Date of Report: 9/28/15

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

1. A. Fire Name: Morrell Complex
B. Fire Number: MT-LNF-000851
C. State: Montana
D. County: Missoula
E. Region: Northern (01)
F. Forest: Lolo (16)

2. G. District: Seeley Lake (06)
H. Fire Incident Job Code: P1J1SX (0116)

I. Date Fire Started: 08/14/2015
J. Date Fire Contained: 95% contained as of 9/24/15

K. Suppression Cost: $3,200,510

L. Fire Suppression Damages Repaired with Suppression Funds
1. Fireline rehabilitated (miles): Machine : 5.5

M. Watershed Numbers: 170102031006, 170102031004, 170102031001

N. Total Acres Burned: 869 acres (all NFS ownership)

O. VegetationTypes: Ridges primarily consist of mixed conifer including lodgepole, subalpine fir, and spruce and are dominated by subalpine fir/beargrass (ABLA/XETE) habitat types. Hillslopes support primarily subalpine fir/menziesia (ABLA/MEFE). Lower slopes and valley bottoms consist of Douglas-fir, lodgepole, and larch with primary habitat types of grand fir/queencup beadlily (ABGR/CLUN) and grand fir/ twinflower (ABGR/CLUN).

P, Q. Dominant Soils and Geologic Type (Lolo National Forest Land Systems Inventory,1988):

Land type	Landform	Slope Range (%)	Geologic Group	Parent Material	Taxonomic Classifcation	Soil Surface Texture
32	Broadly convex ridges	10-35	Q	Quartzite, Siltite, and Argillite	Andic Cryocrepts	Silt loam with ash loess
41	Steep subalpine ridges and mountain slopes, glacial cirque headwalls	50-100	Q	Quartzite, Siltite, and Argillite	Entic/Lithic Cryandepts	Silt loam with ash loess
47	Glacial valley bottoms (glacial valley trains)	35-45	O	Glacial till deposits derived from Quartzite, Siltite, and Argillite	Entic Cryandepts	Silt loam
48	Glaciated mountain Slopes	55-75	Q	Quartzite, Siltite, and Argillite	Entic Cryandepts/ Typic Vitrandepts	Silt loam
64	Steep mountain slopes	55-75	Q	Quartzite, Siltite, and Argillite	Andic Cryocrepts	Silt loam with ash loess
74	Glacially scoured mountain slopes and rolling benches	25-55	U	Quartzite, Siltite, and Argillite or glacial till on benches	Andic Dystric Eutrocrepts	Silt loam with ash loess

R. Miles of Stream Channels by Order: 1.3 miles, 1st order streams

S. Transportation System (NFS):

Trails: 3.75 miles Roads: 5.5 miles

PART III - WATERSHED CONDITION

A. Burn Severity (acres): 69 (8%) (unburned); 256 (29%) (low); 366 (42%) (moderate); 178 (20%) (high)

B. Water-Repellent Soil (acres): ~180, soils in the area tend to be naturally hydrophic when dry; hydrophobicity was only attributed to fire effects where burned at high severity.

C. Soil Erosion Hazard Rating (acres): 0 (low); 689 (moderate); 179 (high)

D. Erosion Potential: Maximum (year 1): 7.5 -10.7 tons/acre

PART IV - HYDROLOGIC DESIGN FACTORS

A. Estimated Vegetative Recovery Period, (years): 2 grass/shrubs; 20-50 confiers

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

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

D. Design Storm Duration, (hours): 10-yr, 24 hr

E. Design Storm Magnitude, (inches): 2.6 inches

F. Design Flow, (cubic feet / second/ square mile): 35 cfs/mi^2 entire fire area

G. Estimated Reduction in Infiltration, (percent): 0-5

H. Adjusted Design Flow, (cfs per square mile): 43 cfs/mi^2

PART V - SUMMARY OF ANALYSIS

A. **Critical Values/Resources and Threats:** The primary values at risk resulting from the Morrell Complex are transportation infrastructure (roads and culverts), trails, water quality, and native vegetation communities.

