

**Date of Report: 9/28/2021**

**BURNED-AREA REPORT**  
**Mud Lick Fire 2021**  
**Salmon-Challis National Forest**



*Mud Lick Fire, July 18, 2021 (from inciweb.com)*

**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:** Mud Lick Fire**B. Fire Number:** ID-SCF-021130**C. State:** Idaho**D. County:** Lemhi**E. Region:** 4 (Intermountain)**F. Forest:** Salmon-Challis**G. District:** Salmon-Cobalt and North Fork**H. Fire Incident Job Code:****I. Date Fire Started:** July 8, 2021**J. Date Fire Contained:** *Estimated* Oct 19, 2021**K. Suppression Cost:** \$24,168,564

**L. Fire Suppression Damages Repaired with Suppression Funds (estimates):**1. **Fireline repaired (miles):** See table below2. **Other (identify):** See table below

FEATURE	REPAIR STATUS (length in miles) – as of 9/15/2021					TOTAL
	Completed - Inspected	In Progress	No Repair Needed	Repair Needed	Unknown	
Completed Dozer Line	4.9					4.9
Completed Fuel Break	8.5	0.8		12.4	2.3	24.0
Completed Hand Line	1.9				0.4	2.3
Completed Road as Line	57.1		0.03	18.4		75.5
Contained Line			26.5			26.5
<b>TOTAL</b>	<b>72.4</b>	<b>0.8</b>	<b>26.5</b>	<b>30.8</b>	<b>2.7</b>	<b>133.3</b>

**M. Watershed Numbers:**

Table 1: Acres Burned by Watershed

HUC #	Watershed Name	Total Acres	Acres Burned	% of Watershed Burned
170602031107	Big Deer Creek	29,377	18,447	63%
170602031201	Trail Creek-Panther Creek	23,294	1,922	8%
170602031106	Little Deer Creek-Panther Creek	19,148	285	1%
170602031203	Clear Creek	32,303	95	0.3%

**N. Total Acres Burned:**

Table 2: Total Acres Burned by Ownership

OWNERSHIP	ACRES
NFS	20,749
OTHER FEDERAL (LIST AGENCY AND ACRES)	0
STATE	0
PRIVATE	0
<b>TOTAL</b>	<b>20,749</b>

- O. **Vegetation Types:** Approximately 70% of the burned area consists of Forested cover types, with the dominant tree species being Douglas fir (42%) in the mid elevation areas and lodgepole pine (22%) in the high elevation areas. Bunchgrass/Fescue (19%) and Grass/Forb (9%) comprise 28% of the burned area. Much of the area classified as Bunchgrass/Fescue is steep hillside forest that was burned in the 2000 Clear Creek fire and has a heavy downed log component with little regeneration.

Cover Type	Acres	Percent
Douglas-fir	8625	42%
Lodgepole Pine	4581	22%
Bunchgrass/Fescue	4004	19%
Grass/Forb	1784	9%
Spruce/Fir	499	2%
Ponderosa Pine	288	1%
Conifer/Mountain Big Sage	267	1%
Mountain Big Sage	159	1%
Cottonwood	118	1%
Bunchgrass	108	1%
Fescue	100	0.5%
OTHER	216	1%
<b>TOTAL</b>	<b>20,749</b>	

- P. **Dominant Soils:** Soils in the burned area are described based on Landtypes shown in the table below. Most of the burned area consists of steep, dissected slopelands of the Big Deer Creek drainage. This relatively steep drainage drains into the deeply incised canyon of Panther Creek. Soils on this landscape range from shallow to deep, dependent on aspect and topography.

Landtype Description	Landtype	Acres	Percent
Strongly dissected mountain slopeland in quartzite, cool and moist sites	Q120c	3150	15.2%
Moderately dissected mountain slopelands in quartzite, cool and moist sites	Q120b	2198	10.6%
Steep timbered headlands, moist to wet sites	Q120d	2191	10.6%
Moderately dissected mountain slopelands in granite and border zone, cool and moist sites	G120b	1620	7.8%
Rocky, moderately dissected glacial troughlands in granite	G111bR	1300	6.3%
Rocky steep canyonlands, hot and dry sites	Q124R	1003	4.8%
Weakly dissected glacial troughlands in granite, moist sites	G111a	955	4.6%
Steep rocky glaciated headlands in granite	G111d	858	4.1%
Weakly dissected mountain slopeland in quartzite, cold and moist sites	Q120an	847	4.1%
Strongly dissected mountain slopeland in quartzite, cold-moist sites	Q120cn	832	4.0%
Cryic ridgelands in quartzite, moist sites	Q109	647	3.1%
Cryic headlands in quartzite, moist to wet sites	Q109d	598	2.9%
Moderately dissected mountain slopelands in quartzite, cold and moist sites	Q120bn	564	2.7%
Strongly dissected mountain slopeland in quartzite, warm and dry sites	Q120cs-1	506	2.4%
Moderately dissected mountain slopelands in granite, cold and moist sites	G120bn	445	2.1%
Strongly dissected mountain slopelands in granite and border zone, warm and dry sites	G120cs-1	407	2.0%
Weakly dissected cryic mountain slopeland in quartzite, moist sites	Q109a	403	1.9%
Alluvial valley bottoms including alluvial fans, terraces, and floodplains	VB	401	1.9%
Weakly dissected mountain slopeland in quartzite, cool and moist sites	Q120a	391	1.9%
Rocky steep canyonlands in granite, hot and dry sites	G124R	346	1.7%
Steep rocky glaciated headlands in quartzite	Q111d	319	1.5%
Moderately dissected mountain slopeland in quartzite, warm and dry sites	Q120bs-1	299	1.4%
Strongly dissected mountain slopelands in granite and border zone, cool and moist sites	G120c	209	1.0%
OTHER LANDTYPES		258	1.2%
<b>TOTAL</b>		<b>20,749</b>	

