

**Date of Report and Type:** 10/24/2018 Interim**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 #1 (text in blue)
- ☒ 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:** Rice Ridge**B. Fire Number:** MT-LNF-001464**C. State:** Montana**D. County:** Missoula, Powell, Lewis & Clark**E. Region:** Northern Region**F. Forest:** Flathead NF, Lolo NF**G. District:** Spotted Bear (FNF), Seeley (LNF)**H. Fire Incident Job Code:** P1K8ND17**I. Date Fire Started:** 07/24/2017**J. Date Fire Contained:** 10/15/2017**K. Suppression Cost:** \$49,150,000**L. Fire Suppression Damages Repaired with Suppression Funds (estimates):**

1. **Dozer Fireline repaired** (miles): 53.6
2. **Excavator Fireline repaired** (miles):
3. **Other** (identify): Road as fireline: 17.5; Handline: 8.7; Aerial Retardant: 7.2; Line Break: 3.1; Aerial Foam drop: 1.1; Fire Break: 0.4; Explosive line 0.1; other: 31.3. Number of Sites Repaired: Road Repair: 81; Drop Points: 42; Water Sources: 37; Landings: 30; Slash Piles: 21; Skid/Dozer line: 19; Log Deck/Bundle: 6; Dip Sites: 5; Repeater Sites: 2; Helibase: 1; Other: 47.

**M. Watershed Numbers:***Table 1: Acres Burned by Watershed*

HUC #	Watershed Name	Total Acres	Acres Burned	% of Watershed Burned
170102030501	Canyon Creek	10204	515	5
170102030503	Dry Fork North Fork Blackfoot River	26778	69	0.3
170102030701	Lake Creek	13680	6824	50

HUC #	Watershed Name	Total Acres	Acres Burned	% of Watershed Burned
170102030702	Middle North Fork Blackfoot River	10441	842	8
170102030703	Rock Creek	25412	453	2
170102030801	Upper Monture Creek	42003	20452	49
170102030802	Dunham Creek	21221	12855	61
170102030803	Dick Creek	20459	1783	9
170102030804	Lower Monture Creek	13787	702	5
170102030908	Shanley Creek	8894	3053	34
170102030909	Town of Woodworth-Cottonwood Creek	35927	9612	27
170102031104	Lake Inez-Clearwater River	23222	2083	9
170102031105	Morrell Creek	16447	9856	60
170102031106	Trail Creek	18922	10334	55
170102031107	Seeley Lake-Clearwater River	24115	1725	7
170102090104	Babcock Creek	16971	8410	50
170102090105	Upper Youngs Creek	32978	20463	62
170102090106	Lower Youngs Creek	27783	11880	43
170102090107	Lower Danaher Creek	25096	1580	6
170102090202	Lower Gordon Creek	23569	47	0.2

#### N. Total Acres Burned:

Table 2: Total Acres Burned by Ownership (acreage based on 10/XX/2017 fire perimeter)

OWNERSHIP	ACRES
FLATHEAD NF	51,773
LOLO NF	104,103
OTHER FEDERAL	0
STATE	150
PRIVATE	546
TOTAL	156,573

#### O. Vegetation Types:

Vegetation consists mostly of coniferous trees including warm and dry sites with ponderosa pine and Douglas-fir communities, as well as cool and moist sites with grand fir and western red cedar communities. Habitats include subalpine fir/huckleberry on northerly aspects and subalpine fir/beargrass on well-drained slopes. Cold alpine sites are dominated by alpine fir, white bark pine, and alpine larch. Subalpine forest communities occupies cold, moist sites above 5,500 feet with a mix of grand fir/queencup beadlily, grand fir/twin flower, western redcedar/queencup beadlily, and ponderosa pine which dominates most northerly aspects of the fire perimeter.

#### P. Dominant Soils:

Entic Cryandepts, Cryandepts-rock outcrop complex, Andic Dystic Eutrochrepts, and Andic Cryochrepts

#### Q. Geologic Types:

Geology is a combination of glaciation features and weathered metasedimentary rocks of the Belt super group, including argillites, siltites, and quartzites. Alpine and continental glaciation has produced many landforms within the fire perimeter: glacial moraines, outwash plains, scoured mountain slopes. Fluvial and gravitational processes associated with stream dissection also has produced terraces, alluvial fans, stream bottoms, and dissected footslopes.

**R. Miles of Stream Channels by Order or Class:***Table 3: Miles of Stream Channels by Order or Class*

STREAM TYPE	MILES OF STREAM
PERRENIAL	213
INTERMITTENT	210
EPHEMERAL	
OTHER (DEFINE)	

**S. Transportation System:**

**Trails:** National Forest (miles): 205      Other (miles): 15 (undefined trails)

**Roads:** National Forest System (miles): 180      Other (miles): 371

**Roads:** National Forest Collector and Arterial: 117 miles

*Table 4: Road miles by maintenance level or status*

SYSTEM STATUS	MAINTENANCE LEVEL/STATUS	MILES
NF SYSTEM ROADS	ML 1	25
	ML 2	72
	ML 3	45
	Convert use decommission	6 32
	<b>TOTAL SYSTEM</b>	<b>180</b>
<b>RECENTLY ACQUIRED, SYSTEM STATUS NOT YET DETERMINED</b>		<b>70</b>
NON-SYSTEM ROADS	Not Needed	43
	Temporary	2
	Undetermined	256
	<b>TOTAL NON-SYSTEM</b>	<b>301</b>
<b>TOTAL FS ROADS WITHIN FIRE PERIMETER</b>		<b>551</b>

**PART III - WATERSHED CONDITION****A. Burn Severity (acres):***Table 5: Burn Severity Acres by Ownership*

Soil Burn Severity	Lolo NF	Flathead NF	Other Federal (List Agency)	State	Private	Total	% within the Fire Perimeter
Low	25,201	10,667	0	47	171	36,086	23%
Moderate	49,430	25,563	0	89	304	75,386	48%
High	6,024	6,114	0	0	22	12,161	8%
Unburned	23,205	9,390	0	15	47	32,940	21%
<b>Total</b>	<b>104,103</b>	<b>51,773</b>	<b>0</b>	<b>151</b>	<b>544</b>	<b>156,573</b>	<b>100%</b>

**B. Water-Repellent Soil (acres):***Table 6: Water Repellent Levels by Acres and Percent of Fire*

Water Repellency	Acres	% of fire
Low	41878	27%
Moderate	33215	21%
High	81475	52%

**C. Soil Erosion Hazard Rating:***Table 7: Pre and Post Fire Soil Erosion Ratings by Acres*

Rating	Pre		Post	
	Acres	% of fire	Acres	% of fire
Low	96925	62%	86296	55%
Moderate	41417	27%	39586	25%
High	17551	11%	30691	20%

**D. Erosion Potential (tons/acre): 1.95***Table 8: Erosion Potential by Soil Burn Severity (tons/acre)*

Low SBS	Moderate SBS	High SBS	Average
.70	1.58	3.68	1.95

**E. Sediment Potential(cubic yards/square mile): 755****PART IV - HYDROLOGIC DESIGN FACTORS**

**A. Estimated Vegetative Recovery Period (years):** 1-3 years grass (achieve % effective ground cover), 10-15 years shrubs, 20-50 years conifers

**B. Design Chance of Success (percent):** 50-90%, depending on site and treatment

**C. Equivalent Design Recurrence Interval (years):** 25-year post-fire

**D. Design Storm Duration (hours):** 24-hour

**E. Design Storm Magnitude (inches):** 3.2 inches

**F. Design Flow (cubic feet / second/ square mile):** varies by drainage—see hydro report

**G. Estimated Reduction in Infiltration (percent):**

**H. Adjusted Design Flow (cfs per square mile):** varies by drainage—see hydro report

**PART V - SUMMARY OF ANALYSIS****Introduction/Background****Overview**

The Rice Ridge started from a lightning strike on July 24, 2017. Approximately 8% of the area within the fire perimeter burned at a high soil burn severity and 48% at moderate soil burn severity. The rest of the area within the fire perimeter had either low or very low soil burn severity with unburned inclusions. In high and moderate areas the soils burned intensely, consuming organic duff on the soil surface along with leaves and needles on standing live vegetation.

High-intensity rainstorms often occur in the burned area from late June through the end of August, and are the precipitation events most likely to generate elevated post-fire runoff. Although relatively uncommon in the burned area, rain-on-snow events also have the potential to generate considerable post-fire runoff events. This type of event generally occurs in May to early June. At the time this report was written, snow had already begun to accumulate at higher elevations in the burned area. The current risk of flooding and erosion is much higher than in the pre-fire condition, threatening various values within and downstream of the burned area.

## Watershed Response

**Hydrologic Response:** Watershed conditions in the burned watersheds have changed significantly as a result of the fire. Vegetation and underlying organic matter slows runoff and protect soils from direct raindrop impact, assists with water infiltration, and releases runoff at slower rates. Consumption of organic material and high soil heating can promote the formation of water repellent layers near the soil surface, which can lead to elevated runoff and soil erosion.

Due to the steepness of many drainages in the burned area, the amount of moderate and high burn severity (56% of the burned area), and the lack of vegetation and groundcover after the fire, even modest rainfall events will likely increase surface runoff and erosion, swelling streams with sediment- and debris-laden flood waters. Elevated runoff response is expected to be greatest in the first year following the fire, and will become less prevalent as vegetation and groundcover become re-established over the next several years.

**Erosion Response:** Primary effects of fire on soils are removal of soil cover and soil heating effects, driven by peak temperatures during passage of the fire front and smoldering consumption of duff and woody debris. Soil heating effects are below ground, which may compromise soil structure, stability and infiltration characteristics. This can change the ability of soils to accommodate infiltration from snowmelt and rain events, and thus affects level of runoff. Soil cover is crucial in physically protecting soil from erosion by absorbing raindrop impact, and dissipating the energy of surface runoff at the duff/soil interface. In most unburned settings in the Rice Ridge area, erosion is limited to a small scale, with eroded soil re-deposited on hillslopes with minimal movement. With widespread loss of cover due to the fire, large contiguous areas are vulnerable to rain and runoff impacts and mobilized sediments will frequently be delivered to stream channels. Soil burn severity mapped for this fire reflects the relative degrees of soil heating effects and cover reduction as a result of the fire. Soil burn severity mapping was used to quantify erosion risk and sediment delivery to streams within and below the burned area.

