Snow Fire 2020

Picture of the Snow Creek Watershed

Date of Report: October 6, 2020

BURNED-AREA REPORT

PART I - TYPE OF REQUEST

A. Type of Report

☒ 1. Funding request for estimated emergency stabilization funds

☐ 2. No Treatment Recommendation

B. Type of Action

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

☐ 2. Interim Request #___

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

PART II - BURNED-AREA DESCRIPTION

A. Fire Name: Snow

B. Fire Number: CA-RRU-119353

C. State: California

D. County: Riverside

E. Region: 05 Pacific Southwest

F. Forest: San Bernardino

G. District: San Jacinto

H. Fire Incident Job Code: 1502 PNNLV1

I. Date Fire Started: 9/17/2020

J. Date Fire Contained: 10/15/2020 (Estimated)

K. Suppression Cost: $1,750,000 (as of 9/30/2020)

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

1. **Fireline repaired (miles): 0 (As of 9/30/20 no suppression repair had occurred)**
2. **Other (identify):**

M. Watershed Numbers:

Table 1: Acres Burned by Watershed

HUC #	Watershed Name	Total Acres	Acres Burned	% of Watershed Burned
181002010104	Upper San Gorgonio River	22,894	14	0.06%
181002010105	Middle San Gorgonio River	17,978	91	0.5%
181002010106	Snow Creek	10,991	3,629	33.0%
181002010107	Lower San Gorgonio River	14,529	2,387	16.4%
181002010304	Chino Canyon-Whitewater River	31181	363	1.16%

N. Total Acres Burned:

Table 2: Total Acres Burned by Ownership

OWNERSHIP	ACRES
NFS	4,466
BLM	890
STATE	0
PRIVATE	1,128
TOTAL	6,484

O. Vegetation Types:

Desert mixed shrub, semi-desert chaparral, montane mixed chaparral, Encelia-sage scrub, canyon live oak woodlands, and riparian vegetation types burned in the Snow Fire.

P. Dominant Soils:

91 percent of the fire is mapped simply as Rock Outcrop, and the remaining soils are riverwash, or Soboba family, which formed on alluvial fans. The two Rock Outcrop map units should be mapped as rubble land, or a similar map unit that would better describe the fractured and discontinuous grantic bedrock outcrops with sandy-loam or sand soils forming between the unweathered blocks. Surface rock approaches 50% on some slopes, but more area has enough soil to support sparse desert vegetation.

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 Transverse Ranges province boundary south of the San Gabriel Mountains is the Cucamonga fault zone, a major compressional fault zone at the base of the mountains. East of the San Gabriel Mountains the province boundary is right-laterally offset 15-20 km by the San Jacinto fault and is located in the structurally complex San Gorgonio Pass area (Matti & Morton, 2000).

The San Bernardino National Forest south of San Gorgonio Pass encompasses several mountain masses that we refer to collectively as the San Jacinto Mountains block. Included within this block are the San Jacinto Mountains themselves, with their topographic culmination of San Jacinto Peak (10,804 ft); the Santa Rosa Mountains; and the Cahuilla Mountain area. The San Jacinto Mountains form a high standing massif tiered by several erosional levels that form a succession of relatively flat benches or plateaus that step up toward the summit apex. On the north and northeast, this massif drops precipitously into San Gorgonio Pass and into the Coachella Valley; to the south and southeast, the massif descends to the lowest erosional surface in the block, represented by Garner Valley and Pinon Flat (Matti & Morton, 2000).

The Snow Fire occurred on the northeastern end of the San Jacinto Mountains block. Physiography of the burned area is dominated generally by extremely steep and rugged terrain, dissected ridge lines and drainages to a young alluvial fan.

Major drainages in the burned area include large portions of the Snow Creek and Lower San Gorgonio River, with smaller portions of the Upper San Gorgonio River, Middle San Gorgonio River and Chino Canyon-Whitewater River. Elevations in the burn area range from about 1,200 feet above sea level at the north end of the fire to 6,100 feet above sea level at the south end of the fire

The San Jacinto Mountains are tectonically active and uplifting mountains displaced by young faults of the San Jacinto fault zone. 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.

San Jacinto Mountains block geologically is not very diverse. Bedrock within the Snow Fire burned area mainly consists of crystalline basement terranes composed of **plutonic igneous rocks**.

