Date of Report: 12/13/04 final

BURNED-AREA REPORT
(Reference FSH 2509.13)

PART I - TYPE OF REQUEST

A. Type of Report

[x] 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

[x] 3. Final Report (Following completion of work)

PART II - BURNED-AREA DESCRIPTION

A. Fire Name: Fridley

B. Fire Number: MT-GNF-01-048

C. State: Montana

D. County: Park

E. Region: 1

F. Forest: Gallatin

G. District: Livingston

H. Date Fire Started: 8/19/2001

I. Date Fire Contained: 9/13/2001

J. Suppression Cost: $12,500,000

K. Fire Suppression Damages Repaired with Suppression Funds
1. Fireline waterbarred (miles): not completed
2. Fireline seeded (miles): not completed
3. Other (identify):

L. Watershed Number: 10070002040 (100%)

M. Total Acres Burned: 26,373
NFS Acres(17,165) State (649) Private (8,559)

N. Vegetation Types: Primarily lodgepole pine, with some sagebrush, douglas fir, subalpine fir, whitebark pine, meadow, riparian, aspen

O. Dominant Soils: The landscape is dominated by Mollic Cryoboralfs, loamy-skeletal with rock outcrops and Argic Cryoborolls, loamy-skeletal on steep breaklands and glacial troughwalls (45% to 70% slope, elevation

range 6500 to 8000 ft.) A small part of the landscape is Mollic Cryoboralfs, fine-loamy and loamy-skeletal (5% to 20% slope, elevation 7800 to 8500 ft.) on broad ridgetops.

P. Geologic Types: The landscape is dominated by eroded Tertiary volcanic rocks (andesite lava flows, mudflow breccias, and welded tuffs.) There is some limestone, shale, and sandstone in the Trail Creek drainage, primarily on private lands.

Q. Miles of Stream Channels by Order or Class:

1st Order – 47.5 miles. 2nd Order – 10.3 miles. 3rd Order – 9.7 miles. 4th Order – 2.8 miles.

R. Transportation System

Trails: 23 miles Roads: 82 miles

PART III - WATERSHED CONDITION

A. Burn Intensity (acres): 887 (unburned) 945 (low) 4,494 (moderate) 20,047 (high)

B. Water-Repellent Soil (acres): 12,000

C. Soil Erosion Hazard Rating (acres):
___ (low) 24,363 (moderate) 2,413 (high)

D. Erosion Potential: 6.83 tons/acre

E. Sediment Potential: 1,095 cubic yards / square mile

PART IV - HYDROLOGIC DESIGN FACTORS

A. Estimated Vegetative Recovery Period, (years):	5 years for understory; 25-50 for conifers.
B. Design Chance of Success, (percent):	80
C. Equivalent Design Recurrence Interval, (years):	10 years
D. Design Storm Duration, (hours):	24 hrs
E. Design Storm Magnitude, (inches):	2.2
F. Design Flow, (cubic feet / second/ square mile):	14.4
G. Estimated Reduction in Infiltration, (percent):	60%
H. Adjusted Design Flow, (cfs per square mile):	33.6

PART V - SUMMARY OF ANALYSIS

A. Describe Watershed Emergency:

The Fridley fire was a large, very intense fire in an area with high downstream aquatic values. Yellowstone Cutthroat trout exist in West Pine and Trail Creeks and brook trout exist in Eightmile Creek. Irrigation

diversions exist from several creeks affected by the fire. Private instream fishing and irrigation ponds exist in Eightmile Creek. Eightmile Creek drains directly into the Yellowstone River which has high fisheries values. Culverted road crossings occur in several streams. Potential effects from the Fridley Fire include accelerated erosion, increased storm peak flows, elevated sediment yields, and nutrient, turbidity, and temperature impacts to affected streams. Preliminary sediment modeling indicates that the % over natural sediment will increase from 5-24% (pre-fire) to 24 to 168% (post fire). Projected storm flows will double during the year after the fire in some watersheds at the Forest boundary. Smaller watersheds would likely have a much larger increase, particularly small watersheds with 100% high intensity burn which have intense rain events over most of the watershed. The most likely damaging storms will occur during the summer of 2002. Intense summer thunderstorms could cause sheet erosion, rilling, debris torrents, water quality impacts, and significant peak flow increases. The result of these processes would include:

1) Sedimentation and water quality impacts in both Trail Creek and West Pine Creek that would further retard the recovery of Yellowstone cutthroat trout
2) Sediment deposition in instream ponds in Eightmile Creek
3) Peak flows entraining logging debris and exceeding culvert capacity of roads within and downstream of the fire perimeter. These stream crossings could fail adding additional sediment to the streams; and
4) Filling of downstream ditches that may hamper private landowners from irrigating their lands
5) Accelerated erosion and sedimentation from overland flow concentration in roads and trails
6) Loss of soil productivity
7) Scouring and erosion of stream channels

The NRCS review of private lands concluded that there is no threat to human life. Several facilities of concern were identified below the fire including: culverts on Trail Creek may not pass the 10 year-24hr design storm, a cabin on Trail Creek which is potentially within the 10 year floodplain, erosion of roads in Trail Creek, under sizing of the West Pine Creek culvert on the Trail Creek road, and under sizing of pond spillways in 2 in-stream ponds in Eightmile Creek.

