Date of Report: 10/20/2020

BURNED-AREA REPORT

PART I - TYPE OF REQUEST

A. Type of Report

☒ 1. Funding request for estimated emergency stabilization funds

☐ 2. No Treatment Recommendation

B. Type of Action

☒ 1. Initial Request (Best estimate of funds needed to complete eligible stabilization measures)

☐ 2. Interim Request #___

☐ Updating the initial funding request based on more accurate site data or design analysis

PART II - BURNED-AREA DESCRIPTION

A. Fire Name: East Fork

B. Fire Number: UT-ASF-100340

C. State: Utah

D. County: Duchesne County

E. Region: R4 Intermountain Region

F. Forest: Ashley NF

G. District: Duchesne/Roosevelt RD

H. Fire Incident Job Code: P4NGU2 (0401)

I. Date Fire Started: 8/21/2020

J. Date Fire Contained: 69% on 10/18/2020

K. Suppression Cost: $19,100,000 on 10/18/2020

L. Fire Suppression Damages Repaired with Suppression Funds (estimates):

1. **Fireline repaired (miles): As of 10/13/2020: 16.0 miles of dozer line; 1.2 miles of hand line**
2. **Other (identify):**

M. Watershed Numbers:

Table 1: Acres Burned by Watershed

HUC #	Watershed Name	Total Acres	Acres Burned	% of Watershed Burned
140600030604	Brown Duck Creek-Lake Fork River	24,823	3,216	13%
140600030604	Cabin Creek-Rock Creek	21,719	8,138	37%
140600030307	Carter Creek-Rock Creek	25,228	813	3%
140600030306	Corral Creek-Rock Creek	24,616	11,620	47%
140600030705	Crystal Creek-Yellowstone River	26,197	39	<1%
140600030603	East Basin Creek-Lake Fork River	15,406	98	<1%

HUC #	Watershed Name	Total Acres	Acres Burned	% of Watershed Burned
140600030302	East Fork Rock Creek	11,720	3,954	34%
140600030301	Fall Creek-Rock Creek	18,438	8,430	46%
140600030605	Petty Creek-Lake Fork River	31,940	13,804	43%
140600030801	Upper Pigeon Water Creek	21,916	1,682	8%
140600030303	West Fork Rock Creek	19,348	590	3%

N. Total Acres Burned:

Table 2: Total Acres Burned by Ownership

OWNERSHIP	ACRES
NFS	46,668
BIA	5,496
STATE	0
PRIVATE	217
TOTAL	52,381

O. Vegetation Types: Lodgepole pine, Ponderosa Pine, Mixed Conifer, Aspen, Pinyon Juniper, Sage, shrubs, grasses.

P. Dominant Soils: The soils in the fire area mostly developed from glacial till or more recent colluvial processes. The till is derived from quartzite, sandstone, and shale material carved out of the upper mountains. Colluvium from the dominantly quartzite, sandstone, conglomerate and minor limestone lithologies is found in the lower elevations of the fire area. Major soil textures are cobbly sandy loams, loamy sands, or loams. Depth to bedrock generally varies by slope position, with deeper and finer-textured soils on more gently sloping concave slope positions and shallower soils on steeper convex positions. Reference: Ashely NF Ecosystem Diversity Report, 2009.

Q. Geologic Types: Upper elevations are glacial landscapes. Cirques are cut into the ridgeline and moraine landforms of till from the Uinta Mountain Group, including quartzite, sandstone and shale lithologies, are deposited in the high-mountain valleys. Below, steep glacial canyons have deposits of glacial outwash and slopewash. The geologic formation underlying these canyons in Rock Creek is mostly Weber Sandstone (including quartzite and calcareous sandstone lithologies). In Lake Fork, the lithologies are more varied, including conglomerate and sandstone from the Starr Flat member of the Duchesne River Formation and limestone from the Madison limestone formation. Some alluvial and debris-fan deposits are mapped in Rock Creek and Lake Fork. References: Utah Geological Survey Interactive Geologic Map Portal, accessed 10/14/2020; Ashely NF Ecosystem Diversity Report, 2009.

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	66
INTERMITTENT/EPHEMERAL	85
CANAL/DITCH	5

S. **Transportation System:**
Trails: *National Forest (miles):* 69 *Other (miles):* 1
Roads: *National Forest (miles):* 43 *Other (miles):* 10

PART III - WATERSHED CONDITION

A. Burn Severity (acres):

Table 4: Burn Severity Acres by Ownership

Soil Burn Severity	NFS	BIA	State	Private	Total	% within the Fire Perimeter
Unburned	16,371	1,028	0	54	17,453	25%
Low	12,772	1,872	0	58	14,702	21%
Moderate	29,710	3,582	0	156	33,448	48%
High	4,186	42	0	3	4,231	6%
Total	63,039	6,524	0	271	69,834	100%

B. Water-Repellent Soil (acres): 37,680 acres

C. Soil Erosion Hazard Rating: Before the fire, the soil resources in these watersheds had a low soil erosion hazard. The post-fire estimated soil erosion hazard on areas of moderate and high soil burn severity is high on steep slopes (>30% slope) and moderate on gentle slopes (<30% slopes). Post fire ratings are as follows: High = 9,420 acres; Moderate = 28,260 acres; Low = 32,154 acres.