**Geologic Response:** Within the Rice Ridge burned area, some watersheds, especially the Dunham Creek, Youngs Creek, and tributaries to Cottonwood Creek area, show evidence of past mass movement (e.g. landslides, debris flows). The likelihood of additional mass movement of materials is higher in the post-fire setting. Other areas within the fire perimeter have shown little evidence of recent past hillslope instability, though mass movement is more likely following the fire in these areas as well. Soils are exposed and have become weakened, and rocks on slopes have lost their supporting vegetation. National Forest System roads are at elevated risk of damage from rolling rock, plugged culverts, debris slides, and debris flows. Stream channels and mountainside ephemeral channels are at greater risk of being flushed of sediment from elevated peak flows. That sediment will deposit in some channels, obstructing flow, raising flood levels, then covering roads or eroding road prisms. Risks to human life, roads, trails and natural resources are **high to very high**. There is a high potential for debris flows within the steep inner gorge areas, particularly within the Morrell Creek, Seeley Creek, Trail Creek, Blind Canyon Creek, Monture Creek, North Fork Cottonwood Creek and Dunham Creek and Youngs Creek drainages.

Recovery of pre-fire slope stability and watershed hydrologic response is dependent on many factors and typically occurs within ten years following the fire. Recovery of high burn severity areas is slower because little or no vegetative ground cover remains, the potential for needle cast is low, and soils have been degraded by extended heat from the fire.

**Vegetation Response:** Grasses and forbs are expected to re-establish within 1-3 years, shrubs within 5-10 years, and mixed conifer including Douglas-fir, western larch, lodgepole pine, subalpine fir, and spruce within 20-50 years.

### **A. Describe Critical Values/Resources and Threats (narrative):**

A comprehensive list of potential values at risk within or directly downstream of the 159,589 acre burned area was compiled for the interim report through consultation with local management and resource specialists and through BAER Team on the ground assessment, which can be found in the Project Record. This interim assessment is based on known values at risk derived through field review and geospatial



analysis of soil burn severity and transportation networks. Following guidance in Interim Directive 2520-2013-1, the BAER assessment team evaluated this list of values through field assessment and subsequent analysis to identify the critical values (FSM 2523.1 – Exhibit 01) that may be treated under the BAER program. The critical values were then assigned a level of risk defined by the probability of damage or loss coupled with the magnitude of consequences using the risk assessment matrix (Table 5). The critical values with unacceptable risks signify a burned-area emergency exists. The characterization of the probability of damage or loss is based on the watershed response analysis completed by the BAER Assessment. Critical values having a “Very High” or “High” risk rating include recommended emergency stabilization actions known to mitigate potential threats or minimize expected damage, which are described in Section H.

Table 9: Critical Value Matrix

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

## 1. Human Life and Safety (HLS):

Potential threats to visitors/recreating public, residents of private lands, and Forest Service employees include flooding with a potential for localized debris flows, hazard trees rock fall, and loss of emergency ingress and egress. These threats exist along roads, at concentrated recreation areas, and to permitted uses downstream or downslope of burned areas, particularly those with high or moderate soil burn severity.

- a. **Threats to Forest Employees and Visitors (Roads):** **Very High (very likely, major)** risk to travelers along routes (roads and trails) within and downslope from hillslopes burned at a moderate to high severity due to an increased threat of falling trees/snags, rocks, excessive erosion, flooding, and other debris. National Forest System routes having the greatest concerns include FSR 477 (Cottonwood Creek), 4388 (Dunham Creek), and 4379 (Swamp Creek), with an estimated length of approximately 117 miles where roads intersect areas of moderate and high burn severity. The highest-priority roads are those that access heavily used access points to the Bob Marshall Wilderness, which are popular with the public and are used extensively by commercial outfitters and guides. Additionally, FSR 477 accesses a communications site used by FS employees and first responders throughout the area.
- b. **Threats to Forest Employees and Visitors (Trails):** **Very High (likely, major)** risk to public and administrative personnel at the Morell Creek Trailhead, Monture-Hahn Trailheads and Falls-Canyon Trailheads due to the presence of hazard trees in areas of likely concentrated use. Treatment recommendations are, removal of site specific imminent hazard trees, and installation of hazard tree warning signage at trailheads to warn of potential threats.

## 2. Property (P):

There are 180 miles of National Forest System roads, 70 miles of roads on newly acquired parcels which have not yet had a system determination yet, at least 301 miles of non-system roads, and 205 miles of National Forest System trails within the fire perimeter. Post-fire conditions and the predicted watershed response indicate the potential for an increase in runoff, with movement of sediment and debris downslope into roadway and trail drainage features, such as water bars, roadside ditches, culvert inlets, roadway dips and run-outs. Road and trail systems within the Rice Ridge fire area are crucial to the economic recovery of the community of Seeley Lake, Montana, which relies heavily of recreation and tourist opportunities on National Forest System Lands.

- a. **Threats to Roads: Very High risk to roads and associated infrastructure** due to elevated runoff and erosion, flooding, and potential debris flows. Post-fire conditions will lead to increased runoff, erosion, sedimentation, debris transport, and rock fall. This elevated runoff response will impact roadway drainage features such as culvert inlets, roadside ditches, over-side drains, roadway dips and run-outs. During even relatively modest precipitation and snowmelt events, drainage features are likely to become overwhelmed, resulting in major damage to the road and loss of access. Treatment recommendations include improvement or upgrade of road drainage features, installation of warning signage, and road storm inspection to ensure that drainage features that are not otherwise improved through BAER treatments continue to function.
- b. **Threats to Trails: Very High risk to trail infrastructure** with substantial damage expected because flooding, debris flows, and erosion are likely in areas of moderate to high burn severity. The Rice Ridge fire burned within and adjacent to some of the highest-use trail infrastructure in the Bob Marshall Wilderness complex. The Bob Marshall Wilderness complex is one of the largest in the country, and provides recreation uses for hikers, hunters, outfitters, and packrafters. On average, 750 visitor groups use these trail systems annually, and 10 outfitters use these trail systems through Forest Service special use permits. In total, 187 miles of trail were impacted by the Rice Ridge fire, with 126 miles located moderate or high severity burn areas (57 miles Flathead NF, 69 miles Lolo NF).

Trail routes of greatest concern are: Monture Hahn Trail #27, Falls-Canyon Trail #16, Morrell Falls Trail #30, and South Morrell Trail 30.1 which represent 15 miles of trails requiring drainage work and 3 miles of spot treatment. Following field review of the Rice Ridge burned area, it was determined that an additional 126 miles of trail were at risk for trail failures associated with hydrologic function within moderate and high severity fire. Trail stabilization treatment recommendations include improving drainage sections of trail through trail tread stabilization and erosion control structure installation, install warning signage, and monitoring to ensure treatments are functioning as intended.

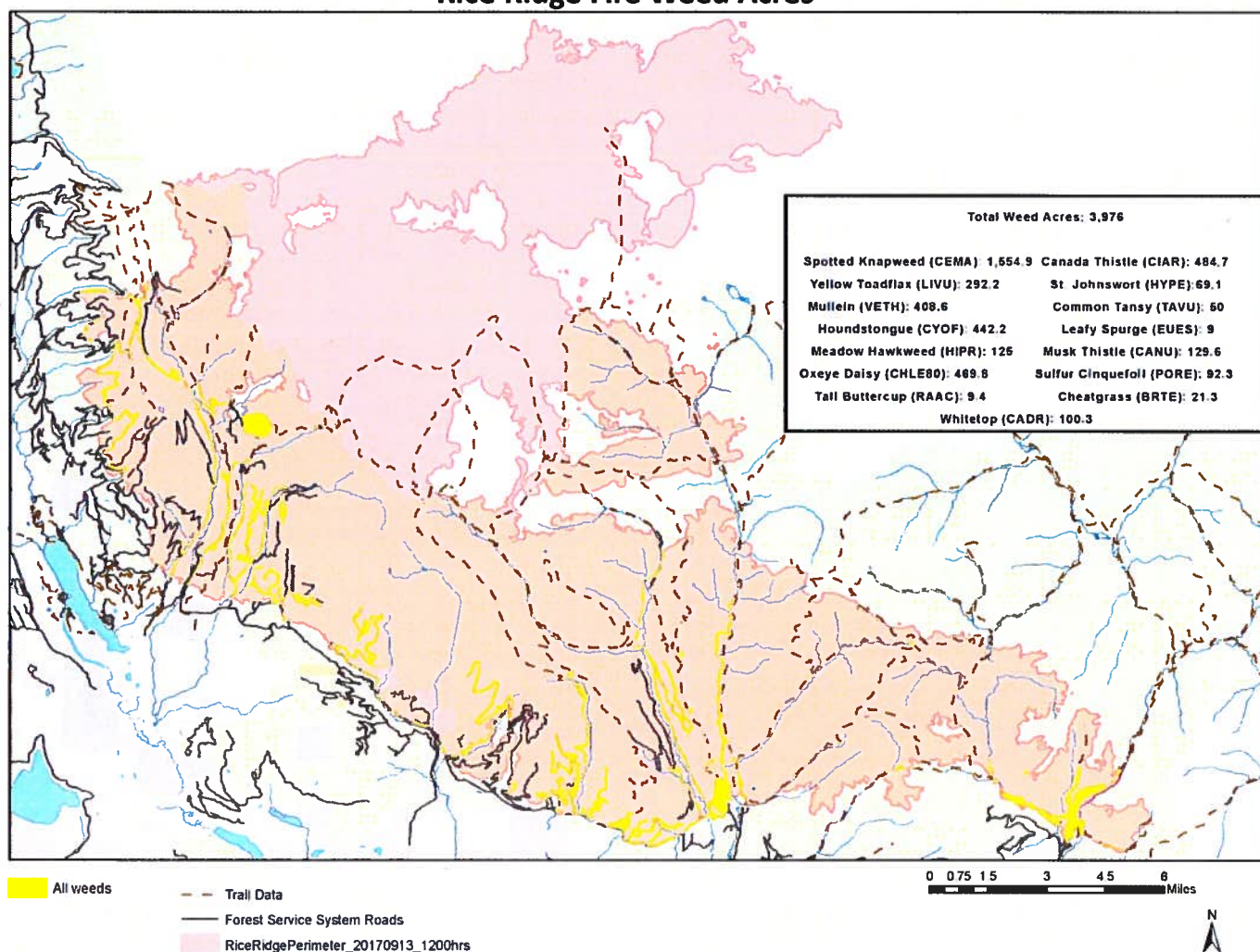
### 3. Natural Resources (NR):

- a. **Native Plant communities and ecological function: Very High risk of expansion of noxious weed infestations** at known locations along roadsides, logging decks, dozerlines and landings. Treatment recommendations are to spray and monitor these locations per the Early Detection Rapid Response treatment protocol.

