Date of Report: October 27, 2016

BURNED-AREA REPORT
(Reference FSH 2509.13)

PART I - TYPE OF REQUEST

A. Type of Report

[x] 1. Funding request for estimated emergency stabilization funds
[ ] 2. Accomplishment Report
[ ] 3. No Treatment Recommendation

B. Type of Action

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

[ ] 2. Interim Report #____.
[ ] Updating the initial funding request based on more accurate site data or design analysis
[ ] Status of accomplishments to date

[ ] 3. Final Report (Following completion of work)

PART II - BURNED-AREA DESCRIPTION

A. Fire Name: Emerald

B. Fire Number: 16-CA-AEU-029631

C. State: CA

D. County: El Dorado

E. Region: 05

F. Forest: Lake Tahoe Basin Mgmt. Unit

G. District: 19

H. Fire Incident Job Code:1502 PNKR7217

I. Date Fire Started: October 14, 2016

J. Date Fire Contained: October 17, 2016

K. Suppression Cost: $ 400,000 as of October 20, 2016

L. Fire Suppression Damages Repaired with Suppression Funds
1. **Fireline waterbarred (miles)**: 3
2. **Fireline seeded (miles)**: 0
3. **Other (identify)**: ---

M. Watershed Number: Cascade Creek – Tallac Creek – Taylor Creek Frontal: HUC6 160501010403

N. Total Acres Burned:
[95.95] NFS Acres [ ] Other Federal [0.03] State [79.48] Private

O. Vegetation Types: Mixed conifer and riparian areas.

P. **Dominant Soils**: SM, SP, GM and GP Unified Soil Classification

Q. **Geologic Types**: Glacial deposits, granitic core rocks, metamorphic roof pendents, and colluvial deposits

R. **Miles of Stream Channels by Order or Class**: 0.48 miles

S. **Transportation System**

Trails: 0 **miles** **Roads:** 0 **miles**

PART III - WATERSHED CONDITION

A. **Burn Severity (acres)**: 13 **(low)** 30 **(moderate)** 53 **(high)**

B. **Water-Repellent Soil (acres)**: 96

C. **Soil Erosion Hazard Rating (acres)**: 14 **(low)** 72 **(moderate)** 10 **(high)**

D. **Erosion Potential**: 0.38 – 23.48 tons/acre 2-year to 10-year

E. **Sediment Potential**: 4.5 **tons/acre**

PART IV - HYDROLOGIC DESIGN FACTORS

A. **Estimated Vegetative Recovery Period, (years)**: 5

B. **Design Chance of Success, (percent):** 80%

C. **Equivalent Design Recurrence Interval, (years):** 30

D. **Design Storm Duration, (hours):** 36

E. **Design Storm Magnitude, (inches):** 5

F. **Design Flow, (cubic feet / second/ square mile):** No perennial streams in the area

G. **Estimated Reduction in Infiltration, (percent)**: 88%

H. **Adjusted Design Flow, (cfs per square mile):** -----

PART V - SUMMARY OF ANALYSIS

Overview

The Emerald fire started on October 14, 2016. The fire was driven by windy conditions combined with very dry fuels, causing the fire to grow quickly, eventually reaching approximately 176 acres, of which approximately 96 acres were located on National Forest System Lands. The Emerald fire burned one ephemeral stream that leads to Lake Tahoe. A significant percentage of this area burned intensely, consuming all organic duff on the soil surface along with leaves and needles on standing live vegetation. A heavy rain over the course of two days aided in containing the fire.

The majority of the area burned on National Forest System Lands, at a moderate soil burn severity. The rest of the fire was low or very low soil burn severity.

State Route Highway 89 bisects the burn area and is situated below National Forest System Lands. Highway 89 is a major travel corridor within Lake Tahoe, being the primary route between South Lake Tahoe and Tahoe City. Additionally, this particular portion of highway is known for its scenic views of Lake Tahoe and blind curves. The hillslope directly above the highway is very steep with slope of 30-70% prone to sheet flow and rilling. This makes the road prism particularly vulnerable to flooding and sediment and debris accumulation during runoff events. Additionally, there is a drop inlet (DI) directly below the main ephemeral channel that drains the burn area. Increased sedimentation from the burn area will impact this DI with the potential to fill the DI and transport sediment below the road.

