San Bernardino National Forest

Date of Report: 03/01/2023

RADFORD FIRE BURNED AREA REPORT

PART I - TYPE OF REQUEST

A. Type of Report

☒ 1. Funding request for estimated emergency stabilization funds

☐ 2. No Treatment Recommendation

B. Type of Action

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

☒ 2. Interim Request # 1 (cost adjustment, in dark-red font)

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

PART II - BURNED-AREA DESCRIPTION

A. Fire Name: *Radford*	**B. Fire Number:** *CA-BDF-12958*
C. State: *CA*	**D. County:** *San Bernardino*
E. Region: *05*	**F. Forest:** *San Bernardino National Forest*
G. District: *Mountaintop Ranger District*	**H. Fire Incident Job Code:** *P5P1TJ*
I. Date Fire Started: *9/5/22 approx.1:30 PM*	**J. Date Fire Contained:** *9/30/2022*
K. Suppression Cost: *$ 11,491,797.51 as of 9/21*	
L. Fire Suppression Damages Repaired with Suppression Funds (estimates) **Fireline (miles):** *Total Dozerlines: 11.3mi; Total Handlines: 6.4mi; Total Completed Road as Line: 6.69mi; Total Road Repair: 1.4mi; Total Other/Repaired Line: 6.5mi. Total Mileage Repaired: 32.3mi*	

M. Watershed Numbers

Table 1. Percentage of Watersheds Burned*

HUC #	Watershed Name	Total Acres	Acres Burned	% Watershed Burned
180702030102	Big Bear Lake	22,926	169	1
180702030202	Deer Creek-Santa Ana River	31,479	875	3
TOTALS		**54,405**	**1,044**	**2**

*Generated from GIS for High, Moderate, and Low SBS categories. The Unburned/Low category is not included in the numbers above.

N. Total Acres Burned

Table 2. Total Acres Burned By Ownership

Ownership	Acres
USDA Forest Service	1,076
TOTAL	**1,076**

O. Vegetation Types

Dominant vegetation communities within the burn perimeter are as follows: great basin mixed chaparral, lower montane mixed chaparral, scrub oak chaparral, upper montane mixed chaparral, annual grasses and

forbs, Jeffery pine forest, mixed conifer-fir forest, canyon live oak forest, California black oak forest, white fir forest, and birchleaf mountain mahogany chaparral.

P. Dominant Soils

Dominant soils in the Radford Fire burned area are derived from granite and gneiss residuum and colluvium (**Table 3**). These soils began forming during the Mesozoic era, approximately 66-252 million years ago. Processes influencing soil formation include mountain building tectonic events, mountain glaciation, and volcanic ash deposition. Volcanic ash occurs irregularly throughout the soils of the burned area, mostly mixed within the epipedons of the major soil map unit complexes. Dominant soil types in the burned area are moderately deep and occur on mountain side-slope and ridgeline positions (FbF, FbE). At a minor extent, very shallow soil depths occur in a complex with rock outcrop on mountain ridgeline (DxG). Also at a minor extent are soils that formed in young alluvium in drainage and mountain toe-slope positions (OmD).

Table 3. Soil Types Present in the Radford Fire

SSURGO[1] Map Unit	Surface Texture	Taxonomic Subgroup	Soil Depth Class	HSG[2]	Soil Erosion Hazard[3]	Percent of Burned Area
Merkel Wapal families complex (FbF)	Very gravelly loamy sand	Frigid Typic Xerochrepts	Moderately deep	C	Severe	80
Merkel-Switchback Families Complex (FbE)	Very gravelly loamy sand	Frigid Typic Xerochrepts	Moderately deep	C	Severe	17
Oak Glen-Rush families complex (OmD)	Sandy loam	Mesic Pachic Haploxerolls	Very Deep	A	Moderate	2
Wapi-Pacifico families dry rock outcrop complex (DxG)	Gravelly loamy sand	Mesic Lithic Xeropsamments	Very Shallow	D	Severe	1

[1] Soil Survey of San Bernardino National Forest Area, California, 1987
[2] Hydrologic soil group
[3] Soil Erosion Hazard (Road, Trail) rating are shown in table. Soil Erosion Hazard (Off-road, Off-trail) map units were not rated in SSURGO Web Soil Survey Database.

Q. Geologic Types

The San Bernardino National Forest (SBNF) includes parts of two major geologic-geomorphic provinces of western North America - the Transverse Ranges and the Peninsular Ranges provinces. The San Gabriel and San Bernardino Mountains are part of the eastern Transverse Ranges, and the San Jacinto, and Santa Rosa Mountains, Thomas Mountain, and Coahuila Mountain are part of the northern Peninsular Ranges. The geology of the two provinces is vastly different one from the other (Matti & Morton, 2000).

The San Bernardino Mountains were elevated within and north of the San Andreas Fault zone. They form a rectangular upland about 65 miles long east-west and about 20 miles wide. A major part of this mountain highland is designated as the north block of the San Bernardino Mountain uplift, which includes an elevated surface of low relief, or a broad plateau. The north block includes the highest peak in southern California at Mount San Gorgonio that rises to an altitude of 11,500 feet above sea level. The southernmost part of this uplift is composed of basement rocks and was elevated or partially elevated as two slices between strands of the San Andreas Fault zone. This block was designated as the south block (Dibblee, 1968) and lacks the plateau surface characteristic of the north block. The Radford Fire occurred on the north block of the San Bernardino Mountain uplift.

Physiography of the burned area is dominated generally by southwest facing steep and rugged terrain, dissected ridge lines and drainages. Much of the burn area is drained by two main drainages, both flowing southwest into the Santa Ana River. The southeast portion of the burn area is drained by an un-named drainage, while the northwest portion of the burn area is drained by the Converse Creek watershed, which is a larger watershed than the un-named watershed to the southeast. Elevations in the burn area range from about 8,000 feet above sea level near the Snow Summit Peak, down to about 6,200 feet above sea level at the lower end of the burn scar.

The San Gabriel as well as the San Bernardino Mountains are some of the most tectonically active and rapidly uplifting mountains in the United Status. The forces lifting the mountains are being countered by opposing forces tearing them down. Forces such as gravity, moving water, wind, earthquakes, and human activities interact and combine to bring down small particles to whole hillsides at a time. The fluvial geomorphic processes which have shaped and are currently shaping these ever-changing mountains include land-sliding of various types, rock-fall, dry ravel, sheet and rill erosion by water and wind, flooding, and debris flows.

Bedrock within the Radford Fire burned area consists of Cretaceous, Igneous – Plutonic rocks; Proterozoic, Metamorphic rocks; Triassic, Igneous – Plutonic rocks, and Late Pleistocene to Quaternary, unconsolidated surficial deposits, including mostly unconsolidated alluvium and landslide debris deposits.

R. Miles of Stream Channels by Order or Class

Table 4. Miles Of Stream Channels By Order Or Class	
Stream Type	**Miles Of Stream**
Ephemeral Stream	0.39
Intermittent Stream	0.74
Perennial Stream Or River	-
TOTAL	**1.13**

S. Transportation System

Table 5. Miles of Road and Trail by Jurisdiction	
ROADS	
Maintenance Level	**Miles**
1 - Basic Custodial Care (Closed)	-
2 - High Clearance Vehicles	2.8
3 - Suitable For Passenger Cars	1.1
4 - Moderate Degree Of User Comfort	-
5 - High Degree Of User Comfort	-
Forest Service - TOTAL	3.9
TRAILS	
Type	**Miles**
Non-Motorized	3.2
Total - Trails	**3.2**

PART III - WATERSHED CONDITION

A. Burn Severity (acres)

Table 6 and **Figure 1** display the soil burn severity conditions within the Radford fire perimeter.

Table 6. Percentage Soil Burn Severity by Watershed (%)

Watershed	Soil Burn Severity by Watershed										Total Watershed Acres
	Unburned		Low		Moderate		High		Moderate + High		
	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	
Big Bear Lake	22,757	99	132	1	35	<1	2	<1	38	<1	22,926
Deer Creek-Santa Ana River	30,604	97	479	2	283	1	113	<1	395	1	31,479

