

Date of Report: 10/19/2015

BURNED-AREA REPORT FOR BEAR LAKE FIRE
(Reference FSH 2509.13)



PART I - TYPE OF REQUEST

A. Type of Report

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

B. Type of Action

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

[] 3. Final Report (Following completion of work)

PART II - BURNED-AREA DESCRIPTION

A. Fire Name: Bear Lake Fire

B. Fire Number: MT-BDF-0001330

C. State: Montana

D. County: Beaverhead

E. Region: Northern (1)

F. Forest: Beaverhead-Deerlodge

G. District: Wisdom/Dillon/Wise River

H. Fire Incident Job Code: P1J2E315

I. Date Fire Started: August 20, 2015

J. Date Fire Contained: Not yet contained

K. Suppression Cost: \$3.5 million

L. Fire Suppression Damages Repaired with Suppression Funds

1. Hand Line (miles):
2. Dozer Line (miles):
3. Other (identify): 0

M. Watershed Numbers: 100200040902, 100200040201, 100200040203

N. Total Acres Burned:

NFS Acres (6,444 acres in fire perimeter, 3,555 acres with some burn severity¹) BLM (0) State (0)
Private (0)

¹ Fire acres assessed prior to final containment although significant changes are not expected

O. VegetationTypes: Whitebark pine,subalpine fir, lodgepole pine, spruce. Grass within the fire perimeter did not burn.

P. Dominant Soils:

The Bear Lake fire is located in a area of glacially affected landscapes. Primary geologic types are granite and quartzite (see Section Q, below, for further details). Most soils in the fire area are young and poorly developed with minimal horizon development (Inceptisols), with smaller inclusions of more developed forested soils (Alfisols).

Map Unit	Landform	Parent Material	Soil Classification	Approximate Acres
368Sr	Glacial, dead ice	Granite	Coarse-loamy, mixed, superactive Lamellic Eutrocryepts and Sandy-skeletal, mixed Typic Eutrocryepts	4,112
537S	Moderate Mountain Slopes	Quartzite	Loamy-skeletal, mixed, superactive Typic Eutrocryepts and Loamy-skeletal, mixed, superactive Eutric Haplocryalfs	760
347S	Glacial Moraine	Quartzite	Loamy-skeletal, mixed, superactive Eutric Haplocryalfs and Loamy-skeletal, mixed Typic Eutrocryepts	668

The most dominant landform is glacial dead ice in granite (368Sr). Glacial dead ice occurs when a glacier or ice sheet ceases to move and melts in situ. After the ice has melted it leaves behind a hummocky terrain

produced by the deposition of glacio-fluvial sediments and ablation till as the ice melted. Such features include kettle holes. This landform is present in the western half of the fire area. Most of this part of the fire burned at moderate and low severity, with larger areas of high burn severity located in the northwest portion of the fire near the headwaters of the East Fork of Warm Springs Creek and just downstream of the headwaters of Rabbia Creek. Erosion risk on this landform is moderate; however, localized areas of high erosion hazard exist in steep areas and/or larger contiguous areas where litter and duff have been removed and water-repellant soils occur.

The eastern part of the fire area is comprised of moderate mountain slopes (537S) and glacial moraine (347S) in quartzite. Most of this portion of the fire area is unburned, with areas of low burn severity and very little moderate and high burn severity. Erosion risk on these landforms is moderate.

Q. Geologic Types: The most common geology type in the fire area is Late Cretaceous granodiorite, tonalite, and quartz diorite. This geology covers the majority of the western half of the fire area.

The eastern half of the fire are is dominated by Middle Proterozoic Missoula Group quartzite.

Pleistocene era glacial till is mapped on small portions of the extreme western and eastern areas of the fire.

R. Miles of Stream Channels by Order or Class:

Stream miles by order within perimeter.

