Date of Report: 9/17/21

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: AMERICAN FORK FIRE

A. Fire Name: American Fork

B. Fire Number: MT-HLF-005131

C. State: MT

D. County: Park, Meagher, Sweetgrass

E. Region: 1

F. Forest: Helena-Lewis & Clark NF
Custer Gallatin NF

G. Districts: White Sulphur RD (HLC)
Yellowstone RD (CG)

H. Fire Incident Job Code: P1N57E (0115)

I. Date Fire Started: 7/17/21

J. Date Fire Contained: TBD

K. Suppression Cost: $8,915,000 as of 9/14/21

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

1. Fireline repaired (miles, to date): Handline: 3.2 miles on NFS land.
   Dozer line: 5.0 miles on NFS land.

2. Other (identify): Road used as fireline: 1.5 Miles

M. Watershed Numbers:

Table 1: Acres Burned by Watershed

HUC #	Watershed Name	Total Acres	Acres Burned	% of Watershed Burned
100402010601	Upper Big Elk Creek	32,814	807	3
100402010901	Upper American Fork	26,128	10,281	39
100700030301	Bennett Creek-Shields River	31,910	6,874	22

N. Total Acres Burned:

Table 2: Total Acres Burned by Ownership

OWNERSHIP	ACRES
NFS	14,684
BLM	0
STATE	0
PRIVATE	3,279
TOTAL	17,963

O. **Vegetation Types:** Douglas-fir, Lodgepole, Juniper, Grassland, Sage/Grass Rangeland, Riparian

P. Dominant Soils: Common soil types within the fire perimeter include Typic Haplocryepts, Lithic Haplocryepts, and Eutric Haplocryalfs on forested hillslopes. Argic Cryoborolls and Typic Cryoboralfs are found on terraces and floodplains. Riparian areas and wetlands contain Fluvaquentic Haplocryolls, Typic Cryaquolls and similar soils. Shallow lithic soils, rock outcrops, and talus fields are common above treeline.

Q. Geologic Types: Within the fire perimeter, geology is dominated by sedimentary Sandstones and Siltstones. Glacial till deposits are found in valley bottoms originating from drainages to the south in the Crazy Mountain. Alluvial deposits are located in the major drainages, the Shields River to the west and the American Fork and South American Fork to the east. Above tree line, an exposed igneous intrusion of diorite and gabro makes up the prominent rock outcrops.

R. Miles of Stream Channels by Order or Class:

Table 3: Miles of Stream Channels by Order or Class

STREAM TYPE	MILES OF STREAM
PERRENIAL	46.8
INTERMITTENT	
EPHEMERAL	
OTHER (DEFINE)	

S. **Transportation System:**
Trails: *National Forest (miles):* 5.4 *Other (miles):*
Roads: *National Forest (miles):* O&M: 16.2 *Other (miles):* Decommissioned: 39.0

PART III - WATERSHED CONDITION

A. Burn Severity (acres):

Table 4: Burn Severity Acres by Ownership

SOIL BURN SEVERITY	NFS	BLM	STATE	PRIVATE	TOTAL	% WITH FIRE PERIMETER
UNBURNED	3,343	0	0	499	3,839	21
LOW	3,612	0	0	1,489	5,101	28
MODERATE	10,183	0	0	1,795	11,978	67
HIGH	852	0	0	31	883	5
TOTAL	17,990	0	0	3795	21,801	

B. Water-Repellent Soil (acres): Water repellent soil area was calculated directly from soil burn severity, with moderate and high severity soils grouped as water repellent soils, and unburned and low severity soils grouped as non-water repellent soil. Within Forest Service lands, water repellent soils totaled 6,995 acres and non-water repellent soils totaled 11,035 acres.

C. **Soil Erosion Hazard Rating (FS Lands):**
Low – 6955 acres
Moderate – 10183 acres
High – 852 acres

D. **Erosion Potential:** 0.0-0.7 tons/acre/year

E. Sediment Potential: 160 lbs/acre/year

F. Estimated Vegetative Recovery Period (years): 2-5 years (grasslands and forest understory)

G. Estimated Hydrologic Response (brief description):

Hydrologic response following wildfire in the American Fork burned area will include reduced interception and infiltration of precipitation, increased runoff and erosion, and potentially higher stream flow volumes in tributaries in response to summer thunderstorms when compared to unburned conditions. Potential hazards were most apparent at three crossings along the Shields Loop road (Table 3). The drainages ranged from 0.9 to 1.2 square miles in drainage area and had sufficient burn area to increase post fire response; the burn areas had from 53 to 80% moderate and high severity burn. Multiple other crossings along the Shields Loop Road were deemed unnecessary to evaluate in-depth because structures were already upgraded to Aquatic Organism Passage (AOP); hydraulic capacity was deemed sufficient to accommodate even post-fire flows.