D. Erosion Potential: Average hillslope erosion 1-year post-fire is 6 tons/acre. Average hillslope erosion 2-years post fire is 3 tons/acre

E. Sediment Potential: Average sediment delivery to channels 1-year post-fire is 380 yds^3/mi^2. Average sediment delivery to channels 2-years post-fire is 190 yds^3/mi^2.

F. Estimated Vegetative Recovery Period (years): 3-5 years for shrubs, forest understory, 20 years for forest overstory.

G. Estimated Hydrologic Response (brief description): Post-fire conditions have been assessed to determine how fire-induced changes to hillslope hydrology and soil conditions will impact the values at risk. Modeling results of a flow analysis show that during summer rainfall events post-fire flows could increase by about 50-100 cfs in Rock Creek above Upper Stillwater Reservoir. Modeling results for a smaller watershed in Peterson Gulch (the outlet of which is above the Rock Creek road) show an increase in flow from 18 cfs to over 400 cfs. These values are very high and based on experiences from other fires in northern Utah, the response would likely be much less, about 50-100 cfs in a large storm.

For spring runoff, post-fire water flows above Upper Stillwater Reservoir are expected to increase very little since spring runoff is dominated by snow melt at high elevations where cooler temperatures slow the rate of snowmelt. Since soil moisture is at or near saturation during snow melt it is expected that the loss of vegetative cover will have little effect on runoff unless there is a rain on snow event, which could increase runoff significantly. Rain on snow events are very difficult to predict and is not included in this analysis.

The primary watershed responses of the East Fork Fire are expected to include: 1) an initial flush of ash, 2) some rill and gully erosion in drainages and on steep slopes within the burned area, 3) possible flash floods with increased peak flows and sediment deposition. These responses would be expected to occur in initial storm events, and will become less evident as vegetation is reestablished, providing ground cover, increasing surface roughness, and stabilizing and improving the infiltration capacity of the soils.

USGS post-fire debris flow hazard models estimate a low to moderate level of debris-flow hazard in most of the area burned by the East Fork Fire. High to moderate levels of debris flow hazard occur in watersheds in the southeast section of the burn area above Dry Canyon and Miners Gulch and above some sections of the Lake Fork River, south of Moon Lake and Rock Creek. Most of the burn areas has a greater than 50% likelihood of producing debris flows at 15-minute rainfall rates greater than 40 mm/hr. High hazard basins require much more modest 15-minute rainfall intensities between 16 and 28 mm/hr to exceed a 50% likelihood of debris flow

occurrence. Most watersheds are estimated to produce volumes between 1,000 – 100,000 m^3, which results in a moderate combined debris-flow hazard for most of the burn area.

PART V - SUMMARY OF ANALYSIS

Introduction/Background: The East Fork Fire was caused by a lightning strike in the Rock Creek drainage of the High Uintas Wilderness above Upper Stillwater Reservoir on August 21st, 2020. On September 7th, high winds pushed the fire to the SE, out of the Wilderness. During the next two days, the fire exhibited extreme fire behavior with wind driven runs to the E/SE that resulted in additional growth of approximately 34,000 acres in 2 days. Following that wind event, modest growth has continued to occur daily on all flanks of the fire except for the south flank where containment has been achieved through the use of dozer lines, handlines, roads, fuel breaks and terrain features.

Burned Area Reflectance Classification (BARC) imagery was obtained from the US Forest Service Geospatial Technology and Applications Center on October 2nd. A field team of Burned Area Emergency Specialists visited the fire to validate the BARC data the following week. No revision to the BARC data was necessary and the team used the BARC data to create the current Soil Burn Severity (SBS) map following the field review. The vast majority of the BAER assessment was completed remotely due to the COVID-19 pandemic. The BARC map validation team were the only BAER team members to visit the burnscar for BAER assessment purposes. However, the BAER team engineer and weeds specialist have both made numerous visits to the fire while acting in Resource Advisor and Technical Specialists roles during suppression of the wildfire.

As staffing on the local unit allows, additional field review of the Moon Lake water system and the Maintenance Level 2 roads is needed and will most likely result in the need for an interim Burned Area Report and additional treatment recommendations.

The fire has continued to grow since the SBS data was finalized and is expected to grow until a season ending precipitation event puts the fire out. The BAER analysis perimeter for the initial 2500-8 will be based on the 69,834 acres that are reflected in the current SBS map. The additional growth has mostly been in the Wilderness area above Upper Stillwater Reservoir and Moon Lake (also a reservoir). The ongoing additional growth beyond the BAER analysis perimeter is not expected to result in significant changes to the Critical Value assessment that is presented in the initial 2500-8, with the only exception being the extent of the potential threat to the non-motorized trail system in the Wilderness area.

A. Describe Critical Values/Resources and Threats (narrative): Critical values within and downstream/downslope of the burnscar were identified and risk to those values was assessed using the matrix in Table 5. See discussion below for a brief analysis of each critical value. Detailed analysis of each critical value is available in the project record and can be found in the Critical Values spreadsheet and resource specialist reports.

