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Subject: FINAL BAER REPORT

Summary:

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To B.Faust
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Subject: 2520 Fork Fire BAER Final Report

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Hardcopy with Pictures to follow.

United States
Department of
Agriculture

Forest
Service

Mendocino
National
Forest

825 N. Humboldt Avenue
Willows, CA 95988
916-934-3316
TTY (916-934-7724)

File Code: 2520
Route To:

Date: January 16, 1997

Subject: Fork Fire - BAER Final Report

To: Regional Forester

The final Burned Area Report (Form FS 2500-8) for the Fork Fire is enclosed. This report reflects changes made from the initial and interim reports.

The greatest change from the initial report was the dramatic increase in rehabilitation costs. The reason for the increase was the need to implement more treatments to help meet the objective of saving life and property. A large fire implementation team was utilized to identify and layout more work than originally planned and team personnel were utilized to supervise work crews.

This report also updates resource information and explains fire treatment measures.

Photographs are enclosed with the hard copy to show the active fire, fire suppression rehabilitation methods, burned area rehabilitation treatments, and monitoring.

Total cost to implement emergency rehabilitation treatments on NFS land was about \$1,840,000. An exact amount will not be known until all salary, per diem, vehicle and material costs have been processed.

/s/ Daniel K. Chisholm
DANIEL K. CHISHOLM
Forest Supervisor

Enclosure

cc:
EC:R05H
R.Griffith:R05A
J.Dawson-BLM

BURNED-AREA REPORT
(Reference FSH 2509.13, Report FS-2500-8)

PART I - TYPE OF REQUEST

A. Type of Report

- ☐ 1. Funding request for estimated WFSU-FW22 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 and design analysis
 ☐ Status of accomplishments to-date

☒ 3. Final report - following completion of work

PART II - BURNED-AREA DESCRIPTION

A. Fire Name: FORK B. Fire Number: P53615
C. State: CALIFORNIA D. County: LAKE
E. Region: R-5 F. Forest: MENDOCINO
G. Districts: UPPER LAKE/STONYFORD
H. Date Fire Started: 8/12/96 I. Date Fire Controlled: 9/7/96
J. Suppression Cost: \$40 MILLION (\$16 MILLION USFS, \$24 MILLION CDF, OES)
K. Fire Suppression Damages Repaired with WFSU-PF12 Funds:
 1. Fireline waterbarred (miles) 109
 2. Fireline seeded (miles) 19
 3. Other (identify) _____
L. Watershed Numbers: 1802011601, 180211602 and small portions of 1801010301 and 1802011503.
M. NFS Acres Burned: 61,928 Total Acres Burned: 82,993
 Ownership type:
 (3000) State (6243) BLM (14822) PVT () _____
N. Vegetation Types: Chaparral, Knobcone, Mixed Conifer, Annual grass, Oak Savannah, Oak Woodland, Riparian vegetation
O. Dominant Soils: Maymen, Etsel
P. Geologic Types: Franciscan melange

Q. Miles of Stream Channels by Order or Class:

<u>1 = 923</u>	<u>2 = 313</u>	<u>3 = 135</u>	<u>4 = 60</u>
<u>5 = 26</u>	<u>6 = 23</u>	<u>7 = 8</u>	

R. Transportation System:

Trails: 7.5 (miles) NFS Roads: 194 (miles) County roads: 60 (miles)

PART III - WATERSHED CONDITION

A. Fire Intensity (Acres): 13055 (low) 26507 (moderate) 43431 (high)

B. Water Repellant Soil (Acres): <5%

C. Soil Erosion Hazard Rating (Acres):

8299 (low) 62245 (moderate) 12449 (high)

D. Erosion Potential: 12 tons/acre

E. Sediment Potential: 2480 cu. yds/sq. mile

PART IV - HYDROLOGIC DESIGN FACTORS

A. Estimated Vegetative Recovery Period: 4 years.

B. Design Chance of Success: 80 percent.

C. Equivalent Design Recurrence Interval: 10 years.

D. Design Storm Duration: 6 hours.

E. Design Storm Magnitude: 2.2 inches.

F. Design Flow: 65 cfs.

G. Estimated Reduction in Infiltration: 20 percent.

H. Adjusted Design Flow: 140 cfs. (adjusted for low soil water holding capacity)

PART V - SUMMARY OF ANALYSIS

A. Describe Emergency:

Subwatersheds within the Fork fire area sustained high intensity burns ranging from 1% to 72% of the area. Six subwatersheds sustained high intensity fire over 50% of the area. The Cache Creek watershed drains into the Indian Valley Reservoir and was heavily burned over with six of the nine subwatersheds more than 50% burned. Indian Valley Reservoir is an important impoundment for Yolo County irrigation water. The Middle Creek watershed drains into Clear Lake and about 40% of the watershed was burned over. Clear Lake is an important recreation lake whose water quality is adversely affected by suspended sediment which aids in algae blooms. The Spring Valley Reservoir and Wolf Creek, which provides water for a subdivision, are located in a subwatershed that was approximately 33% burned over.