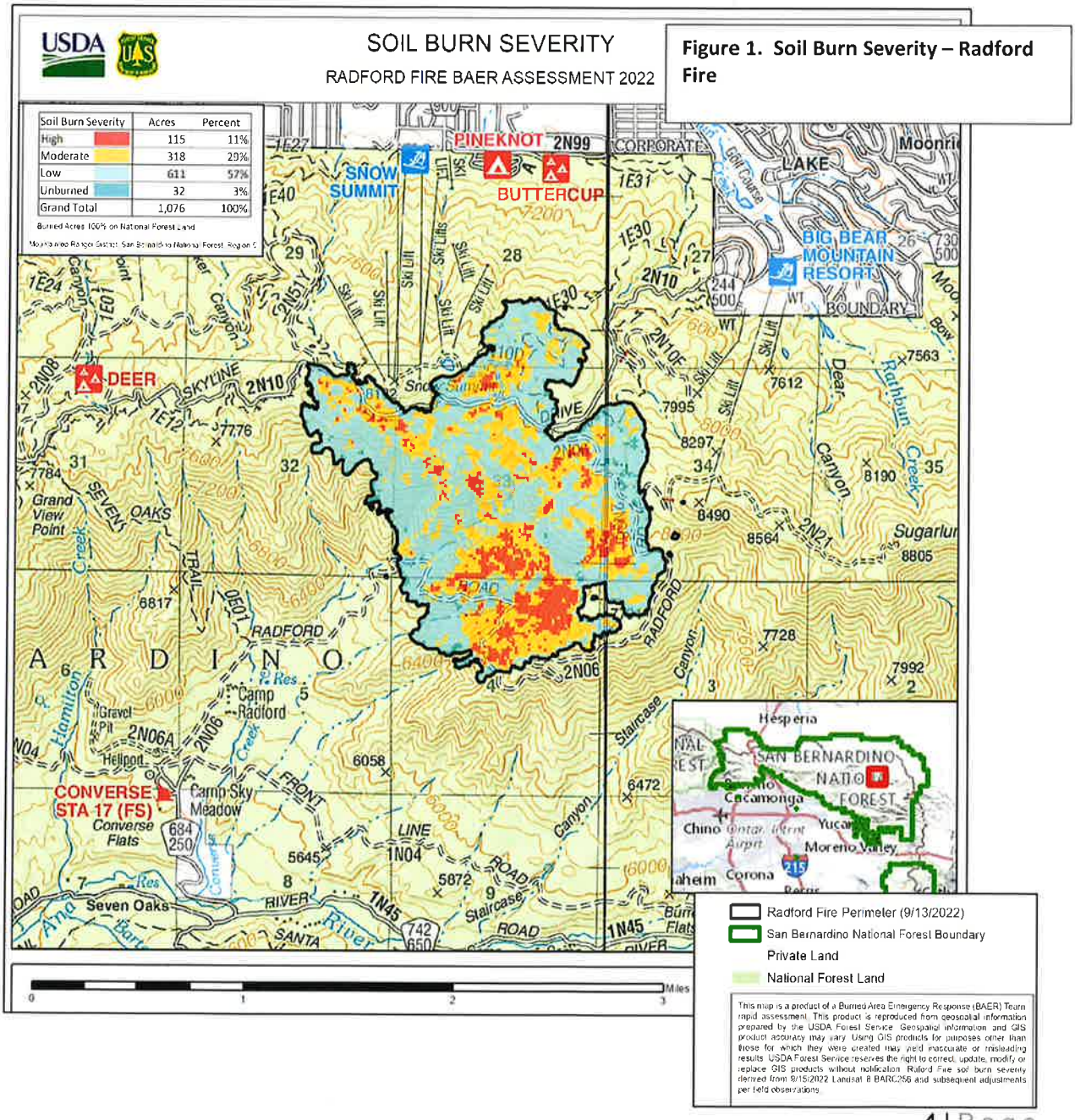


Figure 1. Soil Burn Severity – Radford Fire

B. Water-Repellent Soil (acres)

Presence and severity of water repellency is a function of both drought and fire intensity/heating duration. Prior to the fire, the burned area experienced a two-year drought. Weak to moderate water repellency was encountered at an unburned control plot just outside the fire perimeter. Water repellency was found in all soil burn severity plots. Estimated acres of water repellent soil is 1,076.

C. Soil Erosion Hazard Rating

Table 7. Soil Erosion Hazard Rating – Radford Fire Area

Rating	Acres [1]	Percent of Fire Area
Severe	1054.5	97.8
Moderate	23.8	2.2
Slight	0.0	0
Not Rated (Rock Outcrop)	0.0	0

[1] Acres are an estimate based on soil survey coverage on FS lands. Soil Erosion Hazard (Road, Trail) rating are shown in table. Soil Erosion Hazard (Off-road, Off-trail) map units were not rated in SSURGO Database.

D. Erosion Potential

Table 8 displays the modeled erosion rates for a 2-year and a 5-year event for select pour points.

Table 8. Modeled Erosion Rates for 2-year and 5-year storm events

Modeled Hillslopes	Erosion Rates (tons/acre)		Acres[1]	% Burned Area
	2-Year Event	5-Year Event		
FbF	33	56	862.2	80
FbE	12	20	180	17
OmD	16	25	23.8	2
DxG	8	18	12.3	1

[1]Acres are an estimate based on soil survey coverage and area assessed by soil burn severity.

E. Sediment Potential

Sediment potential, fire-wide: 1,217 cubic yards per square mile.

F. Estimated Vegetative Recovery Period (0-100)

Recovery of early successional herbs and shrubs will be within the first few years even in areas of high severity. Conifer forests comprise 76% of the burned area and areas of high fire severity are not expected to recover to mature forest within the next 50-100 years and have potential to type convert to shrub lands. Low severity and small areas of moderate fire severity areas of conifer forest are expected to recover in 0 –30 years. Chaparral and oak communities comprise 23% of the burned area. These communities are expected to recover in 5-40 years in moderate and high severity burned areas unless re-burned or non-native plants densely establish.

G. Estimated Hydrologic Response

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 Radford 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 (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 bulked runoff (≥150%) related to flood risk were at pour points 2 (2N06 at unnamed drainage), and 3 (2N06 at Converse Creek). It is important to note that, although the increases are high relative to normal Q2 discharge, none of the pour points modeled reached the pre-burn Q10 discharge magnitude. Stream channels measured in the vicinity of BCV's during field review showed that most channels were incised, and flows would be confined during >Q50 (and in many cases >Q100) flood events. As such, risks from ***clear and bulked water flooding alone*** are generally considered low for a 2-year, 6-hour design storm. Debris flows, on the other hand, pose a much greater threat in areas of steep terrain and moderate to high soil burn severity. **Table 9** from the hydrology report shows hydrologic response for the pour points modeled.

Table 9 Model output showing percent increase in bulked 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	Pour Point Watershed	Watershed Area (mi2)	Percent Bulked Water Yield Increase		
			Q2	Q5	Q10
PP1	Bristlecone Trail @ Big Bear	0.8	19	11.2	10.5
PP2	2N06 @ unnamed drainage	0.3	230	111.9	94.3
PP3	2N06 @ Converse Creek	0.6	162.7	76.5	67.8
PP4	2N06 @ Converse Ck above Camp Radford	1.4	95.1	47.3	42.6
PP5	Camp Radford	2.0	65.8	33.1	29.7
PP6	Front Line Rd. (1N04)	0.7	153.0	74.4	62.7
PP7	Sky Meadow Camp	2.3	57.4	29.0	25.9
PP8	2N06 @ Converse near Santa Ana River	2.4	55.1	27.7	24.9
PP9	2N06 @ Santa Ana River	56.3	2.7	1.3	1.1
PP10	Seven Oaks @ Santa Ana River	59.0	5.5	2.7	2.3

H. Geology and Geomorphology - Geologic Response

Within the burned area of the Radford Fire, evidence of past mass wasting as shallow debris slides, debris flows, and rock fall were observed. Based on our observations, it appears that some slopes and drainages in the burn area have large amounts of stored material, significant drainage areas, defined channels, and steep gradients. Based on the steep burn slopes, the soil burn severity and the amounts of stored sediments in the some drainages, it is our estimate that as a result of high intensity storms (>28 mm/hr.) that tend to initiate/trigger debris flows, including summer thunder-storms, as well as rain-on-snow events, the probabilities of debris flows and/or hyper-concentrated flows are low to moderate in the Converse Creek watershed and moderate to high in the adjacent un-named watershed to the southeast of Converse Creek watershed.

Now, because of the removal of vegetation by the fire, soils are exposed and have become weakened, hydrophobicity conditions have changed and rocks on slopes have lost their supporting vegetation. Due to these post-fire new conditions, roads, trails, and other infrastructure in and downstream of the burn scar are at risk from numerous geological hazards as rolling rocks, debris flows, debris slides and hyper-concentrated floods. Risks to human life, infrastructure, roads, and other facilities, in addition to natural and cultural resources is elevated in some areas in and downstream of the Radford Fire.

Debris Flow Potential: The US Geological Survey (USGS) - Landslide Hazards Program, has developed empirical models for forecasting the probability and the likely volume of post-fire debris flow events. To run their models, the USGS uses geospatial data related to basin morphometry, burn severity, soil properties, and rainfall characteristics to estimate the probability and volume of debris flows that may occur in response to a design storm (Staley, 2016). Estimates of probability, volume, and combined hazard are based upon a design storm with a peak 15-minute rainfall intensity of 12 – 40 millimeters per

hour (mm/h) rate. We selected a design storm of a peak 15-minute rainfall intensity of 28 millimeters per hour (1.1 inch/hr.) rate to evaluate debris flow potential and volumes since based on the NOAA Atlas 14 Point Precipitation Frequency Estimates, this magnitude of storm seems likely to occur in any given year.

