

**14060009**Date of Report and Type: Interim 07/01/2018**BURNED-AREA REPORT**

(Reference FSH 2509.13)

**PART I - TYPE OF REQUEST****A. Type of Report**

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

**B. Type of Action**

- ☐ 1. Initial Request (Best estimate of funds needed to complete eligible stabilization measures)
- ☒ 2. Interim Report # 1
- ☒ 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:**Trail Mountain**B. Fire Number:**UT-MLF-008089**C. State:**Utah**D. County:**Emery**E. Region:**04 - Intermountain**F. Forest:**10 – Manti-La Sal**G. District:** Ferron-Price**H. Fire Incident Job Code:**P4LU1C18 (0410)**I. Date Fire Started:**06/06/2018**J. Date Fire Contained:**85% on 07/01/2018**K. Suppression Cost:**\$12,900,000 on 07/01/2018**L. Fire Suppression Damages Repaired with Suppression Funds** (estimates):

1. **Dozer Fireline repaired** (miles): None reported as of 7/1/18
2. **Excavator Fireline repaired** (miles): None reported as of 7/1/18
3. **Other** (identify):

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

HUC #	Watershed Name	Total Acres	Acres Burned	% of Watershed Burned
140600090201	Indian Creek	9,971	11	0.1%
140600090204	Upper Cottonwood Creek	15,731	1,834	12%
140600090103	Miller Fork Canyon-Huntington Creek	36,786	12,208	33%

HUC #	Watershed Name	Total Acres	Acres Burned	% of Watershed Burned
140600090105	Huntington Lake-Huntington Creek	40,348	3,642	9%

#### N. Total Acres Burned:

Table 2: Total Acres Burned by Ownership within BAER analysis perimeter, delineated 06/25/2018

OWNERSHIP	ACRES
NFS	14,412
BLM	67
STATE	1231
PRIVATE	1,985
<b>TOTAL</b>	<b>17,695</b>

**O. Vegetation Types:** Forest cover types that are present across the burn area are spruce, fir, mixed conifer, aspen, mountain brush, snowberry, rabbit brush, and sagebrush.

**P. Dominant Soils:** Soils on the Trail Mountain Fire can be characterized by 28 map units mapped inside the burn perimeter, 19 of which comprise 99% of the soils within the burn perimeter. The 10 map units displayed in Table 2 comprise 90% of the High soil burn severity. Soil moisture regimes range from Udic to Ustic, while temperature regimes vary between cryic and frigid.

Table 3: Dominant soil map units within the Trail Mountain Fire

Map Unit	Component Percent & Particle Size Control Section Designation
81-	Bundo-Lucky Star-Scout families, 30-60% slopes: Bundo (40%), Lucky Star (25%), Scout (20%) - all Loamy-skeletal
100C	Behanin family, 30-70% slopes: Behanin (80%) - Loamy-skeletal
107-	Bundo-Scout-Uinta families, 30-70% slopes: Bundo (35%), Scout (30%) - both Loamy-skeletal, Uinta (20%) Fine-loamy
107A	Circleville-Scout-Panguitch families, 40-80% slopes: Circleville (40%), (Scout 30%) - both Loamy-skeletal, Panguitch (20%) Coarse-loamy
107B	Uinta-Contide-Croydon families, 5-25% slopes: Uinta (40%), Croydon (20%) - both Fine-loamy, Contide (30%) - Fine
301-	Redfist-Mirabal-Parachute families, 40-90% slopes: Redfist (40%), Mirabal (30%), Parachute (20%) - all Loamy-skeletal
560-	Lucky Star-Skylick families, 30-60% slopes: Lucky Star (50%) - Loamy-skeletal, Skylick (35%) Fine-loamy
701-	Croydon-Elwood families, 30-60% slopes: Croydon (50%) - Fine-loamy, Elwood (35%) - Loamy-skeletal
711-	Scout-Bundo-Lucky Star families, 30-70% slopes: Scout (40%), Bundo (40%), Lucky Star (20%) - all Loamy-skeletal
711A	Uinta-Bundo-Lucky Star families, 15-50% slopes: Uinta (40%) - Fine-loamy, Bundo (25%), Lucky Star (20%) - both Loamy-skeletal

**Q. Geologic Types:** Parent material across the burn is comprised of highly dissected shales, sandstones and limestone resulting in steep slopes and bluffs formed in the Price River, Blackhawk, North Horn, Mancos Shale, Flagstaff Limestone and Star Point Sandstone formations with alluvial fans and colluvium in the bottoms.

**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	6.9
INTERMITTENT/EPHEMERAL	30.3

**S. Transportation System:**

Trails: National Forest (miles): 11.12      Other (miles): 0.3  
 Roads: National Forest (miles): 6.6      Other (miles): 0.74

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

Soil Burn Severity	NFS	BLM	State	Private	Total	% within the Fire Perimeter
Low	1,999	18	143	273	2,432	14%
Moderate	5,650	37	481	943	7,111	40%
High	5,496	3	512	677	6,688	38%
Unburned	1,276	9	96	92	1,464	8%
Total	14,412	67	1,231	1,985	17,695	100%

**B. Water-Repellent Soil** (acres): Assumed to be those soils burned at a Moderate and High Severity: 13,806 acres (78%).

**C. Soil Erosion Hazard Rating:** Available data sources identify general erosion hazard on 4,941 acres within the burn scar. Hazard rating is not classified.

**D. Erosion Potential** (tons/acre): Soil erosion potential averages 6.0 tons/acre for the first two years following the fire for the moderate and high soil burn severities.

**E. Sediment Potential**(cubic yards/square mile): Soil erosion modeling and subsequent sediment delivery potential are based on areas affected by moderate and high SBS. Sediment delivery potential is estimated to be 4,134 cubic yards per square mile.

**PART IV - HYDROLOGIC DESIGN FACTORS**

**A. Estimated Vegetative Recovery Period** (years): 3-5 years

**B. Design Chance of Success** (percent): 80%

**C. Equivalent Design Recurrence Interval** (years): 10 years

**D. Design Storm Duration** (hours): 1 hour

**E. Design Storm Magnitude** (inches): .0988 inches

**F. Design Flow** (cubic feet / second/ square mile): 12 cfs/mi<sup>2</sup>

**G. Estimated Reduction in Infiltration** (percent): 90%

**H. Adjusted Design Flow** (cfs per square mile): 100 cfs/mi<sup>2</sup>

**PART V - SUMMARY OF ANALYSIS**

**Introduction/Background:**

The Trail Mountain Wildfire began when the Trail Mountain Prescribed Fire escaped across Cottonwood Canyon Road to East Mountain, Wednesday, June 6, 2018. The escaped fire initially burned 300 acres. Late Sunday, June 10, wind gusts of 55 miles per hour grounded all aircraft and pushed the fire northeast into Meetinghouse Canyon. Over the following days, the fire progressed north into North Fork Canyon, Rilda Canyon, Mill Fork Canyon, Little Bear Canyon, and Crandall Canyon, all of which are tributaries to Huntington Canyon. The fire burned on lands managed by the Manti-La Sal National Forest, Price Field Office of the Bureau of Land Management, the Utah Division of Forestry, Fire and State Lands, and private lands 15 miles northwest of Orangeville, UT. The soil burn severity (SBS) map shows that approximately 78% of the burned area experienced high or moderate soil burn severity. The rest of the areas within the fire perimeter were either low soil burn severity or unburned. Increased post fire soil erosion and runoff are likely to occur within and downstream of the moderate and high soil burn severity areas and may result in localized flooding, scouring and/or deposition of materials.

Short duration, high intensity storms are the precipitation events of primary concern. Based on historic precipitation patterns, these types of events are likely to occur as Monsoonal thunderstorms during the summer months. The risk of flooding and erosional events has increased significantly as a result of the fire, creating hazardous conditions within and downstream of the burned area.

