Date of Report: **August 30, 2005**

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
[] Updating the initial funding request based on more accurate site data or design analysis
[] Status of accomplishments to date

[**X**] 3. Final Report (Following completion of work)
See page 9 for the Implementation Accomplishment Report

PART II - BURNED-AREA DESCRIPTION

A. Fire Name: Sims

B. Fire Number: CA-SRF-3784

C. State: CA

D. County: Trinity

E. Region: 05

F. Forest: Six Rivers & Shasta Trinity

G. District: Lower Trinity & Hayfork

H. Date Fire Started: July 28, 2004

I. Date Fire Controlled: not controlled as of Aug 9

J. Suppression Cost: $3.4 million as of Aug 5

K. Fire Suppression Damages Repaired with Suppression Funds
1. Fireline waterbarred (miles): 11.3 dozer; 14.5 hand
2. Fireline seeded (miles): 0
3. Other (identify): related PG&E access roads

L. Watershed Number: HUC4 #18010212

M. Total Acres Burned: 4030 (2345 SHF / 1685 SRF)
NFS Acres(3294) Other Federal (0) State (0) Private (736)

N. Vegetation Types: Mixed conifer, chaparral, oak woodland

O. Dominant Soils: Skalon, Dunsmuir, Holand, Clallon

P. Geologic Types: Franciscan ultramafic mélange, Jurasic metasediments

Q. Miles of Stream Channels by Order: 1 = 23.6; 2 = 13.2; 3 = 3.8; 4 = 3.5; 5 = 5.0

R. Transportation System

Trails: 0 miles Roads: 23 miles

PART III - WATERSHED CONDITION

A. Burn Severity (acres): 623 (low) 1812 (moderate) 1595 (high)

B. Water-Repellent Soil (acres): 322

C. Soil Erosion Hazard Rating (acres):
34 (low) 1578 (moderate) 2245 (high)

D. Erosion Potential: 3.7 tons/acre

E. Sediment Potential: 2385 *tons* / square mile

PART IV - HYDROLOGIC DESIGN FACTORS

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

B. Design Chance of Success, (percent): 85

C. Equivalent Design Recurrence Interval, (years): 25

D. Design Storm Duration, (hours): 24

E. Design Storm Magnitude, (inches): 8

F. Design Flow, (cubic feet / second/ square mile): 512

G. Estimated Reduction in Infiltration, (percent): 71

H. Adjusted Design Flow, (cfs per square mile): 1741

PART V - SUMMARY OF ANALYSIS

A. Describe Watershed Emergency:

Overview

The fire resulted in high burn severity on a substantial portion of the upper end of a large, deep-seated, dormant rotational slide with multiple nested shallow rotational slides of varying stability. It is drained by Grapevine Creek and an unnamed stream to the south (Glass Creek for this report and supporting documentation), and it faces directly on the west bank of the South Fork Trinity River. Other large areas of high burn intensity occurred in unnamed tributaries to Grouse Creek, which is also a tributary to South Fork Trinity.

South Fork Trinity is listed as a 303d sediment impaired stream; it has a sediment TMDL. It is also habitat for several salmonid fish species of interest, as is Grouse Creek. These include Threatened Coho salmon, Upper Klamath – Trinity Rivers ESU Chinook Salmon, and the Klamath Mountains Province ESU steelhead. Post-fire sediment production has the potential to impact anadromous fish habitat downstream.

The burn area comprises about 3% and 5% of the watershed areas associated with the burn on South Fork Trinity and Grouse Creek, respectively. Existing sediment production and bedload from upstream are several orders of magnitude larger than the predicted short-term surface erosion pulses from the burn area, with or without treatment. For these reasons, the primary concern is the potential for stream networks on the large dormant slide to become destabilized. This would result in a long period of chronic increased sediment production due to channel re-adjustment in the colluvial material, and the associated destabilization of adjacent banks and hillslopes.

Not all of the intensely burned areas resulted in emergency situations. The headwater streams of Glass Creek are marginally stable also, but the soils are substantially rockier. The soil surfaces are generally very rocky, permeable, and resistant to surface erosion. Therefore no emergency exists in this watershed. As for the unnamed tributary to Grouse Creek, evaluation determined that the benchy topography provided sufficient sediment trapping and retarding capacity to mitigate sediment delivery adequately. Details are documented in the hydrology specialist report.