Stream Order	Length (Miles)
1	8
2	0
3	0
4	0
5	0
Grand Total	8

S. Transportation System

Trails: 8.2 miles Roads: 1.2 miles

PART III - WATERSHED CONDITION

A. Burn Severity (acres): 2,889 (unburned); 1,504 (low); 1,316 (moderate); 736 (high),

Burn Severity	Acres
Unburned/Very Low	2,889
Low	1,504
Moderate	1,316
High	736

B. Water-Repellent Soil (acres): All high severity and some moderate portions have varying degrees of water repellency. North facing slopes were observed to have stronger hydrophobicity than south facing slopes.

C. Soil Erosion Hazard Rating (acres):

Erosion Hazard Rating	Acres
Low	967
Moderate	4,871
High	605

D. Erosion Potential: 0.20 tons/acre (disturbed WEPP, 10-year return period, average high severity site used, Wisdom, MT climate adjusted for location (correct lat/long and elevation) using PRISM) This event has a ~20% chance of happening during a 10 year recovery period.

E. Sediment Potential: 0.19 tons/acre (disturbed WEPP, same run as erosion potential above)

PART IV - HYDROLOGIC DESIGN FACTORS

- A. Estimated Vegetative Recovery Period, (years): 3
- B. Design Chance of Success, (percent): 85
- C. Equivalent Design Recurrence Interval, (years): 5
- D. Design Storm Duration, (hours): 1 hour
- E. Design Storm Magnitude, (inches): 1.5 inches
- F. Design Flow, (cubic feet / second/ square mile): 15 cfs/mi²
- G. Estimated Reduction in Infiltration, (percent): 75
- H. Adjusted Design Flow¹ (cfs per square mile): 65 cfs/sq.mi. ²

Based on Rule of Thumb by Kuyumjian (2007).

PART V - SUMMARY OF ANALYSIS

A. Describe Critical Values/Resources and Threats:

Summary of Potential Watershed Response

The Bear Lake fire burned high elevation (~8,000 feet) stands of lodgepole pine, whitebark pine, and spruce on generally moderate mountain slopes along the crest of the East Pioneers. These high elevation stands are interspersed with large, gently rolling grassy parks, which did not burn. There is a high

² Post-fire runoff events are extremely variable. Relatively small storm events (2-5 year recurrence interval) can produce very large flood events. The adjusted design discharge represents the entire burned area. Past post-fire measurements indicate there is potential for much larger runoff events to occur (Parrett et al. 2004. USGS WRIR 03-4319).

proportion of unburned and low burn severity with this fire, and more limited areas of moderate and high burn severity. It is the location of the moderate and high burn severity in relation to the Rabbia trail network that dictates a need for BAER work to be completed for health and human safety along with infrastructure protection.



Figure 2. Representative photo of burned conditions near Rabbia Trail System.

The majority of precipitation in the burned area occurs as snow during the winter months. Peak runoff typically occurs during snowmelt, but spring and summer thunderstorms often produce runoff events. Runoff potential is relatively high in areas that have moderate and high burn severity. Hillslopes vary from rolling to moderately steep with a low to moderate rock content. In areas classified as low burn severity, needle-cast has created a degree of ground cover which will slow runoff and enhance infiltration during rain events.

A few thunderstorms have brought 0.1 to 0.5 inches of rain to the fire. Some evidence of overland flow was observed; however, the rain was not continuous across the burned area.

Soil hydrophobic conditions were investigated in unburned, moderate and high burn severity areas adjacent to the Rabbia trail system. Both Unburned and Burned soils on north facing slopes are strongly hydrophobic down to 3 inches. South facing slopes had less hydrophobicity and generally less fire effects.

The Bear Lake fire burned the headwaters of 3 sub-watersheds with a mosaic pattern of low to high burn severity. Not all forested areas within the burn perimeter were affected and most of the grass parks present did not burn or burned very lightly which created the mosaic pattern found on the ground.

