Date of Report: September 24, 2013

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

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

[X] 2. Interim Report # 1
[X] 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: Rim Fire

B. Fire Number: CA-STF-002857

C. State: CA

D. County: Tuolumne, Mariposa

E. Region: 05

F. Forest: Stanislaus NF

G. District: Groveland and MiWok RD

H. Fire Incident Job Code: P5HV2F (0516)

I. Date Fire Started: **08/17/2013**

J. Date Fire Contained: est. 10/01/2013

K. Suppression Cost: $119 million as of 09/21/2013

L. Fire Suppression Damages Repaired with Suppression Funds
1. Fireline waterbarred (miles): 134
2. Fireline seeded (miles): 0.0
3. Other (identify):

M. Watershed Number and Name:

180400091002	Big Creek
180400090301	Kendrick Creek
180400080303	Cascade Creek
180400090601	Upper Middle Tuolumne River
180400090804	Lower Clavey River
180400091001	Jawbone Creek-Tuolumne River
180400090404	Upper Cherry Creek

180400080306	Crane Creek-Merced River
180400080307	Moss Creek-Merced River
180400091004	Grapevine Creek-Tuolumne River
180400090802	Reed Creek
180400080402	Bull Creek
180400080401	Bean Creek-North Fork Merced River
180400090304	Miguel Creek-Eleanor Creek
180400090405	Lower Cherry Creek
180400090504	Hetch Hetchy Reservoir-Tuolumne River
180400090701	Upper South Fork Tuolumne River
180400090602	Lower Middle Tuolumne River
180400090902	Lower North Fork Tuolumne River
180400090403	West Fork Cherry Creek
180400090303	Kibbie Creek
180400090803	Middle Clavey River
180400090702	Lower South Fork Tuolumne River
180400090302	Frog Creek
180400090505	Poopenaut Valley-Tuolumne River

N. Total Acres Burned: 256,895 as of 09/21/2013
NFS Acres: 154,108; Other Federal: 78,946 acres in Yosemite National Park and 129 acres in Bureau of Land Management (BLM); State: 0; Private: 23,711

O. Vegetation Types: Sierra Mixed Conifer, Ponderosa Pine, Mountain Hardwood, and Mixed Chaparral

P. Dominant Soils:
The dominant soils within the Rim Fire are varied extremely gravelly loams, very gravelly loams, loams, and gravelly loamy sands. These soils are shallow to moderately deep, and mostly in soil hydrologic groups B and D. Specific dominant soils include Badgerpass, Canisrocks, Fiddletown, Gerle, Holland, McCarthy, Josephine, Sites, Waterwheel, and Wintoner families (these soils each comprising > 5,000 acres).

Q. Geologic Types: Within the burned area, much of the bedrock is granitic where erosion has exposed the batholiths commonly associated with the Sierra Nevada landscape. The metasedimentary bedrock which the batholiths originally intruded is still present in foothill formations and isolated roof pendants. Tertiary to Recent deposits mantle erosional surfaces and are generally of volcanic or glacial origin. Consequently, the bedrock underlying the area burned by the Rim fire (in order of oldest to youngest) is:

1) metasedimentary bedrock consisting mainly of schist, argillite, quartzite, dolostone, and marble,
2) granitic bedrock (igneous Intrusive) with mafic bodies including diorite and gabbro, and
3) Tertiary-aged fluvial gravels and Quaternary-aged volcanic flows and glacial deposits.

R. Miles of Stream Channels by Order or Class:

Stream Class	Length (miles)
Ephemeral	2,005
Intermittent	287
Perennial	363
Total	2,655

S. Transportation System

Trails: 118 miles Roads: 720 miles

Within the fire perimeter there are approximately 720 miles of Forest Service (FS) system roads. The FS transportation system consists of 5 categories of operational maintenance level (OML). The summary of surveyed and non-surveyed roads by OML is as follows:

OML	Total (mi)	Surveyed (mi)	Non-Surveyed (mi)
1	80	0	80
2	500	325	175
3	78	78	0
4	20	20	0
5	42	42	0

Table 1: Summary of Surveyed and Non-Surveyed FS Roads by OML

OML 1 roads are closed roads, and therefore, were not surveyed. The reason why 175 miles of OML 2 roads were not surveyed could be any of, or a combination, of the following reasons: (1) Road was in low burn severity, (2) Road was along a ridge, (3) Road was not accessible, and (4) Within the time constraints of a rapid assessment the road was determined to be low priority.

Forest Service system roads by burn severity are as follows: 407 miles are in low and non-burn areas, 281 miles are in moderate burn areas, and 32 miles are in high burn areas.

PART III - WATERSHED CONDITION

The Rim Fire has burned over 256,000 acres in the central Sierra Nevada with an estimated containment date of October 1st, 2013. A significant percentage of this area burned intensely, consuming all organic duff on the soil surface along with all leaves and needles on standing live vegetation.

The soil burn severity (SBS) map shows approximately 44% burned at high and moderate soil burn severity. The rest of the fire was either low or very low soil burn severity. It is very important to understand the difference between *fire intensity* and *burn severity*, and *soil burn severity* as defined for watershed condition evaluation in BAER analyses. Fire intensity or burn severity as defined by fire, fuels, or vegetation specialists may consider such parameters as flame height, rate of spread, fuel loading, thermal potential, canopy consumption, tree mortality, etc. For BAER analyses, mapping is not simply vegetation mortality or above-ground effects of the fire – soil burn severity considers additional surface and below-ground factors that relate to soil hydrologic function, runoff and erosion potential, and vegetative recovery. The main areas of high severity are Cherry Creek, Jawbone Creek, South, Middle and Upper Tuolumne River above Don Pedro Reservoir. These areas are at risk due to flooding and sedimentation affecting water quality, roads, hydroelectric powerhouses, and private camps.