- Q. **Geologic Types:** Geologic types in the burned area are defined by Landtype Geology:

Quartzite Landtypes	13,949 acres	67%
Granitic Landtypes	6399 acres	31%
Alluvial Landtypes	401 acres	2%

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

Table 3: Miles of Stream Channels by Order or Class

STREAM TYPE	MILES OF STREAM
PERENNIAL	32.9
INTERMITTENT/EPHEMERAL	33.8
OTHER (DEFINE)	0

S. **Transportation System:**

**Trails:** National Forest (miles): 21.2 miles\* Other (miles): 0 miles

\* All trails in the burned area are non-motorized.

**Roads:** National Forest (miles): 10.0 miles\* Other (miles): 0 miles

\* Includes 3.4 miles of closed roads used by the mines, and 6.6 miles of unauthorized roads.

No open roads are in the burned area.

### **PART III - WATERSHED CONDITION**

#### **A. Burn Severity (acres):**

BARC Model: The BAER Team used BARC (Burned Area Reflectance Classification) data derived from the Forest Service Remote Sensing Applications Center (RSAC) as a basis for analyzing burn intensity (vegetative scorch) and burn severity (fire impacts to the soil). BARC data were derived from a comparison of Landsat 8 OLI satellite imagery on 8/7/2021 with pre-fire Landsat 8 OLI satellite imagery from 6/29/2021. The original classification thresholds of the BARC model are as follows:

Original BARC thresholds: Unburned/Undetectable 0-73, Low 74-135, Moderate 136-206, High 207+

Burn Intensity: BARC data verification of burn intensity was conducted using photographs and observational data from a 8/17/2021 field visit by Salmon-Challis National Forest BAER Team personnel. It was determined that the original BARC data overestimated burn intensity. Several locations were identified where the original BARC data showed high intensity burn where observations indicated moderate intensity, and several locations where BARC data showed moderate intensity burn where observations indicated low intensity. The BARC data thresholds were adjusted to provide a more accurate representation of burn intensity.

The adjusted classification thresholds are as follows:

Adjusted BARC thresholds: Unburned/Undetectable 0-73, Low 74-150, Moderate 151-220, High 221+

Burn Severity: Limited field sampling of burn severity (soil burn severity testing) was conducted on 8/17/2021 to establish a relationship between burn intensity as shown in the adjusted BARC model and the effects of the fire on the soil (burn severity). Collection of soil burn severity data was limited as a result of safety concerns in moderate and high intensity burned areas during the day of the field visit (high winds). The BAER Team was able to make the assumptions shown below regarding burn severity based on field observations, and soil burn severity was determined to be equivalent to burn intensity using the adjusted BARC thresholds shown above.

- Because most of the burned area previously burned in the 2000 Clear Creek Fire, a heavy component of large downed trees exists in many portions of the burned area. High intensity burned areas tend to be located on steeper slopes that contain thick regrowth from the Clear Creek Fire as well as a heavy downed log component. In these areas, white-colored soils where downed logs were completely consumed are indicative of high soil burn severity. Areas of high burn intensity generally showed these characteristics, and the assumption was made that all high intensity areas burned at high severity.



- Many lower gradient slopes with thick regrowth from the 2000 Clear Creek Fire but a lesser component of downed logs tended to burn at moderate intensity, sometimes with pockets of high intensity where downed logs smoldered. The assumption is made that these moderate intensity burned areas burned at moderate soil burn severity.



- Low intensity burn occurred in areas of thick regrowth from the 2000 Clear Creek fire where the fire backed down the slope, as well as on most of the South-facing open ponderosa pine forests. Soil burn severity testing on 8/17/2021 confirmed that open ponderosa pine forests burned at low severity, with the bunchgrass root masses still intact and regrowth occurring just a few weeks after the fire.



- The adjusted BARC data showed a mixture of unburned, low intensity, and moderate intensity burn in riparian areas along Big Deer Creek. Grassy meadows in the valley floor that burned at moderate intensity show signs of low soil burn severity, with new growth occurring just weeks after the fire. With the assumption that severity is equivalent to intensity, the accuracy of the BARC severity mapping in these areas is mixed as a result of large pixel size, but suitable for this analysis.



Table 4: Burn Severity Acres by Ownership

Soil Burn Severity	NFS	Other Federal (List Agency)	State	Private	Total	% within the Fire Perimeter
Unburned	3,037	0	0	0	3,037	15%
Low	9,448	0	0	0	9,448	46%
Moderate	6,636	0	0	0	6,636	32%
High	1,628	0	0	0	1,628	8%
<b>Total</b>	<b>20,749</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>20,749</b>	

**C. Water-Repellent Soil (acres):** Approximately 1800 acres. Water repellent soils are likely present in areas of high burn severity, as well as some areas of moderate burn severity where heavy ground fuels caused extended periods of smoldering.

**D. Soil Erosion Hazard Rating:** Landtype Association Erosion Hazard Ratings for the burned area are shown in the table below:

LTA Erosion Hazard Rating	Acres	Percent
Low	2,049	10%
Moderate	11,982	58%
High	6,286	30%
Very High	432	2%
<b>TOTAL</b>	<b>20,749</b>	

**E. Erosion Potential:** Up to 1.53 tons/acre\*

\* Based on ERMiT modeling for high burn severity on representative slopes, at the 20% probability that the sediment yield will be exceeded.