There are numerous roads within the fire area. High intensity burn areas are expected to yield high amounts of water flow and debris due to steep slopes and the inability to effectively treat them.

Red legged frog (endangered species), are thought to exist in Middle and Cache Creeks as well as Rice Fork. These frogs are sensitive to sediment and ash deposits by irritation to breathing mechanisms and chemical oxygen demand of the water.

B. Emergency Treatment Objectives:

1. Protect downstream property.
2. Reduce the amount of sediment and ash entering downstream reservoirs and lakes.
3. Reduce channel down cutting.
4. Control off road vehicle use until native vegetation barriers regrow.
5. Correct suppression damage.
6. Improve and maintain road drainage to handle increased runoff and debris.

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

Land 95 % Channel 95 % Roads 75 % Other %

D. Probability of Treatment Success

	<----Years after treatment----->		
	1	3	5
Land	70	80	90
Channel	80	80	80
Roads	90	90	90
Other			

E. Cost of No-Action (Including Loss): \$5,896,000

F. Cost of Selected Alternative (Including Loss): \$3,033,000

G. Skills Represented on Burned-Area Survey Team:

<input checked="" type="checkbox"/> Hydrology	<input checked="" type="checkbox"/> Soils	<input checked="" type="checkbox"/> Geology	<input checked="" type="checkbox"/> Range
<input checked="" type="checkbox"/> Timber	<input checked="" type="checkbox"/> Wildlife	<input type="checkbox"/> Fire Mgmt.	<input checked="" type="checkbox"/> Engineering
<input type="checkbox"/> Contracting	<input type="checkbox"/> Ecology	<input checked="" type="checkbox"/> Research	<input type="checkbox"/> Archaeology
<input checked="" type="checkbox"/> Botany	<input type="checkbox"/> _____	<input type="checkbox"/> _____	<input type="checkbox"/> _____

Team Leader: Bob Faust

Phone: (916) 934-3316 DG Address: B.Faust:R05F08A

**PART VI- EMERGENCY REHABILITATION TREATMENTS AND
SOURCE OF FUNDS BY LAND OWNERSHIP**

			NFS Lands		Other Lands			All	
Line Items	Units	Unit Cost \$	Number of Units	EFFS-FW22 \$	Unit Cost \$	Number of Units	Fed \$ BLM/NRCS	NonFed \$ ident	Total \$
A. LAND TREATMENTS (BLM)									
Mulching	acres	1270	265	336550	999	4	3996		340546
Aerial seeding	acres	51.43	5600	288008	60	455	27300		315308
Contour falling	acres	870	262	227940	120	25	3000		230940
SUBTOTAL				852498			34282		886794
B. CHANNEL TREATMENTS (BLM)									
Log check dams	each	83	29	2407					
Straw wattle check dams	each	72	1217	87624	165	23	3795		91419
Straw bale check dams	each	228	1058	241224	427	12	5124		246348
Misc Structure	each	62	131	8122					8122
Bnk/Trail mulc	acre	350	8.24	2884					2884
SUBTOTAL				342261			8919		348773
C. ROADS AND TRAILS									
Road drainage improvement	mi.	2416	120	332414					332414
Storm patrol	days	1500	20	30000					30000
SUBTOTAL				362414					362414
D. STRUCTURES									
SUBTOTAL									
E. BAER EVALUATION/ ADMINISTRATIVE SUPPORT									
BAER TEAM (PERSONEL)	EACH	12000	17	204000					204000
LOGISTICS (HELO/VEH)				28000					28000
R5 EC Burn Intensity Remote Sensing				50000					50000
SUBTOTAL				282000					282000
F. TOTALS				\$1839173			43201		1879981

PART VII - APPROVALS

1. _____
 Forest Supervisor (Signature)

1/16/97
 Date
2. _____
 Regional Forester (Signature)

 Date

CHANGES FROM INITIAL PLANNING TO TREATMENT IMPLEMENTATION
by Implementation Team Leader

INTRODUCTION

The Fork fire started on August 12, 1996 and burned a total of 82,993 acres. The fire burned for 11 days and was contained on August 23, 1996. The fire area encompasses land managed by the U.S. Forest Service on the Upper Lake and Stonyford Districts of the Mendocino National Forest, the Bureau of Land Management, and privately owned parcels. Burned Area Emergency Rehabilitation reports were submitted and approved for a total expenditure of \$1,987,422. This report presents an overview of BAER project implementation and compares planned BAER work to accomplished work. A final report, including a final accounting of costs, will be submitted by January 16, 1997.