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

The fire was divided into sub-watersheds with “pourpoints” established at the bottom of burned watersheds, or where values at risk were located. In most cases, the pourpoints are located at the bottom of watersheds as they enter the Tuolumne River. Watershed runoff response is referenced to these points.

A. Burn Severity (acres): low: 143,225; moderate: 94,940; high: 16,796

	Low	Moderate	High
USFS	80,259	63,917	9,758
NPS	49,142	22,903	5,106

BLM	93	36	0
Pvt	13,711	8,072	1,929

B. Water-Repellent Soil (acres): 25% of the moderate and high burn severity acres – approximately 30,000 acres.

C. Soil Erosion Hazard Rating (acres):

EHR	Low	Moderate	High	V High	Total
Acres	**67,768**	**151,407**	**34,480**	**40**	**254,056**
Percent	**27%**	**60%**	**14%**	**0%**	**100%**

D. Erosion Potential: Average over the low, moderate and high burn severity the erosion potential is:
2 tons/acre (range of 0 – 9) for the 2 year storm event
12 tons/acre (range of 3-36) for the 10 year storm event

E. Sediment Potential: ____ cubic yards / square mile

PART IV - HYDROLOGIC DESIGN FACTORS

Hydrologic design factors used to analyze the effects of the Rim Fire considered the vegetative recovery period to be 3 to 5 years and treatment chance of success as 80%. Storm recurrence interval of 2 years and 24-hours using NOAA Precipitation Frequency Data Server for 2-year 24-hour precipitation yielded a design storm magnitude of 3.6 to 4.2 inches of rainfall. Estimated reduction in infiltration was based on the percentage of hydrophobic soil in the burn area, which was determined to be 25%. Pre-fire design flow was estimated at 7.57 cubic feet per second per square mile and post-fire design flow was estimated at 11.65 cubic feet per second per square mile. These values vary by watershed analysis and are described in detail along with the analysis method in the Hydrology specialist report.

A. Estimated Vegetative Recovery Period, (years): 3-5

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

C. Equivalent Design Recurrence Interval, (years): 2

D. Design Storm Duration, (hours): 24

E. Design Storm Magnitude, (inches): 3.6-4.2

F. Design Flow, (cubic feet / second/ square mile): 7.57

G. Estimated Reduction in Infiltration, (percent): 25%

H. Adjusted Design Flow, (cfs per square mile): 11.65

PART V - SUMMARY OF ANALYSIS

A. Describe Critical Values/Resources and Threats:

A BAER team began assessing the area for post-fire emergencies on September 9th, 2013. *An initial 2500-8 was submitted on Friday, September 13th. Details from that intial request are shown in this interim in underlined italics.* Since the initial, the team has identified the following values at risk to post-fire threats. Additional needs may be identified by the Forest in the near future. If necessary an interim report will be submitted to address those emergencies.

Values at Risk:

The risk matrix below was used to evaluate the Risk Level for each value identified during Assessment. Only treatments that had a risk of Intermediate or above are discussed below, but all values at risk are included in the tables in the appendix. Additionally, more information on the values at risk by watershed that are driving treatments can be found in the appendix.

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**

*Source: Exhibit 2 of Interim Directive Number **2520-2010-1**

A-1. Life, Safety and Property

a. *Hazard Trees*

Hazard trees exist along roads, trails, and recreation sites throughout the burn, along private lands and along a private ditch on FS land that threaten safety of land owners and structures on these lands. Hazard trees also exist in areas where treatments are proposed that threaten the safety of crews implementing treatments along roads and within designated recreation sites.

Forest Campground and picnic area facilities
Many Forest Service campgrounds (built assets) (Dimond O, Lost Claim, Lumsden Bridge, Lumsden, South Fork and Sweetwater) and Day Use Areas (Carlon, Cherry Creek Boat Launch, Merals Pool Boat Launch, Middle Fork, Rainbow Pool and Rim of World) are located within the fire area and are at risk from hazard trees.

Risk Assessment *– Threats to Forest visitors and facilities*
Probability of Damage or Loss: Very Likely *– severity of burn*
Magnitude of Consequences: Major *– loss of facility and potentially injury to Forest workers.*
Risk Level: Very High *– Hazard trees have the potential to damage built assets and injure Forest workers this winter in the campgrounds.*

b. Open Mine Shaft
An open mine shaft roughly 30 feet deep is cut into the side of the hill. The shaft is hard to see when walking down the ridge from the end of Forest Road 1S01YB. Therefore, this open mine shaft is a safety hazard.

Risk Assessment – Threat to Forest visitors

Probability of Damage or Loss: Possible – burned vegetation has exposed shaft
Magnitude of Consequences: Major – injury to death to visitors
Risk: High

c. *Rock Fall* and Debris Flows

There is an increased chance of rock fall in several locations, along the FS Roads 1N07 and 3N01. This poses a threat to humans both by direct impact of falling rocks and obstacles on roadways.
Debris flows and rockfalls are the primary geologic hazards associated with burned watersheds (Santi et al., 2013; Parise and Cannon, 2012).

Debris flow activity is not uncommon within the area affected by the Rim Fire. Examples of areas where precipitation-induced debris flows have occurred in the past include within the Clavey River area and on Pilot Ridge. Areas where conditions of geology and slope steepness are similar to those within the Rim Fire have also resulted in debris flows (De Graff, 1994; 2001).

Rockfall in the form of individual rocks or small groups of rocks have already rolled onto roads and trails from the steep slopes within the Rim Fire area. It is recognized that rockfall activity often takes place during and immediately after a wildfire. The threat to the facilities at Early Intake due to rockfall was identified in the past and measures have been installed to reduce the risk to critical infrastructure (De Graff and Gallegos, 2012). Accumulations of small rocks can damage tires and interfere with safe driving. Rocks in motion or large rocks (1-foot diameter or larger) can damage pavement, cause accidents, damage vehicles, and cause injury or death.

Road and Trail Segments and recreation sites throughout the burned area:
Specific identified roads and trail segments and recreational facilities (public and private) within the burned area are potential values at risk for debris flows and/or rockfall (Geology specialist report contains specific sites).

