

Box Canyon Fire July-October 2016



Photo by BAER Team Leader, Brendan Waterman

Date of Report: October 18, 2016

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 # _____
 ☐ 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:** Box Canyon**B. Fire Number:** UT-UWF-000534**C. State:** UT**D. County:** Summit**E. Region:** 04**F. Forest:** Uinta-Wasatch-Cache**G. District:** Heber Kamas**H. Fire Incident Job Code:** P4KJS916-0419**I. Date Fire Started:** July 28, 2016**J. Date Fire Contained:** 85% Contained as of 10/13/16

K. Suppression Cost: \$3,500,000 as of 10/18/16. Fire will remain in patrol status and suppression costs will slightly increase until the burned area is covered in significant snowpack and the fire is declared out.

L. Fire Suppression Damages Repaired with Suppression Funds

1. Fireline waterbarred (miles): 0
2. Fireline seeded (miles): 0
3. Other (identify): None

M. Watershed Numbers and Percentage Burned

5th Field Sub-Watershed	HUC Number	Total Acres	Acres Burned	Percent Burned
Smith and Morehouse Creek	160201010202	25,514	4723	19%

N. Total Acres Burned:

Land ownership	Acres burned	Percent of burned area
USDA Forest Service (USFS)	4723	100%

0. Vegetation Types

Forest cover types that are present across the burn area are conifer, mixed conifer, aspen, mountain brush, native grasses, sedges, and forbs.

P. Dominant Soils

Mirror Lake Family-Marsell Association, Mirror Lake-Duchesne Rock Outcrop Complex, Mirror Lake-Marsell Families, Mirror Lake-Duchesne Complex, Marsell Family, Rock Outcrop-Mirror Lake Stony-Duchesne Stony Complex, Cuberant-Ledgefork-Rock Outcrop Association, Rock Outcrop-Mirror Lake-Duchesne Complex. The soils within the burned area range from very deep to shallow depths with sandy loam, loam and silt loam textures and are skeletal (>35% rock fragments). Significant amounts of rock outcrop and talus slopes exist throughout the burned area. Soil descriptions can be found in the Draft NRCS UT_647 Report.

Q. Geologic Types: The majority of the area is comprised of glacial till over granite with minor shale outcroppings.

R. Miles of Stream Channels by Order or Class:

2.7 miles perennial, 1.5 miles intermittent

S. Transportation System

Trails miles Roads: 0.0 miles (NFS)

PART III - WATERSHED CONDITION

A. Soil Burn Severity for the Whole Burned Area (acres):

Severity	Acres Burned	Percent
High	118	2.5%
Moderate	1253	26.5%
Low	1746	37.0%
Unburned	1606	34.0%

All modeling from this point on in this document was completed during late August after the fire was assumed to be close to controlled at approximately 2,887 acres. A wind event occurred the following week that resulted in significant growth on the north flank in the Smith and Morehouse and Hells Kitchen drainages. Fire effects and potential critical values were reviewed again after this growth occurred. It was determined that the previously analyzed burn patterns, critical values, and risk levels were unchanged and additional modeling was not needed. All suppression related trail, facility, and area closures will remain in place through the 2016-2017 winter.

B. Water Repellent Soils and Increased Runoff: The degree and extent of water repellent soils is unknown. The BAER team was unable to conduct in depth field testing of soil water repellency due to hazardous field conditions and safety concerns regarding the high number of snags that were observed by the Agency Administrator, Incident Commander, Forest Safety Officer, and BAER Team Leader.

Increased runoff due to assumed hydrophobic conditions is reflected in the peak flow analysis contained in the Hydrology Report. Increased overland flow due to the hydrophobic conditions may increase hill-slope rill and sheet erosion in areas where significant amounts of ground cover were consumed. However, ground cover within much of the burn scar is unchanged due to the high amount of surface rock and mosaic burn pattern within the low and moderate burn severity areas. When present, hydrophobic layers will usually take six months to two years to break down. Plant root development, soil microbial activity, and freeze-thaw cycling all contribute to the degradation of hydrophobic conditions.