PROJECT PLANNING AND INVENTORY

Field reconnaissance by the BAER implementation team indicated that the initial funding request for implementation of the Fork Fire Burned Area Emergency Rehabilitation project was inadequate to effectively treat the burned area. The implementation team prioritized treatment areas in each watershed basin by overlaying existing data consisting of: high burn intensity, vegetation type, soil erodibility, and mass wasting. The team inventoried each watershed by priority for the prescribed treatments that were outlined in the initial request. This inventory included: field verification of the plan, identification of locations for treatment work, and specific prescriptions for each treatment.

PROJECT IMPLEMENTATION

The Burned Area Emergency Rehabilitation project work was begun on October 15, 1996 and completed on November 16, 1996. The BAER implementation team provided training and technical support for all work. California Conservation Corps and Forest Service hired Organized Crews provided the workforce in the field.

The implementation of the Burned Area Emergency Rehabilitation plans encompassed various changes to the originally planned work based upon the actual burned area conditions as inventoried by the implementation team. A comparison of planned work outlined in the initial Fork Fire Burned-Area report (FS-2500-8) versus implemented work is presented in Table 1.

TABLE 1. COMPARISION OF PLANNED (INTERIM #2) VS IMPLEMENTED WORK ON NFS LAND.

Activity	Interim #2 Request	Implemented Cost
1. Mulching	\$419,250	\$336,550
2. Aerial seeding	\$288,008	\$288,008
3. Contour falling	\$293,700	\$227,940
4. Log check dams	\$ 40,000	\$ 10,529
5. Straw wattle check dams	\$ 89,999	\$ 87,624
6. Straw bale check dams	\$206,550	\$241,224
7. Road drainage improvement	\$332,414	\$332,414
8. Storm patrol	\$ 30,000	\$ 30,000
9. BAER team (personnel)	\$204,000	\$204,000
10. Logistics (heliocopter/ vehicles)	\$ 28,000	\$ 28,000
11. R5 Burn intensity remote sensing	\$ 50,000	\$ 50,000
TOTAL	\$1,987,422	\$1,839,173

DISCUSSION OF PLANNED VERSUS IMPLEMENTED WORK

The actual number of units implemented for each treatment was slightly increased or decreased in each watershed depending on the field verification of the planned work. Because all treatments were confined to slopes no greater than 40 percent, the work was implemented in the upper watershed areas only. Road accessibility was a major factor in prioritizing areas for project work. Several planned work units would require up to two hours of driving time one way each day. The beginning of the project work had been delayed, and the possibility of storms threatened to prematurely end the project.

Additional areas were located where straw bale check dams could be effectively used to trap, store, and gradually release suspended sediment. The use of log check dams was decreased drastically because most of the drainages were not located in timbered areas. Straw wattle check dams were increased slightly in the upper watershed areas where wattles could be placed in non defined swale areas to slow down anticipated overland flows. Additional miscellaneous structures were built as prescribed by the implementation team.

Additional mulching and contour falling units were identified because field verification identified further areas that had potential for surface runoff. Several mulching and contour falling units were not implemented because of inadequate road access. Also, it was felt that work production in some identified units would be inordinately slow because they were located in areas with steep slopes, excessive numbers of burned brush stubs, and often, insufficient timber.

Treatment costs were higher because the costs of logistical support for the field crews were higher than anticipated. Also, all crews had up to a two hour driving average to the field to start work.

Middle Creek

White Rock, Decy, Sky Rock

The Middle Creek watershed, containing 13 subwatersheds, was the top priority for implementation because of the downstream values at risk, including Clear Lake. The White Rock, Decy, and Sky Rock (headwaters of Middle Creek) subwatersheds were heavily implemented with all planned treatments which included aerial seeding, mulching, contour falling, and channel structures. Work in the remaining nine watersheds was completed in order of priority as outlined in the BAER plan.

Rice Fork

French Ridge

The Rice Fork watershed, containing 11 subwatersheds, was the second priority for implementation. Rice Fork Creek drains into Lake Pillsbury, a recreational area and local water source. Treatments included: aerial seeding, contour falling, mulching, and channel structures. The treatments were not as concentrated as in Middle Creek because of lack of high burn intensity throughout the watershed.