R. Miles of Stream Channels by Order or Class:

Table 3: Miles of Stream Channels by Order or Class

STREAM TYPE	MILES OF STREAM
PERRENIAL	0
INTERMITTENT	29.73
EPHEMERAL	224.69
OTHER (DEFINE)	0

S. **Transportation System:**
Trails: *National Forest (miles):* 8.71 *Other (miles):* 0
Roads: *National Forest (miles):* 0 *Other (miles):* 0

PART III - WATERSHED CONDITION

Within the Snow Fire burned area, evidence of mass wasting as debris slides, debris flows, and rock fall are widespread. In addition, numerous slopes and drainages in the burn area have large amounts of stored material, significant drainage areas, defined channels and steep gradients.

It is estimated that high intensity storms (>20 mm/hr.) tend to initiate/trigger debris flows, including summer thunder-storms, as well as rain-on-snow events. The probabilities of debris flows are very high in this landscape under normal conditions, especially in the Snow Creek and Lower San Gorgonio River. In addition, based on air reconnaissance, landslides and rock-fall are very likely along numerous steep burned slopes within the burn area of the Snow Fire.

Now, as a result 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 new post-fire conditions, roads, trails and water systems are at risk from numerous geological hazards as rolling rocks, debris flows, debris slides and hyper-concentrated floods. Risks to human life/safety, infrastructure, facilities, roads, trails, water systems and natural resources is elevated in most areas in and downstream of the Snow Fire.

A. Burn Severity (acres): All references to soil burn severity observations, effects, and ground conditions associated with the Snow Fire are based on the modified BARC and not on a final ground truthed soil burn severity model.

Table 4: Modified-BARC in lieu of Soil Burn Severity, Acres by Ownership

BARC class (modified)	NFS	BLM	State	Private	Total	% within the Fire Perimeter
Unburned	665	134	0	178	976	15%
Low	3,078	740	0	878	4,696	72%
Moderate	713	16	0	73	801	12%
High	10	178	0	0	10	1%
Total	4,466	1,068	0	1,129	6,484	100%

B. Water-Repellent Soil (610 acres, 9% of Fire):

Field surveys for ground-validating BARC mapping were not done in the Snow fire, for lacking timely access in the Wilderness and high national preparedness level. The BARC mapping was adjusted using photography from aerial reconnaissance, but without ground-validation it is not considered a soil burn severity map. Based on fires with similar burn severity and vegetation patterns, fire-induced water repellency is expected to be limited in extent within the Snow fire. Moderate burn severity occurred under shrubs and oak of sufficient density to create water-repellent conditions in 50% of the area. Only 5-10% of Low burn severity is expected to be water repellent.

C. Soil Erosion Hazard Rating:

Slight: 724 acres (11%), Moderate: 4964 acres (77%), Severe: 796 acres (12%)
Due to the low vegetation cover pre-fire, erosion hazards are naturally elevated in the Snow fire area. Post-fire, erosion hazard is elevated in all the moderate burn severity, or ~800 acres.

D. Erosion Potential:

1-2 tons/acre (2 year runoff event)*
3-4 tons/acre (5 year runoff event)*

*Erosion modeling was not performed for the Snow fire; instead erosion potential is estimated based on natural erosion rate properties (K and T factors). Most of the fire was low burn severity, appeared to have little belowground heating, and is not expected to be hydrophobic in much area. Thus, erosion potential is also expected to be low.

E. Sediment Potential:

Rowe, Countryman, and Storey (1949) developed estimates of annual erosion rates for watersheds in the burn area based on measurements of sedimentation in reservoirs. On average, across the burn area, annual sediment delivery is estimated to increase 1.4 times normal with an average of 1,372 cubic yards per square mile. These estimates are in line with field observations of expansive low soil burn severity, sparse vegetation (pre-fire), and rocky slopes. For much of the burn area the existing unstable slopes have not been made significantly worse by fire effects, although they are inherently at risk of debris flow, rockfall, and flash flooding.

F. 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 24 millimeters per hour (mm/h) rate to evaluate debris flow potential and volumes since based for three reasons:

1. Post-fire debris flows are most often triggered by high-intensity, short-duration bursts of rain.
2. A 24 mm/h rain burst is likely to happen in most areas of the western U.S. (i.e. a 1-5-year recurrence interval).
3. A 24 mm/h rain burst is known to trigger debris flows at USGS monitoring sites in burn areas.