Table 5: 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. Human life and safety of Forest visitors and employees traveling on NFS roads and trails in the burnscar is threatened due to the potential for injury or loss of life from hazard tree

strikes, falling rocks, flash floods, debris flows, and other burned area hazards. The probability of damage or loss is **likely** as the NFS transportation system contains many motorized and non-motorized routes adjacent to and through the burned area. The hazard tree threat is particularly concerning as many of the ML2 roads and most, if not all trails have not been assessed or treated by the fire suppression resources. Much of the burned area had standing, beetle killed trees before the fire. The extreme fire behavior during the wind driven run in early September also burned many of the Aspen stands at high severity creating a unique hazard in the form fire-killed Aspen, which has inherently weak, shallow roots. The magnitude of consequence is **major** since an overhead hazard strike, entrapment in a flood or debris flow could result in serious injury or loss of life. The risk level is **very high**. Treatments are recommended. See treatments PS-01, RT-01, RT-02, RT-03.

b. Human life and safety of Forest visitors and employees traveling cross-country on foot or horseback through the burned area (not on system roads or trails) is threatened due to the potential for injury or loss of life from hazard tree strikes, falling rocks, flash floods, debris flows, and other burned area hazards.. The probability of damage or loss is **possible** as cross-country travel through the burned area is to be expected, however not with the frequency of travel that occurs on the transportation system. The magnitude of consequence is **major** since an overhead hazard strike, entrapment in a flood or debris flow could result in serious injury or loss of life. The risk level is **high**. Treatments are recommended. See treatment PS-01, RT-03.

c. Human life and safety of campground occupants at the Moon Lake campground is threatened due to the potential for debris flow deposition in the site. Burned slopes are present within 500' of the campground. The probability of loss or damage is **possible**. USGS modeling indicated there is 40-60% chance of debris flow in the drainage above the campground. The magnitude of consequence is **moderate** as debris flow deposition in the campground could result in injury to campers on low lying surfaces (sleeping in tents). Treatments are recommended. See treatment RT-03.

d. Human life and safety of boaters on Moon Lake is threatened by the potential for fire killed trees and floatable debris being washed into the lake during high flow events and presenting a collision hazard. The probability of damage or loss is **unlikely** given the size of the lake and types of small watercraft that are operated on the lake. The magnitude of consequence is **major** as a collision could cause serious injury or death. The risk rating is **intermediate**. Treatments are recommended. See treatment RT-03.

2. **Property (P):**The Rock Creek and Moon Lake NFS roads are threatened due to increased post-fire runoff and debris flows that could result in culvert overtopping, erosion of fill slopes, loss of control of water, and deposition of debris on the pavement. Post fire peak flow and debris flow model outputs indicate that an increased watershed response to short duration, high intensity precipitation is expected. The probability of damage or loss is **likely** because steep hillslopes and drainages with extensive amounts of moderate and high SBS are present above both routes. Between the two routes the most substantial threats are present on the Rock Creek road, just above the Forest boundary where it crosses an active alluvial fan at the mouth of Peterson Gulch. The magnitude of consequence is **moderate** because debris deposition on the roads would require emergency removal to restore access to critical infrastructure (Upper Stillwater Dam, Rock Creek Lodge, Moon Lake Resort, numerous NFS campgrounds and trailheads) and erosion of fill slopes or culvert plugging would require repair to restore control of water under the roads and the structural integrity of the road shoulders. The risk level is **high**. Treatments are recommended. See treatments RT-01, RT-02.

b. Numerous additional motorized vehicle bridges on NFS roads within and downstream of the of the burnscar are threatened due to expected increases in post-fire runoff, mobilization of floatable debris, and debris flows. The probability of damage or loss is **unlikely** because in many cases much of the streamflow under the bridges is regulated by upstream dams

(Upper Stillwater, Moon lake, Twin Potts), the contributing watersheds below the dams have relatively low expected increases in runoff, or the structures have adequate clearance to pass flood flows. The magnitude of consequences if the threat did present itself would be **major** as substantial property damage would occur to the NFS bridges. The risk level is **intermediate**. Treatments are not recommended.

c. The NFS non-motorized trails within the burnscar are threatened due to increased post-fire runoff that may result in accelerated erosion of trail prisms downstream or downslope of areas of moderate and high SBS. Many of the trails affected by the fire are located on steep slopes or in the drainage bottoms and have the potential to intercept overland flow from upslope burned areas. The probability of damage or loss is **likely** because many of the threatened trails have steep grades and inadequate drainage features to withstand the expected increases in post-fire runoff. The magnitude of consequence is **major** because erosion of the threatened trail segments would result in substantial property damage and loss of the NFS investment in the trail system. The risk level is **very high**. Treatments are recommended. See treatment RT-03

d. The non-motorized trail bridge on the Brown Duck trail is threatened due to expected increases in post fire runoff that may mobilize existing floatable debris in the channel above the structure during high flow events. The probability of damage or loss is **likely** as increased post-fire stream flows will have the ability to mobilize the logs and they may impact the structure due to the reduced freeboard that is expected with the increased post-fire flood discharge. The magnitude of consequence is **major** as total loss of the trail bridge is expected to occur. The risk level is **very high**. Treatments are recommended. See treatment C-01.

e. The non-motorized trail bridge on the Rock Creek trail is threatened due to expected increases in post fire runoff that may mobilize fire killed trees that fall in the channel above the structure. The probability of damage or loss is **possible** as increased post-fire stream flows will have the ability to transport any fire killed trees that fall in the channel above the bridge and they may impact the structure due to the reduced freeboard that is expected with the increased post-fire flood discharge. The magnitude of consequence is **major** as substantial damage to trail bridge would occur. The risk level is **high**. Treatment options to reduce the risk are limited due to the location of the bridge and lack of access for heavy equipment. Removal or disassembly of the bridge would not be possible ahead of the damaging event. Emergency stabilization treatments are not recommended. Forest staff are advised to regularly monitor the bridge and channel directly upstream of the bridge for accumulation of fire killed trees and cut/remove threatening material when possible.

