USDA-FOREST SERVICE **FS-2500-8 (6/06)**

Date of Report: Oct. 20, 2007

Edited D. Kennell 10/20/07

BURNED-AREA REPORT
(Reference FSH 2509.13)

PART I - TYPE OF REQUEST

A. Type of Report

[X] 1. Funding request for estimated emergency stabilization funds
[ ] 2. Accomplishment Report
[ ] 3. No Treatment Recommendation

B. Type of Action

[ ] 1. Initial Request (Initial Full Assessment for Payette NF)

[X] 2. Interim Report # 4
[X] Updating the initial funding request based on more accurate site data or design analysis

Report #3 clarifies a few question related to Trails and adds RMRS and Dr. Pete Robichard Paired Watershed Hillslope Mulch Treatment Effectiveness Monitoring. New information and request are highlighted in yellow.

[ ] Status of accomplishments to date

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

PART II - BURNED-AREA DESCRIPTION

A. Fire Name: Cascade Complex

B. Fire Number: ID-SIS-007058

C. State: Idaho

D. County: Valley

E. Region: R4

F. Forest: Payette NF

G. District: Krassel RD

H. Fire Incident Job Code: P4DR27

I. Date Fire Started: July 17, 2007

J. Date Fire Contained: TBD - First large snowfall**.**

K. Suppression Cost: $53,200,000 to date

L. Fire Suppression Damages Repaired with Suppression Funds (Limited suppression activities with the exception of point protection of homes occurrred on the PNF)

1. Fireline waterbarred (miles): < 1 mile
2. Fireline seeded (miles): 0
3. Other (identify): Duff and organic matter pulled back onto handline**.**

M. Watershed Number: 1706020801-Upper South Fork Salmon River (SFSR) and 1706020802-Upper East Fork South Fork Salmon River (EFSFSR)

N. Total Acres Burned: Total to date = 302,376 acres, 37,598 acres on PNF plus the acreage along the SFSR Road Corridor on the BNF. NFS Acres (98%) Other Federal (0%) State (1%) Private (1%)

O. Vegetation Types: The portion of the fire with which we're concerned exceeds 4,000 feet in elevation and burned through a variety of forest types, including ponderosa pine (*Pinus ponderosa*) forest and plantations, Douglas fir (*Psuedotsuga menziesii*), western larch (*Larix occidentalis*), and grand fir (*Abies grandis*) at intermediate elevations (the so-called mixed conifer association), alpine fir (*A. lasiocarpa*) and Englemann spruce (*Picea englemanni*) at higher elevations (the spruce-fir association), and lodgepole pine (*P. contorta*) scattered throughout in suitable locations. Shrubby streamside vegetation includes alder (*Alnus sinuata*), which may also occupy springs, seeps, and roadsides where groundwater is intercepted, willow (*Salix spp.*), and aspen (*Populus tremuloides*), while thimbleberry (*Rubus parviflorus*) and gooseberry (*Ribes sp*.) may occupy various favorable sites. Streamsides also naturally support various sedges (*Carex spp.*) and grasses, some species of which, like elk sedge (*C. geyeri*) and pinegrass (*Calamgrostis rubescens*) also occur in upland locations. Many of these resprout quickly if the soil is not severely burned.

P. Dominant Soils: The subbasin is highly dissected with very high relief. Soils are typically shallow and erode readily. Examples include: Typic and Lithic Cryochrepts, Cryorthents and Cryumbrepts Xeropsamments.

Q. Geologic Types: The SFSR subbasin comprises approximately 812,750 acres, primarily in the granitic Idaho Batholith but with some other geologic formations, including Challis Volcanics, near the headwaters of the EFSFSR.

R. Miles of Stream Channels by Order or Class: 92.4 miles ranging from small first through third headwater streams to large main headwater rivers such as the SFSR and EFSFSR.

S. Transportation System

Trails: 10.5 miles **Roads:** 32.9 miles

PART III - WATERSHED CONDITION

A. Burn Severity (acres): 6,255 (23% - low) 10,511 (39% - moderate) 10,214 (38% - high) [BARC]

B. Water-Repellent Soil (acres): Unknown

C. Soil Erosion Hazard Rating (acres): 6,255 (23% - low) 10,511 (39% - mod) 10,214 (38% - high)

D. Erosion Potential: 3.2 tons/acre

E. Sediment Potential: 20 to 5,000 cubic yards / square mile TBD (see narrative below)

In 1964 and 1965, following the Poverty Flat Fire and subsequent salvage logging, intense storm events and the resulting runoff literally inundated the SFSR with sediment that blanketed the streambed and covered many important spawning and rearing areas used by anadromous fish. The flood report from this event estimated that 100,000 yds^3 of sediment were delivered to stream channels during these floods, and that 45% originated in the Poverty Flat Fire area and that the trenched and planted areas were more severely damaged than the unlogged areas on the opposite side of the river (Jensen and Cole 1965).

PART IV - HYDROLOGIC DESIGN FACTORS

A. Estimated Vegetative Recovery Period, (years): 2-5

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

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

D. Design Storm Duration, (hours): 6 hr 2 hr

E. Design Storm Magnitude, (inches): 1.8 in 1.2 in

F. Design Flow, (cubic feet / second/ square mile): 24.2

G. Estimated Reduction in Infiltration, (percent): 20

H. Adjusted Design Flow, (cfs per square mile): 29.1

The upper SFSR has a history of periodic flooding, generally on a cycle of about 10-15 years. This winter will be 10 years after the last major rain-on-snow flood event. In addition, there is some indication that La Niña (cold phase of the El Niño – Southern Oscillation) conditions may be developing; major flooding in the SFSR was frequently shortly after La Niña years (1964, 1973, and 1995).

PART V - SUMMARY OF ANALYSIS

A. Describe Critical Values/Resources and Threats:

Cascade Complex Wildland Fire

The Cascade Complex Fires started during a lightning bust on July 17, 2007. Several individual escaped fires grew large enough to merge. Most of the fires were on the Boise National Forest and in the SFSR subbasin; however, one fire, the North Fork Fire, started in the Gold Fork watershed of the North Fork Payette River subbasin and burned over the ridge into the SFSR in the vicinity of Dollar Creek. Although most of the complex is on the Boise National Forest (BNF), the northern front of the North Fork portion of the fire is on the Payette National Forest (PNF). In addition, the Riordan Fire in the Johnson Creek watershed, a tributary of the EFSFSR, crossed into the PNF near Stibnite. The PNF also has maintenance responsibility for the SFSR Road north of the Warm Lake Road. The SFSR Road has been severely damaged by this fire and the East Zone Fire Complex to the north; consequently, the PNF is accepting Burned Area Emergency Response (BAER) responsibilities for the entire SFSR Road and the PNF Administrative Portion of the Cascade Fire Complex in the Upper SFSR and the Upper EFSFSR subwatersheds near Stibnite.

Catastrophic Fire History in Upper SFSR

In 1961, the Poverty Flat Fire burned in the Upper SFSR subwatershed in the vicinity of Goat Creek, Sisters Creek, Twin Creek, and Snowslide Creeks. The burned area was salvage logged and reforested using an extensive network of roads and contour trenches. Then, late in 1964 and in the spring of 1965, intense storm events and the resulting runoff literally inundated the SFSR with sediment that blanketed the streambed and covered many important spawning and rearing areas used by anadromous fish. The flood report from this event estimated that 100,000 yds^3 of sediment were delivered to stream channels during these floods, and that 45% originated in the Poverty Flat Fire area and that the trenched and planted areas were more severely damaged than the unlogged areas on the opposite side of the river (Jensen and Cole 1965). Timber harvest was suspended in the watershed in 1965, pending restoration of streambed conditions. Many roads, including system, non-system, and rehabilitated roads, continue to provide sediment to the river. In 1994 the main SFSR Road, which parallels the river was paved in an effort to remove an obvious source of material. The Goat Creek, Twin Creek, Sister Creek, Snowslide Creek, Bearhill Creek, and Silver Creek subwatersheds in

the Cascade Complex burned severely hot leaving little potential for heavy needle casts in much of the area (Table 1). In addition to the high extent of moderate and high burn intensities, these subwatersheds have some of the highest erosion hazards on the Payette NF.