Transportation Infrastructure: Two roads within the fire perimeter, FSR 720 and FSR 17484 are located midslope on steep slopes that experienced high fire intensity and moderate to high soil burn severity. FSR 720 is a major access road that is open year-round to the public, and is part of a snowmobile trail system in the winter. FSR 17484 provides access to a radio repeater that is critical for forest communications. Four culverts on these roads have been identified as unable to handle post-fire flows from a 10 year storm event. Additionally, current drainage features including catch basins, ditches, and surface dips are at risk of being overwhelmed by increased movement of sediment and debris. Due to fire effects, higher stormflows are expected in the Morrell Complex in the first few years following the fire. Larger flow events are a function of increased surface runoff from loss of vegetative cover, loss of soil structure, and increased soil hydrophobicity. Furthermore, burned and exposed soils are more susceptible to transport to stream channels. This combination of increased runoff and greater susceptibility to erosion threatens transportation infrastructure that is not designed to handle these increased post-fire flows. Failure of current road drainage structures could result in major damage to road structure allowing uncontrolled water to divert, potentially impacting adjacent water quality and soil productivity.

Trails: Four trails are located within the fire perimeter: #183 (Inez Ridge), #382 (Swan Divide), #429 (Richmond Ridge), and #430 (Richmond-Sunday Mtn.). During the Morrell fire, portions of these trails experienced high fire intensity, resulting in areas of moderate and high soil burn severity adjacent to trails. These areas are expected to experience increased runoff and erosion during post-fire rain events. Current trail dranaige features will not support increased runoff and may result in damage to trail structure and increased soil erosion. Failures in trail drainage ultimately have the potential to damage soil productivity, increase sedimentation into adjacent streams, and damage wildlife and fisheries habitat.

Water quality: Increased sediment and nutrient yield will occur from portions of watersheds that burned at moderate or greater severity. Slopes above and adjacent to tributaries of Camp Creek, Inez Creek, Richmond Creek, and Morrell Creek experienced moderate to high soil burn severities, and are at risk for increased post-fire flows and sedimentation. Morrell Creek is designated bull trout critical habitat and is one of our key bull trout streams in the Blackfoot Basin. Camp Creek, Inez Creek, and Richmond Creek are smaller order, high gradient streams that contain populations of pure cutthroat trout. Aquatic populations may be negatively impacted by these post-fire flows, especially in the event of road or trail drainage failures.

Native vegetation: Native vegetation communities and soil productivity are at risk from rapid expansion of noxious weeds from existing populations in the burn area vicinity. Roads within and leading to the burn perimeter, as well as areas within the fire are infested with noxious weeds. Known weed species include: Spotted knapweed, cheatgrass, St. Johnswort, houndstongue, and oxeye daisy. Weed infestation in the fire area has the potential to decrease soil cover and native vegetation, which would increase erosion and limit soil productivity.

Values at Risk:
In accordance with the revised Forest Service manual, the risk matrix below, Exhibit 2 of Interim Directive No. 2520-2010-1, was used to evaluate the Risk Level for each value identified. Only treatments that had a risk of Intermediate or above are recommended for BAER authorized treatments. For the Morrell Complex, roads, trails, and weeds/sensitive plants had risk levels of high or greater and are the only resources recommended for BAER funded treatments.

Table 5. Values at Risk Matrix.

Probability of Damage or Loss	Magnitude of Consequences		
	Major	Moderate	Minor
	RISK		
Very Likely	Very High Weeds/Sensitive Plants	Very High	Low
Likely	Very High	High Soil Erosion, Trails	Low
Possible	High Roads	Intermediate	Low
Unlikely	Intermediate	Low Archaeology	Very Low

B. Emergency Treatment Objectives:

As noted above, threats to natural resources and forest infrastructure from failure of road and trail drainage structures, increased sediment delivery, reduction of soil productivity and establishment of noxious weeds exist as a result of the Morrell Complex. For these reasons the primary treatment objectives are:

- Mitigate effects under changed post-fire watershed response, particularly where forest roads and trails cross drainages or drainage features are unlikely to support post-fire flows.
- Minimize the increased potential for the spread of invasive and noxious weeds.
- Provide safe access to fire area for personnel implementing road, trail, and weed mitigations.
- Monitor implemented BAER treatments and exising infrastructure to determine effectiveness in post-fire flow conditions. Monitor weeds to determine effectiveness of BAER treatments and determine need for future treatements.