Based on the USGS debris flow modeling regarding a peak 15-minute rainfall intensity of 28 millimeters per hour (1.1 inch/hr.), it appears that probabilities of any debris flows occurring within the Converse Creek watershed are relatively low, ranging between 0-40%, with some exception of a couple of side channels that present higher probabilities of 40-60% and 80-100%. In contrast, the un-named adjacent watershed to the southeast of Converse Creek present moderate probabilities of debris flow initiation ranging from 40-60%, with some segments and side channels presenting high probabilities of 60-80% and 80-100%. During the September 12, 2022, rainstorm event, one of these side channels that presented probabilities of 80-100% did produce a debris flow that ended up depositing rocks and debris over the crossing of FS road 2N06.

Volumes of debris flow predicted for the Radford Fire range from 1K-10K cubic meters along most of the main channels, with a moderate combined hazard for most of the burn area. Just downstream of the burn scar, one segment of the un-named watershed adjacent to the Convers Creek watershed has the potential to produce debris flows with volumes ranging from 10K-100K cubic meters. For most of the VAR's downstream of the burn scar, beyond the concern of direct impacts from debris flows, there is a higher concern of impacts from flooding and/or hyper-concentrated flows.

Regarding the 1-year estimated thresholds, the Converse creek watershed would need to experience a rainstorm of 32mm/hour (1.25"/hour) or higher to exceed a 50% likelihood of debris-flow occurrence. In the un-named watershed adjacent to Converse Creek a rainstorm of 28-32mm/hour (1.1-1.25"/hour) would need to occur to produce a debris flow with probabilities of 50% likelihood.

The conclusion of our field observations is that whether the primary post-fire process is rock-fall, debris slides, debris flows or sediment laden flooding, the cumulative risk of various types of slope instability, sediment bulking, and channel flushing is low to moderate along some slopes and drainages in the Converse Creek watershed and moderate to high in the adjacent un-named watershed (southeast of Converse Creek). Based on the above, special attention and caution is recommended in areas where people are living or traveling through, working, or recreating in or below the burned areas during and after storm events.

In order to reduce risk to life, it is our recommendation to coordinate warning notifications with the National Weather Service, post warning signs and enforce administration closures.
Beyond threats to life and property, as a result of the fire, excessive sedimentation and debris could adversely affect the quality and capacity of streams and other critical habitats for Federally Listed Species in and below the burn area, in addition to adversely impacting cultural resources.

PART IV - SUMMARY OF ANALYSIS

INTRODUCTION & BACKGROUND

The Radford Fire started on September 5th about 1 mile south of the City of Big Bear Lake and a mile north of the Santa Ana River. The fire is on the San Bernardino National Forest in San Bernardino County. The drought, combined with dry, hot weather and strong winds, resulted in active fire behavior.

On September 19th, a BAER team began assessing the fire area. The team consisted of soil scientists, hydrologists and geologists focused on mapping soil burn severity and assessing imminent post-fire threats to human life and safety, property, and natural resources. Additional BAER specialists, including

road engineers, wildlife biologists, archeologists, botanists, and recreation managers identified and evaluated Critical Values in their areas of expertise.

A. DESCRIPTION OF CRITICAL VALUES/RESOURCES AND THREATS

The BAER Critical Value matrix (**Table 10**) was used to assess the overall risk for all of the resources analyzed under the Radford Fire BAER process.

Table 10. 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)

The Radford Fire BAER Team has identified a risk to human life and safety at several locations throughout the fire based on the threat of debris flows, flooding, rockfall, and hazard trees. Occupancy or use of BAER critical values such as roads and trails and other dispersed sites have post-fire threats to life/safety as well as to Forest Service property. Forest users, employees, and partners could be hit by falling trees, caught in a debris flow, or flood, or be injured or killed due to damaged travel-ways. A summary for of the assessment follows; additional details are found in the resource specialist reports that address BAER critical values/threats and risks.

1a) Human Life & Safety - Roads: There are three main roads in the Radford Fire: 2N10 on the ridge, 2N06 that goes through the burned area, and 1N04 below the burn. Threats exist on road segments within and downstream of moderate and high soil burn severity slopes and at drainage crossings due to flooding, rolling rocks, and falling debris during a significant flood event or after damages have occurred and failures are triggered. There is a risk that the public, special use permit holders, private landowners, and even employees could be entrapped, injured, or die due to washed out road segments after major storm events.

- *Risk Assessment for Risk to Human Life/Safety – Roads*:
  - *2N06*: The Probability is *Likely* due to debris flows, rockfall, and flooding that could wash out the road, block ingress/egress, and lead to injury or death of road users. Along the road segment of highest concern, debris flows have a 40-100% chance of occurrence and the 2 year flood is expected to increase 160-230%. Signs of debris flows caused by the September 11th storm were evident on this road segment. Erosion modeling showed erosion rates of 45-55 tons per acres along this segment during the first year post-fire. The Magnitude of Consequences = *major* because death/injury may occur. The Risk is **VERY HIGH.**
  - *1N04*: The Probability is *Possible* due to flooding that could wash out the road, block ingress/egress, and lead to injury or death of road users. The 2 year flood is expected to increase 160%. The Magnitude of Consequences = *major* because death/injury may occur. The Risk is **HIGH.**
  - *2N10*: The Probability is *Possible* due to hazard trees causing injury or stranding road users along segments within moderate to high SBS. The Magnitude of Consequences = *major* because death/injury may occur. The Risk is **HIGH.**

Treatments for Life/Safety – Roads: Road and trail treatments are recommended to protect life and safety.

1b) Human Life & Safety - Trails: The non-motorized trails within/adjacent to the fire are part of a very popular mountain bike trail system. Mountain biking, by nature, has an inherent risk and a higher likelihood of injury than hiking. On almost a weekly basis, users are transported to the hospital for injuries associated with mountain bike use of this trail system. These trails are single-track cross-country trails with natural obstacles and uneven trail surfaces.

Post-fire life/safety threats associated with the trail system in/near the fire are moderated by the small amount of High/Moderate SBS and the topography of the trails **(Table 122).** Hazard trees are present along the trails; however, there are no formal or informal trailheads or parking areas within the burn. Trail users are at risk due to hazard trees, specifically in areas where trail users congregate at road and trail junctions.

- *Risk Assessment for Risk to Human Life/Safety –Trails*:
  - Skyline and Pirates Trails: The Probability is *Possible* due to hazard trees on sections with weakened, burned trees near the trail. The Magnitude of Consequences = *Major* because injury is possible especially for mountain bikers and equestrian users. The Risk is **HIGH.**
  - Other Trails: The Probability is *Unlikely* due to Low SBS and topography. The Magnitude of Consequences = *Major* because injury is possible especially for mountain bikers and equestrian users. The Risk is **INTERMEDIATE.**

Treatments for Life/Safety –Trails: Closure of trail portions (Skyline and Pirates) at high risk due to presence of hazard trees. Re-assess after winter.

1c) Human Life & Safety – Developed/Dispersed Recreation Sites and Recreation Special Use Events: There are no developed recreation sites in the Radford Fire area. There are several developed sites downslope from the north side of the fire: Buttercup Group Camp and Pineknot Campground. The burned area is open to dispersed camping, but much of it is steep and not suitable for camping.

The Santa Ana River corridor downstream and downslope of the south side of the fire is very popular for daytrips, waterplay, biking, driving, dispersed camping, fishing, hunting, picnicking, etc. There are several recreation residence cabins, two organization camps (one active and one inactive), and some private lands resulting in a relatively high number of visitors in a concentrated area. The Santa Ana River area is accessed by one main road (Seven Oaks Road) downstream of the fire. This is a County road and it received damage during previous storm events as well as previous post-fire watershed events. The other access road to the Santa Ana River dispersed recreation area, 1N45 Santa Ana River Road, is outside the influence of the Radford fire post-fire watershed response area.

The post-fire conditions could include increased flows, erosion, and debris flows. The main road on through the fire (Radford Road, 2N06) is likely to experience some degradation at drainage crossings. Rock fall is likely in some places where vegetation burned on the uphill side of the road. These conditions may put employees, residents, and dispersed recreation visitors at risk of serious injury or death. Dispersed activities within the Radford fire perimeter include off-trail hiking, fishing, waterplay, picnicking, birding, dispersed camping, hunting, rock-climbing etc. The areas that pose the greatest threats are where people gather individually or in groups for an extended period (*e.g.*, Santa Ana River for picnics, fishing, waterplay, etc.).

The roads and non-motorized trails in and below the fire are often used for special use events and some outfitter guide tours (*e.g.*, jeep rides, motorcycle events, mountain bike events and races, and foot races). They are also used by groups from the organization camp (Camp Sky Meadow) and the recreation

residence tracts. The post-fire conditions also pose human life/safety risks for outfitter guide and events under special uses permits. The BAER team results will be shared with organization camps and Seven Oaks cabin owners. The Forest will likely handle safety risks for special events by including warnings in the permits and/or not permitting events on trails, 2N06, and Seven Oaks Road for some period.

- *Risk Assessment for Risk to Human Life/Safety – Dispersed Recreation*: The Probability is Unlikely due to lack of concentrated use areas and predicted post-fire increases in flows, etc. The Magnitude of Consequences = *Major* because people could be injured. The Risk is ***INTERMEDIATE.***

  Treatments for Human Life/Safety – Dispersed Recreation and Special Use Events: Some minor treatments are recommended.

