8,996 (8%)

D. **Erosion Potential:** 0.9 tons per acre
The USDA-Forest Service Erosion Risk Management Tool (ERMiT) was used to model erosion and sediment potential across the watersheds within the entire burned area. The average erosion potential for the entire fire area is 0.90 tons/acre when modeled for 5-year (20 percent probability) peak precipitation intensity storms.

E. Sediment Potential: 117,265 tons for the entire fire area

F. Estimated Vegetative Recovery Period (years): 1-5 years. Different vegetative recovery rates will occur for different vegetation communities. For example, riparian and meadow habitats are anticipated to recover more quickly than mixed conifer types. During the BAER assessment, willows and wetland plants (Carex sp.) were already re-sprouting in low to moderate burn severity areas.

G. Estimated Hydrologic Response (brief description):

The watershed response of the Beckwourth Complex fire is expected to include: 1) an initial flush of ash, 2) rill and gully erosion in drainages and on steep slopes within the burned area, 3) flooding with increased peak flows and sediment deposition, and 4) increased suspended sediment that will extend beyond the fire perimeter. These responses are expected to be most evident during initial storm events immediately after the fire. Thereafter, responses are expected to become less evident as vegetation reestablishes. Flood potential will decrease as vegetation reestablishes, providing ground cover, increasing surface roughness, and stabilizing and improving the infiltration capacity of the soils.

The largest flow increases are expected in the first year after the fire. Watersheds with higher total burned areas or higher intensity burned areas will likely have a greater flow increase than watersheds with lower burn intensities or less watershed area burned. As a result, increases in turbidity are expected within streams across the burned area and increased flow may also contribute to the ability for debris flows or local erosion events to mobilize downstream. In low and moderate severity burn areas, unburned plant roots provide evidence that plant recovery may begin in the first several years after the fire, reducing the potential for erosion. Within meadows and riparian areas that burned at low to moderate severities, regeneration was already occurring at the time of BAER field visits, indicating recovery would begin immediately in those areas. The quick recovery of riparian and wetland areas adjacent to streams should reduce high flows and erosion potential immediately adjacent to the streams where recovery is occurring. However, high severity areas generally do not have plant roots present and will be at risk for higher flows or erosion for a longer period.

Changes to flow at specific watershed pourpoint locations were assessed where critical values were potentially at risk due to increased runoff from the burned area (see map in Appendix A). Six pourpoints were selected:

- Chilcoot Campground – This campground is downstream of Frenchman Lake reservoir and is situated adjacent to Little Last Chance Creek. Incidentally, a pourpoint upstream of the dam was removed from the area of analysis since runoff effects from the burned area would be attenuated by managed flows out of the reservoir.
- Frenchman Creek –This creek is an inflow to Frenchman Lake reservoir on the southwest side. This location was chosen as a pourpoint modeling location due to the adjacency to the dam and the potential for impacts to reservoir operations from increased inflows and/or sediment.
- Gallepi Creek – This creek is an inflow to Frenchman Lake reservoir on the southeast side. This location was chosen as a pour point modeling location due to the adjacency to the dam and the potential for impacts to reservoir operations from increased inflows and/or sediment.
- Little Last Chance Creek (upstream) – Little Last Chance Creek is the primary upstream (north) inflow to Frenchman Lake reservoir. This location was selected as a pourpoint modeling location due to potential impacts to overall reservoir function.
- Doyle Grade road / Willow Ranch Creek – Willow Ranch Creek runs along the Doyle Grade on the northeast side of the burned area and down into the community of Doyle, CA. This location is an off-Forest resource and was selected as a pourpoint modeling location due to the combination of the road occurring in close proximity to the creek and because Doyle, CA is located immediately downstream.
- Doyle South - This location is an off-forest resource and was selected as a pour point modeling location due it’s large upstream burned area and the community South of Doyle, CA that exists downstream.