Risk Assessment – Debris flows and rockfall for roads, trails and recreation sites throughout burned area
Probability of Damage or Loss: Possible – *severity of burn*
Magnitude of Consequences: Moderate – loss of facility and potentially injury to Forest users/workers.
Risk Level: Intermediate – Debris flows have the potential to damage built assets and injure/kill Forest travelers. Based on this risk analysis the recommended treatment is to close areas where possible and install warning signs at specified locations.

Granite Creek Roads
Granite Creek is crossed by roads at three points. These roads include FR1N07 and FR1N96. The debris flow probability is 40-60% for a 10 year, 60 minute storm. Over a three year recovery period of the Granite Creek watershed, above the road channel crossings, the probability of a debris flow occurring would be 16%.

Risk Assessment – *Debris flow threats to Granite Creek roads*
Probability of Damage or Loss: Likely – *severity of burn*
Magnitude of Consequences: Moderate – *loss of facility and potentially injury to Forest travelers.*
Risk Level: High – *Debris flows and rockfall have the potential to damage assets and* injure or kill Forest *travelers.* Based on this risk analysis the recommended treatment is to install warning signs.

Lumsden Road
The Lumsden Road (FR1N10) has the highest rock fall hazards of all roads in the Rim Fire Area. Rock fall hazards on the Lumsden Road range from low to very high rock fall hazard.

Risk Assessment *– Rock fall threat to Lumsden road*
Probability of Damage or Loss: Very Likely *– severity of burn*
Magnitude of Consequences: High *– loss of facility and potentially injury/death to Forest travelers.*
Risk Level: Very High *– Rock fall has the potential to damage built assets and injure Forest travelers.* Based on this risk analysis the recommended treatment is to close the road until next summer and install warning signs. The rock fall hazard will be very high for at least 3 years.

d. Roads and Trails

There are 720 miles of road and 118 miles of trails in the burn area. Roads and trails throughout the burned watersheds are likely to be impacted by runoff, sediment, and debris derived from burned areas. US and state highways, county roads, and Forest roads exist in these watersheds. Culverts, bridges, low water crossings, roadside ditches, and other road drainage features are at risk from these watersheds. Increased runoff and sediment from the burned areas can negatively affect the road prism, damaging the road, eroding land downslope of the road and routing flow and sediment directly to stream channels. Culverts associated with these roads are at risk of plugging from debris carried down channels from burned watersheds. Some culverts are undersized for the expected increases in peak flows and are at risk of failure from overtopping. Culvert failures may increase the magnitude of flood, sediment and erosion hazards in downstream communities and private lands and increase scouring of stream channels on NFS lands.

Forest Roads
The field survey was conducted on September 9 – 23, 2013 by truck and foot travel.
The geology of the burn area includes metasedimentary and igneous (granitic) bedrock. Some of the soils are very susceptible to erosion degradation while others tend to impound water on the surface. Directed runoff features are critical to maintaining stable, sustainable, and safe roadways. Uncontrolled runoff can result in significant damage and potential loss to the road system.

Seven (7) bridges within the fire perimeter were inspected. A scorched object marker at the South Fork Tuolumne River Bridge (1N10) and a damaged, structurally compromised, wing wall on the Niagara-Clavey bridge (2N04) are the only significant bridge damage resulting from the fire. Charred guard-rail posts and wingwall components on the Joe Walt Run bridge (3N01) are not structurally significant.

1. The roads are at increased risk due to:
   a. Additional erosion damage as a result of increased storm water runoff velocity and volume on and across the road templates.
   b. Rock fall and landslide events (as discussed above).
   c. Tree fall

2. The consequences of the fire on the roads will be:
   a. Primarily manifest as increased storm water runoff erosion damage, including potential total loss to the surfaces and templates.
   b. Secondary consequences to the system is to increased the adverse effects, and decrease control, of storm water runoff to adjacent watersheds.
   c. Public Safety is affected due to a significantly increased hazard resulting from destabilized rock slopes, falling trees, and damage to traffic safety structures and signs.

Risk Assessment *– Threats to travelers and infrastructure on Forest System Roads*
Probability of Damage or Loss*: Likely. Flash flood risk, culverts plugging and overtopping roads, increased water and ash creating potentially hazardous driving conditions.*
Magnitude of Consequence*: Moderate. Possible injury of both administrative users and Forest visitors.*
Risk Level: high*: treatment considered for threats to human life or safety. Seasonal closure, hazard tree removal, gates to control access, warning signs, culvert cleaning, and rolling dip construction.*

Forest non-motorized trails
Eleven (11) non-motorized trails exist within the fire area and were affected by the fire. There are 15.9 miles of non-motorized trails in the high and moderate burn severity areas. The Forest Service system trails are typically classified as Class 3. Watershed response is expected to result in increased runoff, likely leading to trail incision and increased watershed efficiency (concentrated water from the trail onto burned watersheds). Also, several wooden drainage features were burned, putting trail tread stability at risk. In addition, there is a safety risk from hazard trees and rock fall to the public and Forest Service employees.

> ***Risk Assessment*** *– Threats to Forest users and loss of trail tread (Forest investment)*
> ***Probability of Damage or Loss: Likely – Very Likely*** *– severity of burn*
> ***Magnitude of Consequence: Moderate-Major*** *– degradation of trail tread and proximity of hazard trees adjacent to the trail*
> ***Risk Level: High – Very High****- Signs, trail stabilization and hazard tree mitigation where there is a potential to damage the trail tread or washout at ephemeral and intermittent stream channels.*

Forest motorized trails
Motorized trails exist in the Jawbone Pass area, Pilot Ridge area, Tuolumne Rim (Ferretti Road), Twomile, Middle Clavey and Reynolds Area and West Side Rail Tour. There are 21.6 miles of routes in high and moderate burn severity areas. These segments have numerous hazard trees. The anticipated increased runoff following the fire has the potential to cause erosion and incision along segments of these trails potentially leading to loss of trail tread.