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

Land: **75** % Channel: **N/A** % Roads/Trails **80** % Protection/Safety **90**

D. Probability of Treatment Success

Table 6. Treatment succession prediction

	Years after Treatment		
	1	3	5
Road/Trails	90	85	80
Channel	-	-	-
Land/Weeds	80	60	50
Protection/Safety	90	80	50

E. Cost of No-Action (Including Loss): >250,000

The average value of FSR 720 and the cost of repairing the road segments without BAER treatment if damage and loss of function occurs is approximately $50,000 per mile (total cost $175,000). Cost to implement the proposed BAER road treatments is approximately $9,000 per mile.

The average value of FSR 17484 and the cost of repairing the road segments without BAER treatment if damage and loss of function occurs is approximately $25,000 per mile (total cost 50,000). Cost to implement the proposed BAER road treatments is approximately $6,500 per mile.

The cost of repairing trail segments without BAER treatment if failures to drainage structures occur is approximately $10,000 per mile (total cost $27,500). Cost to implement proposed trail treatments is approximately $2,400 per mile.

The value of protecting the ecological integrity and soil productivity of the burned area from noxious weed infestation likely exceeds the cost of weed treatment and monitoring, although this was not quantified. per mile.

F. Cost of Selected Alternative (Including Loss): There remains a 10% chance that the proposed treatments for this initial work may not succeed. Total cost of the action alternative plus this 10% chance of failure ($73,567 * 0.10) is **$80,924**.

G. Skills Represented on Burned-Area Survey Team:

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

Team Leader: Ann Hadlow

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H. Treatment Narrative:

Proposed Road Treatments

Treatment/Work Item	Treatment Narrative – Work Requirements - Rational
Culvert Replacement in Tributaries to Camp Creek, Inez Creek, and Richmond Creek	Two road- stream crossings (culverts) will be replaced on FSR 720, and one will be replaced on FSR 17484. A second road-stream crossing on FSR 17484 will be eliminated to reduce the substantial risk of culvert plugging, overtopping, and breaching. The watershed above the culvert locations received moderate to high soil burn intensity. Eight culverts in the fire area were assessed for BAER treatment. Four of these culverts were found to be undersized to pass a 10 year post-fire flow event and are recommended for replacement or removal where possible.
Catch Basin Repair/ Reconstruction	Catch basins will be enlarged and back slopes stabilized to prevent failure during post-fire runoff events.
Road Reshaping	Existing surface drainage on Roads 720 and 17484 will be reshaped and reconditioned to bring the template back to original typical section and provide adequate surface drainage to operate at full function. The road will be bladed, reshaped, and compacted to re-establish original section and eliminate rutting and berms.
Road Drainage Maintenance (Storm-proofing)	Road drainage on both roads would be addressed by cleaning and shaping all road drainage features such as drain dips, culvert inlets and outlets, and ditch cleaning. Cross drainage, additional ditch relief, or waterbar construction may be necessary to handle the additional movement of water.
Storm Patrol	Implemented and existing road drainage structures would be monitored for effectiveness following storm events.

Proposed Weed Treatments;

Treatment/Work Item	Treatment Narrative – Work Requirements - Rational
Spot Treatment (EDRR)	Spot treatments of weeds will be completed within and immediately adjacent to the fire area as part of an early detection rapid response (EDRR) protocol. Spot treatments will include herbicide treatment and hand-pulling. Known weed species include: Spotted knapweed, cheatgrass, St. Johnswort, houndstongue, and oxeye daisy. Roads within the fire perimeter were used for suppression actions and will be treated as part of the fire rehabilitation, but will be included in monitoring surveys.
Monitoring	Monitoring will be done to detect and rapidly respond to existing and new weed infestations resulting from fire effects. Monitoring would occur along roads, trails, and within the interior of the fire where moderate or high soil severity is observed. Monitoring efforts would require 20 days of survey to inventory the fire area. As noxious weeds are discovered they will be spot treated or hand-pulled.

