

Date of Report: 9/07/2021

ALDER CREEK COMPLEX BURNED-AREA REPORT



PART I - TYPE OF REQUEST

A. Type of Report

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

B. Type of Action

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

PART II - BURNED-AREA DESCRIPTION**A. Fire Name: Alder Creek Fire, Christiansen Creek Fire****B. Fire Number: MT-BDF-006269, MT-BDF-006298****C. State: Montana****D. County: Beaverhead****E. Region: R1****F. Forest: Beaverhead Deerlodge****G. District: Wisdom****H. Fire Incident Job Code: P1N5G3****I. Date Fire Started: July 8th and July 16th, 2021****J. Date Fire Contained: October 31st, 2020 (estimated)****K. Suppression Cost: \$5,055,000****L. Fire Suppression Damages Repaired* with Suppression Funds (estimates):**

1. Fireline (miles): 11.8 miles of dozer line, 1.3 miles of hand line
2. Other (identify): 4.5 miles of fuel breaks, 5.8 miles of road access or improvements, 6.4 miles of road modification as line

** Not yet repaired because suppression activities are still occurring***M. Watershed Numbers:***Table 1: Acres Burned by Watershed*

HUC #	Watershed Name	Total Acres	Acres Burned	% of Watershed Burned
100200040806	Alder Creek	13,640	5,561	41%
100200040807	Big Hole River-Dickie Bridge	16,652	1,937	12%
100200040803	Big Hole River-Fishtrap	35,317	4,576	13%
100200040808	Big Hole River-Meadow Creek	23,816	4,518	19%
100200040805	Bryant Creek	12,098	1,578	13%
100200040909	Lower Wise River	40,691	773	2%
100200040908	Middle Wise River	20,328	953	5%
100200040606	Squaw Creek	13,420	2,741	20%

N. Total Acres Burned*: *Interim, based on fire progress on August 13th**Table 2: Total Acres Burned by Ownership*

OWNERSHIP	ACRES
NFS	20,906
STATE	42
BLM	1426
PRIVATE	262
TOTAL	22,636

- O. Vegetation Types:** Vegetation varies from open sagebrush parks with Idaho Fescue and Douglas-fir/Idaho Fescue habitat types in the lower elevations to wetter lodgepole pine and subalpine-fir stands in higher elevations. Wet meadows with willow and riparian sedge plant communities can be found in drainages.
- P. Dominant Soils:** Soils in the fire area are very deep cobbly and stony loams and very gravelly and stony sandy loams (see Table 3 below for a summary of the most common landtypes).

Table 3. Most common soil map units found in the Alder Complex fire area, with associated landforms, geology, and common soil series.

Soil Map Unit*	Landform	Geology	Common Soil Series	Acres
527E, P, S; 537E, P, S, X; 547S, Sr	Gentle, Moderate and Steep Mountain Slopes	Quartzite	Garlet , Elve , Libeg	4,345
528E, S; 538E, P, S; 548E, P, S, Sr	Gentle, Moderate and Steep Mountain Slopes	Granitics	Como , Worock , Bearmouth , Sebud	11,025
227Sa, Sr	Glacial landforms— primarily troughwalls, with minor amounts of trough bottoms and cirque basins	Predominantly granitics with a minor component of quartzite	Garlet , Worock	3,382
218Sr, Vr			Comad , Como	
228Sr, Sra			Como , Worock	
258Sa			Upsata	

*Letters at the end of each soil map unit denote different vegetation.

- Q. Geologic Types:** Cretaceous, late Cretaceous and Tertiary Granitic rocks (granodiorite, tonalite, quartz diorite, biotite and gneiss) predominate in the fire area, with lesser amounts of middle Proterozoic quartzite and siltite and minor amounts of Pleistocene glacial till ([Ruppel et al. 1993](#)). Moderate and steep stream-dissected mountain slopes, with a small component of glacial landforms including valley trough walls and cirque basins comprise the majority of landforms found in the fire area (see Table 3, above).