Lower Warm Springs Creek

This is the watershed where the fire started. The lower boundary was bounded by a large meadow complex that encompasses Bear Lake and Bear Creek which had very little fire effects due to the protection from the surrounding meadow complex. A portion of FS trail 3205 did sustain some fire effects and additional drainage may be necessary along with hazard tree removal (see map for locations). Portions of the intermittent headwaters did have high severity burn areas although no effects are anticipated to affect the lower perennial reaches.

Upper Warm Springs Creek

There are two mapped perennial stream in this watershed that had fire effects associated with the Bear Lake fire. An unnamed stretch of the Upper East Fork of Warm Springs Creek had limited effects associated with some spot fires near the Northern perimeter of the fire. These effects are small in nature and no lasting effects are anticipated.

The Upper East Fork of Warm Springs Creek did have more substantial fire effects and the small watershed had did have a fair bit of moderate and high severity fire mapped. The lower segment of this channel is a mapped conservation population of Westslope Cutthroat although impacts to the fishery are expected to be minimal due to a good stringer meadow buffer which covers most of the riparian area. It is possible that sediment delivery may occur from fire effects but the magnitude does not constitute action in this remote setting.

Wyman Creek

There are three perennial streams mapped in this watershed that fall within the fire perimeter boundary. The first is Wyman Creek which flows along the Southern boundary of the fire perimeter. This stream is not expected to have any fire effects due to large unburned meadows which buffer this stream from potential fire effects.

Armor Creek is also within the burned area boundary but only limited portions of the watershed have burned and even less was moderate and high severity. Most of the burned areas were on the slopes well above the stream so fire effects are anticipated to be very limited.

Rabbia Creek had the most significant effects of any sub-watershed in the fire perimeter. Most of its length is mapped as a conservation population for Westslope Cutthroat. After a field visit it was determined that no in channel treatments or hillside stabilization were necessary due to the topography, spottiness of the burn, and distance from active water although impacts to the trail were a concern and included in the BAER request. This is a remote area with limited use but controlling erosion and stabilizing the trail were the highest priority from the fisheries and recreation staff.

Noxious Weeds

Introduction of noxious weeds to the fire area is a concern for most of the area, especially on the south and west boundaries of the fire perimeter. The West Pioneer Mountains have very low levels of infestations of non-native invasives and noxious weeds.

*Based on the site visits much of the fire perimeter is noxious weed free. Weed infestation are small, low density, and isolated in occurrences. Three weed species are primarily found close to the fire area and present the biggest threat of invasion. Forest Roads and the scenic byway had small infestations of spotted knapweed (*Centaurea stoebe*), musk thistle (*Carduus nutans*), and Canada thistle (*Cirsium arvense*), bull thistle (*Cirsium vulgare*), and oxeye daisy (*Leucanthemum vulgare*).*

Weeds encountered on the south side of the fire area were oxeye daisy. Anderson Meadows is prime habitat for this species' occupation and spread. The plant does well in riparian areas and sub-irrigated meadows. Two patches were found and GPS'd along the Anderson Meadows trail 167.