Table 1.—Extent of moderate and high burn intensities (based on BARC)

Watershed	Total Acres	Erosion Hazard	Burn Intensity Class					
		Mod-High	Moderate		High		Both	
		Percent (%)	Acres	%	Acres	%	Acres	%
Goat Creek	4291	90	1446	34	1161	27	2607	61
Sister Creek	1563	88	292	19	357	23	649	42
Twin Creek	657	86	224	34	321	49	545	83
Snowslide Creek	670	86	238	36	187	28	425	63
Bearhill Creek	265	100	132	50	12	5	144	54
Silver Creek	651	98	227	35	22	3	249	38
Other	985	90	299	30	101	10	400	41
Total	9082	91	2858	31	2161	24	5019	55

In addition to the *damage to the SFSR Road*, much of the old timber roads, contour trench network, and fill placed across ephemeral drainages remains in place.

South Fork Salmon River (SFSR) Road

The Exigency BAER request is based only on fire damage assessment associated with the Cascade Complex on the Boise and Payette National Forest, along approximately 13 miles of the SFSR Road. The Forest requests immediate approval of exigency work associated with the need to protect life and road infrastructure associated with erosion control and water management structures that were damaged or destroyed by the Fire. In addition to providing the only road access in the winter to the community of Yellow Pine, controlling erosion and mass failures along the road protects ESA listed spawning habitat in the SFSR for Chinook salmon, Steelhead, and Bull Trout.

In fiscal year 1989 Appropriation Bill (H.R. 4867), Congress directed that the SFSR Road be paved and erosion be controlled through a line item appropriation of 8 million dollars. The SFSR Road begins at the Warm Lake Highway and continues parallel along the SFSR for approximately 31 miles. The two primary objectives of this project are to: 1) Reduce long-term sediment delivery to the SFSR, and 2) Maintain motorized access on the SFSR Road and provide the only winter access to the community of Yellow Pine.

Threat to life and the SFSR Road Infrastructure

The Fires burned several critical road infrastructure water management and erosion components. It is critical that these structures be replaced or repaired to allow safe public and administrative travel along the road. The following is a short summary of the damage and associated critical values and specific threats:

1. *HDPE Culverts:*

A total of 142 plastic culverts were destroyed or severely damaged by the fire. The plastic culverts that caught fire on the outlet side were totally consumed due to the chimney effect of the pipe. Pipes size range from 18 inches to 36 inches. Function ranges from inslope ditch cross drains, to concrete drop boxes with plastic culverts extending under 10 feet high hilfiker fill walls, to intermittent and perennial stream channels. The concerns range from road surface collapse under passing vehicles to saturation of entire road fill and mass failure of road sections at the culvert locations. The SFSR Road is the only winter access to the community of Yellow Pine. The SFSR Road will remain closed until repair is completed.

2. *Inlet Retaining Walls:*

A total of 41 wood culvert inlet headwall structures were destroyed by the fire. These relatively small oil treated wooden structures stabilize the oversteeped cutslope immediately above road relief culverts. Failure of the cutslope would plug the relief culverts and may result in fill and road prism failures and increased sediment to the SFSR.

3. *HPDE Culvert Downspouts*

A total of 50 HDPE culvert downspouts were totally destoyed by the fire. These downspouts were located on fillslope sites on highly vulnerable landtypes. Most of these sites provide direct delivery to streams. If these downspouts are

not replaced, gully erosion and potential mass failure will threaten critical ESA salmon and Steelhead spawning habitat and compromise the SFSR road features.

4. Coutour Log - Vegetation Cutslope Stabilization Sites:

All cutslope sites consisting of contour logs and associated planted erosion control vegetation were completely consumed by fire. Sediment is currently perched above the fire consumed logs. Planted deep rooted native shrubs and conifers were killed. If these sites are not stabilized, surface erosion and potential mass failure will compromise the SFSR water management features.

5. Log Grid - Vegetation Cutslope Stabilization Sites:

All cutslope sites consisting of log grid structures and associated planted erosion control vegetation were completely consumed by fire. Sediment is currently perched above the fire consumed logs. Planted deep rooted native shrubs and conifers were killed. If these sites are not stabilized, surface erosion and potential mass failure will compromise the SFSR water management features.

6. Cut and Fill Slope Erosion Vegetative Erosion Control:

Originally nearly one half million dollars of vegetative erosion control was used on the SFSR Road cut and fill slopes. It is estimated the approximately 210 acres need treatment due to the severity of the burn on these slopes due to accumulated jack piles and heavy fuels. Several of these sites that need treatment are directly above perennial and ephemeral stream culverts or inslope ditch relief culverts. Failure to stabilize these slopes may result in culverts being plugged. The Forest plans to use the Forest Watershed Crew and Forest Hydroseeder to apply erosion control grass seed, PAM-12, mulch, and fertilizer to a total of 210 acres along the cut and fill slopes.

7. Rock Rollout and Fallen Snags:

The fire on steep slopes have caused both rocks, granitic sand, and burnt snags to fall onto the road, inslope ditches, culvert inlets, and cutslopes. These hazards need to be stabilized or removed.

8. Monitoring Patrols:

It is expected that rollout and debris will continue to fall onto the road, inslope ditches, culvert inlet, and cutslopes throughout the winter requiring ongoing hazard removal. Removal of debris will protect public safety and maintain drainage features.

9. Road Warning Signs:

Approximately 30 road safety and warning signs were severely damaged or destroyed and need to be replaced.

Goat Creek Culvert (SFSR Road)

Prior to the Cascade Complex Wildland Fire the SFSR Road Goat Creek Culvert was scheduled to be replaced with a 22 foot open bottom arched culvert. This was to occur under an awarded contract and be implemented from August through October of 2007. This project is required in the NOAA Fisheries Biological Opinion associated with the original SFSR Road Project FEIS. It was determined that the 8 foot steel shotgun culvert with over 8,000 cubic yards of fill on top posed an unacceptable risk to the listed T&E fisheries. The fire and subsequent need to replace over one hundred and fifty burned out HDPE culverts along the SFSR Road has required the Forest to postpone the Goat Creek Culvert Replacement Contract until fall of 2008. The issue of culvert failure identified in the FEIS has now been exacerbated due the high burn intensity within the Goat Creek subwatershed. Replacement this fall is not an option because the road will not be open until HDPE culverts are replaced. It is necessary to mitigate the impaired watershed conditions within the Goat Creek subwatershed until the Goat Creek Culvert contract is implemented.

Sister Creek and Twin Creek Culverts (SFSR)

These two steel culverts in the SFSR Road were not upgraded and replaced with larger HDPE culverts during the SFSR Road Project. It was determined that several existing metal culverts would be left in place because they were deep seated and replacement costs were prohibitive. None of the metal culverts were destroyed by the fire. There is now a higher risk of these culverts to fail due to the high fire intensity and high inherent erosion risk within these two drainages. It is necessary to mitigate the impaired watershed conditions in these subwatersheds as an alternative to culvert upsizing and replacement.

High Intensity Fire on High Inherent Erosion Landtypes along 4 miles of the SFSR Road.

On August 12, 2007, the North Fork Fire made a major run, burned acrossed lands previously impacted by the 1989 Dollar Fire, jumped across the SFSR, and burned to the top of east side of the SFSR watershed through the area previously burned by the 1994 Thunderbolt Fire. That 20,000 acre run resulted in a high intensity burn along 4 miles of the SFSR Road. There are three major moderately high to high inherent erosion risk landtypes (LT) along this section of the SFSR Road and the 1961 Poverty Flat Fire. The Strongly Dissected Mountain Slope Land - LT120c, "exhibit some of the most severe hazards for logging and road building on the District…These lands have in the past produced large amounts of sediment in connection with road activities…These lands produce considerable amount of sediment to the streams...roads and fills on these land types are quite difficult to stabilize." The River Breaks Land - LT 122, "are among the most geological unstable lands in the survey area. They have one of the highest natural geological erosion rates in the survey area. The inherent erosion hazard of this unit range from moderately high to high. The erosion hazard and mass stability hazard for road construction on these kinds of lands range from moderately high to high on all aspects." The Faulted Bench Land - LT 123, "The inherent erosion hazard is moderate and the surface erosion hazard for road cuts, fills, and road surface range from moderate to moderately high. The fill slope mass stability hazard ranges from moderate to moderately high. This unit would result in moderately high amounts of sediment to the drainages".