Recovery of pre-fire slope stability and watershed hydrologic response is dependent on many factors and typically occurs within 3-5 years following the fire. Recovery of high burn severity areas is slower because little or no vegetative ground cover remains, the potential for needle cast is low, and soils may be impacted by fire effects.

There is a very high likelihood (80-100% chance) of debris flows initiating in the burned area in response to short duration, high intensity rainfall events if emergency stabilization treatments are not implemented. The USGS performed a post-fire debris-flow hazards analysis for the burned area using empirical models to estimate the likelihood and volume of debris flows for selected basins in response to a design storm with a peak 15-minute rainfall intensity of 24 millimeters per hour. The empirical models are based upon historical debris-flow occurrence and magnitude data, rainfall storm conditions, terrain and soils information, and burn-severity data from recently burned areas. Results of this modeling and in depth discussion of model inputs and assumptions are available on the [USGS post-fire debris flow hazard assessment webpage](#).

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

A list of values important to the Manti-La Sal National Forest was compiled by the BAER team during the assessment kickoff meeting. The BAER team subsequently evaluated this list of values through field assessment and associated analysis to determine the critical BAER values (FSM 2523.1 – Exhibit 01) that may be treated within the BAER program. The risk (FSM 2523.1 – Exhibit 02) to these critical values has been assessed by the BAER team and is described below. A list of treatment numbers has been included below each critical value description to ensure tracking between values and treatments.

*Table 6: 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. Very high risk to travelers along routes (NFS roads and NFS trails) and at campsites on NFS lands within and downstream of the burn scar due to an increased threat of flooding and debris flows from contiguous areas of high and moderate burn severity in watershed source areas. The probability of damage or loss is very likely and the magnitude of consequences is major. (Treatments: T01, T03, T04, T05, T06, T07, T08, T10)
- b. Very high risk to travelers along routes (NFS roads and NFS trails) within and downslope from hillslopes burned at a moderate to high severity due to an increased threat of falling trees, rocks, and other debris. The probability of damage or loss is likely and the magnitude of consequences is major. (T01, T06, T07, T08)

## **2. Property (P):**

- a. Very high risk to road infrastructure within and downslope of the burn scar due to an increased post-fire watershed response to precipitation and runoff events that is expected to result in the loss of control of water, overwhelming of existing drainage features and erosion of the road prism. Approximately 9.2 miles of road within Rilda, Mill Fork, Little Bear, Crandall, and Cottonwood Canyons are at risk. The probability of damage or loss is very likely and the magnitude of consequences is major. (Treatments: T01, T03, T04, T10)
- b. Very high risk to trail infrastructure throughout the burn scar due to an increased post-fire watershed response to precipitation and runoff events that is expected to result in the loss of control of water, overwhelming of existing drainage features and erosion of the trail prism. The burned area contains approximately 11 miles of trails at risk. The probability of damage or loss is likely and the magnitude of consequences is major. (Treatments: T01, T05)
- c. Intermediate risk to approximately 2.0 miles of NFS roads that are located within the burn scar on the top of East Mountain. These routes were primarily used as containment line for the west flank of the fire, however short segments have burned hillslopes above the road prisms. The probability of damage or loss is possible and the magnitude of consequences is moderate. BAER treatments are not recommended.
- d. Intermediate risk to campground infrastructure at developed sites within Huntington Canyon due to the potential for flash flooding and debris flows impacting the sites. The probability of damage or loss is possible and the magnitude of consequences is moderate. BAER treatments specific to the protection of these properties are not recommended, however T01, T03, and T04 are expected to reduce the magnitude of debris flows and flash flooding that could damage these areas.

## **3. Natural Resources (NR):**

- a. Very high risk to soil productivity and hydrologic function due to the threat of increased erosion and watershed response to precipitation events on areas that experienced moderate and high soil burn severity. The loss of ground cover and presence of hydrophobic soils will result in increased soil erosion, loss of soil horizons, debris flow initiation, channel scouring, and sedimentation during runoff producing events. The probability of damage or loss is very likely and the magnitude of consequences is major. Treatments (T01, T03, T04, T05, T10)
- b. High risk to waters on NFS lands that are used for power supply generation at the downstream Huntington plant due to contamination of the source waters following debris flow events which are expected to contribute significant volumes of debris and sediment. Two on-channel structures were installed on the Huntington River following the 2012 Seeley fire (one large trash rack and one very large debris basin), however those structures are above the confluence with Meetinghouse Canyon and their efficacy could be compromised during large debris flow events if maintenance crews are unable to clean them should multiple storms occur in a short time frame (which did occur in the days following the Seeley

fire). The probability of damage or loss is possible and the magnitude of consequence is major. Treatments (T01, T03, T04, T10).

- c. Very high risk to native plant communities due to the threat from the spread of noxious weeds and invasive plant species. Known noxious weed and invasive plant populations exist within and immediately adjacent to the burned area. The probability of damage or loss is very likely and the magnitude of consequences is moderate. Treatments (T02)

#### **4. Cultural and Heritage Resources:**

- a. Very high risk to NRHP eligible cultural resources located in easily accessed slope positions that are threatened by increased post-fire runoff, erosion, and loss of pre-fire ground cover. This has resulted in a risk of loss of scientific value for irreplaceable artifacts due to the threats of mobilization of artifacts during hillslope erosion events, as well as potential artifact looting. The probability of damage or loss is likely and the magnitude of consequences is major. Treatments (T09)

#### **5. Other non-BAER Values:**

Although not necessarily BAER Critical Values, there are several NFS and non-NFS values that are potentially at risk from post-fire threats originating primarily on NFS lands. Therefore, coordination with partner agencies and potentially affected entities was initiated early on in the BAER assessment process. Other non-BAER values include:

- Municipal water infrastructure located on NFS lands and private lands. North Emery has infrastructure in Meetinghouse and Rilda Canyons and Castle Valley has infrastructure located in Little Bear canyon. These are very important municipal water sources for the communities of Emery County and are estimated to provide 75% of the culinary water supply.
- PacifiCorp's Huntington Plant, which is an 895 megawatt coal-fired power plant located at the mouth of Huntington Canyon. This plant is a critical piece of PacifiCorp's power grid. PacifiCorp uses water from Huntington Creek for cooling purposes at the plant. Cooling waters are stored in an off-channel reservoir, which is estimated to have 4-5 days' worth of storage. If the plant is unable to re-fill the reservoir with source water from Huntington Creek due to debris flow damage and sedimentation, daily losses are estimated at \$1,100,000 per day in plant operation and replacement power costs.
- A memorial at the Crandall Canyon Mine was built to honor the lives of nine men who were killed in a tragic accident in 2007. The memorial contains headstones for the six miners and three members of the rescue team, whose final resting place is within the collapsed mineshaft. The memorial is built adjacent to Crandall Creek, directly above the mine pad.
- Mines and associated infrastructure, including Crandall Canyon Mine, a mine in Rilda Canyon that is presently being decommissioned, and other facilities throughout the burned area
- Colorado River cutthroat populations in Crandall Canyon
- State Highway 31
- Multiple powerlines
- Agricultural water sources and irrigation diversions
- Communities and private lands located downstream of the burn area

- County campground along Huntington Creek

The National Weather Service (NWS) will soon be deploying a Campbell Scientific weather station within the burned area to aid in real-time monitoring of precipitation events. When threshold rainfall intensities are recorded, NWS staff will be alerted and on-duty forecasters will issue flash flood warnings to affected individuals and entities when life or property-threatening weather hazards are imminent. The NWS has coordinated with the Emery County Sheriff's Office to issue warnings.