> ***Risk Assessment*** *– Threats to Forest users and loss of trail tread (Forest investment)*
> ***Probability of Damage or Loss: Possible-Very Likely*** *– Severity of Burn*
> ***Magnitude of Consequences: Moderate-Major*** *– degradation of trail tread and proximity of hazard trees adjacent to the trail.*
> ***Risk Level: Intermediate – High****: Signs, trail stabilization and hazard tree mitigation where there is a potential to damage the trail tread or washout at ephemeral and intermittent stream channels.*

d) Hazardous Materials

Burned structures have exposed hazardous materials. This includes several buildings at the Berkely-Tuolumne Camp. Also, 2 vault toilets have burned, exposing human waste and melted construction materials. This material could pollute surface and groundwater, threatening human safety and water quality. An ephemeral drainage to the Middle Fork Tuolumne River has an extensive dump site (cans and bottles, etc.) and two abandoned automobiles located within and adjacent to the channel. Steep slopes upstream of the site burned moderately and will likely generate runoff that could cut into the dump site. The deposit is located on an outward bend of the stream. A threat of contaminants (possibly metals) from the deposit rinsed by high runoff from the dump site to the river is likely and water quality could be impacted. Heritage values of the site could also be impacted if the deposit is eroded. The automobiles may still have hazmat present and if so a minor amount, they should be removed from the stream channel and properly disposed.

> ***Risk Assessment*** *– Threat to human safety from exposure and water quality deterioration from materials entering water bodies during flood flows.*
> ***Probability of Damage or Loss****: Likely. Materials are easily accessible and flood risk is increased due to changes in post-fire watershed function.*
> ***Magnitude of Consequences****: Moderate. Possible injury and water quality deterioration.*
> ***Risk Level: High****. Treatment considered for threats to human life and safety and water quality. Seal vault toilets and install erosion control devices around the hazardous materials to contain it until it can be properly disposed of.*

A-2. Natural Resources

a) Soil Productivity

Soil productivity and hydrologic function was determined to be values at risk in areas that have burned once or more within the last 40 years and now have burned again. Soils here are inherently moderate to highly productive (Forest Survey Site Class 2-5) due to the geographic and climatic setting. The ecosystems here are also fire-adapted, so periodic post-fire erosion is a natural ecological and geomorphic process, but with heavy accumulations of fuel, drought conditions, and strong winds fire damage can be extensive. Areas of high and moderate burn severity have impacted soil productivity by removing vegetative ground cover, the organic matter within the topsoil and on the forest floor, and to a lesser extent by creating water repellent conditions within the soils themselves. The Rim Fire burned 7% (16,796 acres) high severity and 37% moderate severity (94,940 acres). Consumption of the organic layer on the forest floor and severe heating of the upper layer of soil has degraded the seed bank stored in the soil. The most important soil physical characteristic that affects soil hydrologic function and soil stability is soil structure. The organic matter component, which provides for loose, granular structure, can be lost at relatively low temperatures. The loss of soil structure increases the bulk density of the soil and reduces its porosity, thereby reducing infiltration and soil productivity and making the soil more vulnerable to post-fire runoff and erosion. Removal of the protective vegetative and organic layers combined with loss of soil structure and increased water repellency also increases erosion. Soil loss occurs through surface, rill, and gully erosion processes. Loss of the soil seed bank, loss of soil structure, and soil loss through erosion processes retards vegetative recovery which, in turn, further impairs soil productivity and watershed conditions. Some areas have been burned by wildfire within the last 40 years. For these areas soil productivity has been impacted from soil loss and this burn represents another hit to soil productivity.

Damage to soil productivity in areas of moderate burn severity with highly erosive soils and areas of high burn severity is very likely to occur, may be irreversible, and is at least of long term duration. Post fire erosion was modelled in the range of 5-10 Tons/Acre based on a 2-year storm return interval.The soils in this watershed are highly erosive and have received damage from several fires over the last 40 yrs. Expected erosion rates from a 2yr. storm generally we expect post-fire erosion to be approximately 10 times compared to pre-fire conditions.

Risk Assessment: Soil Productivity
Probability of Damage or Loss: Likely – due to soil condition and erodibility
Magnitude of Consequences: Moderate – potentially reducing productivity by one site class
Risk level: High

b) Hydrologic Function and Ecosystem Integrity

Hydrologic function within moderately and severely burned areas has also been impacted by loss of the vegetative canopy that intercepts some rainfall, by loss of the organic layer on the forest floor that absorbs some rainfall and slows runoff, by loss of soil structure which reduces infiltration and to a lesser extent by development of water repellent soils which also reduces infiltration. Reduced interception and absorption, and reduced infiltration increase runoff speed from a given rainfall event. Increased runoff increases erosion and the magnitude of peak flows expected from a watershed. The increased magnitude of peak flows represents an increased flood threat to downstream life and property and natural and cultural resources.

Increases in erosion can occur on both uplands and in channels. Rills and gullies can form in uplands and channels can scour and downcut. Sediment delivered to channels from rill and gully erosion and eroded from channel banks during scouring and incision processes can deposit in areas of lower energy. Sediment, bedload, and debris deposits can plug culverts and bridges, deposit on floodplains, terraces and other low lying areas such as meadows and valley bottoms, can clog ditches and water supply intakes and generally adversely affect infrastructure in downstream areas.

Downcutting of stream channels can lower water tables in adjacent floodplain aquifers and result in drying of meadows and mortality of riparian vegetation. Downcutting of stream channels also separates the stream from its floodplain, alters the sediment transport characteristics of the channel, and causes erosion of the channel banks until the channel has widened sufficiently to permit development of a new floodplain at the lowered base level of the channel. The downcutting, widening and depositing processes can destabilize affected channels for many years.