The Rice Ridge fire area is adjacent to the Bob Marshall Wilderness Complex, including the Bob Marshall and Scapegoat wildernesses and also includes the Bear-Marshall-Scapegoat-Swan inventoried roadless area (BMSS IRA). The roadless area and wildernesses provide habitat for many wildlife species, including some of the more prominent species such as grizzly bear, black bear, mountain lions, lynx, fisher, marten, elk, whitetail deer, mule deer, wolf, moose, mountain goat, and bighorn sheep. They also support important summer range habitat for big game species.

Currently, known and mapped noxious weed infestation acreage is **3,976 acres** across the Seeley Lake RD portion of the Rice Ridge Fire and **130 acres** in the Bob Marshall Wilderness portion of the fire on Spotted Bear RD. Species include thistles, spotted knapweed, yellow toadflax, common mullein, houndstongue, meadow hawkweed, oxeye daisy, tall buttercup, St. Johnswort, common tansy, leafy spurge, sulfur cinquefoil, and cheatgrass. Infestations are mostly limited to roadsides, trails, trailheads, and open areas along roads. The majority of the infestations on the Spotted Bear RD are concentrated in Youngs Creek drainage. There are no known AIS within the perimeter of the fire.

## Rice Ridge Fire Weed Acres



Noxious weed infestations pose a serious threat to the composition, structure, and function of native plant communities. The recent fire activity dramatically changed the forest condition in some areas where moderate to high intensity fire occurred. Crown canopy was highly reduced to eliminated (moderate to high intensity burned areas); as was shrub and forb cover in the understory. These disturbed areas are now highly vulnerable to noxious weed invasion or noxious weed spread from existing infestations or adjacent sources. Areas considered burned at low intensities are also susceptible to noxious weed invasions because native vegetation was reduced. In noxious weed ecology, any reduction in competition for available nutrients, space, or light is considered an advantage to noxious weeds growth and establishment.

The fire-caused disturbance creates perfect habitat for noxious weed invasion and expansion. If emergency mitigation activities are not implemented this problem will expand exponentially and will require future extensive resources to manage. If left unmanaged the results could permanently alter plant communities and habitat, and adjacent private land values.

Overall, if left untreated the noxious weeds in the Rice Ridge burned area could spread and establish causing new infestations throughout the fire perimeter. The spread and establishment of noxious weed directly impacts native plant and wildlife communities in terms of habitat for both and forage for livestock and wildlife.

Damage to soils and native plant communities is irreversible in most cases and the loss of native plant communities (without treatment) is irretrievable as the native plant communities will not return on their own.



**b. Fisheries:**

There is an **intermediate risk (possible, moderate)** to bull trout (*Salvelinus confluentus*) (ESA listed species) and Western Cutthroat Trout (*Oncorhynchus clarki lewisi*) (Species of Concern). Fishes native to western Montana are adapted to the effects of wildfire on undisturbed landscapes. However, manmade landscape alterations (e.g., roads and culverts) can increase the occurrence and magnitude of wildfire effects such that local native fish populations may be at risk of extirpation. This is because roads and culverts are typically constructed to accommodate water yield from vegetated watersheds. However, little or no vegetation remains in moderate-highly burned areas such that water yield increases dramatically. This increase in flow often leads to road and culvert failures capable of delivering unnaturally large amounts of sediment and debris to nearby streams. Additionally, undersized culverts are problematic even if they do not fail. The reason for this is that undersized culverts increase water velocities so high that fish cannot swim upstream. This barrier to upstream movement is harmful to the overall population as it denies native species access to important habitat and contributes to genetic isolation. Immediate threats to fisheries resources by the Rice Ridge fire were therefore analyzed by identifying where areas of moderate-high burn severity overlap with manmade infrastructure near high-value fisheries resources. No treatments are proposed specifically for the fisheries resource; emergency resource treatments are captured within the proposed road treatments.

**c. Water Quality and Hydrologic Function:**

There is a **high risk (likely, moderate)** to water quality in area streams. Erosion and runoff from steep burned hillslopes and the road network will likely impact water quality through transport and deposition of ash and fine sediment in streams throughout the burned area, including important fishery streams and in Seeley Creek, which flows into Seeley Lake, the source water for the town of Seeley Lake. While ash in streams during the first year following the fire will be widespread, it should be relatively short-lived. However, in lakes downstream of the fire, ash could linger, particularly in areas where wave action and circulation do not keep water moving. While this has the potential to impact water quality in Seeley Lake and potentially Salmon Lake, effects will be mitigated by Seeley Lake's predominantly unburned watershed. Hillslope treatments can reduce erosion and sedimentation in targeted areas of a burned landscape, but are limited in effectiveness on steeper ground, and are expensive. These treatments were considered but determined not to be a cost-effective means of mitigating water quality impacts, particularly given the large burned area and extensive areas of steeper slopes. However, proposed road and trail drainage improvement work as well as culvert upgrades will reduce post-fire risk to water quality from the road and trail network.

There is a **high risk (likely, moderate)** to hydrologic function in the burned area. Hydrologic function is impaired in areas burned at moderate to high severity, primarily due to loss of groundcover, vegetation, and soil structure. Less water infiltrates the soil, and more runs off the ground surface, eroding soils and delivering sediment to streams. Road surfaces intercept elevated surface flows and re-route water from natural drainage ways. Treatments that increase roughness and reduce impermeable surfaces will accelerate the natural recovery rate of hydrologic function. Removal of unneeded culverts and restoration of drainage on open and closed roads also mitigates this risk.

**d. Soil Productivity:**

Soils within the Rice Ridge burned area are considered at **intermediate risk (possible, moderate)** in a post-fire environment with respect to soil loss (soil erosion) and loss of soil productivity, particularly in moderate and high burn severity areas. The BAER critical value of soil productivity is at risk for long term soil impairment (> 10 years) associated with the likely occurrence and moderate consequences of a soil erosion event and loss of productivity from soil burning.

**4. Cultural and Heritage Resources**

A **low risk (possible, minor)** exists for the archaeological resources within the Rice Ridge burned area. Seven cultural resource sites were previously documented within the Rice Ridge fire perimeter,

all historical in nature. Three sites located in the front country included Morrell Mountain Lookout (NRHP eligible Administrative site), Center Ridge Lookout (NRHP ineligible due to deteriorated condition), East Spread Lookout (NRHP ineligible due to deteriorated condition). Four sites in the backcountry were recorded in 2002 following the Post Burn Survey along Upper Monture Creek. These include the Upper Monture Cabin (burned in 2000), Upper Monture Camp (burned in 2000), Center Creek Trail Camp (burned in 2000), and an unevaluated historic site on the Flathead National Forest (evaluation pending access in spring 2018). For this interim request, no treatments are recommended and no funding is requested. If surveys after snowmelt identify appropriate BAER treatments, an interim request will be considered.

## 5. Other non-BAER Values

Numerous NFS values that are not BAER Critical Values in addition to non-NFS values are potentially at risk from post-fire threats originating primarily on NFS lands. Treatments for these other values were not been identified by the BAER team. Evaluation for non-BAER Critical Values on NFS lands could be considered for appropriate program funding. Evaluation of threats to non-NFS values by private and other landowners is encouraged, as is outreach to agencies that may be able to assist with treatments off of NFS land (e.g. NRCS). In particular, the Town of Seeley Lake should consider evaluating the potential impact of changed water quality to their treatment operations.

## B. Emergency Treatment Objectives:

The goals of the burned area emergency response include the following:

- Mitigate and protect, to the extent possible, threats to personal injury or human life of forest visitors and Forest Service employees by raising awareness through posting hazard warning signs on roads, improving stream crossings, and communicate hazard of flooding, debris flows, and rock fall. Provide safe access to the burned area for personnel implementing authorized BAER response actions and communicate threats to cooperating agencies and community groups. Consider temporary closures to protect public users of NFS lands and recreation facilities.
- Protect or minimize damage to NFS investments in roads infrastructure by improving existing drainage features, and in targeted locations, installing upgraded drainage features capable of withstanding predicted increased flood flows. Minimize damage to key NFS travel routes.
- Protect or mitigate potential post-fire impacts to critical natural resources within the burned area. Implement treatments that minimize threats to naturalized ecosystems by minimizing the potential for expansion of non-native invasive species (NNIS) into the burned area; minimize expected invasion of NNIS within and adjacent to the area where soils and vegetation was disturbed as a result of fire suppression activities.
- Evaluate authorized BAER treatments and existing infrastructure to determine effectiveness in post-fire flow conditions. Monitor weeds for effectiveness of BAER treatments and to identify need for future treatments.
- Assist cooperators, other local, State, and Federal agencies with the interpretation of the assessment findings to identify and address potential post-fire impacts to communities and residences, domestic water supplies, public utilities (including power lines, roads, and other infrastructure).