1d) Human Life & Safety - Abandoned Mines and Hazmat: There is only one abandoned mine in the SBNF GIS database: B and B mine. A review of the San Bernardino National Forest abandoned and inactive mine survey documents state that no chemicals or sulfides that would produce hazmat (acid mine drainage) are present at the abandoned B and B Mine Prospect. A 20-ton stockpile of ore containing U308 is present at the site. No information or photographs confirming the condition of the stockpiled ore are available.

This site was not located during suppression repair efforts or the BAER field assessments. Based on the database description, the mine features likely pose little threat to public safety from open adits. Stockpile ore associated with the abandoned mine site was not observed but may pose a risk of hazmat exposure. No information is available on the conditions of the stockpiled materials located at the abandoned mine sites.

The B and B prospect is a 1 (one) acre uranium mine. Per the San Bernardino National Forest Abandoned and Inactive Mine Survey documentation, uranium minerals (U308) are present in the stockpiled ore (approximately 20 tons according to historical survey documentation) remains on the 1 (one) acre mine site. A 40-foot-deep dozer cut is present on the mine site feature. Usage at the site is low to moderate as the site is accessible by paved and dirt roads from the town of Big Bear. Visitors to the B and B prospect site more than likely frequent the site on the weekends. No carbonites/sulfides have been identified at the site; however, historical survey documentation does not confirm that chemicals are not present at the site.

- *Risk Assessment for Human Life & Safety - Abandoned Mines*
  - *Human Life & Safety - Open Adits:* The Probability is *Unlikely* due to the lack of open adits and hazmat. The Magnitude of Consequences is *Minor* because while injuries could occur from people entering the site, death or significant injuries are not expected. The Risk is **VERY LOW.**

  - *Human Life & Safety – Hazmat:* The Probability is *Possible* because a 20-ton stockpile of ore containing U308 is present on site. U308 is an impure mixture of uranium oxides obtained during the processing of uranium ore. The Magnitude of Consequences is *Moderate* because of easy access by the public. The Risk is **INTERMEDIATE.**

  Treatments for Human Life & Safety - Abandoned Mines: BAER treatments are not recommended. Given the nature of the mining activity (uranium mining) that occurred at the abandoned B and B Mine Prospect, the mine site will be evaluated and managed by the R5 Environmental Compliance and Protection Program to ensure the site is evaluated and managed in accordance with the requirements found in the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).

1e) Human Life & Safety – Forest Service Facilities: The Forest Service's Converse fire station is downstream and downslope from the fire. It is about 1.7 miles below the fire's western edge along Converse Creek. The station facility is about 800 feet west of the creek. The effects to the Converse Fire station are expected to be attenuated due to the distance from the fire and the distance of the facility from the creek. As such, effects from post-fire events are considered unlikely.

- *Risk Assessment for Human Life & Safety – Forest Service Facilities:* The Probability is *unlikely* due to the location relative to the creek and burned area. The Magnitude of Consequences = *high* because potential for injury or death. The Risk is **Intermediate**

Treatments for Human Life & Safety – Forest Service Facilities: Treatments are not recommended to protect life/safety at the Converse Flat fire station.

1f) Human Life & Safety – Threats from Geologic Hazards: The conclusion of our field observations is that whether the primary post-fire process is rock-fall, debris slides, debris flows or sediment-laden flooding, the cumulative risk of various types of slope instability, sediment bulking, and channel flushing is low to moderate along some slopes and drainages in the Converse Creek watershed and moderate to high in the adjacent un-named watershed (southeast of Converse Creek). Based on the above, special attention and caution is recommended in areas where people are living or traveling through, working, or recreating in or below the burned areas during and after storm events.

Beyond threats to life and property, because of the fire, excessive sedimentation and debris could adversely affect the quality and capacity of streams and other critical habitats for Federally Listed Species in and below the burn area, in addition to adversely impacting cultural resources.

- *Risk Assessment for Human Life & Safety – Threats from Geologic Hazards:* The Probability is *Likely* due to geological hazards (rockfall and debris flows) primarily associated with road use (primarily 2N06; lower threat for 1N04), dispersed recreation, and special use permittees below the fire. The Magnitude of Consequences is Major because people may get injured or die. The Risk is ***VERY HIGH.***

Treatments for Human Life & Safety - Geologic Hazards: Treatment recommendations include closures and posting warning signs. Those treatments are included in the Road Treatments. To reduce risk to life, it is our recommendation to coordinate early warning notifications with the National Weather Service,

1g) Human Life & Safety – Special Uses Permits/Sites: Threats to human life/safety are also associated with special use permits such as recreation residences and organization camps. The BAER team evaluated threats at all the recreation residence tracts and organization camps below the Radford Fire on a general level. Site-specific (*e.g.*, cabin by cabin) evaluations of threats was not done.

- *Risk Assessment for Human Life & Safety – Special Uses Permits/Sites:* The Probability is *unlikely - based on post-fire hydrologic and geologic response.* The Magnitude of Consequences is *major* because of these areas being used by the public and permittees The Risk is **intermediate.**

Treatments for Human Life & Safety – Special Uses Permits/Sites: Treatment recommendations include working with permit administrators to notify permittees about post-fire risk. Coordination with the National Weather Service, to ensure permit administrators and permittees are including on early warning notifications.

2) Property

BAER Critical Values for property include forest roads, non-motorized trails/trailheads, a family campground, a group campground, dispersed recreation sites with improvements, and the Forest Service's Converse fire station.

2a) Property – Forest Service Roads: The National Forest transportation system consists of approximately 3.9 miles of National Forest System Roads (NFSR) within the fire perimeter. Some roads are suitable for passenger cars, while others are more suited for high-clearance vehicles. Of these roads, several are utilized for administrative use only.

Table 11 summarizes the road maintenance level mileage in High and Moderate SBS and whether treatments are being proposed.

Table 11. Summary of Forest Service Roads by Soil Burn Severity

Maintenance Level	Miles by Soil Burn Severity				Grand Total
	Unburned	Low	Moderate	High	
2 - HIGH CLEARANCE VEHICLES	0.1	2.2	0.4	0.0	2.8
3 - SUITABLE FOR PASSENGER CARS	0.0	0.9	0.2		1.1
Grand Total	**0.2**	**3.1**	**0.6**	**0.0**	**3.9**

- *Risk Assessment for Property – Forest Service Roads:* One NFS road, 2N06, is in and downstream of the burned area and is at a *likely* probability of debris flows and flooding during rainstorms because of changed watershed condition. Debris flows have a 40-100% chance of occurrence and a 2-year flood event is expected to increase 160-230%. Soil erosion is predicted to be 45-55 tons per year during the first year post-fire. Debris impacting the road with accelerated runoff, sediment-laden flows could plug existing overside drains, causing them to overtop and erode the fill slope or send road drainage runoff to concentrate down the road bed to the next drainage point, potentially leading to a cascading failure of the road prism. This is likely to cause a *moderate* magnitude of damage to these roads. The resulting risk of road failures in and downstream of the burned area is **HIGH**. No BAER emergency was identified for any other NFSRs (2N10, 2N10D, 2N21, and 1N04) in or affected by the Radford fire.

Treatments for Property – Forest Service Roads: Treatments are proposed to mitigate the emergency condition for NFSR 2N06.

2b) Property – Forest Service Trails: There are 3.2 miles of non-motorized trails within fire perimeter of the Radford Fire. These trails are part of an extensive and extremely popular trail system. They tie into a mountain bike trail system at Snow Summit Ski Resort. They also link to the community and are used by hikers and equestrian users. The Skyline Trail offers stunning views of the San Gorgonio Wilderness and the Big Bear Valley. These trails are used frequently for special use events (e.g., mountain bike races, endurance foot races, etc.), some of which draw international competitors. In addition, some of those non-motorized trails continue downslope north outside the fire perimeter. Within the burn area, there are some impacts to the National Forest Trail System (NFTS) including:

- burned tree and hazard trees (can impact trail tread)
- loss of trail tread from dry ravel and fill slope failure
- water channeling

The trails within the Radford fire were mostly in Low and Moderate SBS areas. The longest trail, the Skyline Trail, is a ridge trail that parallels Forest Road 2N10. Due to the location and SBS, post-fire

effects to trails are expected to be confined to localized areas in/near High/Moderate SBS at drainage crossings. **Table 12** summarizes the mileage of trail by Forest and SBS.

Table 12. Total Miles Of Trail Within The Burn Area By Soil Burn Severity					
Trail Name/Number	**Unburned**	**Low**	**Moderate**	**High**	**Grand Total**
Skyline Trail	0.1	1.0	0.5	0.1	1.7
Pirates	0.0	0.5	0.2	0.0	0.7
Fall Line	-	0.6	0.1	-	0.7
Going Green	0.0	-	-	-	0.0
Total Miles	0.2	2.1	0.8	0.1	3.2

The fire has burned adjacent slopes above and along the trail routes, with about 0.9 miles of trail in Moderate/High SBS. These conditions may result in runoff, rock/debris movement, and sediment that could damage the trail system in short sections where the trails cross drainages.