In addition to the streams mentioned in Table 1, immediately above the road and above the river, there are dozens of small intermittent and ephermal drainages ranging from 1 to 40 acres in size. These small moderately high to high erosion risk land types pose a direct threat to public safety along the road from dislodged rockfall to debris flows. Impaired watershed conditions pose a direct threat from increase runoff to HDPE replaced, existing undersized steel culverts, road cuts and fills, and travel way sections.

Old Abandoned Roads with Unmaintained Culverts and Fills Across Intermittent Drainges.

There are a total of 6 separate abandoned road segments for a total 2.6 miles that have been identified for land treatment. These abandoned roads are along the Goat Creek to Old Poverty Flat Fire section of the SFSR Road that had a high burn intensity on moderately high to high erosion landtypes. A total of 3 metal culverts and 2 log culverts have been identified that need to be removed. A total of 10 ephemeral draws with road fill and no drainage structures exist. These roads will be used for temporary access to mulching land treatment sites and then will be obliterated. The high intensity of the fire removed the vegetation that had become established on these abandoned roads and now pose a high risk for further degradation from illegal ATV and motorized vehicle use in a sensitive area closed to cross-country motorized access.

Fisheries Resources

The SFSR supports three Salmonoid species listed as **Threatened** under the Endangered Species Act of 1969 (ESA, 16 USC 1531 *et seq*.): Chinook salmon (*Oncorhynchus tshawytscha*), Snake River steelhead (*O. mykiss*), and Columbia River bull trout (*Salvelinus confluentus*); the last is designated a "Management Indicator Species" (MIS) under the PNF Land and Resource Management Plan (LRMP). Salmonoid species that also occur but are not listed under ESA include redband trout (the resident form of *O. mykiss*), westslope cutthroat trout (*O. clarkii lewisi*), a species designated as "Sensitive" by the Intermountain Regional Forester, and Eastern brook trout (*S. fontinalis*), a widely distributed naturalized species native to eastern North America.

The principal streams in the upper SFSR involved in the Cascade Complex include Goat Creek, Sister Creek, Twin Creek on the east side of the SFSR, and the mainstem SFSR itself. According to Platts et al. (1989), about 75% of the Chinook salmon that spawn in the SFSR spawn in the upper 31 miles of the river. The three largest spawning areas are downstream of the mouths of these streams affected by the fire, with the nearest being at Poverty Flat. The SFSR is used for Chinook salmon broodstock for the McCall Hatchery as part of the Idaho Supplementation Study, and the Idaho Department of Fish and Game (IDFG) has been implementing a sport fishery for surplus adult steelhead for the past several years.

Bull trout undoubtedly use the mainstem SFSR as a migration corridor because there are known resident populations farther upstream and in some upper SFSR tributaries (Platts and Nelson 1988; Platts and

Partridge 1978, 1983), and individuals of migratory size have been collected from the headwaters portion of the SFSR itself (R.L. Nelson, personal observation).

Streambed fine sediments smaller than 4.75mm at the Poverty Flat spawning area reached a high of 46% by volume in 1969 and declined to about 20% in 1984 (Platts *et al*. 1989). Payette NF sampling studies show that the Poverty Flat spawning area had 33.3% streambed fines smaller than 4.75mm with a non-significant upward trend over the past 10 years. The Poverty Flat spawning area is described as **Functioning at Unacceptable Risk** based on a 5-year average fines smaller than 6.3mm by volume concentration of 34.4% and several years in excess of 36% (Nelson and Burns 2007a).

The EFSFSR supports the same assemblage of fish as the upper SFSR. Chinook salmon and steelhead spawn in the EFSFSR upstream to at least Double A Creek (R.L. Nelson, personal observation), though Chinook broodstock have been planted as far upstream as Meadow Creek above the Glory Hole, where returning adults are prevented from ascending farther by the cascading inlet to the pool. Bull trout use the EFSFSR as a migration corridor in summer and spawn in several of the principal tributaries (Hogen and Scarnecchia 2006). These bull trout populations appear to be relatively robust and large numbers can be found mainstem EFSFSR during the summer migration period (D.M. Hogen, personal communication; R.L. nelson, personal observation).

Noxious Weeds

Three designated noxious weeds; spotted knapweed (*Centaurea maculosa),* rush skeletonweed *(Chondrilla juncea),* and canada thistle (*Cirsium arvense;)* currently infest ~30 acres on a total of ~72 sites within or immediately adjacent to the Cascade Complex Fires on the Payette NF. Two other invasive species, cheatgrass (*Bromus tectorum)* and sulfur cinquefoil (*Potentilla recta)*have also invaded disturbed sites. The vegetation currently occupying this ecosystem are threatened with further displacement associated with accelerated potential for invasion by these weed species and other invasive plants existing at low elevations in the SFSR and EFSRSR drainage. Noxious weed invasion can be expected in areas within moderate to high intensity burn areas and along roads and trails within the fire area.

NFS Trails & Bridges

A total of 10.5 miles of National Forest trails have been identified within the fire perimeter of the Cascade Complex fires on the Payette NF. The primary threat is loss of infrastructure from impaired watershed conditions. Resource values at risk include access to NFS lands, water quality, and listed ESA aquatic habitat. The SFSR is a listed 303(d) water quality limited segment with a TMDL requiring the Forest to reduce sediment from man-caused activities (road and trails). In addition, the SFSR is listed as critical habitat for 3 listed aquatic species where sediment from roads and trails has been identified as a limiting factor.

The management objectives and direction for various trails vary (i.e. motorized versus non-motorized). Some sections of trail experienced severe damage to the tread. This tread damage is related to ravel associated with loss of vegetation, rock slides, burned out of stumps or other woody material in the tread. The result is a narrower, uneven and rough tread, or in some situations the total disappearance of the trail prism and any discernible travel way.

There will be instances of existing diversion structures (e.g. water bars) being burned out or blocked, which will increase potential for erosion damage to the trail. It is anticipated that problems with gully and erosion channels will worsen with the impaired watershed and trail condition as a result of the fire. It is clear that further damage to the trail system due to runoff erosion will be inevitable, although there may be opportunities to limit it to some extent with spring and early summer work. Although spring run-of is a concern, the majority of expected trail damage is likely to occur from mid to late summer resulting from isolated convective thunderstorms.

The Goat Creek Trail Bridge was severely damaged by the fire. Only three loose log stringers remain. These stringers are heavily spiked with nails. They are currently loose and wobbly on the hand placed rock abutment and pose a serious safety concern for anyone attempting to cross the stream on the log stringers.

NFS Recreation Site Developments & Improvements

The Poverty Campground is within the fire perimeter. There are several other locations along roadways within the perimeter of the Cascade Complex fires with interpretative signs provided for public information & education. The threat to these values & facilities is the potential for loss of site integrity and function. As a result of the fire there will be an expected increase in surface erosion or destabilization of potentially damaging trees and rocks.

B. Emergency Treatment Objectives:

SFSR Road

Objectives: Provide clear and safe vehicular travel along the SFSR Road. The SFSR Road will remain closed until emergency repair work is completed. The SFSR Road provides the only winter vehicular access to the community of Yellow Pine.

Exigency road work will be accomplished this fall and/or next spring prior to snowmelt runoff.

a) Provide clear and safe passage for vehicles along the SFSR Road and to the community of Yellow Pine.
b) Replace 142 burned plastic culverts with metal culverts to establish safe travelway prism.
c) Repair or replace 41 wooden culvert inlet retaining walls to prevent erosion, mass failure, and sustain drainage features.
d) Treat burned out contour logs, grid structures, and deep rooted erosion control vegetation on cut and fill slope by blowing wood fiber mulch, Ag. straw mulch, PAM-12 soil amendment, and hydroseeding on 210 acres of cut and fill slopes to reduce erosion.
e) Plant 1600 stockpiled native shrub species on cut and fill slopes sites to prevent provide long-term stabilization. (long-term w/ NFVW funds)
f) Reduce imminent hazards by removing hazardous downfall and rocks along road inslope ditch, and cutslopes of the SFSR Road.
g) Replace approximately 30 damaged road safety and warning sign to protect public safety.
h) Patrol and monitor the road for expected rollout and removal of hazards throughout the winter.