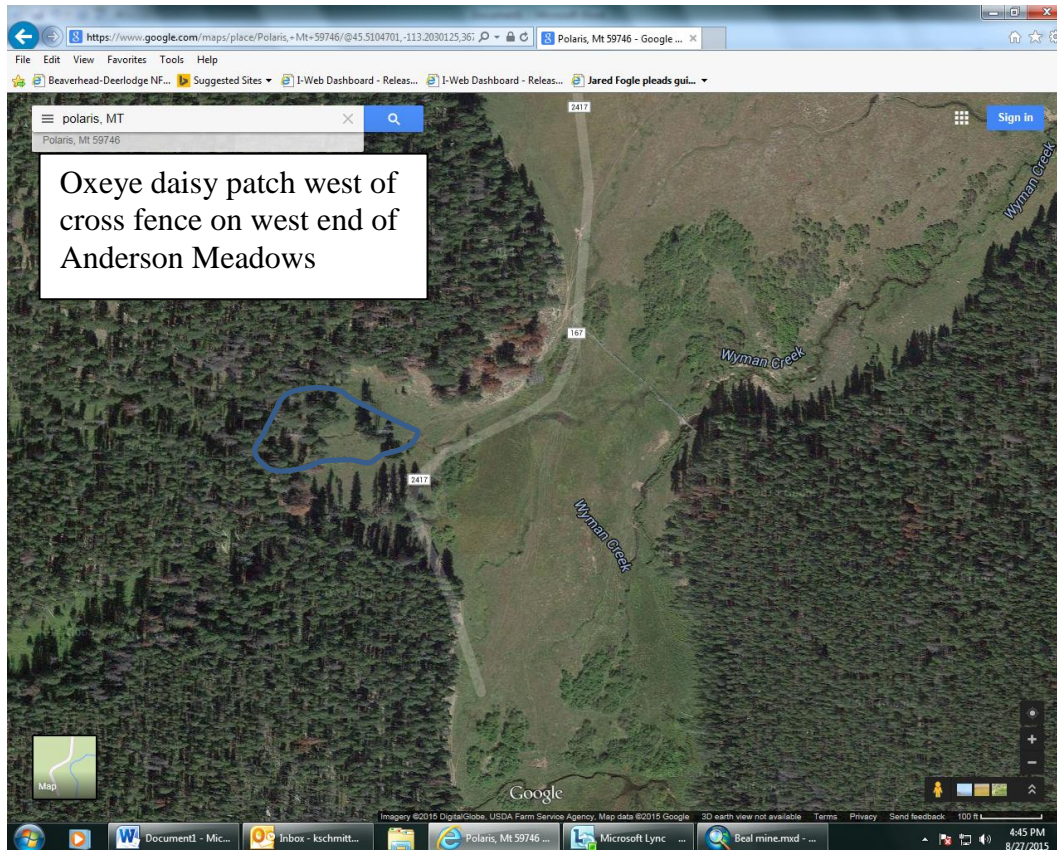
Oxeye Daisy

The first patch of oxeye daisy encountered on the trail is approximately 1 mile from the Wyman Creek Trailhead (see map for location). This infestation was treated on 8/23/15, and estimated to be about 20 scattered plants. Most plants had gone to seed at the time of treatment.

Photos of oxeye daisy:



The furthest-most and largest patch of oxeye daisy patch is 4.2 miles from the Wyman Creek trailhead (see map and figure below for location). The patch is estimated at one acre and is directly above trail 167 in the bottleneck above the old jack fence in Upper Anderson. Most of this patch was also treated on 8/23/15 with an ATV sprayer. Plants were past peak bloom and some had gone to seed. A good crop of rosettes were present. Potential for increased spread is high.



Potential for weed spread is moderate for the Anderson Meadows trail and south side of the fire. Parts of the trail/fire line also passed through the larger patch of oxeye daisy on the west end of Anderson Meadows. Potential for spread of weeds along the UTV trail fire line and into the fire perimeter are moderate up to Bear Lake.

Meadow habitats that could be susceptible to oxeye daisy invasion



One small patch of Canada thistle was found on the Odell trail. Otherwise, the north containment line of the fire appears to be clean.

Values at Risk:

The risk matrix below was used to evaluate the Risk Level for each value identified during Assessment (Exhibit 2 of Interim Directive No.: 2520-2010-1). Proposed treatments and their associated risk levels are discussed below in the following categories: Life, Property, and Natural Resources.

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

Human Life and Safety: Trails

The monetary costs associated with not completing the proposed work is difficult to estimate based on the range of probabilities for runoff events over the next couple of years, when significant effects are anticipated. The ecological effects are easier to account for given the existing condition of the sites in question.

The use of a USFS trail crew along with a USFS saw crew for a week would allow the Forest Service to complete the needed treatments necessary to reduce the risk to human safety. This is a low cost benefit for the potential liability of doing nothing.