Based on historical precipitation patterns, it can be expected that winter storms have a high probability of occuring in the weeks following the Emerald fire. The risk of flooding and erosional events will increase as the result of the fire, creating hazardous conditions downstream of the burn area. These hazardous conditions may be worsened in the case of a rain-on-snow event, where long-duration rainstorms on a shallow snowpack can produce very high peak flows.

It cannot be overstated that Lake Tahoe is a significant water of national and even international recognition. While its water quality is renowned, it continues to be threatened by urban development and other factors. The effects of ash and sediment delivery to Lake Tahoe from the Emerald Fire, while not chronic, will nonetheless be a cumulative effect in a situation in which there is substantial concern over a treasured resource to the states of California and Nevada.

Flow increases from the fire will also be bulked by ash, debris and other floatable and transportable material within the channel areas. There is a high probability that post-fire flows from the first runoff producing rain events will see a high concentration of ash discharged from the burn area.

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

The risk matrix below, Exhibit 2 of Interim Directive No.: 2520-2010-1, was used to evaluate the Risk Level for each value identified during the Assessment:

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**

Natural Resources

I. Hydrology

- **Intermediate**
- Probability of Damage or Loss: **Possible**
- Magnitude of Consequences: **Moderate**

Watershed conditions in the burned watershed has changed significantly as a result of the Emerald Fire. Vegetation and underlying organic matter slows runoff and protects soils from direct raindrop impact, assists with water infiltration to soil and releases runoff at slower rates. Consumption of organic material and high soil heating can promote the formation of water repellent layers, at or near the soil surface, which can result in significant soil loss. With the amount of moderate burn severity in the Emerald Fire, and the large areas now devoid of vegetation and groundcover after the fire, large runoff producing storms will likely create increased surface flow volumes and velocities that can transport available sediment from the slopes and along the ephemeral channel. These responses are expected to be greatest in initial storm events, and will become less evident as vegetation is reestablished, providing ground cover, increasing surface roughness, and stabilizing and improving the infiltration capacity of the soils. As a result, values at risk are expected to be at an increased risk from post fire flooding and sedimentation.

There is a notable lack of stream channels on these slopes to concentrate water and sediment, due to the very high infiltration rate of these soils under normal conditions. Due again to low erosion rates, stream bulking here is NOT expected to be a significant problem. Mobilized sediments will transit by overland flow to lower slopes. Slope profiles are concave or benchy, so there are ample possibilities for re-deposition of fines on lower slopes prior to reaching a channel that would deliver to the lake. Additionally, there is a drop inlet and culvert directly below the ephemeral channel, which leads to a rock lined channel and sediment basin.

Safety concerns regarding downslope Values At Risk (VARs), including the highway, are more appropriately *and effectively* managed by sediment routing controls to address flow and sediment concerns, such as k-rails, wattles, or sediment fences. Land treatments are not considered necessary or cost effective for the watershed response.

II. Erosion

- **High**
- Probability of Damage or Loss: **Possible**
- Magnitude of Consequences: **Moderate**

Erosion risks were modeled to determine if the estimated soil erosion would represent a risk to soil productivity (source areas) or a hazard in terms of sediment delivery (water quality; contribution to stream bulking). Given low modeled erosion rates, soil productivity was NOT in itself determined to be a value at risk, nor were threats from *sedimentation* judged to pose an unacceptable level of risk to BAER critical VARs.

Effects of the fire on the soils have NOT created emergency conditions that would drive the need for erosion prevention via hillslope mulch treatments for soil stabilization purposes. Assessment of risk did not identify unacceptable risks as a likely result of erosion processes.

Natural recovery should be adequate for re-vegetation of hillslopes in the short-term (1-3 years). Hillslope erosion will occur, but estimated erosion rates are quite low, and downslope will comprise little more than "nuisance" sediment. Safety concerns regarding downslope VARs, including the highway, are more appropriately *and effectively* managed by sediment routing controls to address flow and sediment concerns, such as k-rails, wattles, or sediment fences. Land treatments are not considered necessary or cost effective for the erosion levels predicted. Increased hillslope erosion is expected to occur throughout the fire area, but is NOT judged to represent an on-site impact or off-site hazard.