Also of concern is the potential for damage to the road system within the burn. County road 311 is the primary access to the area, but it is often closed during winter by mass movement on Big Slide just south of the burn area. During such closures, Forest road 4N20 provides alternate access and egress from Hyampom/Hayfork for the private landowners in the area. A segment of 4N20 traverses the burn area and is vulnerable to stream crossing failure as noted below, under “Roads”.

Private land residences and other structures were evaluated for risk of damage from NF flood source areas. None were found to be at risk, so no emergency exists with respect to NF lands. Risk from private land source areas appears to be low, but was not evaluated in detail. Private landowners will be advised of the local NRCS contact for possible assistance under that agency’s EWP program.

Known heritage resources were evaluated for post-fire threats, and none of the sites were at risk.

The wildlife biologist identified no terrestrial wildlife emergencies.

Stream and Hillslope Stability

The headwater streams of Grapevine Creek are marginally stable, many of which have one or more nick points eroding headward. Accelerated upslope runoff and erosion will increase the power of storm flows to erode the channels. In-channel coarse woody debris was largely consumed by the fire, reducing the energy dampening capacity of the stream channels and increasing their erodability during flood events. The resulting channel and bank erosion will also destabilize adjacent banks and hillslopes. Once destabilized, the stream / hillslope system will take many years to re-adjust, during which time sediment rates will be chronically elevated.

Roads

Many of the culverts on the roads within the burn are inadequately sized to pass the design storm flows or the elevated debris loads. Culvert failures would result in facility repair costs, increased sediment delivery (up to 19,000 cubic yds) to South Fork Trinity and Grouse Creek, and would cut off road access for local residents. Culverts on roads within light and moderate burn severity areas are subject to greater loads of woody debris capable of plugging the culvert. This is due to partial consumption of woody debris in the channels, which leaves behind smaller pieces that can be more easily mobilized during storm runnoff, but which are still large enough to bridge culvert openings.

Noxious Weeds

Construction of dozer control lines, operation of fire camp, use of water drafting sites, and opening of closed roads created potential for introduction of noxious weeds. If any actual introductions are not detected and eradicated timely, substantial long-term ecosystem and economic damage could result.

B. Emergency Treatment Objectives:

Land

Retard storm runoff and erosion on intensely burned upper Grapevine Creek watershed slopes adjacent to order 1 and 2 streams (ephemeral and NWFP intermittent). Areas selected for treatment are targeted at reducing peak runoff rates and degree of bulking, in order to reduce erosive forces on low order streams and their channel treatments. This in turn will decrease risk of accelerated nick point migration, new nick point initiation, and debris torrent initiation with cascading downstream scouring.

Channel

Dissipate stream energy in order 1 and 2 streams by restoring coarse woody debris into the channel and bank environment.

Reduce risk of culvert plugging by cleaning mobilizable woody debris from channels upstream of culverts in light and moderate burn areas.

Roads

Reduce risk of stream crossing failure by upgrading culverts to pass design storm flows and debris loads. Reduce risk of cascading stream diversion by constructing critical dips where diversion potential exists.

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

Land **95** % Channel **95** % Roads **95** % Other ___ %

D. Probability of Treatment Success

	Years after Treatment		
	1	3	5
Land	80	85	90
Channel	80	85	90
Roads	90	95	97
Other			

E. Cost of No-Action (Including Loss): $1,644,037

F. Cost of Selected Alternative (Including Loss): $935,230

G. Skills Represented on Burned-Area Survey Team:

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

Team Leader: Mike Van Dame

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H. **Treatment Narrative:**

Land Treatments: ***Italicized, red font Items are for Interim # 1*** **Bold, green font items for Interim #2**

Contour fall fire-killed trees on 282 acres adjacent to order 1 and 2 streams in upper Grapevine Creek watershed.

Hand straw mulch 5 acres in the upper headwaters of Grapevine Creek.

Lop and scatter and strip straw mulch units in the upper Grapevine watershed that consist of hardwood vegetation. A total of 16 acres will be completed.

Hand seed 21 acres with cereal grain barley.

Channel Treatments:

Herring-bone fall fire-killed trees 3 miles of order 1 and 2 streams in upper Grapevine Creek watershed.