Risk Assessment – Threats to trail users from hazard trees and/or falling rocks

Probability of Damage or Loss: Very Likely

Magnitude of Consequence: Moderate – personal injury, moderate property damage

Risk Level: Very High

Natural Resources: Soil Productivity, Water Quality, and TES Aquatic Species and Habitat

Areas burned at high and moderate severity are at elevated risk of soil erosion. Soils in moderate and high severity are hydrophobic. Accelerated erosion and sediment delivery are very likely to occur, but will decrease as vegetation becomes established. Needle cast in low burn severity areas will reduce potential erosion and sediment delivery.

Risk Assessment – Threats to soil productivity, watershed function, and fisheries

Probability of Damage or Loss: Likely – These watersheds naturally move high sediment loads; increased bare ground and hydrophobic soils will likely result in higher sediment loads.

Magnitude of Consequence: Moderate – systems naturally move high sediment loads; most major streams in the fire area have conservation populations of Westslope Cutthroat a USFS sensitive species. These small isolated populations are especially sensitive to potential fire effects. Trail work proposed will reduce sediment introduction into stream courses.

Risk Level: Moderate – Although limited in extent, there is enough moderate and high burn severity acreage in close proximity to Rabbia Creek for increased sediment to be delivered and because it is a small stream sediment transport is limited.

Natural Resources: Native Plant communities

The area of the fire is relatively pristine and noxious weed free. There are known infestations of Oxeye Daisy and other weeds within and adjacent to burned areas. Noxious weed infestations of spotted knapweed (*Centaurea stoebe*), musk thistle (*Carduus nutans*), and Canada thistle (*Cirsium arvense*), bull thistle (*Cirsium vulgare*), and oxeye daisy (*Leucanthemum vulgare*) are known along the access routes into the area. Also, many resources assigned to the fire originated from major noxious weed epicenters. A weed wash station was implemented early on the incident but the potential for weed seed introduction was still present.

Risk Assessment – Threats to native plant communities due to the establishment or spread of noxious weeds.

Probability of Damage or Loss: Very Likely - Based on moderate and high burn severity and proximity to known weed infestations.

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

Risk Level: Very High – Primary risk comes from the existing infestations within and adjacent to burned area along with introduction of noxious weed seed from fire fighting resources. Invasive species detection surveys and treatment within and adjacent to the burned area is warranted.

B. Emergency Treatment Objectives:

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

- Minimize potential effects of post-fire conditions on native plant communities by assessing and controlling noxious weeds.
- Minimize effects to trail infrastructure and reduce erosion from trail network on Rabbia Creek.
- Install warning sign at appropriate locations to warn forest visitors of post-fire hazards. Signs will be placed at the trailheads for Wyman Creek and Odell Lake (FS trails 2167, 2758)

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

Land 90 % Channel 50 % Roads/Trails 90 % Protection/Safety 75 %

D. Probability of Treatment Success

	Years after Treatment		
	1	3	5
Weeds	90	80	70
Trails	90	85	80
Protection/Safety	75	75	75

E. Cost of No-Action (Including Loss): \$300,000

F. Cost of Selected Alternative (Including Loss): There remains a 25% chance that the proposed treatments for this initial work may not succeed. Total cost of the action alternative (\$42,802) plus this 25% chance of failure is \$53,502.

G. Skills Represented on Burned-Area Survey Team:

☒ Hydrology ☒ Soils ☒ Geology ☒ Range
☐ Forestry ☐ Wildlife ☐ Fire Mgmt. ☒ Engineering
☐ Recreation ☐ Ecology ☒ Botany/Weeds ☐ Archaeology
☐ Fisheries ☐ Research ☐ Landscape Arch ☒ GIS

Name	Function	Unit
Kevin Weiner	Team Leader, Hydrology, GIS	Beaverhead-Deerlodge NF
Pam Fletcher	Soils and Geology	
Cliff Stout	Engineering	
Bob Hutton	Range, Recreation, and Weeds	

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H. Treatment Narrative:

See map on next page for locations of proposed treatments. The proposed treatments on National Forest System lands can help to reduce the impacts of the fire, but treatments will not completely mitigate the effects of the fire. The treatments listed below are those that are considered to be the most effective on National Forest System lands given the local setting including topography and access. The attached Excel worksheet summarizes the funding request.