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

Land 70%

Roads/Trails 70%

Channel N/A

Protection/Safety 90%

## D. Probability of Treatment Success

Table 10: Probability of Treatment Success

	1 year after treatment	3 years after treatment	5 years after treatment
Land	70%	80%	90%
Channel	NA	NA	NA

	<b>1 year after treatment</b>	<b>3 years after treatment</b>	<b>5 years after treatment</b>
<b>Roads/Trails</b>	70%	80%	90%
<b>Protection/Safety</b>	90%	90%	90%

**E. Cost of No-Action (Including Loss): \$11.1 Million** (excluding ecosystem, economic, and social costs)

Choosing to implement a “No Action” treatment of natural forest recovery comes with associated costs to forest infrastructure and the natural resources and their functions within the Rice Ridge fire area. Road reconstruction following failure of culverts and drainage features costs approximately \$60,000/mile. The cost of replacing a failed culvert at a stream or drainage crossing proposed for upgrade in this assessment would cost roughly 50% more than the cost of the proposed new culvert due to the need to import fill lost in the culvert failure and repair associated channel damage. Similarly, at sites where this assessment has proposed culvert removal, the cost of repairing the site of a culvert failure would equal or exceed the cost of removal, given that mobilization as well as channel and valley reconstruction would be required in either event, and represent the majority of the contract cost. The ecosystem cost of hundreds to thousands of cubic yards of fine sediment deposited in bull trout habitat streams from a culvert or road failure is difficult to quantify but would be considerable. Road failure is possible to likely on 193 miles. Trail reconstruction is variable but costs roughly \$12,500/mile. There are 180 miles of trail in non-ridgetop locations within moderate-to-high burn severity areas. If one assumes 50% loss of structures/road/trail drainage within moderate-to-high burn severity area, replacement costs would be roughly \$7.9 million. This value is only the replacement costs, and does not account for damage/loss to ecosystem, economic and social values, which would substantially exceed this number. Ecosystem functions within the fire area include bull trout critical habitat, native plant communities, and soil and hydrologic function, which do not have a clear “replacement” cost. Noxious weed spread without implementing EDRR treatments can result in a 14% growth rate if left untreated, resulting in costs that could increase twenty-fold (from \$161,330 dollars for EDRR to \$3.2 million dollars for noxious weed suppression efforts).

The Rice Ridge fire heavily impacted the economy of Seeley Lake, Montana during peak tourist season; tourism and recreation are a main industry in this community. Maintaining access to recreation opportunities including hunting, backpacking, and outfitter access are crucial to the economic recovery of Seeley Lake, Montana.

Cost of Selected Alternative (Including Loss): \$2.42 Million

**G. Skills Represented on Burned-Area Survey Team:**

- |   |  |   |   |   |
|---|--|---|---|---|
| <input checked="" type="checkbox"/> Archaeology | <input checked="" type="checkbox"/> Botany | <input type="checkbox"/> Ecology              | <input type="checkbox"/> Economist            | <input checked="" type="checkbox"/> Engineering |
| <input checked="" type="checkbox"/> Fisheries   | <input type="checkbox"/> Forestry          | <input checked="" type="checkbox"/> GIS       | <input checked="" type="checkbox"/> Hydrology | <input type="checkbox"/> Range                  |
| <input checked="" type="checkbox"/> Recreation  | <input checked="" type="checkbox"/> Soils  | <input checked="" type="checkbox"/> Team Lead | <input type="checkbox"/> Wildlife             | <input type="checkbox"/>                        |
| <input type="checkbox"/>                        | <input type="checkbox"/>                   | <input type="checkbox"/>                      | <input type="checkbox"/>                      | <input type="checkbox"/>                        |

**Team Leader:** Dave Callery

**Email:** dcallery@fs.fed.us

**Phone:** 406-439-5932

**Forest BAER Coordinator:** Ann Hadlow

**Email:** ahadlow@fs.fed.us

**Phone:** 406-626-5402

**Core Team Members:**

Table 11: BAER Team Members by Skill

<b>Skill</b>	<b>Team Member Name</b>
<b>Team Lead(s)</b>	Eric Winthers, Dave Callery, Claire Campbell
<b>Archaeology</b>	Sydney Bacon
<b>Botany</b>	Karen Stockmann, Geoff Bogie, Anna Crockett
<b>Ecology</b>	
<b>Economist</b>	
<b>Engineering</b>	Dustin Baker, Kathie Marks



<b>Skill</b>	<b>Team Member Name</b>
<i>Fisheries</i>	Josh Schulze
<i>Forestry</i>	
<i>GIS</i>	Jeff Kaiden
<i>Hydrology</i>	Traci Sylte, Jamie Krezelok, Dustin Walters, Dave Callery
<i>Range</i>	
<i>Recreation</i>	Katie Knotek, William (Tad) Wehunt, Rich Owens, Jeremy Watkins
<i>Soils</i>	Claire Campbell, Sarah Brame
<i>Wildlife</i>	

#### **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: Noxious Weeds**

As part of the BAER treatment efforts for noxious weed control, ground are necessary within and immediately outside of the fire perimeter to successfully prevent the spread of noxious weeds throughout the burned areas. Ground treatments would include road and spot treatments (EDRR) along trails and sensitive areas. Early Detection and Rapid Response (EDRR) is necessary to prevent new invaders from establishing and spreading into noxious weed free areas. While there are thousands of acres of noxious weed in the Rice Ridge burned area and along the roads leading into the burn, there are still many acres that are native plant communities where noxious weeds are absent or only present at low levels. Known leafy spurge, houndstongue, common tansy, St. Johnswort, yellow toadflax, oxeye daisy, and common mullein infestations would be spot sprayed by backpack with a variety of treatment prescriptions based on the noxious weed species along road sides used as contingency lines, frontcountry and backcountry trails, open grasslands, and the interior of the fire where the canopy no longer exists. Some of the infestations overlap, but current known/mapped acres of these species are estimated over 4,000 acres for both the Lolo and Flathead National Forests. These areas have been treated in the past but are still at high infestation levels due to the frequency of use and continual introduction of seed by forest personnel and public users. Initial efforts would include spot treatments with herbicide along handlines, dozer, contingency lines, log decks, and shaded fuel breaks as well as known weed-free areas within the burned area.

Fire is a disturbance that provides a receptive avenue for the spread of noxious weeds and/or invasive species. Noxious weeds and non-native invasive species are a concern for biodiversity. Weed invasion is a potentially threatening process leading to competition and habitat modification. Plant communities and native species likely to be at greatest risk from weed invasion are those which occupy weed-prone habitats, such as riparian zones, forestlands with naturally low understory vegetation cover, and disturbed areas adjacent to and near existing weed infestations. On the Rice Ridge Fire disturbances caused by suppression forces (dozer lines, drop points, etc.) and transportation routes (roads and trails) are the main vectors for noxious weed invasion. This treatment mitigates this risk by allowing for an early means of detecting new noxious weed occurrences in highly susceptible areas and a quick response for control.

Critical areas to consider for treatment include riparian habitat, roads, dozer lines, shaded fuel breaks, ephemeral drainages, and burned areas where suppression vehicles and equipment traveled through known noxious weed populations. Moderate and high severely burned areas generally have altered soil structure and reduced organic matter content creating more favorable germination substrate for weed seeds. Undisturbed areas in the drier habitat type groups in the fire area are also at risk.

EDRR would also be applied to surveying Seeley, Cottonwood, and Florence lakes, which were used as dip sites, for aquatic invasive species such as zebra mussels, New Zealand mud snails, Eurasian



watermilfoil, and curly leaf pond weed. All of these species are present in Montana's waterways. Aquatic invasive species can have a devastating economic impact (Lovell and Stone 2006) therefore the decontamination process is strictly adhered to by firefighters for engines and aerial firefighting techniques. Early detection is limited to surveying for actual viable species. Lakes would be surveyed in the summer of 2018. Current conditions, cold and snowy, are not conducive to early detection, especially this close to the season ending event. Sample collection (early detection) would be completed by forest service employees or partners and would cost \$1,750 (5 days at \$350/day).

Ground treatments (truck/UTV mounted sprayer) would also occur for spotted knapweed and other weeds along the road sides within the burned area and areas where road improvements occur for BAER improvements. Treatments will be prescribed at 7 ounces/acre of aminopyralid with a surfactant for 2,482 acres (517 miles) that access the burned area perimeter, drop points, log landings, dozer lines, and hand lines. It is important to treat the entire road (broadcast spray) to ensure any plants missed by the EDRR efforts would be sprayed which would increase the chance of full eradication. These treatments would cost \$161,330.00 (\$65.00 per acre) and would be accomplished with an existing IDIQ contract and Forest Service force account personnel. Aminopyralid has been highly effective on knapweeds and other aggressive noxious species such as oxeye daisy. It has been shown to be as effective as picloram, and the lower use rates pose less risk to the environment and it has fewer impacts on non-target plants. In field trials at 10 locations spanning four states, only 14 of 68 desired forb species were moderately susceptible or susceptible to aminopyralid applications at 5 to 7 oz/acre (Duncan et. al. (rev.) 2017). The expansion of known and high potential infestations, such as yellow toadflax, located in moderate and high intensity burned areas within the fire perimeter may occur rapidly during the first post-fire growing season. Species, such as yellow toadflax, are capable of widespread disruptive impacts to native plant communities. Chlorsulfuron at 2.2 ounces/acre will effectively control and eradicate the species if detected early enough in the expansion and colonization process.

Signs at trailheads would be installed to educate the visitor about noxious weed spread and encourage them to stay on the trail. Each sign would also have a boot brush to clean footwear prior to entering vulnerable areas. Signs would be placed at the following trailheads on the Lolo NF: Morrell and Lodgepole trailheads. Estimated costs per sign with install would be around \$2,500 for sign development, construction and installation.

The purposes of these treatments are 1) preserve native plant communities where noxious weeds are absent or present in only minor amounts; wildlife habitat, soil and hydrological resources, 2) to prevent the highest priority noxious weeds from spreading and/or increasing in density, 3) to detect and rapidly respond (spot treat) to known and new infestations associated with fire suppression/fire effects, 4) to prevent potential new infestations resulting from BAER actions. These efforts would occur along road sides used as contingency lines, trails, and adjacent high and moderately burned areas where the canopy no longer exists.

***Detailed noxious weed treatment costs can be found in the project record, specification sheet L-01 (EDRR).***

#### **Flathead National Forest Treatment Recommendations**

Early detection rapid response treatments on the Spotted Bear Ranger District will all occur within the Bob Marshall Wilderness in known of noxious weeds, including spotted knapweed, yellow toadflax, houndstongue, oxeye daisy, and thistles. On the Spotted Bear Ranger District there are approximately 130 acres of known small and isolated noxious weed populations in the wilderness.