Remove mobilizable woody debris that is large enough to bridge culvert openings from 8500 linear feet of channels upstream from about 30 culverts located in light and moderate burn areas.

Construct 18 straw bale check dams in 5 small ephemeral drainages located in the upper headwaters of Grapevine Creek.

Roads and Trail Treatments:

Remove 9 undersized culverts and replace with larger culverts; install 1 new culvert cross-drain; construct 3 critical dips; construct 5 new surface cross drains (dips); improve culvert inlet / outlet.

Additional road work will include the construction of critical dips at road stream crossings, upgrade culverts, install inlet armoring and ditch relief culverts as needed.

Patrol after first and second storms of the season that result in runoff, to detect and prevent culvert plugging. Patrol thereafter during or after storms with magnitudes that approach the design storm. Patrol once at end of wet season to clear any remaining partial culvert blockages.

Structures:

None

Noxious Weed Assessment

Monitor during the 2005 growing season to detect any noxious weed infestations associated with suppression activities and BAER road improvements. Refer to noxious weed monitoring plan for details.

Provide vegetation competition by seeding intersections of roads and similar disturbed settings (e.g. dozer lines). This will prevent the introduction and spread of noxious weeds.

H. **Monitoring Narrative:**

The purpose of this monitoring is to measure how effectively Herringbone Log Dams trap/store sediment and reduce the risk of in-channel debris flow bulking / scouring that destabilize channel grade and banks.

This monitoring will involve surveying channels treated with Herringbone Log Dams before and after for three consecutive years. Dam configuration, channel cross-sections, longitudinal profiles, bed-material composition, bank stability, and photo points will be surveyed/measured immediately after installation to provide a baseline. The channels will be re-surveyed for the first two winters following the fire. For more details please refer to the Sims Fire Hydrologist Specialist Report.

The total cost for installing and the first year of monitoring will be 7,500 dollars. Additional funding requests will be made for out-year monitoring will be submitted in subsequent interim 2500-8 reports.

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

Line Items	Units	Unit Cost	# of Units	WFSU SULT $	Other $	# of units	Fed $	# of Units	Non Fed $	Total $
A. Land Treatments										
Contour falling	acre	**1200**	**100**	**$120,000**			$0		$0	**$120,000**
Lop/Scat and Mulch	*acre*	**1,026**	**22**	**$22,572**			$0		$0	***$22,572***
Hand Straw Mulch	*acre*	**614**	**6**	**$3,684**			$0		$0	***$3,684***
Hand Seeding	**acre**	**533**	**21**	**$11,193**			$0		$0	**$11,193**
Subtotal Land Treatments				**$157,449**			$0		$0	**$157,449**
B. Channel Treatments										
Herringbone falling	mile	**8216**	**3.5**	**$28,756**			$0		$0	**$28,756**
Debris removal	lin. ft.	**0.2**	**10340**	**$2,068**			$0		$0	**$2,068**
Straw Bale Dams	*each*	**637**	**18**	**$11,466**			*$0*		*$0*	**$11,466**
				$0			$0		$0	$0
Subtotal Channel Treat.				**$42,290**			$0		$0	**$42,290**
C. Road and Trails										
Improve culverts	job	**293125**	**1**	**$293,125**			$0		$0	$293,125
Storm patrol	patrol	5	1000	$5,000			$0		$0	$5,000
Additional Road Wrk	**job**	**47000**	**1**	**$47,000**			$0		$0	**$47,000**
				$0			$0		$0	$0
Subtotal Road & Trails				**$345,125**			$0		$0	**$345,125**
D. Structures										
Seed Nox Weed Inv	*ea*	*3800*	*1*	*$3,800*			*$0*		*$0*	*$3,800*
				$0			$0		$0	$0
				$0			$0		$0	$0
				$0			$0		$0	$0
Subtotal Structures				$3,800			$0		$0	$3,800
E. BAER Evaluation										
Initial survey	job	11500	1	$11,500	$0		$0		$0	$11,500
Tracking / reporting	job	1500	1	$1,500	$0		$0		$0	$1,500
Nox weed assmnt	job	16545	1	$16,545	$0		$0		$0	$16,545
Insert new items above this line!				$0	$0		$0		$0	$0
Subtotal Evaluation				$29,545	$0		$0		$0	$29,545
F. Monitoring										
Chan Trtmt Effctvns	job	7500	1	$7,500	$0		$0		$0	$7,500
Insert new items above this line!				$0	$0		$0		$0	$0
Subtotal Monitoring				$7,500	$0		$0		$0	$7,500
G. Totals				**$585,709**	***$0***		***$0***		***$0***	**$585,709**