**F. Sediment Potential:** Up to 725 cubic yards/square mile

**G. Estimated Vegetative Recovery Period (years):** 1-3 (graminoid), 2-5 (woody), 10-50 (conifers)



## H. Estimated Hydrologic Response (brief description):

The Mud Lick Fire burned almost entirely within the Big Deer Creek watershed. 63% of this watershed burned, with 5% of the watershed burning at high severity and 21% of the watershed burning at moderate severity. The uppermost headwaters of the watershed did not burn, but high severity burn is scattered along many of the mid and upper slopes throughout the watershed.

Post-fire flood events in the Big Deer Creek drainage are likely to occur. In addition to increased runoff, the potential for debris flows is high as a result of post-fire hydrophobic soils, steep topography in the watershed, and the typical late summer thunderstorm patterns that often track along the Salmon River Canyon and impact this area.

Most of the Big Deer Creek watershed burned in the 2000 Clear Creek Fire. Large, destructive post-fire debris flow events occurred in Clear Creek and Garden Creek drainages just to the north, but no debris flow event occurred in Big Deer Creek as a result of that fire. Evidence can be seen of debris flows on Big Deer Creek in geologic history, based on large boulders situated at the mouth of Big Deer Creek. However, debris fan development at the mouth of Big Deer Creek is minimal in the constricted canyon of Panther Creek, as the much larger Panther Creek is able to flush material downstream.

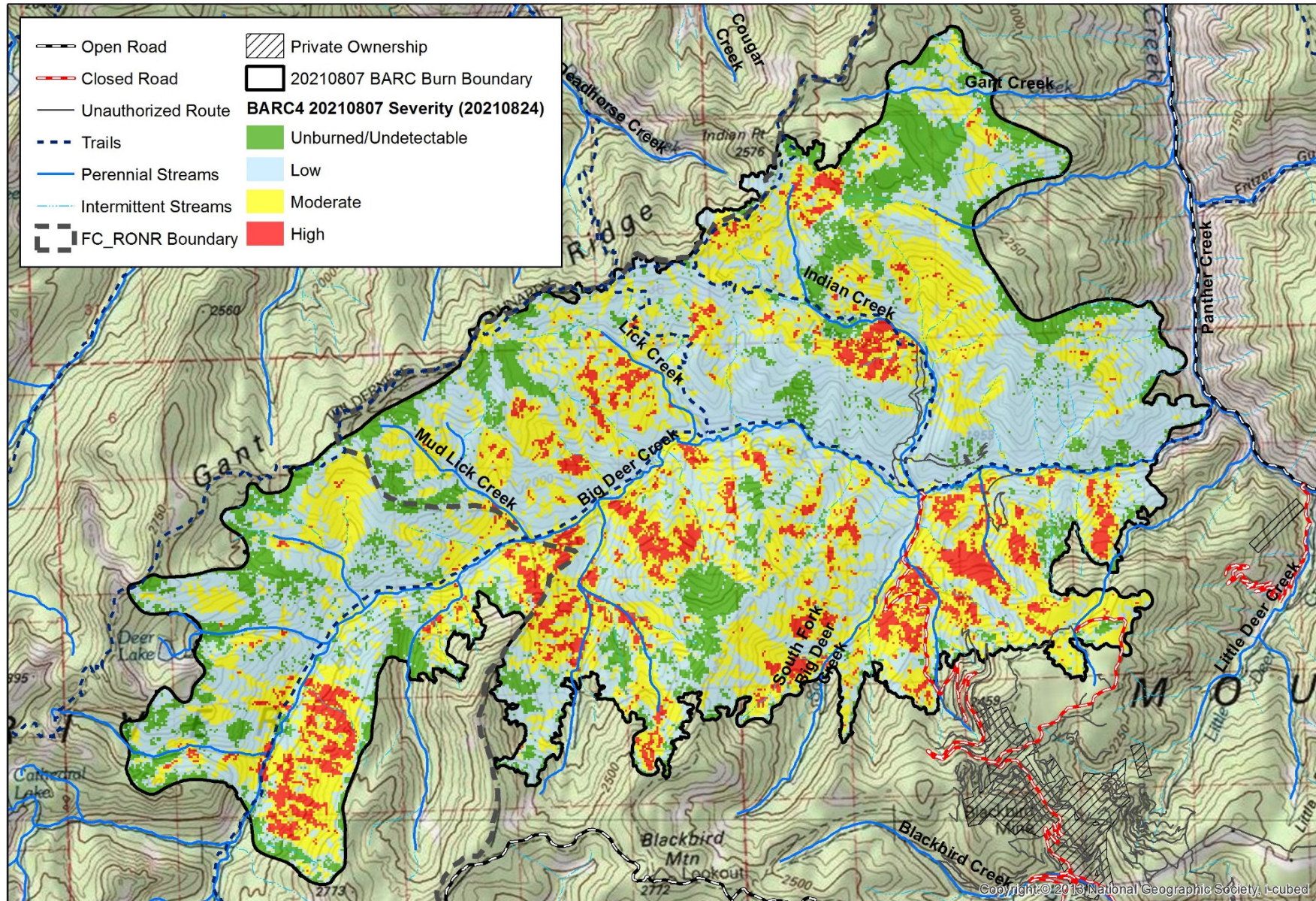
A high intensity storm event could produce a debris flow in Big Deer Creek or its tributaries. Big Deer Creek is a hanging valley. The lower mile cuts down steeply (average gradient >10%) to the lower elevation of Panther Creek, while the valley gradient in the middle portion of the valley is relatively low (1 to 2%). An unlikely scenario in which a debris flow reaches the mouth of Big Deer Creek at Panther Creek is a very large, high intensity thunderstorm that covers a large portion of the Big Deer Creek watershed. It is more likely that smaller, isolated thunderstorms would occur over portions of the watershed, potentially producing smaller debris flow events in the tributaries of Big Deer Creek where high severity burn occurred. These types of events are less likely to produce a debris flow that reaches Panther Creek because of the depositional environment and intact riparian vegetation in the low gradient valley in the middle portion of the Big Deer Creek Valley.

