United States Department of Agriculture
Forest Service
Bitterroot National Forest
1801 N. First St.
Hamilton, MT 59840

REPLY TO: 2520

Date: January 3, 1997

SUBJECT: Final BAER Report for the Willow Complex

TO: Regional Forester, R1;

Enclosed is the hard copy of the fianl BAER Report for the Willow Complex Fire. A map showing completed BAER treatments is also included. An electronic copy of this report was also submitted to Bill Putnam, BAER coordinator, previously. If you have any questions about the report please call Gary Decker.

STEPHEN K. KELLY
Forest Supervisor

Enclosure

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FS-2500-8 (8/93)

USDA-FOREST SERVICE Date of Report: 2/2/97

BURNED-AREA REPORT
(Reference FSH 2509.13)

PART I - TYPE OF REQUEST

A. Type of Report

[ ] 1. Funding request for estimated EFFS-FW22 funds
[X] 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

[X] 3. Final report - following completion of work

PART II - BURNED-AREA DESCRIPTION

A. Fire Name: Willow Complex B. Fire Number: MT-BRF-11227

C. State: MT D. County: Ravalli
E. Region: Northern - R1 F. Forest: Bitterroot
G. District: Stevensville

H. Date Fire Started: 8/11/96 I. Date Fire Controlled: 8/21/96
J. Suppression Cost: $1.6mm as of 8/21/96

K. Fire Suppression Damages Repaired with EFFS-PF12 Funds:
1. Fireline waterbarred (miles) 9.2
2. Fireline seeded (miles) 1.0
3. Other (identify) _____

L. Watershed Number: 17010205 07

M. NFS Acres Burned: 398 Total Acres Burned: 398 Added - 93
Ownership type:
( )State ( )BLM ( )PVT ( )_____

N. Vegetation Types: Ponderosa pine, Douglas-fir, lodgepole pine and subalpine fir.

O. Dominant Soils: Typic Ustochrepts, sandy-skeletal, mixed and Andic Cryochrepts, loamy-skeletal and sandy-skeletal, mixed Added 93

P. Geologic Types: Highly weathered granite with and without volcanic ash cap and belt rock quartzite and calc-silicates wiht ash

Q. Miles of Stream Channels by Order or Class:

Order I = 1.7 mi Order II = 0.5 mi Order III = 0.7 mi Order IV = 1.0 mi

R. Transportation System:

Trails: 0.5 miles Roads: 2.0 miles

PART III - WATERSHED CONDITION

A. Fire Intensity (acres): 170 (low) 100 (moderate) 128 (high) Nov 93

B. Water-Repellent Soil (acres): 228

C. Soil Erosion Hazard Rating (acres):
100 (low) 65 (moderate) 235 (high)

D. Erosion Potential: 60 tons/acre average
E. Sediment Potential: 32,000 cubic yards / square mile average

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: 1.3 inches
F. Design Flow: 10.5 cubic feet per second per square mile
G. Estimated Reduction in Infiltration: 35 percent
H. Adjusted Design Flow: 428 cubic feet per second per square mile

PART V - SUMMARY OF ANALYSIS

A. Describe Watershed Emergency:
The fire burned intensively over about one third of the area in 1 to 60 acre blocks. Within these intensively burned areas the standing trees have been killed. The understory has been consumed above ground but there is a good possiblity that below ground parts of fire-adapted species such as pinegrass, snowberry, beargrass, elk sedge, and to some extent blue huckleberry have survived and will re-establish the understory over the next several years. In high intensity burn areas the litter and duff layers have been consumed, leaving bare soil and surface cobbles/gravels exposed to erosion. These areas consist of coarse sandy loam granitic surfaces and on northerly aspects volcanic ash silt loams that are particularly subject to hydrophobicity from moderate to high intensity fires. Slopes are generally 25 to 50 percent and 1/8 to 1/2 mile in length. In addition, approximately 30 acres of high intensity burn occur on steep slopes with little woody debris. This area drains directly into live streams. If a high intensity rain storm occurs on these hydrophobic soils before the water repellency is ameliorated by natural processes and before adequate natural vegetative cover returns, there is a high likelihood of major overland flow occurring. This would result in large amounts of soil erosion and consequent loss of soil productivity and consequent stream sedimentation.

There is a high potential for flooding in three small tributaries of Willow Creek due to the conditions described previously. Several roaded stream crossings are incapable of passing floods of this magnitude. In the event of a flood, downstream roads, irrigation systems, domestic water supplies and important fisheries would be threatened.

