

Date of Report: Oct 2, 2006

BURNED-AREA REPORT

(Reference FSH 2509.13)

PART I - TYPE OF REQUEST

A. Type of Report

- ☒ 1. Funding request for estimated emergency stabilization funds
☐ 2. Accomplishment Report
☐ 3. No Treatment Recommendation

B. Type of Action

- ☒ 1. Initial Request (Best estimate of funds needed to complete eligible stabilization measures)
☐ 2. Interim Report _____
 ☐ Updating the initial funding request based on more accurate site data or design analysis
 ☐ Status of accomplishments to date
☐ 3. Final Report (Following completion of work)

PART II - BURNED-AREA DESCRIPTIONA. Fire Name: Passage FallsB. Fire Number: MT-MCD-0650C. State: MontanaD. County: ParkE. Region: NorthernF. Forest: GallatinG. District: Livingston

H. Fire Incident Job Code: P1C5K5

I. Date Fire Started: August 29, 2006J. Date Fire Contained: 55% contained on 10/2/06K. Suppression Cost: \$4.0 million (part of Paradise Valley Complex which cost \$9,570,000 as of 9/25/06)L. Fire Suppression Damages Repaired with Suppression Funds
 Fireline rehabilitated, handline (miles): 1.5M. Watershed Number: 100700020302 (6th HUC)

N. Total Acres Burned: 6,627 as of October 2, 2006

NFS Acres(6,627) Other Federal () State (0) Private (0)

O. Vegetation Types: Engleman spruce/subalpine fir (35%) lodgepole pine and Douglas fir (50%), Whitebark Pine (10%), grassland (5%)P. Dominant Soils: Soils are medium textured with many rock fragments. Soils are commonly developed in sandstone, hard metamorphic rocks, and hard volcanic rocks. Soils are moderately productive and have low to moderate erosivity. Soil productivity is generally moderate, but is low on

some areas of shallow or extensively rocky soils. Dominant parent materials are alluvium and colluvium over residuum derived from consolidated Tertiary volcanics. Primary landscape forming processes are stream down cutting, slope wash, and some debris flows.

Q. Geologic Types: intrusive and extrusive Tertiary volcanics, Cambrian Paleozoic sediments along Mill Creek

R. Miles of Stream Channels by Order or Class: (1st order 26 miles; 2nd order 6 miles; 3rd order 4 miles; 4th order 2.5 miles)

S. Transportation System

Trails: 9.1 miles Roads: 11.2 miles

PART III - WATERSHED CONDITION

Public Land

Burn Intensity* (acres): 2,887 (low/unburned) 1,870 (moderate) 1,870 (high)

Burn Severity* (acres): 1,870 (moderate as defined below)

* Burn Intensity refers to vegetation effects. "High" means all vegetation is killed, and is blackened. "Low" means most vegetation is not burned. "Moderate" means there is a mosaic of "High" and "Low".

Burn Severity refers to soil effects or the degree of environmental change caused by fire. An area is classified as "high" burn severity if duff and litter layers have been completely consumed to ash such that little or no effective ground cover remains, surface soil is often loose, single grained with little sign of intact structure or fine roots. (It is important to compare to unburned areas, since sometimes this is the natural condition.) Soil structure is often destroyed, and fine roots in surface soil have been consumed. Surface soil which, prior to the fire, may have had stable granular structure can, after a high severity burn, be loose and single grained, due to volatilization of roots and binding organic compounds.

"Low" burn severity means that generally surface litter is consumed and duff deeply charred or consumed, but recognizable char and some unburned remnants of leaf or needle litter, root crowns, and duff may remain. Ash and char are present. Soil characteristics are not significantly visibly altered, other than a darkening of the first centimeter of soil. Though these soils are bare, they will resprout plants within weeks. They do contribute, however, to watershed response.

"Moderate" burn severity is a mosaic of "High" and "Low" burn severity.

