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

Date of Report: 11/14/2018

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

[X] 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 DESCRIPTION

A. Fire Name: Bacon Rind

C. State: Montana

D. County: Gallatin

E. Region: Northern (1)

F. Forest: Custer Gallatin NF

G. District: Hebgen Lake

H. Fire Incident Job Code: P1L06418 0111

I. Date Fire Started: July 20, 2018

J. Date Fire Contained: 11/05/2018

K. Suppression Cost: $4,000,000

L. Fire Suppression Damages Repaired with Suppression Funds
1. Fireline waterbarred (miles): 0
2. Fireline seeded (miles): 0
3. Other (identify): 0

M. Watershed Numbers: Gallatin River – Crowfoot Ridge (#100200080102)
Gallatin River – Snowslide Creek (#100200080103)
Bacon Rind Creek (#100200080104)

N. Total Acres Burned: 5,991

NFS Acres (3,700) Other Federal (2,291) State () Private ()

O. VegetationTypes: Douglas fir, Lodgepole Pine, Whitebark Pine, sub-alpine fir, riparian.

P. Dominant Soils:

Due to the predominance of limestone and dolomite parent materials in the area, most soils in the area will be calcareous at relatively shallow depths in the soil profile. Based on the presence of calcium carbonate in the soil, pH's levels in the subsoil will range from mildly to moderately alkaline, with an approximate range in pH 7.6 to 8.4. They will also contain abundant hard, angular rock fragments, either throughout the soil profile or below a surface volcanic ash layer, if one is present. These soil conditions favor Douglas-fir over most other conifer species which was observed during field reconnaissance of the area.

Soil textures in limestone areas are mainly loams and clay loams and due to the hardness and horizontal planes of weakness in the underlying bedrock will tend to have a substantial amount of hard, flat lying, limestone, rock fragments, called channers, in the soil. The proportion channers present increases with depth until a lithic (hard bedrock) contact is reached.

Landform – Steep and very steep mountain slopes.

Parent Material – Limestone bedrock with limited areas of volcanic ash surface deposits

Erodibility - Moderate

Q. Geologic Types:

Limestone with minor areas of dolomite and shale; basalt intrusion of limited effect.

The predominant bedrock type found throughout the entire area burned is limestone. Along with the limestone there are several interbedded strata of dolomite, a somewhat harder, magnesium enriched carbonatic rock. Commonly associated with both limestone and dolomite strata as bands of finer grained shale. Near the center of the burn area, there is also a basaltic volcanic plug as identified in the Montana Bureau of Mining and Geology (MBMG) geologic map for the Hebgen Lake area (O'Neill and Christiansen 2002).

R. Miles of Stream Channels by Order or Class (only channels on CGNF lands are shown):

Stream miles by order within perimeter.

Stream Order	Length (Miles)
1	5.7
2	2.3
Grand Total	8.0

S. Transportation System

Trails: 1.2 miles Roads: 0 miles

PART III - WATERSHED CONDITION

Note: the following information is for the Bacon Rind Creek 12th code HUC watershed. This is the only watershed containing identified Values At Risk

A. Burn Severity (acres): 8928 (unburned); 671 (low); 728 (moderate); 68 (high)

B. Water-Repellent Soil: Low water repellency in most areas with moderate water repellency on moderate to high severity areas (approximately 20% of the area).

C. Soil Erosion Hazard Rating: Moderate ovr 80% of the area; low over 20% of the area.

D. Erosion Potential: 2.0 tons/acre

E. Sediment Potential: 0.8 tons/acre

PART IV - HYDROLOGIC DESIGN FACTORS

Estimated Stream Discharge at Lower End of Bacon Rind Creek 12th Code HUC (#100200080104)

Return Period	Pre-Fire Discharge (cfs)	Post-Fire Discharge (cfs)
2	107	115
5	185	199
10	251	270
25	350	377
50	432	465
100	516	555

A. Estimated Vegetative Recovery Period, (years): 3

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

C. Equivalent Design Recurrence Interval, (years): 5

D. Design Storm Duration, (hours): NA (see table above)

E. Design Storm Magnitude, (inches): NA (see table above)

F. Design Flow, (cubic feet / second/ square mile): See table above (Pre-Fire Discharge)

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

H. Adjusted Design Flow, (cfs per square mile): See table above (Post-Fire Discharge)

PART V - SUMMARY OF ANALYSIS

A. Describe Critical Values/Resources and Threats:

Summary of Potential Watershed Response

The Bacon Rind Fire burned 5,991 acres, mostly within the Bacon Rind and Snowslide Creek drainages. The western portion of the fire burned within the Lee Metcalf Wilderness on Custer Gallatin National Forest lands. The eastern portion burned along the northwestern edge of Yellowstone National Park.