PART VII - APPROVALS

1. /s/ Thomas A. Contreras (for) 9/30/2004
   J. SHARON HEYWOOD Date
   Forest Supervisor

2. _____ _____
   JACK A. BLACKWELL Date

SIMS FIRE
BAER IMPLEMENTATION ACCOMPLISHMENTS
AUGUST 30, 2005

Introduction

Using the assessment team's information (documented in the approved Initial, Interim #1 and #2, FS-2500-8 reports), the implementation team began ground proofing proposed Land, Channel, and Roads/Trails Treatments that included marking specific treatment sites and unit boundaries.

During the first weeks, the Implementation Team generated GIS treatment maps, ordered supplies, continued to fill team positions and requested crews to support Land, Channel and Road and Trail Treatments. Mid September all supplies were ordered and delivered to staging areas to begin the actual fieldwork. The Road Treatments were split into four packages (either contract or force account because of the critical time limit to complete the work. The majority of prescribed treatments were completed by November 14, 2004.

The Noxious Weed Assessment identified by the assessment team and documented on the 2500-8 reports remains the responsibility of the Six Rivers Forest Botanist department to implement at this time. The remaining dollars are requested to be carried over to complete the assessment this fall.

The Herringbone dam monitoring is continuing this fall and is with the remaining allocated funds.

Land Treatments Accomplishments

The Assessment Team identified contour falling as a land treatment for BAER implementation. Considering the critical time element that the implementation team was facing, due to the fact that the wet season was fast approaching, the team reassessed the contour falling units for possible mulch/lop and scatter, hand mulching or hand seeding units Ground Operations and specialists performed a field review to prioritize Land Treatment units based on treatment criteria. Units with areas that included good vehicle and crew accessibility, gentle slopes and less rock content and/or located along burned stream banks were considered for hand mulching or seeding units. Also, many of the contour falling areas identified were filled with small hardwoods and brush and did not have the type and size of tree needed to implement contour falling. These units were identified to be implemented using the Lop/Scatter and Mulch treatment.

Land Treatments Accomplishment Table

Treatment Unit	Acres Planned Initital Request	Acres Planned Interim #1 and #2	Acres Implemented
Contour Falling	282	100	97
Lop/Scatter and Mulch		22	22.2
Hand Straw Mulch		6	2.2
Hand seeding		21	47.1
Totals	**282**	**149**	**168.5**

Channel Treatments Accomplishments

The Assessment Team identified 3 miles of order 1 and 2 streams in the Upper Grapevine Creek watershed for Channel Treatment. The treatment includes Herring-bone falling fire-killed trees in the streams to restore course woody debris into the channel and bank environment. Local experienced contract fallers were hired to implement the project.

The Team also recommended removing mobilizable woody debris that is large enough to bridge culvert openings in channels, upstream from approximately 30 culverts.

The Implementation Team identified areas in small ephemeral drainages to install straw bale check dams to store sediment that will be released slowly through the system for the next few years.

Channel Treatments Accomplishment Table

Treatment Unit	Planned Initital Request	Planned Interim #1 and #2	Implemented
Herringbone Falling	3.5 miles	3.5 miles	3 miles
Debris Removal	10,340 lin ft	8,500 lin ft	9,700 lin ft
Straw Dams		18 each	19

Road and Trail Treatments Accomplishments

The Assessment Team identified the upgrade of 9 culverts, installation of culvert cross drains, construction of critical dips and improvements of inlets and outlets. Further review of the road work by the Implementation Team determined that additional work was needed and requested in Interim #2. The Implementation Team coordinated the design and implementation to upgrade two pipes on the County road with the Trinity County Road Department. Design and implementation of upgrading pipes and road work on the Six Rivers National Forest was coordinated with the Forest Engineering group. The work was completed using an existing Forest Indefinite Quantity Contract. Design and implementation of upgrading pipes and road work on the Shasta-Trinity National Forest was completed using a Forest Force Account crew and equipment. The Large Grapevine pipe work was completed with a Shasta Trinity National Forest Contract. The design and contract for the pipe was completed by the Forest Engineering group and the District Hydrologist.

