

2016

Date of Report: September 23,

BURNED-AREA REPORT
(Reference FSH 2509.13)**PART I - TYPE OF REQUEST****A. Type of Report**

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

B. Type of Action

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

PART II - BURNED-AREA DESCRIPTION

- A. Fire Name: Rail – South Portion* B. Fire Number: OR-WWF-000582
C. State: Oregon D. County: Grant & Baker
E. Region: 6 F. Forest: Malheur
G. District (s): Prairie City RD H. Fire Incident Job Code: P6KJ3V (0616)
I. Date Fire Started: July 31st, 2016 J. Date Fire Contained: estimated 9/18/2016
K. Suppression Cost: \$32.9M (as of 9/6/2016)
L. Fire Suppression Damages Repaired with Suppression Funds
 1. Fireline waterbarred (miles): 12
 2. Dozer line (miles): 11
 3. Fireline seeded (miles): NA
 4. Other (identify): road containment lines 27

*This BAER report addresses Values at Risk in the southern portion of the Rail Fire only on Malheur NF land.

M. Watershed Number: 1705011611, 1705011612, 1705020203, primarily in the Little Malheur River

N. Total Acres Burned:
 NFS Acres (41,716) Malheur NF Land (13,330) Other Federal () State () Private (13)

O. Vegetation Types: Cold Dry Upland Forest; Cool Dry Upland Forest; Cool Moist Upland Forest; Cool Moist Upland Herbland; Hot Dry Upland Forest, Herbland, Shrubland, and Woodland; Hot Moist Upland Woodland; Warm Dry Upland Forest; Warm Moist Upland Forest, Shrubland

P. Dominant Soils: Ashy silt loam, gravely silt loam

Q. Geologic Types: 80% basalt and andesite lava flows of the Strawberry Volcanics, 8% sedimentary rocks, 2% mixed lithologies of meta-sedimentary rocks

R. Miles of Stream Channels by Order or Class: Class 1- 11.28 mi; Class 3- 7.91 mi; Class 4- 17.99 mi

S. Transportation System

Trails: Total – 13.12; Non-motorized – 8.7; Snomobile – 4.8 miles

Roads: WAW Open Roads – 0.43; WAW Closed Roads – 0 ; MAL Closed Roads – 5.5 ; MAL Open Roads – 10.83 miles

PART III - WATERSHED CONDITION

A. Burn Severity (acres):

2885 (Unburned) 5429.4 (low) 4963.8 (moderate) 50.73 (high)

B. Water-Repellent Soil (acres): Field observations of water repellency in all burn severity classes show weak water repellency throughout the sampled area. Due to fire behavior and lack of access most of the sampling occurred around the perimeter and not in the fire interior where water repellency could be higher.

Table 6. Average Percent Water Repellency at Surface

Field Assessed SBS	<i>Weak</i>	<i>Moderate</i>	<i>Strong</i>
Low	75	15	10
Moderate	68	10	23
High	100	0	0

Table 6 shows the average water repellency at the mineral surface for low, moderate and high SBS. Moderate showed 23% strong repellency, which was more than the value of the high burn at 0%. Most of the soils across regardless of burn had weak water repellency at the surface. It was noted that water repellency was variable in all of the burns, and all three classes of repellency were found in each of the burn severities.

Table 7: Average Percent Water Repellency at 4 Inches Below the Surface

Field Assessed SBS	<i>Weak</i>	<i>Moderate</i>	<i>Strong</i>
Low	100	0	0
Moderate	68	15	18
High	100	0	0

Table 7 shows the average subsurface water repellency, 4 inches, for low, moderate and high burn severity. Average repellency does not show a meaningful change from the surface to subsurface. High burn remains approximately 0%. Moderate burn severity shows higher levels of repellency at the subsurface, which decreases in high burn severity.

C. Soil Erosion Hazard Rating (percent):

29.2% (low) 46.1% (moderate) 24.4% (high) 0.3% (very high) 25% (total)

D. Erosion Potential: 2-3 tons/acre

E. Sediment Potential: 950 to 1420 cubic yards / square mile

PART IV - HYDROLOGIC DESIGN FACTORS

A. Estimated Vegetative Recovery Period (years): 2-5 years (70% effective ground cover)

B. Design Chance of Success (percent): 75

C. Equivalent Design Recurrence Interval (years): 10

D. Design Storm Duration, (hours): 24

E. Design Storm Magnitude (inches): 2.3

F. Design Flow (cubic feet / second/ square mile): 4.8 to 13.7 (pre-fire)

G. Estimated Reduction in Infiltration (percent): 15

H. Adjusted Design Flow (cfs per square mile): 33.2 to 58.2

Design factors are the same as for the northern part of the Rail Fire.

PART V - SUMMARY OF ANALYSIS

A. Describe Watershed Emergency:

Emergency is determined using the Risk Assessment Matrix below. Values at risk that are at High to Very High Risk are considered to be at unacceptable risk of post-fire effects and warrant treatment. Values at Risk for the southern portion of the Rail Fire are summarized in the VAR Table (Table 1).