f. Additional non-motorized trail bridges were present within the burned area, but post-fire inspections have not been completed and the current status of the structures is unknown. Two bridges on the Squaw Basin trail were built using untreated native log stringers and may have been significantly damaged by the fire. The Ottoson Creek and Lake Fork trail bridges were built with metal superstructures and the decks/railings may have been damaged by the fire. Follow up inspection, threat identification, and risk assessment are recommended.

g. The Moon Lake campground is threatened due to the potential for debris flow material being deposited in the campground following short duration, high intensity rainfall on the hillslopes above the site. The probability of damage or loss is **possible** as there are burned hillslopes within 500’ of the campground. The magnitude of consequence is **minor** as the expected damage would be limited to deposition of debris on the campground infrastructure. The risk rating is **low**. Emergency stabilization treatments are not recommended.

h. The remaining FS campgrounds within or near the burnscar (Upper Stillwater, Yellow Pine, Miner's Gulch, and Moon Lake Group site) are not threatened.

i. The Moon Lake trailhead is threatened by the potential for sediment from adjacent hillslopes and the trail corridor being deposited in the parking lot. The probability of damage or loss is **likely** given the proximity to the moderate and high SBS slopes above the parking lot and the history of pre-fire sediment deposition in the parking lot. The magnitude of consequence is **minor** since the impact would be limited to deposition in the parking lot and erosion of the infrastructure is not expected. The risk rating is **low**. Treatments are not recommended.

3. **Natural Resources (NR):**Water on NFS lands within and downstream of the burnscar that is used for municipal and agriculture supply is threatened due to potential water quality impacts from increased sediment and nutrient loading following runoff producing events. The probability of damage or loss is **possible** because hillslope erosion and transport of sediment, ash, and nutrients is expected to occur for the next few years. The magnitude of consequence is **minor** because the impacts to water quality are expected to be a temporary event following storm runoff and the sediments will settle in the reservoirs at Upper Stillwater and Moon Lake. The risk rating is **low**. Treatments are not recommended

b. Soil productivity in areas of high SBS is threatened by post-fire erosion and loss of soil horizons. The probability of damage or loss is **possible** because there is a short-term potential for large increases in hillslope erosion. The magnitude of consequence is **moderate** because the considerable loss of soil productivity is within the expected variability for soil productivity in fire adapted landscapes. The risk rating is **intermediate**. Treatments are not recommended.

c. Hydrologic function in areas of moderate and high SBS is threatened due to the presence of hydrophobic soils, loss of ground cover, and reduced infiltration. The probability of damage or loss is **likely** given the amount of moderate and high SBS that is present within the burnscar (approximately 54% of the BAER analysis area). The magnitude of consequence is **moderate** because the expected increases in runoff and erosion will persist on the landscape for approximately 3-5 years. The risk rating is **high**. Treatments to reduce the risk are not recommended because they would be very limited in application by the steepness of the threatened slopes, not economically justified, and in many cases would not be compliant with Wilderness management policy.

d. Native plant communities in areas where invasive species or noxious weeds are absent or present in only minor amounts are threatened by potential introduction of noxious weeds into areas that were disturbed by unmitigated fire suppression activities. The probability of damage or loss is **very likely** because firefighting equipment and personnel are known to be vectors. One of the locations used for an incident command post (ICP) is infested with numerous noxious weeds. All firefighting equipment and personnel assigned to this ICP are assumed to be vectors as daily cleaning/inspection was not conducted when departing the ICP to engage in firefighting activities. The magnitude of consequence is **moderate** because noxious weed establishment in areas newly disturbed by suppression activities will create a long term weed management issue and will degrade the existing intact native plant community. The risk rating is **very high**. Treatments are recommended. See treatment L-01.

e. Native plant communities in areas where invasive species or noxious weeds are absent or present in only minor amounts are threatened by potential introduction of noxious weeds into areas that experienced moderate and high SBS. The probability of damage or loss is **very likely** because invasive weeds are expected to take advantage of disturbed or bare soil where seeds lay dormant in uninfested native plant communities or adjacent to known

weed populations. The magnitude of consequence is **moderate** because the known populations are aggressive with very persistent seeds requiring years of monitoring and treatment. The risk rating is **very high**. Treatments are recommended. See treatment L-02

4. **Cultural and Heritage Resources:**The NRHP eligible Bear Wallow Logging Camp is threatened because the site has increased visibility in the post-fire environment which could lead to vandalism or looting and a loss of historic integrity, especially considering its proximity to a road. The probability of damage or loss is **likely** because it is adjacent to a ML2 road and is a highly visible site. The wildfire has removed groundcover and previously concealed artifacts are now exposed. The magnitude of consequence is **moderate** because unauthorized removal of artifacts or damage to features will irreversibly damage the site integrity and thus its potential to convey associations with historical events or important themes in Ashley National Forest history. The risk rating is **high**. Treatments are recommended. See treatment PS-02.

    b. Numerous other NRHP eligible sites are threatened by erosion during post fire runoff or debris flow events. The erosion could impact intact features and artifact distribution across sites. The probability of damage or loss is **unlikely** because all sites are located low angle slopes that have a low probability of generating damaging erosion. The magnitude of consequence is **major** because damage to soils on historic properties could compromise the integrity of those sites or possibly destroy intact features. The risk rating is **intermediate**. Treatments are not recommended.