All of the burned area is located in the Willow Creek drainage. Downstream of the burned area, Willow Creek contains isolated populations of bull trout and westslope cutthroat trout. These isolated native trout populations are

restricted to a short segment of stream (approx. 3.5 miles) by irrigation dewatering on private land and steep gradients in the headwaters. Both species are relatively common within this short reach. Bull trout and westslope cutthroat trout are classified as Sensitive by the Forest and as "Species of Special Concern" by the Montana Department of Fish, Wildlife, and Parks. Bull trout are also designated as a Category 1 (C1) species by the U.S. Fish and Wildlife Service, meaning that "formal listing as Threatened or Endangered is warranted, but has been precluded". None of the Willow Creek tributaries which drain the burned area are known to contain fish due to steep reaches which form numerous fish barriers.

The Willow Creek drainage has not been designated as a "priority watershed" for bull trout in the Bitterroot River drainage; however, it is still considered very important for maintaining bull trout viability in the Bitterroot. Bull trout are known to be sensitive to increased amounts of fine sediment in bottom substrates. There is a concern that sediment inputs to Willow Creek tributaries could increase considerably due to increased erosion in intensively burned areas. In a worst case scenario (a storm event which would generate enough runoff and sediment to wash out numerous old road crossings), it is possible that direct impacts to bull trout populations and indirect impacts to bull trout habitat would be severe enough that viability of this isolated population could be significantly jeopardized. Also, bull trout are known to be particularly vulnerable to replacement by highly-competitive brook trout in degraded habitats. Brook trout are present in Willow Creek near the Forest boundary, and any further degradation of bull trout habitat would likely enhance their upstream expansion and contribute to the decline of bull trout.

B. Emergency Treatment Objectives:

The objectives of the treatments are to promote infiltration, reduce erosion and provide quick revegetation of the sites with the highest risk of soil loss and slope instability. This would be done by seeding and placement of straw windrows and logs along the contours at the heads of some drainages. In-channel scour, erosion and sedimentation would be minimized by placement of single log and/or straw bale structures in the headwater channels of the areas most at risk. To minimize the threat to property and downstream fisheries, undersized culverts and road fills will be removed and roads stabilized where they aren't needed in the near future.

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

Land 90 % Channel 90 % Roads 90 % Other _____ %

D. Probability of Treatment Success

	<----Years after treatment----->		
	1	3	5
Land (seed)	60	100	100
(straw & logs)	70	70	70
Channel	60	70	80
Roads	100	100	100
Other			

E. Cost of No-Action (Including Loss): $ 107,000

F. Cost of Selected Alternative (Including Loss): $ 34,000

G. Skills Represented on Burned-Area Survey Team:

[X] Hydrology	[X] Soils	[ ] Geology	[ ] Range
[ ] Timber	[X] Wildlife	[ ] Fire Mgmt.	[X] Engineering
[ ] Contracting	[X] Ecology	[ ] Research	[ ] Archaeology
[ ] _____	[X] Fisheries	[ ] _____	[ ] _____

Team Leader: Gary Decker
Phone: 406-363-7158 Electronic Address: R01F03A

H. Treatment Narrative:

Roads OHV Trails and Drainage Crossings

Purpose: Prevent failure of road fills at drainage crossings where there are no culverts or the culvert is inadequate to pass expected flows and debris. Also improve infiltration in road surfaces in high risk areas and stabilize potential slope failures on fill slopes.

Treatment: On roads that are not needed in the near future, remove culverts and road fills in the drainage. Lay the slopes of fills back to stable angle and treat with erosion blanket and seed. Stabilize stream bed with rocks and log structures. This treatment will be applied to four stream crossings.

Treatment: On two roads that traverse a severely burned slope with potentially unstable slopes, deep rip the road perpendicular to the slope and install water bars. Seed all disturbed areas with a mixture of perennial rye, intermediate wheatgrass, and smooth brome. This treatment will be applied on about 0.7 miles of road.

Purpose: Prevent increased runoff from creating rills and gullies in two old jeep or OHV trails within the fire perimeter. Portions of the trails were used for suppression activities and these portions were rehabilitated with suppression funds. The proposed treatments would occur on those portions that were not used for suppression.

Treatment: Use excavator to sweep berms back onto surface of OHV trail and smooth to approximate natural contour. Construct or restore effective waterbars at spacing recommended for waterbars on hand firelines. Pull adjacent cut trees and down logs onto surface of jeep road to improve water dispersion and add organic debris. Seed restored OHV trail with certified weed-free grass seed mix containing 23 pounds/acre annual rye, and 11 pounds/acre slender wheatgrass, for a total application rate of 34 pounds/acre. Lightly rake top of soil after seeding to cover seed with thin soil layer.