B. Emergency Treatment Objectives:

1) To reduce erosion and sedimentation from streamside zones and filter sediment eroded from adjacent sideslopes.

2) To protect crews installing drainage and erosion control measures along roads and trails by removing hazard trees.

3) To reduce concentration of water and subsequent erosion on Forest system roads and trails and reduce erosion and sedimentation on the downslope side of these roads and trails.

4) To remove corduroy log crossings on a tributary to West Pine Creek that could potentially plug culverts and cause accelerated bank erosion.

5) To reduce concentration of water and subsequent erosion on roads and skid trails.

6) To prevent expansion of noxious weeds in the burned area.

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

Land 90 % Channel 90 % Roads 90 % Other 80% (trails)

D. Probability of Treatment Success

	Years after Treatment		
	1	3	5
Land	80	90	95
Channel	100	100	100
Roads	75	80	85
Other	80	85	90

E. Cost of No-Action (Including Loss): $1,454,000

F. Cost of Selected Alternative (Including Loss): $810,000

G. Skills Represented on Burned-Area Survey Team:

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

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After 9/13/2001

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H. Treatment Narrative:

Land Treatments:

Seeding High Intensity Burned Streamside Zones

Location: Trail, West Pine, and Eight Mile Creeks.

Several miles of Trail, West Pine, and Eightmile creeks were intensely burned in the Fridley Fire. Before the fire, vegetation in these riparian areas protected streamside soils and filtered sediment from the steeper side slopes and therefore prevents movement to the streams. With this vegetation consumed, streamside soils will erode and sediment can be transported from the high intensity burn, steep slopes to stream channels. Trail and West Pine creeks are habitat to the Yellowstone cutthroat trout. Eightmile Creek is Eastern brook trout habitat. Downstream irrigators heavily use all streams.

Aerial seed the National Forest lands within the Fridley Fire boundary with 30 lbs/acre of annual winter wheat 250 feet on each side of the streams where slopes are less than 40 percent. 30,000 pounds of seed will be needed to accomplish this task. Grazing should be eliminated for 1-2 years to allow establishment of the annual grasses and native plants within the riparian areas.

Trail Creek and Tribs	3.0 Miles	170 Acres
West Pine Creek and Tribs	3.8 Miles	230 Acres
Eight Mile Creek	10.0 Miles	600 Acres
Total	16.8 Miles	1,000 Acres

Skid Trails on Steep Slopes in Section 7

Location: T4S, R8E, Section 7.

Observations: Section 7 is a recently acquired property with numerous down slope and excavated skid trails. These skid trails were constructed without any drainage. The cumulative effects of roads without drainage, poorly located skid trails, fire, grazing, and an intense summer thunderstorm could lead to severe sheet erosion, rilling, and debris torrents on the slopes and massive sedimentation in West Pine Creek.

Aerial seed 220 acres that include several skid trails and roads. This treatment is designed to improve drainage and prevent the concentration of water.

Temporary range fences

To prohibit livestock from moving into protected areas, provide for temporary fences in areas where natural barriers were burned. This is a special concern along West Pine Creek. BAER project funds may be supplemented with District or private funding to allow for a more permanent fence option.

Noxious weeds

Aerial seed areas next to known noxious weed infestations with a perennial mix to allow for prompt revegetation of suitable grasses in formerly forested stands on warm, dry sites. This practice will have the effect of discouraging the introduction of noxious weeds.

Expansions of noxious weeds infestations identified in the noxious weed monitoring will be hand pulled or treated with herbicides for up to 3 years. Interim funding requests to treat any expansion of noxious weeds will be submitted in subsequent years.

Log erosion barriers

25 acres of log erosion barriers would be installed in a 25-acre treatment watershed in West Pine Creek to facilitate Pete Robichaud's BAER monitoring.

Replace Culverts in Fish Bearing Streams and Other Perennial Streams (North Fork Pine Creek)

Objective

Emergency conditions in high severity burn areas have been modeled for increased flows. This treatment is to ensure that culverts are capable of passing flood flows and to ensure culverts are designed to accommodate fish passage.