Table 12: Flathead NF Weeds Species Locations and Sizes

LOCATION	SPECIES	SIZE(ACRES)	DESCRIPTION
<b>BABCOCK SIDEHILLS</b>	Spotted Knapweed	10	Above and below trail #130 in 1st, 3rd, 4th open sidehills
<b>BABCOCK/YOUNGS CONFLUENCE</b>	Spotted Knapweed, Yellow Toadflax	20	SE side of the confluence
<b>BABCOCK OUTFITTER CAMP</b>	Houndstongue, Spotted Knapweed	7	Houndstongue in and around the corral area; Spotted Knapweed in and around camp and along the trail coming in to camp.
<b>CABIN CR/YOUNGS CR TRAIL JUNCTION</b>	Yellow Toadflax	1.5	NW corner of trail junction
<b>HAHN OUTFITTER CAMP</b>	Oxeye daisy; Spotted Knapweed	10	in around camp, thicker as you get closer to Youngs Creek
<b>HAHN CABIN AREA</b>	Oxeye daisy; Spotted Knapweed; Houndstongue	80	Between Hahn Cabin, along the trail corridor to the ford. Oxeye daisy and Spotted knapweed on both sides of the creek. Houndstongue is mostly between the cabin and the outfitter camp
	Total Acreage	128.5	

Additionally, there are 250 acres of backcountry wilderness outfitter camps which have known noxious weed infestations. The proposed treatment would contain and eradicate noxious weeds that could spread into high and moderate burned adjacent areas in a relatively pristine landscape.

There are three active outfitter camps within the burn area of the Rice Ridge fire. There is also an additional unassigned outfitter camp that is used by private parties and as an occasional spike camp for an existing outfitter during hunting season. Several well-travelled routes pass through existing infestations as well. Because of the grazing associated with the outfitter camps and the travel corridors that pass through noxious weed infestations, it will be critical to monitor the trail corridors above and below current locations to monitor for spread of noxious weeds.

Table 13: Flathead Weeds EDRR Treatment Types and Cost

TREATMENT DESCRIPTION	TARGET WEED SPECIES	PRESCRIPTION	ESTIMATED ACRES	COST PER ACRE	COST	TIMING
<b>EDRR – WILDERNESS</b>	common tansy, St. Johnswort, yellow toadflax, oxeye daisy, and common mullein	EDRR	130	\$200	\$25,700	Spring 2018
<b>EDRR – WILDERNESS OUTFITTER CAMPSITES</b>	common tansy, St. Johnswort, yellow toadflax, oxeye daisy, and common mullein	EDRR	250	\$50	\$12,500	Spring and Summer 2018
<b>TOTAL</b>					<b>\$38,200</b>	

*Lolo National Forest Treatment Recommendations*

The Rice Ridge fire burned over 517 miles of road on the Seeley Lake Ranger District. Ground treatments (truck/UTV mounted sprayer) would also occur for spotted knapweed and other weeds along the road sides within the burned area and areas where road improvements occur for BAER improvements. Treatments will be prescribed at 7 ounces/acre of aminopyralid with a surfactant for 830 acres (173 miles) that access the burned area perimeter. These roads are open and drivable by a standard vehicle and continually being treated for noxious weeds due to the accessibility of the roads and continually introduction on noxious weeds from vehicles. It is important to treat the entire road (broadcast spray) to ensure any plants missed by the EDRR efforts would be sprayed which would increase the chance of full eradication. Road systems act as vectors for weed dispersal regardless of burn severity, and it is most cost effective to spray all road prisms, rather than spot treating only in moderate and high severity. There are an additional 877 acres (183 miles) of roads that were opened for either fire suppression or the vegetation was removed by the fire that are now accessible by UTV. These roads will be treated with the same prescription as the open roads. These treatments would cost \$110,930 (\$65.00 per acre) and would be accomplished with an existing IDIQ contract and Forest Service force account personnel. Aminopyralid has been highly effective on knapweeds and other aggressive noxious species such as oxeye daisy. It has been shown to be as effective as picloram, and the lower use rates pose less risk to the environment and it has fewer impacts on non-target plants. In field trials at 10 locations spanning four states, only 14 of 68 desired forb species were moderately susceptible or susceptible to aminopyralid applications at 5 to 7 oz/acre (Duncan et. al. (rev.) 2017). The expansion of known and high potential infestations, such as yellow toadflax, located in moderate and high severity burned areas within the fire perimeter may occur rapidly during the first post-fire growing season. Species, such as yellow toadflax, are capable of widespread disruptive impacts to native plant communities. Chlorsulfuron at 2.2 ounces/acre will effectively control and eradicate the species if detected early enough in the expansion and colonization process.

Signs at trailheads would be installed to educate the visitor about need to prevent noxious weed spread and encourage them to stay on the trail. Each sign would also have a boot brush to clean footwear prior to entering vulnerable areas. Signs would be placed at the following trailheads on the Lolo NF: Morrell and Lodgepole trailheads. Estimated costs per sign with install would be around \$2,500 for sign development, construction and installation.

Table 14: Lolo L-01 Weeds EDRR Treatment Types and Cost

TREATMENT DESCRIPTION	TARGET WEED SPECIES	PRESCRIPTION	ESTIMATED ACRES	ESTIMATED ACRES OF NOXIOUS WEEDS LEADING TO AND INTERSECTING	COST PER ACRE	COST	TIMING
EDRR SUPPRESSION IMPACTS- OPEN ROADS (173 MILES)	Spotted knapweed, sulfur cinquefoil, oxeye daisy, houndstongue, common mullein, meadow hawkweed, tall buttercup, thistles, St. Johnswort, leafy spurge, cheatgrass, and yellow toadflax	7 oz/ac of Aminopyralid + Surfactant	830		\$65	\$53,950	Fall 2017 Spring 2018 Summer 2018 Fall 2018
EDRR SUPPRESSION IMPACTS – ROADS (183 MILES)	Spotted knapweed, sulfur cinquefoil, oxeye daisy, houndstongue, common mullein, meadow hawkweed, tall buttercup, thistles, St. Johnswort, leafy spurge, cheatgrass, and yellow toadflax	7 oz/ac of Aminopyralid + Surfactant	877	4,466	\$65	\$56,980	Fall 2017 Spring 2018 Summer 2018 Fall 2018
EDRR SUPPRESSION IMPACTS – DOZER LINE (54 MILES)	Spotted knapweed, sulfur cinquefoil, oxeye daisy, houndstongue, common mullein, meadow hawkweed, tall buttercup, thistles, St. Johnswort, leafy spurge, cheatgrass, and yellow toadflax	7 oz/ac of Aminopyralid + Surfactant	131	4,594	\$150	\$19,650	Fall 2017 Spring 2018 Summer 2018 Fall 2018
EDRR SUPPRESSION IMPACTS – HAND LINE (9 MILES)	Spotted knapweed, sulfur cinquefoil, oxeye daisy, houndstongue, common mullein, meadow hawkweed, tall buttercup, thistles, St. Johnswort, leafy spurge, cheatgrass, and yellow toadflax	7 oz/ac of Aminopyralid + Surfactant	3	3,552	\$150	\$450	Fall 2017 Spring 2018 Summer 2018 Fall 2018



TREATMENT DESCRIPTION	TARGET WEED SPECIES	PRESCRIPTION	ESTIMATED ACRES	ESTIMATED ACRES OF NOXIOUS WEEDS LEADING TO AND INTERSECTING	COST PER ACRE	COST	TIMING
EDRR SUPPRESSION IMPACTS – DROP POINTS (53)	Spotted knapweed, oxeye daisy, houndstongue, common mullein, meadow hawkweed, thistles, St. Johnswort, cheatgrass, and yellow toadflax	7 oz/ac of Aminopyralid + Surfactant	27	2,830	\$65	\$1,755	Fall 2017 Spring 2018 Summer 2018 Fall 2018
EDRR SUPPRESSION IMPACTS – LOG LANDINGS (30)	Spotted knapweed, oxeye daisy, houndstongue, common mullein, meadow hawkweed, tall buttercup, thistles, St. Johnswort, cheatgrass, and yellow toadflax	7 oz/ac of Aminopyralid + Surfactant	45	1,146	\$65	\$2,925	Fall 2017 Spring 2018 Summer 2018 Fall 2018
WEED SITES WITHIN NATURAL COMMUNITIES EDUCATIONAL SIGNS	Spotted knapweed, houndstongue, common mullein	Various, mostly hand pulling	387.5		\$200	\$77,700	Summer 2018
EDRR LAKE SAMPLING			2	each	\$2,500	\$5,000	
			5	Days	\$350	\$1,750	
				<b>TOTAL</b>		<b>\$163,180</b>	

### Administrative Closures for Noxious Weeds

Road prisms within the Rice Ridge burned area act as vectors for noxious weed spread and are more prone to weed dispersal associated with vehicle traffic on open Forest System roads. To reduce weed spread, administrative closures are proposed in 33 sites on closed collector roads not normally used for public access. These sites will include three closure types: (1) closure associated with storm proofing and culvert removals (27 sites), (2) closures with gates (4 sites), and (3) rock berm improvements at dispersed recreation sites (2 sites). These areas are shown on the Rice Ridge BAER treatment map.

Table 15: Lolo Administrative Closures for Noxious Weeds Cost Estimate

TREATMENT	UNIT	UNIT COST	# OF UNIT	TOTAL COST
ROAD CLOSURES WITH CULVERT REMOVALS	Each	\$250	27	\$6,750
GATE INSTALLATIONS AT DISPERSED RECREATION SITES (R-01 TREATMENT)	Each	\$2,850	4	\$11,400
ROCK BERM INSTALLATION	Each	\$500	2	\$1,000
TOTAL ADMIN CLOSURE TREATMENT	Each	(average) \$580	33	\$19,150

Channel Treatments: **No treatments proposed.**

**Roads and Trail Treatments:**

The community of Seeley Lake, Montana relies on tourism and recreationists for the majority of its economy. The Rice Ridge fire severely impacted the 2017 recreation season and local businesses, and recovery of this economy is driven by access to the National Forest transportation system, including major trailheads into the Bob Marshall Wilderness. Outfitters and guides, local businesses, and forest visitors all rely on access through the burned area. For these reasons, no administrative closures are proposed in the fire area.

**Road drainage maintenance:** In areas with high and moderate burn severity, runoff from burned hillslopes will increase the amount of water and debris on road surfaces and in drainage structures. Impacts will likely include sedimentation or blockage of ditches and culvert inlets, plugged culverts, and gully erosion on road surfaces and fill slopes. Drainage issues were estimated to have a high probability of occurrence at numerous locations throughout the burned area, and major magnitude of consequences with respect to replacement costs and risk to human life and safety.