Land Treatment

Objectives: Mitigate the impaired watershed conditions immediately above and adjacent to the SFSR Road to provide public safety, safety to BAER implementation crews, maintain winter access to the community of Yellow Pine, protect Forest Road infrastructure from additional damage and/or loss, and reduce sedimentation impacts on critical spawning reaches for listed threatened aquatic species.

Land Treatment is planned for this fall, however, because there may be access problems associated with the HDPE culvert replacement and the short window before winter snows - final treatments may be implemented next spring or early summer.

a) Reduce the risk to the BAER implementation contractors working on the SFSR Road infrastructure from erosion, debris slides, and rock fall by mulching immediately upslope and in small ephemeral drainages.
b) Provide clear and safe passage for vehicles along the SFSR Road and to the community of Yellow Pine by reducing the risk of erosion, debris flows, and rock fall.
c) Reduce the risk of failure to the existing Goat Creek, Sister Creek, and Twin Creek Culverts by improving watershed conditions.
d) Utilize existing road templates on 2.6 miles of abandoned roads to blow Ag Straw and Wood Fiber mulch.
e) Remove 3 metal culverts, 2 log culverts, and man-placed fill in ephemeral draws on 10 abandoned road segments.

f) Close 2.6 miles of temporary BAER treatment roads and stabilize by obliterating the road segments to reduce erosion and stabilize slopes.
g) Road obliteration solves the problem of ATV and motorized vehicle use on these now exposed road templates in a sensitive area closed to cross-country motorized use.
h) Apply Ag Straw and Wood Fiber mulch to approximately 400 acres in Goat Creek, Sister Creek, Twin Creek, Snowslide Creek, Little Bear Hill Creek, and Silver Creek through a combination of blowing off the SFSR Road, blowing off of temporary/abandoned roads, hand application, and aerial application.
i) Plant 1600 stockpiled native shrub and conifer species on cut and fill slopes sites to provide long-term stabilization. (Accomplished with NFVW funds)
j) Assist the Rocky Mountain Research Station (RMRS) in application of cut and fill slope mulch treatments on 3 of the abandoned roads and along the SFSR Road. A total of 4 treatments (control, Ag Straw with tackifier, Wood Fiber, and PAM12) will be applied on 10 uniform plots for a total of 40 plots.

Noxious Weeds

Objectives: Prevent identified weed species from encroaching into the burned area. This is accomplished by treating known weed infested sites to prevent invasion into the burned area. By reducing the amount of weed seed in the area and treating new populations, existing plant communities can have time to recover with less competition from invasive plants.

Trail & Bridge Infrastructure

Reduce the risk of additional loss and damage to the NFS trail infrastructure within the South Fork Complex fire perimeter (e.g. by repairing damaged water management features such as burned log water bars).

Limit any contribution to resource degradation by the failure of a trail that could be triggered by or associated with, fire related impacts or damage (e.g. provide, where necessary, additional water bars and drainage features where increased runoff and erosion may cause trail failure).

Remove safety hazard to the public or FS employees who might try the use the damaged bridge at Goat Creek.

Recreation Site Developments

Reduce the risk of additional loss, damage or loss of function to the NFS recreation infrastructure within the South Fork Complex fire perimeter that could be triggered by or associated with, fire related impacts or damage.

C. Probability of Completing Treatment Prior to Damaging Storm or Event:

Land 90 % Channel 80 % Roads/Trails 80 % Protection/Safety 90 %

D. Probability of Treatment Success

	Years after Treatment		
	1	3	5
Land	80	90	95
Channel	90	95	100
Roads/Trails	70	80	90
Protection/Safety	100	100	100

E. Cost of No-Action (Including Loss): $10,000,000

F. Cost of Selected Alternative (Including Loss): $5,723,000

TOTAL = [(C + D) * A] + [(C + E) * B]

A = 80%, probability of success of primary treatment;
B = 20%, probability of failure of primary treatment;
C = $1,400,000, primary treatment cost;
D = $ 2,000,000.00, potential resource value loss if primary treatment succeeds; and
E = $12,000,000.00, potential resource value loss if primary treatment fails.

Selected Alternative = [(1,723,000+2,000,000) * .80] + [(1,723,000 + 12,000,000) * .20] = $5,723,000
No Action Alternative = [(0+2,000,000.) * .20] + [(0)+ 12,000,000) * .80]= $10,000,000

G. Skills Represented on Burned-Area Survey Team:

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

Team Leader: David Kennell

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H. Treatment Narrative:

LAND TREATMENTS

1. Ag Straw and Wood Fiber Mulch

Description of Emergency Treatments: The Forest will apply Ag Straw and Wood Fiber Mulch to a total of 400 acres. The August 12, 2007 fire run that crossed the SFSR completely consumed ground organic and all conifer litter. The primary objective is to reduce erosion and provide for increased slope stability by providing an immediate ground cover until native ground cover vegetation is adequately established within 2-5 years.

Where Treatment is Applied: All treatments will be done on the PNF in the Upper SFSR 6th Level HUC subwatershed above the Poverty Flat spawning area. Streams in the area include: Goat Creek, Sister Creek, Twin Creek, Snowslide Creek, Bearhill Creek, Silver Creek, and ephemeral draws directly above the SFSR and SFSR Road. Mulching will be applied primarily in areas of high intensity burns on hills slopes and small ephemeral draws directly adjacent and above the SFSR Road.

How Treatment is Applied: A total of 50 acres of Ag Straw and Wood Fiber Mulch will be directly blown off 4 miles of the SFSR Road and off 2.6 miles of adjacent Abandoned Roads. Ag straw can be blown approximately 100 feet on either side of the road. Wood Fiber can be blown for approximately 50 feet.

Blowing reduces the labor cost of hand spreading to achieve uniform cover. The contract objective will be to achieve 60 percent ground cover (plus or minus 10 percent).

Hand application will occur on approximately 50 acres of Ag Straw and Wood Fiber Mulch will be directly hand placed off 4 miles of the SFSR Road and off 2.6 miles of adjacent Abandoned Roads. This hand placement will occur where mulch can be delivered by truck to the site but cannot be reached by blowing.

Aerial Mulching of both Ag Straw and Wood Fiber will be directly flown onto another 300 acres at the top of the small watersheds that can not be reached by blowing. Currently the Forest plans to contract out for the mulch purchase, delivery, and loading into the net. The Forest will use FS helicopter, helitack and ground crew to place and spread the mulch.

Purpose of Treatment: The Mulching Land Treatment will mitigate the risk and reduce the threats to several values and resources, including the following:

a) Reduce the risk to the BAER implementation contractors working on the SFSR Road infrastructure from erosion, debris slides, and rock fall by mulching immediately upslope and in small ephemeral drainages.
b) Provide clear and safe passage for vehicles along the SFSR Road and to the community of Yellow Pine by reducing the risk of erosion, debris flows, and rock fall.
c) Reduce the risk of failure to the existing Goat Creek, Sister Creek, and Twin Creek culverts by improving watershed conditions. (preferred alternative to upsizing).
d) Reduce erosion and provide channel stability on the new disturbance that occurs from the removal of 3 metal culverts, 2 log culverts, and 10 man-placed fill in ephemeral draws on abandoned road segments.
e) Reduce erosion and proved slope stability on the temporary BAER treatment roads that will be obliterated.
f) Reduce the erosion and therefore the streambed fines delivered to the SFSR, Poverty Flat and other downstream areas to protect valuable anadromous fish habitat.
g) Assist RMRS (P.Robichaud) in effectiveness monitoring on cut and fill slope mulch treatments on 3 of the abandoned roads and along the SFSR Road. A total of 4 treatments (control, Ag Straw with tackifier, Wood Fiber, and PAM12) will be applied on 10 uniform plots for a total of 40 plots.