The fire burned in a mosaic pattern and resulted in a well distributed mix of severity levels (Figure 1). Landforms in the burned area consist of alpine hillsides and ridges, alluvial fans, and floodplains. Stream channel morphology ranges between steep headwater channels to lower gradient alluvial channels.

The BARC imagery has been field verified along FS trail 176 which runs just inside the south boundary of the fire. Field inspection determined that the BARC imagery is relatively accurate in that area, although the actual presence/extent of moderate severity burn appears to be more patchy and discontinuous in reality than what is shown in Figure 1. Needle cast is already occurring and grass/forb roots appear mostly unharmed in most areas, both of which will aid in recovery of vegetative cover and infiltration. Erosion is likely to occur primarily during spring snowmelt and rain. Recovery of burned areas is likely to be quite rapid: 1-5 years depending on burn severity and location.

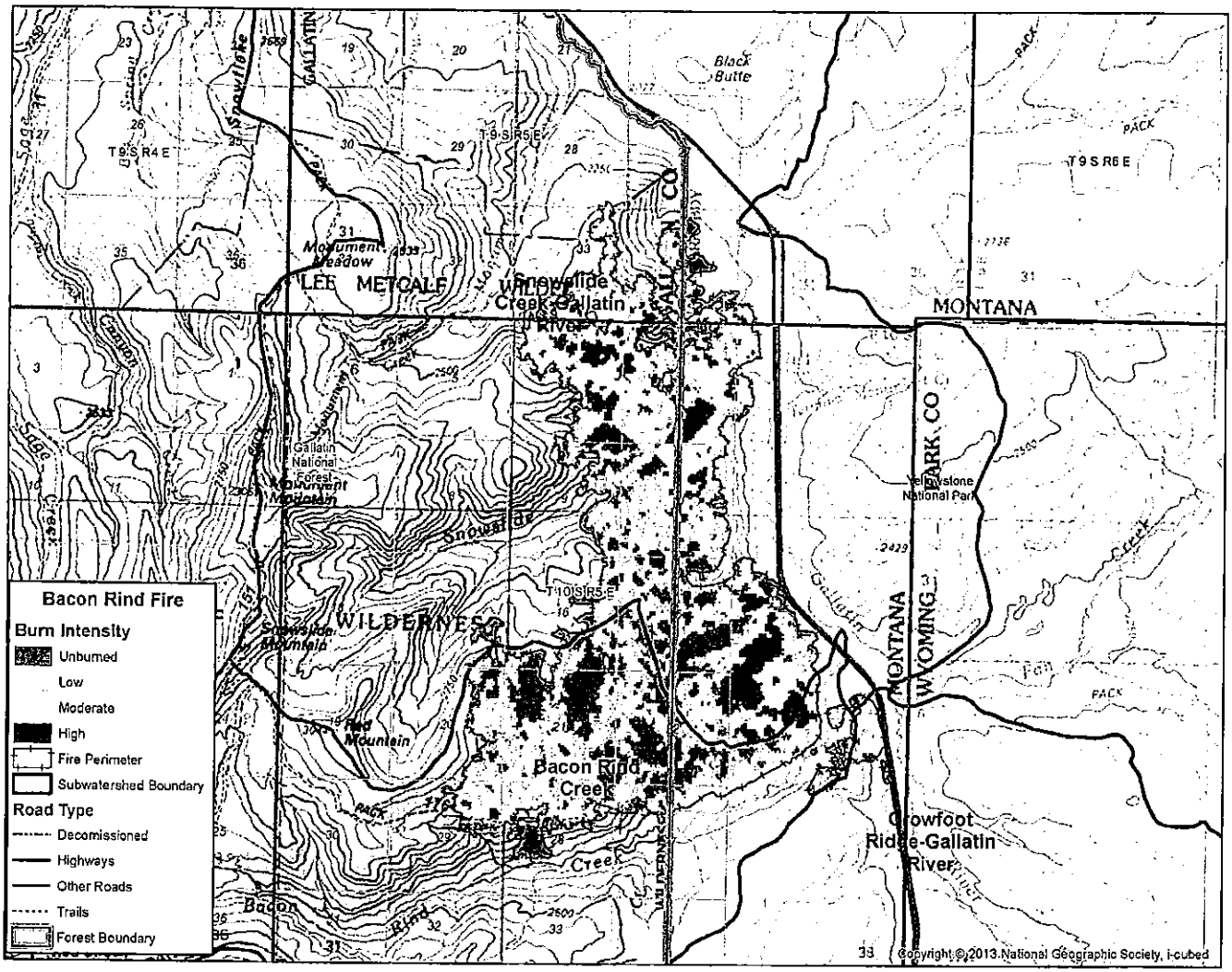

Figure 1. Bacon Rind Fire

Values at Risk:

The risk matrix below and associated definitions were used to evaluate risk levels in the assessment. (Exhibit 2 of Interim Directive No.: 2520-2010-1). Proposed treatments and their associated risk levels are discussed below in the following categories: Life, Property, and Natural Resources.

Probability of Damage or Loss	Magnitude of Consequences		
	Major	Moderate	Minor
	RISK		
Very Likely	**Very High**	**Very High**	**Low**
Likely	**Very High**	**High**	**Low**
Possible	**High**	**Intermediate**	**Low**
Unlikely	**Intermediate**	**Low**	**Very Low**

Probability of Damage or Loss: The following descriptions provide a framework to estimate the relative probability that damage or loss would occur within 1 to 3 years (depending on the resource):

- Very likely. Nearly certain occurrence (90% - 100%))
- Likely. Likely occurrence (50% - 89%)
- Possible. Possible occurrence (10% - 49%)
- Unlikely. Unlikely occurrence (0% - 9%)

Magnitude of Consequences:

- Major. Loss of life or injury to humans; substantial property damage; irreversible damage to critical natural or cultural resources.
- Moderate. Injury or illness to humans; moderate property damage; damage to critical natural or cultural resources resulting in considerable or long term effects.
- Minor. Property damage is limited in economic value and/or to few investments; damage to critical natural or cultural resources resulting in minimal, recoverable or localized effects.

Property: Forest Service Trails

Risk Assessment: Trail Infrastructure

Probablity of Damage or Loss: Likely (50-89% chance)

Magnitude of Consequence: Moderate

Risk Level: High

Trail 176 runs through low and moderate severity burn areas as well as unburned areas (Figure 1). Some segments of these trails are at risk of further damage that is likely to occur in the next 12 months. This future damage is likely to occur through the following mechanisms.

- Direct erosion of trail prisms due to loss of drainage features such as water bars and dips
- Direct erosion of tread due to loss of adjacent and upslope vegetation
- Fillslope failure due to direct loss of forested vegetation and root systems. This potential failure mechanism is likely to occur on steep hillslopes with moderate and high burn severity.

Trail segments that would be eligible for emergency treatments were identified using the following landscape and trail filters to separate short term (<12 months) risks from long term risks.

- Burn severity levels adjacent to and upslope of trail segments
- Hillslope position (ridgetop, midslope, or valley bottom) of trail segments
- Hillslope gradient
- Aspect
- Iminent risk of further loss of trail prisms in the next 12 months

Trail grades within the area vary from 5% to 25% with hillslope gradients up to 60%. Pre-fire trail conditions within the fire perimeter ranged from fair to excellent. Trail segments proposed for drainage treatment include those within moderate and high severity on hillslopes greater than 30%.

Natural Resources: Native Plant communities

Noxious weeds are likely present in the burned area. There have not been inventories conducted in or near the Bacon Rind fire, however, based on other areas with trails, it is likely that there are some weeds along these trails.

Risk Assessment – Threats to native plant communities

Probability of Damage or Loss: Possible - Based on burn severity and proximity to potential weed populations.

Magnitude of Consequence: Moderate – Loss of native plant communities and spread of noxious weeds.

Risk Level: Intermediate – Invasive species treatment may be needed on infestations in and adjacent to the fire perimeter. Additional invasive species monitoring next year will determine if weeds are present and if weed spread is occurring.

There is approximately 1.0 mile of trail in moderate and high burn severity, which if buffered by 100 feet on either side of the trail, is 24 acres of potential EDRR activities.

B. Emergency Treatment Objectives:

As noted above, threats to life, property, and natural resources could potentially result from post-fire conditions in the burned area. For these reasons the primary treatment objectives are:

- Prevent additional loss of trail infrastructure that is likely to occur in the next 12 months
- Minimize potential effects of post-fire conditions on potential spread of noxious weeds into burned area.

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

Land **N/A** % Channel **N/A** % Roads/Trails **50** % Protection/Safety **N/A** %

Further damage to the trail may occur in the spring before BAER work is initiated. However, the highest potential for further damage would be from thunder storm runoff during the summer. We conservatively estimate that the trail work would have a 50% chance of being completed prior to any significant further damage to the trail.