This group of treatments is designed to mitigate threats to Human Life and Safety, National Forest System property, and other values, including emergency access, access for forest visitors and local residents, water quality, aquatic habitat, and soil productivity. Treatments are focused on the segments of National Forest system arterial and collector (maintenance level—ML 2-3) that are located within or directly downslope from areas burned with moderate to high soil burn severity. Treatment prescriptions for road drainage maintenance include existing Culvert Maintenance (catch-basin reconstruction, inlet and outlet repair, culvert headwall repair), Culvert Cleaning (clearing of debris and sediment from culverts), Ditch Reconstruction, Linear Road Drainage Maintenance (slump and slide removal, surface drainage maintenance, ditch maintenance), Surface Drainage Construction (drain dips, outslopes, open-top culverts), and Slough Prevention/Retaining Wall Repair.

**Road storm inspection:** Many of the roads that are vulnerable to damage from post-fire runoff and erosion were not specified for maintenance treatments or culvert protection and upgrades. On these roads, the proposed treatment is to evaluate the roads during or immediately after significant runoff-producing events in order to remove obstructions to road drainage and otherwise ensure that road drainage is functioning well enough to avoid severe damage or loss to the infrastructure. While this treatment is less likely to be successful than more aggressive (and expensive) treatments, it was judged to be appropriate given the values at risk. Roads where this work is proposed are listed in the specification sheets.

**Culvert upgrade and removal:** In drainages with extensive area in high and moderate burn severity, streamflow response to relatively modest inputs is expected to be robust. Moreover, elevated flood flows will also carry substantial quantities of large woody debris, raising the risk of culvert failure, particularly in concert with elevated and sediment-bulked flow volume.

Numerous road-stream crossings were found on open roads both within and outside the burn perimeter with contributing areas affected by the fire. Crossings that drain areas of moderate-to-high burn severity were evaluated for flow capacity in order to determine their adequacy to convey post-fire design-storm flow events. Under post-fire conditions, model output suggests that all of these drainages would likely see an increase in post-fire runoff from a relatively high-probability event that would substantially exceed culvert capacity and overtop roads, leading to failure of the crossing, road damage, loss of access, and negative impacts to aquatic habitat in adjacent streams. Inadequate road drainage to accommodate anticipated increases in post-fire overland flow may also lead to erosion of the roadbed and subsequent damage to road segments below burned hillslopes.

Proposed treatments at culverts determined to be undersized for the post-fire design storm (25-year) were determined based on values at risk from failure of the culvert. For the numerous culverts determined to be lower in priority, inlet clearing and road storm inspection was proposed as the least expensive means of reducing the risk of failure.

Where culverts were at elevated risk of failure on roads closed to the public, or at the end of open roads, they were proposed for removal—a relatively inexpensive way of guaranteeing that the road and culvert will not fail. Stream culverts determined to be of higher priority for mitigation were those that were determined to be likely to fail and are on primary routes that access a communication site, a lookout, and trailheads used extensively by the public and by commercial outfitters. At these sites, culverts were sized for the post-fire 25-year event, or no greater than the standard required by the Lolo Forest Plan. Overflow culverts have been prescribed in the past as a lower-cost solution to provide capacity where a primary culvert becomes blocked by debris. These pipes have not been approved for roughly a decade in Region 1 after numerous such pipes installed by BAER teams have failed. Overflow pipes are particularly poorly suited for this burned area, given the more rounded, less stable nature of the native glacial fill material in the area of the burn. When a road fill acts as a dam, the fill material can become saturated and fail, or piping can develop preferential flow paths through the fill, rapidly leading to failure.

For the purposes of this assessment, two classes of culverts are defined. Culverts on perennial streams are discussed here as *stream culverts*, whereas culverts on ephemeral or intermittent drainages are referred to as *drainage culverts*. Stream culverts are generally larger and more expensive to replace.

Detailed road and trail treatment costs can be found on specification sheets in the project record.

Table 16: Lolo NF Stream Culvert Upsizing Cost Estimate

Site	Values at Risk	Proposed structure	Cost estimate <sup>1</sup>
Nome Creek FSR 4388	Road, culvert, aquatic habitat for listed fish, public and administrative access to upper Lodgepole Creek area and trailhead	16' arch	\$360,000
Spruce Creek FSR 4388	Road, culvert, aquatic habitat for listed fish, public and administrative access to upper Lodgepole Creek area and trailhead	11' arch	\$180,000
Tributary to Spruce Creek FSR 4388	Road, culvert, aquatic habitat for listed fish, public and administrative access to upper Lodgepole Creek area and trailhead	7' arch	\$180,000
Cottonwood Tributary FSR 477 MP 10.5	Road, culvert, aquatic habitat for listed fish, administrative access to communications site, public access to Morrel Mountain area	72" CMP	\$30,000
Mountain Creek (north) FSR 17511	Road, culvert, aquatic habitat for listed fish, administrative access to communications site, public access to Morrel Mountain area	72" CMP	\$30,000
Mountain Creek FSR 36025	Road, culvert, aquatic habitat for listed fish, administrative access for forest and fuels management	72" CMP	\$30,000
Mountain Creek (south) FSR 17511	Road, culvert, aquatic habitat for listed fish, administrative access to communications site, public access to Morrel Mountain area	84" CMP	\$50,000
Swamp Creek	Road, culvert, aquatic habitat for listed fish, administrative access to	96" CMP	\$70,000

Site	Values at Risk	Proposed structure	Cost estimate <sup>1</sup>
FSR 477	communications site, public access to Morrel Mountain area		
Swamp Creek FSR 4379	Road, culvert, aquatic habitat for listed fish, administrative access for forest and fuels management	96" CMP	\$60,000
Swamp Creek FSR 36019	Road, culvert, aquatic habitat for listed fish, administrative access for forest and fuels management	120" CMP	\$80,000
Swamp Creek Tributary FSR 36019	Road, culvert, aquatic habitat for listed fish, administrative access for forest and fuels management	96" CMP	\$60,000
Upper Shanley FSR 602	Road, culvert, aquatic habitat for listed fish, public and administrative access to Nome Point Trailhead	96" CMP	\$70,000
<b>TOTAL</b>			<b>\$1,200,000</b>

<sup>1</sup> Cost estimates for stream crossing culvert upsizing includes contract administration, overhead, and survey and design costs.

Table 16: Lolo NF Road Treatment Cost Estimate

TREATMENT	UNIT	UNIT COST	UNITS (#)	TOTAL COST
<b>ROAD DRAINAGE MAINTENANCE</b>				
CULVERT MAINTENANCE	Each	215	117	\$25,155
CULVERT CLEANING	Each	125	133	\$16,625
DITCH RECONSTRUCTION	Feet	1.25	8310	\$10,388
LINEAR ROAD DRAINAGE MAINTENANCE	Miles	3500	59.22	\$207,270
CONSTRUCTION OF SURFACE DRAINAGE	Each	350	118	\$41,300
SLOUGH PREVENTION/RETAINING WALL REPAIR	Lump	10,000	3	\$30,000
ROAD STORM INSPECTION	days	700	75	\$52,500
CULVERT REMOVALS	each	\$1,450	37	\$53,650
DRAINAGE CULVERT UPSIZING	each	\$2,030	28	\$56,840
STREAM CULVERT UPSIZING	each	\$100,000	12	\$1,200,000
CONTRACT DESIGN AND ADMINISTRATION	lump	\$105,000	1	\$105,000
CONTRACT MOBILIZATION	lump	\$115,500	1	\$115,500
<b>TOTAL</b>	lump			<b>\$1,914,228</b>

**Trail Drainage Maintenance:** Many of the trails in the burned area are at high to very high risk due to the burning of stabilizing brush, roots and logs. Current trail drainage features are not adequate to address the anticipated increased runoff. Treatments are needed to provide sustainability of the trails and to prevent off-site impacts, should the trails erode or fail for the initial 15 miles.

Trail features will be constructed to standard as defined by USFS Trails Handbook 2309.18. Installation should be designed to last no more than three years. Permanent structures are not part of this treatment. If safety risks (e.g. hazard trees) cannot be mitigated for work crews, work will be delayed until threat is reduced or stabilized. Install drainage feature depending on steepness of trail in areas of moderate or high severity or those areas directly below moderate or high soil burn severity. Focus on sections of trail that have continuous gradient for a length of greater than 50 feet and are either insloped (cupped) or show evidence of routing water (rills, gullies). Hazards within or along the trail route that restrict efficient and safe access to work sites will be mitigated (rocks, trees). This treatment



is designed to stabilize trails for anticipated increases in runoff. The stabilization methods may vary by site but are designed to reduce trail erosion or damage.

Treatment prescriptions for trail drainage maintenance include:

- Clean existing drainage features
- Installation of rolling grade dips and non-structure water bars
- Berm removal, bank stabilization and the installation of non-structure stream crossing

### Trail Stabilization: Flathead National Forest

The Rice Ridge fire impacted 57.3 miles of National Forest System Trails on the Spotted Bear Ranger District on 12 trails. The trail grades within the area vary from 5 to 20% and have side slopes of up to 70%. Trail tread in this area is commonly derived from soils with granitic parent material. These soils normally have a high erosion potential, however the erosion potential becomes severe when coupled with the effects of wildland fire, putting the trails within the Flathead National Forest at a high risk (likely, moderate) impact to forest service property and failure of hydrologic function. The 12 trails impacted and proposed for treatment are summarized below. Field reconnaissance of the Rice Ridge fire showed that the Spotted Bear Ranger District trail system treatments would include predominantly trail stabilization spot treatments (filling holes, installing grade dips, and erosion control structures).