Critical Values to be Considered During Burned-Area Response (BAER)

HUMAN LIFE AND SAFETY
Human life and safety <i>on National Forest System (NFS) lands.</i>
PROPERTY
Buildings, water systems, utility systems, road and trail prisms, dams, wells or other significant investments <i>on NFS lands.</i>
NATURAL RESOURCES
Water used for municipal, domestic, hydropower, or agricultural supply or waters with special Federal or State designations <i>on NFS lands.</i>
Soil productivity and hydrologic function <i>on NFS lands.</i>
<i>Critical habitat or suitable occupied habitat for federally listed threatened or endangered terrestrial, aquatic animal, or plant species on NFS lands.</i>
Native or naturalized communities on NFS lands <i>where invasive species or noxious weeds are absent or present in only minor amounts.</i>
CULTURAL AND HERITAGE RESOURCES
Cultural resources which are <i>listed on or potentially eligible</i> for the National Register of Historic Places, <i>Traditional Cultural Properties, or Indian Sacred Sites</i> on NFS lands.

BAER Risk Assessment

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

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

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

Magnitude of Consequences:

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

Table 1. Values at Risk Analysis for the Rail Fire

BAER Critical Value		Threat	Probability of Damage or Loss	Magnitude of Consequences	Risk	Notes	Decision
Human Life & Safety	People on open roads - collectors	Fallen trees, snags, debris flows, Severe storm event/ road fill failure	Possible (10% - 49%)	Major	High	most roads have been snagged for hazard trees already, need signage	
Human Life & Safety	People on trails	Snags, loss of trail tread, trail not visible	Possible (10% - 49%)	Major	High	LMRT crossings needs for safe passage and trail drainage upgrades in sections of high and moderate burn severity	
Human Life & Safety	People in developed campgrounds	Debris flow, high runoff event, snags	Possible (10% - 49%)	Major	High	Elk Flat campground, hazard trees have been removed already	
Human Life & Safety	People in dispersed campsites	no threats identified because no campsites were identified				none identified for assessment or treatment	
Property	Developed campgrounds - Elk Flat Spring Campground	High runoff event, snags falling on property	Possible (10% - 49%)	Moderate	Intermediate	low gradient ephemeral channel, low risk of post-fire runoff	
Property	Developed Trailheads - Elk Flat Spring Trailhead, south end of Little Malheur River Trail	Elk Flat Spring Trailhead at risk of erosion during high runoff events due to location below road crossing on Big Elk Ck.	Possible (10% - 49%)	Moderate	Intermediate		
Property	Developed Hiking Trails - Little Malheur River Trail	high runoff event caused loss of trail tread and forest investment in trail construction and maintenance	Likely (50% - 89%)	Moderate	High	moderate consequences because loss of trail would result in moderate to substantial property damage	
Property	Roads	road failure due to increased runoff by culvert plugging and flow rerouting down roads	Likely (50% - 89%)	Moderate	High	crossings need armored rolling drain dips to accommodate increased runoff, culverts and ditches need cleaning to allow passage of increased flow	
Natural Resources	Soil Productivity - moderate and high soil burn severity	accelerated erosion and debris flow	Likely (50% - 89%)	Minor	Low	Modeled erosion rates are low and fall within a tolerable amount of soil loss. Sites that re burned severely in the previously burned area will have be slower to recover but that comprises a relatively small area.	
Natural Resources	Invasives - primarily houndstounge, canada thistle, bull thistle	Expansion of currently isolated invasive populations along the major roads and trails in the burned area	Very Likely (90% - 100%)	Moderate	Very High	consequence on invasion is considerable and could cause long term damage to native plant populations	
Natural Resources	Watershed - Hydrologic function and Aquatic Habitats	Loss of soils from post-fire erosion with flashier hydrologic response and subsequent degradation to Aquatic Habitats	Likely (50% - 89%)	Minor	Low	Porous Log Jams located in Within the Little Malheur River and junctions of tributaries would be beneficial but based on the risk no treatments are warranted	
Natural Resources	Bull Trout habitat	not present in the Little Malheur				Habitat is not considered critical for bull trout	
Cultural & Heritage Resources	Treatment implementation - surface and subsurface features	Loss of scientific data present in the archaeological deposits at the work sites during BAER treatments	Possible (10% - 49%)	Major	High	Equipment use and other ground disturbing treatment activities needs to be cleared by Archeologist prior to implementation	magnitude of consequence is major because loss of data is irreversible

Human Life and Safety

Threats to human life and safety exist throughout the burned area. The area is very popular during big game hunting seasons such as Rocky Mountain Elk and mule deer in the fall and early winter. People using the roads, developed campgrounds, motorized trails, and hiking trails will potentially be exposed to fire-exacerbated high runoff events, peak flows, debris flows, rock fall, and fire-killed falling trees/limbs. Limited ingress/egress and escape routes are offered by FS roads. Roads throughout the south portion of the Rail Fire are only along the wilderness boundary where many are narrow, covered by a seasonal snowpack, located on steep slopes, and traverse through burned-over forest. Primary routes are used by recreationists, hunters, local residents, contractors, and administrative users. Currently the Rail Fire Closure Order (T-2016-0616-03) is in effect as fire suppression repair, patrol, mop-up, and hazard trees are being removed, but it is expected to be lifted before mid-fall.

There are about 4.8 miles of motorized trails (snowmobile) in the south portion of the fire, and 7.3 miles of the Little Malheur River wilderness trail (LMRT). Nearly all these trails either go through areas where soil burn severity was moderate to severe or are directly impacted by areas of influence where severity was moderate to severe. These areas have nearly all killed trees, which will become snags and pose a degree of hazard to trail users. River crossings along the LMRT have become undistinguishable and unsafe due to fire effects.

The probability of damage or loss to values at risk of human life and safety is considered to be possible, and the magnitude of consequence major, therefore the risk is deemed to be high. Significance of protecting human life and safety is self-evident, and is justification enough for proposed treatments to mitigate or minimize the hazards.