Human Life and Safety

- **High**
- Probability of Damage or Loss: **Possible**
- Magnitude of Consequences: **Moderate**

In the section of Hwy. 89 affected by the Emerald Fire, it is likely that storms would provide increased runoff and sediment delivery to the road prism, due to the moderate soil burn severity in the area. If not mitigated, runoff and sediment delivery to the road prism would cause a safety issue to road users and increase the chance of injury. Highway 89 is managed by Caltrans. No BAER treatments are recommended.

- **Very High**
- Probability of Damage or Loss: **High**
- Magnitude of Consequences: **Major**

Risk to travelers and FS workers along Highway 89, downslope from hillslopes burned at a moderate to high severity, are at an increased threat of falling trees/snags, and other debris. Treatment recommendations are mitigation of hazard trees.

Federally listed species

- **No risk**

There are no federally listed plant, terrestrial animal, or aquatic species within the Emerald Fire. No BAER treatments are recommended.

Cultural Resources

- **No risk**

There are no values at risk relating to Cultural Resources within the Emerald Fire.
No BAER treatments are recommended.

B. Emergency Treatment Objectives (narrative):

The goal of the burned area emergency rehabilitation is to:
- Reduce threat of transporting sediment from the Emerald fire into Lake Tahoe.
- Reduce threats to human life and safety to users of Highway 89 by reducing soil erosion upslope from Highway 89.

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

Land 80% **Channel** N/A% **Roads/Trails**: N/A **Protection/Safety** 80%

D. Probability of Treatment Success

	Years after Treatment		
	1	3	5
Land	85	90	95
Channel	N/A	N/A	N/A
Roads/Trails	N/A	N/A	N/A
Protection/Safety	100	100	100

E. Cost of No-Action (Including Loss): (calculated from the Values at Risk (VAR) tool)

Public Health and Safety: Non-market value. The values at risk tool was utilized to assess the benefit/cost (B/C) ratio but our treatment are proposed for public health and safety benefits. The B/C ratio is not relevant and is strictly used as an accounting exercise because public safety is a factor.

F. Cost of Implementation (Including Loss): (calculated from the Values at Risk (VAR) tool)
N/A

G. Skills Represented on Burned-Area Survey Team:

[x] Hydrology	[x] Soils	[ ] Geology	[ ] Range
[x] Forestry	[x] Wildlife	[ ] Fire Mgmt.	[x] Engineering
[ ] Contracting	[ ] Ecology	[x] Botany	[x] Archaeology
[x] Fisheries	[ ] Research	[ ] Landscape Arch	[x] GIS

** While there were only a few specialists on the BAER team, representatives for each skill were consulted and they relayed that there was no impact to their resource.

Team Leader: Brian Hansen

Email: bchansen@fs.fed.us **Phone**: 530-543-2870

Core Team Member(s):
USFS Core Team Members:
Stephanie Heller – Hydrologist
Dave Young – Soil Scientist
Kurt Teuber – GIS

H. Treatment Narrative:

Land Treatments:

Fiber rolls (wattles)

This treatment is to provide safety to the public and FS employees utilizing Highway 89. There is a future threat to travelers along the road, due to the increased amount of flow and sediment coming from the Emerald Fire. Fiber rolls will be installed directly above Highway 89 in areas where rilling is prominent. One to two rows of fiber rolls may be necessary, depending on the location.

Cost Estimate – Fiber rolls

Item	Unit Cost	Unit	Total Units	Total Item Cost
Fiber rolls	$10,000.0	Unit	1	$10,000.00
Forest Watershed Specialists	$400.0	Days	10	$4,000.00
Hot Shot Crew	$3,500.0	Day	5	$17,500.00
Travel and Per Diem and Vehicle	$200.0	Day	20	$4,000.0
			Total Cost of Treatment	**$35,500.00**

Channel Treatment: None recommended

Roads and Trail Treatments: None recommended

Protection/Safety Treatments:

Hazard Tree Removal along Highway 89

Purpose of Treatment: With Highway 89 remaining open to the public, the threat of hazard trees falling on the road, especially during a high wind event, will be mitigated through the felling of trees where the severity of the burn is high and moderate.