B. Water-Repellent Soil (acres): 1,870

C. Soil Erosion Hazard Rating (acres):

2,887 (low) 3,740 (moderate and high)

D. Erosion Potential: 86.8 ton/acre

E. Sediment Potential: 21.7 cubic yards / square mile

PART IV - HYDROLOGIC DESIGN FACTORS

A. Estimated Vegetative Recovery Period, (years):	<u>2 grass/shrublands and understory/conifer</u>
B. Design Chance of Success, (percent):	<u>80</u>
C. Equivalent Design Recurrence Interval, (years):	<u>5 (50 year unburned event)</u>
D. Design Storm Duration, (hours):	<u>6 and 1 hr</u>
E. Design Storm Magnitude, (inches):	<u>1.5 (6 hr), 0.92 (1hr)</u>
F. Design Flow, (cubic feet/second/square mile):	<u>17.5</u>
G. Estimated Reduction in Infiltration, (percent):	<u>30</u>
H. Adjusted Design Flow, (cfs per square mile):	<u>22.8</u>

PART V - SUMMARY OF ANALYSIS

A. Describe Critical Values/Resources and Threats:

Summary:

The Passage Falls Fire burned about 6,627 acres across primarily mid elevation zones of watershed 100700020302 (Upper Mill Creek) tributary to the Upper Yellowstone River. The fire has about 20% high burn intensity, and 20% low and moderate burn intensity across primarily Lodgepole pine, Douglas fir, subalpine fir, and limited areas of whitebark pin . The primary value at risk is 6.7 mile of trails with moderate-high burn intensity areas and some inadequate road culverts.

Most of the soils examined displayed hydrophobic conditions in burned areas. Areas of high burn intensity examined 2 weeks after a rain event of 9/18 - 9/19 had very limited infiltration below a wet ash layer indicating infiltration reduction in burned areas. The Passage Falls fire was a lightning ignition, wind driven event, which burned actively for about 3 weeks. The complex nature of the terrain and perpendicular orientation of the primary watersheds were not conducive to entire drainage consumption, hence the mosaic nature of the fire. The Passage Falls fire is about 70% within the Absaroka -Beartooth Wilderness, hence the high ratio of trail/road treatments. Stormflow runoff response could be robust through the remainder of 2006 and into the summer of 2007 due to reduced ground cover. During the winter of 2006 and 2007, fire induced water repellency is expected to be reduced, particularly after spring 2007 greenup. Vegetative recovery is expected to be robust during the summer of 2007. In high intensity burn areas, however, the vegetation mass will need to be compressed by snow onto the soil during the winter of 2007/2008 and will begin to form a protective litter layer and expected substantial storm response decline in 2008.

The primarily drainages affected by the Passage Falls fire include Colley Creek, Wallace Creek, and Mill Creek. Colley Creek has the highest percent of high intensity burn (25%) and moderate and low intensity burn (25%). Sediment increase in Colley Creek was modeled with the R1R4 model with an estimated pre-fire sediment yield of 7% over natural increasing to 160% over natural in 2007. Peak flows were calculated for Colley Creek using the NRCS (TR-20) Fire Hydrology (2002) spreadsheet as well as adjustments to Parrott (2004) USGS regression equations. Results for the 6.8 mile Colley Creek watershed indicated a Q₅ NRCS method peak flow increase from pre-fire 89 cfs to post fire 168 cfs. The USGS method was used to calculate a Q₅ peak flow increase from pre-fire 85 cfs to post fire 110 cfs. Flooding in Mill Creek, Colley Creek, or Wallace Creek is not anticipated from the fire although localized debris flows and 1-2nd order tributary erosion could occur in localized areas due to locally intensive rain events.

Cultural features. There are no known cultural features at risk in this area.

Yellowstone Cutthroat Fishery: The Mill Creek stream system above a constructed barrier near the Forest Boundary is a Yellowstone Cutthroat fishery. It is not considered at risk from the fire although adverse sediment effects could occur in Colley Creek and to a lesser degree, Wallace Creek and upper Mill Creek.

