

Date of Report: December 18, 2002

BURNED-AREA REPORT
(Reference FSH 2509.13)

PART I - TYPE OF REQUEST

A. Type of Report

- ☐ 1. Funding request for estimated WFSU-SULT funds
- ☒ 2. Accomplishment Report
- ☐ 3. No Treatment Recommendation

B. Type of Action

- ☐ 1. Initial Request (Best estimate of funds needed to complete eligible rehabilitation 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)
FY02 Monitoring Report

PART II - BURNED-AREA DESCRIPTION

- A. Fire Name: Blue Fire
- B. Fire Number: CA-MDF-621
- C. State: California
- D. County: Modoc, Lassen
- E. Region: 5
- F. Forest: Modoc NF
- G. District: Warner Mountain
- H. Date Fire Started: August 8/9
- I. Date Fire Contained: August 21, 2001
- J. Suppression Cost: as of 27 August 01 - \$15,500,000
- K. Fire Suppression Damages Repaired with Suppression Funds
 - 1. Fireline waterbarred/covered with native materials (miles): 50 miles
 - 2. Fireline seeded (miles): 0
 - 3. Other:
 - a) Safety Zones and Drop Points: 20 acres
 - b) Meadows: 1 acre
 - c) Archeological Sites: 10 acres
 - d) Roads: 116 miles
 - e) Trails: 3 miles
 - f) Drainages (reshaping): 1 mile

L. Watershed Number: 1802000201 and 1802000202

M. Total Acres Burned: 34,140
NFS Acres(32,493) BLM (925) Private (722)

N. Vegetation Types: Ponderosa Pine, White Fir, Mountain Mahogany, Sagebrush, Aspen

O. Dominant Soils: Lithic Haploxerolls, Lithic Cryoborolls, Pachic Cryoborolls, Pachic Udic Agrixerolls, and Typic Argixerolls

P. Geologic Types: Pyroclastic andesites overlain by Warner Mountain basaltic flows or alluvium from this material

Q. Miles of Stream Channels by Order or Class: 52 miles of perennial, 85 miles of intermittent, and 160 miles of ephemeral streams

R. Transportation System

Trails: 8 miles Roads: 116 miles

PART III - WATERSHED CONDITION

A. Burn Severity (acres): 17,843 (low) 8,806 (moderate) 7,491 (high)

B. Water-Repellent Soil (acres): 11,350

C. Soil Erosion Hazard Rating (acres):
19,242 (low) 7,382 (moderate) 7,185 (high)

D. Erosion Potential: 11.8 tons/acre

E. Sediment Potential: 719 cubic yards / square mile

PART IV - HYDROLOGIC DESIGN FACTORS

A. Estimated Vegetative Recovery Period, (years): 10

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

C. Equivalent Design Recurrence Interval, (years): 10 year

D. Design Storm Duration, (hours): 24 hour

E. Design Storm Magnitude, (inches): 2.2

F. Design Flow, (cubic feet / second/ square mile): 16.0

G. Estimated Reduction in Infiltration, (percent): 45% *

H. Adjusted Design Flow, (cfs per square mile): 23.0 **

* This is an arid environment with most of the precipitation coming in as snowfall, which is absorbed into the soil and volcanic bedrock.

** Channel forming flows occur as a result rain or snow event.

PART V - SUMMARY OF ANALYSIS

A. Describe Watershed Emergency:

Overview : The Blue Complex included three separate fires ignited during a dry lightning storm occurring on August 8 and 9, 2001. This complex included: the Canyon Fire, the Shields Fire, and the Blue Fire. The Canyon Fire, located approximately two miles west of Cedarville, was controlled at 210 acres. The Shields Fire, located in the South Warner Wilderness, was controlled at 160 acres. The Blue Fire, the largest fire in the Blue Complex, was controlled at 34,140 acres. Because of relatively small size, patchy fuels, and general location, the Canyon and Shields fires do not require rehabilitation. Only the Blue Fire rehabilitation requirements will be considered in this assessment.

Conditions within the Blue Fire assessment area were clearly ripe for catastrophic wildfire. Precipitation was an estimated 30% of "normal". High fuel levels existed in the assessment area as a result of insect-related tree mortality, especially in the East Creek drainage in the South Warner Wilderness area. After lightning-caused ignition, Blue Fire behavior was extreme. Winds of up to 40 miles per hour and relative humidities as low as 3% were recorded. Watersheds severely impacted by the fire include: Upper, Middle and West Parnip, Harvey Creek, Coyote Face, Upper and Lower East Creek, and a small portion of Mill Creek. Portions of Upper and Lower East Creek are located in the South Warner Wilderness.

