

**Date of Report:**

July 29, 2021

**SALT 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 #         
  - Updating the initial funding request based on more accurate site data or design analysis

**PART II - BURNED-AREA DESCRIPTION****A. Fire Name: Salt****B. Fire Number: CA-SHF-000982****C. State: CA****D. County: Shasta**

**A. Fire Name: Salt**

**B. Fire Number: CA-SHF-000982**

**E. Region: 5**

**F. Forest: Shasta Trinity**

**G. District: Shasta Lake**

**H. Fire Incident Job Code: P5N39N**

**I. Date Fire Started: June 30, 2021**

**J. Date Fire Contained: July 19, 2021**

**K. Suppression Cost: \$19.15 million**

**L. Fire Suppression Damages Repaired with Suppression Funds (estimates):** Over 90% has been repaired or determined to not need repair.

1. **Fireline (miles):** Dozer line; 8.2 miles on NFS, 25.2 off NFS
2. **Other (identify):** Hand line; 11 miles on NFS, 8.5 off NFS

**M. Watershed Numbers:**

*Table 1: Acres Burned by Watershed*

HUC #	Watershed Name	Total Acres	Acres Burned	% of Watershed Burned
180200050402	Charlie Creek-Sacramento River	18,410	7,149	39
180200050401	Middle Salt Creek	11,027	3,021	27
180200050307	Mosquito Creek-Sacramento River	9,232	182	2
180200050403	Salt Creek	13,608	2,294	17

**N. Total Acres Burned: 12,660, BAER analysis area = 12,645**

*Table 2: Total Acres Burned by Ownership*

OWNERSHIP	ACRES
NFS	4,208
OTHER FEDERAL (LIST AGENCY AND ACRES)	
STATE	631
PRIVATE	7,806
TOTAL	12,645

**O. Vegetation Types:** Vegetative communities affected by the Salt fire area primarily consist of oak woodlands and mixed conifer forests. Oak woodlands within the fire area are primarily dominated by California black oak (*Quercus kelloggii* Newb.) and canyon live oak (*Quercus chrysolepis* Liebm.) with understories of big leaf maple (*Acer macrophyllum* Pursh.), Western red bud (*Cercis occidentalis* Torr. ex A. Gray), and poison oak (*Toxicodendron diversilobum* (Torr. & A. Gray) Greene). Mixed conifer forests are dominated by ponderosa pine (*Pinus ponderosa* Douglas ex Lawson & C. Lawson) and Douglas fir (*Pseudotsuga mensiezii* Mirb. & Franco) with scattered grey pine (*Pinus sabiniana* D. Don) and understories dominated by deer brush (*Ceanothus integerrimus* Hook. & Arn.) and Lemmon’s ceanothus (*Ceanothus lemmonii* Parry). No Threatened or Endangered plant species or their designated habitat are known to occur within the Salt fire perimeter.

**P. Dominant Soils:** The dominant soils are the Holland, Goulding and Marpa soils. These soils tend to have loam surface textures with a 20-35% rock fragment. These soils appear to be associated with bedded sedimentary rock, primarily bedded shale. Since the beds are highly folded, the soils are highly variable in depth. Given the finer soil texture, it is expected that runoff will contain high amounts of finer textured soil.

**Q. Geologic Types:**

**Geology:** The Salt Fire area lies within the Klamath Mountains Physiographic Province and is underlain predominantly by Paleozoic and Mesozoic metavolcanic and metasedimentary rock, along with minor amounts of Tertiary and Quaternary sediments. Tectonic processes have created sedimentary formations, plutons, volcanos, and have accreted numerous terranes to the western margin of North America. The Eastern Klamath Terrane consists of island-arc volcanic rocks plus intercalated sedimentary rocks of Devonian through Middle Jurassic age. It forms a younging-eastward, homoclinal, internally deformed sequence that is faulted against the Trinity terrane to the west and the Western Cascades Terrane to the east. It is overlain to the south and east, with great angular unconformity, by Cretaceous sedimentary strata of the Great Valley sequence. The terrane in the fire area consists of two distinct lithologic formations, which are described below.

**Bragdon Formation (Devonian - Mississippian)** – Dark gray to black shale, mudstone, and siltstone in lower part; siliceous sandstone, and chert conglomerate prominently interlayered with dark pelitic rocks in middle and upper parts.