Access routes and road infrastructure: About 9.18 miles Of the 11.1 miles of roads within the fire perimeter had potential for damage or sediment contribution. These include the main Mill Creek Road 486 and parts of the Passage Road 2508. The modeled post fire 5 yr recurrence interval discharge for Colley Creek is 168 cfs using the NRCS method and 155 cfs using the USGS method. The 5' squash pipe in Colley Creek along Road 2508 was judged to have about 160 cfs capacity using a culvert capacity spreadsheet developed by Joel Cahoon of the Montana State Dept. of Civil Engineering (2000). The Colley Creek Culvert was judged to be marginally capable of handling likely stormflow events during 2007 although it needs upgrading for fish passage (with non-BAER funds). No additional culverts were judged to be at risk during the field review.

Trails: Three National Forest system trails are located in the interior of the Passage Falls Fire perimeter on the Gallatin NF. Safety concerns are relevant regarding hazard trees and/or tread failure. The Passage Falls Fire has increased the potential for Gallatin National Forest system trails to be at risk of deterioration and also as an avenue for an increase in sediment from post fire conditions being deposited into streams. There are also threats of upslope erosion being damage to trails, as well as increased flow on the surface tread and fill slope. Approximately 6.7 miles of Gallatin National Forest trails are expected to be at risk of deterioration from additional runoff and sediment from post-fire conditions, and because of post-fire hazard trees, are considered a safety risk to BAER rehab crews.

One threat is from upland slope erosion being deposited on the trail. The trails were not designed for the increased flow that may occur from the Passage Falls Fire. This may cause soil erosion on the trail surface and fill-slope. Failure of drainage dips and water bars may cause stream capture onto trail surface area, causing soil erosion, including loss of the trail by rilling and gullying. The BAER team did not recognize any values at risk for trails on private property.

Range Vegetation and Invasive Species: Approximately 300 acres of known noxious weed infestations occur within and adjacent to the Passage Falls fire area including spotted knapweed, Canada thistle, musk thistle, yellow toadflax, etc. Many of these known infestations occur along roads and trails, which can be vectors for weed spread. The new seedbed created by the burned landscape is another vector for weed spread. Vulnerable vegetation types including woody draws, meadows, timbered stands, and designated wilderness areas. The Livingston District has an ongoing program for treating the approximately 45 acres of weeds in this area that are found primarily along the roads. BAER funds are being requested to treat and monitor expansion of these weed infestations.

No active grazing allotments occur with the Passage Falls fire perimeter.

B. Emergency Treatment Objectives:

Access routes and road infrastructure:

The primary hydrology objective of the BAER treatments on NF land is to increase the capacity of the road surface, ditches, and culverts along roads 486 and 2508 to handle anticipated erosion and stormflow events from the Passage Falls fire. An additional objective is to maintain functioning of stream crossings and ditch relief culverts with cleaning and rock armoring.

Trails

Approximately 6.7 miles of Gallatin National Forest trails are expected to be at risk of deterioration from additional runoff and sediment from post-fire conditions, and because of post-fire hazard trees, are considered a safety risk to BAER rehab crews.

Three National Forest system trails are located in the interior of the Passage Falls Fire perimeter on the Gallatin NF. Safety concerns are relevant regarding hazard trees and/or tread failure. Warning signs need to be installed at Colley Creek and Lambert Creek trailheads. These sign will provide information for BAER rehab crews about the hazards of the burned over landscape.

To ensure BAER rehab crew safety, a number of post-fire hazard trees will need to be removed during rehabilitation of system trails leading into the burned area. The Safety Handbook and the Fire Suppression Manual, clearly state that when hazards to these workers are recognized, they should be immediately dealt with and paid with fire suppression or BAER funds.

BAER crews will also need to access these trails to install erosion control devices and reconstruct tread for better surface drainage and slough removal.

Invasive Species: Immediate control of known weed infestations and monitoring the most likely vectors of weed spread will reduce the risk of expansion of existing infestations and allow burned plant communities to recover more rapidly.