Protection/Safety Treatments:

- Install sign warning forest users of hazards associated with the fire (rolling rocks, falling trees).

Land Treatments:

- Spray noxious weeds on 50 acres.
- Assess noxious weed spread on approximately 500 acres.

Trail Treatments:

- Trails within the Fire perimeter³:
 - Install 2 armored fords (trail 2174)
 - Clear Hazard trees where conducting trail work on trail 2174
 - Install 12 drain dips (trail 2174)
 - Install 6 drain dips (trail 3205)
 - Clear Hazard trees on a portion of trail 3205 where doing waterbar work

³ All trail work will be completed FS trail crews with onsite materials.

I. Monitoring Narrative:

Effectiveness of weed treatments will be monitored through visual observation. Continual assessment of weed establishment and spread will occur this fall and in early next spring.

Monitoring of the proposed trail work will be completed after large storm events to monitor the success of the treatments.

PART VII - APPROVALS

1. _____ 10/27/2015
Forest Supervisor Date

2. _____ 10/XX/2015
Regional Forester Date

Bear Lake Fire
BAER Work Proposed

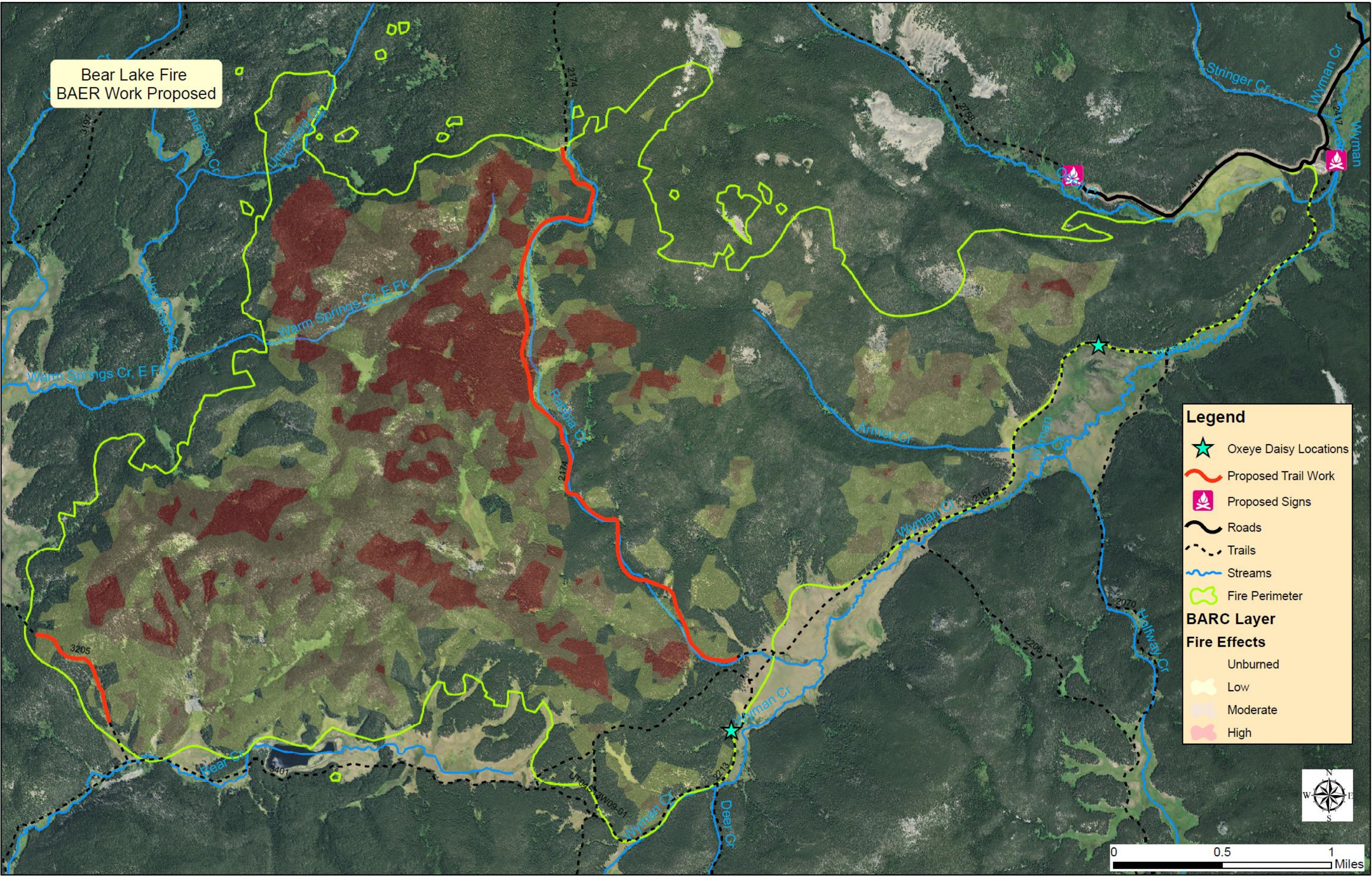
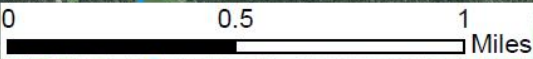
Legend