R. Miles of Stream Channels by Order or Class:

Table 4: Miles of Stream Channels by Order or Class

STREAM TYPE	MILES OF STREAM
PERENNIAL	22
INTERMITTENT	57

S. Transportation System:

Trails: National Forest (miles): 21.0

Roads: National Forest (miles): 24.5

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

Soil Burn Severity	NFS	BLM	Private	State	Total	% within the Fire Perimeter
Unburned	6,458	406	51	16	6,931	31%
Low	7,406	765	137	23	8,331	37%
Moderate	4,950	231	72	3	5,256	23%
High	2,093	24	2	0	2,119	9%
Total	20,907	1,426	262	42	22,637	

B. Water-Repellent Soil (acres): Approximately 4,000 acres, hydrophobicity was common, but not universal, in high and moderate burn severity soils located in forested areas.

C. Soil Erosion Hazard Rating: Erosion risk for each soil map unit was completed for the Beaverhead Soil Survey area in 2011. These risk ratings are similar to the ones generated by NRCS but are modified to consider landform (see Ruppert and Fletcher, 2011). The majority of the fire area is considered to have high erosion risk with another 18.4% having high-moderate erosion risk (Table 6). Under normal conditions forest and grassland communities have low erosion risk due to intact vegetation and forest floor ground cover. However, these erosion rating consider when the soil is disturbed and bared as in this fire situation. Note that acres may not match other totals, because only Forest Service ownership was considered. Also some map units (a small acreage) were county soil survey units, and risk ratings were not developed for these.

Table 6. Erosion risk of soils in the Alder Complex.

Erosion Risk	Acres	Percent
Slight	546	2.7
Moderate-Slight	2,275	11.4
Moderate	3,046	15.3
High-Moderate	3,671	18.4
High	10,385	52.1

D. Erosion Potential: [WEPPcloud -- Disturbed](#) was run for both unburned and burned scenarios as described in the soils report. Tables 7a and 7b show the results, both per unit area of watershed and also at the outlet of the watershed. Toomey Creek watershed was modeled for the western portion of the fire complex. Meadow Creek watershed, below the convergence with Harriet Lou watershed, was used for the eastern portion of the fire complex. These watersheds represent the most severe fire conditions. Total hillslope loss at the outlets are predicted to increase by 4 times for the Toomey watershed and 4.6 times for the Meadow Creek watershed, which is significant.

Table 7a. WEPP PeP modeled erosion for the Toomey Creek watershed on the Christiansen (west end) of the fire complex. Unburned and burned results are included.

	<u>Unburned model results</u> per unit area of watershed	<u>Burned model results</u> per unit area of watershed	<u>Unburned model results</u> from outlet	<u>Burned model results</u> from outlet
Precipitation	19.5 in/yr	19.1 in/yr	440,000,000 ft ³ /yr	430,000,000 ft ³ /yr
Stream discharge	3.41 in/yr	4.16 in/yr	78,000,000 ft ³ /yr	95,000,000 ft ³ /yr
Total hillslope loss	7.4 lb/acre/yr	29 lb/acre/yr	23 ton/yr	91 ton/yr
Total channel soil loss	17 lb/acre/yr	26 lb/acre/yr	53 ton/yr	81 ton/yr
Sediment discharge	22 lb/acre/yr	45 lb/acre/yr	68 ton/yr	140 ton/yr
Sediment delivery ratio for watershed	--	--	0.89	0.827

Table 7b. WEPP PeP modeled erosion for the Meadow Creek watershed (including Harriet Lou watershed) on the Alder (east end) of the fire complex. Unburned and burned results are included.

	<u>Unburned model results</u> per unit area of watershed	<u>Burned model results</u> per unit area of watershed	<u>Unburned model results</u> from outlet	<u>Burned model results</u> from outlet
Precipitation	21.4 in/yr	21.2 in/yr	630,000,000 ft ³ /yr	620,000,000 ft ³ /yr
Stream discharge	2.86 in/yr	3.65 in/yr	84,000,000 ft ³ /yr	110,000,000 ft ³ /yr
Total hillslope loss	21 lb/acre/yr	96 lb/acre/yr	84 ton/yr	390 ton/yr
Total channel soil loss	34 lb/acre/yr	46 lb/acre/yr	140 ton/yr	180 ton/yr
Sediment discharge	54 lb/acre/yr	120 lb/acre/yr	220 ton/yr	490 ton/yr
Sediment delivery ratio for watershed	--	--	0.985	0.86

E. Sediment Potential: Meadow Creek had 8100 acres contributing to outlet and Toomey Creek had 6300 acres. Meadow Creek had 2800 acres of high severity where Toomey only had 1500. An increase from 68 tons per year to 140 tons per year for the outlet of Toomey Creek and an increase from 220 tons per year to 490 tons per year for Meadow Creek is modeled. This increase accounts for the increases from hillslope and channel erosion that occurs where watersheds have the majority of area impacted by moderate or severity wildfire. The model results appear to be consistent across the fire with more than double exiting sediment possible than prefire conditions. This volume of sediment can impact road and trail drainage.