2. Obliterate Temporary and Abandoned Roads.

Description of Emergency Treatments: A total of 2.6 miles of temporary and abandoned roads will be obliterated. On these roads there are a total of 3 metal and 2 log culverts, along with 10 addition drainage fills with no visible water management features. These roads date back to the 1960's. The travel way template, culverts and fill in drainages are still in place. These roads all received high intensity burns. No trees or needle cast survived. All brush and organic matter was total consumed by the fire.

Where Treatment is Applied: All treatments will be done on the PNF in the Upper SFSR 6th Level HUC subwatershed above the Poverty Flat spawning area. These abandoned roads are along the Goat Creek to Poverty Flat section of the SFSR Road that had a high burn intensity on moderately high to high erosion landtypes. Six abandoned roads totaling 2.6 miles in length will be treated: Goat Creek-SFSR Road (1.3 miles), East Sister Creek Road (0.4 miles), West Sister Creek (0.3 miles), Poverty Overlook-Twin Creek Road (0.2 miles), Lower Twin Creek road (0.3 miles), Snowslide Creek Road (0.1 miles).

How Treatment is Applied: From the end of the roads the culverts and fill will be removed using a track excavator. Fill will be removed to natural pre-road level. The fill will be recontoured along the existing cutslope slopes of the road prism. The site will be dry seeded. Ag Straw and Wood Fiber Mulch will be placed on all new disturbance.

Purpose of Treatment: The Culvert and Fill Removal and Channel Treatment are designed to mitigate the risk and reduce the threats to several values and resources, including the following:

a) Reduce the risk of mass failure of road fill in drainages along abandoned roads.
b) Close out all temporary routes used for BAER treatment applications.
c) Eliminate the potential of these roads being used and established as unauthorized ATV and other motorized access routes in an area closed to motorized cross-country travel.
d) Reduce the risk of failure along the SFSR Road by improving watershed conditions.

e) Reduce erosion and provide channel stability on the new disturbance that occurs from the removal of 3 metal culverts, 2 log culverts, and 10 man-placed fills in ephemeral draws on abandoned road segments.
f) Reduce the erosion and therefore the streambed fines delivered to the SFSR, Poverty Flat and other downstream areas to protect valuable anadromous fish habitat.

3. Noxious Weed Treatment

Description of Emergency Treatments: Treat known sites (~30 acres) of weed infestations with herbicides or mechanically within the burn perimeter and adjacent to the fires along well established road and trail vectors.

Where Treatment is Applied: The following table specifically identifies noxious weed species and existing known infestation sites.

Cascade Complex, PNF (North Fork & Riordan Fires) INVENTORIED WEED PRESENCE & RISK ON THE PAYETTE NF			
LOCATION	**SPECIES**	**EXTENT**	**Notes**
➢ STIBNITE ROAD	RUSH SKELETON CANADA THISTLE	1 ACRE 1 ACRE	~2-10 DIFFERIANTED SPOTS / ACRE
➢ UPPER SOUTH FORK ROAD	RUSH SKELETON CANADA THISTLE SPOTTED KNAPWEED	1 ACRE 1 ACRE 26 ACRES	~2-10 DIFFERIANTED SPOTS / ACRE

How Treatment is Applied: Herbicide treatment will follow the direction of the ROD for the SFSR WEED FEIS. Herbicide treatment will be done with backpack sprayers or pickup bed spray units using chemicals and guidelines approved in the SFSR Weed EIS ROD (USDA, 2006). Treatment near waterways will require hand removal of infestations to prevent water contamination.

Purpose of Treatment: The purpose of the treatment is to maintain existing ecosystem vegetation composition by treating known weed infested sites to prevent invasion into the burned area. By reducing the amount of weed seed in the area and treating new populations, native plant communities can have time to recover with less competition from non-native invasive plants. There is a favorable cost/benefit ratio for treating known weed sites in order to prevent expansion into the burned-area.

CHANNEL TREATMENTS

1. Remove Culverts and Fill on Abandoned Roads.

Description of Emergency Treatments: A total of 3 metal and 2 log culverts, along with 10 addition drainage fills with no visible water management features, have been identified that need to be removed along old abandoned roads.

Where Treatment is Applied: All treatments will be done on the PNF in the Upper SFSR 6th Level HUC subwatershed above the Poverty Flat Spawning Area. These abandoned roads are along the Goat Creek to Poverty Flat section of the SFSR Road that had a high burn intensity on moderately high to high erosion landtypes. There is a total of 4 Abandoned Roads that will be treated. The Goat Creek-SFSR Road is 1.3 miles in length. The East Sister Creek Road is 0.4 miles in length. The West Sister Creek road is 0.3 miles in length and Poverty Overlook-Twin Creek Road is 0.2 miles in length. The Lower Twin Creek road is 0.3 miles in length. The Snowslide Creek Road is 0.1 miles in length.

How Treatment is Applied: From the end of the road the culverts and fill will be removed using a track excavator. Fill will be removed to natural pre-road level. The fill will be placed outside the drainages along the existing cutslope slopes of the road prism. The stream channel will be designed to mimic the natural

channel and stabilized with rocks and logs. The site will be hydroseeded. Wood fiber mulch will be placed on all new disturbance.

Purpose of Treatment: The Culvert and Fill Removal and Channel Treatment is designed to mitigate the risk and reduce the threats to several values and resources, including the following:

g) Reduce the risk of mass failure of man-placed fill in drainages along abandoned roads.
h) Restore natural channel and floodplain.
i) Reduce the risk of failure along the SFSR Road to the existing Goat Creek, Sister Creek, and Twin Creek Culverts by improving watershed conditions.
j) Reduce erosion and provide channel stability on the new disturbance that occurs from the removal of 3 metal culverts, 2 log culverts and 10 man-placed fills in ephemeral draws on abandoned road segments.
k) Reduce the erosion and therefore the streambed fines delivered to the SFSR, Poverty Flat and other downstream areas to protect valuable anadromous fish habitat.

ROADS AND TRAIL TREATMENTS

1. SFSR Road Treatments:

a). HDPE Culverts:

Replace 142 plastic culverts with metal culverts that were destroyed or severely damaged by the fire. Manage water if present. Cut blacktop and concrete treated base. Excavate fill and remove any remaining culvert. Place new metal culverts. Fill and compact. Patch blacktop (possible use of County equipment). Reconstruct inlet and outlet controls. The plastic culverts that caught fire on the outlet side were totally consumed due to the chimney effect of the pipe. The concern is that the road surface will collapse under a passing vehicle at the culvert locations. The subsequent accident could be fatal. The SFSR Road will remain closed until work is completed.

b). Inlet Retaining Walls:

Repair and/or replace 41 wood culvert inlet headwall structures destroyed by the fire. Remove damaged material. Excavate fill behind structures. Replace post if necessary. Replace damaged planks. Revegetate by hydroseed/mulch where disturbance occurs. Failure of the cutslope would plug the relief culverts and may result in fill and road prism failures.

c. Downspouts:

Replace 50 destroyed downspouts associated on destroyed culverts on steep fill on highly vulnerable landtypes. Downspouts range for 20 to 100 feet in lenth.

d). Cut and Fill Slope Erosion Vegetative Erosion Control:

Hydroseed/mulch approximately 210 acres to protect cut and fill slopes and the road prism from post fire events. The Forest plans to contract erosion control grass seed, mulch, and fertilizer to the cut and fill slopes within the Cascade Complex. If these sites are not stabilized, surface erosion and potential mass failure will compromise the SFSR water management features. A soil amendment PAM-12 will be applied on small portion of the area to be protected. PAM-12 has shown to be effective in limiting soil loss in burned areas (Uinta NF monitoirng results). The PAM-12 will be compared against agricultural and wood straw as a BAER treatment.

e. Rock Rollout and Fallen Snags Hazards:

Remove rocks, granitic sand, and burnt snag that fell onto the road, inslope ditches, culvert inlet, and cutslopes. Use backhoe/loader and dump truck to haul to designated diposal site.

f. Monitoring Patrols:

Maintain regular patrol to monitor and remove hazards that will continue to fall onto the road, inslope ditches, culvert inlet, and cutslopes throughout the winter.

g. Warning Sign

Replace 30 road safety and warning signs.

2. EFSFSR Road and Meadow Creek Lookout Road.

Description of Emergency Treatments: There is a need to remove rocks, debris slides, and burnt snag that fell onto roads, inslope ditches, culvert inlet, and cutslopes roads on the PNF affected by the Riordan Fire portion of the Cascade Complex.