Cache Creek - Spanish Ridge
Spanish Ridge, wolf/Long creek

The Cache Creek watershed was the last priority for implementation and the largest of the watersheds. It consists of 28 subwatersheds and drains into Indian Valley Reservoir. Because of the size of the watershed, only high priority areas were chosen for work. These were the Alder Spring Ridge and Spanish Ridge areas. Both have concentrations of aerial seeding, contour falling, mulching and channel structures. The remaining work was spread out in a few of the other subwatersheds. Wolf and Long Creek are two subwatersheds that had been chosen by the BAER planning team as having high priorities for treatment. Both subwatersheds were extensively aerial seeded but did not have road access to the fire area and were subsequently dropped from consideration for further inventory or treatment.

MONITORING

On November 17, the first damaging storm hit the Fork Fire area. Approximately two inches of rain fell during the week. The BAER team monitored the upper Middle Fork watershed area for effectiveness of the various treatments. Photos were taken and documented in the photo point monitoring books.

In open areas where no treatments were prescribed, and especially in the areas of high intensity burn, surface sheet erosion, water runoff, rilling, and channel cutting on the slopes were extreme. Soil directly under the ash and hydrophobic layer was dry. In the mulched units the runoff was minimized by the absorbing and protective layer of straw. Log erosion barriers, where placed correctly, were trapping sediment. It was noted that water would run down the log and concentrate at the end resulting in downhill rilling. Straw wattle structures worked extremely well at slowing down runoff and collecting sediment. An estimated 80 percent of the installed straw wattle structures survived the impact of the storm. Those that did not, initially held water and sediment, but when water finally spilled over the top, the pressure forced the water between the wattle and the soil. Minimal repairs were needed to seal the structures. Straw bale check dams experienced the same problem but had a 90 percent survival rate. Structures located below a recently logged area of private property are now completely full of sediment. Structures in other areas are storing sediment at a range of 75 to 100 percent of their capacities.

Photo point monitoring was completed as part of the BAER implementation project. All photo point documentation books have been given to the District. It is recommended that photo points be taken in early spring to document the effectiveness of the prescribed and implemented treatments.

Annetta Mankins
BAER Implementation Team Leader

FORK FIRE UPDATES
by Fire Rehabilitation Team Leader

I. CHANGES FROM INITIAL REPORT

A. Description of the Incident

1. Downstream values

Spring Valley reservoir became more of a concern as it is used for domestic water for the Spring Valley subdivision. Rains in November and December created high sediment laden water which drastically affected the Spring Valley water intake pipes. Unfortunately, due to steep terrain and lack of access in the high intensity burn area only aerial grass seeding could be done.

2. Research Natural Area

Waterbarring and mulching of firelines occurred within the Hale Ridge RNA. The steep bottom part of the fireline was covered with geo-jute to prevent gully erosion. The lower half of the fireline was accidentally seeded with native grass when the helicopter pilot lost radio communications with the on-the-ground observer.

3. Transportation System

Two bridges damaged by fire on the Cache Creek county road were replaced by the county.

The USFS added end sections to culverts and installed energy dissipators to improve the efficiency of the culverts to pass increased flows and debris in high intensity burn watersheds. Roads were reshaped and outsloped to avoid concentrated flows on already unstable soils within the burn. Flood patrol is being conducted and equipment used to clean out culverts and remove floatable debris which were blocking culverts.

4. Wildlife, Riparian, and Aquatic Resource Values

Within the fire area, five known northern spotted owl nest sites were burned or severely damaged. A portion of Late Successional Reserve (LSR) RC313 was burned including one spotted owl activity center, as well as four unmapped LSRs. Cache Creek and Middle Creek contain habitat for California red legged frog (Federally threatened) and western pond turtle (Federally sensitive). The fire area is also utilized by peregrine falcon (Federally endangered) and bald eagle (Federally threatened).

Along the North Fork Cache Creek and East Fork Middle Creek drainages, slightly over 14 miles of riparian habitat was burned at varying intensities. High intensity burns occurred in the headwaters of these streams.

5. Grazing allotments

There are two grazing allotments within the fire area and one grazing allotment adjacent to the fire area. The Middle Creek and Elk Mountain allotments are currently active; the Cache Creek grazing allotment is currently vacant; and the Little Stony Creek allotment (adjacent to the east edge of the fire) is currently active. There are no grazing permits for the BLM portions of the fire area.