F. Estimated Vegetative Recovery Period (years): 1-3 years grass and forbs, 10-15 years shrubs, 20-50 years conifers

G. Estimated Hydrologic Response (brief description): Based on the modeling detailed in Table 7 hydrologic response in the Toomey and Meadow Creek drainages would have a low probability of debris flows but likely additional sediment and ash flows. Structures that were identified to be undersized currently will have a high threat for overtopping from post fire flows based on modeled results. Ash plumes have been observed in various locations although no failures have occurred.

Sheet flow from the adjacent hillsides under 40% are unlikely but erosion on steeper slopes with moderate to high soil burn severity effects is expected and could create hazards where those locations are in close proximity to roads and trails. The erosion potential will steadily decrease over time, mostly decreasing with the first 3 years. Debris flow and rock fall could occur in this period. The granitic soils in particular as portrayed in the Erosion Hazard section pose higher inherent erodibility where soils gruss and the fire consumed the forest cover.

PART V - SUMMARY OF ANALYSIS

Introduction/Background

The Christiansen and Alder Creek fires known as the Alder Creek complex are located in the Northwest corner or the West Pioneers Southwest of the town of Wise River. Elevations range from 6,000 feet on the eastern edge of the fire near Wise River, and up to 9,000 feet near Foolhen Mountain. Fire severity (heat intensity, duration and loss of vegetation) ranged from low to high depending on terrain, ground cover, weather and suppression activities. Post fire severity conditions resulting from this fire have the potential to directly and indirectly impact the natural and cultural landscape, road infrastructure, potential for weed infestations, trail network, and stream courses within the fire perimeter. These resource impacts will be evaluated based on the critical value matrix outlined in Table 8.

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

Table 8: 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):

- a. Within the Alder Creek complex fire, public safety is at risk from fire related effects including falling trees and hazardous terrain.

There are a limited number of access points via road and trail based on the size of this fire area. In general this area is fairly remote and the majority of use occurs during the hunting season. All major access points to the fire area are prime location to warn the public about the danger that may be present associated with fire related dangers that include **Very High** risk to public safety. Trail warning signs will be important shortly after this area opens up and the public use increases though the fall hunting season and winter recreation. Though not a BAER critical value, numerous trail marker signs were burned up and thus public navigation is impacted.

- 2. Property (P):** Within the Alder Creek complex fire, road and trail infrastructure was impacted by fire related effects will continue to effect road and trail infrastructure putting the public health and safety at risk.

There are more than 24 miles of roads within the fire perimeter (August 13th) that are normally open to the public and have areas of measurable burn effects. At a minimum, general road maintenance will be critical to address potential fire effects including opening up ditches and catch basins to allow full efficiency of our drainage network. Based on the modeling completed in Table 7 we could expect up to twice as much sediment mobilization that will create local road failures and prompt road infrastructure upgrades. The probability of loss is likely at least 10 miles of road with major consequences expected

from eroded road prism. Thus, fire condition has a **very high** risk for road loss. Road treatments are recommended.

A similar situation exists for the 21 miles of trails within the fire perimeter (August 13th) that have potential measurable burn effects from slopes burned with moderate and high burn severity that could produce erosive runoff. These trails have high value given year-round access with sections of groomed snowmobile trails and popular hunting trails. There are numerous hazards to the trail infrastructure require drainage be increased to accommodate the post fire runoff. The runoff is likely and would create a high magnitude of consequence if these trail prisms were lost; thus the risk is **very high**. Trail drainage treatments are recommended.

- 3. Natural Resources (NR):** Within the Alder Creek Complex fire, the probability for noxious weed infestations has increased with significant disturbance adjacent to existing weed populations from fire suppression activities and burned conditions.

With 11.8 miles of dozer line, 1.3 miles of hand line, 4.5 miles of fuel breaks, 5.8 miles of road access or improvements, 6.4 miles of road modification as line, disturbances were common throughout the fire area due to the close proximity to the town of Wise River and numerous cabins off of the highway. A robust weed treatment plan will be critical to ensure invasive plants do spread further into these native forested and grassland conditions. Given the array of disturbance, the potential threat of spread into native communities likely with a major consequence depending on the vegetation community and site. At most this potential threat poses a **very high** risk to lead to major changes in vegetation communities from fire and suppression effects.