Increases in runoff and erosion, changes in sediment transport characteristics, impacts to channels and floodplains, and impacts to water quality from ash, sediment, and temperature effects, combine to impair hydrologic function.

Impaired soil productivity and hydrologic function affect:

- Human life and safety on or in close proximity to burned NFS lands through increased flood threats,
- Property and infrastructure on or in close proximity to burned NFS lands through increased flooding, erosion, and debris threats,
- Critical and occupied habitat for federally listed threatened or endangered terrestrial and aquatic animal species within and in close proximity to burned NFS lands through increased flooding and water quality impacts and through delayed vegetative recovery affects.

Bear Gully Stabilization
Bear Gully is located at the headwater of an unnamed tributary to the Middle Fork Tuolumne River in the Bear Mountain area. An extensive and deeply incised gully exists in this drainage that terminates with two large headcuts and trailing gullies in deep alluvial granitic soils. Both headcuts have been treated to arrest headcut migration. The treatments are comprised of large wood (several cut logs) that were placed over the active face of the headcuts in order to slow erosion.

The eastern and primary headcut also has a pond (plug and pond treatment) above with surface water. These treatments are holding and do not have a threat of impact as a result of post fire runoff. The drainage where the headcut treatments are located burned moderate to high severity. The western branch headcut experienced damage from the fire when the logs placed for armoring were burned and now stability has been reduced and potential for further headcut migration increased. Two additional and smaller active headcuts exist below the treated and impaired headcut in the gully will add to increased erosion.

Without treatment, there is a high probability that the western headcuts will migrate rapidly due to increased peak flows as a result of burned watershed conditions and the loss of protective function of the existing treatment (burned log armoring). Headcut migration will cause further gully formation and increased soil erosion, and worsen hydrologic function. If the headcuts are treated, it is likely that potential for gully migration will be significantly reduced.

> **Risk Assessment:** Hydrologic Function, Ecosystem Integrity and existing stabilization structure in Bear Gully
> **Probability of Damage or Loss: Likely** – increase runoff from burned area
> **Magnitude of Consequences: Moderate** – loss of investment, downcutting of meadow, loss of meadow ecosystem, reduced ecosyste integrity from erosion.
> **Risk level: High** – install additional stabilization features

Noxious/Invasive Weeds
The Rim Fire resulted in heavy impacts to the native plant communities over large portions of the burned area. The large scale loss of vegetative cover has resulted in ecosystems which are highly vulnerable to weed invasion. There are approximately 134 miles of dozer lines including contingency lines outside the fire perimeter. There are numerous known weed sites within the burned area which were subjected to impacts by dozers resulting in the likely spread from infested areas into un-infested

natural communities. The weed species in the burned area include the California Department Food and Agriculture's (CDFA) A-Rated spotted knapweed (*Centaurea stoebe* ssp. *micranthos*). There are three CDFA B-Rated weed species, barbed goatgrass (*Aegilops triuncialis*), Canada thistle (*Cirsium arvense*) and dyers woad (*Isatis tinctoria*). Yellow Star Thistle (*Centaurea solstitialis*) is a CDFA C-Rated weed species. Fire Suppression activities occurred through populations of these and other known weed species.

Soil compaction and erosion will likely result from dozer and hand line and this disturbance may reduce areas of native plant recovery. Dozer lines were observed going through and/or in close proximity to known weed infestations. Most of the dozers were not cleaned prior to entering the burned area and likely vectored weeds into the burned area. The Tuolumne base camp was heavily infested with the noxious weed yellow star-thistle (*Centaurea solstitialis*). While the infested areas were dozed to scrape away the star-thistle, seed would have been present in the soil which was then watered for dust control. Seed was then likely picked up in the resulting mud sticking in tire treads and undercarriages of any vehicle which drove into the parking areas. The seed was likely vectored on some of these vehicles to the burned area.

The value at risk is the ecosystem health and integrity of the native communities within the burned area. The threat is the potential loss of the health and integrity of native plant communities due to new weed introductions and weed spread from existing weed infestations which could push out the native vegetation resulting in nonfunctioning ecosystems. Dense non-native weeds make forage for wildlife unavailable. Most of the weeds of high concern have deep taproots and few fibrous roots making soil erosion in dense stands a concern. For these reasons, loss of the ecosystem health and integrity of native plant communities from weed invasion in the burned area is an emergency needing to be mitigated.

> **Risk Assessment:** Loss of ecosystem function and native plant recovery
> **Probability of Damage or Loss: Very Likely.** There is a significant amount of dozer lines and other fire suppression related disturbances that impacted known weed infestation sites that will be highly detrimental to vegetation recovery and encourage noxious weed invasion.
> **Magnitude of Consequences: Major**. Loss of native plant communities.
> **Risk level: Very High:** Weed species detection surveys following winter precipitation.

Cultural Resources
Wildfires have the potential to damage, or destroy heritage resources through: (1) direct effects of the fire; (2) ground disturbing suppression or rehabilitation activities; and/or (3) indirect effects caused by the fire and firefighting efforts, such as erosion, vandalism/looting, or recreational use. These impacts may completely destroy historic and archaeological resources or alter the context of surface and subsurface cultural remains vital to any scientific analysis or interpretation. Also, wildfires may increase the accessibility and visibility of archaeological site locations making them more susceptible to vandalism/artifact looting and unauthorized recreational activity. The Rim Fire Incident has the potential to directly or indirectly impact heritage resources located in the area.

A total of 1,677 heritage sites were considered at risk for impacts from the fire and/or fire-related suppression or rehabilitation measures. For this initial report, 150 sites located in areas of moderate or high burn intensity were monitored by the BAER team archaeologists. In addition, 25 sites within the burn area were not visited due to safety concerns, a lack of potential BAER issues, or could not be relocated.

Thirty sites have been identified as having values at risk from looting, loss of site or a portion of a site due to erosion or hazard trees; and weeds and cattle grazing.