B. Emergency Treatment Objectives: Raise awareness of post-fire hazards throughout the burned area; minimize post-fire damage to NFS roads, trails, and bridges; minimize the spread of noxious weeds in areas disturbed by fire suppression activities; minimize the spread of noxious weeds in burned areas, protect the integrity of NRHP eligible cultural resources.

C. Probability of Completing Treatment Prior to Damaging Storm or Event:
Land: 90%
Channel: 90%
Roads/Trails: 80%
Protection/Safety: 95%

D. Probability of Treatment Success

Table 6: Probability of Treatment Success

	1 year after treatment	*3 years after treatment*	*5 years after treatment*
Land	85%	90%	90%
Channel	90%	90%	90%
Roads/Trails	85%	90%	90%
Protection/Safety	90%	80%	70%

E. Cost of No-Action (Including Loss): $5,905,570 (assumes 80% chance of loss of threatened market value resources and ongoing noxious weeds/invasive treatments costs with non-BAER funds).

F. Cost of Selected Alternative (Including Loss): $2,331,382 (assumes costs of treatments to protect threatened market value resources with a 20% chance of loss of, costs of BAER EDRR, and ongoing noxious weeds and invasive species to be funded with non-BAER funds).

G. Skills Represented on Burned-Area Survey Team:

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

Team Leader: Brendan Waterman
Email: brendan.waterman@usda.gov **Phone(s):** 385-377-4338

Forest BAER Coordinator: Ryan Mower
Email: ryan.mower@usda.gov **Phone(s):**435-781-5870

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

Skill	Team Member Name
Team Lead(s)	Brendan Waterman
Soils	Kara Green
Hydrology	Charlie Condrat, Michael Damman
Engineering	Valton Mortenson
GIS	
Archaeology	Trista Schiele
Weeds	Garry Brown
Recreation	Ryan Buerkle
Other	

H. **Treatment Narrative:** The following narratives summarize the response actions recommended to decrease risks to BAER Critical Values. Detailed specifications, cost estimates, and maps identifying the spatial location for the treatments are located in the East Fork BAER Assessment project record. The documents can be obtained by contacting the Ashley National Forest BAER Coordinator.

Land Treatments:

L-01 Early Detection Rapid Response (EDRR) Suppression: Surveys and treatment for new or expanding invasive plant and noxious weed infestations associated with fire suppression activities will be conducted by during Spring/Summer 2021. EDRR activities that extend beyond the first year will be accomplished through non-BAER funding sources. EDRR Suppression efforts will only occur along areas that were disturbed by unmitigated suppression activities and suppression rehab, including areas of dozer line construction, handline construction, the initial ICP at Rock Creek Ranch (this meadow was previously infested, then heavily disturbed while utilized for the ICP, then drill seeded during suppression rehab), heli-spots, safety zones, spike camps, and drop points. These areas were delineated by the BAER Weeds Specialist using suppression disturbance lines and points provided by the IMT. If an effort to accurately capture the actual size of the on the ground disturbance, the points and lines were buffered into polygons that most accurately represent the actual disturbed area. The buffer assigned to the GIS line and point features varied by feature type. For example, the line features for rehabilitated dozer lines are assumed to be 25’ total disturbance width and the rehabilitated handlines are assumed to be 3’ total disturbance width.

Item	UOM	Unit Cost	# of Units	Total Cost
L-01 EDRR – Suppression	acre	$95.38	78	$7,440

L-02 EDRR BAER: Survey and treatment for new or previously undocumented expanding invasive plant/noxious weed infestations associated with fire disturbance will be conducted during Spring/Summer 2021. EDRR implementation will be completed within one year of fire containment. EDRR activities that extend beyond the first year will be accomplished through non-BAER funding sources. This treatment will focus on existing small populations of noxious weeds within the burned area (approximately 80 acres total, with an average size of 1.4 acres per site) and burned areas adjacent to known noxious weed populations in an effort to minimize spread of those populations into the adjacent burned area (a 200’ buffer around the existing

infestations). The burned areas are highly susceptible to new infestation as because the native vegetation that has historically minimized spread of the existing noxious weeds has been consumed by the fire. Implementation personnel will survey and treat any newly detected invasive plants or noxious weeds immediately upon detection. The estimated cost per acre is based on the assumption that much of the targeted acreage (the burned acreage adjacent to the know populations) will only require a brief survey and not an eradication treatment.

Item	UOM	Unit Cost	# of Units	Total Cost
L-02 EDRR – BAER	acre	$25.93	453	$11,750

Channel Treatments:

C-01 Trail Bridge Stream Channel Clearing: Removal of logs and woody debris from the stream channel directly upstream of the Brown Duck Trail bridge during Fall 2020. This treatment will minimize the potential for LWD to impact the bridge and ensure that the structure has adequate freeboard to pass water and debris that is expected to mobilize during post-fire flood events. Onsite boulders will be repositioned to protect abutment #2 from accelerated erosion during post-fire runoff events. This trail bridge is used for recreation and administrative uses and represent a significant financial investment for the USFS with an estimated replacement cost of approximately $60,000. Implementation of the treatment protects that investment from damage or loss during post-fire flood events.