Storm Patrol of the roads identified for BAER work was completed by the Hydrology and Engineering shops of the District/Forest during the winter of 2004-2005.

Road and Trail Treatments Accomplishment Table

Treatment Unit	Planned Initial Request	Planned Interim #1 and #2	Implemented
Improve Culverts	1 job		1 job
Strom Patrol	5 patrol		4 patrol
Additional Road work		1 Job	1 job

Herringbone Log Dam Monitoring

Pre monitoring of the Herringbone dam treatment was completed in the winter of 2005. Follow up; post monitoring will be completed in the fall/winter of 2005/2006. We are requesting $8,250 to complete this task. Please see Herringbone Log Dams: Purpose, Installation and Effectiveness report on page 13.

Sims Fire Monitoring Results First Year Post Fire (2005)

Access routes, dozer lines, and areas adjacent to and surrounding weed infestations within the Sims Fire on Six Rivers National Forest (Lower Trinity Ranger District) and Shasta Trinity National Forest (Hayfork Ranger District) were inventoried during the summer of 2005 (one year post fire) for invasive weeds, on 7/14/5, 7/18/5, 7/19/5, and 8/26/5.

Biological Science Technicians, Caroline Stimson and Carrie Schreiber, performed the surveys and treatments. Twenty miles of road surveys were conducted by vehicle (80 acres), and 2.8 miles of dozer/ hand line intersections were walked (11.2 acres). The targeted noxious weed species, yellow starthistle (State listed C species, *Centaurea solstitialis*) was located and documented in twenty-six new sites within the fire, providing a total of 3.34 infested acres. Caroline Stimson hand pulled yellow starthistle in fifteen sites, effectively treating .38 acres on 7/14/5, 7/18/5 and 7/19/5. All weed sites were mapped, and data recorded on the NRIS documentation forms. Records reside with Six Rivers National Forest.

Sims Fire Noxious Weed Inventory 2005				
Roads	**Date surveyed**	**Miles surveyed**	**Linear feet surveyed**	**C**
4N14	7/14/05	3.2	16,896	
4N14A	7/14/05	0.5	2640	
4N20	7/18/05	5.5	29,040	
3N51	7/14/05	0.7	3696	
4N20B-part of rd.	7/18/05	0.3	1584	
4N20C-part of rd.	7/18/05	0.2	1056	
4N31	7/18/05	3.9	20,592	
4N59-part of rd.	7/18/05	0.7	3696	F
311-part of rd.	7/19/05	4.1	21,648	F
4N11B	8/26/05	1.7	8976	F
TOTAL		20.8	109,824	
Dozer lines	**Date surveyed**	**Miles surveyed**	**Linear feet surveyed**	**C**
1: Section 29 on private property	8/26/05	0.7	3696	
2: Section 23, off 4N11B	8/26/05	0.2	1056	
3 & 4: Dozer line that begins in Sect. 25 & runs to the SE corner of Sect. 23 (intersects dozer line **2**)	8/26/05	1.3	6864	
5: Section 25: dozer line that runs between 4N31 (connects N. & S. part of 4N31)	8/26/05	0.3	1584	

6: Section 25, off 4N59B	8/26/05	0.2	1056
7: Section 25, between E. end of 4N59 connecting 4N20	8/26/05	0.1	528
TOTAL		2.8	14,784