Table 5 shows that at Scofield and Clear Creek, estimates suggest post fire flows could occur in near normal circumstance (every 10 years) that would match volumes expected for a 1 and 50 year event prefire (2 % probability). The risk for this flow equates to a 20% probability (Q_5). At Turkey Creek, the risk is slightly less likely with the risk for an equivalent prefire flow of Q_{50} is likely from a 1 and 10 year event , roughly 10% annual probability.
Using these peak flow recurrence interval relationships, the natural log-adjusted peak flows for a pre-fire Q_{50} were compared against estimated overtopping discharges computed using the software HY-8. All three

crossings have predicted flows for a 10 year event that are over 2 times the pipe capacity. All three similarly could overtop the roads with a 10 year event.

Table 5. Estimated overtopping flows for three crossings of interest along the Shields Loop Road.

Tributary Name	Existing structure type and size	Existing structure hydraulic capacity (Robison et al. 1999)	Estimated overtopping flow (Q per HY-8)	Estimated post-fire Q10 (pre-fire Q50)	Percent drainage area burned under mod/high severity
Turkey	42" by 29" metal pipe arch	26	36	65	53.7
Scofield	42" by 29" metal pipe arch	26	62	60	76.7
Clear	36" diameter CMP	31	66	60	79.7

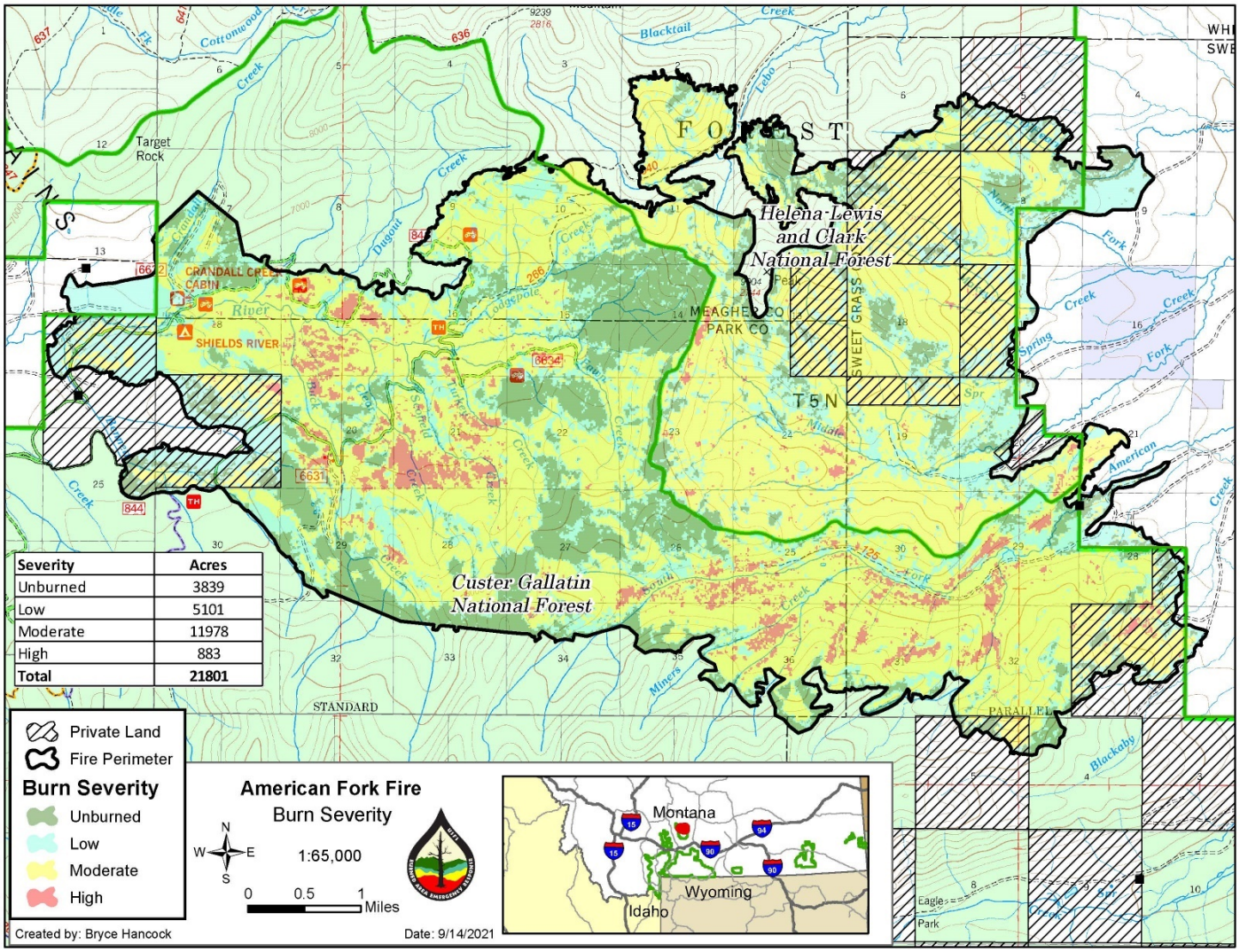

Figure 1: Soil Burn Severity Map for American Fork Fire

PART V - SUMMARY OF ANALYSIS

Introduction/Background

The American Fork Fire ignited as a result of lightning on July 17, 2021 on the Helena-Clark NF. The fire subsequently spread to private lands and to the Custer Gallatin NF, where the majority of the burning occurred. Soil burn severity was primarily moderate, with some areas of low and high severity (Figure 1). Burned areas were a mix of timber, open grassland areas, aspen groves, and riparian.

A. Describe Critical Values/Resources and Threats

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)

Risk Assessment: Human Life and Safety

Probablity of Damage or Loss: Possible

Magnitude of Consequence: Major

Risk Level: High

Human life and safety of Forest visitors and employees traveling on NFS roads and trails in the burned area 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. Recommend posting signs to warn for hazards.

2. Property (P):

Property: Trail Stabilization of Forest Service Trails 640 and 266 (HLCNF & CGNF)

Risk Assessment: Trail Infrastructure

Probability of Damage or Loss: Very Likely

Magnitude of Consequence: Moderate

Risk Level: Very High