Post-fire peak flow increases were calculated using regional flood frequency equations presented in USGS Scientific Investigations Report 2012-5113 (Gotvald et al 2012). A runoff increase factor for each level of soil burn severity is applied to the proportion of the watershed that burned at high, moderate, and low SBS. The resulting post-fire estimated 2-year annual peak flow (i.e. an annual peak flood that is expected to be exceeded less than 50% for a given year in the assessed watershed), along with the magnitude of increase due to the burned area, for each pourpoint is presented below. Flow increases at pourpoints are expected to increase as much as 3.7 times the pre-fire flow for a 2-year streamflow event. As an approximation, a 2 times increase in a 2-year peak flood flow is similar to a 5-year, pre-fire annual peak flow (i.e. a 20% exceedance probability). In low burned acreage/runoff areas, the increase in flow will likely not damage infrastructure in comparison to higher flow areas within the burned area.

Predicted post-fire annual peak flow for a 2-year flood for selected pourpoints (in cubic feet per second), plus the magnitude factor of flow increase from unburned condition:

- Chilcoot Campground (2,293-acre watershed): 48 cfs; 2.76 factor increase
- Doyle South (2,815-acre watershed): 83 cfs; 3.67 factor increase
- Doyle Grade, Willow Ranch (5,001-acre watershed): 109 cfs; 3.18 factor increase
- Frenchman Creek (9,487-acre watershed): 194 cfs; 2.65 factor increase
- Gallepi Creek (3,878-acre watershed): 78 cfs; 3.36 factor increase
- Little Last Chance Creek, upstream (24,008-acre watershed): 449 cfs; 2.73 factor increase

PART V - SUMMARY OF ANALYSIS

Introduction/Background

The Beckwourth Complex consists of two fires, the Dotta Fire and the Sugar Fire, that were ignited by lightning strikes on July 2, 2021. The Dotta Fire burned on remote Plumas National Forest (PNF) lands approximately 7 miles due north of the small Plumas County community of Beckwourth, CA (which is located along CA Highway 70, five miles east of the city of Portola, CA). The Dotta Fire grew to 594 acres and was 100% contained on July 21. The Sugar Fire started just west of Sugarloaf Peak and just north of CA Highway 70, about 1 mile east of Beckwourth, CA. On July 7, the Sugar Fire was pushed across containment lines by gusty southwest winds. For the next 3 days, extreme fire behavior, including long range spottting, continued due to very dry forest fuels and hot, dry, and windy weather. By July 10, the fire had grown to over 50,000 acres, progressing further northeast to the US Highway 395 corridor, within one mile of the Doyle Grade Road. By July 16, the Sugar Fire had grown to just over 105,000 acres. The fire encroached on US Highway 395 but firefighters were aided by air support and able to pick up spot fires east of the highway and hold the fire west of the US 395. Multiple structures were burned in the community of Doyle. Less extreme fire behavior occurred on the fire's western flank but containment was slow in that area due to steep terrain with little road access north of Dixie Lookout. Afternoon winds threatened containment lines on the northern flank but crews were able to prevent the fire from crossing containment lines. By July 21, the Sugar Fire was 90% contained at approximately 105,700 acres and little or no fire growth occurred after that date.

The Beckwourth Compex Fire burned within twelve HUC12 watersheds, as delineated by USFS (see Table 1 above and the Soil Burn Severity map in Appendix A). Three HUC12s (Upper Red Clover, which contains only the Dotta Fire; Dixie Creek; and Ferris Creek – Last Chance Creek) drain to Indian Creek near Taylorsville, CA which flows into East Branch North Fork Feather River. The majority of the fire area (62,000 acres) burned within the three HUC12s that comprise the entire watershed (above, below, and within Frenchman Lake reservoir) of Little Last Chance Creek, which enters Middle Fork Feather River just south of Beckwourth, CA at a point in the northwestern portion of Sierra Valley. The Mapes Canyon HUC12 also enters Middle Fork Feather River near that same point. A very small (less than 1%) portion of the fire is located at the extreme northern tip of the large Sierra Valley Channels HUC12 watershed. The remaining four HUC12s, including Rhodes Creek, drain eastward across US Highway 395 and enter Long Valley Creek, which flows north to Honey Lake in the Great Basin. Just over 38,000 acres burned within these four HUC12s, including the vast majority of the federal USDI Bureau of Land Management (BLM), State of CA, and private lands affected by the fire.