Any high flow events or debris flows within the Big Deer Creek drainage are likely to mobilize sediment and woody debris. Because of the large amount of woody debris already in the channel as a result of the 2000 Clear Creek Fire, a high potential exists for the formation of large debris jams. Debris jams in Big Deer Creek would have the potential to store sediment that could be easily mobilized during subsequent high flow events. It is likely that post-fire flood events in Big Deer Creek will increase delivery of sediment and woody debris to Panther Creek. While an extreme consequence of this could include temporary high turbidities and the loss of portion(s) of the Panther Creek Road, the delivery of sediment and woody debris to the channel of Panther Creek would ultimately provide the materials for improved aquatic habitat.



*Woody debris in Big Deer Creek, approx. ¼ mile upstream of mouth.*





### Burn Severity Map for the Mud Lick Fire, Salmon-Challis National Forest

Map created 8/25/2021 by the Salmon-Challis National Forest Mud Lick Fire BAER Team. BARC Data and Fire Perimeter from analysis of Landsat 8 OLI satellite data, by USDA Forest Service, Geospatial Technology and Applications Center, BAER Imagery Support Program. BARC data field verified 8/17/2021, and burn severity data adjusted to match field data/observations.



0 0.5 1 2 Miles



## **PART V - SUMMARY OF ANALYSIS**

### **Introduction/Background**

The Mud Lick Fire started on July 8, 2021 as a result of lightning. The fire is about 23 miles west of Salmon, Idaho in rugged backcountry terrain of the Salmon River Mountains. The majority of the fire burned in the Big Deer Creek watershed, a tributary of Panther Creek. The Big Deer Creek drainage is remote and undeveloped, containing a system of backcountry trails, but no open roads. The southern boundary of the fire burned adjacent to Blackbird Mountain, the Blackbird Mine (in reclamation status), and the Idaho Cobalt Mine (in development).

The fire burned for approximately one month under extremely dry conditions, before moisture returned to the area in late July/early August, moderating fire behavior. 87% of the burned area is within the burn scar of the 2000 Clear Creek Fire. 22% of the burned area is within the Frank Church River of No Return Wilderness at the head of Big Deer Creek. Most of the burned area that is not within the Clear Creek burn scar is within the Wilderness. Firefighters established control lines along Blackbird Mountain (South of the fire), the Panther Creek Road (West of the fire), and the Ridge Road (about 13 miles to the West of the fire).

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

*Table 5: Critical Value Matrix*

Probability of Damage or Loss	Magnitude of Consequences		
	Major	Moderate	Minor
	<b>RISK</b>		
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):**

**BAER Value:** Human life and safety on or in close proximity to burned NFS lands

**What is at Risk:** Human life and safety

**Probability:** Possible

**Consequences:** Major

**Risk:** High

**Comments:** Increased risk of hillslope erosion, rockfall, hazard trees, high flows, and debris flows will likely be present for 3 to 5 years following the fire. Relatively few people visit this area. Blackbird Mine personnel and Forest Service personnel access the southern portion of the burned area via the Bucktail Road, a closed Forest Service road that is utilized and maintained by the Blackbird Mine. The trail system is typically accessed from the eastern end by fording Panther Creek, which inhibits some foot access during spring and early summer, although stock can be used to access the trail even during period of higher flow. Alternate access is from the Frank Church River of No Return Wilderness on the western end, or from the trail system in Clear Creek and Gant Ridge to the North, which are all very remote areas. The greatest amount of use occurs along the Big Deer Creek Trail during hunting season in the Fall. While this trail does not generally pass through high severity burned areas, much of the trail is adjacent to Big Deer Creek, where high flows, debris blockages, and trail damage from post-fire runoff/erosion are potential risks. Increased amounts of deadfall along the trail system is likely to be a concern for at least 5 to 10 years, and potentially longer.



## 2. Property (P):

**BAER Value:** Buildings, water systems, utility systems, road and trail prisms, dams, wells, or other significant investments on or in close proximity to burned NFS lands