Field reconnaisance documented that 1 mile of Trail 640 (HLCNF) and 1.8 miles of Trail 266 (CGNF) had been burned over damaged by the fire and will be at risk of further damage in the post fire period. This future damage is likely to occur through the following mechanisms.

- Direct erosion of trail prisms due to loss of drainage structures and deposition from upslope.
- Direct erosion of tread due to loss of adjacent and upslope vegetation
- Fillslope failure and/or trail tread destabilization due to direct loss of forested vegetation, organic soil components, and root systems. These failures very likely to occur on steep hillslopes with moderate and high burn severity.

In addition to trail repair each of the two trails affected by the fire will be posted with two signs warning trail users of post-fire hazards.

Property: Forest Service Administrative Roads (CGNF)

Risk Assessment: Road Infrastructure, including road prism and other drainage infrastructure

Probablity of Damage or Loss: Likely

Magnitude of Consequence: Moderate

Risk Level: High

Approximately 2.6 miles of road #844 was located within or adjacent to high severity burn areas and judged susceptible to damage by increased post-fire runoff and sediment. Protect that 2.6 miles of road infrastructure, and other infrastructure susceptible to damage, from erosion related to post-fire hydrology in order to retain access for range permitees, public, and admin use and to protect aquatic resources from elevated sediment inputs.

Property: Culverts on Forest Service Road #844 (CGNF)

Risk Assessment: Road Infrastructure

Probablity of Damage or Loss: Possible

Magnitude of Consequence: Major

Risk Level: High

The Shields Loop Road is a critical access route for grazing permittees in the Shields drainage. Based on the hydrologic analysis, overtopping of the road surface during the post-fire period is likely at three crossing locations on Road #844 (Clear Cr., Scoffield Cr., and Turkey Cr.). Moderate to severe road damage to the road prism would likely result, severing road access and adding a large volume of sediment to downstream water bodies. Crossing washout would likely also affect administration of existing grazing allotments. Also of note is that the Shields headwaters has been heavily invested in by both the Custer Gallatin N.F. and partners in effort to promote re-establishment of native Yellowstone cutthroat trout, as evidenced by the multiple AOPs already installed within the drainage as well as the downstream fish barrier. Loss of the three structures discussed above would result in adverse effects to high-value aquatic habitat downstream.