Table 17: Trails Impacted on the Flathead NF

TRAIL NAME	TRAIL #	BURNT MILEAGE (MODERATE AND HIGH SEVERITY ONLY)
YOUNGS CREEK*	141	19
PYRAMID PASS*	283	6.7
MARSHALL CREEK	137	4.8
BABCOCK CREEK	130	5.3
CABIN CREEK	205	4.1
HAHN CUT OFF	124	1.9
HAHN CREEK*	125	5.3
FOOLHEN CREEK	142	0.9
ROSS CREEK	284	3.0
SPRUCE CREEK	221	1.3
CRIMSON PK.	468	2.4
BLACKFOOT DIVIDE	278	2.6
TOTAL MILES:		57.3

Table 18: Flathead T-01 Trail Drainage Maintenance Cost Estimate

TREATMENT	UNIT	UNIT COST	# OF UNIT	TOTAL COST
T-01 TRAIL DRAINAGE MAINTENANCE	Miles	\$1,779	57.3	\$101,950

### Trail Stabilization: Lolo National Forest

On the Lolo National Forest, Seeley Lake Ranger District, 130.9 miles of trail were located within the Rice Ridge fire area. Of those 130.9 miles, 69.3 miles were located within moderate and high burn severity fire. These trails include front country access and provide primary access to the Bob Marshall Wilderness Complex. Trail use ranges from light to heavy, and typically occurs between May and mid to late November. Trail users include outfitter/guides, hikers/backpackers, stock users, and mountain bikes. This trail system also serves as a transportation network for Forest personnel and other agencies such as MT Fish, Wildlife, and Parks and Missoula, Powell, and Lewis and Clark County Search and Rescue. The affected trails are constructed on creek bottoms, side hills and high elevation ridge tops.

Trail grades within the area vary from 5% to 30% and side slopes of up to 70%. Trail tread in this area is commonly derived from soils composed of glacial till with limestone/mudstone parent material. These soils normally have a high erosion potential and low slope stability, however erosion and instability potential becomes severe when coupled with the effects of wildland fire. Within the Lolo National Forest ownership, more extensive trail stabilization work is needed, including trail retread for erosion and drainage maintenance and installation of drainage structures. These longer length treatments result in a higher unit cost associated with additional trail crew employees and time associated with trail stabilization. The following trails (below) were impacted on the Lolo National Forest. Of the 130.9 miles of trail impacted by the Rice Ridge fire, treatments are only proposed on 62.8 miles of trail.

Table 19: Trails Impacted on the Lolo National Forest

TRAIL NAME	TRAIL #	BURNT MILEAGE (MODERATE AND HIGH SEVERITY ONLY)
LODGEPOLE	13	1.2
MCCABE CREEK	1404	0.02
OLD INDIAN	1460	0.28
FALLS-CANYON	16	7.51
CANYON LAKE	165	0.35
SPREAD MOUNTAIN	166	4.04
BEAR CREEK	17.1	0.83
CENTER RIDGE	246	8.00
CENTER RIDGE-A	247	2.09
WORK CENTER	25	0.68
WORK CENTER MONTURE	25-A	0.19
MONTURE CREEK	27	5.53
BLACKFOOT DIVIDE	278	0.98
BLACKFOOT DIVIDE	278.1	0.16
BLACKFOOT DIVIDE 2	278.2	0.45
BLACKFOOT DIVIDE 3	278.3	0.38
MORRELL FALLS (NRT)	30	0.86
HOBNAIL TOM	32.1	0.38
HOBNAIL TOM	32.1-A	0.04
FS/OUTFITTER TIE		
HOBNAIL TOM 2 <sup>ND</sup> BYPASS	32.1-C	0.01
MIDDLE FORK MONTURE CREEK	371	0.09
NOME POINT	374	4.48
MINERAL HILL	376	0.18
WEST FORK MONTURE CREEK	378	2.53
MORRELL CREEK	383	0.57
CHAFFIN	388	0.28
CRESCENT LAKE	390	1.68
CRESCENT MOUNTAIN	391	0.11
TOWER	392	1.28
DUNHAM CREEK	400	2.44
ART JUKKALA (SHANLEY RIDGE)	401	4.87
DUNHAM POINT	405	1.09
GRIZZLY BASIN	409	1.89
PYRAMID PASS	416	2.45
LAKE MOUNTAIN	421	1.65
RICE RIDGE	429	3.4
EAST SPREAD	435	1.07
FLORENCE LAKE	451	0.43

TRAIL NAME	TRAIL #	BURNT MILEAGE (MODERATE AND HIGH SEVERITY ONLY)
CENTER CREEK	463	1.28
LAKE CREEK	61	1.94
LAKE CREEK OUTFITTER TIE	61-A	0.33
FENN MOUNTAIN	88	1.19
TOTAL MILES:		69.27

Of the 69 miles of trails within moderate and high severity, 62.3 miles are proposed for treatment. The initial 2500-8 provided funding for approximately 20 miles of trail work, resulting in 42.3 miles of new proposed treatments within this interim report.

Table 20: Lolo T-01 Trail Drainage Maintenance Cost Estimate

TREATMENT	UNIT	UNIT COST	# OF UNIT	TOTAL COST
T-01 TRAIL DRAINAGE MAINTENANCE	Miles	\$3,700	42	\$155,400

It is acknowledged that the trail unit costs for the Lolo and Flathead National Forests are different. Trail treatment costs were estimated on a per mile basis, considering all proposed treatment activities within that mile on each individual trail. On the Flathead National Forest, the per mile unit cost is less than the Lolo National Forest cost; this is associated with less treatment activities per mile of trail. Treatments on the Lolo National Forest comparatively called for more extended trail stabilization efforts (installation of more rolling dips, filling holes, and improving trail drainage), whereas Flathead National Forest trail treatments propose more spot treatments. Further details are available in the Recreation and Trails specialist reports.

### Protection/Safety Treatments:

- a. **PS-01 (Road) and PS0-2 (Trail) Hazard Warning Signs:** Working, traveling, and recreating in burned areas poses an elevated risk to Human Life and Safety. The purpose of this treatment is to acknowledge and alert forest employees and visitors to the existing threats associated with traveling routes (roads and trails) within and downstream of burned areas.

“Entering Burned Area” signs are needed to alert the public to possible threats to life and safety. These signs should contain language addressing risks that warrant heightened awareness such as falling trees, rolling rocks, and flash floods.

These warning signs should be posted in site-specific locations to alert travelers to upcoming dangers such as falling rocks, and “Flood Risk – No Parking or Standing”, etc. These signs will be located in strategic intersections to inform the traveler of their current location on the Forest Visitor Map and Motor Use Vehicle Map (MVUM). In most cases, these areas are located adjacent to the fire perimeter.

Detailed warning sign treatment costs can be found in the project record, specification sheets PS-01 Road Warning Signs and PS-02 Trail Warning Signs.

In the initial 2500-8, \$6,000 of funds were requested for both road and trail warning signs.

**Additional Road Warning Signs:**

## 1. Closure Signs

During field reconnaissance of the fire area, several burned road signs were observed, particularly on gates of closed system roads. When these gate features lose reflectivity, they become more of a safety hazard due to limited visibility to motorists and snowmobile drivers. Replacement of these features is proposed in 17 locations.

## 2. Burned Area Warning Signs

Further field assessment identified 7 additional locations for "Entering Burned Area" warning signs within the fire perimeter. These signs are needed to alert the public to possible threats to human life and safety. Seven additional signs will be placed at entrances to the burned area.

## 3. "Road Closed" Barricade Signs

The implementation of road treatment R-05, Culvert Removals, will result in unsafe driving conditions that require motorists to avoid the road system that is temporarily closed for public safety. These signs will be placed strategically where there is room for a vehicle to safely turn around and avoid the road hazards associated with culvert removals. Eight signs are proposed to close roads where culverts will be removed.

*Table 21: Lolo National Forest Hazard Warning Signs Treatment Costs*

TREATMENT	UNIT	UNIT COST	# OF UNIT	TOTAL COST
<b>PS-01 HAZARD WARNING SIGNS</b>	Each	\$350	32	\$11,200

## b. PS-03 Hazard Tree Mitigations

There is a very high risk to human life and safety associated with the implementation of BAER trail stabilization treatments, especially where Forest Service employees congregate during work activities. To mitigate this risk, hazard trees will be identified and felled within areas where crews will congregate for significant amounts of time (for trail retread work, at camp sites, and at trailheads). These treatments are only proposed in areas where extensive trail work will occur; treatments are proposed on 17.5 miles on the Flathead National Forest and 25.1 miles on the Lolo National Forest. Hazard tree mitigation work on the Flathead National Forest will occur in the Bob Marshall Wilderness; this treatment will be conducted with a cross-cut saw, which requires more time than front country (chainsaw) hazard tree mitigation.

*Table 22: Flathead PS-03 Hazard Tree Mitigations Cost Estimate*

TREATMENT	UNIT	UNIT COST	# OF UNIT	TOTAL COST
<b>PS-03 HAZARD TREE MITIGATIONS</b>	Miles	\$800*	17.5	\$11,812

\* Cross-cut saw implementation in the Bob Marshall Wilderness.

*Table 23: Lolo PS-03 Hazard Tree Mitigations Cost Estimate*

TREATMENT	UNIT	UNIT COST	# OF UNIT	TOTAL COST
<b>PS-03 HAZARD TREE MITIGATIONS</b>	Miles	\$675	25.12	\$16,956



**Interagency Coordination:**

BAER Implementation requires consultation with cooperating agencies including the State of Montana (Fish, Wildlife, and Parks), National Fish and Wildlife Service, as well as county and city agencies on resource issues regarding the proposed BAER treatments. For the Rice Ridge fire, 2 days (each) are proposed for a GS-9 Fisheries Biologist and a GS-12 Forest Hydrologist on the Lolo National Forest. No BAER evaluation coordination costs are proposed on the Flathead National Forest.

*Table 24: Lolo Coordination and Consultation*

TREATMENT	UNIT	UNIT COST	# OF UNIT	TOTAL COST
E-01 COORDINATION AND CONSULTATION	Each	\$750	4	\$3,000

**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.)

No monitoring is proposed other than treatment effectiveness monitoring.