Sims Fire Noxious Weed Inventory 2005

Noxious weed species	NRIS #	Infested acres	Date treated	Acres treated	% Treated
CESO3	52CESO19505A	0.05	07/14/05	0.05	99
CESO3	52CESO19505B	0.01	07/14/05	0.01	100
CESO3	52CESO19505C	0.01	07/14/05	0.01	100
CESO3	52CESO19505D	0.02	07/14/05	0.01	60
CESO3	52CESO19505E	0.02	07/14/05	0.007	33
CESO3	52CESO19505F	0.25	07/14/05	N/A	N/A
CESO3	52CESO19505G	0.1	07/14/05	N/A	N/A
CESO3	52CESO19905A	0.01	07/18/05	0.01	100
CESO3	52CESO19905B	0.01	07/18/05	0.01	100
CESO3	52CESO19905C	0.02	07/18/05	0.02	100
CESO3	52CESO19905D	0.02	07/18/05	0.02	100
CESO3	53CESO19905E	0.1	07/18/05	0.095	95
CESO3	53CESO19905F	0.01	07/18/05	0.01	100
CESO3	52CESO19905G	0.01	07/18/05	0.01	100
CESO3	52CESO19905H	0.01	07/18/05	0.01	100
CESO3	53CESO20005A	0.25	07/19/05	0.075	30
CESO3	52CESO20005B	0.02	07/19/05	0.02	98
CESO3	52CESO20005C	0.1	07/19/05	N/A	N/A
CESO3	52CESO20005D	0.6	07/19/05	N/A	N/A
CESO3	52CESO20005E	1.2	07/19/05	N/A	N/A
CESO3	52CESO20005F	0.1	07/19/05	N/A	N/A
CESO3	52CESO20005G	0.02	07/19/05	N/A	N/A
CESO3	52CESO20005H	0.01	07/19/05	N/A	N/A
CESO3	52CESO20005I	0.1	07/19/05	N/A	N/A
CESO3	52CESO20005J	0.02	07/19/05	N/A	N/A
CIAR	53CIAR20005A	0.02	07/19/05	0.01	50
CESO3	53CESO23805A	0.25	08/26/05	N/A	N/A
TOTAL		3.34		0.377	

Total treated = 0.38 ac
Total infested = 3.34 ac
Total miles surveyed = 20.8 + 2.8 = 23.6 miles = 94.4 acres (at 4 acres/mile)
Dozer line with locked gate on private property in Sect. 18 was not surveyed.

Monitoring Needs Second Year Post Fire (2006)

It is recommended, for second year post fire (2006), that nineteen of the new yellow starthistle sites (.57 acres) be re-inventoried and treated if necessary by a Biological Technician. Six larger starthistle sites (1.45 acres) will require treatment, from a weed crew, early summer 2006. We are requesting $13,560 to perform this task.

It is also suggested, for second year post fire (2006), that six sites where dozer/hand lines intersect with roads, be revegetated with native grass seed (Fall, 2006). This will protect, through competition, these vulnerable disturbed sites from the introduction of yellow starthistle.

Accounting spreadsheet showing planned versus implemented treatments

Approved in Initial, 1st and 2nd Interim Reports PLANNED						Completed by Nov 14, 2004 IMPLEMENTED			
		Unit	# of	WFSU			Unit	# of	Total
Line Items	Units	Cost	Units	SULT $		Units	Cost	Units	$
A. Land Treatments									
Contour falling	acre	**1200**	**100**	**$120,000**		acre	1092	97	**$105,924**
Lop/Scat and Mulch	*acre*	**1026**	**22**	**$22,572**		acre	987	21.2	**$20,924**
Hand Straw Mulch	*acre*	**614**	**6**	**$3,684**		acre	756	2.2	**$1,663**
Hand Seeding	**acre**	**533**	**21**	**$11,193**		acre	419	47.1	**$19,735**
Subtotal Land Treatments				**$157,449**					**$148,247**
B. Channel Treatments									
Herringbone falling	mile	**8216**	**3.5**	**$28,756**		mile	9578	3	**$28,734**
Debris removal	lin. ft.	**0.2**	**10340**	**$2,068**		lin. ft.	0.21	9806	**$2,059**
Straw Bale Dams	*each*	**637**	**18**	**$11,466**		each	588	*20*	**$11,760**
Subtotal Channel Treat.				**$42,290**					**$42,553**
C. Road and Trails									
Improve culverts	job	**293125**	**1**	**$293,125**		job	292457	1	**$292,457**
Storm patrol	patrol	5	1000	$5,000		patrol	3774	1	**$3,774**
Additional Road Wrk	**job**	**47000**	**1**	**$47,000**		job	45640	1	**$45,640**
Subtotal Road & Trails				**$345,125**					**$341,871**
D. Structures									
Seed Nox Weed Inv	*ea*	*3800*	*1*	*$3,800*		ea	990	1	**$990**
				$0			0		**$0**
				$0			0		**$0**
				$0			0		**$0**
Subtotal Structures				$3,800					**$990**
E. BAER Evaluation									
Initial survey	job	11500	1	$11,500		job	11500	1	**$11,500**
Tracking / reporting	job	1500	1	$1,500		job	1500	1	**$1,500**
Nox weed assmnt	job	16545	1	$16,545		job	9297	1	**$9,297**
Insert new items above this line!									
Subtotal Evaluation				$29,545					**$22,297**
F. Monitoring									
Chan Trtmt Effctvns	job	7500	1	$7,500		job	4971	1	**$4,971**
Insert new items above this line!									
Subtotal Monitoring				$7,500			0		**$4,971**
G. Totals				**$585,709**					**$560,929**