**What is at Risk:** Forest Trails

**Probability:** Possible

**Consequences:** Moderate

**Risk:** Intermediate

**Comments:** The most commonly used trail in the burned area is the Big Deer Creek Trail (#6029), which follows the length of Big Deer Creek. This trail is commonly used by hunters and horse packers during the fall hunting season. Other trails in the trail network within the burned area include the Indian Creek Trail (#6026), the Lick Creek Trail (#6010), and the Gant Ridge Trail (#6028), which are used to a lesser degree. A primitive hunting camp exists along the Big Deer Creek Trail at the mouth of Indian Creek. The Big Deer Creek Trail has a well defined tread as it crosses variable hillslopes adjacent to Big Deer Creek, passes through some floodplain areas, and occupies old bench-cut road beds in other areas. The trail condition is good, although drainage structures are not incorporated into the trail, and some sections of trail cross eroding slopes. Post-fire hillslope runoff is not likely to have a large effect on the Big Deer Creek Trail because most of the trail crosses through low severity burn on South-facing slopes of ponderosa pine, in which groundcover is likely to recover quickly. The greatest risk to this trail is from post-fire debris flow events in the Big Deer Creek drainage. The portions of this trail in the floodplain directly adjacent to Big Deer Creek would likely experience the greatest effects, but bank cutting could also induce erosion that could undermine portions of the trail that are on the slope adjacent to the channel. Portions of the trail that become blocked or damaged where the canyon is constricted may become impassible. The hunting camp at the mouth of Indian Creek is in a flat, grassy meadow and is at low risk. The Indian Creek, Lick Creek, and Gant Ridge Trails pass through mostly low and moderate severity burn, although a portion of the Indian Creek Trail passes through or adjacent to an area of high severity burn. Isolated portions of these trails may be at risk from increased post-fire hillslope runoff/erosion and/or debris flows. However, these trails receive less use and maintenance, with little in the way of drainage structures and deadfall being the major issue since the 2000 Clear Creek Fire. Increased deadfall as a result of the Mud Lick Fire is likely to be a concern for at least 5 to 10 years along this trail system, and potentially much longer. Increased deadfall has been a major issue impacting access to this area for the past 20 years following the 2000 Clear Creek Fire.



*Big Deer Creek Trail along Big Deer Creek*

**BAER Value:** Buildings, water systems, utility systems, road and trail prisms, dams, wells, or other significant investments on or in close proximity to burned NFS lands

**What is at Risk:** Roads within the burned area

**Probability:** Possible

**Consequences:** Major

**Risk:** High

**Comments:** The only roads that are located within the Mud Lick burned area are closed Forest Service Roads and Unauthorized routes. The Bucktail Road (FR61031) is a closed Forest Road that is primarily used and maintained by the Blackbird Mine and Idaho Cobalt Mine to access the pump-back station, outflow, and monitoring sites in the lower end of the South Fork Big Deer Creek drainage. Storm control structures in place along this road were damaged by the fire, and approximately 1 mile of this road is within or adjacent to high severity burn on a steep hillslope. This road may be at risk of erosion or loss as a result of post-fire runoff if the storm control structures are not maintained. The only other roads within the watershed are 6.6 miles of unauthorized routes. These “U-routes” are primarily old remnant mining roads, some of which are still being used. While some groundcover is established on these U-routes, heavy infestations of spotted knapweed are also present. Some of these U-routes impact natural hillslope drainage, but the risk of damage to these roads or resource damage resulting from these roads is minimal.

**BAER Value:** Buildings, water systems, utility systems, road and trail prisms, dams, wells, or other significant investments on or in close proximity to burned NFS lands

**What is at Risk:** Blackbird Mine and Idaho Cobalt Mine Infrastructure

**Probability:** Possible

**Consequences:** Major

**Risk:** High

The fire burned the lower portion of the Bucktail Creek drainage. The upper portion of this drainage upstream of the burned area includes mine waste rock, numerous roads, two dams, pumpback stations to return contaminated water to the water treatment plant, powerlines to the pumpback stations, and other associated mine infrastructure. The lower portion of this drainage, within the burned area, includes the Bucktail Road, the lower Bucktail Creek sediment dam, and the Bucktail diversion pipeline, which routes “clean” water from Bucktail Creek directly into Big Deer Creek (bypassing South Fork Big Deer Creek). A portion of the lower Bucktail Creek drainage burned at high severity, and the lower portion of Bucktail Creek is at risk of increased post-fire flood flows, increased sediment delivery, and possibly debris flows. While the fire did not increase the risk of contaminated water from the Blackbird Mine in the upper Bucktail drainage discharging into Big Deer Creek, the lower Bucktail Creek sediment dam and the Bucktail diversion pipeline could potentially experience failure in the event of a large flood or debris flow event. Continued access and power to the pumpback stations are vital to ensure continuous operation of the pumpback stations to avoid discharge of contaminated water into Big Deer Creek.

**BAER Value:** Buildings, water systems, utility systems, road and trail prisms, dams, wells, or other significant investments on or in close proximity to burned NFS lands

**What is at Risk:** Panther Creek Road

**Probability:** Possible

**Consequences:** Major

**Risk:** High

**Comments:** The Panther Creek Road (FR60055) is not within the burned area, but it is adjacent to the burned area at the mouth of Big Deer Creek. The risk of debris flows impacting this location is discussed above under Hydrologic Response. The Panther Creek Road at this location is in the highly confined Panther Creek canyon, with only the channel of Panther Creek separating it from the mouth of Big Deer Creek. The valley width at this location is approximately 100 to 120 feet, and the elevation of the Panther Creek Road is only about 5 feet above the bankfull elevation of Panther Creek. A 20 to 30-foot wide riparian area exists between Panther Creek and the Panther Creek Road. The gradient of Panther Creek just downstream of the mouth of Big Deer Creek is fairly low, providing a depositional environment. This geomorphic configuration presents a risk to the Panther

Creek Road if a post-fire debris flow in Big Deer Creek were to create a fan deposit of sediment, rocks, and/or logs in Panther Creek. Depending on the magnitude of such an event, this could result in erosion along the road embankment, inundation of the road, and/or burial of the road with the Panther Creek channel being pushed onto the location of the road. A temporary closure of the road at this location would impact access to the Forest on this main access road, but it would not prohibit ingress/egress because alternative access routes exist into the Panther Creek corridor. The degree of risk to roads or other Forest Service property along Panther Creek downstream of the mouth of Big Deer Creek resulting from a flood or debris flow event would decrease substantially with distance, as the Panther Creek is a much larger channel than Big Deer Creek (the approximate 100-year flow recurrence interval flow on Panther Creek is 2860 cfs, based on Streamstats modeling).