Property – Roads, Trails, Infrastructure

Roads- There are a total of 16.33 miles of roads within the perimeter of the south portion of the fire, with 5.5 miles of closed roads and 10.83 miles of open roads. All 16.33 miles of road are located within 1000 feet of high or moderate severity burned area. Risks to roads from fire-exacerbated high runoff and peak flows, and debris flows exist on numerous segments within the burned area. Threat to roads is road failure due to increased runoff by culverts plugging and flow rerouting down the roads. Most of these segments are located on steep slopes, either adjacent to or in an area of influence of intermittent streams where there is a likelihood of interception of peak stream flow and routing it down their tread. Damage to roads from high runoff or erosional events could contribute to excessive channel erosion, threats to aquatic habitat, and dramatically alter hydrologic function.

Trails- There are 2.25 miles of the LMRT that are within moderate and severe soil burn severity are threatened by high runoff events that could cause loss of trail tread and obliteration of the existing trail. Remote sensing shows moderate soil burn severity in the central portion of the Little Malheur River Trail but field observations show that soil burn severity is actually higher. This is likely due to the abundance of dead and down timber from the 2002 Monument Rock Fire that re-burned in the Rail Fire contributing to soil damage in this area due to the fire's long residence time. Probability of damage or loss is likely with the magnitude of consequences moderate, making the risk high.

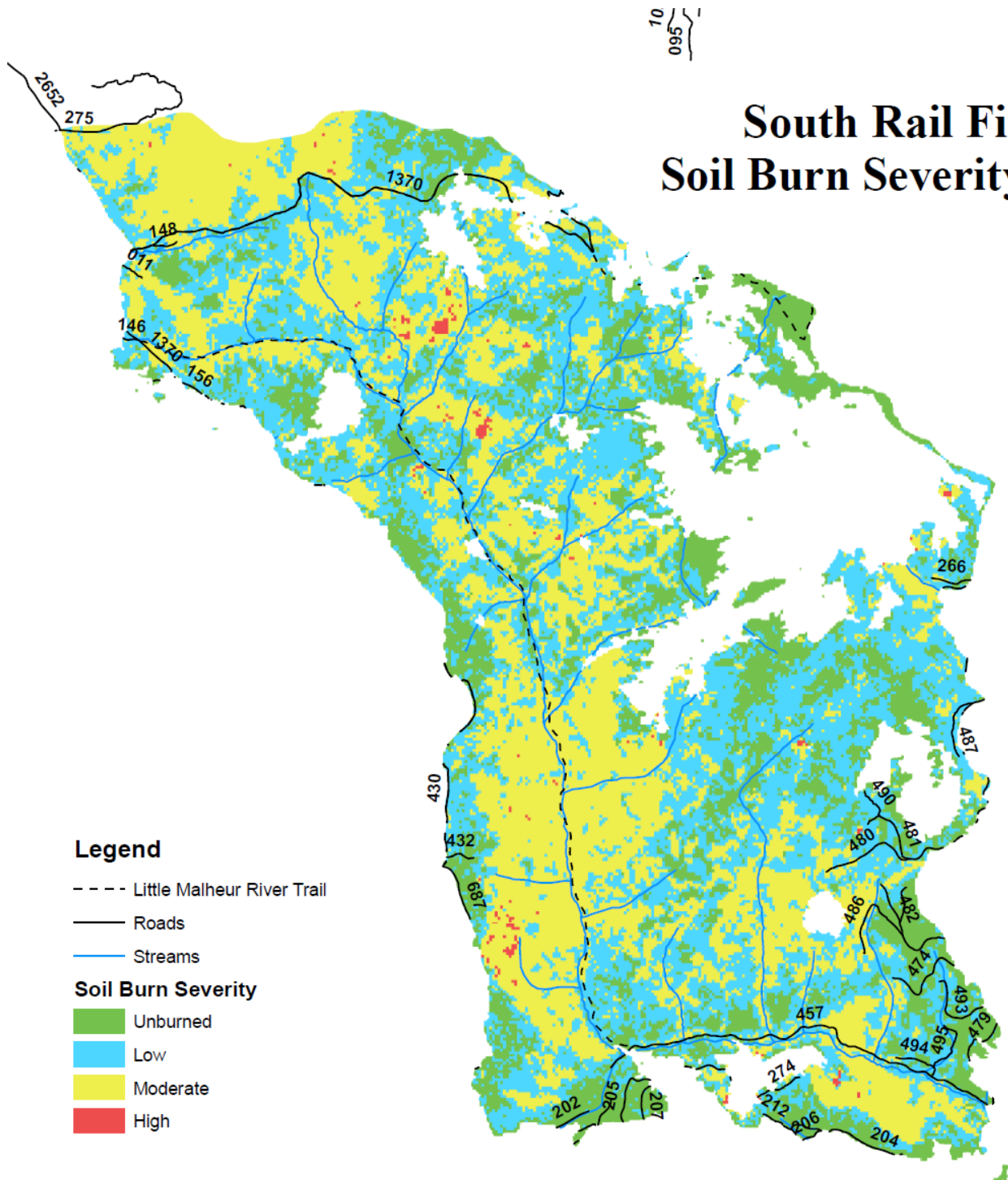
Infrastructure- Elk Flat Spring Trailhead at the northern end of the Little Malheur River Trail is at risk of erosion during high runoff events due to location below a road crossing on Big Elk Creek. The probability of damage or loss is possible with magnitude of consequences moderate, making the risk intermediate and treatment possible. Elk Flat Spring Campground is located on a low gradient ephemeral channel that is threatened by high runoff events, and snags falling on the property. The greatest concern at this location is a damaged toilet and the hazards a high flow event could pose to the structure and its contents entering the downstream waters. The probability of damage or loss is possible and the magnitude of consequences is moderate, making the risk intermediate.