Emery County has submitted a formal request for technical assistance and emergency funding under the Natural Resources Conservation Service (NRCS) Emergency Watershed Protection (EWP) program. NRCS engineers visited the burned area on June 25, 2018 to review values at risk that are eligible for protection under the authority of EWP. Initial values identified include, but are not limited to: the Crandall Canyon Memorial and Mine infrastructure, municipal water supply collection and transmission facilities in Little Bear, Rilda, and Meetinghouse Canyons; power transmission lines in Meetinghouse, Mill Fork, and Crandall Canyons; and PacifiCorp's Huntington Plant. The Forest will continue to coordinate with the NRCS, Special Use Permittees, and private land owners to help with implementation of NRCS prescribed treatments.

The Forest will continue coordination with the Utah Division of Wildlife Resources (DWR), State Lands (SITLA), and other agencies and entities as needed on both emergency response needs and long-term rehabilitation.

## **B. Emergency Treatment Objectives:**

Mitigate and protect, to the extent possible, threats to personal injury or human life of forest visitors and Forest Service employees by raising awareness through posting hazard warning signs on roads and trails, improving stream crossings, and communicate hazard of flooding, debris flows, and rock fall. Provide safe access to the burned area for personnel implementing authorized BAER response actions and communicate threats to cooperating agencies.

Protect or minimize damage to NFS investments in road and trail infrastructure by installing drainage features capable of withstanding potential increased stream flows and/or debris flows. Minimize damage to key NFS travel routes.

Protect or mitigate potential post-fire impacts to critical natural resources within the burned area. Implement treatments to reduce risks to soil productivity, hydrologic function, and municipal and power supply waters by stabilizing hillslopes, road prisms, and trail treads. Implement treatments that minimize threats to native and naturalized ecosystems by minimizing the potential for expansion of non-native invasive species (NNIS) into the burned area; minimize expected invasion of NNIS within and adjacent to the area where soils and vegetation was disturbed as a result of fire suppression activities.

Mitigate potential post-fire impacts to cultural resources to prevent irretrievable loss of archaeological assets.

Evaluate authorized BAER treatments and existing infrastructure to determine effectiveness in post-fire flow conditions. Monitor weeds for effectiveness of BAER treatments and to identify need for future treatments.

Assist cooperators, other local, State, and Federal agencies with the interpretation of the assessment findings to identify and address potential post-fire impacts to communities and residences, domestic water supplies, public utilities (including power lines, roads, and other infrastructure).

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

**Land** 80%  
**Roads/Trails** 80%

**Channel** N/A  
**Protection/Safety** 90%

#### D. Probability of Treatment Success

Table 7: 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>	70	80	90
<b>Channel</b>	N/A	N/A	N/A
<b>Roads/Trails</b>	75	85	90
<b>Protection/Safety</b>	90	80	70

**E. Cost of No-Action (Including Loss):** Equations taken from the VAR Tool were used to determine Market Resource Values for the following; Roads (6.6 miles x \$40,000/mile), Trails (11.2 miles x \$15,000/mile), FS Campground/Designated Dispersed sites (Standard amenities estimated at \$400,000) totals \$830,800 for Direct Market Values.

Grazing allotments utilized by cattle & sheep (\$2,000,000), Recreation (\$1,500,000) and Forest Visitor use (\$1,500,000) equal \$5,000,000 for Loss of Use Market Values.

Total Market Resource Value is estimated at \$5,830,800. This amount does not take into account human life and safety, one site eligible for Historic Registry, soil productivity, loss of naturalized plant communities, hydrologic function, or the many non-BAER values identified during the assessment.

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

Three alternatives were analyzed for cost analysis:

Alternative 1: Mulching 1,602 acres (\$3,539,500) and all other treatments proposed (\$286,794) plus the previously approved (\$163,950) totaling \$3,990,244.

Using the RMRS VAR tool the B/C ratio returned as Not Justified (<1).

Using the BCRatio calculation spreadsheet consulted on the Brianhead BEAR assessment, the B/C ration returned as Justified (1.1).

Alternative 2: Mulching Crandall Canyon & Little Bear, 37% of the area proposed in Alternative 1 (assuming a 50% cost reduction) for \$1,769,750. All other variables the same, totaling \$2,224,200.

Using the RMRS VAR tool the B/C ratio returned as Justified (1.2).

Using the BCRatio calculation spreadsheet consulted on the Brianhead BEAR assessment, the B/C ration returned as Justified (1.5).

Alternative 3: Mulching Crandall Canyon, Little Bear and Rilda, 65% of the area proposed in Alternative 1 for \$2,300,000. All other variables the same, totaling \$2,300,700.

Using the RMRS VAR tool the B/C ratio returned as Justified (1.4).

Using a custom built benefit cost ratio spreadsheet (available in the project record), the B/C ratio returned as Justified (1.4).

Both calculation spreadsheets are available in the project record.

#### F. Skills Represented on Burned-Area Survey Team:



<input checked="" type="checkbox"/> Archaeology	<input checked="" type="checkbox"/> Botany	<input checked="" type="checkbox"/> Ecology	<input checked="" type="checkbox"/> Hydrology	<input checked="" type="checkbox"/> Engineering
<input checked="" type="checkbox"/> Fisheries	<input checked="" type="checkbox"/> NOAA - NWS	<input checked="" type="checkbox"/> GIS	<input checked="" type="checkbox"/> Wildlife	<input checked="" type="checkbox"/> Range
<input checked="" type="checkbox"/> Recreation	<input checked="" type="checkbox"/> Soils	<input checked="" type="checkbox"/> Team Lead	<input type="checkbox"/> Minerals	<input checked="" type="checkbox"/> PIO
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**Team Leader:** Brendan Waterman

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**Phone:** 385-377-4338

**Forest BAER Coordinator:** Mat Meccariello

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**Phone:** 435-696-3509

### Core Team Members:

Table 8: BAER Team Members by Skill

Skill	Team Member Name
Team Lead(s)	Brendan Waterman
Archaeology	Sarah Herrera
Range/Weeds	Nolan Hicks
Engineering	Daniel Luke
Wildlife	Kevin Albrecht
GIS	Theresa Nallick
Hydrology	Brad Higginson
Recreation	Chris Nichols
Soils	Dave Marr
PIO	Rosann Fillmore
Minerals	Jeff Sallow

### H. Treatment Narrative:

(Describe the emergency treatments, where and how they will be applied, and what they are intended to do. This information helps to determine qualifying treatments for the appropriate funding authorities. For seeding treatments, include species, application rates and species selection rationale.)

#### Land Treatments:

#### T01 – Aerial Mulching

**General Description:** Both agricultural mulch and wood mulch were considered for use of mulching treatments. The agricultural mulch was not considered as a viable treatment due to treatment locations on steep slopes and landform positions high in the watershed that are prone to high winds. Wood shred or Wood straw (depending on availability) will be applied to the ground surface by helicopter (and spread with hand crews as necessary) to achieve a continuous cover of uniform thickness, as specified below, to replace ground cover consumed by the fire.

**Location/Suitable Sites:** Treatments are proposed 1,602 acres (1,221 FS, 205 private, 176 State) on slopes between 25%-55% occurring on moderate and high soil burn severities within the burn perimeter. Drainage prioritization was determined based on the following; occurrence of BAER Critical VARs, estimated ability to make a change in watershed response and non-BAER VARs.