- ★ Oxeye Daisy Locations
- Proposed Trail Work
- Proposed Signs
- Roads
- Trails
- Streams
- Fire Perimeter

BARC Layer

Fire Effects

- Unburned
- Low
- Moderate
- High



			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											
Weed Treatment	acres	270	50	\$13,500	\$0			\$0		\$0	\$0
Weed Assessment	acres	7	500	\$3,500	\$0			\$0		\$0	\$0
Subtotal Land Treatments				\$17,000	\$0			\$0		\$0	\$0
B. Trail Hazard Trees											
4 GS-5 (Fire--swampers)	days	260	5	\$1,300	\$0			\$0		\$0	\$0
4 GS-7 (Fire--sawyers)	days	500	5	\$2,500	\$0			\$0		\$0	\$0
Insert new items above this line!				\$0	\$0			\$0		\$0	\$0
Subtotal Channel Treat.				\$3,800	\$0			\$0		\$0	\$0
C. Trails and Access											
MCC Crew for trail work	hitch	9000	1	\$9,000	\$0						
1 GS-9 (Engineering)	days	300	5	\$1,500	\$0			\$0		\$0	\$0
Pack string, packer, logistics for packing in crews	days	1,000	4	\$4,000							
Insert new items above this line!				\$0	\$0			\$0		\$0	\$0
Subtotal Roads and Trails, includes 35%Overhead--includes survey and design, contracting, mobilization and BMP expense during construction (dewatering, sediment abatement plan).	total	1.35		\$19,575							
					\$0			\$0		\$0	\$0
D. Protection/Safety											
Post-fire Hazard Signs	each	888.67	2	\$1,777							
					\$0			\$0		\$0	\$0
Insert new items above this line!				\$0	\$0			\$0		\$0	\$0
Subtotal Structures				\$1,777	\$0			\$0		\$0	\$0
E. BAER Evaluation											
Team Evaluation	days	325	5		\$1,625						
				---	\$0						
Insert new items above this line!				---	\$0			\$0		\$0	\$0
Subtotal Evaluation				\$0	\$1,625			\$0		\$0	\$0
F. Monitoring											
Monitoring of trail work --Hydrologist time	Days	325	2	\$650							
Insert new items above this line!				---	\$0			\$0		\$0	\$0
Subtotal Monitoring				\$650	\$1,625			\$0		\$0	\$0
G. Totals											
				\$42,802	\$1,625			\$0		\$0	\$0