Based on USGS debris flow modeling it appears that under conditions of a peak 15-minute rainfall intensity storm of 24 millimeters per hour (0.95 inch/hr.), the probability of debris flows occurring is **very low** (0-10%) in a majority of the channels/creeks in the Snow fire burn area. However, aerial reconnaissance observed active debris flow channels were present in this area prior to the Snow Fire event This **very low** probability of the USGS model illustrated that there is *not a large difference between pre- and post-fire debris flow conditions*. Under these same conditions, predicted volumes in these channels are expected to range from 1K-10K cubic meters in some channels to 10K-100K cubic meters in other channels. Based on the **very low** probabilities of

debris flow initiation and **low** predicted volumes of debris flows, in the burn area appear to present a **low** combine hazard. However, debris flows are common occurrences in this mountainous desert area regardless of fire.

G. Estimated Vegetative Recovery Period (5-75 years):

The majority of desert mixed shrub, Encelia-sage scrub, semi-desert chaparral, lower montane chaparral, and riparian vegetation communities burned at low to moderate intensity (Table 5). Riparian areas and willow shrub vegetation had very low to moderate burn severity may recover within 3-5 years, whereas semi-desert chaparral and desert mixed shrub recovery may be estimated between 10-40 years for areas that experienced low to moderate burn severity. Recovery in semi-desert and desert mixed shrub communities may be more complex compared to other vegetation communities; desert shrubs are more sensitive to fire, and it may take longer to achieve greater native cover (approximately 30-75 years) depending on the pre-fire condition of the vegetation community, environmental conditions (e.g. climate, topography, aspect, slope, etc), fire frequency, and presence of non-native weeds (Abella 2010). Some previously disturbed communities that burned low to moderate may be more vulnerable to re-invasion by fountaingrass seed that escaped direct fire exposure (Adkins et al. 2011). Given enough space, resources, and time, fountaingrass, Sahara mustard, and other noxious weeds can quickly invade and further degrade open, recently burned critical habitat in Snow Creek. Both species are known to increase fuel loads and eventually alter natural fire regimes (Trader et al. 2006, Poulin et al. 2007, Moloney et al. 2019). Frequent fire may negatively impact natural resource values (e.g. native vegetation recovery in critical habitat and wilderness) recreation values (PCT), and life and property values (neighboring mountain and desert communities).

Table 5. Vegetation burn severities (acres) estimated using the Snow Fire modified BARC map.

Vegetation Community	High	Moderate	Low	Very Low / Unburned	Grand Total
Agriculture (General)	-	-	-	0.07	0.07
Barren	-	0.92	17.39	7.25	25.56
Canyon Live Oak	-	14.08	37.91	17.90	69.90
Cheesebush	-	-	-	2.20	2.20
Desert Mixed Shrub	2.37	364.17	2167.01	368.62	2902.17
Encelia Scrub		55.51	1368.03	154.91	1578.45
Lower Montane Mixed Chaparral	3.65	109.79	91.02	62.08	266.56
Red Shanks Chaparral		2.58	2.27		4.85
Riparian Mixed Hardwood		2.07	6.37	4.22	12.65
Semi-Desert Chaparral	4.25	244.22	996.08	355.21	1599.76
Willow (Shrub)		7.97	6.89	0.30	15.16
Total	**10.28**	**801.31**	**4692.97**	**972.76**	**6477.32**

H. Estimated Hydrologic Response (brief description):

Elevation across the Snow Fire burn area ranges from about 1,240 to 6,080 feet. Average annual precipitation for select pour points is about 17 to 25 inches annually and mostly arrives between November and April although summer thundershowers are common in August and early fall. The area previously burned in the Silver Fire 2013, Blaisden Fire 2005, and Verbina Fire 2004.

Damaging Storms: Although not the only types of storms that could occur, two common storm types that could cause significant damage within the burn area are monsoonal thunderstorms and storms related to atmospheric rivers. Short duration, high intensity storms (such as a monsoonal thundershowers) frequently trigger debris flows. The second storm type is a long duration storm, commonly linked to atmospheric rivers.

Major flooding events have occurred across Southern California due to atmospheric rivers which contain large amounts of water vapor. One such weather system is known as the “Pineapple Express," which moves subtropical moisture from the latitudes of the Hawaiian Islands to Southern California.