#### **Drainages are listed in order of treatment priority:**

1. Crandall Canyon: Total subwatershed acres on the Forest is 2,962, which burned at 68% Moderate and High SBS. Treatments are prescribed on 491 acres (315 on FS lands & 176 acres on Utah School and Institutional Trust Lands (SITLA) lands. BAER Critical VARs in this subwatershed include; soil productivity, hydrologic function and FS property (roads & trails). Non-BAER values in this watershed include; the Crandall Mine

Memorial, Crandall Canyon Coal Mine infrastructure and agronomic and industrial water use. Crandall Canyon has the most treatable acres while also having the most infrastructure

2. Little Bear: Total subwatershed acres on the Forest is 841, which burned at 68% Moderate and High SBS. Treatments are prescribed on 114 acres (80 on FS lands & 34 on private lands). BAER Critical VARs in this subwatershed include soil productivity, hydrologic function and FS property (roads, trails & campground). Non-BAER values in this subwatershed include; a spring development collection and water conduit system which serves as the municipal water intake providing 75% of drinking water for the Castle Valley Water District and agronomic and industrial water use. Little Bear has the highest potential for success given the relatively small burn extent and localized Critical BAER VARs and non-VARs.

Risk reductions in Crandall and Little Bear are anticipated to have the highest benefit the widest magnitude precipitation event. However, a precipitation event of the magnitude to generate damaging debris flows is not anticipated to be decreased by the aerial application of wood shreds.

3. Rilda: Total subwatershed acres on the Forest is 5,143, which burned at 69% Moderate and High SBS. Treatments are prescribed on 442 FS acres. BAER Critical VARs in this subwatershed include soil productivity, hydrologic function and FS property (roads & trails). Non-BAER values in this subwatershed include; the primary spring source recharge areas by which several municipal water intakes and water conduit systems are located servicing 75% of North Emery Water District users and agronomic and industrial water use.
4. Meetinghouse: Total subwatershed acres on the Forest is 5,335, which burned at 46% Moderate and High SBS. Treatments are prescribed on 299 acres (128 on FS lands & 171 on private lands). BAER Critical VARs in this subwatershed include soil productivity, hydrologic function and FS property (roads & trails). Non-BAER values in this subwatershed include; the primary spring source by which several municipal water intakes and water conduit systems are currently not in use due to contamination, but under SUP with North Emery Water District users, also a high voltage powerline are in the valley bottom and agronomic and industrial water use occurs downstream.
5. Mill Fork: Total subwatershed acres on the Forest is 4,011, which burned at 82% Moderate and High SBS. Treatments are prescribed on 256 FS acres. BAER Critical VARs in this subwatershed include soil productivity, hydrologic function and FS property (roads & trails). Non-BAER values in this subwatershed include; Mill Canyon Coal Mine infrastructure and agronomic and industrial water use.

Risk reduction in Rilda, Meetinghouse and Mill Fork has the least likelihood to be changed by aerial mulching given anticipated storm events. Treatments on private and STLA managed lands would require use of the Wyden Authority.

### Design/Construction Specifications:

Design specifications are recommended based on RMRS-GTR-240, RMRS-GTR-307 and similar treatment guidelines for recent, nearby and approved BAER requests.

- On-site material will be utilized by a contractor to produce wood shreds. If insufficient quantity of on-site material is available, negotiations will be made to determine additional suitable materials either on or off Forest.
- If a contractor is unavailable to produce wood shreds, wood straw may need to be purchased.
- Less than 5% of the wood shreds should be smaller than 1 inch in length. (2% is recommended). The optimal size range is 2 inches to 8 inches. Calibration of material produced may need to occur as the machinery is being set up.
- Contract specifications should be based on percent ground cover. A target of 80% ground coverage (assuming 90% compliance = 89% to 71% coverage). As a starting point, approximately 8 tons/acre produces enough material for 70% ground cover.
- Wood shred piles may need to be covered at staging area to keep them dry.
- Plan to have multiple cargo nets ready with shreds to maximize helicopter use.
- If a Heli-claw is used, compacting and flat-topping the wood shred piles increases efficiency
- Notify the local Archeologist and Noxious Weed coordinator of locations intended to be used for staging, processing, etc. to have sites cleared of cultural resources and pre-treated for weeds if necessary.
- Coordinate with UT DWR to facilitate the application of seed while aerially applying wood shreds.

**Purpose of Treatment:** Ground cover is needed to maintain soil moisture, accelerate recovery of native vegetation, and to protect any seed remaining onsite. The organic wood shreds will protect soil from solar heating and drying, thereby improving the ability of seeds to germinate. Proper application of wood shreds has proven successful as valid BAER treatment to preserve soil productivity and maintain hydrologic function if applied on the appropriate slopes.

The wood shred treatments are predicted to lower the estimated soil erosion and subsequent sediment delivery to the streams up to 90% on treated slopes (see BAER Soils Report, Table 4). Wood shreds will also reduce downstream peak flows by absorbing and slowly releasing overland runoff which is likely to be increased due to reduced soil cover and hydrophobic soil conditions. Applying wood shred treatments in the headwaters of the streams can protect a much larger downstream area from cumulative runoff and sedimentation. Numerous in channel debris deflectors have been installed in the lower portions of Rilda and Mill Fork to impeded anticipated debris flows. Armoring in the upper watershed will hopefully decrease the magnitude of events impacting these structures increasing their effectiveness and longevity. Roads, trails and associated infrastructure (culverts, etc.) located inside the burned area may receive less damage resulting from overland flow and high flows.

This treatment is the most effective method to attenuate the risks associated with the loss of long-term soil productivity, hydrologic function and FS Property from post fire effects.

Table 9: T01 – Aerial Mulching

TREATMENT	UNIT	UNIT COST	# OF UNIT	TOTAL COST
IMPLEMENTATION				
INSPECTORS, MONITORING, ARCH, GS-7	Day	\$230	46	\$10,580
MISCELLANEOUS SUPPLIES FOR INSPECTION CREWS	Lump	\$100	1	\$100
INSPECTOR VEHICLES	Lump	\$420	1	\$420
HELICOPTER APPLICATION OF WOOD SHREDS	Acre	\$2,200	1,602	\$3,524,400
FELLER BUNCHER MOBILIZATION (INCLUDING LOW-BOY)	Lump	\$3,000	1	\$3,000
FELLER BUNCHER	Day	\$200	5	\$1,000

## **T02 – Early Detection and Rapid Response**

**General Description:** When monitoring actions are initiated, Forest, Early Detecting Rapid Response Crew, or Skyline Cooperative Weed Management Area (CWMA) personnel will be equipped to immediately treat infestations of noxious weeds. This allows for the immediate treatment and eradication (i.e. hand pulling, herbicide application, biological agent control, seeding of native species) of known infestations. BAER funding authorization will be used for the first year following containment of the fire to meet objectives above. Existing infestations will also be treated as prescribed by CWMA plans at the same time. As appropriate, these actions may be carried out under a combination of BAER and other management authorities. Treatment and monitoring activities occurring after the first year of BAER funded EDRR will be carried out under non-BAER authorizations. The CWMA will be utilized to survey for noxious weeds and/or provide treatments on private lands adjacent to the Forest.

**Location/Suitable Sites:** Areas adjacent to existing known weed infestations within and directly adjacent to the Trail Mountain Fire burned area. EDRR BAER treatments will only be applied to native or naturalized communities on NFS where noxious weeds are absent or present only on minor amounts. Focus areas will include areas that subject to new disturbance during suppression activities and high priority natural communities that were subject to moderate and high burn severities.

**Design/Construction Specifications:** Select herbicide, application rate, and application timing based on specific weed being treated, and access to the location of the infestation; Consideration for TES (listed species) habitat and sensitivity when selecting appropriate herbicide. Thorough reconnaissance will be conducted in and around all sites identified in the Noxious Weed Assessment. These sites will be monitored by crews on foot or by vehicle as appropriate. If noxious weed infestations are identified an appropriate treatment will be implemented to eradicate or control the infestation (i.e. hand pulling, herbicide application, biological agent control, seeding of native species).

**Purpose of Treatment:** Prevent establishment of new infestations, prevent spread of existing infestations, and prevent increase in weed density in existing infestations.