Channel Treatments

Purpose: Single log and straw bale structures will be placed across intermittent channels at the very heads of the high risk drainages to trap sediment and prevent channel scour during runoff events. They will decrease the

erosive potential of this runoff and thus limit the sediment yield to area streams. This is both a preventative and a control treatment.

Treatment: Single log and/or straw bale grade stabilization and sediment trap structures will be installed along intermittent stream channels located within high intensity burn areas. Where available, larger trees on site which were killed by the fire will be felled across these channels and notched in the middle so that they will sag down and contact the ground within the channels. Logs would not be keyed in, but would be felled behind standing trees or stumps whenever possible to prevent movement. Where logs are not available, straw bale structures will be placed and keyed into the drainage as per design by Ruby (11/94). The straw bale structures are wrapped in chicken wire, keyed into the soil and supported by either posts or cross logs if available. A total of approximately 15 structures will be installed along approximately 1/4 mile of intermittent channels.

Land Treatments

Purpose: Log barriers and/or windrows of straw along the contour in upper concave drainage basins will help shorten slope lengths on steeper slopes, store sediment, increase infiltration and slow down anticipated increases in runoff and overland flows. A reduction in overland flows would result in less soil movement from the steeper, high intensity burn areas. This will retain soil nutrients on the site, limit the amount of sediment yield to streams, and decrease the risk of gully formation. This is a preventative treatment.

Treatment: Where excess, fire killed trees are available, fall trees on the contour and position them to help slow surface runoff. Wedge fallen trees above standing trees or stumps to create stable log barriers. Pull soil and duff onto the upslope portion of the logs to increase bole contact with the ground and maximize sediment storage potential. Log barriers will be spaced approximately 50 feet apart up and down the hillside. Logs and gaps in adjacent rows will be staggered, so runoff moving down the fall line is intercepted by a log in every other row. The application rate could very depending on slope length and steepness, but the average rate is approximately 20 logs per acre. Where logs are not available, construct windrows of loose straw approximately 6 feet wide and 1 foot high along the contours at the same spacing and in the same fashion as the contour logs. Cover the straw windrow with biodegradable netting and stack or anchor to the slope. Treatment is limited to identified critical areas within the high intensity burns. Total treatment areas is approximately 6 acres.

Purpose: Seeding with rye grasses will provide a protective cover of living plants and litter on highly erosive soils over the first and second post-fire years. This cover will reduce raindrop impact, provide roots and organic matter to help bind soil particles, improve infiltration, help retain soil moisture and nutrients on the site, and slow the movement of any overland flow, thereby reducing erosion. In lower elevation areas the seeding will also help protect the site from invasion by spotted knapweed, which is growing in the area.

Treatment: A mixture of 60% annual and 40% perennial ryegrass will be seeded by helicopter at a rate of 52 pure live seed per square foot on approximately 30 acres of land that is especially prone to overland flow and erosion. The ryegrass is expected to occupy these sites for 2 to 3 years, after which it will not provide any significant amounts of volunteer plants. This species was

selected because of its short term viability plus very effective erosion control capability for the critical first two years after fire. Native vegetation is expected to occupy at most of these sites after 2 to 4 years.

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

Line Items	Units	Unit Cost $	NFS Lands Number of Units	NFS Lands EFFS-FW22 $	NFS Lands Other $ ident.	Other Lands Number of Units	Other Lands Fed $ ident.	Other Lands Non-Fed $ ident.	All Total $
A. LAND TREATMENTS									
Helicopter seeding mix	acre	51	30	1518					1518
Straw windrows or log contour felling	acre	6	450	2700					2700
B. CHANNEL TREATMENTS									
log and/or straw bale structures	each	19	100	1855					1855
C. ROADS AND TRAILS									
Remove culverts & fill	each	200	4	800					800
Rip, drain, stab. road	mile	500	.7	350					350
Jeep trail stab. & close	mile	458	1.0	458					458
D. STRUCTURES									
E. BAER EVALUATION/ ADMINISTRATIVE SUPPORT									
Evaluation	day	200	9	1800					1800
Administration	day	199	10	1985					1985
F. TOTALS				11,466					11,466

PART VII - APPROVALS

1. _____ _____
Forest Supervisor Date

2. _____ _____
Regional Forester Date