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

Land 60 % Channel na % Roads/Trails 70 % Protection/Safety na %

D. Probability of Treatment Success

	Years after Treatment		
	1	3	5
Land (fence reconst)	na	na	na
(weed treatment)	50	70	90
Channel	na	na	na
Roads/Trails	70	80	90
Protection/Safety*	na	na	na

E. Cost of No-Action (Including Loss):_ \$333,650

F. Cost of Selected Alternative (Including Loss):_ \$307,793

G. Skills Represented on Burned-Area Survey Team:

<input checked="" type="checkbox"/> Hydrology	<input checked="" type="checkbox"/> Soils	<input checked="" type="checkbox"/> Trails	<input checked="" type="checkbox"/> Range/weeds
<input type="checkbox"/> Forestry	<input type="checkbox"/> Wildlife	<input type="checkbox"/> Fire Mgmt.	<input checked="" type="checkbox"/> Engineering
<input type="checkbox"/> Contracting	<input type="checkbox"/> Ecology	<input type="checkbox"/> Botany	<input type="checkbox"/> Archaeology
<input type="checkbox"/> Fisheries	<input type="checkbox"/> Research	<input type="checkbox"/> Landscape Arch	<input type="checkbox"/> GIS

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H. Treatment Narrative:

(Describe the emergency treatments, where and how they will be applied, and what they are intended to do. This information helps to determine qualifying treatments for the appropriate funding authorities. For seeding treatments, include species, application rates and species selection rationale.)

Land Treatments:

Road Treatments: The existing road system in the Passage Fire burned area has numerous stream crossings that have been affected by the fire. Culverts that are currently plugged or have catchments that are full or brushed in should be cleaned out to ensure unobstructed flows. The purpose of the road work is to decrease the risk that ditch relief and stream crossings fail resulting in culvert washouts as well as ditch and road surface water flows being diverted down roadways. Three locations on Mill Creek Road 486 have been identified in need of additional drainage. These sites are proposed to be stabilized by constructing diversion dips and placement of riprap for bank and fill slope stabilization and soil erosion control. One site has been identified for culvert removal and returning the crossing site to as near natural conditions as practicable (with non-BAER funds). About 9.18 miles of road is in need of road reconditioning including cleaning of existing culvert catch basins and ditch cleaning. An additional 2 locations need culverts augmented with riprap placement at the inlets and outlets for cut slope bank stabilization.

Trail Treatments: Three trails have been heavily impacted by the Passage Falls fire including:

- #221 – Moose Park Trail
- #275 – Colley Creek Trail
- #280 - Lambert Creek Trail

Proposed Treatments

Treatments that are being recommended for each trail affected by the Passage Falls fire:

- 1) Hazard tree removal for BAER rehab crew safety.
- 2) Installation of drainage structures such as check dams, water bars and drain dips.
- 3) Tread stabilization for surface drainage, tread erosion and upslope slough removal.
- 4) Puncheon removal and replacement to provide safe travel for BAER rehab crew and reduce erosion potential.
- 5) Warning signs installed at trailhead to inform the BAER rehab crew about entering a burned landscape and the associated hazards.

These treatments to reduce erosion, runoff, and sediment delivery, are being recommended at varying levels for each trail, with a number of factors taken into consideration. These factors are burn intensity, burn severity, soil type and structure, trail grade, side slope, alluviums, topography, vegetative cover, watersheds, proximity to critical fish habitat, current trail use, expected use, and future travel planning being consideration in the near future.

Immediate Needs - Within the Passage Falls Fire burn area, National Forest trails will require immediate emergency assistance to reduce erosion, protect trail prism and provide for safe travel for BAER rehab crews.

1. Removal of all hazard trees and clearing of down trees.
2. Install adequate drainage structures to prevent erosion of trail prism from upslope runoff likely to occur over the coming months of rain and snowfall.
3. Re-tread, repair and stabilize trail prisms and puncheon to provide for safe travel for BAER rehab crews.

Weed Expansion: Treat existing sites as part of the District's program of weed management (Weed Occurrence Map). Aggressively treat expansion areas existing sites for the first year. Monitor peripheral ground (roads, dozer lines, infested helispots) to detect new infestations or expansion of existing sites. Subsequent treatments may be financed through interim requests to the BAER program. The third year's

monitoring will provide the basis for requests to finance a continuing need for monitoring and treatment at a level above what has been available to support the District weed program.

Channel Treatments: No treatments proposed.

Protection/Safety Treatments: Road drainage and hardening work to reduce the probability of road washouts. Trail drainage, hazard removal, and tread stabilization which provide increased public and BAER implementation worker safety as well as erosion/sediment reduction.