- *Risk Assessment for Property – Forest Service Trails:* The Probability of loss of Forest Service trail infrastructure is *Unlikely* due to the location of the trails on the upper slope or ridgetop, resulting in limited SBS upslope; a *Moderate* Magnitude of Consequences and a ***LOW*** risk.

Treatments for Property – Forest Service Trails: Treatments are not recommended for trails to protect the investment in the trail infrastructure.

2c) Property - Developed and Dispersed Recreation Sites: Developed recreation sites consist of the Pineknot campground downslope from the fire, Buttercup group camp downslope from the fire, and jumping-off spots for several non-motorized trails associated with a mountain bike network of trails around Snow Summit ski area. The Santa Ana River downslope from the fire is a popular dispersed recreation area. There are turnouts along the Seven Oaks road where people picnic, explore, fish, etc. There are some parking barriers and signs in the area.

Post fire threats to recreation sites include impacts to infrastructure (parking barriers, interpretive and directional signs, campground structures (bathrooms, site barriers, picnic tables, campfire rings, etc.) because of flooding, erosion and debris from upslope rolling into sites. However, the distance between the fire and the two campgrounds and the low SBS should lessen any potential effects to infrastructure. The modeling for the Santa Ana River similarly suggests that there is low potential for effects to any Forest Service infrastructure on the Santa Ana River. **Table 13** summarizes the type of developed sites within the Radford Burn Area.

Table 13. Developed Recreation Sites	
Site Type	**Sites In/Below the Fire**
Trailheads	None
Campgrounds	Pineknot campground down slope; Buttercup group camp down slope
Concentrated dispersed recreation areas	Santa Ana River

- *Risk Assessment for Property – Forest Service Developed/Dispersed Recreation Sites:* The Probability is *Unlikely* due to only a small area of burn (low severity) above the sites. The Magnitude of Consequences is *Moderate* because of potential damage to Forest Service infrastructure at the campgrounds. The Risk is **LOW.**

Treatments for Property – Forest Service Developed Recreation Sites: Treatments are not recommended for the developed/dispersed recreation areas near the Radford fire.

2d) Non-Forest Service Property - Recreation Special Use Sites and Private Land: Recreation special uses downslope/downstream from the Radford fire consist of a ski area, two organization camps, and recreation residences. There are also several private land in-holdings: two on Converse Creek (one privately owned by the Cooks and one owned by the same owners as adjacent Camp Sky Meadow), and the Seven Oaks Resort downstream on the Santa Ana River. **Table 14** summarizes the special uses sites within the Radford Fire area.

Table 14. Special Uses Sites within the Radford Fire	
Site Type	**Sites**
Recreation Residence Tracts	Seven Oaks Tract, Santa Ana River Tract
Organization Camps	Camp Radford (not operating), Camp Sky Meadow (operating)
Ski/Snow Play Area	Snow Summit Ski Resort
Other	Marine Recreation Facility

The BAER team evaluated threats at special uses sites within the Radford Fire on a general level. Site-specific (*e.g.*, cabin by cabin) evaluations of threats was not done.

- *Risk Assessment for Property – Special Uses Sites:* The BAER team did not assess the risks to non-Forest Service property other than generally identifying areas with elevated threats due to post-fire watershed response.

Treatments for Property – Special Uses: The BAER process does not provide for developing treatments for non-Forest Service property. There will be a coordination treatment to provide the BAER team findings for expected increases in flows, etc. to the special use permittees in the area.

3) Natural Resources (NR)

3a) Natural Resources – Beneficial Uses: Water for Domestic, Municipal, Hydropower or Agricultural Supply: There are no known domestic water supplies that are authorized by the Forest Service. In the late 1990s, organization camps and recreation residence cabins that were extracting water from the Santa Ana River and its tributaries were notified by the SBNF that use was no longer allowed. Most cabin owners installed water tanks and arranged for trucked-in water. However, enforcement and inspections has been inconsistent due to staffing. It is possible that some cabin owners on National Forest System lands still extract water from the Santa Ana River. The source of water for private land owners at Seven Oaks Resort is unknown; it is likely from well water. Post-fire watershed events are likely to result in some water quality changes in Santa Ana River; if extractions are occurring, they could be affected. Because the use of the cabins is seasonal and part-time, this may be an inconvenience but is not likely to be a significant concern.

- *Risk Assessment for Natural Resources - Beneficial Uses of Water:* The Probability of effects is *Unlikely* for the reasons discussed above; Magnitude of Consequences is *Moderate*. The Risk is **LOW.** No BAER emergency exists for beneficial uses of water.

Treatments for Natural Resources - Beneficial Uses of Water: Specific treatments are not recommended, though road stabilization treatments within the Radford fire would somewhat minimize impacts to water quality.

3b) Natural Resources: Soil Productivity and Hydrologic Function/Threat from Accelerated Hillslope Erosion: Displaying post-fire erosion rates by storm probability for the Radford fire shows that long term affects to soil productivity could persist on approximately 1,037 acres. This is the acreage where post-fire erosion could exceed annual soil loss tolerance values for the soil type. Conditions typical of this acreage include near complete loss of soil cover, weakening of soil structure between 0 and 5cm, charring and consumption of fine roots in the surface, and moderate to strong fire induced hydrophobicity. Minor,

localized affects could persist on approximately 27 acres. Conditions typical of this acreage include a mosaic burn pattern in the forest floor, incomplete consumption of soil cover, and moderate hydrophobicity.

Risk Assessment for Natural Resources – Soil Productivity and Hydrological Function:

- The probability of damage or loss to soil productivity and hydrologic function on 1,037 acres of the burn area is ***likely***. The reported erosion rates (ERMiT) are associated with the 2-year storm (50% probability) for approximately 4.57" storm total precipitation with 6.37hr duration. The magnitude of consequences is ***moderate*** because soil loss on these acres could result in considerable long-term damage to soil productivity. The risk is **HIGH**.

- The probability of damage or loss to soil productivity and hydrologic function on 27 acres of the burn area is ***likely***. The reported erosion rates (ERMiT) are associated with the 2-year storm (50% probability) for approximately 4.57" storm total precipitation with 6.37hr duration. The magnitude of consequences is ***minor*** because the damage to soil productivity is minimal, recoverable, or localized. The risk is **LOW**.

Treatments for Soil Productivity: No treatments, beyond natural recovery, are recommended.

3c) Natural Resources: Wildlife: **Table 15** displays T/E species on the San Bernardino National Forest and the BAER assessment approach.

Table 15. Rare Species Considered for BAER Critical Values – Radford Fire

Common Name	Latin Name	Federal Status	Critical Habitat	Occurrence & Habitat Notes	Evaluated for BAER?
Monarch Butterfly	*Danaus plexippus*	Candidate	Not Applicable	Candidate species are not evaluated under BAER. https://www.fws.gov/savethemonarch/ssa.html	No – not listed or proposed
Mountain yellow-legged frog	*Rana muscosa*	USFWS Endangered	Designated but no overlap in/near the fire	Historical habitat within Santa Ana River	No. Considered extirpated and unlikely due to degraded conditions from predatory non-native fish.
Southwestern willow flycatcher	*Empidonax traillii extimus*	USFWS Endangered	Designated. None occurs within the Radford fire; Critical Habitat is designated in the Santa Ana River downslope and downstream from the fire.	Occupied and Critical Habitat in Santa Ana River downslope/downstream from the fire. No suitable habitat within the fire.	Yes

Southwestern willow flycatcher (SWFL) is federally-listed as Endangered. The southwestern willow flycatcher is a neotropical migrant that breeds in low-elevation riparian habitats. Habitat characteristics include the presence of perennial or near-perennial water, high vegetative volume in the lower strata and high canopy density.

There are no known breeding territories within the Radford fire. Additionally, suitable habitat for breeding has not been identified and is unlikely within the fire perimeter. Suitable, occupied, and Critical Habitat occurs downslope and downstream of the fire in the Santa Ana River and at the confluence with some tributaries.

The modeling for predicted increased flows and sediment deposition in the Santa Ana River as a result of the Radford Fire (See Wildlife Report). The habitat may have some short-term effects during the predicted storm events. Unless scoured to bedrock, the habitat would be expected to recover within 1-10 years depending on the severity of the storms. The Santa Ana River is a dynamic ecosystem where the suitability of willow flycatcher habitat changes over time. Effects to individual nesting willow flycatchers would depend on the timing of post-fire watershed events and whether occupied vegetation is substantially damaged during the event.

- *Risk Assessment for Threatened/Endangered Wildlife:* Probability = *Unlikely*, due to relatively low post-fire watershed effects occurring within the occupied/critical habitat. Magnitude = *Major* for federally-listed species. **Risk = *INTERMEDIATE.*** No BAER emergency exists for T/E species.

  Treatments for Threatened/Endangered Wildlife: Treatments are not recommended.