Left: Mouth of Big Deer Creek at Panther Creek. Right: Panther Creek Road across from mouth of Big Deer Creek.

### 3. Natural Resources (NR):

**BAER Value:** Soil productivity and hydrologic function on burned NFS lands

**What is at Risk:** Soil erosion and stream channel function

**Probability:** Possible

**Consequences:** Minor

**Risk:** Low

**Comments:** Increased soil erosion will likely occur in areas of high and moderate burn severity. Ground cover will likely recover quickly (1-3 years) in low and moderate severity burned area, and over a period of 3 to 5 years in high severity burned areas. Post-fire flooding and/or debris flow events are likely to occur to some degree. However, fire is a natural part of this landscape, and any hydrologic impacts resulting from this fire will not alter the overall natural balance between runoff and erosion in the Big Deer Creek watershed.

**BAER Value:** Critical habitat or suitable occupied habitat for federally listed threatened or endangered terrestrial, aquatic animal or plant species on or in close proximity to burned NFS lands

**What is at Risk:** Chinook, Steelhead, and Bull Trout Habitat

**Probability:** Possible

**Consequences:** Minor

**Risk:** Low

**Comments:** Because of steep gradients and a documented waterfall barrier in the lower portion, Big Deer Creek does not support anadromous fish populations. However, Chinook salmon and steelhead will utilize the lower reaches of Big Deer presumably for temperature and flow refugia. Bull trout have not been documented in Big Deer Creek, likely because of the barrier near the mouth. Chinook salmon, steelhead, and bull trout could be present downstream in Panther Creek depending on the time of year. The fire appeared to mimic natural fire patterns that would have historically occurred in this area and are critical to developing and maintaining quality fish habitat



and fish populations by introducing woody material and spawning gravel to the stream systems through increased erosion and debris flow events. If post-fire events occurred and resulted in flood or debris flow events, it is anticipated that those impacts would be short term and localized.

**BAER Value:** Native or naturalized communities on NFS lands where invasive species or noxious weeds are absent or present only in minor amounts

**What is at Risk:** Spread of invasive plant species

**Probability:** Likely

**Consequences:** Moderate

**Risk:** High

**Comments:** The Big Deer Creek drainage is of very high value for native plant community and big game habitat values. For example, one of the largest populations of Lemhi penstemon, a rare endemic plant species, occurs in Big Deer Creek. Climax plant communities dominated by late seral bunchgrasses that provide key big game winter range and crucial spring transitional range are distributed across thousands of acres in the drainage. Rocky Mountain elk, mule deer and bighorn sheep all occupy suitable habitats in Big Deer Creek, as may small numbers of mountain goats that inhabit lower Panther Creek. However, the burned area is susceptible to colonization by invasive species. Invasive plants have been inventoried and treated in the Big Deer Creek watershed, but not eradicated. The species known to be present in the area have the potential to disrupt native plant community reestablishment in areas otherwise uninfested by noxious weeds. Invasive plant species inventoried in the burned area currently include small, discrete populations of rush skeletonweed, sulphur cinquefoil, hoary alyssum, houndstongue, and Canada thistle, as well as larger infestations of spotted knapweed. Roads, trails, and backcountry use within the burned area increase the risk to susceptible areas, particularly in the first year following the fire, although wind is also a vector for the spread of species such as rush skeletonweed.

SCNF has invested resources into weed management in the Big Deer Creek drainage because of the values represented in the drainage, the backcountry and wilderness character, and because of the 2000 Clear Creek Fire. Work had progressed toward a mop-up phase of weed management in much of the drainage prior to the Mud Lick Fire, particularly on spotted knapweed infestations in the meadows at the mouth of Indian Creek. Weed treatments and recovery of native plant communities meant that viable weed seeds were buried too deep and/or becoming too old for viable germination. The priority is now early detection/rapid response of new invaders such as rush skeletonweed and sulfur cinquefoil. The fire has set plant community succession back to an earlier seral stage favored by invasive species and uncovered more deeply buried viable seed. Ultimately, the risk of weed spread is greatest under dry weather and/or erosive soil conditions.

Of particular note, invasive annual grasses (like cheatgrass) have not been inventoried in the Big Deer Creek drainage, though they are certainly present. Expansion of very small patches of cheatgrass into much larger patches post-fire is likely even under ideal conditions. Areas with open ponderosa and douglas fir are most susceptible, with risk being greatest if conditions remain drier than normal in the year after the fire.

#### 4. Cultural and Heritage Resources:

**BAER Value:** Cultural resources on NFS lands which are listed on or potentially eligible for the National Register of Historic Places

**What is at Risk:** Historic Sites

**Probability:** Unlikely

**Consequences:** Moderate

**Risk:** Low

**Comments:** Historic sites within and adjacent to the burned area are at low risk from post-fire erosion or flood events.

**B. Emergency Treatment Objectives:**

- Reduce the risk of loss of Forest road and trail infrastructure.
- Reduce the risk of new weed infestations in the burned area and promote the recovery of native plant populations.
- Decrease risk to public life and safety within the burned area.