Table 10: T02 - Weeds EDRR Treatment Types and Cost

TREATMENT DESCRIPTION	TARGET WEED SPECIES	PRESCRIPTION	ESTIMATED ACRES	COST PER ACRE	COST	TIMING
EDRR - SUPPRESSION IMPACTS	Plumeless Thistle Canada Thistle Musk Thistle Scotch Thistle Diffuse Knapweed Spotted Knapweed Squarrose Knapweed Russian Knapweed Hoary Cress Houndstongue Dyers Woad Yellow Toadflax Perennial Pepper weed White Top	Monitor dozerlines, handlines, and heavily impacted by suppression resources. Treat target weeds species upon detection	50	\$88.77	\$4,439	FY18/19
EDRR – IN HIGH PRIORITY NATURAL COMMUNITIES	Same as above.	Herbicide application by contract crew on moderate and high SBS sites where weeds are known to be present in minor amounts	135	\$88.77	\$11,984	FY18/19

**Channel Treatments:** None proposed

**Roads and Trail Treatments:**

### **T03 – Initial Road Drainage/Prism Protection – Approved by RF 6/21/08**

**General Description:** Treatments include protection of road infrastructure and downstream water quality.

**Location/Suitable Sites:** Rilda, Crandall, Mill Fork Canyons

**Design/Construction Specifications:** Existing culverts and ditches in priority road segments are being cleaned of sediment and debris to allow proper road drainage. Two small sediment basins are having stored sediment removed to allow them to function. These basins are adjacent to FS roads and municipal water systems. Log debris and sediment structures are being installed on 1st order drainages immediately upstream of roads at greatest risk. These structures are also being installed in watersheds that contain municipal water systems. Rip rap will be used to protect drainage inlets/outlets and used to protect 1st order channels from down cutting next to critical road segments.

**Purpose of Treatment:** These treatments are expected to mitigate the existing threat to the road prisms, and downstream water quality and municipal water infrastructure. High Risk (Possible probability; Major consequence) that the road infrastructure could be impacted by flash flooding and/ or debris flows during a high intensity precipitation events. If such an event were to occur, the increased watershed response from the post-fire condition is expected to result in plugging of the culverts, stream channel diversion, and fill material loss along the road prism.

Table 11: T03 – Initial Road Drainage/Prism Protection Treatment Cost Estimate

TREATMENT	UNIT	UNIT COST	# OF UNIT	TOTAL COST
DEBRIS BASIN CLEANOUT, DEBRIS BASIN CONSTRUCTION, LOG TRASH RACK CONSTRUCTION	Job	\$66,250	1	\$66,250
CLEAN CULVERTS, DITCHES, INLETS, INSTALL WATERBARS	Job	\$33,700	1	\$33,700
HAZARD TREE FELLING AT ALL WORK SITES, STRUCTURE CONSTRUCTION BY HAND CREWS	Job	\$27,600	1	\$27,600
RIP RAP FOR BANK PROTECTION	CY	\$110	500	\$55,000
EMBANKMENT MATERIAL FOR ACCESS ROAD PROTECTION	CY	\$40	200	\$8,000
SEED FOR DISTURBED CONSTRUCTION SITES	Lump Sum	\$1000	1	\$1000

#### **T04 – Interim Road Drainage/Prism Protection**

**General Description:** Several debris flow protection treatments have been prescribed for high risk drainages in Huntington Canyon along Highway 31 in the Ferron Ranger District that have been directly impacted by wildfire. High to moderate severity burned areas in the steep canyons along the highway have greatly increased the potential for flash flooding and debris flows. Loss of water control from drainage structures and channels is a safety and property risk. Treatments include construction of overflow basins by existing flood plains, installation of natural log debris racks, rock armored overflow structure, flood warning signs, and storm inspection and response. The treatment described will work to control water flow and help protect life. During implementation an engineer or engineering technician should be on site to ensure proper placement and installation. Cooperation with required Forest Service personnel should also be implemented, including but not limited to a Cultural Resource Specialist and Biologist.

**Location/Suitable Sites:** Rilda, Crandall, Mill Fork, Meeting House, Little Bear, Mill Canyon

**Design/Construction Specifications:**

1. Survey, design, and contract administration by USFS personnel. Use Forest Service Specifications for Construction of Roads and Bridges, Special Contract Provisions and Burned Area Emergency Response Treatments Catalog.

2. Key design considerations include channel gradient, design storm, overflow basin capacity, and material to be excavated at each site. Overflow basins will be constructed in natural flat areas adjacent to stream channels and utilize existing flood plains allowing peak flood flows to dissipate over a larger area, dropping large and small sediment away from stream channel and protecting identified downstream values. Excavated material will be left on site and used to construct berms around the perimeter of the basin and in critical locations to direct flows back to the natural stream channel. Topsoil shall be removed and stockpiled separately and spread back across overflow basin upon completion of work. Recommend seeding and willow planting to prevent erosion. Two larger sediment basins are being constructed adjacent to FS roads and above Municipal water systems. The intent is to increase the effective length of the stream channel during flood conditions to slow down the flows and allow debris and sediment to dissipate over a large area.

3. Natural log debris racks are constructed from suitable on-site logs that are anchored to large trees adjacent to the stream channel. Large boulders may also be incorporated into the structures. Debris racks are usually vertical and constructed at right angles to streamflow, but may be skewed with the flow or inclined with the vertical. The height of the racks should be minimized to avoid excessive material and water buildup behind the structure. Debris racks should be spaced to allow access for equipment access for debris removal after runoff events.

4. Rock Armored Stream Grade Stabilizers are to be constructed where channels gradient change is great below Municipal water systems or Culvert outlets. Rock structures should incorporate large size rip-rap to withstand the force of heavy debris flows and protect slopes from headcutting. For additional stability concrete may be used to fill voids between rock armoring. Refer to the BAER Treatment Catalog for additional design and construction specifications. Concrete may be used to provide additional strength and resistance to erosion.

Log debris and sediment structures are being installed on 1st order drainages immediately upstream of roads at greatest risk. These structures are also being installed in watersheds that contain municipal water systems. Rip rap will be used to protect drainage inlets/outlets and used to protect 1st order channels from down cutting next to critical road segments.

**Purpose of Treatment:** These treatments are expected to mitigate the existing threat to the road prisms, and downstream water quality and municipal water infrastructure. High Risk (Very Likely probability; Major consequence) that the road infrastructure could be impacted by flash flooding and/ or debris flows during a high intensity precipitation events. If such an event were to occur, the increased watershed response from the post-fire condition is expected to result in plugging of the culverts, stream channel diversion, and fill material loss along the road prism.

Table12: T04- Road Drainage/Prism Protection Treatment Cost Estimate

TREATMENT	UNIT	UNIT COST	# OF UNIT	TOTAL COST
<b>CONTRACT DESIGN AND ADMINISTRATION</b> RILDA CANYON – CONSTRUCT DEBRIS BASINS AT EXISTING MINE DISTURBANCE SITES	Lump	\$22,500	1	\$22,500
	Each	\$7,035	2	\$14,070

TREATMENT	UNIT	UNIT COST	# OF UNIT	TOTAL COST
CRANDALL CANYON – INSTALL NATURAL LOG DEBRIS RACKS	Job	\$25,300	1	\$25,300
HAZARD TREE FELLING AT ALL WORK SITES, STRUCTURE CONSTRUCTION BY HAND CREWS	Job	\$17,200	1	\$17,200
END DUMP HAULING OF RIP RAP FROM PIPELINE PILES	Hour	\$100	600	\$60,000
CONCRETE TO GROUT ROCK STRUCTURES FOR ADDITIONAL STRENGTH	Job	\$35,000	1	\$35,000
SEED FOR DISTURBED CONSTRUCTION SITES	Lump	\$1,000	1	\$1,000

### **T05 – Trail Drainage/Tread Protection**

**General Description:** Treatment would provide immediate protection to the trail system. Trails may capture increased surface runoff caused by the lack of effective ground cover to inhibit excessive flow. Flows will intercept system trails and cause severe tread erosion and initiation of soil rutting adjacent to the trails. The trail system would be improved to withstand increased runoff, protecting property, workers and users.