Item	UOM	Unit Cost	# of Units	Total Cost
C-01 Trail Bridge Channel Clearing	Job	$7,800	1	$7,800

Roads and Trail Treatments:

RT-01 Road Drainage Reconstruction: Increased post-fire runoff and erosion from burned watersheds above NFS roads is expected to overwhelm the existing road drainage features and result in culvert plugging, culvert over-topping, erosion of fill slopes, and deposition of debris on the Rock Creek and Moon Lake roads. Both routes are paved ML5 routes owned and maintained by the USFS. These roads are critical for USFS, US Bureau of Reclamation, and Central Utah Water Conservancy District administrative use and well as forest recreation, and other permitted special uses. These routes represent a significant financial investment.

Implementation of the recommended treatments will decrease the risk to human life and safety, minimize operational impacts to critical water diversion, storage, and delivery infrastructure, and protect the NFS road infrastructure investments. The potential monetary cost to repair roads that would be damaged by post-fire events if left untreated significantly exceeds the cost of the treatments as both routes are valued at more than $500,000 per mile.

The items to be implemented include culvert cleaning and ditch cleaning along the sections of the Rock Creek and Moon Lake roads that are downstream or downslope of areas of moderate and/or high SBS. Under pre-fire runoff regime, the current condition and previous maintenance for the drainage structures on these high value roads was adequate to accommodate pre-fire runoff. Both roads are regularly inspected by Forest Engineering staff to monitor the condition of the ditches and culverts and assess the capacity of the structures. Ongoing maintenance has not been deferred. An emergency funding authorization is needed to support the immediate mobilization of equipment and operators who will prepare the drainage structures for the increased runoff that is a direct result of the burned watershed conditions and the increased response to precipitation events. The current BAER guidance for road infrastructure, issued in 2018, clearly states that the emergency maintenance of high-value drainage features in

combination with post-storm inspection and response are appropriate BAER treatments in lieu of more costly structural modification to the ML5 roads.

Item	UOM	Unit Cost	# of Units	Total Cost
RT-01 Road Drainage Reconstruction	Mile	$3,470	13.1	$45,500

RT-02 Road Treatment Storm Inspection and Response: Storm inspection and response keeps drainage features treated under RT01 functional by removing accumulated sediment and debris between or during storm events. This treatment is in lieu of more expensive structural modifications (culvert upsizing) or additions to existing road drainage structures which is not economically viable on the paved routes. Road drainage inspection and response treatments are proposed for the Rock Creek and Moon Lake roads.

Following heavy rains and significant spring snowmelt the inspection will involve identification of drainage hazard conditions such as accumulated debris, sediment, and plugged culverts that are limiting functionality of the road drainage features. The response will use equipment to remove obstructions from culvert inlets, catch basins, dips, lead-off ditches, riprap armor, and other drainage features. Excess material and debris removed from the drainage features will be placed where it cannot re-enter the stream. Problems will be corrected before they worsen or jeopardize the road drainage features. This treatment is used in lieu of more costly structural upgrades.

Item	UOM	Unit Cost	# of Units	Total Cost
RT-02 Road Storm Inspection and Response	Day	1,900	20	$38,000

RT-03 Trail Drainage/Tread Stabilization and Trailhead Warning Signs: The existing trail system drainage features are insufficient to handle the anticipated increase in post-fire runoff in areas burned at moderate to high severity on approximately 28 miles of trails in BAER analysis area. 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 and/or dangerous to use. 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. Accelerated erosion that is channelized downslope and into streams may impair water quality.

Implementing this treatment will decrease the risk of unacceptable loss of trail prism, providing for continued recreation opportunities with reduced risk to human life and safety. Proper and adequate drainage for post-fire runoff will reduce and prevent the trail prism and tread from eroding. Preventing the loss of trail prism is much more cost effective than rebuilding trial prisms.

The managed use for these systems is non-motorized. Priority trails to be worked on include those that are within or below moderate to high soil burn severity slopes and those with sustained steep grades that have inadequate drainage.

The system trails are resources for visitors and recreationists in the area. Large storm events will deteriorate and compromise the trail's integrity, eventually destroying large sections if no actions are taken. The fire has burned through root balls and stumps underlying the trail tread creating hazardous voids beneath the trail. When trail users travel over these voids, they can break through the thin overlying crust potentially causing a significant accident and injury.

Emergency drainage features will be placed on grades in excess of 5% with a spacing of 50 feet between each feature. Grades above 15% will call for drainage features to be implemented with a spacing of 25 feet between drainage features. Drain dips are acceptable in place of rock waterbars if soil types allow for maximum compaction and result in an effective design.

Minimum tool requirements are necessary for designated wilderness trails. If the trails affected by the fire deteriorate or are destroyed by increased runoff and erosion the costs to reconstruct or relocate trails would be significant and costly as rebuild cost is estimated at $25,000 per mile. The emergency response drainage construction would mitigate the risk of catastrophic failure and the potential for high replacement costs due to the minimum tool wilderness regulations. It is anticipated that 80 percent of the affected trails would experience significant damage if no emergency stabilization is completed and 10% would have some level of damage if the work is completed.

Burned area hazard warning signs will warn visitors regarding the hazards they may encounter when using affected trails, Moon Lake Campground, and Moon Lake Boat Launch.