Burned area reflectance classification (BARC) satellite imagery from July 23, 2021 was used to initially estimate burn intensity. The two BAER soil scientists for this asessment spent 3 days in the field verifying the correlation between soil burn severity (SBS) and BARC estimations and found excellent correlation, with only a slight adjustment needed for the threshold between moderate and high SBS. The final SBS map is displayed in Appendix A and summarized above in Table 4. Approximately 56% of the fire area burned at moderate or high SBS with less 7.5% being high severity. Watershed response in these areas is expected to be significant, with increased runoff expected over the next one to three runoff seasons due to reduced ground cover, duff storage, and infiltration capacity. The highest proportions of high SBS are located in the Frenchman Lake, Lookout Creek, and Rhodes Creek HUC12 watersheds, particularly along the Diamond Mountains ridge east of Frenchman Lake. Soil hydrophobicity was not commonly observed in the burned area. Hydrophobicity was found at most sampled locations in high SBS but was weak or moderate in strength.

The USDA-Forest Service Erosion Risk Management Tool (ERMiT) was used to model erosion and sediment potential across the watersheds within the entire fire perimeter. This model is a storm-based erosion potential model and 5-year (20 percent probability) precipitation intensity storms were used. Erosion rates from a 5-year storm event across the entire fire perimeter were highest in the southwestern portion of the fire near Reconnaissance Peak and Frenchman Creek. Pre-fire erosion rates are assumed to be less than 0.5 ton/acre across the fire area.

More detailed ERMiT analysis was performed for selected pourpoint watersheds where potential critical values exist and was evaluated for both 5-year and 10-year (10 percent probability) storms (see results on the map in Appendix A and listed below). The post-fire erosion rates for modeled pourpoints for a 5-year storm event

ranged from 0.9 to 1.5 tons/acre and 3.0 to 4.6 tons/acre for a 10-year storm event. These rates are very low overall considering the extent of moderate and high burn severity, likely because of gentle slopes and low predicted rainfall. Erosion rates are highest in the Doyle South pourpoint watershed which is in the northeastern portion of the fire perimeter where slopes within the headwaters are steep, soil burn severity is predominately moderate and high, and soils are sandy loam in texture. Predicted erosion rates are also high in the Galeppi Creek pourpoint watershed, which flows into Frenchman Lake at the southeastern end. It is possible actual erosion rates will exceed these modeled values in intense thunderstorms; in this scenario, the erosion rate maps in the Soil report can be used to show relative risk of erosion across the fire.

Predicted erosion potential for a 10-year storm for selected pour points (pre-fire / post-fire):

- Chilcoot Campground (2,293-acre watershed): 0.3 ton per acre / 3.6 tons per acre
- Doyle South (2,815-acre watershed): 0.2 ton per acre / 4.6 tons per acre
- Doyle Grade, Willow Ranch (4,988-acre watershed): 0.2 ton per acre / 3.2 tons per acre
- Frenchman Creek (7,147-acre watershed): 0.3 ton per acre / 3.0 tons per acre
- Gallepi Creek (3,878-acre watershed): 0.1 ton per acre / 4.2 tons per acre
- Little Last Chance Creek, inflow to Frenchman Lake (20,870-acre watershed): 0.1 ton per acre / 3.5 tons per acre

Most stream channels in the burned area flow either to Frenchman Lake reservoir on the western portion of the fire or to Long Valley Creek east of the Diamond Mountains escarpment. Elevation ranges from 8,327 feet at Dixie Lookout on the western edge of the fire and 8,197 feet at Adams Peak on the Diamond Mountain Escarpment to approximately 5,040 feet where Little Last Chance Creek flows out of the burned area at the southern fire perimeter. Average annual precipitation for the Frenchman Lake basin is approximately 22 inches. Aspen, wet meadow, riparian, lacustrine and spring habitats constitute less than 1% of the total burn area. Stream channels are generally very steep but the landscape approaches to Frenchman Lake have gentle toe slopes, providing flatter areas for streams to attenuate flood events and debris flows. The eastern slope approaches to Long Valley Creek are more severe with smaller floodplain areas so less capacity exists to attenuate increased runoff from the burned area, particulary along Lassen County Road 322 (Constantia Road) and in the area of Doyle, CA. Stream crossing culverts along Constantia Road, as well as private properties in this area and in Doyle hold significant risk for plugging due to increased flood flows and debris, with subsequent risk of overtopping and wash-out of the road prism by flood flows.