Applying this to the BAER critical values matrix, the probability of occurrence is *possible* with the magnitude of consequences being *major* given the potential damage to road prism and potential safety hazard to Forest service personnel and public access.

Property: Forest Service Road #844 and bridge/fish barrier at Shields River crossing (CGNF)

Risk Assessment: Road Infrastructure, including road prism

Probablity of Damage or Loss: Likely

Magnitude of Consequence: Major

Risk Level: Very High

A bridge/fish barrier was constructed in 2016 as the keystone element of a multiyear effort to protect the Upper Shields River watershed as a refuge for Yellowstone Cutthroat Trout. It was constructed in 1996 at a cost of $500,000. It is likely that heightened post-fire peak flows could cause damage to the bridge/barrier and/or to Road #844. Piscide treatments to rid the watershed above the barrier will begin in 2022, and if the barrier is compromised the project will be severly hampered. In addition, moderate to severe road damage to the road prism would likely occur, adding a large volume of sediment to downstream water bodies. Access for range permitees, public, and admin use would also be severed.

3. Natural Resources (NR):

***Natural Resources: Native Plant communities* (CGNF & HLCNF)**

Noxious weeds are within and adjacent to the burned area mostly along roads and disturbed areas. These populations have the potential to spread into burned areas.

Risk Assessment – Threats to native plant communities (including Species of Conservation Concern)

Probability of Damage or Loss: Very Likely

Magnitude of Consequence: Moderate

Risk Level: Very High

Aggressive perennial invasive plants are present within the burned area, and are located primarily along travel routes, decommissioned roads, and recreation sites as well as adjacent private lands. Invasive plants are highly adapted to take advantage of early seral conditions and can outcompete native plants for resources (water and nutrients). Given the proximity of the invasives to un-infested, vulnerable habitat the probability of spread into the native plant communities is very likely particularly in moderate to high soil burn severity areas.

In addition, the unintentional introduction and dispersal of invasive weeds into areas disturbed by fire suppression and rehabilitation has the potential to establish persistent weed populations.

In summary, for the critical value of native plant communities at risk the probability of damage or loss is Very Likely with a moderate magnitude of consequences, resulting in a Very High Risk.

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

- Prevent injury or loss of human life that is possible in the next 12 months
- Prevent additional loss of trail infrastructure that is very likely to occur in the next 12 months
- Prevent additional loss of road infrastructure that is possible in the next 12 months
- Minimize the establishment and spread of noxious weed infestations that is very likely to occur in the next 12 months.

C. Probability of Completing Treatment Prior to Damaging Storm or Event:
Land: 50
Channel: NA
Roads/Trails: 50 (Roads) 50 (Trail)
Protection/Safety: 100

D. Probability of Treatment Success

Table 7: Probability of Treatment Success

	Years after Treatment		
	1	3	5
Land			

Noxious weed treatment	80	85	85
Channel NA			
Roads/Trails			
Trail Stabilization	85	90	95
Replace Culvert	90	90	95
Storm Proofing	90	80	80
Protection/Safety			
Hazard Tree Felling	95	85	80

E. Cost of No-Action,Including Loss (CGNF & HLCNF combined):

The loss of trail drainage controls (waterbars) and trail tread is very likely to increase repair costs over time if BAER trail stabilization treatments are not implemented as soon as possible. The current estimate is $14,000 to treat 2.8 miles of trail. If the treatments are not implemented, and assuming the at-risk trail segment requires full tread rebuilding with waterbars, the cost would be 2.8 miles x $15,000 cost/mile for a total of $42,000.

The loss of the existing culvert and road embankments at the Turkey, Clear, and Scoffield Creek crossings on Road #844 would damage the road prism, damage/destroy the culvert, and subject the stream and its aquatic resources to the input of sediment from the road prism material (sediment). The estimated cost to install relief culverts at these stream crossings is $6,000/crossing for a total of $18,000. If the crossing hardening is not implemented and the crossing washes out, the estimated cost of repair would be $11,000 per crossing ($10,000 plus an estimated $1,000 for disposal of the ruined culvert and furnishing fill material) to rebuild the road prism, for a total of $33,000. Thus, the estimated loss would be $15,000.