Natural Resources

Soil Productivity- Approximately 38% (5,015 acres) of land within the fire perimeter is considered to have moderate and high soil burn severity (Map 1). The threat within moderate and high severity burn areas is accelerated erosion and debris flow. Twenty five percent of the fire area has an erosion hazard rating of high to very high, where soil burn severity is moderate to high and slopes are greater than 20% (Map 2). This indicates that the probability of damage or loss to soil resources is likely. The magnitude however, was determined to be minor at the landscape scale. Certain sites, it is recognized, will be impacted for the long-term, especially those where cumulative effects from both natural and anthropogenic past disturbances have occurred. But overall, recovery potential is judged to be high.

Sampling of soil burn severity in the field suggested that below-ground effects to soils were not high across a majority of the burned over area. Fine roots, rhizomes, seeds, and organic material were present near the surface in moderate and low burn severity. In places, the fall of unconsumed needles from fire-killed trees has already provided some ground cover. Thus it was concluded that recovery potential, or the time it will take for vegetation to reestablish an effective ground cover will be less than 2 years across most of the southern portion of the fire. The risk to soil productivity and hydrologic function was determined to be low, and treatments unneeded. It is recognized, however, that there will be individual sites prone to long-term damages and loss from post-fire effects.

South Rail Fire Soil Burn Severity Map



Legend

- Little Malheur River Trail
- Roads
- Streams

Soil Burn Severity

- Unburned
- Low
- Moderate
- High

Soil Burn Severity	Acres	Percent
Unburned	2886	21.6%
Low	5429	40.7%
Moderate	4964	37.2%
High	51	0.4%
Grand Total	13330	

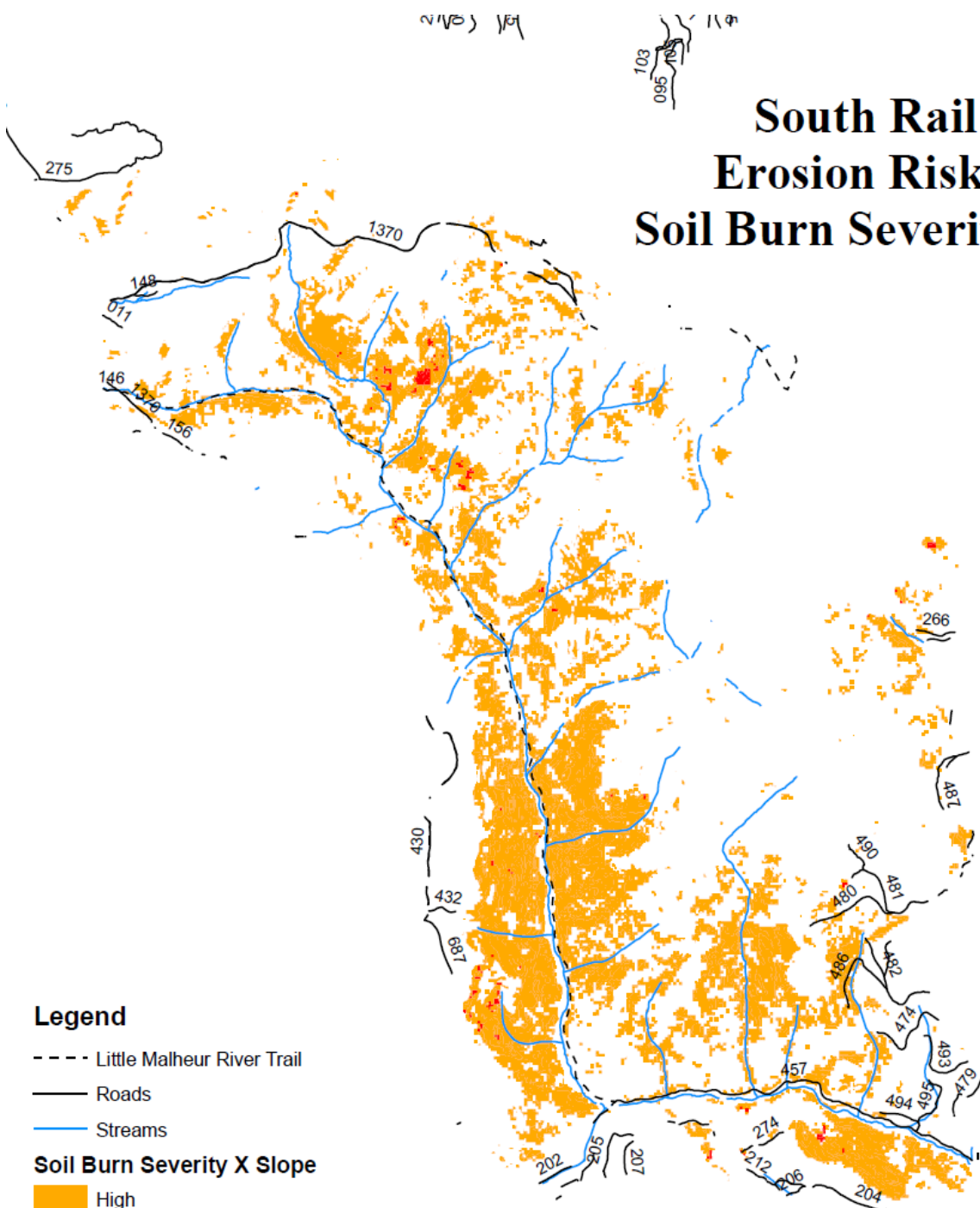


Coordinate System: NAD 1983 Oregon Washington Albers
Projection: Albers
Datum: North American 1983