Debris flows with large quantities of boulders, cobble, sediment, and large wood material most often occur during exceptionally high precipitation and streamflow events. Rain on snow events are commonplace in these burned watersheds, and the burned areas will exacerbate the risk of debris flows. Recent studies have identified that rainfall intensities measured over durations of 60 minutes or less (high-intensity, short duration rain) are best correlated with debris-flow initiation (See Soils Report for this BAER Assessment).

The United States Geological Service (USGS) provides preliminary assessment of post-fire debris flow hazard using empirical models to estimate the likelihood and volume of debris flows in response to design storms. The models are based upon historical debris-flow occurrence and magnitude data, rainfall storm conditions, terrain and soils information, and BAER assessment field-validated estimates of soil burn severity. Debris-flow likelihood and volume are estimated for basin outlets, with the maximum area of analyzed basins being 8 square kilometers. It is very important to note that the USGS model was initially developed for landscapes in southern California, which are much more prone to debris flows than the Beckwourth Complex fire watersheds. Therefore, the model likely predicts higher debris flow probability for a typical 15-minute storm in this area, but is still useful for identifying basins at the highest risk of debris flows.

For this BAER assessment, a design storm with a peak 15-minute rainfall intensity of 24 millimeters per hour (mm/h) was used to evaluate debris flow potential and volumes, since the NOAA Atlas 14 Point Precipitation Frequency Estimate predicts this magnitude of storm is likely to occur in any given year. The USGS model results estimate a low to moderate level of debris-flow hazard in most of the area burned by the Beckwourth Complex fire (see map in Appendix A). Most stream reaches and drainages have a 20-40% likelihood of debris-flow occurrence at the modeled rainfall intensity. A few small watersheds and stream reaches have a high level of debris-hazard. Most high hazard basins occur on the east side of the fire, between Robinson

Canyon and Crystal Peak. Channels with debris flow likelihood exceeding 60% occur near Doyle Heights and in unnamed drainages above some sections of Constantia Road. On the western side of the fire, some drainages south of Frenchman Creek near Huntley Cove and Reconnaissance Peak also have high hazard. Most of the burn area requires 15-minute rainfall rates that exceed 24 mm/h to have a greater than 50% likelihood of producing debris flows. Again, please be aware that the USGS model likely predicts higher debris flow probability for a typical 15-minute storm in this area, but is still useful for identifying basins at the highest risk of debris flows.

For the burned area, stream crossings along roads below areas of moderate and high burn severity are particularly at increased risk from rolling rock, plugged culverts, and debris flows. Measures to address debris flow and rock fall hazards from burned areas include: notifying the public of these hazards through warning signs and road closures; clearing and improvement of culvert inlets and inside road ditches; maintenance and up-grade of drainage structures; and the construction of rolling dips in critical locations along National Forest System roads and trails.

Extra vigilance is recommended for those living or working along Constantia Road and in the Doyle, CA area during storm events over the next 2-3 years. Debris flow occurrences could impact homes and roads along streams in the vicinity of these areas due to large quantities of sediment, rock, and wood that could deposit in these streams, particularly at road / stream crossing structures and for homes located near the stream floodplains.

Plumas National Forest lands within the Beckwourth Complex fire area support seven known rare plant species (USFS sensitive species). Additionally, there are 11 known infestations of five invasive species that are a priority for management by the Plumas NF within the fire area or adjacent to suppression features. Invasive weeds are very effective at occupying disturbed soil and displacing native plants and habitat. If any weeds were introduced, they would likely take advantage of the disturbance associated with the fire and displace native vegetation, degrade habitat function and lower ecosystem stability. Movement of fire suppression and rehab equipment can disperse and spread noxious weeds to and from areas within the fire and among home units. Dozer firelines and existing roads that were widened to serve as fire breaks would be most impacted by this threat. An assessment of the post-fire risk to native plant communities, and a funding request for survey and treatment of invasive weeds, is presented below. It is important to note that only small portions of the Beckwourth Complex Fire area have been surveyed for invasive and rare plant species in recent years; 98% of acres on NFS lands within the fire area or adjacent to suppression features has not been surveyed. Therefore, it is very likely that undocumented occurrences of invasive and rare plant species were present prior to the fire and were not captured in existing datasets.