Statement of Emergency: Burn conditions led to devastating results across the landscape. Coniferous vegetation and soil organic matter was completely consumed on approximately 50% of the burned area. Heat generated from the fire was so extreme that soil structure was destroyed to a depth of 4 inches; ash accumulations up to 6 inches deep are common. Soil hydrophobicity exists in 50% to 70% of soils on at least half of the fire-affected area. The increase in overland runoff due to loss of vegetation, loss of groundcover, and increased hydrophobicity is predicted to **double** peak flow magnitudes. Soil losses of up to 74 tons of soil/acre/year are anticipated, which is a rate approximately 35 times higher than soil-loss tolerance levels.

Without management action, 390,000 tons of sediment will be eroded from hillslopes as a result of the fire. Increased overland flow will transport 88,000 tons of this material to stream channels, where peak flows that have doubled will rapidly transport it downstream. Watershed impacts of this magnitude seriously threaten life, property, loss of control of water, water quality, long-term soil productivity, and aquatic and terrestrial habitats.

- The residents and structures (e.g. domestic water sources) located near the mouths of both East and Harvey Creeks are at risk. Catastrophic flooding or debris flows could destroy homes and take the lives of occupants.
- The water quality of the entire burned area is threatened. Specifically, sixty percent of the slopes surrounding Blue Lake burned at high to moderate severity. Soil and ash movement downslope is expected to severely impact the water quality and clarity of Blue Lake. The decreased water quality will in turn kill fish, severely impact local community revenues, and cause a "take" situation for the bald eagle habitat.
- Fish habitat will be destroyed throughout the burned area. The increased nutrient levels will result in a vegetative bloom that could be severe enough to alter the dissolved oxygen level in the lake water. Sedimentation could significantly reduce lake level and instream pool depths, which would lead to increased water temperature. Increases in turbidity, temperature, and oxygen levels will cause the death of trout (including Goose Lake redband) and other aquatic organisms.
- Soil productivity is severely threatened in areas that burned at high and moderate severity. This loss may result in significant reduction of "productive" conifer growth, or even in loss of site carrying capacity for vegetation. Substantial reduction in site quality threatens to reduce the capacity to provide desired stand growth and characteristics, which will add several decades to a century of time necessary to develop these characteristics. Loss of soils will severely hinder basic ecosystem integrity including habitat for plants, wildlife, and fish habitats.
- Roads will be lost or damaged due to increased channel flows, which are expected to double. Culvert capacities are expected to be exceeded. Roads are also threatened by erosion both upslope (accumulation of material on road surface) and downslope (undermining) of the road. Both situations lead to increased stream sedimentation, loss of spawning habitat in the impacted channels, degraded water quality, and inhibit access for rehabilitation crews, recreationists, and special use permittees. Loss of control of water and increased sediment delivery may heighten the potential for debris flows, which would result in damage and/or loss of roads and impact aquatic habitat.

- Visitors health and safety is severely threatened. Blue Lake facilities (campground, picnic area, boat ramp, and National Recreation Trail) in addition to trails within the South Warner Wilderness provide some of the most popular recreational opportunities on the Modoc National Forest. There is an increased threat to the lives of visitors from falling snags and other post-fire hazards.

B. Emergency Treatment Objectives:

The objectives of Burned Area Emergency Rehabilitation are to protect human life and property, reduce impacts to water quality, minimize sedimentation, and protect soil productivity, and aquatic and terrestrial habitats. The recommended treatments were designed to mitigate the following threats identified by the BAER Team.

1. **Threats to Human Life:** The lives of occupants of structures located near the mouths of both East Creek and Harvey Creek are at risk from catastrophic flooding or debris flows. At East Creek, a small cabin overhangs the creek without structural support and rapid bank erosion during a flood or debris flow could completely undermine the structure. Another cabin is set back from the creek and occupants are at lower risk, although the deck would likely be lost in the event of a flood or debris flow. The bridge at this location is at high risk of washout, which would threaten the life of persons attempting to cross it. At Harvey Creek, a series of man-made ponds sit above a residence. During a catastrophic flood or debris torrent, rapid overtopping or failure of the earthen dams could destroy the home and take the lives of occupants. Increased sediment loads in Harvey Creek will deposit in the upstream pond, reducing its storage capacity and increasing the risk of overtopping the dam.