Hydrologic Processes: Functioning of hydrologic processes is connected to vegetation (type, density, litter and organic matter accumulation) and soil types. Fire causes impacts to several hydrologic processes including reduction in interception, transpiration, and infiltration, and increases in soil moisture and the rate of runoff (due to lack of litter and decreased surface roughness). Removal of vegetation and changes to soil such as increases in hydrophobicity, changes in soil structure, and removal of duff and organic matter alters these processes and ultimately lead to increases in runoff, peak flows and erosion. These alterations are typical of soils classified as having incurred moderate to high soil burn severity.

The Snow Fire had minimal percentage of moderate and high soil burn severity. The terrain is extremely rocky and steep, with cliffs at the headwaters and rocky slopes below. Although rocky slopes have the potential to increase the rate of runoff, rocky slopes can also protect soils from erosion and provide surface roughness. The majority of the Snow Fire burned at low soil burn severity with a small percentage of moderate soil burn severity. There did not appear to be a thick accumulation of duff available to burn in the Snow Fire. Bulked discharge within the burn area is expected to be approximately 106-128% of normal, which is a considered to be a minor to moderate increase.

Channel crossings, floodplains, washes, and depositional fans have an inherent risk of flooding which will be exacerbated by the fire. Increased runoff and sediment delivery (ex. surface erosion, sediment-laden flows) may cause channel migration, flooding in low-lying areas, and filling-in of pools.

Watershed response in the burn area will result in minimal to moderate increases in peak flows and deliver slightly increased sediment loads. Woody debris could be increased although there are limited trees in the burn area. Increased flows could negatively impact infrastructure in low-lying areas and pose a threat to life and safety. It is important to note that downstream areas that experience regular flooding or difficulty controlling drainage during small storms will be very likely to experience flooding and/or failure in post-fire storms. Bulking and increased flows may cause channels to flood, divert, or migrate to areas that do not usually flood.

Water Quality: Wildfires primarily affect water quality through increased sedimentation. As a result, the primary water quality constituents or characteristics affected by this fire include color, sediment, suspended material, and turbidity. The loss of riparian shading and the sedimentation of channels may increase stream temperature. Vegetation mortality can result in increases in floatable material such as large woody debris. Post-fire delivery of organic debris to stream channels can potentially decrease dissolved oxygen concentrations in streams and pools. Fire-derived ash inputs can increase pH, alkalinity, conductivity, and nutrient flux (e.g. ammonium, nitrate, phosphate, and potassium), although these changes are generally short lived. Given the low soil burn severity in the Snow Fire, it is estimated there will be minimal ash available to significantly impact water quality.

PART V - SUMMARY OF ANALYSIS

Introduction/Background

The Snow Fire is located on the San Bernardino National Forest on the San Jacinto Ranger District. The Fire started on Thursday September 17th, 2020. The cause of the fire is unknown/under investigation and started near the Snow Creek Village area. As of Septenber 30th, the Snow Fire was being reported as 95% contained and stable at 6,254 acres.

The soil burn severity (SBS, per modified BARC) shows 13% burned at high and moderate soil burn severity. The rest of the fire was ether low soil burn severity or unburned. All referneces to soil burn severity observations, effects, and ground conditions associated with the Snow Fire are based on the modified BARC and not on a final ground truthed soil burn severity model.

Based on historic precipitation patterns, it can be expected that fall storms have a high probablity in occuring within the weeks following the Snow Fire. The risk of flooding and erosion events will increase as a result of the fire, creating hazardous conditions within and downstream of the burn area.

The fire was divided into sub-watersheds with “pourpoints” established at the bottom of the burned watersheds or where critical values are located. Watershed runoff response is referenced to these points.

A. Describe Critical Values/Resources and Threats (narrative):
A BAER team began assessing the area for post-fire emergencies on September 21, 2020. In that time the team has identified the following critical values and post-fire threats. The full list of critical values analyzed and risk determinations is included in Appendix 3. The Critical Values described below are included within the report as these values were brought forward with proposed treatments later in the report.

Interim reports may be submitted as additional assessments are completed.

The risk matrix below (Table 6), Exhibit 2 of Directive No.: 2500-2020-1 was used to evaluate the Risk Level for each value identified during Assessment.