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):

- There is a potential for roadside hazard trees and rock fall along the roads within and along the fire perimeter. The threat is to life and safety of road users, obstruction of roadway drainage courses, and denial of access until roads can be cleared. The probability of hazard trees falling along NFS roads and impacting Forest visitors, contractors, or employees is possible. The potential consequence if trees were to strike travelers in these areas is major. The risk of this threat is high.

2. Property (P):

- National Forest System (NFS) road infrastructure represents a significant government investment and asset. There are approximately 159 miles of NFS roads within the fire perimeter. The value of the road system varies depending on road designs, maintenance and service levels, with the estimated value of the existing road system being $150,000 to $500,000 per mile. Until vegetation is reestablished, during high precipitation events the lack of ground cover in the areas of moderate and high soil burn severity is expected to result in increased and more flashy runoff; down slope movement of fine ash and sediment; plugging of culvert inlets due to woody debris from burned areas; and possible debris flow. For this analysis area, 122 miles of NFS roads and motorized trail are located within or below areas of moderate and high burn severity and are at risk of runoff impacts. In the areas of light and moderate burn severity, some brush remains with ground cover partially consumed. The increase in runoff in these locations will be far lower but transport of woody debris could increase. Roadway ditches, overside drains, natural drainage culverts and cross drains are at risk of losing their drainage function and diverting water onto the roadway when becoming clogged with debris during post burn storm events.

  The probability of increased streamflow, debris, and sediment causing loss of drainage function on NFS roads and causing significant erosion of the road infrastructure is likely. The magnitude of property damage is moderate to substantial. The risk of this threat is high to very high.

- As described above, residences and developments along Constantia Road and in the Doyle, CA area could experience damage from large amounts of sediment and debris deposition that could block stream channels, causing the creek to flow through developed areas.

  The probability of debris flow deposition (sediment, rock, and large wood pieces) that would cause flooding of structures within developed areas is possible, particularly along Constantia Road and in the Doyle, CA area. The potential consequence of these impacts is moderate, since damage is expected to be localized and repairable. The risk of this threat is intermediate. Extra vigilance is recommended for those living or working along Constantia Road and in the Doyle, CA area during storm events over the next 2-3 years.

3. Natural Resources (NR):

- Plumas National Forest lands within the Beckwourth Complex fire area support seven known rare plant species (USFS sensitive species). Additionally, there are 11 known infestations of five invasive species that are a priority for management by the Plumas NF within the fire area or adjacent to suppression features. Invasive weeds are very effective at occupying disturbed soil and displacing native plants and habitat. If any weeds were introduced, they would likely take advantage of the disturbance associated with the fire and displace native vegetation, degrade habitat function and lower ecosystem stability. Dozer firelines, drop points, and existing roads that were widened to serve as fire breaks would be the areas most likely impacted by this threat.

  The probability of spread and introduction of invasive noxious weeds into areas disturbed by fire is very likely. Damage to these plant communities would be considerable and long-term. The risk of this threat is very high.

4. Cultural and Heritage Resources:

- Archaeological sites within the burn footprint of the Beckwourth Complex fire were assessed in the office for potential erosional concerns that could damage site integrity. Areas of high burn intensity on steep slopes were determined based off the initial BARC raster and slope shapefile in GIS. Sites that were within these areas or downslope of them were considered eligible for a field visit. Additionally, a site record review was done to further narrow down the pool of sites to be looked at in the field. Eight sites were ultimately visited in the field for this BAER assessmant, with just one site determined to be potentially at risk due to runoff

from the burned area. Further evaluation of this site will occur later this summer but BAER funds are not requested for this site at this time.