0 2 4 Miles

Map 1. Soil Burn Severity Map of the South Portion of the Rail Fire, Malheur NF

South Rail Fire Erosion Risk Index Soil Burn Severity X Slope



Legend

- Little Malheur River Trail
- Roads
- Streams

Soil Burn Severity X Slope

- High
- Very High

Soil Erosion Potential (SBS X Slope Index)	Acres	Percent
High	3,255	24.4%
V High	38	0.3%
Total	3,293	24.7%

Coordinate System: NAD 1983 Oregon Washington Albers
Projection: Albers
Datum: North American 1983

0 2 4 Miles



Map 2. Erosion Risk Index Map of the South Portion of the Rail Fire, Malheur NF

Invasive Plant Species- There are three different known noxious weeds of main concern: *Cirsium arvense* (Canada Thistle), *Cynoglossum officinale* (Houndstongue), and *Cirsium vulgare* (Bull Thistle). The probability of damage or loss from invasive plant is considered to be very likely, and the magnitude of consequences is determined to be moderate. So the risk is very high that invasive plant species will have a negative impact as a result of the fire. Post-fire conditions are particularly favorable to noxious weed establishment and spread, so treatments are warranted to attempt to minimize or mitigate their spread. There are known populations of Canada Thistle, Houndstongue and Bull Thistle in the area within and adjacent to the fire perimeter that have a high probability to spread based on the level of disturbance and individual species post-fire behavior.

Watershed- Loss of soil from post-fire erosion is expected with flashier hydrologic response resulting in degradation to water quality. Increased flows are also expected to increase potential for instream erosion (gullyng or debris flow) and floating debris that will compromise hydrologic function and integrity of downstream aquatic habitats. The Little Malheur River has mixed severity burns, but has lost significant portions of riparian vegetation that would contribute to shade, bank and channel stability. Key pieces of wood that contribute to bank stability were removed as part of the Monument fire in 2002, and consequently, remaining large wood was compromised by the Rail fire. Because of this, channel stability and key habitat forming features have been impacted. In addition, by compromising the hydrologic function, increased sedimentation will result in impaired (embedded) substrate. The probability of damage or loss is likely with the magnitude of consequence minor, making the risk low.

Cultural and Historical Resources

No cultural or historic resources were identified as at risk at the time of this report. Based on photos and mapping, there is a high likelihood there are cultural and historic resources in the Little Malheur River drainage. Treatment implementation is the main concern, with features and subsurface remains at risk of being damaged or exposed by restoration activities, erosion, and soil movement. The main concern for the archaeology resource is the location of equipment during road treatments and the disposal of any waste material created during road treatments. The possibility of damage or loss is possible due to burn severity and/ or the susceptibility to deposition of erosional overburden over the cultural resources as the result of equipment use, potential damage, and erosional events. The magnitude of consequences (loss of scientific data present in the archaeological deposits) is major, making the risk high.

B. Emergency Treatment Objectives:

Human Life and Safety:

Mitigate and minimize potential hazards from flash floods and snags by installing warning signs. Continue Rail Fire Closure Order (T-2016-0616-03) for the duration of suppression repair operations.

Install signage containing specific language that clearly informs the public about the potential for debris flows, high flow events, eroded trails, falling trees and loose rock at entrances to burned area and high use recreation sites. Existing templates from the Canyon Creek Complex are available.

Conduct storm patrols to monitor any damage or loss to the road system and high use recreation sites that could pose a threat to public life and safety.

Property:

Prepare specified NFS roads to protect them from damage or loss that could result from expected heightened runoff, heavy storm flows, and debris flows. Improve the effectiveness of road drainage structures to help mitigate or minimize post-fire impacts to roads.

Perform emergency trail stabilization on segments at greatest risk of erosion during a high runoff event and sediment delivery to the Little Malheur River.

Natural Resources:

Protect native or intact plant communities from encroachment by invasives with emphasis on roads and trails.

Heritage and Cultural Resources:

To ensure cultural resources are not damaged by road and trail BAER treatment activities site inspections by a qualified archaeologist will be performed prior to any ground disturbing activity. Heritage specialists will assess locations where heavy equipment will work and be parked as well as locations where .

C. Probability of Completing Treatment Prior to First Major Damage-Producing Storm:

Human Life & Safety 90-100% Roads 90-100% Trails 20-50% Natural Resources 50-90% Heritage and Cultural Resources 90-100%

D. Probability of Treatment Success

	Years after Treatment		
	1	3	5
Human Life & Safety	90-100%	90-100%	90-100%
Property	70-90%	90-100%	90-100%
Natural Resources	50-90%	50-90%	50-90%
Heritage & Cultural Resources	90-100%	90-100%	90-100%

E. Cost of No-Action (Including Loss): **\$124,059 as determined below.**

Human Life and Safety – Without signs describing hazards present in the burned area a forest user could be unaware of risks and proceed without further consideration for their safety. For example minimizing exposure to fire-killed trees may not be a consideration for some forest users. The significance of protecting human life and safety is assumed self-evident and not included in the calculations used below to justify treatments.