Where Treatment is Applied: All road are in the Upper EFSFSR 5th Level HUC subwatershed above the community of Yellow Pine. The fire affected approximately 10 miles of the EFSFSR Road between Yellow Pine and the Mining District of Stibnite. In addition, clearing and water management features need to be maintained on 5 miles of the Meadow Creek Lookout Road.

How Treatment is Applied: A one time road maintenance patrol on 15 miles of road should meet the need on reducing hazard risk and reestablishing drainage features. The Forest Heavy Equipment Crew and/or County road Crew under cooperative maintenance plan will remove rock and debris hazards on the cutslopes and travelway, clean out existing culverts, and reestablish drainge features.

Purpose of Treatment: Provide safe public and administrative access. Protect road infrasture. And reduce adverse effects to listed Threatened anadromous fish.

3. Trails

Description of Emergency Treatments: There is a need to remove rocks, debris slides, and burnt snags that have fallen onto or across trails to allow access for BAER treatment crews. The Forest must provide clear and safe passage to BAER trail treatment sites. Over 80 percent of the area has high erosion hazard risk. Crews will reestablish proper drainage and water management structures to prevent further loss to the trail transportation infrastructure. The crews will maintain, repair, rebuild and add new water management structures where needed to deal with expected increase of surface runoff and control erosion.

Where Treatment is applied: On identified Payette NF system trails within the perimeter of the Cascade Complex fires. The fire affected approximately 10.5 miles of trail in this area of the South of the Salmon River drainage on the Payette NF. Approximately 200 damaged log waterbars need to be cleaned, repaired, or reinstalled.

Cascade Complex (North Fork , Riordan Fires)
Trails and Bridges @ Risk on the Payette NF

Trail Name / #	Miles	Notes
➢ Goat Cr – Four Mile #093	7.5	High intensity burn, high inherent erosion hazards. Most log waterbars consumed by fire. Upper SFSR. Over 150 waterbars need to be cleaned, repaired, or reinstalled.
➢ Log Mtn #092	2	High intensity burn, high inherent erosion hazards. Most log waterbars consumed by fire. Upper SFSR. Over 30 waterbars need to be rebuilt.
➢ Caton Lk #091	1	High intensity burn, high inherent erosion hazards. Most log waterbars consumed by fire. Upper SFSR. Approximately 20 waterbars need to be rebuilt.
Total miles of NFS Trail effected by fire	**10.5**	

How Treatment is Applied: One time trail maintenance effort on these 10.5 miles of trail during the spring / summer of 2008 should meet the need for reducing hazards & user risks and re-establishing drainage features. Forest Service trail crews, or contracted maintenance personnel or available cooperative crews, will be used to remove rock and debris hazards on the cutslopes and travelway, clean out existing culverts, to reestablish and maintain drainage features. Approximately 200 damaged log watershed need to be replaced, 50 drainage structures need to be cleaned, and numerous slumps and

slides need to be removed on all 10.5 trail miles to reduce erosion and prevent further loss of trail infrastructure.

Purpose of Treatment: Trail maintenance is needed to provide for maximum effectiveness of existing water bars to efficiently route water and sediment from the trails, thereby preventing erosion of trail surface and minimizing impacts to water quality and fish habitat. Protect trail infrastructure. Reduce adverse effects to listed threatened anadromous fish.

1. Provide clear and safe passage along NFS Trails to emergency BAER treatment sites.
2. Reduce the risk of additional loss and damage to the NFS trail infrastructure within the fires perimeter by maintaining and repairing damaged water management features such as burned log waterbars.
3. Remove downed logs, rock fall, and debris that may cause additional erosion to the trail system as a result of increased runoff.
4. Clean current drainage structures to ensure increased runoff and erosion do not cause additional erosion and loss of trail tread.
5. Reduce trail erosion and streambed fines delivered to the SFSR and the Poverty Flat and other downstream spawning areas to protect critical T&E listed anadromous fish habitat.

PROTECTION and SAFETY TREATMENT

Goat Creek Bridge

Description of Emergency Treatments: The three remaining burned and spiked log stringers on the Goat Creek Bridge must be removed. These logs are currently a tempting route across the creek. They are wobbly and full of nails and spikes. The bridge abutments and the vertical stream banks should be rehabilitated so as to remove a safety hazard and to restore and protect the streambank stability.

Where Treatment is applied: Fire destroyed Goat Creek Trail Bridge in SFSR drainage.

How Treatment is Applied: Forest Service crews will remove the burned bridge log stringers from the crossing. The unstable hand placed rock abutment will be dismantled.

Purpose of Treatment: Remove log stringers at destroyed bridge hazard to provide public safety. Stabilize vertical streambanks at damage bridge abutment location to prevent erosion and maintain site for potential reconstruction. Bridge will be rebuilt with CMTL or in the Black funds when available.

Recreation Sites

Description of Emergency Treatments: Remove hazard trees and snags or other features where failure could present a public hazard or cause damage to the recreation facilities and improvements.

Where Treatment is Applied:

Cascade Complex (North, Riordan Fires) Recreation Values Potentially @ Risk on the Payette NF		
Developed Recreation Sites		
➢ Poverty Flat Campground (includes well, interpretative site & trail head)		T 17N, R 6E, Sec 11
Interpretive Sites		
➢ South End of S Fork Road interpretative site (2 signs & information board),		T 15N, R 6E, Sec 1

How Treatment is Applied: There are two snags hung up in adjacent trees that Class C fellers determined were unsafe to fall. The Forest will contract out for a rubber tired skidder to cable the bottom of the tree and to pull it down from the bottom.

Purpose of Treatment: Eliminate the hazard to public safety by standing snags that have burned off the stump and are still hanging up in adjacent trees.

SFSR Road Treatments:

1. HDPE Culverts:

Replace 142 plastic culverts with metal culverts that were destroyed or severely damaged by the fire. Manage water if present. Cut blacktop and concrete treated base. Excavate fill and remove any remaining culvert. Place new metal culverts. Fill and compact. Patch blacktop (possible use of County equipment). Reconstruct inlet and outlet controls. The plastic culverts that caught fire on the outlet side were totally consumed due to the chimney effect of the pipe. The concern is that the road surface will collapse under a passing vehicle at the culvert locations. The subsequent accident could be fatal. The SFSR Road will remain closed until work is completed.

2. Inlet Retaining Walls:

Repair and/or replace 41 wood culvert inlet headwall structures destroyed by the fire. Remove damaged material. Excavate fill behind structures. Replace post if necessary. Replace damaged planks. Revegetate by hydroseed/mulch where disturbance occurs. Failure of the cutslope would plug the relief culverts and may result in fill and road prism failures.

3. Downspouts:

Replace 50 destroyed downspouts associated on destroyed culverts on steep fill on highly vulnerable landtypes. Downspouts range for 20 to 100 feet in lenth.

4. Cut and Fill Slope Erosion Vegetative Erosion Control:

Hydroseed/mulch approximately 210 acres to protect cut and fill slopes and the road prism from post fire events. The Forest plans to contract erosion control grass seed, mulch, and fertilizer to a total of along the cut and fill slopes within the Cascade Complex. If these sites are not stabilized, surface erosion and potential mass failure will compromise the SFSR water management features. A soil amendment PAM-12 will be applied on small portion of the area to be protected. PAM-12 has shown to be effective in limiting soil loss in burned areas (Uinta NF monitoirng results). The PAM-12 will be compared against agricultural and wood straw as a BAER treatment.

5. Rock Rollout and Fallen Snags Hazards:

Remove rocks, granitic sand, and burnt snag that fell onto the road, inslope ditches, culvert inlet, and cutslopes. Use backhoe/loader and dump truck to haul to designated diposal site.

6. Monitoring Patrols:

Maintain regular patrol to monitor and remove hazards that will continue to fall onto the road, inslope ditches, culvert inlet, and cutslopes throughout the winter.

7. Warning Sign

Replace 30 road safety and warning signs.