B. Emergency Treatment Objectives:

Per the risk matrix shown above, emergency situations are determined for a risk (combined probability and magnitude of consequence) of high or very high. Treatment strategies are prescribed to address these emergency situations and are described below. Treatment strategies for intermediate risks may be prescribed depending upon local circumstances.

Treatments to protect investments in NFS road infrastructure are installing new or maintaining existing road drainage facilities to control runoff and debris and prevent substantial erosion damage to the road prisms. Treatment objectives also include protecting human life and safety by providing strategically-placed warning signs at NFS roads for hazard tree and rock fall threats.

For native plant communities, the objective is to protect the integrity and recovery of those communities, including rare plant habitats and areas of high plant diversity (i.e. the two designated Special Interest Areas in the fire area), from the negative impacts of invasive plant species. Early Detection Rapid Response (EDRR) surveys and treatments will prevent fire-induced expansion of known weed infestations within the fire area. These surveys and treatments will also prevent establishment of new infestations in locations where propagules were introduced or spread by fire suppression efforts.

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

Land: N/A

Channel: N/A

Roads/Trails:

Road treatment costs have been estimated assuming that a local contractor will be secured to perform the work. Additional BAER funds are requested to fund overtime needed for a USFS engineer to prepare the contract, evaluate bids, and administer the roads contract (the engineer's base time will be funded with non-BAER funds). Given the demand for road contractors in the area and the demand on USFS contracting officers, the probability of a contract being awarded and treatments completed prior to the first major damage-producing storm is predicted to be 80%. Any treatments not completed in fall 2021 would be completed the following field season.

Protection/Safety: Warning signs will be placed this fall.

D. Probability of Treatment Success

Table 6: Probability of Treatment Success

	1 year after treatment	***3 years after treatment***	***5 years after treatment***
Land			
Channel			
Roads/Trails	80%	90%	90%
Protection/Safety			

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

$16.7 million (95.5 miles of road at $175,000 per mile)

F. Cost of Selected Alternative (Including Loss):

G. Skills Represented on Burned-Area Survey Team:

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

Team Leader: Joe Hoffman

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Forest BAER Coordinator: Joe Hoffman
Email: joseph.hoffman@usda.gov **Phone(s):** 530-283-7868

Team Members: *Table 7: Phase-1 BAER Team Members by Skill*

Skill	Team Member Name
Team Lead(s)	Joe Hoffman
Soils	Curtis Kvamme, Tricia Prentice
Hydrology	Rachel Hutchinson, Lisa Fong
Engineering	Craig Kusener, Devin Germann
GIS	
Archaeology	Miguel Jeffrey
Weeds	Kirsten Bovee, Michelle Coppoletta
Recreation	
Other	

H. Treatment Narrative:

Land Treatments:

Early Detection Rapid Response (EDRR) surveys and treatments will be conducted in 2022 for target invasive plant species. EDRR is a strategy developed to increase efficiency of weed control by combining surveying, mapping, and immediate treatment of new weed populations as they are discovered. Areas adjacent to existing infestations that burned at high to moderate severity and areas disturbed during fire suppression (fire lines, safety zones, staging areas, drop points, roads completed as line) will be surveyed for new infestations and treated to prevent establishment. . Where feasible, new or isolated infestations will be treated by hand pulling or utilizing other mechanical means (e.g. string-trimmer) during the same visit.

The percentage of treatment cost for non-native invasive plant survey and treatment associated with suppression-related activities is 29% of the total proposed cost (i.e. $11,600 of the $40,420 proposed).

Table 8: Phase 2 Invasive non-native invasive plant survey and treatment costs

Personnel	**Daily Rate (8 hour day)**	**Number of Days**	**Cost**
GS-11 Botanist (Overtime)	$675	10	$6,750
GS-7 Bio Tech Crew Leaders (2)	$185	70 (x2)	$25,900
Subtotal			$32,650
Fleet/Materials	**Cost**	**Miles/Units**	**Total**
Mileage for vehicles (100 miles/day x $0.58 /mi.)	$58.00	65	$3,770
Weed bags, tools, safety supplies	$500	2	$1,000
4WD vehicle rental (per month)	$1,000	3	$3,000
Subtotal			$7,770
TOTAL			**$40,420**

Channel Treatments: N/A

Roads and Trail Treatments:

Restore drainage function of all roads and trails that have high to moderate burn severity by cleaning ditches and culvert inlets and outlets. Install armored emergency overflow dips at stream crossing culverts with high risk of plugging and overtopping. At select locations with high risk of erosion of road template, install armored rolling dip. Install several dozen high-clearance waterbars to disperse runoff across the road template.