Property – Certain road segments and trail segments have been identified as being susceptible to damage by post-fire peak flows and heightened runoff. A method called the Implied Minimum Value (IMV) is recommended by BAER leadership to determine the cost-benefit ratio for values at risk where market value is not available Calkin et. al., (USDA 2007). An example of this is considering the cost of lost access to the Table Rock Lookout by failure of the 1370 road. Since numerical values for cost to repair the damaged resources are not available an IMV is assigned to the Property Values at Risk which equals \$71,571.

Estim. cost of treatments: \$53,678
Estim. Probability of Damage or Loss w/o Treatment: 90%
Estim. Probability of Loss if Treated: 25%
IMV = Treatment Cost/(Probability Loss Untreated - Loss Treated)
Implied Minimum Value (IMV) for Property $\$53,678/(0.9-0.25) = \$71,571$

Natural Resources – Without treatments to minimize post-fire effects from the spread of known populations of invasive plant species, there is a risk of diminishing native vegetation and ecosystem diversity in wilderness and the areas. Using the IMV method, the value of the native plant communities in threatened areas is \$52,488.

Estim. cost of treatments: \$20,995
Estim. Probability of Damage or Loss: 90%
Estim. Reduction of Loss if Treated: 50%
IMV = Treatment Cost/(Probability Loss Untreated - Loss Treated)
IMV for Natural Resources: \$20,995/(0.9-0.5) = \$52,488

Cultural Resources – An estimate of the cost of no-action is unknown given the lack of information about cultural resources in the burned area.

F. Cost of Selected Alternative (Including Loss): **\$92,605 – details in treatment narrative section**

Treatment	Units	Unit Cost	# of Units	Total Cost
Life and Safety				\$12,980
Property				\$53,678
Natural Resources				\$20,995
Cultural Resources				\$1,000
Total				\$92,605

G. Skills Represented on Burned-Area Survey Team:

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

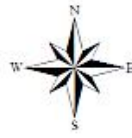
Team Leader: Hannah Grist

Email: hgrist@fs.fed.us Phone: 541-575-3346 FAX: _____

Rail Fire South Proposed Treatments

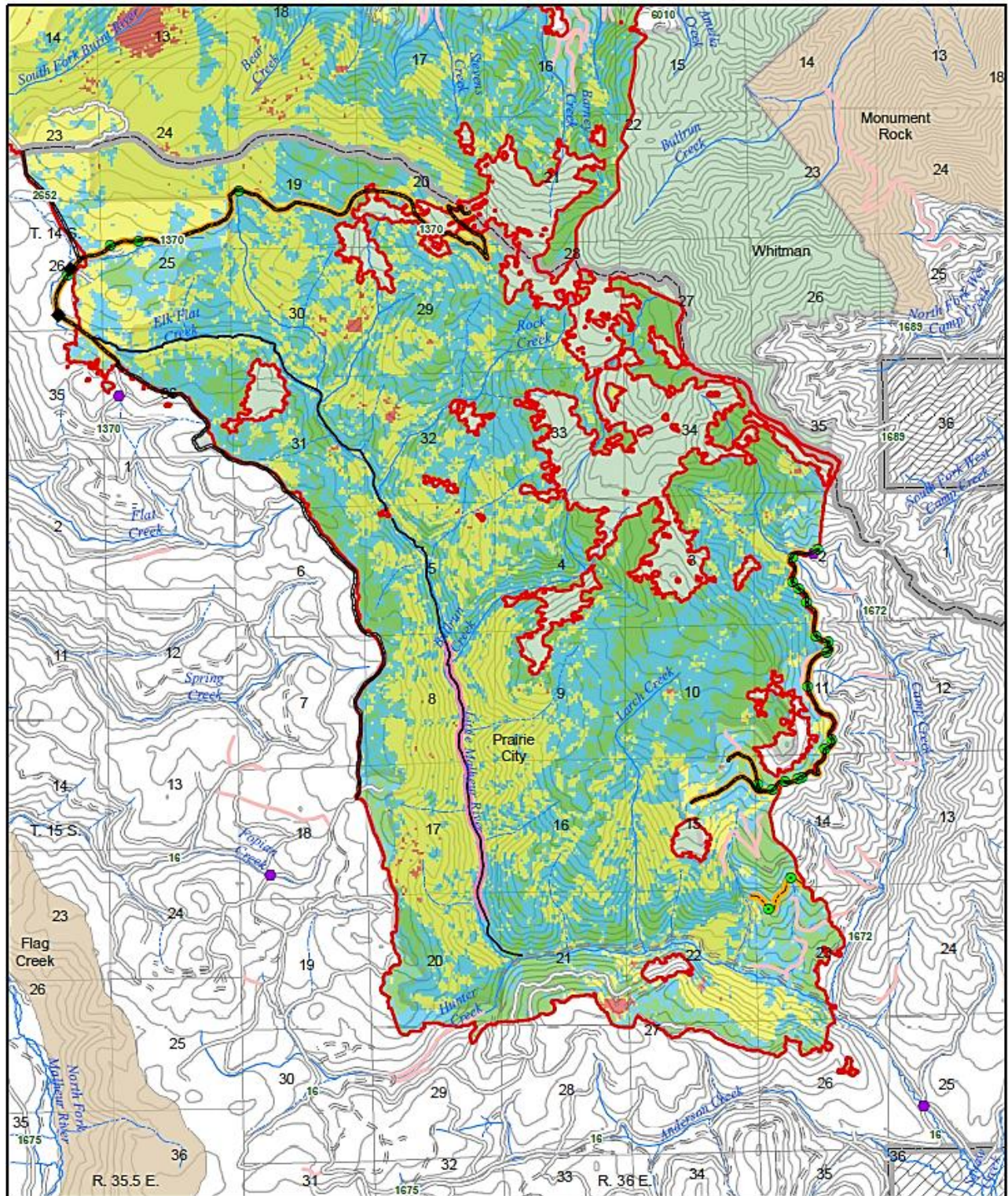
Date: 9/23/2016

0 0.25 0.5 1 1.5 2 Miles



1:65,000

100 ft Contour Interval



Map 3. Proposed BAER Treatments on the southern portion of the Rail Fire

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.)