Item	UOM	Unit Cost	# of Units	Cost
RT-03 Trail Drainage/Tread Stabilization	Mile	$1,053.75	28	$29,505
RT-03 Recreation Warning Signs	Sign	$30	10	$300

Protection/Safety Treatments:

PS-01 Burned Area Warning Signs – Roads: The purpose of the Burned Area Warning signs is to reduce risks to human life and safety, to inform forest visitors of potential dangers and/or hazards when entering burned areas on NFS lands. Entering burned areas presents a high risk to human and life and safety, with increased threats from post-fire effects such as falling trees, rolling rocks, flash floods, and debris flows. It is necessary to inform the public of burned-area hazards that are a direct result of wildfire; hazards which are substantially different compared to unburned forest setting and with which many forest visitors may be unfamiliar.

Roadway burned area warning signs will be installed to inform the public of the possible dangers associated with a burned area on major entry points into the burned area. Advisory speed limit signs (35 mph) are needed on the Rock Creek road at both ends of the Peterson Gulch alluvial fan to minimize collisions with destabilized rocks or debris that will be transported off of the burned slopes onto the pavement, presenting a new post-fire hazard to this portion of the roadway. Without the reduced advisory speed limit posting, travelers might encounter post-fire debris while traveling at the currently posted speed limit (55 mph) and be unable to avoid rocks or debris on the road.

Item	UOM	Unit Cost	# of Units	Total Cost
PS-01 Sign Design/Install Labor	Job	$4,400	1	$4,400
PS-01 Equipment	Day	$400	4	$1,600
PS-01 8’x4’ Warning Signs	Each	$600	8	$4,800
PS-01 Speed Limit Signs	Each	$100	2	$200
PS-01 Sign Posts	Each	$30	22	$660
PS-01 Hardware	Lump	$100	1	$100

PS-02 Cultural Resource Patrols: The primary purpose of resource protection patrols is to reduce or mitigate the risk of archeological looting or vandalism. These sites are most vulnerable to looting immediately after a fire when there is no vegetation to help obscure artifact visibility. The values mitigated by this treatment are the site integrity of cultural resources listed, eligible, or potentially eligible for inclusion in the National Register of Historic Places and the site integrity of cultural resources important to potentially affected Indian tribes, regardless of National Register eligibility. Exposure of previously hidden artifacts and features due to vegetation loss and increased ground surface visibility increase the potential for looting that affects site integrity. Unauthorized artifact collection (i.e. looting) is a pervasive, persistent, and well-documented activity in this area of Utah.

Patrols will reduce the potential for looting to sites by establishing a regular presence in the area. The patrols will document changes to the site in terms of artifact and feature composition that indicate if archeological looting and /or erosion is occurring that could affect site integrity. The results of the patrols will be used to determine if additional management action is required to protect these sites. Cultural resources are scattered throughout the fire area, making area closures difficult. Administrative closures and on the ground treatments such as fencing, signing and “camouflaging” can draw attention to cultural site locations. These treatment types will not deter criminal activity, they will most likely draw unwanted attention to the site and increase the probability of artifact looting.

Item	UOM	Unit Cost	# of Units	Total Cost
PS-02 Cultural Resource Patrol	Patrol	$913	3	$2,738

I. Monitoring Narrative: Road drainage treatment effectiveness monitoring will be completed through implementation of storm inspections and response activities in the first year following containment of the fire. Road storm inspection and response will be monitored by assessing the response time to ensure objectives are being met. Trail drainage treatment effectiveness will be monitored by Forest personnel who will patrol trails after spring run-off and precipitation events to ensure existing drainage structures are effective and ready to handle the next precipitation event. EDRR treatments will be monitored by reviewing the size and density of infestations following EDRR treatments. Trail bridge channel clearing will be completed through implementation of inspections in the first year following containment of the fire. Warning sign treatments will be monitored by Forest personal to ensure that the signs are not being vandalized, damaged, or stolen. Cultural resource patrols will be monitored by documenting changes to the site in terms of artifact and feature composition that indicate if archeological looting and /or erosion is occurring that could affect site integrity.