> **Risk Assessment:** Loss from looting, loss of site or a portion of a site due to erosion or hazard trees; and weeds and cattle grazing
> **Probability of Damage or Loss: Likely.**
> **Magnitude of Consequences: Major**.
> **Risk level: Very High**.

B. Emergency Treatment Objectives

1. *To protect life with warning signs relaying the hazards within the burned area on entry points that will be open to the public and at specific areas that have been identified for rock fall that could reach the roads and public use areas.* Protect life and safety at open mine shaft.
2. *Maintain control of runoff, reduce erosion/sedimentation from the road, and protect road infrastructure.*
3. *Treat snag hazard trees along roads and recreation sites that will be open to the public.*
4. Identify and treat new infestations of noxious weeds associated with bare ground created by the fire, dozer lines and disturbed areas to protect the ecosystem and native plant communities.
5. Protect long term soil productivity on highly productive soils in high soil burn severity areas.
6. Protect archaeological sites from looting, erosion, falling hazard trees and damage from invasive weeds, grazing, and recreational use.
7. Protect hydrologic function of Bear Gully.

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

Land **75**% Channel **85** % Roads/Trails **85** % Protection/Safety **90**%

D. Probability of Treatment Success

	Years after Treatment		
Risk Level	**1**	**3**	**5**
Land	80%	80%	80%
Channel	80%	80%	80%
High Risk Roads	95%	90%	90%
Intermeditate Risk Roads	90%	85%	80%
Trails	85%	85%	85%
Protection/Safety	80%	80%	80%

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

F. Cost of Selected Alternative (Including Loss):

G. Skills Represented on Burned-Area Survey Team: See appendix for team member list.

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

Team Leader: Todd Ellsworth

Email: tellsworth@fs.fed.us Phone: 760-937-2033 FAX:

H. **Treatment Narrative:**

(Describe the emergency treatments, where and how they will be applied, and what they are intended to do. This information helps to determine qualifying treatments for the appropriate funding authorities. For seeding treatments, include species, application rates and species selection rationale.)

Land Treatments:

Noxious weed detection and rapid response

Weed detection surveys and rapid response eradication treatments are to determine whether ground disturbing activities related to the Rim Fire Incident and the fire itself have resulted in new or the expansion of existing noxious weed infestations. With 134 miles of dozerline, numerous drop zones, staging areas, drop zones and two fire camps and innumerable areas of road widening and disturbance in the Rim fire it is expected that new and expanding weed infestations will proliferate in and along these vectors if left unchecked, eventually leading to vegetation type conversion. Surveys and rapid response eradication treatments will begin in 2014 during the flowering periods of weed species. Because of differences in flowering times for all potential species, two visits may be required during the growing season. If timing is such that all the target species are detectable/treatable in one visit, the actual costs would be lower than displayed below. Completion of surveys in dozer lines, roads, staging areas, safety zones, and known invasive and sensitive plant populations would be the first priority. The second survey priorities would be along handlines and drop points. The area needing assessments was calculated at over 1,200 acres.

Mastication (mulch)

To reduce topsoil loss and protect soil productivity mastication is recommended to use on site dead medium sized plantation trees to produce mulch. Masticate approximately 900 acres with low pressure masticators using medium plantation sized trees on slopes less than 40% slopes on highly productive soils. This will reduce erosion on highly productive soils in selected areas. Mulching with wood chips at a rate of 1 tons/acre will reduce erosion from average anticipated rate (2-year storm) of 3.79 to 0.42 tons/acre which is an 82% decrease in erosion (WEPP-ERMiT see Appendix B). Cost per acre is estimated at $550 so for 600 acres the total cost is $330,000 (for detailed cost breakdowns see Appendix E). Mulch is an effective treatment for controlling erosion and reducing runoff (Robichaud, et al, 2010, Napper, 2006). This treatment is effective for reducing loss of soil productivity and hydrologic function and would also provide some reduce in peak flows that threaten downstream stream infrastructure.

Channel Treatments:

Bear Gully

Stabilize and improve existing headcut treatment and stabilize two additional secondary headcuts in incised gully to prevent upstream migration of existing gully. Remove burned logs used in original treatment, slope back the headcuts to bring closer to existing grade and reduce hydraulic drop and install geo-textile filter cloth underlayment and add large rock rip rap and logs to stabilize headcuts. Up to 1-5 hazard trees may need to be removed from work site for worker safety. An experienced watershed specialist is needed to guide design and implementation of the treatment.

Roads:

A. Treatment(s) will vary from culvert cleaning and culvert removal to replacement or up-sizing of drainage structures. In some locations, minor to intermediate road reconstruction is recommended. There is no anticipated need for relocation of roads or major reconstruction efforts. Specific treatment details for each road appropriate monitoring for specific roads is noted in Appendixes in the roads report.
B. To stabilize the transportation system roads and prevent further damage resulting from:
   1. Erosion and other effects of storm water runoff as a result of fire damage on adjacent lands.
   2. Traffic on the roads.

Emergency Determination - All roads with a Risk Assessment of Intermediate, High, or Very High are considered to have a significant hazard risk from falling trees. It is expected that this risk will remain for several years or until the trees are specifically removed through a Hazard Trees Timber Sale or other program. Imminent hazards to the roads system vary from minor sloughing and culvert blockage to partial or total loss of road template. Specific assessment details for each road are noted in Appendix 1of the roads report.

IV. Discussion/Summary/Recommendations.
The base upon which the roads are built varies from bed rock to decomposed granite (DG) and alluvial deposits.

The weathered granitic rock (DG), which underlies much of the road system north of the Tuolumne River, is highly susceptible to water erosion. Lack of maintenance on many of the roads has resulted in significant surface and template degradation in numerous locations. Although it is recognized that BAER is not intended to correct past maintenance deficiencies, the drastically changed conditions resulting from wildfire impose an urgency for correction on some of those situations to avoid partial or complete loss of the road template. The work proposed herein is intended to stabilize the identified roads and structures in preparation for the anticipated increase in erosion from storm water runoff. Additional, several work elements involve public safety hazards.