Increasing flood conveyance capacity, and raising the road surface elevation, at the bridge/fishbarrier would cost $15,400. Replacement of the bridge/barrier would cost $500,000. Perhaps a more likely scenario would be repair to the bridge/fish barrier and road prism. The cost of doing so would depend on the extent of damage of course, but $100,000 would be a reasonable estimate. Thus, the estimated loss would be $84,600.

Adding both trail and road infrastructure costs equates to a potential loss of $141,600.

The value of protecting the ecological integrity of native plant communities and soil productivity of the burned area from noxious weed infestation exceeds the cost of treatment and monitoring. The continued spread would impact treatment costs in the future. As a coarse estimate, the weeds may spread largely into high and moderate burn areas at 14% per year. Using the base estimate combined treatment cost of $17,016, if not treated immediately the cost at three years would be $22,121. Thus the cost of no treatment would be $5,105.

Altogether, the cost would be $203,705 if no treatment for these critical values.

F. **Cost of Selected Alternative (Including Loss):** There remains an estimated 20 percent chance that the proposed treatments for this work either may not be completed prior to damaging storms or fail. As a gross estimate, the cost is the treatment estimate ($81,416) plus the loss (0.2 x $89,075) which equals $97,699.

G. Skills Represented on Burned-Area Survey Team:

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

Team Leader:
Email: dale.white@usda.gov **Phone(s)** 406-551-0874

Forest BAER Coordinator:
Email: dale.white@usda.gov **Phone(s)** 406-551-0874

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

Skill	*Team Member Name*
Team Lead(s)	Dale White
Soils	Erik Anderson
Hydrology	Andy Efta
Engineering	Grant Morrison
GIS	Bryce Hancock
Archaeology	Connie Constan
Weeds	Beth Bischoff, Brad Sauer
Recreation	Bob Gliko, Lawson Maclean
Aquatics	Clint Sestrich

H. Treatment Narrative:

Safety

Signage

Human life and safety of Forest visitors and employees traveling on NFS trails and roads within the burn scar is threatened due to damaged/destroyed road signs, the potential for injury or loss of life from falling trees, falling rocks, flash floods, debris flows, and other burned area hazards.

Methods

The method for reducing these risks is to install signs to educate visitors and NFS employees of the dangers associated with travel within the burn scar. Signs would be installed at trailheads, and damaged/destroyed road signs would be replaced.

Land Treatments

Invasives EDRR

The objective is to implement an Early Detection Rapid Response (EDRR) strategy which would be to detect and suppress new weed infestations in the burned area. Left unchecked, it is likely that existing weed infestations will increase post-fire, particularly in moderate to high soil burn severity areas, due to conditions favorable to accelerated growth and reproduction and release from competition with native plant communities. In addition, the unintentional introduction and dispersal of invasive weeds into areas disturbed by fire suppression and rehabilitation has the potential to establish persistent weed populations. It is expected that most native vegetation will recover if weed invasions are minimized.

Invasives EDRR – Suppression Repair

EDRR would concentrate on fire suppression repair on dozer lines (2.2 miles HLC; 2.75 miles CGNF) and hand lines (0.35 miles HLC; 2.8 miles CGNF). Similarly EDRR would occur on additional suppression repair

events where disturbances occurred including completed road as line (0.29 miles HLC; 1.18 miles CGNF) and access or improved road (0.2 miles HLC; 0.29 CGNF). See Table 8.

Application of herbicides to control invasive plant infestations is covered under the Lewis and Clark Forest Wide FEIS for Noxious Weed Control (1994) using three chemicals and the 2019 NEPA sufficiency review and finding for seven new chemicals. Application for the CGNF portion of the fire area is covered under the Gallatin National Forest Noxious and Invasive Weed Treatment Project FEIS and Record of Decision (2005).

The cost of treatment is estimated from current costs of contractors used for IDIQ contracts on the Helena-Lewis & Clark National Forest and Custer Gallatin National Forest, and adjusted to be consistent across the units. Soil burn severity and suppression disturbances were used in connection with the noxious weed inventory to determine acres to be treated. These acres were then broken out between UTV or backpack acres. (Table 3)

Methods

The strategy on the American Fork Fire on the CGNF would be to use EDRR to contain noxious weeds along the Shields River Road corridor, and search for potential weed spread from known populations in the vicinity of the road where soil burn severity is moderate and high severity. Secondarily, additional search would occur in other areas of the fire, where soil burn severity is moderate to high and adjacent to known weed infestations and/or suppression disturbance vectors.