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.)

Invasive Weed Monitoring : Monitor known and high potential infestation sites for noxious weed species in the burned area, emphasizing areas of existing infestation on National Forest land, to determine need and extent of control treatment to be implemented with BAER funds. Methods include visual identification and GPS mapping. This will occur in the summer of 2007.

Storm Patrol: Roads and the lower section of the Colley Creek trail have numerous drainage crossings and road culverts that have been affected by post fire sediment runoff. In the event of heavy rain, a patrol will be sent out inspect drainage road and trail crossings to identify problems before they cause facility problems. The purpose of the storm patrol monitoring is to decrease the risk of road and trail damage, particularly at culverts and drain dips. Road drainage malfunction during a heavy rain event could result in safety hazards.

Part VI – Emergency Stabilization Treatments and Source of Funds
Initial Request

Line Items	Units	Unit Cost	NFS Lands		Other \$	Other Lands				All Total \$
			# of Units	BAER \$		# of units	Fed \$	# of Units	Non Fed \$	
A. Land Treatments										
weed treatment	AC	416	45	\$18,731	\$0		\$0		\$0	\$18,731
<i>Subtotal Land Treatments</i>				\$18,731	\$0		\$0		\$0	\$18,731
B. Channel Treatments										
<i>Insert new items above this line!</i>				\$0	\$0		\$0		\$0	\$0
<i>Subtotal Channel Treat.</i>				\$0	\$0		\$0		\$0	\$0
C. Road and Trails										
ROADS										
road equipment mobilization	LS	1	937	\$937	\$0		\$0		\$0	\$937
drainage excavation armored drain dip	each	2	150	\$300			\$0		\$0	\$300
place riprap, class 2, onsite	CY	32	30	\$960	\$0		\$0		\$0	\$960
road reconditioning, compaction method	miles	9.18	818	\$7,509			\$0		\$0	\$7,509
18 inch corrugated metal pipe, 0.064 inch thickness for steel or 0.075 inch thickness for aluminum, method B	feet	48	28	\$1,344			\$0		\$0	\$1,344
TRAILS				\$0	\$0		\$0		\$0	\$0
install/maintain drainage structures	each	275	172	\$47,175			\$0		\$0	\$47,175
hazard trees	each	450	47	\$21,100			\$0		\$0	\$21,100
route marking	miles	3	4135	\$12,405			\$0		\$0	\$12,405
tread stabilization	miles	5.5	16987	\$93,430			\$0		\$0	\$93,430
punchon removal/recondition	each	2	6180	\$12,360			\$0		\$0	\$12,360
<i>Insert new items above this line!</i>				\$0	\$0		\$0		\$0	\$0
<i>Subtotal Road & Trails</i>				\$197,520	\$0		\$0			\$197,520
D. Protection/Safety										
<i>Insert new items above this line!</i>				\$0	\$0		\$0		\$0	\$0
<i>Subtotal Structures</i>					\$0		\$0		\$0	\$0
E. BAER Evaluation										
assessment (person days)	DAYS	700	30	\$21,000			\$0		\$0	\$21,000
travel costs and misc.	LS	3	82	\$246			\$0		\$0	\$246
implementation administration		500	10	\$5,000						\$5,000
<i>Insert new items above this line!</i>				---	\$0		\$0		\$0	\$0
<i>Subtotal Evaluation</i>				\$26,246	\$0		\$0		\$0	\$26,246
F. Monitoring										
storm patrol	each	400	5	\$2,000						\$2,000
weeds	AC	207	86	\$17,920						\$17,920
<i>Insert new items above this line!</i>				\$0	\$0		\$0		\$0	\$0
<i>Subtotal Monitoring</i>				\$19,920	\$0		\$0		\$0	\$19,920
G. Totals				\$262,417	\$0		\$0		\$0	\$262,417
Previously approved					\$0					
Total for this request				\$262,417						

PART VII - APPROVALS

1. /s/ Rebecca Heath
Forest Supervisor (signature)

10/2/06

2. _____
Regional Forester (signature)

Date