Cost Estimate - Hazard Tree Removal				
Item	Unit Cost	Unit	Total Units	Total Item Cost
Saw supplies	$1,000.0	Unit	1	$1,000.0
Forest Vegetation Specialist	$400.0	Days	10	$4,000.0
Vehicle (2)	$0.50	mile	500	$500.00
			Total Cost of Treatment	**$5,500.00**

*** Half of the 20 person Hot Shot crew will fell imminent hazard trees while the rest will install fiber rolls. Cost estimate for the 20-person Hot Shot crew is included in the cost estimate for fiber roll installation.

Extended Emergency Coordination

This project involves communication and coordination with state and local agencies with jurisdiction over lands where life and property are at risk from post-fire conditions. Even though this was a small fire, there was a very high level of public involvement and interagency coordination initiated during the Emereld Fire suppression efforts. This interest has continued into the BAER assessement and there will be a need for maintaining a high level of coordination during implementation of emergency stabilization treatment recommendations that are approved for NFS lands. The primary action will be coordinating with other agencies and exchanging information and coordinating the BAER implementation plan as needed when subsequent recovery plans are developed by other agencies. This initial request is to fund a primary coordinator assigned to the Lake Tahoe Basin Management Unit to facilitate coordination of the Forest Service BAER activites with the cooperating partners with other jurisdictions.

Extended Emergency Coordination				
Item	Unit Cost	Unit	Total Units	Total Item Cost
Forest BAER Coordinator	$400	day	10	$4,000
Vehicle (1)	$0.50	mile	2,000	$1,000.00
			Total Cost of Treatment	**$5,000.00**

I. Monitoring Narrative:

Forest personnel will conduct implementation monitoring of the BAER treatments to check that treatments are present and functioning properly.

This report is an initial funding request based on a rapid assessment. If additional treatment needs are identified through more site specific on the ground investigation in cooperation with interested agencies, or through futher field analysis location or noxious weed detection surveys, interim request for additional funding will be filed. These funding requests will identify the purpose for each treatment, and specific treatment specifications, locations, and number of each treatment. A detailed implementation and treatment effectiveness monitoring plan will be submitted as a separate document to the Regional BAER coordinator.

PART VII - APPROVALS

1. _____ 10/28/16
Forest Supervisor (signature) Date

2. Barnie T. Dyar 11/2/2016
Regional Forester (signature) Date

Part VI – Emergency Stabilization Treatments and Source of Funds **Interim #**

			NFS Lands			Other Lands				All
		Unit	# of		Other	# of	Fed	# of	Non Fed	Total
Line Items	Units	Cost	Units	BAER $	$	units	$	Units	$	$
A. Land Treatments										
Fiber rolls	Lump	35,500	1	$35,500	$0		$0		$0	$35,500
				$0	$0		$0		$0	$0
				$0	$0		$0		$0	$0
Insert new items above this line!				$0	$0		$0		$0	$0
Subtotal Land Treatments				$35,500	$0		$0		$0	$35,500
B. Channel Treatments										
				$0	$0		$0		$0	$0
				$0	$0		$0		$0	$0
				$0	$0		$0		$0	$0
Insert new items above this line!				$0	$0		$0		$0	$0
Subtotal Channel Treat.				$0	$0		$0		$0	$0
C. Road and Trails										
				$0	$0		$0		$0	$0
				$0	$0		$0		$0	$0
				$0	$0		$0		$0	$0
Insert new items above this line!				$0	$0		$0		$0	$0
Subtotal Road & Trails				$0	$0		$0		$0	$0
D. Protection/Safety										
Hazard trees	Lump	5500	1	$5,500	$0		$0		$0	$5,500
Interagency Coord.	day	500	10	$5,000	$0		$0		$0	$5,000
				$0	$0		$0		$0	$0
Insert new items above this line!				$0	$0		$0		$0	$0
Subtotal Structures				$10,500	$0		$0		$0	$10,500
E. BAER Evaluation	unit	1	25000							
				---			$0		$0	$0
Insert new items above this line!				---	$0		$0		$0	$0
Subtotal Evaluation					$0		$0		$0	$0
F. Monitoring										
				$0	$0		$0		$0	$0
Insert new items above this line!				$0	$0		$0		$0	$0
Subtotal Monitoring				$0	$0		$0		$0	$0
G. Totals				$46,000	$0		$0		$0	$46,000
Previously approved										
Total for this request				**$46,000**						