The strategy for HLC work would be to use EDRR to contain noxious weeds to private lands (Sect 28), where dozer lines were established on private land immediately adjacent to the forest and pose a threat. Additional monitoring would be primarily to search along fringes of dozer lines and handlines on forest where weeds are most likely to take hold, and SBS is moderate to high.

Table 8. HLCNF EDRR Treatments

EDRR Treatment	Units (Acres)	cost/unit	Total	Method
HLC EDDR Treat Fire suppression Repair Handline (0.35 miles)	0.5	$130	$65	Backpack
HLC Dozer line (2.2 mi), fireline (2.3)	5	$60	$300	UTV
HLC Native Plant Communities Treat	19	$60	$1,140	UTV
HLC Plant Communities Search	121	$25	$3,025	Search

Table 9. CGNF EDRR Treatments

EDRR Treatment	Units (Acres)	cost/unit	Total	Method
CGNF EDDR Treat Fire suppression Repair Handline (2.8 miles)	1	$130	$130	Backpack
CGNF EDDR Treat Fire suppression Repair Dozer Line (2.75 miles)	5	$130	$650	Backpack
CGNF EDDR Treat Fire suppression Completed Road as Line (1.18 miles)	2.1	$60	$126	UTV
CGNF EDDR Treat Fire suppression Access or Improved Road (0.29 miles)	0.5	$60	$30	UTV
CGNF Native Plant Communities Treat	60	$60	$3,600	UTV
CGNF Native Plant Communities Search	318	$25	$7,950	Search

Costs include chemical, PPE, labor, equipment for direct application on ground. Mileage, FOR, are part of other costs that other resource areas contribute. Additional treatment work is considered to be multifunded.

- Backpack spray cost/acre=$130

- UTV cost/acre=$60

Channel Treatments NA

Roads and Trail Treatments

Trail Stabilization

Trail Drainage Stabilization.

1 mile of Trail 640 (HLCNF) and 1.8 miles of Trail 266 (CGNF) are expected to be at risk of deterioration from additional runoff, and sediment from post-fire conditions. The threats are from runoff severely eroding the trail and depositing sediment from upslope areas onto the trail.

High and Moderate-severity burn along trails has created many standing dead and fire-weakened trees in this wind-prone area which threaten the safety of trail crew members implementing trail stabilization measures.

Methods

The method for reducing these risks is primarily trail tread repair and installation of water bars, which would be used to direct and divert flow off the trail. These treatments would reduce the risk of the trail washing out, becoming hazardous to trail users, and transporting sediment to streams. Implementation will be accomplished by CGNF Trails Crew.

Burned trees would be assessed by a firefighting crew and those with high hazard ratings and the potential to fall into the trail work area would be marked. Treatment targets hazard trees within 1 1/2 tree lengths of the planned working areas. Trees posing high risk and impeding drainage work would be addressed.

Road Stormproofing

Objective:

The objective is to protect road infrastructure from erosion related to post-fire hydrology in order to retain access for range permitees, public, and admin use and to protect aquatic resources from elevated sediment inputs. Cleanout and reshaping of drain dips and ditches will restore and improve efficient road drainage. Removing debris and brush from the culvert inlets and outlets would let culverts function as designed and restore flow capacity. The purpose of this work is to decrease the risk that drain dips, ditch relief culverts, and stream culverts plug and fail, resulting in culvert washouts as well as water flows being diverted down roadways which would degrade road conditions and add sediment to downstream water bodies.

Methods:

Drain dips and ditches will be cleaned out and reshaped. Culverts that are currently plugged or have inlet basins that are full or brushed in should be cleaned out to insure unobstructed flows. As soon as possible, culvert inlets and outlets would be brushed and cleaned by hand crew using chain saws, hand tools, and in some more difficult situations, with a rubber-tired backhoe. The treatment will also include replacing an undersized 12” crossdrain culvert under Turkey Creek Road with a 18” culvert, and installation of 6 new road signs (for public safety) where existing signs were damaged by the fire. The treatment aims to maintain road access for allotment permittee and public/adminstrative use by restoring road drainage and reducing potential for road prism erosion and high cost repairs.

Storm Inspection and Response

Objective:

The objective is to facilitate protection of road infrastructure from erosion related to post-fire hydrology by patrolling immediately after significant storms in order to identify storm damage as quickly as possible.

Methods:

All roads would be assessed immediately after all significant rainfall events.