**Location/Suitable Sites:** #086 Mill Fork Ridge, #394 Little Bear Ridge, #390 Crandall Canyon, #085 East Mountain, Mill Fork Canyon Trail #391

**Design/Construction Specifications:** Install water-bars depending on steepness of trail (18 per mile) in areas of moderate or high severity. Install waterbars in sections of trail that have continuous gradient for a length of greater than 50 feet and are either insloped (cupped) or show evidence of routing water (rills, gullies). Construct tread retention structures where necessary and downslope, stabilizing vegetation has been consumed. Retread trail following TMO standards for width. Hazards within the trail route that restrict access to work sites will be removed (rocks, trees). Clean existing water bars. Removal of identified hazards surrounding work site locations. If the area poses a large safety risk then the work will be delayed until safety risk is stabilized

**Purpose of Treatment:** Trails within the Trail Mountain Fire are located within and downslope of moderate to high soil burn severity slopes. Predicted increased runoff due to water repellant soils and lack of effective ground cover will be intercepted and captured by trails, leading to severe trail tread erosion that will render the trails unusable or dangerous to use. Hikers and stock parties are the primary users. Additional hazards caused by the fire such as hazard trees and rockfall will create unsafe conditions at trail access points and worksites along the trails to workers. The fire has burned adjacent slopes above and along the trail routes that will result in runoff that will damage the system substantially enough to prevent future use of the trails. The increased erosional risk to trails can be mitigated with drainage structures, tread stabilization, and scheduled drainage maintenance. The treatments directly mitigate these increased threats in that adequate trail tread drainage will pass accelerated erosional runoff off the tread and prevent tread erosion, and fire-generated hazards such as hazard trees and rock fall will be removed.

These treatments would prevent unacceptable erosion and loss of trail investment and minimize degradation to water quality. Treatments ensure drainage structures are sufficient to divert water

effectively given increased runoff and increased sediment movement. Treatments will protect property and watershed values. Treatment will prevent injury and remove risk to workers and users.

This treatment was used to prepare trails affected by the Seeley fire with great results. Mitigating damage now prevents having to take more costly and unsafe corrective measures later when trying to reestablish.

Table 13: T05 – Trail Drainage/Tread Protection Cost Estimate

TREATMENT	UNIT	UNIT COST	# OF UNIT	TOTAL COST
IMPLEMENTATION/ MONITORING (GS-9 REC)	Day	\$350	11	\$3,850
TRAILS FOREMAN-SAWYER (WG-8)	Day	\$288	7	\$2,016
TRAILS SWAMPER(GS-3 REC TECH)	Day	\$122	7	\$854
IMPLEMENTATION/CONTRACT MNGMT. (GS-11 REC)	Day	\$400	1	\$400
MISC SUPPLIES (SAW GAS, HARDWARE, TREATED POSTS, POST ANCHORS	Lump	\$2,630	1	\$2,630
CONTRACT CREW	Day	\$1,150	15	\$17,250

### Protection/Safety Treatments:

#### T06 – Road Closure Devices

**General Description:** Install road closure gates at roads accessing the burned area from State Highway 31 so that the public cannot access the fire area, especially while emergency conditions exist. Install gates at suitable locations near the start of the road (near junction with Highway 31). Gates are intended to keep vehicle traffic out of the burned area and serve as a non-removable visual barrier to discourage foot traffic. Gate location should be selected to prevent access around the sides of the gates. Install barrier rock if needed.

**Location/Suitable Sites:** Crandall Canyon Road (FSR 0248), Mill Fork Canyon (FSR 0245), and Rilda Canyon Road (FSR 0246), Meetinghouse Road should already be closed by the private land surrounding the Coal Power Plant.

**Design/Construction Specifications:** Gates shall be constructed according the Standard Specifications for Construction of Road and Bridges on Federal Highway Projects FP-03 (<https://flh.fhwa.dot.gov/resources/specs/fp-03/>). All signing associated with the gate installation shall follow FSM 7100-15 and the Federal Highways MUTCD. This includes typical gate barricade markers and object markers and any signs that may be installed with the gate such as road closed signs. Ensure the area around the gate is large enough for a vehicle with trailer to turn around.

**Purpose of Treatment:** Gates are necessary to ensure the public will not enter the burned area while conditions are unsafe. Road gates are needed so that FS crews can access the area to perform storm inspections, do mine remediation work (Rilda), and monitor BAER treatments. There is a very high risk that human life and safety could be impacted by flash flooding and/ or debris flows during a high intensity precipitation events. Road closures are needed to reduce the risk. Gates have been selected over less costly treatments that would allow for road closure (earthen berms, barrier rock, etc.) because rapid access by storm inspection and response crews is required as well as permittee access to service municipal water systems and the Crandall Canyon mine.



Table 14: T06 – Road Closure Device Cost Estimate

TREATMENT	UNIT	UNIT COST	# OF UNIT	TOTAL COST
ROAD CREW PERSONNEL AND EQUIPMENT	Week	\$4,300	1	\$4,300
ENGINEER	Day	\$400	5	\$2,000
GATES/SIGNS/MISC SUPPLIES	Each	\$1,700	3	\$5,100

**T07 – Dispersed Campsite Closure Devices**

**General Description:** Due to the risk of post-fire flash flooding and debris-flow impacts, multiple developed and dispersed recreation sites along Huntington Creek are now at risk of being impacted during and immediately after precipitation events in upstream watershed source areas. Currently the sites do not have closure devices in place that would allow for an administrative closure to prohibit forest users from camping at these locations. As such, there is a very high risk to human life and safety at these locations.

**Location/Suitable Sites:** Little Bear CG, Lower Little Bear CG, and River Bend CG

**Design/Construction Specifications:** Construction of buck and rail fence at CG entrances along with installation/maintenance of closure/burn scar signage. Leftover closure/burn scar signage from the Seeley fire will be used when available.

**Purpose of Treatment:** To educate visitors of the burn area hazards and to prevent entry into sites that may be impacted by potential flooding from fire damaged in up canyon slopes. The treatment is reasonable because human life and safety is a critical value. Warning the public of the potential hazards or closing sites with high probability of flooding will decrease the risk to this value. Buck and rail fencing was identified as the most economical way to effectively close these sites due to low cost of materials required to build the fencing. Damage/vandalism is not expected to the wooden fences due to the high visibility locations directly adjacent to SR 31.

Table 15: T07 – Dispersed Campsite Closure Device Cost Estimate

TREATMENT	UNIT	UNIT COST	# OF UNIT	TOTAL COST
WG8 EQUIPMENT OPERATOR/REC PERSONNEL	Day	\$288	4	\$1,152
GS3 REC TECH	Day	\$121	4	\$484
GS9 NRS(RECREATION)	Day	\$350	2	\$700
FENCING MATERIALS,SUPPLIES	Lump	\$1,800	1	\$1,800

**T08 – Warning Signs**

**General Description:** This treatment is for the installation of burned area warning signs to warn Forest users of changed conditions and hazards within the burned area. Burned area signs warn the public of the possible dangers associated with a burned area on major entry points into the burned area and developed recreation sites (roads, trailheads, and other areas). It shall contain language specifying items to be aware of when entering a burn area such as falling trees and limbs, rolling rocks, and the likelihood for debris flows and flash floods.