On the active allotments, stock management is occurring on Sled and Big Ridges (Elk Mountain allotment) and Pacific Ridge and Lovelady Ridge of the Little Stony Creek allotment. These ridges had OHV trails which became firelines and subsequently were seeded and mulched. Even though the Middle Creek allotment is active, non-use is occurring in 1997 as the allotment contains damaged type conversions and firelines that have been reseeded.

6. Off Highway Vehicle use

OHV trails within the fire area that were used as firelines received fire suppression rehabilitation (waterbars, seed and/or mulch) and are closed to use until revegetated. Some trails have been barricaded to insure OHV vehicles stay off the trails.

7. Private Property

Landowners located along streams at the mouth of canyon bottoms had increased water flows and sediment laden water passing through their property.

Since the White Rock area had life and property values at risk, the watershed areas above White Rock, Decy Canyon and an unnamed subwatershed to the north received multiple rehabilitation treatments such as aerial seeding, seeding, mulching, contour falling and in-channel structures. Based on resource advice from the NRCS, two homeowners built stream deflection walls and installed larger culverts to protect their property. They did this work at their own expense, which was less than their EWP cost share.

8. Other agency involvement

The NRCS had a team (Tom Schott, Len Kashuba and others) which reviewed private land burn intensity and made recommendations for aerial seeding. However, the NRCS could not get private landowner nor Lake County Board of Supervisor financial partnership to seed land the NRCS recommended for treatment.

Since there was small acreage of BLM land within the fire area, the BLM requested that the Forest Service review there land for potential rehabilitation areas. Several areas were discussed on-the-ground with BLM staff (Renee Snyder, Jim Dawson and others) for treatment.

2. Findings after initial rehabilitation planning

A. Loss of soil and site productivity:

Decisions to aerial seed grass were based on soil samples taken from high burn intensity areas. Soil samples from affected vegetation types were tested for germination of seed stored in the soil at the Chico Genetic Resource Center.

Results indicated that soil samples from annual grasslands had a high percentage of germinants. Thus, annual grass areas such as meadows were not seeded.

Soil samples from both brush and conifer vegetation types had varying germination rates. After ten days of germination there were zero to 10 plants per plot and after thirty days of germination about 30 germinants on chaparral soils. Native seed germination on timber soils had nearly zero germinants after 10 days and about 10 germinants after 30 days. Since there was varying results on chaparral soil types after 10 days, it was decided to seed chaparral acres on slopes less than 40%. The Forest Management Team decided not to seed any timber areas.

Seed germination was done under ideal conditions in a green house. Field surveys show native seed germination much lower than control conditions of water and temperature.

PHOTOGRAPHS OF FORK FIRE REHABILITATION TREATMENTS

Photograph 1. The Fork fire started in East Fork Middle Creek Upper Lake Ranger District, Mendocino N.F. on Aug. 12, 1996. Vegetation type is chaparral with some mixed conifer.

Photograph 2. By the following day the fire was across East Fork Middle Creek and heading towards the Rice Fork drainage of the Eel River.

Photograph 3. A week later the fire made a 28,000 acre run down Cache Creek. This picture is taken on Highway 20 near Williams, some 25 miles away. The smoke plume travelled south to Monterey.

Photograph 4. Fire suppression rehabilitation consisted of waterbarring and aerially seeding firelines with native grass.

Photograph 5. Other fire suppression damage rehabilitation consisted of strawing firelines where they crossed stream channels and use of erosion mat in the channel to retard stream downcutting.

Photograph 6. An interagency team of Bureau of Land Management, California Fish and Game and U.S. Forest Service discuss fire rehabilitation measures on BLM administered land.

Photograph 7. Straw mulching on hotly burned chamise fields located on a ridge above White Rock homes (Middle Creek watershed).

Photograph 8. Straw wattles placed in small drainages were used to slow water runoff and catch sediment. Straw bale check dams were used further down the drainage. Straw mulching was used on hotly burned slopes above the channel treatments.

Photograph 9. Straw bale check dams were used in intermittent streams to slow water velocity, to prevent streambottom downcutting and to trap sediment.

Photograph 10. Knobcone pine trees were felled to make log erosion barriers.

Photograph 11. Logs placed on the contour catch surface water runoff and trap sediment.

Photograph 12. Monitoring plots were established in chamise fields to determine differences in seeding of native grasses, cultivated oats and native vegetation growth to create ground cover and reduce soil erosion.

Photograph 13. Soil erosion measurement plot using a straw wattle to store sediment and metal bar to measure soil depth in front of the wattle. Note rilling that has occurred on the windy ridge top.

Photograph 14. Road treatment measures included adding culvert downspouts and energy dissipators to reduce the amount of channel scour from increased channel runoff.