Table 6: Critical Value Matrix

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

1. Human Life and Safety (HLS):

Based on the potential for flooding, sediment laden flows, rock falls, etc., the BAER team identified an **intermediate to high** risk for human life and safety of the public and USFS employees within the burn area. The burn area in general will experience flows 106-128% of normal. There is a **possibility** of debris flows and flooding with moderate to major consequences to human **life and safety**.

2. Property (P):
Trails (Pacific Crest Trail):
There is one trail located within and affected by the Snow Fire. This is a section of the Pacific Crest Trail (8.7 miles) of the PCT are within the burned area and *portions* of the trail will possibly be damaged by increased overland and debris flows where modified BARC indicates soil burn severity was moderate. Watershed effects are considered **possible** and the magnitude of consequence is **moderate** due to the threat of rockfall/debris flow causing serious injury/loss of life on this popular trail. Overall risk is **intermediate** and mitigation treatments are proposed.

3. Natural Resources (NR):
Hydrologic Function:

Fire impacts proper functioning of hydrologic processes with the greatest and longest lasting impacts occurring from high soil burn severity and anthropogenic activities. Fire impacts within moderate, low, and very low burn areas are recoverable and expected to diminish as vegetation reestablishes. Most of the burn area resulted in low soil burn severity. The greatest threats to recovery are threats from mass wasting. The impacts to Hydrologic Function are expected to be **possible** and magnitude of consequences are **minor**, resulting in a **low** risk level.

Soil Productivity:

It is **possible** that soil productivity will be impacted in very large storms (10-year or greater runoff event) due to elevated surface erosion in moderate burn severity. The magnitude of consequence of this soil loss is **minor** because the area of moderate burn severity is a small part of the fire, and erosion rates in low severity are not expected to be much above normal. Thus, the overall risk to soil productivity is **low**.

Wildlife: Threatened and Endangered Species, and Wildlife Water Sources

There are four endangered species within the fire perimeter or just downstream of the burned area. These are Peninsular Bighorn Sheep, Least Bell's Vireo, Desert Tortoise, and Coachella Valley Fringe-toed Lizard. Threats to endangered species include hillslope erosion/debris flow, non-native invasive plants, Off Highway Vehicle (OHV) trespass, and impacts on water sources.

Threatened and Endangered Species: Within the Snow Fire perimeter, the terrain is extremely rocky and the burn severity was mostly low to moderate. The increase in stream flows is expected to be minimal and the increase in erosion is expected to be moderate; therefore no treatment is proposed for risks related to erosion and debris flows. With implementation of a BAER treatment to survey and treat non-native plants within the fire area the risk of adverse impacts from non-native invasive plants is reduced (see botany section). OHV trespass may increase within the fire area, particularly in areas adjacent to private lands where control lines were established. This is primarily an issue on Bureau of Land Management lands and effects are expected to be minor; no treatment is proposed. The BAER team has provided a recommendation to monitor and mitigate such incursions if they occur.

Wildlife water sources: Water sources such as streams and springs are expected to be minimally affected as the Snow Fire area is very rocky and the burn severity was mostly low to moderate. No treatment is proposed to protect water sources as the risk to these resources is low.

Botany:

Natural Resources- T&E habitat- Federally Listed Endangered Species, Coachella Valley milkvetch
It is **very likely** that burned critical habitat will be threatened by the spread of noxious weeds that burned in the fire and are expected to resprout, recolonize, and expand in the burned area. Noxious weeds adjacent and/or in close proximity to the burned area will likely invade the burned area, causing degradation and eventual loss of critical habitat for Coachella Valley milkvetch. There are **major** consequences to impacted critical habitat, such as loss of suitable habitat and local extirpation. There is a **very high** risk of degradation or loss of Coachella Valley milkvetch critical habitat, therefore this is a BAER emergency, and Early Detection Rapid Response (EDRR) noxious weed treatments are recommended.

Native Vegetation Recovery: Burned Areas
It is **very likely** that noxious weeds present adjacent or in close proximity to the burned area will impact native vegetation recovery and invade the burned area. Forest visitors (e.g. PCT hikers) may unintentionally spread existing weed species and/or introduce new weeds by carrying in and dispersing seeds on boots into the burned areas. There are **major** consequences from lack of native vegetation recovery in recently burned desert shrub communities. Ecosystem structure and function may be compromised by noxious weed invasion due to loss of native plant biodiversity and presence. Type conversion from desert mixed shrublands to non-native grasslands or forblands can alter the natural fire regime and fire frequency in non-adapted fire ecosystems. The risk for irreversible habitat type conversion from desert shrublands to non-native grasslands is **very high**. Therefore, this is a BAER emergency, and EDRR noxious weed treatments are requested to mitigate invasive weed introductions, spread, and proliferation from fire suppression activities into burned critical habitat and San Jacinto Wilderness.