D. Probability of Treatment Success

	1 year after treatment	3 years after treatment	5 years after treatment
Land	80	80	75
Channel	NA	NA	NA
Roads/Trails	50	100	100
Protection/Safety	90	80	70

E. Cost of No-Action (Including Loss): $23,100

The loss of trail drainage controls (waterbars) and tread is highly likely to increase repair costs over time if BAER treatments are not implemented as soon as possible. The current estimate is $2,000 to treat 1.0 miles of trail. If the treatments are not implemented, and assuming the at-risk trail segment requires full tread rebuilding with waterbars, the cost would be 1.0 miles x $15,000 cost/mile (about $3/foot), for a total or about $15,000.

The wildfires created conditions conducive to noxious weeds spread and establishment by reducing competition, exposing bare mineral soil, and creating an environment where fall nutrient availability (water and soil nutrients) goes to the fall growth period for noxious weeds and not native plants which are mostly dormant at this time. This equates to a high probability of new noxious weed invasions and spread if left untreated (very likely and with major consequences).

Having noxious weeds establish and spread (at the generally accepted rate of 14% per year) will reduce native forage and cover for wildlife species and reduce the recreational value of the greater Bacon Rind Fire area. All of these aspects have a "non-market forest benefit", non-market forest benefit loss, that would be apparent to the users of the Bacon Rind Fire area within a decade should these sites go untreated.

If Early Detection/Rapid Response (EDRR) treatments are not funded, noxious weeds may establish and potentially take multiple years post-establishment to be detected. Assuming a 14% per year establishment and spread rate from wind, wildlife, and humans, contract cost of weed treatment (backpack treatment at $200/acre) could be as much as $8,100 after 5 years.

BAER EDRR treatments are the first step in treating and minimizing noxious weed invasion. In post-fire years 2-5 risk for noxious weeds will persist as native ground cover and vegetation recovers.

F. Cost of Selected Alternative (Including Loss): $12,220

There remains a 20% chance that the proposed treatments for this initial work may not succeed. Total cost of the action alternative plus this 20% chance of failure is $12,220.

G. Skills Represented on Burned-Area Survey Team:

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

Team Leader: Dale White

Email: dalewhite@fs.fed.us Phone: 406-587-6752

H. Treatment Narrative:

The proposed trail treatments are designed to prevent further loss of prisms. This loss is likely to occur in the next 12 months without treatment. In addition, the cost of these treatments is expected to be less than complete reconstruction of prisms in the event of complete loss. To provide for trail worker safety, hazard trees would be removed along all sections of trail approved for treatment. Proposed treatments are summarized below.

- Replace damaged trail structures that were destroyed in the fire along sections of trail that are likely to experience further loss in the next 12 months.
- Construct new trail structures along sections of trail that are likely to experience further loss in the next 12 months.
- Remove hazard trees as necessary to provide safe environment for FS employees and trail users.
- EDRR for weeds to prevent or minimize spread into burned areas.
- Install signs to warn trail users of post-fire hazards.

I. Monitoring Narrative:

Monitoring of post-fire conditions and the effects of storm events will be monitored informally by ranger district personnel and reported to the Forest BAER Coordinator. Continued monitoring and inventory of trail conditions may result in submission of an Interim 2500-8 in the coming months.

PART VI - EMERGENCY STABILIZATION TREATMENTS AND SOURCE FUNDS

Line Items	Units	Unit Cost	NFS Lands # of Units	BAER $	Other $
A. Land Treatments					
EDRR	acres	$200	24	$4,800	$0
Subtotal Land Treatments				$4,800	$0
B. Channel Treatments					
Subtotal Channel Treatments				$0	$0
C. Road and Trails					
FNF Trail Stabilization	miles	$2,000	1	$2,000	$0
Subtotal Road & Trails				$2,000	$0
D. Protection/Safety					
Post-fire Hazard Signs	each	$300	2	$600	$0
Hazard Tree Removal	miles	$400	0.5	$200	$0
Subtotal Protection/Safety				$800	$0
E. BAER Evaluation					
Team Evaluation	each				$2,500
Subtotal Evaluation				$0	$2,500
F. Monitoring					
Post-fire Monitoring	each			$0	$0
Subtotal Monitoring				$0	$0
G. Totals				**$7,600**	$2,500

PART VII - APPROVALS

1. /s/ Mary Erickson — Forest Supervisor — 11/15/13 — Date

2. /s/ — Regional Forester — 11/24/13 — Date