**C. Probability of Completing Treatment Prior to Damaging Storm or Event:****Land:** 80%**Channel:** N/A – No BAER Treatments Proposed**Roads/Trails:** N/A – No BAER Treatments Proposed**Protection/Safety:** 80%**D. Probability of Treatment Success***Table 6: Probability of Treatment Success*

	<b>1 year after treatment</b>	<b>3 years after treatment</b>	<b>5 years after treatment</b>
<b>Land</b>	90%	80%	70%
<b>Channel</b>	N/A	N/A	N/A
<b>Roads/Trails</b>	N/A	N/A	N/A
<b>Protection/Safety</b>	75%	75%	75%

**E. Cost of No-Action (Including Loss):**

Native Plant Communities: The cost of no action is the estimated cost of treating weeds in the area of likely invasive plant expansion as a result of the fire if no immediate BAER treatments are implemented. Moderate and high severity burned areas are susceptible to invasive plant infestation over a period of up to 3 or more years while graminoid groundcover is being reestablished. Approximately 80 acres could potentially become infested during this time as a result of spread into burned areas, using an average of 20% annual spread rate. This rate could be higher given that rush skeletonweed is a wind-dispersed invader. Once established in these areas, multiple treatments would likely be required to eradicate these infestations. Using a treatment cost of \$370 per acre, the cost of no action would be approximately \$29,600 per treatment. The total cost of no action could be as high as \$90,000 or greater, assuming that multiple treatments would be needed at that point to achieve reestablishment of native vegetation. The probability of experiencing loss if no treatment occurs is 0.80.

**F. Cost of Selected Alternative (Including Loss):**

Native Plant Communities: The total cost of proposed treatments is \$20,350. The probability of experiencing loss if treatment occurs is 0.20. Implementing the proposed treatments would reduce the probability of experiencing loss by 0.60, and the expected benefit of treatment would be \$54,000. Treatment is justified.

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

- |  |  |   |   |   |
|--|--|---|---|---|
| <input checked="" type="checkbox"/> Soils    | <input checked="" type="checkbox"/> Hydrology  | <input checked="" type="checkbox"/> Engineering | <input checked="" type="checkbox"/> GIS | <input checked="" type="checkbox"/> Archaeology |
| <input checked="" type="checkbox"/> Weeds    | <input checked="" type="checkbox"/> Recreation | <input checked="" type="checkbox"/> Fisheries   | <input type="checkbox"/> Wildlife       |   |
| <input checked="" type="checkbox"/> Minerals |  |   |   |   |

**Team Leader:** David Deschaine**Email:** david.deschaine@usda.gov**Phone(s):** (208)756-5171**Forest BAER Coordinator:** David Deschaine**Email:** david.deschaine@usda.gov**Phone(s):** (208)756-5171

**Team Members:** *Table 7: BAER Team Members by Skill*

<b>Skill</b>	<b>Team Member Name</b>
<i>Team Lead(s)</i>	Dave Deschaine
<i>Soils</i>	Dave Deschaine
<i>Hydrology</i>	Bill MacFarlane, Dave Deschaine
<i>Engineering</i>	Pete Schuldt
<i>GIS</i>	Bill MacFarlane
<i>Archaeology</i>	Cammie Sayer
<i>Weeds</i>	Diane Schuldt
<i>Recreation</i>	Larry Vogel
<i>Fisheries</i>	Kelly Schade
<i>Minerals</i>	Glenwood Brittain

**H. Treatment Narrative:****Land Treatments:**

EDRR Weed Treatments - Conduct Early Detection Rapid Response (EDRR) management activities on invasive plant species within and adjacent to the burned area. Areas around known infestations along existing roads and trails will be examined for potential expansion into previously uninfested areas. EDRR activities will begin at known weed infestations and then radiate out from these epicenters to detect, map and treat new infestations. Chemical treatment will be the primary method used, and all herbicides proposed for use (see spec sheet in project file) are covered under the Salmon-Challis National Forest Invasive Plant Treatment Final Environmental Impact Statement (November 2015).

Invasive plant populations are known to occur along the Big Deer Creek Trail, The Indian Creek Trail, and the Buckhorn Road. While these routes are vectors for spread of invasive plants in the watershed, wind is also a primarily vector for the spread of rush skeletonweed. The SCNF has inventoried 44.3 acres of existing infestations of rush skeletonweed, sulphur cinquefoil, hoary alyssum, houndstongue, and Canada thistle. It is likely that some spread has occurred since the last inventory (2017), particularly with the spread of windborne seed that allows rush skeletonweed to colonize susceptible areas. With potential spread rates of 10 to 30% in the first year following the fire, a total of about 55 acres may need to be treated in the first year to prevent large scale spread in the Big Deer Creek watershed.

Access to this area is difficult because of steep topography and a lack of roads. The only reasonable access to this area for crews performing EDRR weed treatments is by stock (with packer support) along the Big Deer Creek trail system. Access is complicated by the large number of downed trees that continue to fall every year as a result of the 2000 Clear Creek Fire, as well as new areas of downfall from the Mud Lick Fire. It will be necessary to clear deadfall from trails to allow access for EDRR treatments, potentially taking up a significant portion of the total treatment time. A crosscut saw would have to be used to clear trees from trails in the Wilderness portion of the burned area.

EDRR weed treatments would occur during one 8-day hitch. The weed treatment crew would include 4 people (total personnel cost of \$10,863), field per diem (\$1124), vehicle costs (\$208), herbicides and adjuvants (\$744), and costs associated with packer support (\$7212). Costs are detailed in the spec sheet in the project file. The total cost per acre (for 55 acres of treatment) is estimated to be \$370 per acre. This cost is higher than typical weed treatment costs on the SCNF because of the difficult access requiring packer support, and trail clearing needed to allow access to the burned area.