**PART VI – EMERGENCY STABILIZATION TREATMENTS AND SOURCE OF FUNDS****Flathead National Forest**

Line Items	Units	Unit Cost	NFS Lands		Other	Other Lands		All	
			# of Units	BAER \$		# of units	Fed \$	# of Units	Non Fed \$
					\$				Total \$
<b>A. Land Treatments</b>									
L-01: EDRR (see table above)	Lump Sum	38,200	1	\$38,200	\$0		\$0		\$0
				\$0	\$0		\$0		\$0
<i>Insert new items above this line!</i>				\$0	\$0		\$0		\$0
<b>Subtotal Land Treatments</b>				\$38,200	\$0		\$0		\$0
<b>B. Channel Treatments</b>									
				\$0	\$0		\$0		\$0
				\$0	\$0		\$0		\$0
<i>Insert new items above this line!</i>				\$0	\$0		\$0		\$0
<b>Subtotal Channel Treatments</b>				\$0	\$0		\$0		\$0
<b>C. Road and Trails</b>									
T-01 Trail Stabilization	Miles	1,779	57	\$101,950	\$0		\$0		\$0
				\$0	\$0		\$0		\$0
<i>Insert new items above this line!</i>				\$0	\$0		\$0		\$0
<b>Subtotal Road and Trails</b>				\$101,950	\$0		\$0		\$0
<b>D. Protection/Safety</b>									
PS-03 Hazard Tree Mitigation	Miles	800	17.5	\$14,000	\$0		\$0		\$0
				\$0	\$0		\$0		\$0
<i>Insert new items above this line!</i>				\$0	\$0		\$0		\$0
<b>Subtotal Protection/Safety</b>				\$14,000	\$0		\$0		\$0
<b>E. BAER Evaluation</b>									
Initial Assessment	Report			\$5,000	\$0		\$0		\$0
				\$0	\$0		\$0		\$0
<i>Insert new items above this line!</i>				---	\$0		\$0		\$0
<b>Subtotal Evaluation</b>				\$5,000	\$0		\$0		\$0
<b>F. Monitoring</b>									
				\$0	\$0		\$0		\$0
				\$0	\$0		\$0		\$0
<i>Insert new items above this line!</i>				\$0	\$0		\$0		\$0
<b>Subtotal Monitoring</b>				\$0	\$0		\$0		\$0
<b>G. Totals</b>									
				\$159,150	\$0		\$0		\$0
Previously approved									
<b>Total for this request</b>				<b>\$159,150</b>					

**PART VII – APPROVALS: FLATHEAD NATIONAL FOREST**

1. \_\_\_\_\_ /2017  
Forest Supervisor Date

2. \_\_\_\_\_ /2017  
Leanne Marten, Region 1 Regional Forester Date




**PART VI – EMERGENCY STABILIZATION TREATMENTS AND SOURCE OF FUNDS****Lolo National Forest**

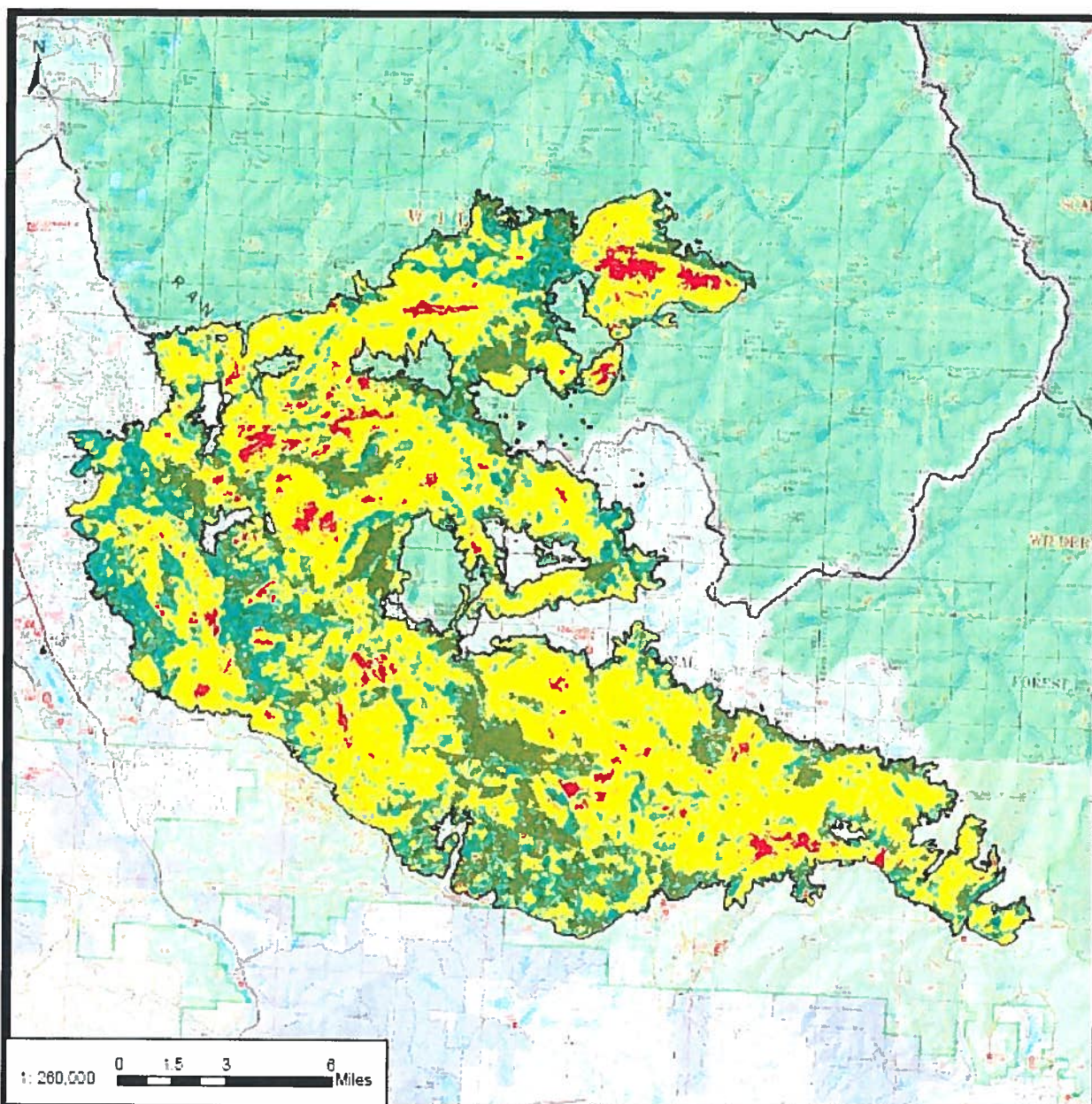
			NFS Lands			Other Lands				All
		Unit	# of		Other	# of	Fed	# of	Non Fed	Total
Line Items	Units	Cost	Units	BAER \$	\$	units	\$	Units	\$	\$
A. Land Treatments										
L-01: EDRR (see table 11 above)	Lump Sur	163,180	1	\$163,180	\$0		\$0		\$0	\$163,180
L-02: Adminstrative Closures (see table 12 abv)	Lump Sur	19,150	1	\$19,150	\$0		\$0		\$0	\$19,150
Insert new items above this line!				\$0	\$0		\$0		\$0	\$0
Subtotal Land Treatments				\$182,330	\$0		\$0		\$0	\$182,330
B. Channel Treatments										
Insert new items above this line!				\$0	\$0		\$0		\$0	\$0
Subtotal Channel Treatments				\$0	\$0		\$0		\$0	\$0
C. Road and Trails										
R-02 Road Drainage Maintenance	Lump Sur	\$330,738	1	\$330,738	\$0		\$0		\$0	\$330,738
R-03 Road Storm Inspection	Days	700	75	\$52,500	\$0		\$0		\$0	\$52,500
R-04 Contract Design and Administration	Lump Sur	105,000	1	\$105,000			\$0		\$0	\$105,000
R-05 Culvert Removals	Each	1,450	37	\$53,650			\$0		\$0	\$53,650
R-06 Drainage Culvert Installation/ Upsizing	Each	2,030	28	\$56,840			\$0		\$0	\$56,840
R-08 Stream Culvert Upsizing	Each	100,000	12	\$1,200,000			\$0		\$0	\$1,200,000
R-09 Contract Mobilization	Lump Sur	115,500	1	\$115,500			\$0		\$0	\$115,500
T-01 Trail Drainage Maintenance	miles	3,700	42	\$155,400			\$0		\$0	\$155,400
				\$0						
					\$0		\$0		\$0	\$0
Subtotal Road and Trails				\$2,069,628	\$0		\$0		\$0	\$2,069,628
D. Protection/Safety										
PS-01 Hazard Warning Signs	Each	350	32	\$11,200	\$0		\$0		\$0	\$11,200
PS-03 Hazard Tree Mitigation	Miles	675	25.12	\$16,956	\$0		\$0		\$0	\$16,956
Insert new items above this line!				\$0	\$0		\$0		\$0	\$0
Subtotal Protection/Safety				\$28,156	\$0		\$0		\$0	\$28,156
E. BAER Evaluation										
Initial Assessment	Report			\$30,000	\$0		\$0		\$0	\$0
Cooperating Agency Coordination	Days	\$750	4	\$3,000	\$0		\$0		\$0	\$0
Insert new items above this line!				---	\$0		\$0		\$0	\$0
Subtotal Evaluation				\$33,000	\$0		\$0		\$0	\$0
F. Monitoring										
				\$0	\$0		\$0		\$0	\$0
				\$0	\$0		\$0		\$0	\$0
Insert new items above this line!				\$0	\$0		\$0		\$0	\$0
Subtotal Monitoring				\$0	\$0		\$0		\$0	\$0
G. Totals										
				\$2,313,114	\$0		\$0		\$0	\$2,280,114
Previously approved				\$152,650						
Total for this request				\$2,313,114						



**PART VII – APPROVALS: LOLO NATIONAL FOREST**

1.  October 25 /2017  
Forest Supervisor Date

2. Leanne M Marten 10/25 /2017  
Leanne Marten, Region 1 Regional Forester Date



## RICE RIDGE SOIL BURN SEVERITY

BURNED AREA EMERGENCY RESPONSE (BAER)

Lolo National Forest

Soil Burn Severity Acres				
High	Moderate	Low		Total
12,161	75,386	36,086	32,940	156,573

This map is a product of a BAER radio assessment. Further information concerning the accuracy and appropriate uses of this data may be obtained from the USDA Forest Service. The Forest Service makes no warranty, expressed or implied, including the warranties of merchantability and fitness for a particular purpose, nor assumes any legal liability or responsibility for the accuracy, reliability, completeness or utility of these geospatial data, or for the improper or incorrect use of these geospatial data. These geospatial data and related maps or graphics are not legal documents and are not intended to be used as such. The data and maps may not be used to determine title, ownership, legal descriptions or boundaries, legal jurisdiction, or restrictions that may be in place on either public or private land. Natural hazards may or may not be depicted on the data and maps, and land users should exercise due caution. The data are dynamic and may change over time. The user is responsible to verify the limitations of the geospatial data and to use the data accordingly.