Native Vegetation Recovery: Suppression Areas

No noxious weed mitigations were in place during fire suppression activities. Introduction and dispersal of non-native weeds from boots and fire equipment movement on constructed suppression lines threaten the recovery of native vegetation in fire suppression areas. It is **very likely** that noxious weeds present adjacent or in close proximity to fire suppression areas will recolonize the site and expand. There are **major** consequences to the introduction and spread of weeds along the PCT and throughout the San Jacinto Wilderness. Ecosystem structure and function may be compromised by noxious weed invasion due to loss of native plant biodiversity and presence. Type conversion from desert mixed shrublands to non-native grasslands or forblands can alter the natural fire regime and fire frequency in non-adapted fire ecosystems. Therefore, the risk for permanent alteration of native desert shrub communities is **very high** if recommended EDRR surveys and treatments are not implemented. Therefore, this is a BAER emergency, and Early Detection Rapid Response noxious weed treatments are strongly recommended.

4. Cultural and Heritage Resources:

Six cultural resources have been identified within the Snow Fire burn perimeter and adjacent areas downstream on Forest Service Lands. Four of the resources are pre-contact archaeological sites including rock shelter and a portion of an ethnographically known village site. The historic period sites are the Pacific Crest Trail and the Snow Creek Recreation Residence tract. Low to moderate intensity fire burned over all of the sites except for the recreation residence tract. Due to the low intensity of the fire and rocky terrain, first order fire effects are unlikely to the archaeological sites. Portions of the Pacific Crest Trail may experience trail bed loss in spots.

It is **possible** debris flows and flooding will impact the Snow Creek Recreation Residence Tract. The magnitude of consequence is **major** because the USGS modeling indicates moderate debris flow potential, possibly resulting in permanent loss of the last historic cabin in the tract. This will adversely affect the tract's eligibility for the National Register of Historic Places. Therefore, a **high** risk to the tract exists.

5. Private Property and other jurisdictions:

Federal and private landownership are checkerboarded throughout the fire area. The fire burned adjacent to the community of Snow Creek. Both Snow Creek and the Falls Creek Forest Service Recreation Residence Tract are downstream of the fire area. The BAER Team shared information on watershed response and potential threats to non-Forest assets with affected entities and responsible agencies such as Bureau of Land Management, Riverside County, Natural Resources Conservation Service, National Weather Service and U S Army Corp. of Engineers. Non-Forest assets are addressed by the respective responsible agencies.

B. Emergency Treatment Objectives:

The objectives of the Snow Fire BAER treatments are to:

- Protect life and safety on NFS Trails and at a recreation residence
- Prevention/mitigation for conversion, degradation, or loss of critical habitat for federally listed endangered species, *Astragalus lentiginosus* var. *coachellae,* Coachella Valley milkvetch.
- Support native vegetation recovery in burned areas- critical habitat and San Jacinto Wilderness.
- Support native vegetation recovery in fire suppression areas- San Jacinto Wilderness
- Protect heritage resources from loss.
- Coordinate post-fire response with other agencies and interested parties.
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C. Probability of Completing Treatment Prior to Damaging Storm or Event:

Land: 80%
Channel: N/A

Roads/Trails: 60%
Protection/Safety: 80%

D. Probability of Treatment Success

Table 7: Probability of Treatment Success

	1 year after treatment	*3 years after treatment*	*5 years after treatment*
Land	80	90	100
Channel	N/A	N/A	N/A
Roads/Trails	70	80	80
Protection/Safety	90	90	100

E. Cost of No-Action (Including Loss): Potential lost market value plus assessment costs. This does not include a monetary value on loss or harm to human life.

F. Cost of Selected Alternative (Including Loss): Potential lost market value plus assessment costs plus treatment costs.This does not include a monetary value on loss or harm to human life.