**Extrusive Volcanic material (Pleistocene)** – Andesite deposits associated with the pre-Shasta Everitt Hill shield volcano upon which the modern Mount Shasta resides.

**Geomorphology:** Most of the geologic terranes of the Klamath Mountains are weak and prone to landslides. Rapid uplift, high precipitation, and seismic activity to the west have created a landscape with abundant deep-seated landslides, many of which occupy several square miles. Most of these larger complexes are dormant under present climatic and seismic conditions though some from tens to hundreds of acres in size are known to be active. Although debris flows initiated from these landslides are possible, the shale bedrock within the fire area does not provide the material typical of debris flows. Under pre-fire conditions soil creep and small-scale soil erosion are the dominate geomorphic processes, although now, under post-fire conditions, hyper-concentrated flows or sediment laden flows will take over as the dominate mass wasting process within the fire area, during intense precipitation events.

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

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

<b>STREAM TYPE</b>	<b>MILES OF STREAM</b>
<b>PERRENIAL</b>	16.8
<b>INTERMITTENT</b>	29.5
<b>EPHEMERAL</b>	91.9
<b>OTHER (DEFINE)</b>	

**S. Transportation System:**

**Trails:** National Forest (miles): Other (miles):  
**Roads:** National Forest (miles): 12.2 Other (miles): 2.0

**PART III - WATERSHED CONDITION**

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

*Table 4: Burn Severity Acres by Ownership*

<b>Soil Burn Severity</b>	<b>NFS</b>	<b>Other Federal (List Agency)</b>	<b>State</b>	<b>Private</b>	<b>Total</b>	<b>% within the Fire Perimeter</b>
<b>Unburned</b>	288		8	339	635	5

Soil Burn Severity	NFS	Other Federal (List Agency)	State	Private	Total	% within the Fire Perimeter
Low	1,916		276	4,201	6,393	51
Moderate	1,808		305	2,611	4,724	37
High	197		42	654	893	7
<b>Total</b>	<b>4,209</b>		<b>631</b>	<b>7808</b>	<b>12645</b>	<b>100</b>

**B. Water-Repellent Soil (acres):** The water repellency was not consistent within the fire boundary and because much of the area was inaccessible, only estimates can be made with a limited amount of observations. The soils tend to have a moderate amount of clay (no more than 28%). Finer-textured soils do not develop the water-repellent intensity as sandier soils. However, vegetation dominated by oak and chapparral develop severe water repellency. It is estimated that 50% of the watersheds have severe water repellency and will contribute to reduced infiltration and increased runoff and peak flow.

**C. Erosion Potential:** Erosion Rates were modelled using ERMiT (WEPP) for a 2 year and 5 year erosional event for four of the primary drainages that terminate at Sacramento River or Shasta Reservoir. Annual precipitation is very high (approximately 85 inches) and loam soil textures dominate the surface. This combination produces significant modelled erosion. Although a lot of erosion and resulting sedimentation will be significant, all inputs terminate within Lake Shasta. The resulting increase in fine material in channels is likely to increase stream bulking. No long-term effects to soil productivity is expected and no subsequent land treatments are warranted. The Soils Report contains a map displaying the spatial resolution of erosion rates.

Analysis Area	Erosion Rate (Tons/Acre)	
	2 yr event	5 yr event
Middle Salt Creek	4.0	6.8
Salt Creek	3.5	6.0
Campbell Creek	9.5	16.3
Indian Creek	16.4	28.4
Fire Perimeter	14.0	22.9

**Sediment Potential:** Not all erosion shown in the table above will make it to downslope channels. However, in some watersheds with high soil burn severity, streamside riparian vegetation was completely burned, thus reducing its role as a sediment trap and allowing hillslope erosion to reach the channels. This condition is present in all watersheds listed above.

**F. Estimated Vegetative Recovery Period (years):** 3 years due to the high precipitation and productive soils within the burn.

**G. Estimated Hydrologic Response (brief description):** Hydrologic response in the burn area is dependent on the soil burn severity pattern within any given watershed. Three locations of interest were identified by the BAER team based on critical values. Results of flood runoff modelling for a 2-year flood using the FSWEPP peak flow calculator are shown below.