Herringbone Log Dams: Purpose, Installation, and Effectiveness

DRAFT August 30, 2005

Prepared by:
Jim Fitzgerald, Geologist

Abstract
Herringbone Log Dams are designed to treat steep drainages where woody debris and riparian zone vegetation have been consumed by fire and there is a high risk of debris flows and channel destabilization. The dams are constructed using the existing trees adjacent to the channel. Herringbone Log Dam treatment effectiveness monitoring shows that these dams, when placed and spaced correctly, can substantially reduce the risk of debris flow bulking. These dams immediately stabilize the pre-fire instream bed-material and trap and store the post-fire debris delivered from the hillslope (Picture 2).

Purpose
The purposes of Herringbone Log Dams are to trap and store bed-material and reduce the risk of in-channel debris flow bulking for two to five years after the severe wildland fire. These dams are designed to treat steep drainages where woody debris and riparian zone vegetation have been consumed by fire. The dams are not hardened so that with time they can mobilize and shift as the stream channel recovers from increased runoff and debris flux. Ideally, the dams trap sediment in the short-term, provide long-term channel stability, and ultimately add to the habitat and complexity of the broader stream network.

Picture 1. Post fire channel response 46 acre subwatershed. Pre-fire the width to depth of this channel was 1.5 x 0.5 feet. Three years post-fire this channel was 6.5 x 3.8 feet. The winters following the fire were normal to below normal.

Monitoring of post wildland fire impacts on source and transport stream channel types shows that there can be a substantial increase in drainage network efficiency and debris flux causing increased channel width and depth downstream (Picture 1). Increased runoff and debris flux can destabilize the stream network causing inner gorge debris flows, rock flows, dry ravel, and downstream sediment delivery.

Installation

Herringbone Log Dams are constructed using existing dead or dying trees adjacent to the stream channel. Trees are strategically fallen with a "primary" tree to plug the channel, and "secondary" tree(s) to buttress the primary tree. The main tree is fallen across the channel and bucked so that either the tree butt of main log touches the channel bottom (Picture 2 and 3). Secondary trees are subsequently fallen to support and/or buttress the primary tree (Picture 4). Cut trees are designated based on their diameter, length, and position relative to the channel. The trees need to be large enough to hold the expected runoff and debris load. Typically, the trees need to be greater than 16 inches in diameter and at least 15 feet long.

Picture 2. Falling the primary tree across the stream channel.

Picture 3. Placing primary tree into channel bottom.


Picture 4. Placing secondary tree into channel to support the primary tree.

The final dam configuration will vary based on site conditions. The final dam though should hold the expected bed-material load and work in concert with the other dams upstream and downstream (Picture 5). Where possible, existing in-channel logs that were not fully consumed by the fire should be used (Picture 6)

Herringbone Log Dam spacing should be a function of channel gradient and the bed-material texture. In steep (i.e., > 10%), course grained channels (i.e., D_{50} > 32 mm), the dams should about 75 feet apart. The dam spacing will also depend on the number of available trees. Monitoring has shown that it is critical to place at least one dam directly below the confluence of headwater tributaries and below large instream bed-material deposits.


Picture 5. Ideal configuration of finished dam.

Picture 6. Use of existing in-channel log.

Monitoring

The Shasta Trinity National Forest has been monitoring the effectiveness of Herringbone Log Dam treatment for five water years. This monitoring indicates that these dams, when placed and spaced correctly, can substantially reduce the risk of debris flow bulking and stream channel destabilization (Picture 7). These dams immediately stabilize the pre-fire instream bed-material and trap and store the post-fire debris delivered from the hillslope.

Picture 7 Looking downstream at Herringbone Log Dam after first winter post fire.
Dam has trapped about 5 yd^3 of debris.