3d) Natural Resources - Botanical Resources

a) Threats to Natural Resources (Native Communities) from Non-Native Invasive Plants

Post-fire weed introduction and spread poses a threat to native communities. The potential introduction and dispersal of invasive weeds into areas disturbed by fire suppression and rehabilitation activities may lead to the establishment of large and persistent weed populations. There is a high probability that extant weed infestations along constructed fire lines will increase in the burn area due to mechanical soil disturbance. Figure 2 displays fireline activity in and adjacent to the Radford Fire and mapped weed occurrences (note that most of this area has not been surveyed for botanical resources and lack of mapped occurrences does not mean that weeds do not occur there). **Table 16** displays known infestation sites within the fire area.

Table 16. Known Infestations in Radford Fire

Species	# of Infestations	Acres
Cardaria chalepensis	1 (along suppression feature)	0.5
Centaurea stoebe ssp. micranthos	1 (along suppression feature)	16
Cirsium vulgare	1 (along suppression feature)	2.86
Tribulus terrestris	1 (along suppression feature)	0.07

i. *Threats to* Native *Communities Associated with Fire Suppression Features:* An emergency exists with respect to native plant communities because of the threat of invasive weed introduction and spread. The introduction and dispersal via heavy equipment of invasive weeds into areas disturbed by fire suppression and suppression repair activities will result in the spread/establishment of persistent weed populations.

- *Risk Assessment to Native Communities Associated with Fire Suppression Features:* The Probability is *Likely* due to lack of equipment washing and equipment likely intersected known invasive plant populations. It is likely that fire suppression activity and resources spread existing and introduced new weed species. The Magnitude = *Moderate* because soil disturbance caused by suppression activities is very susceptible to being invaded by weed species which can spread to native communities with little weed presence, causing long-term

considerable impacts. Risk = *HIGH*. A BAER emergency exists for Native Communities Associated with Fire Suppression Features.

Treatments for Native Communities Associated with Fire Suppression Features: Early Detection Rapid Response (EDRR) treatments are recommended.

ii. *Threats to Native Communities within the Burned Area Where Weeds are Currently Absent or Present in Minor Amounts:* Additionally, recovery of native vegetation over the burned areas distant from suppression features is at risk. Newly-burned wildland areas are well-documented to be perfect seed beds for aggressive non-native plants that could be deposited by birds, water, or wind. Areas such as vulnerable riparian habitat types, meadows, and fuel breaks will be impaired by invasive plant incursion.

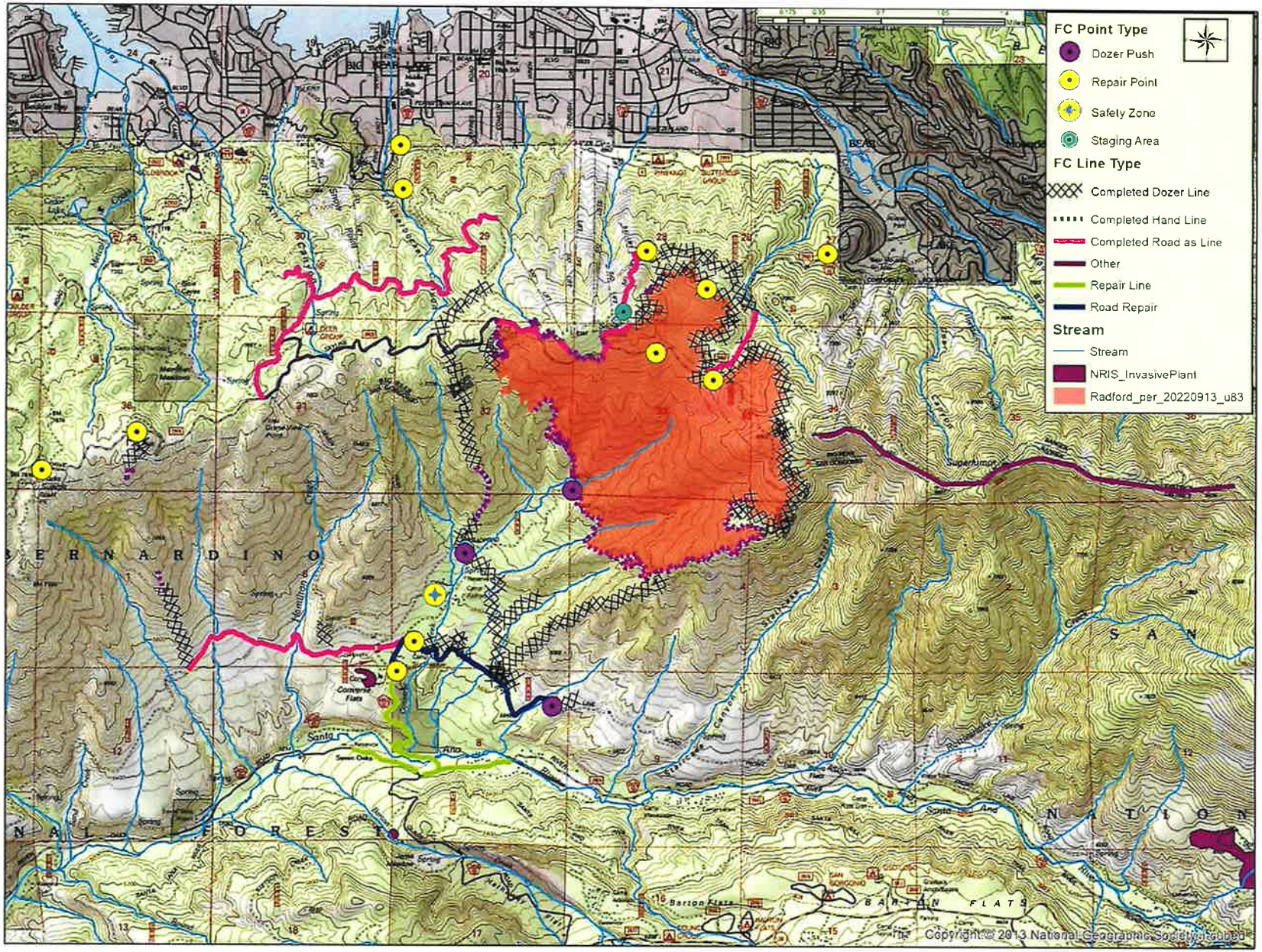
The introduction of new invasive plant species (or new infestations from outside the Forest) and expansion of the existing weed populations could affect the structure and function of native plant communities if left unchecked. It is expected that most native vegetation adapted to moderate or infrequent high severity fire would recover well, and often benefits from fire if weed invasions are minimized.

The probability is higher than pre-fire for rapid establishment and spread of seeds that happen to be brought in by wind, runoff, erosion, or wildlife. Immediately post-fire there is an abundance of water, mineral soil, sunlight, and nutrients; non-native invasive plants can outcompete natives quickly in this setting. Aggressive weeds adapted to high elevations (*e.g.*, spotted knapweed, Canada thistle) could impede native vegetation recovery if undetected.

- *Risk Assessment for Native Communities within the Burned Area:* The Probability is *Likely* due to the known presence of invasive populations in the area and the high likelihood that unmapped invasive species occur. Colonization of invasive species within the post-fire area is likely. The Magnitude = *Moderate* of the potential for invasive species establishment and spread in areas difficult to detect and treat. Risk = *HIGH*.

Treatments for Native Communities within the Burned Area: Early Detection Rapid Response (EDRR) treatments are recommended.

Figure 2. Suppression Disturbances In and Outside the Burn Area



4) Cultural Resources

Thirty-two cultural resources have been identified within the Radford Fire and 1-mile of the burn perimeter on Forest Service Lands. One of the resources is a pre-contact archaeological site. The remainder are historic period sites related to logging, fox-farming, recreation camps and residences, skiing, small-scale mining, and historic roads and trails, including early mail routes over probable aboriginal trails. All but seven cultural resources are well outside of the fire perimeter and/or any potential for post-fire effects. See the heritage specialist report for details.

Low to moderate intensity fire burned over all or portions of five cultural resources consisting of historic alignments of roads 2N10 & 2N06, South Big Bear Lumber Roads, FS site 05-12-52-01424, and Snow Summit Ski Resort. Snow Summit (05-12-52-00598) property did partially burn at the top of the ridge; however, post fire effects are not expected on the slopes or features of the ski resort property. The same is true for 05-12-52-01424, a small prospect pit, which is assumed ineligible for the National Register in accordance with Appendix F-1 or the Regional Programmatic Agreement and current BAER guidance.

Portions of the historic roads and trails within and adjacent to the burn perimeter may experience minor road/trail bed loss from debris flows or fire-weakened tree falls. These incidents will likely be isolated and not result in adverse effects to the resources. Historic roads and trails still in use will experience the same effects, but standard resource protection measures and approved maintenance activities will protect their historic character. Downslope, two resources, Camp Radford, a national register eligible organization camp dating to 1919, and CA-SBR-7443, a precontact lithic scatter assumed eligible for the National Register under Criterion D, may experience post-fire effects related to debris flows and increased hydrologic activity related to the loss of vegetative cover and soil burn severity in the fire perimeter.

- *Risk Assessment for Cultural Resources* - Historic Roads and Trails: It is *likely* debris flows, flooding, and hazard tree falls will impact historic roads and trails within and adjacent to the burn. The magnitude of consequence is *minor* because isolated debris flows, washouts, and tree falls will be minimal and not result in an unrecoverable loss to the historic character for these roads and trails. Therefore, a **LOW** risk exists to the historic roads and trails.