Human Life and Safety Treatments:

Treatments proposed to minimize or reduce the post-fire risks to human life and safety on the Rail fire are relatively inexpensive and easy to implement. Thus, the benefit/cost ratio is considered to be high, and well worth the minor expense. A high degree of effectiveness of the treatments would be expected, but is dependant in part on the awareness and responsibility of individual forest users to heed warnings and alerts, or posted temporary closures.

HL1 – Signage: Warning signs (16) will be posed at principal portals and ingress/egress routes at or outside the fire perimeter and high use recreation sites. The signs will inform users of the dangers associated with entering and recreating within a burned area. The signs will state the hazard of unanticipated flash flood, falling snags or limbs from fire-killed tress, and falling rock from cut banks.

HL2 – Storm Patrol: Storm patrols will occur periodically over the next 12 months. Storm inspection/response will keep culverts and drainage structures functional by cleaning sediment and debris from the inlet between or during storms. This work will be accomplished through Forest Service Road Crew, equipment rental, and general labor. Priority areas for patrol will be the culvert at the 16 road at the Little Malheur River crossing, the 1370 road to the Table Rock Lookout, and 1672 road in the Camp Creek subwatershed (Map 3).

HL3 – Hazard Mitigation at Elk Flat Springs Campground: To mitigate risk to human health the sanitary facility at the campground requires pumping of human waste and closure of the vault. Hazard mitigation at this site also includes the removal of debris and hazard trees.

Human Life and Safety Treatment	Units	Unit Cost	# of Units	Total Cost
HS1 – Signage	Sign/Post	\$530	16	\$8,480
HS2 - Storm Patrol	Days	\$1,000	4	\$4,000
HS3 – Hazards at Elk Flat Springs Campground	Project	\$500	1	\$500
Life and Safety Total				\$12,980

Property Treatments – Roads and Trails:

Road Treatments - To address the threat posed to roads by the increase in post-fire runoff during rain events we propose to establish or reestablish surface cross ditches, cleaning culverts, and installing rolling dips to channelize and direct any over flow that occurs during storms. Detailed information on locations of proposed work can be found in the Engineering spreadsheet. The primary treatments proposed address drainage issues along roads will reduce risk of erosion, protect water quality, and protect the Forest Service investment in property.

R1 – Road Drainage Enhancement: Treat 10.3 miles of roads within the burned area to improve drainage and protect them from damage or loss that could result from heightened runoff and heavy storms. To improve the effectiveness of road drainage stuctures treatment will include enhancing ditchlines, installing ~25 armoured drain dips and ~9 waterbars to localize and direct any over flow problems caused by increased runoff in the post-fire environment. To improve water passage at road-drainage intersections the inlets of existing ditch relief culverts will be cleaned as well as inlets to culverts at stream crossings. Included in the drainage enhancement work will be the removal of hazard trees in

the immediate vicinity of work locations when needed to protect worker safety. Five days of hazard tree removal work at a rate of \$1,100 per day is included in the total cost estimate. Soil burn severity in the Camp Creek area (1672 road in the southeastern portion of the fire) is mapped as mostly low but on the ground observations show that, like the mapped moderate burn along the Little Malheur River, soil burn severity is actually higher due to the abundance of dead and down trees from the 2002 Monument Rock Fire that were burned in the Rail Fire. The presence of logs and ceanothus as ground cover in the previously burned areas seems to have contributed to elevated soil burn severity and a significant reduction in soil stabilizing properties making these roads at risk of post-fire effects. A detailed description of the proposed work and locations can be found in the Engineering spreadsheet.

T1 – Trail stabilization: Drainage improvements to divert elevated runoff will occur along 2.25 miles of the Little Malheur River Trail in the moderate and high severity burned areas. Trail work will focus on the segment of trail below the Bullrun Creek-Little Malheur River confluence where post-fire increase in runoff and erosion will have the greatest effect to the property and potential to deliver sediment to the Little Malheur River. This segment of trail lies within an area mapped as moderate soil burn severity but field observations show that the burn severity is actually high, likely due to the presence of dead and down timber and long residence time of fire in this part of the watershed. Work will include installing drainage features, and defining the trail where it has dissapeard to prevent off-trail travel and damage to surrouding resources.

Location and Treatment	Units	# of Units	Unit Cost	Total Cost
R1 – Road Drainage Enhancement	Project	1	\$37,928	\$37,928
T1 – Little Malheur River Trail/Drainage	Miles	2.25	\$7,000	\$15,750
Property Protection Total				\$53,678

Natural Resources Treatments: Invasive Plants – Herbicide treatment is recommended to protect native plant communities from the spread of non-native invasive species. There are known populations of Canada Thistle, Houndstounge and Bull Thistle in and adjacent to the burned area that are very likely to spread based on the level of disturbance and individual species post-fire behavior. Survey and treatments will focus on known populations as well as roads and trails as they are the primary vectors for the spread of invasive species.