Treatment	Qty.	Estimated Cost	Justification
Restore drainage, Paved (MI)	68.9	REDACT	Protecting the significant investment in the primary transportation system routes. Maintain critical administrative and public access.
Restore drainage, Native (MI)	251.1	REDACT	Protecting the investment in principle and secondary routes. Maintain important and/or critical administrative and public access.
New or reconstructed Rolling Dip (EA)	400	REDACT	Minimize damage to the road surface and template by diverting storm water run-off flow off the road.
Armored Dip (EA)	7	REDACT	Minimize damage to the road surface and template by hardening road surface and diverting water off the road at intermittent channels. Minimizes fill-slope deterioration.
Armored Crossing (EA)	30	REDACT	To minimize or prevent the loss of road surface and template due to erosion of cross drains.
Water Bars	54	REDACT	To stabilize and protect the road surface and template from damage from over-winter erosion.
Rip Rap (CY)	1,885	REDACT	Protects upstream fill slopes and dissipates energy to minimize erosion and help prevent head cut on fill slopes.
Riser (Drop Inlet) (EA)	58	REDACT	Prevents culvert inlet obstruction in basin situations.
Flared End Section, Inlet (EA)	96	REDACT	Improves hydraulic capacity and enhances free debris passage capability of existing culverts. Reduces the probability of the culvert plugging.
Culvert Replacement(EA) (Upsizing)	10	REDACT	Increases the capacity of the drainage structure to handle the expected increase flows from the burned area. Decreases the probability of road failure.
Debris Rack (EA)[3]	5	REDACT	Prevents burned area debris from plugging culverts which could cause road failure.
Guardrail with posts (LF)	24	REDACT	Restore public safety due to guardrail damage caused from fire.
Guardrail Post 8x8 (EA)	21	REDACT	Restore public safety due to guardrail post damage caused from fire. Burnt-out guardrail posts. Guardrail undamaged

Striping (MI)	1.0	REDACT	Restore public safety due to striping loss by fire.
Drop Inlet Cover (EA)	15	REDACT	Prevents culvert inlet obstruction in basin situations.
Reflectors (EA)	200	REDACT	Maintain public safety. Replace roadway delineators damaged or destroyed by fire.
Over side Drain (EA)	21	REDACT	Protection of fill slopes on outside of road form expected increase in run-off
Storm Inspection-Response (MI)	159.4	REDACT	Maintain transportation system integrity and protect public safety.

Trail Treatments:

1. Temporary closures at Campgrounds, Day Use Areas, Dispersed Camping and Concentrated Use Areas, Non-motorized and Motorized Trails
2. Storm-proofing ten miles of high priority trails
3. Replacement of burned stabilizing staircases, with native material on the Tuolumne River Canyon Trail.
4. Patrol affected areas and maintain implemented treatments
5. Replacement of burned traffic control barriers with rock

Protection/Safety Treatments:

1. *Treat imminent hazards trees on roads, trails and recreation sites that will be open to the public or will be accessed by workers implementing emergency treatments.*
2. *Install 'burned watershed' warning signs along roads at points of entry (12 signs). Install rock fall and debris flow warning signs at identified high risk sites (24 signs)* (plus 43 additional for Interim #1).
3. Install 92 warning signs at recreation sites and on trails.
4. *Install 10 gates and several barricades on roads to prevent access to unsafe areas.*
5. *Install route markers at road intersections to protect users.*
6. *Install sealed cap on 2 vault toilets to protect water quality and protect public safety.*
7. *Install 1000 feet of erosion control materials at hazards material sites to prevent impacts to public safety and water quality.*
8. Install geotextile filter cloth underlayment over dump deposits along stream channel and apply class 3 rock rip rap deflector wall over cloth. Wall to be built will be approximately 2-3 feet tall by 30 feet in length.
9. Fencing will be installed around the perimeter of an exposed open mine shaft. Fencing will consist of barb wire and t-posts preventing accidental access and detering the public from entering the hazard. Two signs will also be installed informing the public of the safety hazard

Cultural Resource Treatments:

1. Removal of hazard trees at seven sites.
2. Install 2,860 feet of rock barriers to replace burned barriers that was protecting a site from recreation user damage.
3. Install weed free hay bales to control erosion at 21 sites.
4. Install two gates on Forest Road REDACT.
5. Install boulders to close user created road of REDACT.
6. Install 400 feet of rock barriers along REDACT.
7. Close portions of REDACT by Closure Order.

I. Monitoring Narrative:

Monitoring of the roads, either under current condition or after mitigation work, needs to be accomplished to document and appraise any adverse effects on adjacent lands and watersheds.

Monitoring is needed to evaluate the effectiveness of the masticating and aireal straw treatments. Mulch effectiveness monitoring will evaluate how well the mulch treatments meet objectives of reducing erosion and effecting sedimentation to streams.

PART VI – EMERGENCY STABILIZATION TREATMENTS AND SOURCE OF FUNDS - INTERIM # 1

Green Highlighted cells are from the Initial 2500-8

			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											
Invasive Weed detection survey	ACRE	REDACT	1200	REDACT	$0			$0		$0	REDACT
Mastication	ACRE	REDACT	900	REDACT	$0			$0		$0	REDACT
					$0			$0		$0	$0
Heritage site protection - lebs and mulch	EA	REDACT	26	REDACT	$0			$0		$0	REDACT
Heritage site protection - Rock Barriers	FT	REDACT	3280	REDACT	$0			$0		$0	REDACT
Heritage site protection - Gates	EA	REDACT	3	REDACT	$0			$0		$0	REDACT
Haz Mat - Burned treated wood waste	LS	REDACT	1	REDACT	$0			$0		$0	REDACT
REDACT Hazmat - Heritage Site Protection	LS	REDACT	1	REDACT	$0			$0		$0	REDACT
				$0	$0			$0		$0	$0
Insert new items above this line!				$0	$0			$0		$0	$0
Subtotal Land Treatments				$895,064	$0			$0		$0	$895,064
B. Channel Treatments											
Bear Gully Headcut Stabilization	LS	REDACT	1	REDACT	$0			$0		$0	REDACT
				$0	$0			$0		$0	$0
Insert new items above this line!				$0	$0			$0		$0	$0
Subtotal Channel Treat.				$5,562	$0			$0		$0	$5,562
C. Road and Trails											
Out-slope Road.	MI	REDACT	23	REDACT	$0			$0		$0	REDACT
Construct dips	EA	REDACT	19	REDACT	$0			$0		$0	REDACT
Construct water	EA	REDACT	42	REDACT	$0			$0		$0	REDACT