Method

The size of culvert to be placed in perennial fish bearing streams will be designed to simulate the natural stream to true bank full width as described by Rosgen, 1994. As a minimum, the effective cross sectional area

should be equal to or greater than channel cross sectional area at bank full. The culverts will be set at natural stream grade or slightly flatter to accommodate fish passage.

Objectives
Emergency conditions in high severity burn areas have been modeled for increased flows. This treatment is to ensure that culverts are capable of passing flood flows.

Methods
Culverts will be upsized due to storm flow modeling predictions where slopes above have burned at high severity levels. Remove existing culverts; install new CMP with flared inlet at stream grade. Place excess fill material in areas where it will not be delivered to the stream channel. This treatment will be applied across the fire area.

Re-contour Roads

Objective
The 4.5 miles of road proposed for re-contouring are those within the Wilderness Study Area in sections 12 and 13. The roads in section 13 were recently constructed by a private timber company with reserve rights to the timber after the exchange of lands. The roads have never been on the forest system and because of the WSA the forest never intended to put the roads on the system. The roads in section 12 have basically the same issue, they are old access roads into the section 13 when it was private. All of these roads were poorly built and have a very high likelihood of mass wasting of road fills. On the transportation plan these roads are shown as historic roads and are not currently considered part of the long-term transportation system.

When road prisms are not needed and have been taken off the travel system, this treatment will restore slope hydrology and facilitate the storage of water on the slopes, thus help eliminate the overall water yield and threat of floods. This treatment also helps decrease the threat of soil erosion and sediment delivery to streams by reducing the chance of road fill failure into streams.

Methods
The fill will be pulled uphill to the natural slope when possible. Decompact the inside one half of the road prism before pulling the fill slope up. Leave unconsolidated material to form a good seedbed. Pull any slash or logs available up over the re-contoured fill to prevent erosion. Seed and mulch the road, especially in stream crossings. At stream crossings, restore the stream to natural stream gradient and natural channel dimensions.

Remove Culverts and Road Fills, convert to Shallow Stream Fords
(West Pine A-spur)

Objective
Emergency conditions in high severity burn areas have been modeled for increased flows. Where roads are going to be put in long term storage, culverts will be removed to ensure the channel is capable of handling flood flows and stream banks will be layed back to the original stream bank contour, stream gradient, and natural stream alignment. The A-spur currently crosses Pine Creek on a 48” culvert. The modeling shows a likely storm event flow of 433 cfs will completely overwhelm this culvert installation making it extremely vulnerable to overtopping and fill erosion. The site would not easily accommodate a larger diameter culvert, so the decision is to remove the culvert until the drainage begins to recover.

Method
The fill material will be removed and placed on the road prism. Stream banks will be re-contoured to natural stream bank slope contour to prevent scouring and sediment entrainment. Protection of the fresh cut slopes with matting, seeding and some rock will be necessary.

Remove Culverts and Road Fills, convert to Shallow Stream Fords
(West Pine Road)

Drainage Dips (all open system roads)

Objectives
This treatment will decrease the threat from flood damage on roads and delivery of sediment to streams by draining water from road surfaces in high severity fire areas.

Methods

The drainage dips will be designed to drain water off of the road, but still allow motorized vehicle crossing. The dips are typically skewed 30 degrees and the outlets will be armored with riprap in most areas, particularly those in close proximity to the streams or on a vulnerable fill slope. Where soils are fine textured and lack resistance to scour, the dips will be surfaced for durability and resistance to deterioration and ponding.

G. Water Bars
(all roads scheduled for additional ripping and seeding)

Objective

This treatment will be used to reduce the threat of increased flow of water from severely burned slopes above the road, from running down the road causing rilling and excess sediment to be deposited in stream channels. This treatment will disperse the flow of water over the fill-slope to more stable areas.

Method

Water bar is constructed by excavating road to a depth of one foot at a 30 degree angle and placing the excavated material as a berm immediately adjacent to the excavation on downhill side spread evenly across the road surface.

Road Decompaction and Seeding

Objective

The treatment is designed to restore natural drainage patterns and disperse overland flows rather than concentrating it on road surfaces. This treatment dramatically reduces sediment delivery to streams channels.

Methods

Remove culverts and fill, and restore stream channels to natural stream gradient, bankfull width, and natural streambank slope. Place available slash on recon toured streambanks for erosion control. Rip the road to desired depth and seed and fertilize.

Hazard Tree Removal

Objective

This treatment reduces the chance for damage to life or property by reducing the risk of trees falling on workers executing the above treatments.

Methods

Fell and remove any hazardous burned trees that are located along roads.

Trail System Treatments

Hazard tree and rock removal for crew safety

Drainage structures such as check dams, water bars and drain dips

Signs installed at trailheads or portals, inform the public about entering a burned landscape and the associated hazards.

Channel Treatments:

Tributary to West Pine Creek Log Corridor Crossings

Location: T4S, R8E, NW ¼ of Section 7.