Installation of Relief Culverts at Road Crossings. (CGNF)

Objective:

Based on the hydrologic analysis, overtopping of the road surface during the post-fire period is likely at three crossing locations on Road #844 (Clear Cr., Scoffield Cr., and Turkey Cr.). Hydraulic analysis of the existing culverts indicates that the estimated 10% probability post-fire peak flow would likely overtop the road at these crossings. Therefore the existing culvert and road embankment has a relatively high potential to fail during the post fire period. The objective of this work is to maintain road access for allotment permittees and public/administrative, and to decrease the risk of moderate to severe road damage to the road prism which would likely add a large volume of sediment to downstream water bodies.

Methods:

Install 24” round relief culverts at Clear and Scoffield Creeks, and a 30” relief culvert at Turkey Creek, to increase conveyance at those crossings so that they will pass the estimated post-fire 10-yr discharge without impact to the crossing/road. The culverts would be installed parallel to existing culverts and riprap would be installed at the outlets to protect the road prism/stream from erosion.

Increasing Conveyance at Bridge/FishBarrier Site (CGNF)

Objective:

The objective is to increase flood conveyance capacity at the Bridge/barrier site and therefore reduce the likelihood of damage to the recently constructed $450,000 structure and associated road prism.

Methods:

The emergency overflow system at the Shield River Barrier is composed of a riprap lined spillway in series with a triple-culvert road crossing (Figure 2). Through hydraulic analysis using the Hec-Ras model it was determined that increasing the length of the emergency spillway by 35 feet would allow the three culverts under the Shields loop road to operate at full capacity (165 cfs total for the culverts). This would increase the conveyance capacity of the spillway-culvert overflow system by 100 cfs, making the total conveyance capacity of the barrier and overflow system 935 cfs.
In addition, a low point on the road prism located immediately north of the bridge/barrier would be elevated by 1 ft using imported, crushed gravel road mix to decrease the risk of peak flow crossing the road at that point. Such flow would likely erode material adjacent to the downstream bridge wingwall and could undermine that component of the structure.