Proposed Trail Treatments;

Treatment/Work Item	Treatment Narrative – Work Requirements - Rational
Erosion Control	Erosion control will be completed on 0.5 miles of Trail #183, 2.0 miles of Trail # 429, and 0.25 miles of Trail #430. Erosion control measures will include water bars, check dams, drainage dips and tread stabilization.
Hazard Tree Removal	Hazard trees will be removed to protect personnel during implementation of erosion control work.

I. Monitoring Narrative:

Monitoring of road treatments will occur multiple times in the fall of 2015 and the spring of 2016. Road treatments will be monitored after major storm events and during spring snowmelt. Monitoring will be done to evaluate treatment effectiveness and to identify potential issues that may need action such as plugged culverts or drainage failures.

Monitoring of trails will occur in 2016 following the spring rains to evaluate treatment effectiveness, identify needs for further mitigation, and assess possible public safety issues.

Monitoring of weeds will occur in 2016 to target areas where spot treatments were applied. Monitoring will be done to evaluate effectiveness of spot treatments and identify needs for additional weed treatments.

Part VI – Emergency Stabilization Treatments and Source of Funds

			NFS Lands				Other Lands				All
Line Items	Units	Unit Cost	# of Units	BAER $	Other $	# of units	Fed $	# of Units	Non Fed $	Total $
A. Land Treatments										
Noxious Weed EDRR	Days	230	20	$4,600	$0		$0		$0	$4,600
Herbicide	Quart	100	2	$200	$0		$0		$0	$200
Insert new items above this line!				$0	$0		$0		$0	$0
Subtotal Land Treatments				$4,800	$0		$0		$0	$4,800
B. Channel Treatments										
Insert new items above this line!				$0	$0		$0		$0	$0
Subtotal Channel Treat.				$0	$0		$0		$0	$0
C. Road and Trails										
Mobilization	Lump	6000	1	$6,000	$0		$0		$0	$6,000
Culvert Removal	Each	1400	1	$1,400	$0		$0		$0	$1,400
Culvert Replacement, FSR 17484	Each	5450	1	$5,450	$0		$0		$0	$5,450
Culvert Replacement, FSR 720	Each	4600	2	$9,200	$0		$0		$0	$9,200
Stormproofing	Miles	5089	5.5	$27,990	$0					$27,990
Contract Administration	Days	427	38	$16,226	$0		$0		$0	$16,226
Trail Hazard Tree Removal	Miles	400	2.75	$1,100	$0					$1,100
Trail Erosion Control	Miles	2000	2.75	$5,500						$5,500
Insert new items *above this line!*				$0	$0		$0		$0	$0
Subtotal Road & Trails				$72,866	$0		$0		$0	$72,866
D. Protection/Safety										
Insert new items above *this line!*				$0	$0		$0		$0	$0
Subtotal Structures				$0	$0		$0		$0	$0
E. BAER **Evaluation**	Lump	7382	1	$7,382	$0		$0		$0	$0
Insert new items above *this line!*				$0	$0		$0		$0	$0
Subtotal Evaluation				$7,382	$0		$0		$0	$0
F. Monitoring										
Roads	Days	500	5	$2,500	$0		$0		$0	$2,500
Insert *new items above this line!*				$0	$0		$0		$0	$0
Subtotal Monitoring				$2,500	$0		$0		$0	$2,500
G. Totals				$80,166	$0		$0		$0	$80,166
Previously approved										
Total for this request				$80,166						

PART VII - APPROVALS

1.  10.9.15
Forest Supervisor — Date

2. _____ _____
Regional Forester — Date