- *Risk Assessment for Cultural Resources* - Camp Radford and CA-SBR-7443: It is *unlikely* debris flows and flooding will impact Camp Radford or CA-SBR-7443. The magnitude of consequence is *major* because Camp Radford has been evaluated as eligible for the National Register and CA-SBR-7443 is assumed eligible for the NRHP under criterion D. Loss of or damage to the features and artifacts at these resources would impact the National Register eligibility of these sites. Therefore, an **INTERMEDIATE** risk exists to the camp and CA-SBR-7443.

  Treatments for Cultural Resource Sites: Treatments are not recommended heritage sites associated with the Radford Fire.

B. EMERGENCY TREATMENT OBJECTIVES

1. Provide for public and employee safety
2. Limit loss of soil productivity
3. Protect native (particularly rare/sensitive) communities from invasive species
4. Protect investment in infrastructure from post-fire watershed response damage
5. Protect threatened and endangered species habitat
6. Protect water quality

C. PROBABILITY OF COMPLETING TREATMENT PRIOR TO DAMAGING STORM OR EVENT

- **Land**: EDRR is accomplished the spring after the fire
- **Channel:** n/a

- **Roads/Trails:** 85
- **Protection/Safety:** 85

D. PROTECTION/SAFETY

Table 17. Probability of Treatment Success			
Type of Treatment	*Time After Treatment*		
	1 year	*3 years*	*5 years*
Land	EDRR	100	100
Channel	n/a	n/a	n/a
Roads/Trails	85	100	100
Protection/Safety	90	100	100

E. COST OF NO-ACTION (INCLUDING LOSS)

Using VAR Lite Cost/Benefit tool, Risks to life and safety due to hazards on roads and trails, losses of Forest road and trail assets and impacts to native plant communities. Cost/Benefit spreadsheet is included in 2500-8 approval package.

Table 18. Cost of No-Action	
Total Treatment Cost	0
Expected Benefit of Treatment	17,500
Implied Minimum Value	0

F. COST OF SELECTED ALTERNATIVE (INCLUDING LOSS)

Using VAR Lite Cost/Benefit tool: Costs include a suite of treatments to minimize risk, especially to roads and trails, EDRR. Minimizing risks to Life and Safety. Cost/Benefit spreadsheet is included in 2500-8 approval package.

Table 19. Cost of Selected Alternative	
Total Treatment Cost	82,800
Expected Benefit of Treatment	28,500
Implied Minimum Value	111,714

G. SKILLS REPRESENTED ON BURNED-AREA SURVEY TEAM

Table 20. Skills on the BAER Team				
☒ Soils	☒ Hydrology	☒ Engineering	☒ GIS	☒Archaeology
☒ Weeds/Botany	☒ Recreation	☐Fisheries/Aquatics	☒ Wildlife	☒ Trails
☒ PAO	☒ Geology	☐ Fire History Analysis	☒ Hazmat	

Table 21. BAER Team Members by Skill*	
Skill	**Team Member Name**
Team Lead(s)	Luke Rutten luke.rutten@usda.gov; 970-631-7043
Logistics/Finance/Admin	Robin Eliason. (robin.eliason@usda.gov); 909-878-3908); Kim Boss
Forest BAER Coordinator	Kim Boss (kim.boss@usda.gov; 909-379-9330)
Soils	Rob Ballard, Serena Kuczmarski
Hydrology	Andy (Keith) Stone, Edgar Martinez
Geology	Yonni (Jonathan) Schwartz
GIS	Tracy Tennant
Engineering	Josh Direen
Archaeology	Jay Marshall
Botany/Weeds	Lance Woolley
Recreation	Joey Martin, Stacey Wellman
Wildlife	Robin Eliason, Kim Boss

Table 21. BAER Team Members by Skill*	
Skill	**Team Member Name**
Hazmat	Belinda Walker
PAO	Cathleen Thompson

H. TREATMENT NARRATIVES

Land Treatments

Land Treatment #1 - Fire Suppression-Related Early Detection, Rapid Response: Early Detection and Rapid Response treatments are requested on suppression related disturbance features on Forest lands including 11 miles of dozer lines, 6 miles of handline, 7 miles of completed road as line where a mix of brushing and blading was done, 3 areas of dozer push, a safety zone and 2 staging areas. Features created by unwashed heavy equipment, particularly dozer lines, would be prioritized. It is likely that introduced or existing invasive plant infestations will quickly spread and expand onto freshly disturbed ground related to fire suppression activities. Cost estimates are based on similar work done in recent years under a challenge cost share partnership agreement.

Table 22. Land Treatment #1 - Invasive Weed Early Detection, Rapid Response Treatment (Suppression-Related)				
Item	**Unit**	**Unit Cost**	**# of Units**	**Total Cost**
6 contract weed surveyors/technicians	Day	$3,300.00	6	$19,800.00
Vehicle Mileage	Miles	$0.62	2,500	$1,550.00
Total Cost				**$21,350.00**

Land Treatment #2 - Burned Area-Related Early Detection, Rapid Response: EDRR treatments are proposed for about 30 acres within the burn, away from suppression features, in vulnerable habitat areas with high probability for invasive plant introductions or expansion. Cost estimates are based on similar work done in recent years under a challenge cost share partnership agreement.

Table 23. Land Treatment #2 - Invasive Weed Early Detection, Rapid Response (BAER/Burned Area)				
Item	**Unit**	**Unit Cost**	**# of Units**	**Total Cost**
6 contract weed technicians	Day	$3,300.00	4	$13,200.00
Vehicle Mileage	Miles	$0.62	2,500	$1,550.00
Total Cost				**$14,750.00**

Road Treatments

Of the NFSR miles in the burned area, 1.2 miles of 2N06 is proposed for treatments due to the overall risk rating of **very high**. This road exhibits an unacceptable risk to property, which constitutes a BAER emergency and treatments are recommended. The purpose of road treatments are to protect roads against loss of water control, soil erosion, flooding, debris flow, loss of road tread and total failure.

Road Treatment #1. Storm Response: Storm response will keep culvert and drainage features functional by cleaning sediment and debris from in and around features between or during storms to help protect against loss of water control, soil erosion, and loss of road tread. This work will be accomplished through contractor equipment and labor. *Locations: NFSR 2N06*

Table 24. Road Treatment #1: Storm Response				
Treatment	**Units**	**Unit Cost**	**# of Units**	**Total Cost**
Storm Response	Days	$ 5,000	3	$ 15,000
Total				**$ 15,000**

Road Treatment #2. Road Stormproofing: Road stormproofing involves cleaning or armoring of existing drainage structures to help ensure road drainage performs optimally and to stabilize roads at risk of damage

from loss of water control, soil erosion, flooding, debris flow, and loss of road tread. This work will be accomplished through contractor equipment and labor utilizing existing IDIQ contract. *Locations: NFSR 2N06*

Table 25. Road Treatment #2: Road Storm-Proofing				
Treatment	**Units**	**Unit Cost**	**# of Units**	**Total Cost**
Mobilization	Lump Sum	$ 2,500	1	$ 2,500
Restore Drainage Function – 2N06	Mile	$ 2,500	1.2	$ 3,000
Reconstruct rolling dips	Each	$ 300	10	$ 3,000
Total				**$ 8,500**

Road Treatment #2 – Interim Cost Adjustment Road Storm-Proofing
Implementation contracting bid estimates are significantly over initial estimates due to inflation and the increased cost of materials. Increased funding is needed to implement the same scope of work originally assessed. Mobilization costs are higher than anticipated due to increased cost of gas and labor as well as remoteness of the site. Unit cost is in addition to the funds that were already approved.

Note that Table 25 above reflects the initial requested funding amount, not the approved amounts. See the Interim Request cover letter for a summary of approved and additional requested funding for this treatment.

Table 26.1. Road Treatment #2: Road Storm-Proofing Interim Cost Adjustment				
Treatment	**Units**	**Unit Cost**	**# of Units**	**Total Cost**
Mobilization	Lump Sum	$ 1,800	1	$ 1,800
Reconstruct rolling dips	Each	$ 50	10	$ 500
Total				**$ 2,300**

Road Treatment #3. Road Drainage Structure Replacement/Improvements: Road drainage structure improvements involves upsizing of existing and installation of additional drainage structures to help protect against loss of water control, soil erosion, and loss of road tread. Two existing overside drains need to be replaced with larger structures to handle expected increases in runoff and sediment. Overside drains are the most cost effective structures to protect fillslopes at rolling dip outlets This work will be accomplished with contractor equipment and labor utilizing existing IDIQ contract. Contract preparation and administration using local forest staff. *Locations: NFSR 2N06*

Table 27. Road Treatment #3. Road Drainage Structure Replacement/Improvements				
Treatment	**Units**	**Unit Cost**	**# of Units**	**Total Cost**
Mobilization	Lump Sum	$ 2,500	1	$ 2,500
Replace undersized overside drain with 18" Overside drain w/ 20' flume – 2N06	Each	$ 2,000	2	$ 4,000
Overside drain and rolling dip (New): 18" Overside Drain w/ 20' flume – 2N06	Each	$ 2,000	2	$ 4,000
Total				**$ 10,500**

Road Treatment #3 – Interim Cost Adjustment Road Drainage Structure Replacement/Improvements
Implementation contracting bid estimates are significantly over initial estimates. Increased funding is needed to implement the same scope of work originally assessed. This is due to inflation, the increased cost of materials, and the low quantity of overside drains. A backhoe or excavator will be needed to install the overside drains, hence the mobilization cost. Mobilization costs are higher than anticipated due to

increased cost of gas and labor as well as remoteness of the site. Unit cost is in addition to the funds that were already approved.