Table 9: Road and Trail Treatments

Treatment (North Complex – Phase 1)	Unit	Quantity	Unit Cost	Cost
Restore Drainage Function				
Restore Road Drainage Function (Level IV-V)	Mile	1.3	$5,000	$6,500
Restore Road Drainage Function (Level III)	Mile	3.7	$3,000	$11,100
Restore Road Drainage Function (Level II)	Mile	90.5	$2,400	$217,200
Restore Drainage Function -Motorized Trail	Mile	3.5	$1,00	$3,500
Install Roadway Dips				
Reshape Existing Dip (Level II)	Each	50	$1,200	$60,000
Relief Dip at Culvert Crossings	Each	18	$2,200	$39,600
Install Aggregate Base Rock	Cubic yard	1100	$25	$27,500
Maint. Culvert inlets & outlets	Each	0	$300	$0
Install Culvert Inlet Treatments				
Metal End Section 36”	Each	9	$3,600	$32,400
Install and Remove Culverts	Each	0	$14,000	$0
Install Signs (Life / Safety Treatment)				
BAER Warning and Info Signs (installed)	Each	25	$800	$20,000
Monitoring and Storm Patrol	Day	16	$1,000	$16,000
			Total	**$433,800**

Protection/Safety Treatments: Install BAER warning/information signs to inform Forest visitors of possible hazards in the burn area including hazard trees, flash floods, rock fall, and debris flow.

I. Monitoring Narrative:

Road Treatments: Monitoring of a sample of treated roads would be executed following the first runoff season to investigate the effectiveness of treatments. The stability of the road prism and evidence of off-site rill or gully erosion or loss of road surface would be examined. Before / after photos would help to document effectiveness.

PART VI – EMERGENCY STABILIZATION TREATMENTS AND SOURCE OF FUNDS

A. Land Treatments										
Weed Survey (EDRR)	Lump	11,600	1	$11,600	$0		$0		$0	$11,600
Weed Survey (BAER)	Lump	28,820	1	$28,820	$0		$0		$0	$28,820
Insert new items above this line!				$0	$0		$0		$0	$0
Subtotal Land Treatments				$40,420	$0		$0		$0	$40,420
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										
Road Drainage Treatments	Lump	322,300	1	$322,300	$0		$0		$0	$322,300
Xings (Relief Dips, MES)	Each	2,667	27	$72,000	$0		$0		$0	$72,000
Motorized Trail Drainage	Mile	1,000	4	$3,500	$0		$0		$0	$3,500
USFS Contract Eng (OT)	Hour	75	200	$15,000	$0		$0		$0	$15,000
Insert new items above this line!				$0	$0		$0		$0	$0
Subtotal Road and Trails				$412,800	$0		$0		$0	$412,800
D. Protection/Safety										
Hazard Warning Signs	Each	800	25	$20,000	$0		$0		$0	$20,000
				$0	$0		$0		$0	$0
Insert new items above this line!				$0	$0		$0		$0	$0
Subtotal Protection/Safety				$20,000	$0		$0		$0	$20,000
E. BAER Evaluation										
Initial Assessment	Report	$49,000	1	---	$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	$0
F. Monitoring										
Monitor and Storm Patrol	Day	$1,000	16	$16,000	$0		$0		$0	$16,000
				$0	$0		$0		$0	$0
Insert new items above this line!				$0	$0		$0		$0	$0
Subtotal Monitoring				$16,000	$0		$0		$0	$16,000
G. Totals				$489,220	$0		**$0**		**$0**	**$489,220**
Previously approved										
Total for this request				**$489,220**						

PART VII – APPROVALS

Barbara Duke

09/01/2021

Deputy Forest Supervisor — Date