**Location/Suitable Sites:** Refer to BAER Treatment Map for the spatial locations.

**Design/Construction Specifications:** Install signs on major roads and trailheads/trails entering the burned area. These include:

- Major FSRs entering from State Highway 31: Crandall Canyon Road (FSR 0248), Mill Fork Canyon (FSR 0245), and Rilda Canyon Road (FSR 0246), Little Bear Campground Area, and Meetinghouse Road (5 major entry signs)

- Roads and Trails in the Cottonwood Creek area: Each side of the Cottonwood Creek Road (FSR 0040) where it enters the burned area (2 major entry signs, one at south end and one at north end); at the junction of the Cottonwood Creek road (FSR 040) and the East Mountain/Mill Canyon Roads (FSR 0060) = 1 major entry sign. A sign at the junction of FSRs 0244 \* 0145 (1 major sign. Another sign is needed on south end of FSR 0600 where it enters the burned area (1 smaller sign); the road system contains more roads than what is on the map here so an additional 2 smaller signs may be necessary.

-Trails entering the west side of burned area: Trailhead for trails 086 & 085 at north end of FSR 0244 = (1 smaller sign).

**Purpose of Treatment:** The warning signs reduce the risk the human life and safety. The signs will inform the public of potential hazards created by the fire including flooding and debris flow potential, falling rocks and trees. The treatment is reasonable because human life and safety is a critical value. Warning the public on potential hazards will decrease the risk to this value.

Table 16: T08-Warning Signs Cost Estimate

TREATMENT	UNIT	UNIT COST	# OF UNIT	TOTAL COST
GS-09 (FOR SIGN INVENTORY/DESIGN)	Day	\$350	2	\$700
GS-11 (FOR PROJECT REVIEW AND INSPECTION)	Day	\$400	1	\$400
2-GS-04 OR 05 (SIGN INSTALLATION) CREW	Day	\$300	4	\$1,200
BURNED AREA WARNING SIGNS, MAJOR ENTRY POINTS	Each	\$300	9	\$2,700
BURNED AREA WARNING SIGNS, SMALLER ENTRY SIGNS, DEVELOPED REC. SITES AND TRAILS	Each	\$100	4	\$400
VEHICLES FOR INSTALLATION/INSPECTION	Lump	\$350	1	\$350

## **T09 – Cultural Resource Protection**

### **General Description:**

There are a total of eight previously identified cultural resource sites in the Trail Mountain Fire, of which one (ML-4523) is at very high risk from primarily post fire erosion and a small potential for looting impacts. This site is a NRHP eligible historic cabin that was burned by fire activity but still retains a stone chimney, stone foundation, and many artifacts within and outside of the cabin footprint. Any sort of erosion event could potentially destroy the chimney, foundation, and mobilize the artifacts from the site. Treatment includes lop and scatter of local woody debris to reduce the risk of erosion and conceal artifacts on the ground surface.

### **Location/Suitable Sites:**

The location of this site is available upon request by authorized personnel.

### **Design/Construction Specifications:**

The site covers an estimated .25 acres. Lop and scatter of local woody debris would be strategically scattered on the ground surface on the cabin footprint and the .25 acres around the cabin that include an artifact debris area. It is anticipated that a five person engine crew could complete the lop and scatter stabilization in one day of work. A GS-7 archaeologist would oversee the lop and scatter to ensure protection of the site features and appropriate covering of artifacts.

### **Purpose of Treatment:**

The purpose of the treatment is to reduce or mitigate the risk of loss of resources, information, and site integrity as a result of erosion, runoff, and flash flooding on a NRHP eligible cultural resource with the additional benefit of concealing artifacts from potential looters.

*Table 17: T09-Cultural Resource Protection Cost Estimate*

<b>TREATMENT</b>	<b>UNIT</b>	<b>UNIT COST</b>	<b># OF UNIT</b>	<b>TOTAL COST</b>
<b>GS-12 ARCHAEOLOGIST</b>	Day	473	1	\$473
<b>GS-07 ARCHAEOLOGIST</b>	Day	214	3	\$642
<b>5-PERSON FIRE CREW FOR IMPLEMENTATION</b>	Day	2000	1	\$2,000
<b>OVERHEAD VEHICLES</b>	Miles	0.30	320	\$96
<b>IMPLEMENTATION CREW VEHICLES</b>	Miles	.50	80	\$40

### **T10 – Storm Inspection and Response**

**General Description:** Patrols will be conducted following storm events to identify road drainage problems such as plugged culverts and/or washed out roads. Any necessary response will be taken. This may include, but is not limited to clearing, cleaning, and/or repairing the road drainage features and prism that received damage. The storm patrollers shall have access to at least a backhoe and dump truck that can be used when a drainage culvert is plugged or soon to be plugged, and to repair roads which are exhibiting severe surface erosion.

**Location/Suitable Sites:** Crandall Canyon Road (FSR 0248), Mill Fork Canyon (FSR 0245), and Rilda Canyon Road (FSR 0246) are the top priorities due to high burn severities. If needed, additional locations include the Meetinghouse Road on Forest above the Coal Power Plant, East Mountain Road (FSRs 0060) and Mill Canyon (FSR 2304).

**Design/Construction Specifications:** FS personnel will direct the work i.e. Forest engineering staff and road crew to coordinate. Following heavy rains and significant spring snowmelt the FS will send out patrols to identify road and drainage hazard conditions – obstructions such as rocks, sediment, washouts, and plugged culverts. Problems will be corrected before they worsen or jeopardize the road and drainage systems. The road patrols shall bring in heavy equipment necessary to mechanically remove any obstructions from the roads and culvert inlets and catch basins where necessary. All excess material and debris removed from the drainage system shall be placed outside of the bankfull stream channel where it cannot re-enter the stream.

**Purpose of Treatment:** This treatment is needed to protect the FS road system from damage during and after damaging storm events. The treatment will also help protect hydrologic function and water to municipal, agricultural, and industrial (power plant) users downstream. Many roads are needed for administrative access to important infrastructure on NFS lands: Crandall Canyon Mine & memorial and

municipal water intakes (Rilda & Meetinghouse). Treatment is needed to protect FS property investments. Indirectly, debris that is not removed immediately could cause more substantial loss of infrastructure and associated sediment/debris that in turn causes an impact to water quality and hydrologic function.

The majority of burned area is susceptible to debris flows. The risk of drainage features being overwhelmed is very high. The streams now have the potential for increased runoff and debris flows. This poses a threat to the existing drainage features which may result in plugging culverts or exceeding their maximum flow capacity. If these flows plug drainage structures, the result will likely be additional erosion and debris further down the drainage due to the failures of the fill slopes of the roads.

The purpose of the monitoring is to evaluate road condition and to identify and implement additional work where needed to maintain and/or repair damage to road surfaces and drainage features. Engineering and road crew personnel will survey the roads within the fire perimeter after high-intensity summer thunderstorms and spring snow-melt. Survey will inspect road surface condition, ditch erosion, and culverts/inlet basins for capacity to accommodate runoff flows.

There is a high risk that NFS roads could be impacted by flash flooding and/ or debris flows during a high intensity precipitation events and spring runoff. Road closures will be in place. Storm inspection and response is also needed to reduce the risk of damaging roads in the fire area. Early detection of damaging events reduces monetary loss and the threat NFS property. The cost of the treatment is reasonable considering that an average mile of road construction costs \$40,000. Treatments are recommended.