I. Monitoring Narrative:

Noxious Weeds

Monitor and inventory for noxious weed invasion and the effectiveness of treatments. Monitoring would be done to assess BAER weed treatments and recovery of the burned sites. It would evaluate the success or failure of treatment, recommend adjustments to treatment and report the findings to management. Monitoring will involve primarily inventory of susceptible lands within the burn perimeter for noxious weeds. Monitoring will be required on the approximately 72 treatment sites (30 acres), within, and adjacent to fires of the Cascade Complex on the Payette NF.

Post-fire Road Treatment Effectiveness Monitoring- Cascade Complex

It is critical to monitor the effectiveness of post-fire treatment installations to determine if treatments reduce erosion and treatment performance meets design expectations. In addition, direct measurement of treatment effectiveness can improve future treatment selection, treatment application protocols, and new treatment evaluations. The results from these monitoring effort will add to several on-going and recently completed post-fire treatment monitoring projects in the western US (e.g., Robichaud 2005; Wagenbrenner et al. 2006; Robichaud et al. 2007). Preliminary results from these monitoring efforts suggest that mulch treatments mitigate hillslope erosion better than erosion barrier or broadcast seeding treatments; however all mulch products need to be evaluated in different regions to determine their effectiveness over a range of climates, ecosystems, and rain events. Additionally, monitoring is needed to determine effectiveness of treatments in combination, at various scales, and over time. Treatment effects on natural post-fire recovery processes, such as enhancement or suppression of invasive species, must also be monitored. This proposed monitoring will evaluate effectiveness of treatments being applied to road cuts and fills that were severely burned.

Objectives

The objectives of this road side monitoring are to:

1) determine the effectiveness of road treatments on stabilizing road cuts and fills and drainage system functions;
2) determine the effectiveness of three mitigation treatments (wood straw, agriculture straw with tackifier, PAM-12) and a control (no treatment)on reducing hillslope erosion; Note additional treatments that are being used (seeding, and combination of above mentioned treatments) may be considered and are not included in this initial monitoring request.

Monitoring Location

Cascade Complex, Payette National Forest, Idaho (South Fork Salmon River Area) that burned at a high severity.

Monitoring Methods

Hillslope treatment monitoring

Replicated hillslope plots—Silt fence sediment traps will be installed (following Robichaud and Brown 2002) at the base of 0.075 (+/-) acre contributing areas to compare unit-area sediment yields from control sites and treatments. Six plots of each treatment—1) agriculture straw, 2) wood straw, 3) PAM-12, and 4) control will be monitored. Site characteristics, such as contributing area, slope, aspect, percent ground cover, percent mulch cover, soil water repellency, and soil texture, will be measured. After each significant rainfall event, sites will be visited to determine if observable erosion has occurred and, if so, trapped sediment will be removed by hand, weighed, and sampled. Observations of treatment functionality (e.g., rilling, mulch being carried downslope, etc.) will be recorded and necessary silt fence/plot repairs will be made. Sediment data and field observations will be linked to rainfall characteristics as measured by recording tipping bucket rain gauges. In the laboratory, field samples will be dried and weighed to convert wet field weights to a dry mass. Annual measurements of changing site characteristics, such as soil water repellency and percent ground cover, will be made. The site data will be used to ensure that treated and control areas are comparable and to quantify the role of factors other than treatment that may be affecting sediment yields. These sites will be monitored and maintained for three years.

Cooperation Need

Cooperation between Payette and Boise National Forests and Rocky Mountain Research Station (RMRS) is needed to accomplish these monitoring objectives. RMRS personnel will install the monitoring equipment/silt fences in cooperation with the Forest. Payette National Forest personnel (Dave Kinnell, Tom Crawford) will be

the main points of contact at the monitoring site and Pete Robichaud and Randy Foltz RMRS-Moscow will be the main contact for RMRS. We anticipate that assistance from cooperators will be needed for silt fence maintenance and for sediment removal after rain events. If sediment fills the silt fences, sediment removal will likely require 1 day for 5-6 people.

Reporting:
Data analysis and monitoring reports will be prepared by RMRS-Moscow and submitted annually to the Forest and the Regional BAER Coordinator. A final report with findings and recommendations will be submitted to the Forest and Regional BAER Coordinator at the end of the third year. Since monitoring data provide measured information as to the effectiveness of these treatments on reducing hillslope erosion, these data will be disseminated at regional and national BAER team training events and regional workshops for land managers. The monitoring information may be used in General Technical Reports and other written documents.

Monitoring Costs:

The major expense for post-fire treatment monitoring is personnel. Installation and maintenance of the monitoring sites is labor intensive. Although fewer people are involved, laboratory work, data analysis, and reporting processes also require personnel support.

Silt Fence Installation and Maintenance for monitoring road cut and fill slopes				
Installation and Year 1				
Item				**Total**
Materials (Silt fence fabric, stakes, rain gauges, data logger, general field equipment)				$ 5,000
	Salary grade	**Pay periods**	**Unit cost**	
Personnel (salary for installation, initial measurements, etc.)	GS-5	2	$1680	$ 3,360
	GS-7	2	$2125	$ 4,250
	GS-9	2	$2920	$ 5,840
	GS-11	2	$3260	$ 6,520
Travel (vehicles, per diem)				$ 4,500
Laboratory (sample preparation and processing)				$ 8,000
			YEAR 1 TOTAL	**$37,470**
Year 2 and subsequent years				
Maintenance materials (silt fence maintenance)				$ 1,000
Personnel (field, laboratory, analysis, reporting)				$21,000
Travel (clean outs/maintenance)				$ 3,500
Laboratory (sample preparation and processing)				$ 3,000
			Annual Costs after Year 1	**$28,500**

References Cited

Robichaud PR. 2005. Measurement of post-fire hillslope erosion to evaluate and model rehabilitation treatment effectiveness and recovery. *International Journal of Wildland Fire*, 14: 475-485.

Robichaud PR, Brown RE. 2002. Silt fences: an economical technique for measuring hillslope soil erosion. General Technical Report RMRS-GTR-94. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 24 p.

Robichaud PR, Wagenbrenner JW, Brown RE, Wohlgemuth PM, Beyers JL. 2007. Evaluating the effectiveness of contour-felled log erosion barriers as a post-fire runoff and erosion mitigation treatment in the western United States. *International Journal of Wildland Fire.* [in press]

Wagenbrenner JW, MacDonald LH, Rough, D. 2006. Effectiveness of three post-fire rehabilitation treatments in the Colorado Front Range. *Hydrological Processes*, 20: 2989-3006.

POST-FIRE HILLSLOPE TREATMENT EFFECTIVENESS MONITORING- CASCADE COMPLEX

It is critical to monitor the effectiveness of post-fire treatment installations to determine if treatments reduce erosion and treatment performance meets design expectations. In addition, direct measurement of treatment effectiveness can improve future treatment selection, treatment application protocols, and new treatment evaluations. The results from these monitoring efforts will add to several on-going and recently completed post-fire treatment monitoring projects in the western US (e.g., Robichaud 2005; Wagenbrenner et al. 2006; Robichaud et al. 2007). Preliminary results from these monitoring efforts suggest that mulch treatments mitigate hillslope erosion better than erosion barrier or broadcast seeding treatments; however all mulch products need to be evaluated in different regions to determine their effectiveness over a range of climates, ecosystems, and rain events. Additionally, monitoring is needed to determine effectiveness of treatments in combination, at various scales, and over time. Treatment effects on natural post-fire recovery processes, such as enhancement or suppression of invasive species, must also be monitored. This proposed monitoring will evaluate effectiveness of hillslope treatments being applied to areas near the South Fork of the Salmon River that were severely burned.

Objectives

The objective of this small watershed monitoring is to determine the effectiveness of agricultural straw mitigation treatments on reducing hillslope erosion as compared to a control (no treatment) at the small watershed scale (7 to 10 acres each watershed).

Monitoring Location

Cascade Complex, Payette and Boise National Forests, Idaho (South Fork Salmon River Area) that burned at a high severity.