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

Land: 75%

Channel: 75%

Roads/Trails: 75%

Protection/Safety: 75%

D. Probability of Treatment Success

Table 9: Probability of Treatment Success

	1 year after treatment	3 years after treatment	5 years after treatment
Land	80%	65%	50%
Channel	85%	85%	85%
Roads/Trails	75%	50%	25%
Protection/Safety	75%	70%	60%

E. Cost of No-Action (Including Loss): \$5,000,000, increased probability of stranding the public in remote location with no outlets. Resource damage from increased noxious weed infestations in disturbed areas.

F. Cost of Selected Alternative (Including Loss):

G. Skills Represented on Burned-Area Survey Team:

- ☒ Soils ☒ Hydrology ☒ Engineering ☒ GIS ☒ Archaeology
☒ Weeds ☒ Recreation ☒ Fisheries ☐ Wildlife
☐ Other:

Team Leader: Kevin Weininger

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Forest BAER Coordinator: Vince Archer

Email: vincent.archer@usda.gov

Phone(s): 559-920-6598

Team Members: *Table 10: BAER Team Members by Skill*

Skill	Team Member Name
<i>Team Lead(s)</i>	Kevin Weiner
<i>Soils</i>	Pam Fletcher
<i>Hydrology</i>	Kevin Weiner
<i>Engineering</i>	Cliff Stout (oversight)
<i>GIS</i>	Kevin Weiner
<i>Archaeology</i>	Mike Ryan
<i>Weeds</i>	Katie Bonogofski
<i>Recreation</i>	Roger Anderson
<i>Botany</i>	Jessie Salix

H. Treatment Narrative:**Land Treatments:** NA**Channel Treatments:** NA**Roads and Trail Treatments:**

RT2 Storm Inspection and Response: Of the 24 miles of road within the fire perimeter, our initial evaluation would target 10 miles with storm patrol that have the most likely conditions to experience damage from spring runoff and summer thunderstorms. These roads could also experience damage from rainstorms this fall and thus response crucial to address immediate needs.

RT1a Road Drainage – Storm Proofing existing features: Of all the roads in the burned area the 925 and 7445 roads were the primary access roads in the fire area that had moderate to high severity fire effects on approximately 3 miles that would warrant storm proofing to address likely failures that could damage the roads. This initial estimate is likely a low estimate at this time but would provide the funding necessary to accomplish priority treatments this fall while equipment was available for fire suppression repairs and local road crews could prepare for spring runoff.

RT13 Trail Drainage/Tread Stabilization: Based on our initial evaluation approximately 10 miles would need structure protection and drainage improvements based on significant portion of the trail segments through moderate to high severity especially above trident meadows (see figure 1). The Bryant Creek drainage also has an important native fish population that could be negatively affected by sediment derived from trail erosion. These treatments will be a priority with hunting season coming up and a higher number of people on these trails after the area opens. Completing work this fall will greatly reduce potential impacts from spring runoff and summer thunderstorms.

Protection/Safety Treatments: There are a few access points into this project area; all are heavily used during hunting season and have areas where the public would encounter burned areas that are a threat to personal safety. Signs at entry points would be the most logical way to inform the public and provide details necessary to safely use the area.

I. Monitoring Narrative: This is an initial request with monitoring needs being identified following the full BAER team evaluation of the final fire area.

RT-6 Road Storm Patrol	Miles	1,000	10	\$10,000	\$0		\$0	\$0	\$10,000
Trail Drainage and protection	Miles	2,500	10	\$25,000					
Insert new items above this line!				\$0	\$0		\$0	\$0	\$0
Subtotal Road and Trails				\$50,000	\$0		\$0	\$0	\$25,000
D. Protection/Safety									
signs	each	100	5	\$500	\$0		\$0	\$0	\$500
				\$0	\$0		\$0	\$0	\$0
Insert new items above this line!				\$0	\$0		\$0	\$0	\$0
Subtotal Protection/Safety				\$500	\$0		\$0	\$0	\$500
E. BAER Evaluation									
Initial Assessment	Report			---	\$0		\$0	\$0	\$0
Team Assessment	days	\$2,500	0	\$0	\$0		\$0	\$0	\$0
Insert new items above this line!				---	\$0		\$0	\$0	\$0
Subtotal Evaluation				\$0	\$0		\$0	\$0	\$0
F. Monitoring									
					\$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									
Previously approved				\$50,500	\$0		\$0	\$0	\$25,500
Total for this request				\$50,500					