bars											
Culvert Inlets (18-24")	EA	REDACT	12	REDACT	$0			$0		$0	REDACT
Culvert Inlets (30-36")	EA	REDACT	6	REDACT	$0			$0		$0	REDACT
Trail Stabilization	MI	REDACT	10	REDACT	$0			$0		$0	REDACT
Rec site traffic control barriers - rock	FT	REDACT	900	REDACT	$0			$0		$0	REDACT
Rec site traffic control barriers - wooden rail	EA	REDACT	100	REDACT	$0			$0		$0	REDACT
Replace trail stabilizers	EA	REDACT	64	REDACT	$0			$0		$0	REDACT
Storm patrol - Trails	LS	REDACT	1	REDACT	$0			$0		$0	REDACT
Restore drainage (paved)	MI	REDACT	68.9	REDACT	$0			$0		$0	REDACT
Restore drainage (native)	MI	REDACT	251.1	REDACT	$0			$0		$0	REDACT
Rolling Dips	EA	REDACT	400	REDACT	$0			$0		$0	REDACT
Armored Dips	EA	REDACT	7	REDACT	$0			$0		$0	REDACT
Amored Crossing	EA	REDACT	30	REDACT	$0			$0		$0	REDACT
Water Bars	EA	REDACT	54	REDACT	$0			$0		$0	REDACT
Rip Rap	CY	REDACT	1885	REDACT	$0			$0		$0	REDACT
Drop Inlet	EA	REDACT	58	REDACT	$0			$0		$0	REDACT
Flared end section	EA	REDACT	96	REDACT	$0			$0		$0	REDACT
Culvert upsizing	EA	REDACT	10	REDACT	$0			$0		$0	REDACT
Debris Rack	EA	REDACT	5	REDACT	$0			$0		$0	REDACT
Guardrail with posts	LF	REDACT	24	REDACT	$0			$0		$0	REDACT
Guardrail Posts	EA	REDACT	21	REDACT	$0			$0		$0	REDACT
Drop inlet cover	EA	REDACT	15	REDACT	$0			$0		$0	REDACT
Reflectors	EA	REDACT	200	REDACT	$0			$0		$0	REDACT
Over side drain	EA	REDACT	21	REDACT	$0			$0		$0	REDACT
Storm patrol - Roads	MI	REDACT	159.4	REDACT	$0			$0		$0	REDACT
				$0	$0			$0		$0	$0
Insert new items above this line!				$0	$0			$0		$0	$0
Subtotal Road & Trails				$3,294,525	$0			$0		$0	$3,294,525
D. Protection/Safety											
Hazard Tree Removal	Day	REDACT	30	REDACT	$0			$0		$0	REDACT
Hazard Tree Removal	Day	REDACT	110	REDACT	$0			$0		$0	REDACT
Route Markers	EA	REDACT	250	REDACT	$0			$0		$0	REDACT
Warning and Regulatory signs	EA	REDACT	30	REDACT	$0			$0		$0	REDACT
Burned Watershed Signs	EA	REDACT	12	REDACT	$0			$0		$0	REDACT
Barricades	EA	REDACT	100	REDACT	$0			$0		$0	REDACT
Gates	EA	REDACT	10	REDACT	$0			$0		$0	REDACT

Debris Flow and Rock Fall Hazard signs	EA	REDACT	24	REDACT	$0			$0		$0	REDACT
Rock Fall Hazard signs	EA	REDACT	43	REDACT	$0			$0		$0	REDACT
Vault toilet sealing	EA	REDACT	2	REDACT	$0			$0		$0	REDACT
Hazardous material erosion control	FT	REDACT	1000	REDACT	$0			$0		$0	REDACT
Rec. Site Closure	EA	REDACT	35	REDACT	$0			$0		$0	REDACT
Rec. sites and trails warning signs	EA	REDACT	92	REDACT	$0			$0		$0	REDACT
Mine shaft fencing and signs	LS	REDACT	1	REDACT	$0			$0		$0	REDACT
				$0	$0			$0		$0	$0
Implementation Team Leader	Day	REDACT	40	REDACT	$0			$0		$0	REDACT
Implementation Team	Day	REDACT	200	REDACT	$0			$0		$0	REDACT
Interagency Coordination	Day	REDACT	60	REDACT	$0			$0		$0	REDACT
Insert new items above this line!				$0	$0			$0		$0	$0
Subtotal Structures				$482,000	$0			$0		$0	$482,000
E. BAER Evaluation											
				REDACT				$0		$0	
Insert new items above this line!				---	$0			$0		$0	$0
Subtotal Evaluation					$0			$0		$0	$0
F. Monitoring											
Mulch effectivemess	LS	$10,000	1	$10,000	$0			$0		$0	$10,000
Insert new items above this line!				$0	$0			$0		$0	$0
Subtotal Monitoring				$10,000	$0			$0		$0	$10,000
G. Totals				$4,687,151	$0			**$0**		**$0**	**$4,687,151**
Previously approved				$362,480							
Total for this request				**$4,324,671**							

PART VII - APPROVALS

1. /s/ Susan Skalski — 9/25/2013
   Forest Supervisor (signature) — Date

2. _____ — _____
   Regional Forester (signature) — Date