C. Soil Erosion Hazard Rating:

Erosion Hazard Rating	Acres*
Low	91
Moderate	1,065
High	1,713

*Acres differ from fire total because some map units are rock outcrop/talus with no soil erosion hazard rating and significant growth occurred during late August wind event.

D. Erosion Potential

The average erosion potential value for the burn scar is 8 tons/acre. The outputs generated from the Disturbed WEPP model were used to assess the differences in erosion and sedimentation prediction rates within the burned area. Total erosion figures were based on average erosion rates for each map unit within moderate and high burn severity and expressed in tons per acre. Sedimentation delivery rates were calculated using a sediment delivery factor for moderate and high burn severity and expressed in cubic yards per square mile. A collective spreadsheet with all erosion and sedimentation prediction values is found with the Soil Resource Report Appendix A.

E. Sediment Potential: 449 cubic yards / square mile

PART IV - HYDROLOGIC DESIGN FACTORS

A. Estimated Vegetative Recovery Period, (years):	Q_
8. Design Chance of Success, (percent):	80%
C. Equivalent Design Recurrence Interval, (years):	25
D. Design Storm Duration, (hours):	1
E. Design Storm Magnitude, (inches):	1.28
F. Design Flow, (cubic feet / second/ square mile):	222
G. Estimated Reduction in Infiltration, (percent):	12%
H. Adjusted Design Flow, (cfs per square mile):	243

Pre and post-fire peak flow predictions from Wildcat Rainfall-Runoff Hydrograph Model

Burn Severity by Watershed (acres) and pre-fire and post-fire modeled peak flows for 25-year return period storm.							
Watershed	Unburned/ Low	Moderate	High	Rock	Total	Pre-fire Qp (cfs)	Post Fire Qp (cfs)
Hells Kitchen	1,327	2	0	353	1,683	234	234
Erickson Basin	1,016	52	6	539	1,613	356	375
Southeast Canyon	1,548	204	81	1,328	3,162	877	996

PART V - SUMMARY OF ANALYSIS

Introduction/Background:

As of October 18, 2016 the Box Canyon Fire has burned approximately 4,723 acres and full containment is not expected a season ending snowfall event. The fire burned in a mosaic pattern. Patches of unburned vegetation, bedrock outcrop, and rock piles were frequently observed within the burned area. The soil burn severity (SBS) map shows that the majority of the area (71%) within the fire perimeter was either unburned or low severity. Due to the mosaic nature of the burn, the high amount of surface rock present, and lack of large continuous areas with full removal of organic ground cover, extreme post-fire watershed responses, namely large increases in runoff and accelerated soil erosion, are not expected to occur. The primary concern within the burned area is the abundance of standing beetle killed trees that were damaged by the fire. The primary concern below the burned area is the potential build up of debris jams against Forest Service owned bridges during high flow events. If this were to occur, the bridges could become compromised and floodwaters could inundate campsites within the Ledgefork Campground.

A. Describe Critical Values/Resources and Threats:

The BAER team began assessing the area for post-fire emergencies on August 19, 2016. The team has identified the following values at risk and post-fire threats. Interim reports may be submitted as additional assessments are completed and/or the need to repair or maintain BAER treatments emerges.

The risk matrix below, Exhibit 2 of Interim Directive No.: 2520-2015-1 was used to evaluate the Risk Level for each value identified during Assessment. Only critical values that had a risk of Intermediate or above are discussed in this report.

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: Potential threats to Forest visitors and agency personnel include hazard trees, flooding, and debris flows along NFS trails and at the Ledgefork Campground.

High Risk (Possible probability; Major consequence) to human life and safety of forest visitors and agency personnel when hiking the Smith and Morehouse (3236) and Erickson Basin (3211) trails due to fire damaged trees within the burn scar.