1. _____
Forest Supervisor Date

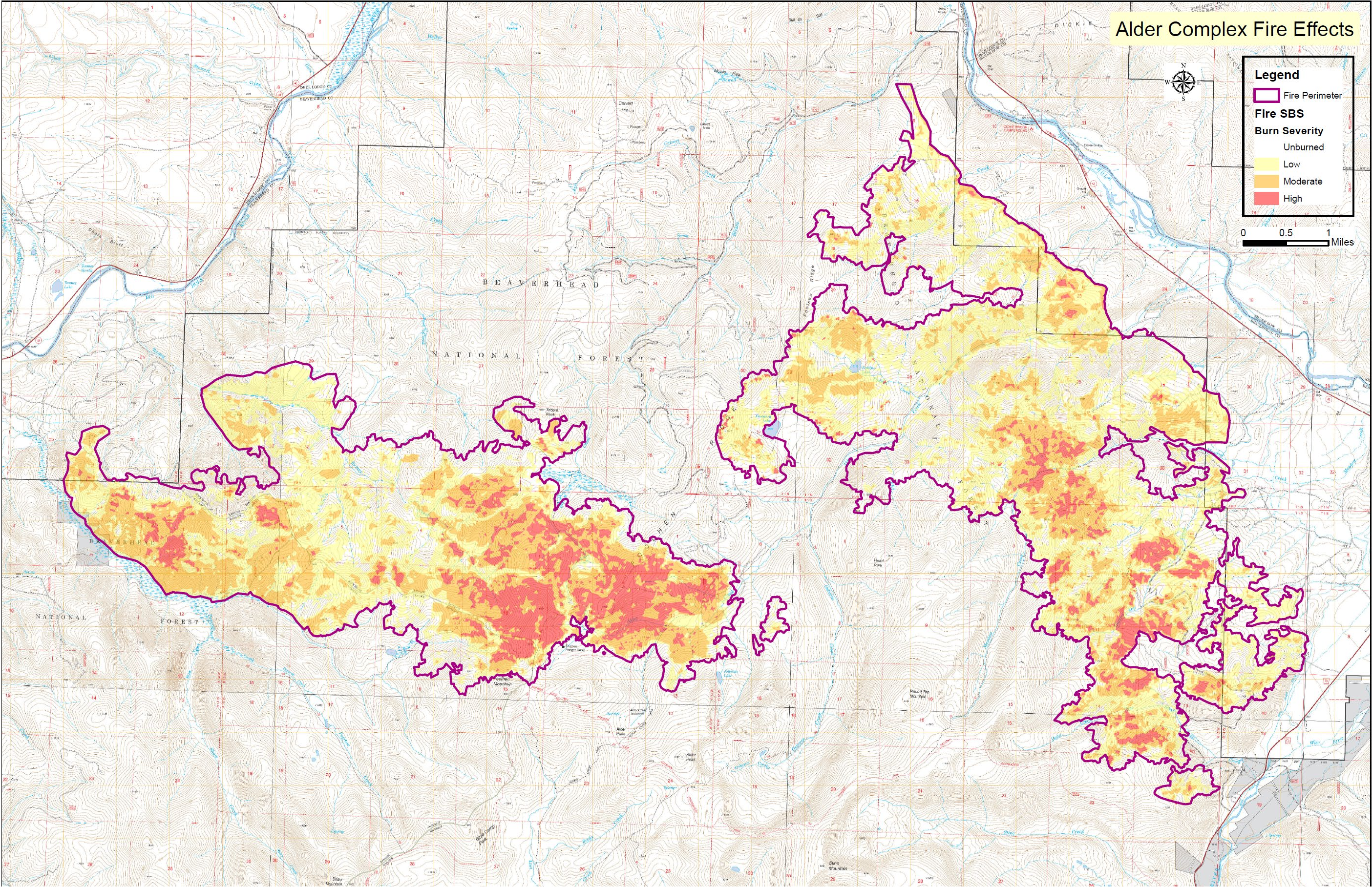


Figure 1. Soil Burn Severity for Alder Creek Complex