Regular program funds (non-BAER) will be used for non-EDRR treatments of existing infestations of spotted knapweed along the Bucktail Road and the larger spotted knapweed infestations at the confluence of Big Deer and the South Fork of Big Deer. We are very much concerned about the ecological impacts of spotted knapweed post-fire. Efforts will be made in 2022 to knock back a fresh flush of sprouting seeds that will erupt from the seed bank during Fall 2021 and Spring 2022. Regular



program funds will also fund any additional invasive species inventory and control that will be required in subsequent years (after 2022), because the risk cannot be eliminated nor eradication achieved in a single year.

**Channel Treatments:**

No BAER Treatments proposed.

**Roads and Trail Treatments:**

Bucktail Road Storm-proofing – The SCNF is not requesting any BAER funding for treatments on the Bucktail Road (FR61031), as this road is a closed Forest Service road maintained by and primarily used by the Blackbird Mine and Idaho Cobalt Mine. However, the SCNF recommends that the Blackbird Mine and Idaho Cobalt Mine implement the following actions: 1) maintain, repair, and/or replace all existing stormwater controls/BMPs that were damaged during the fire prior to the winter season, 2) conduct regular maintenance along this road to address road drainage, particularly after storm events during the first year following the fire, 3) monitor the condition of the road and the effectiveness of the stormwater controls/BMPs, particularly during the first year following the fire, and 4) maintain proper function of the lower Bucktail sediment dam, particularly after storm events in the first year following the fire. The SCNF will work with the Idaho Cobalt Mine and Blackbird Mine to ensure that these actions are implemented.

Panther Creek Road – The SCNF is not proposing any BAER treatments to decrease the risk of damage to the Panther Creek Road as a result of potential debris flow deposition at the mouth of Big Deer Creek. Potential treatments to address this issue could include mulching the high severity burned areas in the watershed or preemptively relocating a portion of the Panther Creek Road. However, these would be very high cost treatments that may not substantially decrease the risk of loss and likely would not be cost effective. Armoring the existing road may provide protection to the road under certain conditions, but would not be beneficial if a large debris flow buried or inundated the road. Because it is not possible to predict the nature or magnitude of effects to the Panther Creek Road if a flood event in Big Deer Creek were to occur, no reasonable preemptive treatment scenario exists. This site will be monitored by road crew and other personnel so that actions can be taken immediately if a flood event results in imminent risks to the road.

**Protection/Safety Treatments:**

Hazard warning signs – One post-fire hazard warning sign was placed at the Big Deer Creek Trailhead in August 2021 to warn backcountry travelers of potential risks in the burned area. As this is the primary entrance/exit point into the watershed for the general public, no additional signs are proposed.

**I. Monitoring Narrative:**

Monitoring inherently occurs as a part of EDRR activities to prevent the spread of invasive plants into susceptible burned areas. No additional monitoring is proposed.

**PART VI – EMERGENCY STABILIZATION TREATMENTS AND SOURCE OF FUNDS**

Line Items	Units	Unit Cost	NFS Lands		Other \$	Other Lands				All Total \$
			# of Units	BAER \$		# of units	Fed \$	# of Units	Non Fed \$	
<b>A. Land Treatments</b>										
EDRR Weed Treatments	Acres	370	55	\$20,350	\$0		\$0		\$0	\$20,350
				\$0	\$0		\$0		\$0	\$0
<i>Insert new items above this line!</i>				\$0	\$0		\$0		\$0	\$0
<i>Subtotal Land Treatments</i>				\$20,350	\$0		\$0		\$0	\$20,350
<b>B. Channel Treatments</b>										
				\$0	\$0		\$0		\$0	\$0
<i>Insert new items above this line!</i>				\$0	\$0		\$0		\$0	\$0
<i>Subtotal Channel Treatments</i>				\$0	\$0		\$0		\$0	\$0
<b>C. Road and Trails</b>										
				\$0	\$0		\$0		\$0	\$0
<i>Insert new items above this line!</i>				\$0	\$0		\$0		\$0	\$0
<i>Subtotal Road and Trails</i>				\$0	\$0		\$0		\$0	\$0
<b>D. Protection/Safety</b>										
				\$0	\$0		\$0		\$0	\$0
<i>Insert new items above this line!</i>				\$0	\$0		\$0		\$0	\$0
<i>Subtotal Protection/Safety</i>				\$0	\$0		\$0		\$0	\$0
<b>E. BAER Evaluation</b>										
Initial Assessment	Report	\$3,420	1	---	\$3,420		\$0		\$0	\$3,420
				\$0	\$0		\$0		\$0	\$0
<i>Insert new items above this line!</i>				---	\$0		\$0		\$0	\$0
<i>Subtotal Evaluation</i>				\$0	\$3,420		\$0		\$0	\$3,420
<b>F. Monitoring</b>										
				\$0	\$0		\$0		\$0	\$0
<i>Insert new items above this line!</i>				\$0	\$0		\$0		\$0	\$0
<i>Subtotal Monitoring</i>				\$0	\$0		\$0		\$0	\$0
<b>G. Totals</b>				\$20,350	\$3,420		\$0		\$0	\$23,770
Previously approved										
Total for this request				\$20,350						

**PART VII - APPROVALS**

1. \_\_\_\_\_  
 Forest Supervisor Date