PART VI – EMERGENCY STABILIZATION TREATMENTS AND SOURCE OF FUNDS

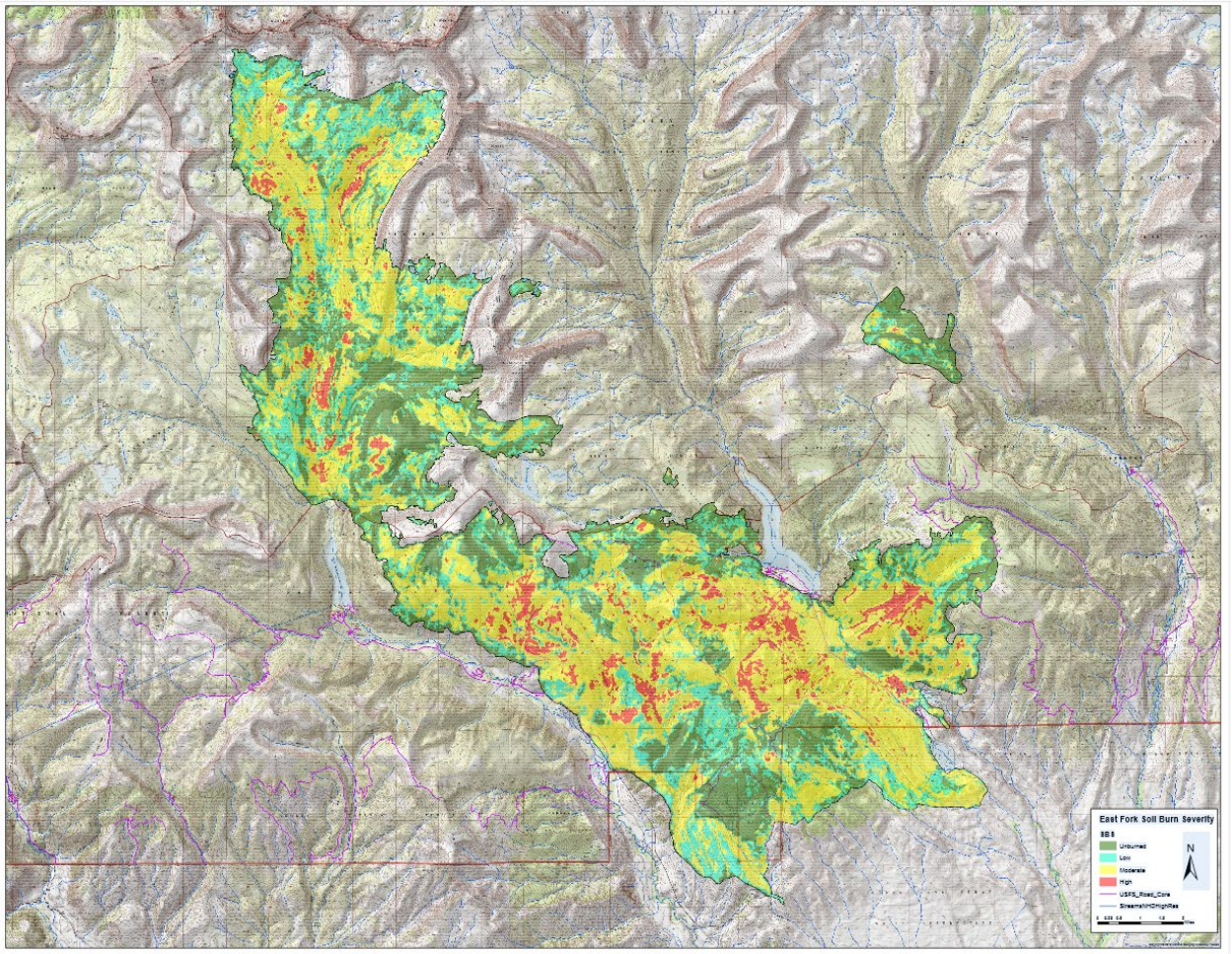
			NFS Lands				Other Lands			All
		Unit	# of		Other	# of	Fed	# of	Non Fed	Total
Line Items	Units	Cost	Units	BAER $	$	units	$	Units	$	$
A. Land Treatments										
L-01 EDRR - Suppression	Acre	95	78	$7,440	$0		$0		$0	$7,440
L-02 EDRR - BAER	Acre	26	453	$11,746	$0		$0		$0	$11,746
Insert new items above this line!				$0	$0		$0		$0	$0
Subtotal Land Treatments				$19,186	$0		$0		$0	$19,186
B. Channel Treatments										
C-01 Channel Clearing	Job	7,800	1	$7,800	$0		$0		$0	$7,800
				$0	$0		$0		$0	$0
Insert new items above this line!				$0	$0		$0		$0	$0
Subtotal Channel Treatments				$7,800	$0		$0		$0	$7,800
C. Road and Trails										
RT-01 Road Drainage Reco	Mile	3,470	13	$45,457	$0		$0		$0	$45,457
RT-02 Road Storm Inspectio	Day	1,900	20	$38,000	$0					$38,000
RT-03 Trail Drainage/Tread	Mile	1,054	28	$29,505	$0		$0		$0	$29,505
Insert new items above this line!				$0	$0		$0		$0	$0
Subtotal Road and Trails				$112,962	$0		$0		$0	$112,962
D. Protection/Safety										
RT-03 Recreation Warning S	Each	30	10	$300	$0		$0		$0	$300
PS-01 Road Warning Signs	Lump	11,760	1	$11,760	$0		$0		$0	$11,760
PS-03 Cultral Resource Pat	Day	913	3	$2,739						$2,739
Insert new items above this line!				$0	$0		$0		$0	$0
Subtotal Protection/Safety				$14,799	$0		$0		$0	$14,799
E. BAER Evaluation										
Initial Assessment	Report			$0	$0		$0		$0	$0
				$0	$0		$0		$0	$0
Insert new items above this line!				$0	$0		$0		$0	$0
Subtotal Evaluation				$0	$0		$0		$0	$0
F. Monitoring										
				$0	$0		$0		$0	$0
				$0	$0		$0		$0	$0
Insert new items above this line!				$0	$0		$0		$0	$0
Subtotal Monitoring				$0	$0		$0		$0	$0
G. Totals				$154,747	$0		**$0**		**$0**	**$154,747**

PART VII - APPROVALS

1. /s/ SUSAN EICKHOFF

Oct 22, 2020

Forest Supervisor Date



Soil Burn Severity for the East Fork Fire.
A large format .pdf map and .kmz file are available in the project record.