G. Skills Represented on Burned-Area Survey Team:

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

Team Leader: Christopher Stewart
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Team Members: *Table 8: BAER Team Members by Skill*

Skill	**Team Member Name**
Team Lead(s)	Chris Stewart, Carly Gibson
Soils	Curtis Kvamme
Hydrology	Emily Fudge
Engineering	Joshua Direen
GIS	Celia Yamagiwa
Archaeology	Jay Marshall, Eraina Nossa
Weeds	Lauren Quon, Emma Williams
Wildlife	Kirsten Winter, Rari Marks
Recreation	Daniel Kasang
Geology	Barton Wills
Other	Todd Ellsworth, Katie VinZant

H. Treatment Narrative:

Land Treatments:

Early Detection, Rapid Response—Related to Burned Area:
Weed detection surveys and rapid response eradication treatments are requested for the features within the burned areas, which include the Pacific Crest Trail (PCT) (8.71 miles) and intermittent streams (7.45 miles). Surveys and treatments implemented post-fire will prevent weed introductions and spread in burned critical habitat and San Jacinto Wilderness. Fountaingrass, Sahara mustard, and other noxious weeds that existed pre-fire condition along these weed corridors will be surveyed and treated as a part of rapid response implementation related to burned areas. Work may be implemented by a 6-person contract weed crew, with oversight by 2 Forest Botanists to lead implementation, monitor for treatment efficacy, and complete administrative coordination. Supplies (tools) and fuel mileage are also included in the estimated treatment costs.

Early Detection, Rapid Response—Related to Suppression Area:
Early Detection and Rapid Response treatments are requested on suppression related disturbance features including constructed hand line (5.73 miles) and helispots (2). Constructed hand line will be the first priority for EDRR surveys and treatments, whereas helispots shall be second priority for survey and treatment. Suppression features including handlines and helispots serve as the main weed corridors on this incident and require careful survey and treatment to prevent Sahara mustard introduction and spread. Work may be implemented by a 6-person contract weed crew, with oversight by 2 Forest Botanists to lead implementation, monitor treatment efficacy, and complete administrative coordination. Supplies (tools) and fuel mileage are also included in the estimated treatment costs

Heritage Site Treatments:
A single historic property, The Snow Creek Recreation Tract, was identified to be at risk from predicted storm induced watershed response. USGS modeling indicates a moderate debris flow in the channel just above recreation tract in addition to a possible increase in flooding. BAER team specialists determined that proposed treatments, e.g., K-rails, may become part of the debris flow and exacerbate the effects to historic properties, a heritage treatment to protect this site from debris flows and watershed response has not been proposed. To mitigate the loss of an historic property, a heritage treatment of enhancing existing documentation of the recreation residence tract through digital or other means to preserve its heritage values has been proposed.

Channel Treatments: No proposed channel treatments.

Roads and Trail Treatments:

Trail Stabilization:

Clean existing rolling dips, install new dips in anticipation of post-fire increased runoff; remove trail berms to increase outboard drainage where possible, and possibly armor key ephemeral drainages to prevent undercutting and loss of trail tread. All trail runoff work would be focused on midslope trails in areas of moderate soil burn severity. Storm inspection and response will be done following storm events to identify post-fire damages that may occur. Existing agreements with UCC or CCC will be utilized for trail crew.

Protection/Safety Treatments:

PCT Warning Signs and Closure:
The recommendation is to close the PCT within the burned area to protect public safety through the winter/spring 2020/2021. Closure and warning signs are needed at access points and trailheads. The burned portions of the trail will be re-evaluated in spring 2021 to determine if lifting of the closure is appropriate. This work will be accomplished by Force Account staff.

Interagency/Partner/Permittee Coordination:
The Forest Service plans on continuing to collaborate and communicate with partnering agencies, other entities and organizations and the public. Many non-Forest Service entities, partners and permittees(recreation

residence, Desert Water Authority, NOAA, NRCS, private landowner) that have infrastructure in the fire area are actively repairing damaged infrastructure and/or implementing mitigations to reduce post-fire damage. The BAER team's findings will be shared with those entities and other responsible agencies so that they can plan measures to protect/prepare infrastructure from post-fire watershed response events. There is also a need to close a recreation residence at risk from flooding and debris flows. The cost reflects time the Forest spends with coordination and facilitation of emergency treatments from partners and permittees. Above and beyond facilitating protection measures for non-Forest Service entities threats to life, property and water quality requires continued coordination with many agencies.

I. Monitoring Narrative: No monitoring is proposed.