There is also a threat to life of those entering the burn area. Without adequate notification, visitors to the burn area are at increased risk to health and safety from falling snags and other post-fire hazards.

2. **Threats to Property:** Roads, homes, and the bridge are at risk. Increases in water levels, due to aggradation of channel bottoms in response to increased hillslope erosion, could result in more frequent flooding of structures and facilities, because of a new high water mark. The upper pond at Harvey Creek, a domestic water source, is threatened with sedimentation and loss of storage capacity due to increased erosion on burned hillslopes.
3. **Loss of Control of Water:** There is a threat of loss of control of water, especially in watersheds containing large areas of high burn severity. These watersheds will likely see a doubling of peak flows as a result of the loss of vegetation and groundcover in addition to the creation of hydrophobic conditions in the soil. As water volume and rate of delivery to channels increases (due to decreased soil infiltration and increased overland flow), flows will peak higher and more quickly than under pre-fire conditions. Increased peak flows increase the likelihood of incision (downcutting) or bank erosion. Increased erosion will result in more material being carried downstream to depositional areas (i.e. the pond on Harvey Creek, the stream reach near the cabins on East Creek, etc.), exacerbating sedimentation problems in those areas. Fish could be killed during high peak flows, and habitat may also be affected as explained in the Threats to Aquatic and Terrestrial Habitat section.

Roads will be lost or damaged due to increases in channel flow. Flows are expected to double as a result of post-fire hillslope conditions. Culvert capacities are expected to be exceeded. Backed up water at culvert inlets can result in flow over the road (with potential for gullyng) or piping around the culvert (potentially eroding fill and undermining the culvert). Both situations lead to increased stream sedimentation, loss of spawning habitat in the impacted channel, and degraded water quality.

Roads in and adjacent to high severity burn areas are threatened by erosion both upslope (accumulation of material on road surface) and downslope (undermining) of the road. Damaged roads could disrupt rehabilitation crews, recreationists, and special use permittees.

Loss of control of water and increased sediment delivery may heighten the potential for debris flows. BAER Team hydrologists estimate that the threat of debris flows is moderate.

4. **Threats to Water Quality:** The severe threat of increased turbidity, sedimentation, nutrient loading, and water temperature exist throughout the burned area, especially in channels draining high and moderate burn severity areas. The loss of vegetation and groundcover, and increased hydrophobicity, result in increases in overland flow and soil erosion. Increased runoff and sediment supply to channels provides rapid connectivity of upper slope areas to the channel network, delivering sediments much more rapidly than under pre-fire conditions. The nutrients contained in the ash and soil delivered to streams are expected to disrupt the nutrient balance and result in algal blooms, which will lower dissolved oxygen levels. Loss of vegetation and filling of pools with sediment will lead to higher water temperatures.

The water quality of Blue Lake is also threatened. Sixty percent of the slopes surrounding Blue Lake (the Upper Parsnip watershed) burned at high to moderate severity. Soil hydrophobicity exists in a mosaic throughout the watershed. Ash accumulations up to 6 inches deep are common. There is little material for needle cast, and almost 100% of remaining seeds are not viable. Soil and ash movement downslope, into channels and into Blue Lake, is expected. The impacts to the water quality and clarity of Blue Lake may be severe. Clays derived from the volcanic soils may remain in suspension for long periods, resulting in turbid conditions. Sedimentation could significantly reduce lake depth and lead to increased water temperature. The increased nutrient levels will support a vegetative bloom that could be severe enough to alter the dissolved oxygen level in the lake water. Redband trout and other aquatic organisms are sensitive to turbidity, temperature and oxygen levels (see Threats to Aquatic and Terrestrial Habitat, below).

The burned area drains into the South Fork of the Pit River, which has beneficial uses including irrigation, recreation, and aquatic habitat identified as far downstream as the San Francisco Delta and Bay. Water quality problems at these downstream sites are the culmination of upstream conditions, and are often treatable only in smaller upstream settings like the burn area.

5. **Threats to Long Term Soil Productivity:** Soil productivity is severely threatened in areas that burned at high and moderate severity. A total of 16,297 acres burned at high or moderate severity and are now threatened with loss of soil productivity. Loss of site productivity can be closely correlated to soil loss. BAER Team soil scientists calculated estimated soil losses across the burned area with the Universal Soil Loss Equation. Soil Loss can be compared to Soil Tolerance, an estimate of the amount of soil loss that can be incurred without substantially affecting soil productivity, as rated in the Soil Survey.