NR1 – Survey and Chemical Treatment: To prevent the infestation of intact native plant habitat in the Monument Rock Wilderness the BAER team strongly recommends survey, detection, and treatment of the three most aggressive invasive plant species present in the burned area. Initial survey and treatment of invasive populations will take place in the late spring of 2017 and 2018. Road survey and detection will occur on 15 miles of road within and adjacent to the burned area. Treatment will occur on a 50' buffer of the infested roads, assuming all 15 miles of likely invasive plant habitat will require treatment we propose to fund all 91 acres of chemical and mechanical treatment. Survey and detection will also occur on 7.1 miles of the Little Malheur River Trail to prevent detrimental invation of invasive species into the wilderness. Assuming invasives are detected along the high use trail and a 15' treatment to the infestations we propose to fund all 26 acres of area adjacent to the trail. Chemical treatments are recommened for all three target species with follow up chemical treatment in the fall for the more aggressive Canada Thistle. The treated populations will be re-surveyed and treated again if necessary.

Natural Resources Treatments	Units	# of Units	Unit Cost	Total Cost
NR1 – Invasive Survey and Detection (15 miles of road, 7 miles of trail)	Miles	22	\$83	\$1,826
NR2 – Invasive Plant Treatment (90 acres along roads, 26 acres along trails)	Acres	116	\$172	\$19,952
Natural Resources Total				\$21,778

Cultural Resources Treatments: Pre-implementation clearance – Archaeological surveys will be necessary to protect heritage values at risk from impacts of implementing other BAER treatments. It is important that there is coordination between heritage resource specialists and other specialists in the implementation phase so cultural resources are not lost or damaged during treatment implementation.

CR1 – To avoid damage to cultural resources by equipment and actions during implementation and comply with Section 106 of the National Historic Preservation Act qualified archeologists will perform assessment of the work sites and the proposed activities. Five days of work to check the road and trail prisms for Archeological resources will be conducted prior to any work in the area.

Cultural Resources Treatments	Units	# of Units	Unit Cost	Total Cost
CR1 – Implementation Survey and Section 106 Compliance	Days	5	\$200	\$1,000

I. **Monitoring Narrative:**

M1 - Monitoring to evaluate the effectiveness of invasive plant treatments at reducing infestation and identify if additional treatment is required to reduce the threat of invasives on native plant populations. This monitoring will be accomplished by the Malheur National Forest Invasive Plant Crew.

M2 – Post-implementation monitoring and After Action Review will be accomplished by team members Hannah Grist and Mary Young. The goal of this work will be to determine if treatments were implemented according to the recommendation and identify the strengths and weaknesses in the process of BAER recommendation and implementation.

Monitoring	Units	# of Units	Unit Cost	Total Cost
M1 – Invasive plant monitoring	Project	1	\$2,720	\$2,720
M2 – Team Lead monitoring of treatment implementation and effectiveness (2 GS-9 for 2 days each, overtime rate)	Days	4	\$308	\$1,232
Monitoring Total				\$3,952

Part VI – Emergency Rehabilitation Treatments and Source of Funds by Land Ownership

Line Items	Units	Unit Cost	NFS Lands		Other \$
			# of Units	WFSU SULT \$	
A. Human Life & Safety					
HS1 - Hazard signs	sign/post	\$530	16	\$8,480	\$0
HS2 - Storm patrol	days	\$1,000	4	\$4,000	\$0
HS3 - Elk Flat CG	project	\$500	1	\$500	\$0
<i>Insert new items above this line!</i>				\$0	\$0
<i>Subtotal Land Treatments</i>				\$12,980	\$0
B. Property					
R1- Road drainage	project	\$37,928	1	\$37,928	\$0
T1 - LMRT Stabilization	miles	\$7,000	2.25	\$15,750	\$0
<i>Insert new items above this line!</i>				\$0	\$0
<i>Subtotal Channel Treat.</i>				\$53,678	\$0
C. Natural Resources					
NR1 - Invasives Detection	miles	\$83	22	\$1,826	\$0
NR2 - Invasives Treatment	acres	\$172	116	\$19,952	\$0
				\$0	\$0
<i>Insert new items above this line!</i>				\$0	\$0
<i>Subtotal Road & Trails</i>				\$21,778	\$0
D. Cultural Resources					
CR1- Implementation compliance	days	\$200	5	\$1,000	\$0
				\$0	\$0
				\$0	\$0
<i>Insert new items above this line!</i>				\$0	\$0
<i>Subtotal Structures</i>				\$1,000	\$0
E. BAER Evaluation					
				\$8,750	\$0
				\$0	\$0
<i>Insert new items above this line!</i>				\$0	\$0
<i>Subtotal Evaluation</i>				\$8,750	\$0
F. Monitoring					
M1- Invasive monitoring	project	\$2,720	1	\$2,720	\$0
M2- Assessment review	days	\$308	4	\$1,232	\$0
<i>Insert new items above this line!</i>				\$0	\$0
<i>Subtotal Monitoring</i>				\$3,952	\$0
G. Totals				\$93,388	\$0

PART VII - APPROVALS

1. /s/ Steve Beverlin
Forest Supervisor (signature)

9/27/2016
Date

2. /s/ Dianne C. Guidry (for)
Regional Forester (signature)

10/11/2016
Date