	Pre fire (cfs)	Post fire (cfs)	Increase in flow
Indian Creek	1965	3035	1.5 times
Gregory Road @ Gregory Creek	138	795	5.8 times
Gregory road @ unnamed creek	59	807	13.7 times

Flows at these points indicate that post fire flows will increase and have the potential to erode and move more sediment and woody debris down channel. This will result in an increased risk of road crossings with small culverts to plug and potentially fail. This would impact any people who use these roads to access their property or for people to access Forest Service facilities at Shasta Lake including Gregory Creek Campground. Gregory

road FS 35N15 is the only road access to the private homes and to Gregory Campground. Increase flows will also transport floatable woody debris from the burned area to Shasta Lake, causing a boating hazard.

## PART V - SUMMARY OF ANALYSIS

### Introduction/Background

The Salt Fire started midday on June 30, 2021 and was caused by a vehicle. The fire quickly grew to 1000 acres by 9:30 pm that evening and 4500 acres the next day. It grew over 1000 acres each of the next five days until it reached the area burned in the 2018 Hirz and Delta fires. Growth stalled at this point and full containment was achieved on July 19. The BAER team began assessing the fire that same day, focused on a list of critical values within the burned area developed by District and Forest personnel.

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

- **Life and Safety:** Threats to life and safety are present to humans within and adjacent to the burn area. Forest visitors and workers may be at risk from hazard trees on roads or in the Gregory Campground and from road failures during floods. These same threats occur on private land and along utility corridors. Boaters on Lake Shasta are at risk from floating woody debris transported to the lake from burned slopes during floods.
- **Property:** Falling fire-killed trees and increased erosion and flooding with high loads of sediment and woody debris may cause damage to Forest Service and non-Forest Service roads, the Gregory Campground, utility lines, and private property.
- **Natural/Cultural Resources:** Native plant communities may be at risk from non-native invasive plants where the burned area or fire suppression activities created exposed soil conditions conducive to invasive plant establishment. Cultural resources in the burn area may be at risk from flooding and falling fire-killed trees.

Table 5: Critical Value Matrix

Probability of Damage or Loss	Magnitude of Consequences		
	Major	Moderate	Minor
	<b>RISK</b>		
Very Likely	<b>Very High</b>	<b>Very High</b>	<b>Low</b>
Likely	<b>Very High</b>	<b>High</b>	<b>Low</b>
Possible	<b>High</b>	<b>Intermediate</b>	<b>Low</b>
Unlikely	<b>Intermediate</b>	<b>Low</b>	<b>Very Low</b>

#### 1. Human Life and Safety (HLS):

Visitors and workers on Forest Service roads and in the Gregory Campground are at risk of injury or death from falling fire-killed trees or road failures during floods. The probability is **possible** and the magnitude of consequences is **high** resulting in **High Risk**.

These same threats occur on private land, non-Forest Service roads and along utility corridors.

Post-fire flood events, especially in the Indian Creek watershed, will **likely** transport large amounts of floatable woody debris into Shasta Lake, which is USFS property. A similar event occurred following the neighboring Delta/Hirz Fires in 2018. This debris will present a boating hazard and could surround Antlers Marina located across the lake, causing **high** consequences or a **Very High Risk**.

- 2. Property (P):** There are 12.2 miles of Forest Service system roads within the Salt Fire Assessment Area. Of these, 8.8 miles are on or near ridgetops, dead-end routes, or through routes that are redundant or parallel to another route. These roads have a **possible** probability of damage but have **minor** magnitude of consequence, resulting in **Low Risk**. 3.6 miles are in high and moderate SBS with significant upslope source area that will result in increased flooding potential which will carry high sediment and woody debris loads and could easily overwhelm existing drainage structures. Probability of damage is **likely**. These roads are necessary for forest management and provide access to recreation and private land. Damage to these routes would have a **moderate/major** magnitude of consequence, resulting in **High/Very High Risk**. Facilities at the Forest Service Gregory Campground are located on high ground and not a risk from flooding. However, falling fire-killed trees could damage infrastructure. This has a **possible** probability with **moderate** consequence, or a **Intermediate Risk**. The BAER assessment team recommends that roads, buildings and utilities on adjacent lands managed by the State, counties, utility providers or private land owners also be evaluated for risk from flooding carrying sediment and woody debris and falling fire-killed trees.
- Natural Resources (NR):** Suppression Related Key Concerns: The introduction and spread of invasive species Malta star thistle, yellow star thistle, French broom, Spanish broom and Armenian blackberry into un-infested lands is likely due to the disturbance of known infestations by suppression related activities and the use of contaminated equipment throughout the burn area. The removal of canopy cover and competing vegetation during suppression activities creates conditions prime for invasion by noxious weeds which are often adapted for quick colonization of disturbed sites.