Table 18: T10-Storm Inspection and Response Cost Estimate

TREATMENT	UNIT	UNIT COST	# OF UNIT	TOTAL COST
GS-11 PATROLER	Day	\$400	5	\$2,000
BACKHOE WITH OPERATOR	Hour	\$110	40	\$4,400
EXCAVATOR WITH OPERATOR	Hour	\$150	40	\$6,000
DUMP TRUCK (10–12 CUBIC YARDS) WITH OPERATOR	Hour	\$100	40	\$4,000

## BAER Evaluation

### T11 – Implementation Coordination

**General Description:** There is a need for a BAER implementation team leader with COR qualifications due to the amount and complexity of work. The treatments involves communication and coordination with other federal (NRCS & NOAA NWS), state (DNR & DWR), local agencies (Emery County Sheriff's Office), and water companies (North Emery & Castle Dale) in order to implement the treatments necessary to protect critical values. Duties will also include COR responsibilities on an aerial mulch contract – Region IDIQ. Actions include but are not limited to cooperating with other agencies on hazard notification systems, exchanging information, coordinating the BAER implementation plan, and COR of aerial mulch contract.

The Forest Service plans on continuing to collaborate and communicate with partnering agencies, other entities and organizations, and the public. There will be a need for the Forest BAER Coordinator to stay engaged in various activities through the end of implementation.

Associated activities obligated under ID-FSM2520-2017-1 need to be considered in the BAER funding request when emergency response actions are authorized. These are accumulated tasks above the normal program of work and generally not accounted for in out-year program planning. Because implementation of approved BAER response actions trigger these required tasks and the unit's allocated budget does not account for these obligations, BAER funding is the appropriate authorization to ensure this coordination and consultation is completed.

Table 19: T11-Coordination and Consultation Cost Estimate

TREATMENT	UNIT	UNIT COST	# OF UNIT	TOTAL COST
IMPLEMENTATION TEAM LEADER GS-12	Days	\$475	25	\$11,875
IMPLEMENTATION TRACKING & REPORTING FOREST BAER COORDINATOR (GS-13)	Days	\$545	20	\$10,900
IMPLEMENTATION TEAM LEAD VEHICLE	Lump	\$840	1	\$840
IMPLEMENTATION TEAM LEAD PER DIEM	Day	\$150	25	\$3,750

#### I. Monitoring Narrative:

(Describe the monitoring needs, what treatments will be monitored, how they will be monitored, and when monitoring will occur. A detailed monitoring plan must be submitted as a separate document to the Regional BAER coordinator.)

**T01-Aerial Mulching:** Application rates need to be monitored early and throughout the process to identify areas that may need to be reworked and ensure compliance. Personnel demands will depend on the size of the operation. Each person should have ground cover assessment frames and training.

**T02-Early Detection Rapid Response:** Treatment sites will be evaluated annually for the next 3-5 years to ensure control methods are meeting resource objectives and to inventory for new invaders. Non-BAER funding will be used for monitoring during years 2-5. Weed specialist/technicians will visit chemically treated sites after treatment; this is especially important for weed populations that are sprayed to ensure efficacy of herbicide application. Initiate follow-up treatments if additional non-native species or new infestations are discovered. Control will be considered successful upon determination that all noxious weeds have been controlled have not spread beyond their pre-fire locations.

**T03-Initial Road Drainage and Prism Protection:** Road drainage maintenance treatment effectiveness will be monitored during storm inspection and response activities (T10).

**T04-Interim Road Drainage and Prism Protection:** Road drainage maintenance treatment effectiveness will be monitored during storm inspection and response activities (T10).

**T05-Trail Drainage and Tread Protection:** Inspections of the critical erosion spots will take place after large rain events to ensure structures are in place, maintained, and still effective.

**T06- Road Closure Devices:** Regularly inspect gates and signs for condition and visibility. Look for signs of non-compliance at closed areas.

**T07-Dispersed Campsite Closure Devices:** Will monitor sites with Natural Resource Specialist and seasonal staff who manage campgrounds in that area.

**T08-Warning Signs:** District and SO personnel will monitor or check signs after events to ensure that they will be effective for the future.

**T09-Cultural Resource Protection:** At least once during the following field season, this site needs to be monitored by an archaeologist to determine treatment effectiveness and document any change in site condition. Monitoring will also be used to determine if additional management action is required to protect these sites.

**T10-Storm Inspection and Response:** Monitor the storm-patrol response time to ensure objectives are being met. Identify the type of storm event that mobilizes material.

**T11-Implementation Coordination:** Forest BAER Coordinator will file annual accomplishment report.

**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>									
T01-Aerial Mulching	Acre	2,209	1602	\$3,539,500	\$0		\$0	\$0	\$3,539,500
T02-EDRR	Acre	89	185	\$16,422	\$0				
<i>Insert new items above this line!</i>				\$0	\$0		\$0	\$0	\$0
<i>Subtotal Land Treatments</i>				<b>\$3,555,922</b>	<b>\$0</b>		<b>\$0</b>	<b>\$0</b>	<b>\$3,539,500</b>
<b>B. Channel Treatments</b>									
None Proposed				\$0	\$0		\$0	\$0	\$0
<i>Insert new items above this line!</i>				\$0	\$0		\$0	\$0	\$0
<i>Subtotal Channel Treatments</i>				<b>\$0</b>	<b>\$0</b>		<b>\$0</b>	<b>\$0</b>	<b>\$0</b>
<b>C. Road and Trails</b>									
T03-Initial Road Drainage/F	Job	163,950	1	\$163,950	\$27,600		\$0	\$0	\$191,550
T04-Interim Road Drainage	Job	175,070	1	\$175,070					\$175,070
T05-Trail Drainage and Tre	Miles	2,477	11	\$27,000	\$0		\$0	\$0	\$27,000
<i>Insert new items above this line!</i>				\$0	\$0		\$0	\$0	\$0
<i>Subtotal Road and Trails</i>				<b>\$366,020</b>	<b>\$27,600</b>		<b>\$0</b>	<b>\$0</b>	<b>\$393,620</b>
<b>D. Protection/Safety</b>									
T06-Road Closure Devices	Each	3,800	3	\$11,400	\$0		\$0	\$0	\$11,400
T07-Dispersed Camp Clos	Each	1,379	3	\$4,136	\$0				\$4,136
T08-Warning Signs	Lump	5,750	1	\$5,750					\$5,750
T09-Cultural Resouce Prot	Lump	3,251	1	\$3,251	\$0		\$0	\$0	\$3,251
T10-Storm Inspection and	Lump	16,400	1	\$16,400	\$0		\$0	\$0	\$16,400
<i>Insert new items above this line!</i>				\$0	\$0		\$0	\$0	\$0
<i>Subtotal Protection/Safety</i>				<b>\$40,937</b>	<b>\$0</b>		<b>\$0</b>	<b>\$0</b>	<b>\$40,937</b>
<b>E. BAER Evaluation</b>									
Initial Assessment	Report	\$45,000		---	\$0		\$0	\$0	\$0
T11-Implementation Coordin	Lump	\$27,365	1	\$27,365	\$0		\$0	\$0	\$27,365
<i>Insert new items above this line!</i>				---	\$0		\$0	\$0	\$0
<i>Subtotal Evaluation</i>				<b>\$27,365</b>	<b>\$0</b>		<b>\$0</b>	<b>\$0</b>	<b>\$27,365</b>
<b>F. Monitoring</b>									
				\$0	\$0		\$0	\$0	\$0
				\$0	\$0		\$0	\$0	\$0
<i>Insert new items above this line!</i>				\$0	\$0		\$0	\$0	\$0
<i>Subtotal Monitoring</i>				<b>\$0</b>	<b>\$0</b>		<b>\$0</b>	<b>\$0</b>	<b>\$0</b>
<b>G. Totals</b>				<b>\$3,990,244</b>	<b>\$27,600</b>		<b>\$0</b>	<b>\$0</b>	<b>\$4,001,422</b>
Previously approved				\$163,950					
Total for this request				<b>\$3,826,294</b>					

**PART VII - APPROVALS**

/s/ Matthew D. Anderson

07/02/2018

Forest Supervisor

Date

2./s/ Mary Farnsworth (for)

07/02/2018

Nora Rasure, Region 4 Regional Forester

Date