Monitoring Methods

Small watershed treatment monitoring—Installation of a sheet metal headwall that forms a sediment trap and directs runoff through a 90 degree V-notch weir allows both runoff and sediment yield to be measured. Paired watershed sediment traps and weirs will be installed in two adjacent small watersheds (drainage areas approximately 7 to 10 acres) to compare both runoff and unit-area sediment yields from a control and agricultural straw treated watershed. Site characteristics, such as contributing area, slope, aspect, percent ground cover, percent mulch cover, soil water repellency, and soil texture, will be measured. After each runoff/sediment producing rain event, the sediment traps will be emptied and the sediment is weighed and sampled. Field samples will be dried and weighed to convert wet field weights to a dry mass. Annual measurements of changing site characteristics, such as soil water repellency and percent ground cover, will be made. Pre-rain event weather and rain event data (from an onsite weather station) will be linked to runoff and sediment yield measurements. Annual measurements of changing site characteristics, such as soil water repellency and percent ground cover, will be made. The site data will be used to ensure that treated and control areas are comparable and to quantify the role of factors other than treatment that may be affecting sediment yields. These sites will be monitored and maintained for three years.

Site characteristics, such as contributing area, slope, aspect, percent ground cover, percent mulch cover, soil water repellency, and soil texture, will be measured. After each significant rainfall event, sites will be visited to determine if observable erosion has occurred and, if so, trapped sediment will be removed by hand, weighed,

and sampled (bobcat-machine if large events occur). Observations of treatment functionality (e.g., rilling, mulch being carried downslope, etc.) will be recorded and necessary repairs will be made. Sediment data and field observations will be linked to rainfall characteristics as measured by recording tipping bucket rain gauges. In the laboratory, field samples will be dried and weighed to convert wet field weights to a dry mass. Annual measurements of changing site characteristics, such as soil water repellency and percent ground cover, will be made. The site data will be used to ensure that treated and control areas are comparable and to quantify the role of factors other than treatment that may be affecting sediment yields. These sites will be monitored and maintained for three years.

Cooperation Need

Cooperation between Payette and Boise National Forests and Rocky Mountain Research Station (RMRS) is needed to accomplish these monitoring objectives. RMRS personnel will install the monitoring equipment/silt fences in cooperation with the Forest. Payette National Forest personnel (Dave Kennell, Tom Crawford) and Boise National Forest (TJ Clifford and John Thorton) will be the main points of contact at the monitoring site and Pete Robichaud RMRS-Moscow will be the main contact for RMRS. We anticipate that assistance from cooperators will be needed for maintenance and for sediment removal after rain events. If sediment fills the sediment traps, sediment removal will likely require 1-2 days with small equipment.

Reporting

Data analysis and monitoring reports will be prepared by RMRS-Moscow and submitted annually to the Forest and the Regional BAER Coordinator. A final report with findings and recommendations will be submitted to the Forest and Regional BAER Coordinator at the end of the third year. Since monitoring data provide measured information as to the effectiveness of these treatments on reducing hillslope erosion, these data will be disseminated at regional and national BAER team training events and regional workshops for land managers. The monitoring information may be used in General Technical Reports and other written documents.

Monitoring Costs

The major expense for post-fire treatment monitoring is personnel. Installation and maintenance of the monitoring sites is labor intensive. Although fewer people are involved, laboratory work, data analysis, and reporting processes also require personnel support.

Paired Watershed Installation and Maintenance

Installation and Year 1

Item	Salary grade	Pay periods	Unit cost	Total
Materials (sheet metal, fabrication, construction supplies, concrete, weather station, data logger, solar power supply, rain gauges, installation equipment)				$28,000
Telemetry equipment/electronics				$4,600
Personnel (salary for installation, initial measurements, etc.)	GS-5	3	$1680	$ 5,040
	GS-7	3	$2125	$ 6,375
	GS-9	3	$2920	$ 8,760
	GS-11	3	$3260	$ 9,780
Travel (vehicles, per diem)				$ 5,500
Laboratory (sample preparation and processing)				$ 4,000
		YEAR 1 TOTAL		**$72,055**

Year 2 and subsequent years

Maintenance materials (repair as needed)	$ 3,500
Personnel (field, laboratory, analysis, reporting)	$27,300

Travel (clean outs/maintenance)	$ 3,500
Laboratory (sample preparation and processing)	$ 5,000
Annual Costs after Year 1	**$39,300**

References Cited

Robichaud PR. 2005. Measurement of post-fire hillslope erosion to evaluate and model rehabilitation treatment effectiveness and recovery. *International Journal of Wildland Fire*, 14: 475-485.

Robichaud PR, Wagenbrenner JW, Brown RE, Wohlgemuth PM, Beyers JL. 2007. Evaluating the effectiveness of contour-felled log erosion barriers as a post-fire runoff and erosion mitigation treatment in the western United States. *International Journal of Wildland Fire*. [in press]

Wagenbrenner JW, MacDonald LH, Rough, D. 2006. Effectiveness of three post-fire rehabilitation treatments in the Colorado Front Range. *Hydrological Processes*, 20: 2989-3006.

Part VI – Emergency Stabilization Treatments and Source of Funds Interim

Abandon Rd Drainage	miles	10000	2.6	$26,000	$0			$0		$0	$26,000
Blown wood straw	acres	2000	30	$60,000	$0			$0		$0	$60,000
Blown Ag straw	acres	500	100	$50,000	$0						$50,000
PAM-12	acres	400	20	$8,000							
Hydromulch	acres	2000	60	$120,000	$0			$0		$0	$120,000
Nox Weed Treatment	acres	250	30	$7,500	$0			$0		$0	$7,500
Insert new items above this line!				$0	$0			$0		$0	$0
Subtotal Land Treatments				$1,071,500	$0			$0		$0	$1,063,500
B. Channel Treatments Approved											
Culvert/Fill Removal	each	1500	15	$22,500	$0			$0		$0	$22,500
Insert new items above this line!				$0	$0			$0		$0	$0
Subtotal Channel Treat.				$22,500	$0			$0		$0	$22,500
C1. Road Treatments Approved											
Culvert Replace	each	3322	142	$471,724	$0			$0		$0	$471,724
Culvert Inlet Walls	each	300	41	$12,300	$0			$0		$0	$12,300
Replace Downspouts	each	1184	50	$59,200	$0						$59,200
Warning signs	each	330	30	$9,900	$0			$0		$0	$9,900
Removal of Hazards	initial	5000	1	$5,000	$0			$0		$0	$5,000
Removal of Hazards	visit	2000	3	$6,000	$0			$0		$0	$6,000
EFSFSR Roads	miles	500	15	$7,500	$0			$0		$0	$7,500
Insert new items above this line!				$0	$0			$0		$0	$0
Subtotal Road & Trails				$571,624	$0			$0		$0	$571,624
C2. Trail Treatments New											
Trails (need more info)	miles	1800	10.5	$18,900	$0			$0		$0	$18,900
Insert new items above this line!				$0	$0			$0		$0	$0
Subtotal Trails				$18,900	$0			$0		$0	$0
D. Protection/Safety											
Rec Sites	each	750	2	$1,500	$0						
Bridge Removal (new)	each	1000	1	$1,000	$0			$0		$0	$0
Insert new items above this line!				$0	$0			$0		$0	$0
Subtotal Structures				$2,500	$0			$0		$0	$0
E. BAER Evaluation											
Survey (SFSR Road only	days	2000	3		$6,000			$0		$0	$6,000
Complete Initial	days	2000	11		$28,000						
Insert new items above this line!				---	$0			$0		$0	$0
Subtotal Evaluation				---	$34,000			$0		$0	$6,000
F. Monitoring											
Noxious Weeds	days	800	5	$4,000	$0						
RMRS Cut/Fill	1st yr	37470	1	$37,470	$0						
RMRS Cut/Fill	1st yr	72055	1	$72,055	$0						
Insert new items above this line!				$0	$0			$0		$0	$0
Subtotal Monitoring				$113,525	$0			$0		$0	$0
G. Totals				$1,800,549	$34,000			**$0**		**$0**	**$1,663,624**
Previously approved				$1,708,594	$6,000						
Total for this request				**$91,955**	**$28,000**						

PART VII - APPROVALS

1. ***/s/ Robert S. Giles for Suzanne C. Rainville*** **10/24/2007**
Payette NF, Forest Supervisor (signature) **Date**

2. **/s/ William P. LeVere for** **10/24/2007**
Acting Regional Forester (signature) **Date**