Burn Related Key Concerns: The area burned during the Salt fire is characterized by high native plant diversity including numerous endemic species that occur nowhere else in the world. Infestations of yellow star thistle and Armenian blackberry are known to occur in the general burn area and often exhibit rapid spread following disturbance events. Spread of these invasive species into native and endemic habitats would have long-term impacts to the continued sustainability of the habitat.

- 4. Cultural and Heritage Resources:** Field surveys revealed no threats to known resources in the burn area.

## B. Emergency Treatment Objectives:

**Life and Safety;** warn visitors and workers to the burned area of risk, and close Gregory Campground and close the gate on Gregory Road during the rainy season. Protect boaters and Antlers Marina on Lake Shasta from floatable debris. Coordinate and share assessment information with local stakeholders.

**Property;** protect FS roads by improving drainage structures. Close Gregory Campground and protect facilities from fire-killed trees. Coordinate and share assessment information with local stakeholders.

**Natural Resources;** control the spread of invasive plants into areas of high and moderate soil burn severity where few to none currently exist and in areas exposed by suppression activities.

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

Land 90%

Channel n/a

Roads/Trails 80%

Protection/Safety 100%

## D. Probability of Treatment Success

Table 6: Probability of Treatment Success

	<b>1 year after treatment</b>	<b>3 years after treatment</b>	<b>5 years after treatment</b>
<b>Land</b>	80	75	70
<b>Channel</b>	n/a		
<b>Roads/Trails</b>	70	80	90
<b>Protection/Safety</b>	85	90	90

**E. Cost of No-Action (Including Loss):** Click here to enter text.

**F. Cost of Selected Alternative (Including Loss):** Click here to enter text.**Skills Represented on Burned-Area Survey Team:**

- Soils                       Hydrology                       Engineering                       GIS                       Archaeology
- Weeds                       Recreation                       Fisheries                       Wildlife
- Other

**Team Leader: Luke Rutten & Brad Rust**

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

<b>Skill</b>	<b>Team Member Name</b>
<i>Team Lead(s)</i>	Luke Rutten, Brad Rust
<i>Soils</i>	Eric Nicita, Jeff Tenpas
<i>Hydrology</i>	Bill Goodman, Jesse Merrifield
<i>Engineering</i>	Alvin Sarmiento, Molly Breitmun, Ben Molitor, Larry Arrington
<i>GIS</i>	Jonna Dushey, Matt House
<i>Geology</i>	Jonathon Schwartz, Dennis Veich, Derek Beal
<i>Archaeology</i>	Laird Naylor
<i>Weeds</i>	Erin Lonergan
<i>Recreation</i>	Joe Stubbendick (district staff)
<i>Other</i>	

**H. Treatment Narrative:Land Treatments:** Treatments to mitigate the noxious weed emergency include early detection surveys to document spread and concurrent rapid response treatments. Detection surveys will be conducted along completed dozer line, road improved as fire line, and within high severity burn areas adjacent to known infestations. Existing infestation which had previously been controlled will be treated to limit fire-induced expansion. A map of specific locations to be surveyed is provided in the Salt BAER Botany Report.

**Channel Treatments:** no treatments proposed**Roads and Trail Treatments:** Treatments to improve drainage on 3.6 miles of FS roads will include cleaning ditches and clearing culvert inlets. Culvert risers and trash racks will be installed on road crossings at risk of plugging by sediment and woody debris. Post storm inspection and response will occur to address threats during the rainy season.**Protection/Safety Treatments:** “Entering Burned Area” warning signs will be installed in 5 locations around the fire. Two sink holes in the 34N17 created by burned root wads will be filled to address user safety. A log boom will be installed in Shasta Lake to catch woody debris that would present a boating safety hazard. The BAER team and the Shasta Trinity National Forest is coordinating and sharing assessment with neighboring stakeholders to share assessment data and findings.**I. Monitoring Narrative:**No monitoring is proposed.