An old skid trail with log corridor crosses this tributary to West Pine Creek. Increased flows and debris due to the wildfire will likely wash out this crossing and entrain wood and plug the downstream culvert on Road 978.

The log corridor crossing should be removed to prevent entrainment and blocking of the downstream culvert. The crossing will need a crew of two individuals ½ day to accomplish this task. A chain saw will also be needed.

I. **Monitoring Narrative:**

(Describe the monitoring needs, what treatments will be monitored, how they will be monitored, and when monitoring will occur. A detailed monitoring plan must be submitted as a separate document to the Regional BAER coordinator)

Fridley Fire – Post-fire Burn Area Emergency Rehabilitation Monitoring Plan

Background

Within the Yellowstone Sub basin and specifically within the Fridley Fire perimeter, there are some unanswered questions:

1) How will soil erosion and hydrophobic conditions respond to BAER treatments;
2) How quickly will vegetation recover in treated and untreated areas;
3) How effective will road and trail treatments be to preventing erosion;
4) How will stream channels respond to BAER treatments;
5) How quickly will fish populations respond to watershed treatments and recovery; and
6) Will invasive species spread into the burned areas via roads and trails?

To answer these questions we propose to monitor these actions. This monitoring will ensure that rehabilitation treatments are functioning as planned and are effective. The monitoring will also include the post-fire presence of invasive species. This Interim Report only includes monitoring costs for the first year after the fire. Funding for subsequent years monitoring activities will be requested in future Interim Reports.

Proposed Activities

1) Soil Erosion Monitoring. Hydrophobic soil testing and erosion rates will be monitored in intensely burned watersheds on both treated and untreated lands. Erosion rates will be measured by ocular means and photo plots on seeded and unseeded slopes for a period of three years. During the first year, monitoring will be coordinated with the USGS to evaluate the effectiveness of BAER treatments of road prisms on soil erosion and debris flows. Costs will be $8,000 for the first year and $6,000 per year for the next years - total cost: $14,000.

2) Vegetative Recovery Monitoring. Vegetative plots will be monitored in intensely burned watersheds on both treated and untreated lands. Recovery rates will be determined on seeded and unseeded slopes for a period of three years. Costs will be $1,000 per year for the three-year study - total cost: $3,000.

3) Road and Trail Treatments. Roads and trails will be inspected for two years following the installation of water bars and cross drains. Effectiveness of treatments and the need for additional treatments will be determined. Costs will be $2,000 per year for the two-year study – total cost: $4,000.

4) Stream Cross Sectional Monitoring. Stream reference sites will be established on West Pine Creek and Eightmile Creek. Channel cross-sections and gradients will be surveyed. Wolman pebble counts will be established. These measurements will establish post-fire and pre-flood conditions in these streams. The cross sectional measurements will be repeated during the fall of 2002 and 2003 to determine trends. Costs will be $1,250 per year for three years – total cost: $3,750.

5) Fish Population Monitoring. Fish populations will be determined in Trail and West Pine creeks this year and in 2002 to determine the effectiveness of watershed treatments and the recovery of the habitat and Yellowstone cutthroat species. Shocking will be used to determine populations. Costs will be $750 per year for three years – total cost: $2,250.

6) Monitoring of Invasive Species. Visual monitoring of trails and roads, three times per year will determine if invasive species, such as Canadian thistle, hounds tongue, and knapweed are spreading into the burned area. Forty-one miles of roads, 18 drop points, 0.81 miles of dozer line, 37 miles of hand line, and 10.4 miles of trail will be monitored. Costs will be $10,000 per year for three years following the fire – total cost: $30,000.

7) Peter Robichaud BAER Effectiveness Treatment Monitoring. Peter Robichaud has established a monitoring study of BAER treatments in the Fridley Fire. The study is on paired intensely burned 25 acre watersheds within the West Pine Creek watershed. Log erosion barriers were installed in one watershed only. The control watershed will not be treated. Effectiveness of the log erosion barriers is monitored by determining erosion levels in the treated and untreated watersheds. The monitoring work includes $80,000 for installation and monitoring and $8,000 for monitoring logistical support from the Gallatin Forest.

The total cost for the first year of monitoring is $117,000 which is included in this report.

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

See attached spreadsheet: for final Fridley BAER accounting and accomplishment. Total spent was $461,253.60 against an authorization of $466,706 for a balance of $5,452.40

PART VII - APPROVALS

1. /S/ Richard Inman — 9/13/2001
   Forest Supervisor (signature) — Date

2. /S/Kathleen A. McAllister — 9/14/2001
   Regional Forester (signature) — Date

3. /S/Joel D. Holthrup — 9/18/2001
   Director WFWAP (WO) (signature) — Date