Note that Table 26 above reflects the initial requested funding amount, not the approved amounts. See the Interim Request cover letter for a summary of approved and additional requested funding for this treatment.

Table 28.1 Road Treatment #3. Interim Cost Adjustment Road Drainage Structure Replacement/Improvements				
Treatment	**Units**	**Unit Cost**	**# of Units**	**Total Cost**
Mobilization	Lump Sum	$ 3,000	1	$ 3,000
Replace undersized overside drain with 24" Overside drain w/ 20' flume – 2N06	Each	$ 1,300	2	$ 2,600
Overside drain and rolling dip (New): 24" Overside Drain w/ 20' flume – 2N06	Each	$ 1,300	2	$ 2,600
Total				**$8,200**

Protection/Safety Treatments

Protection/Safety Treatment #1 - Road Warning Signs

This treatment will install burned area warning signs at key road entry points to caution forest users about the potential hazards from hazard trees, debris flow, flooding, and rockfall that exist within the burned area. This work will be accomplished using contractor equipment and labor. *Locations: 1N04, 2N06, 2N10*

Table 29. Protection/Safety Treatment #1 - Road Warning Signs				
Item	**Units**	**Unit Cost**	**# of Units**	**Total Cost**
Mobilization	Lump Sum	$ 1,000	1	$ 1,000
Hazard signs - Aluminum Panels and Posts	Each	$ 600	6	$ 3,600
Total				**$ 4,600**

Protection/Safety Treatment #2 - Road Closure

This treatment will provide for public safety on NFS roads at the highest risk of hazards from hazard trees, debris flow, flooding, and rockfall. This treatment will also help with enforcement of burned area and trail closures to prevent vehicle access at public trailhead access points. Existing road gates will be utilized, however a new road gate is needed on 2N10, east of 2N51Y, to support the burned area closure. This work will be accomplished using contractor equipment and labor.

Table 30. Protection/Safety Treatment #2 – Road Closure				
Item	**Units**	**Unit Cost**	**# of Units**	**Total Cost**
Mobilization	Lump Sum	$2,000	1	$2,000
Medium-duty (6 inch steel) gate including installation	Each	$9,500	1	$9,500
Total				**$11,500**

Protection/Safety Treatment #3 – Trail Closures

This treatment will provide for public safety on NFS trails at the highest risk of hazards from hazard trees. This will be accomplished by District staff.

Table 31. Protection/Safety Treatment #3 – Trail Closures and Warning Signs				
Item	**Units**	**Unit Cost**	**# of Units**	**Total Cost**
Trail Closure Hazard signs - Aluminum Panels and Posts	Each	$15	40	$600

Table 31. Protection/Safety Treatment #3 – Trail Closures and Warning Signs				
Item	**Units**	**Unit Cost**	**# of Units**	**Total Cost**
Total				$600

I. MONITORING NARRATIVE Treatment Effectiveness Monitoring

Effectiveness Monitoring Treatment #1 (Road Stabilization Treatments): Monitoring will be conducted after storm events. If the monitoring shows the treatment to be ineffective at stabilizing road and there is extensive loss of road bed or infrastructure an interim report will be submitted. A several page report would be completed after the site visit. The report would include photographs and a recommendation on whether additional treatments are necessary. Since monitoring would be conducted by SBNF staff, not costs are displayed.

PART V – EMERGENCY STABILIZATION TREATMENTS AND SOURCE OF FUNDS

Table 32. Treatment Costs – National Forest System Lands					
Line Items	**Units**	**Unit Cost**	**# of Units**	**BAER $**	**Other $**
A. Land Treatments					
1. EDRR - Suppression					
6 contract weed surveyors/technicians	Day	3,300	6	$19,800	$0
Vehicle Mileage	Miles	0.62	2,500	$1,550	$0
2. EDRR - Burned Area					
6 contract weed technicians	Day	3,300	4	$13,200	$0
Vehicle Mileage	Miles	0.62	2,500	$1,550	$0
Subtotal Land Treatments				$36,100	$0
B. Channel Treatments					
Subtotal Channel Treatments				$0	$0
C. Road and Trails					
1. Road Storm Response	Days	5,000	3	$15,000	$0
2. Road Storm Patrol					
Mobilization	Lump	2,500	1	$2,500	$0
Restore Drainage Function – 2N06	Mile	2,500	1.2	$3,000	$0
Reconstruct rolling dips	Each	300	10	$3,000	$0
Mobilization, Additional Cost	Lump	1,800	1	$1,800.00	$0
Reconstruct rolling dips, Additional Cost	Each	50	10	$500	$0
3. Road Drainage Structures					
Mobilization	Lump	2,500	1	$2,500	$0
Upsize existing Overside drain: 18" Overside Drain w/ 20' flume – 2N06	Each	2,000	2	$4,000	$0
Overside drain and rolling dip (New): 18" Overside Drain w/ 20' flume – 2N06	Each	2,000	2	$4,000	$0
Mobilization, Additional Cost	Lump	3,000	1	$3,000	$0
Upsize existing Overside drain: 24" Overside Drain w/ 20' flume – 2N06, Additional Cost	Each	1,300	2	$2,600	$0
Overside drain and rolling dip (New): 24" Overside Drain w/ 20' flume – 2N06, Additional Cost	Each	1,300	2	$2,600	$0
Subtotal Road and Trails				$44,500	$0
D. Protection/Safety					
1. Road Warning Signs				$0	$0
Mobilization	Lump	1,000	1	$1,000	
Hazard signs - Aluminum Panels and Posts	Each	600	6	$3,600	$0
2. Road Closure Gate				$0	$0
Mobilization	Lump	2,000	1	$2,000	
Closure Gate	Each	9,500	1	$9,500	$0
Road Closure Gate					
3. Trail Warning Signs/Closure					
Closure/Hazard Signs	Each	15	40	$600	
Subtotal Protection/Safety				$16,700	$0
E. BAER Evaluation					
Initial Assessment	Report			$51,780	$0
Subtotal Evaluation				$51,780	$0

F. Monitoring					
SBNF staff on NFSE				$0	$0
Subtotal Monitoring				$0	$0
G. Totals – Previously Requested				$86,800	
Previously Approved				$66,800	
Interim-1 Request				$10,500	
Incident Grand Total				$77,300	
*No Non-Forest Service lands were involved					

PART VI - APPROVALS

Danelle D. Harrison, Forest Supervisor, San Bernardino National Forest 3/2/2023 Date

PART VI - ATTACHMENTS

Embedded Excel Spreadsheet for the costs

Mobilization, additional cost	Lump	1,800	1	$1,800	$0					
Reconstruct rolling dips, additional cost	Each	50	10	$500.00	$0					
3. Road Drainage Structures										
Mobilization	Lump Sum	2,500	1	$2,500	$0					
Upsize existing Overside drain: 18" Over	Each	2,000	2	$4,000	$0		$0		$0	
Overside drain and rolling dip (New): 18"	Each	2,000	2	$4,000	$0					
Mobilization, additional cost	Lump	3,000	1	$3,000	$0		$0		$0	
Upsize existing Overside drain: 24" Overside Drain w/ 20' flume – 2N06, additional cost	Each	1300	2	$ 2,600.00	$0					
Overside drain and rolling dip (New): 24" Overside Drain w/ 20' flume – 2N06, additional cost	Each	1300	2	$ 2,600.00	$0		$0		$0	
Subtotal Road and Trails				$44,500.00	$0					
D. Protection/Safety										
1. Road Warning Signs				$0	$0					
Mobilization	Lump Sum	1,000	1	$1,000			$0		$0	
Hazard signs - Aluminum Panels and P	Each	600	6	$3,600	$0					
2. Road Closure Gate				$0	$0		$0		$0	
Mobilization	Lump Sum	2,000	1	$2,000			$0		$0	
Closure Gate	Each	9,500	1	$9,500	$0		$0		$0	
3. Trail Warning Signs/Closure	Each	15	40	$600			$0		$0	
Closure/Hazard Signs							$0		$0	
Subtotal Protection/Safety				$16,700	$0		$0		$0	
E. BAER Evaluation	Report			$51,780	$0		**$0**		**$0**	
Initial Assessment				$0	$0					
				$51,780	$0					
Subtotal Evaluation										
F. Monitoring				$0	$0					
				$0	$0					
				$0	$0					
Subtotal Monitoring										
G. Totals - Previously Requested				$86,800.00						
Previously approved				$66,800.00						
Interim-1 Request				$10,500.00						
Total for this request				**$77,300.00**						