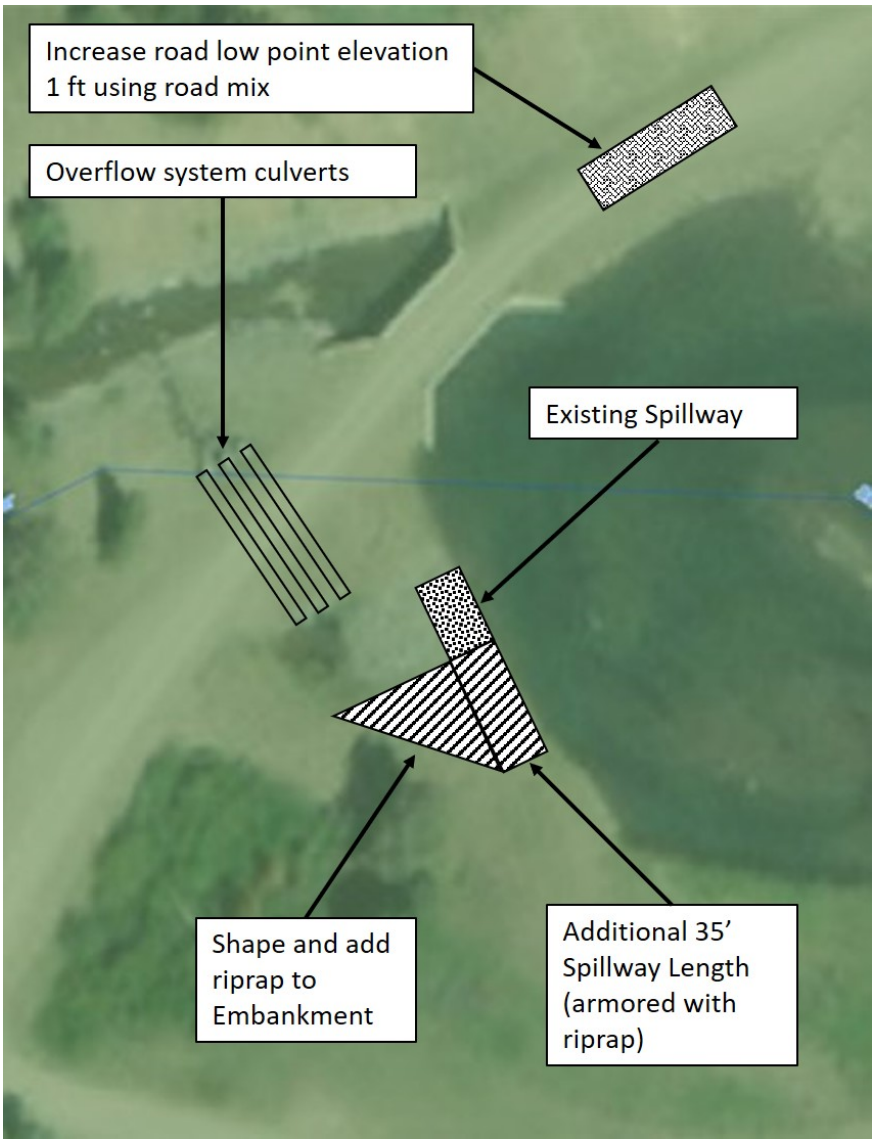

Figure 2: Proposed work at the Shields Bridge/Barrier Site

I. Monitoring Narrative: NA

PART VI – EMERGENCY STABILIZATION TREATMENTS AND SOURCE OF FUNDS

HELENA-LEWIS AND CLARK NATIONAL FOREST

Line Items	Units	Unit Cost	# of Units	BAER $	
A. Land Treatments					
P1b. EDRR Treat Fire Suppression Handline (0.35 mi)	Acres	130	0.5	$65	Backpack
P1b. EDRR Dozer Line (2.2 mi) and Road (0.5 mi)	Acres	60	5	$300	UTV
P1a. Native Plant Communities - Treat	Acres	60	19	$1140	UTV
P1a. Native Plant Communities - Search	Acres	25	121	$3025	
Subtotal Land Treatments				**$4,530**	
B. Channel Treatments					
None					
C. Road and Trails					
T1. Trail Stabilization	Miles	5,000	1.0	$5,000	
Subtotal Road and Trails				**$5,000**	
D. Protection/Safety					
S1b. Trail/Recreation Hazard Signs	Each	200	2	$400	
Subtotal Protection/Safety				**$400**	
E. BAER Evaluation					
Initial Assessment	**Lump**	**$8,900**	**1**	**$8,900**	
F. Monitoring					
Subtotal Monitoring				**$0**	
G. Totals				**$9,930**	
Previously approved				**$0**	
Total for this request				**$9,930**	

PART VI – EMERGENCY STABILIZATION TREATMENTS AND SOURCE OF FUNDS

CUSTER GALLATIN NATIONAL FOREST

Line Items	Units	Unit Cost	# of Units	BAER $	
A. Land Treatments					
P1b. EDRR Treat Fire Suppression Handline (2.8 mi)	Acres	130	1	$130	Backpack
P1b. EDRR Dozer Line (2.8 mi) and Road (1.5 mi)	Acres	130	5	$650	Backpack
P1b. EDRR Access Road (1.5 mi)		60	2.6	$156	UTV
P1a. Native Plant Communities - Treat	Acres	60	60	$3,600	UTV
P1a. Native Plant Communities - Search	Acres	25	318	$7,950	
Subtotal Land Treatments				**$12,486**	
B. Channel Treatments					
None					
C. Road and Trails					
T1. Trail Stabilization	Miles	5,000	1.8	$9,000	
R1 Storm proofing	Each	5,000	2.6	$13,000	
R2 Storm Inspection and Response	Each	2,000	0	$2,000	
R6 Relief Culvert	Each	6,000	0	$18.000	
R11 Increase conveyance at Bridge/Barrier	Each	13,000	0	$13,000	
R13 Increase road height adjacent to Bridge/Barrier	Each	2,400	0	$2,400	
Subtotal Road and Trails				**$57,800**	
D. Protection/Safety					
S1b. Trail/Recreation Hazard Signs	Each	200	2	$400	
S1a. Road Hazard Signs	Each	200	6	$1,200	
Subtotal Protection/Safety				**$1,200**	
E. BAER Evaluation					
Initial Assessment	**Lump**	**$26,400**	**1**	**$26,400**	
F. Monitoring					
Subtotal Monitoring				**$0**	
G. Totals				**$71,486**	
Previously approved				**$0**	
Total for this request				**$71,486**	

PART VII - APPROVALS

1. MARY ERICKSON Digitally signed by MARY ERICKSON Date: 2021.09.23 11:27:40 -06'00'

Forest Supervisor Date