Table 1. Soils

Estimated Soil Loss Range (tons/acre/year)	Soil Tolerance Range (tons/acre/year)
4.8 – 74	1 - 3

In most cases, the expected soil loss in high severity burn areas is substantially higher than Soil Tolerance. This may result in significant reduction of “productive” conifer growth, or even in loss of site carrying capacity for vegetation.

Under the Sierra Nevada Forest Plan Amendment, approximately 2/3 of the non-wilderness fire-affected area is designated for “Old Forest Emphasis” and 1/3 of the non-wilderness fire-affected area is designated for “General Forest”. Substantial reduction in site quality threatens to reduce the capacity to provide desired stand growth and characteristics, and to

add between several decades to a century to the time necessary to develop these characteristics. This is a significant threat to long-term bald eagle critical habitat.

6. Threats to Aquatic and Terrestrial Habitat: Habitat for Goose Lake redband trout (a species of specific concern), bald eagle (federally listed under ESA), and four other sensitive species was impacted by the fire. The Goose Lake redband trout was reviewed by the United States Fish and Wildlife Service (USFWS), who denied a petition for listing based upon the excellent management practices and habitat condition on the Modoc National Forest at the time of the petition. The effects to the instream and adjacent upslope habitats need to be mitigated in order to retain the current status of Forest Service sensitive for this species.

Redband habitat is threatened by increased sediment delivery. In stream environments, spawning gravels may be blanketed by fine sediment. Spawning success is greatly reduced by excessive fine sediment; the fines clog the space between the gravels, cutting off the flow of oxygenated water to fish eggs and suffocating them. Excess sediment also fills pools which are important resident habitat for fish. The filling of pools results in decreasing water depth and, combined with loss of shade (loss of trees), creates warmer water temperatures. Increasing water temperature is a potentially lethal threat to fish. In Blue Lake, water temperature is also threatened by excessive sedimentation. Elevated nutrient levels and temperatures will support more lake vegetation which could alter the dissolved oxygen level enough to affect lake-dwelling organisms.

The threats to bald eagle habitat are three-fold. First, the loss of pilot trees will diminish foraging capabilities. Second, loss of soil productivity will inhibit the re-establishment of suitable nesting and foraging habitat for centuries. Finally, the Blue Lake bald eagles rely heavily on lake fish as a food source. Without treatments to save the integrity of the fishery, bald eagles may be displaced from the area at the minimum and next year's young may die depending on the timing of events.

C. Probability of Completing Treatment Prior to First Major Damage-Producing Storm:

Land 70% Channel 75% Roads 80% Other 70%

D. Probability of Treatment Success

	Years after Treatment		
	1	3	5
Land	80%	85%	90%
Channel	90%	80%	75%
Roads	95%	95%	95%
Other	80%	85%	90%

E. Cost of No-Action (Including Loss): \$4,426,500

F. Cost of Selected Alternative (Including Loss): \$2,662,222

G. Skills Represented on Burned-Area Survey Team:

<input checked="" type="checkbox"/> Hydrology	<input checked="" type="checkbox"/> Soils	<input checked="" type="checkbox"/> Geology	<input type="checkbox"/> Range	<input checked="" type="checkbox"/> Wilderness
<input checked="" type="checkbox"/> Forestry	<input checked="" type="checkbox"/> Wildlife	<input type="checkbox"/> Fire Mgmt.	<input checked="" type="checkbox"/> Engineering	<input checked="" type="checkbox"/> Trails
<input type="checkbox"/> Contracting	<input type="checkbox"/> Ecology	<input checked="" type="checkbox"/> Botany	<input checked="" type="checkbox"/> Archaeology	<input checked="" type="checkbox"/> Vegetation
<input checked="" type="checkbox"/> Fisheries	<input type="checkbox"/> Research	<input checked="" type="checkbox"/> Recreation	<input checked="" type="checkbox"/> GIS	Management

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H. Treatment Narrative: The following are proposed emergency rehabilitation treatments for the Blue Fire. The land, channel, and roads are reasonable applications of treatments that have been determined to be effective for their purpose when used under similar conditions in other wildfire areas. The final set of treatments was determined with the input from the BAER survey team, the responsible line officer, the USDA Natural Resource Conservation Service, Bureau of Land Management and Pit River Tribe Band/Head Representatives .

Part VI – Emergency Rehabilitation Treatments and Source of Funds by Land Ownership

[illegible]

1. /s/Stanley G. Sylva
 Forest Supervisor (signature)

January 27, 2003
Date
2.

Regional Forester (signature)

Date