High Risk (Possible probability; Major consequence) to human life and safety to forest visitors camping in sites 34, 39, and 53 of the Ledgefork Campground from in Smith and Morehouse Creek. These sites were found to be at an elevation that could be impacted by flood and debris flows.

- 2) Property: Potential threats to the road and trail bridges below the burn scar exist on the Smith and Morehouse trail and in the Ledgefork Campground. If high flow events occur in the year following containment of the fire, debris could build up in front of the bridges and cause damage to the structures.

High Risk (Possible probability; Major consequence) to Forest Service owned bridges on Smith and Morehouse Creek. The non-motorized trail bridge is located on the Smith and Morehouse Trail (3236).

The auto bridge is located within the Ledgefork Campground on the 051 Road.

B. Emergency Treatment Objectives:

1. Protection and Safety

Implement trail and campsite closures to protect the lives and safety of forest visitors and workers.

2. Road and Trail

Inspect bridges for debris jam build up during high flow events. Remove debris jams if necessary to protect structural integrity of bridges.

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

Land N/A % Channel N/A % Roads/Trails 80 % Protection/Safety 95 %

D. Probability of Treatment Success

	Years after Treatment		
	1	3	5
Land -	N/A	N/A	N/A
Channel	N/A	N/A	N/A
Roads/Trails	80	80	80
Protection/Safety	95	95	95

E. Cost of No-Action (Including Loss): \$250,000 - assumes auto bridge reconstruction cost of \$225,000 and trail bridge reconstruction cost of \$25,000.

F. Cost of Selected Alternative (Including Loss): \$59,883 - assumes \$9,883 for proposed BAER treatments and 80% chance of success for bridge storm inspection and response.

G. Skills Represented on Burned Area Survey Team:

<input checked="" type="checkbox"/> Hydrology	<input checked="" type="checkbox"/> Soils	<input type="checkbox"/> Geology	<input type="checkbox"/> Range	<input type="checkbox"/> Liaison
<input type="checkbox"/> Forestry	<input type="checkbox"/> Wildlife	<input type="checkbox"/> PIO	<input checked="" type="checkbox"/> Engineering	<input checked="" type="checkbox"/> Trails/Recreation
<input type="checkbox"/> Contracting	<input type="checkbox"/> Ecology	<input checked="" type="checkbox"/> Botany	<input checked="" type="checkbox"/> Archaeology	<input checked="" type="checkbox"/> NOAA/NWS
<input type="checkbox"/> Fisheries	<input type="checkbox"/> Research	<input type="checkbox"/> Landscape Arch	<input checked="" type="checkbox"/> GIS	

Team Leader: Brendan Waterman. Uinta-Wasatch-Cache National Forest

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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.)

Protection and Safety Treatments

Trail Closures are needed to protect human life and safety of visitors to NFS lands along the Smith and Morehouse and Erickson Basin Trails. Closure signs will be placed at the Smith and Morehouse, Upper Setting, and Crystal Lake trailheads to advise forest visitors of closures in place at the fire perimeter (1-4 miles from trailheads). Additional closure signs will be installed at the entrance to the fire perimeter. The closure signs will be removed when the current closure order is lifted and warning signs will be installed at the 3 trail entrances to the fire perimeter. The warning signs will be left in place for 2-3 years.

Item	Unit	Unit Cost	# of Units	Cost
GS-11 Recreation Officer	Days	\$350	1	\$350
Warning Signs/Materials	Each	\$75	3	\$225
Closure Signs/Materials	Each	\$75	6	\$450
Sign Installation - Trail Crew Time	Each	\$222	9	\$1,998
Total Trail Closure Cost				\$3,023

Campsite Closures are needed to protect human life and safety of forest visitors within the Ledgefork Campground. Sites 34, 39, and 53 are low lying sites, adjacent to Smith and Morehouse Creek that could potentially be impacted by high flow events. These sites will be closed with rock barricades to prevent users from accessing them when campground hosts are not present. Signs will also be placed at the entrances to the sites to advise users of the reason for the closures. These signs can be installed by the Trail Crew during trail closure sign installation mission.

Item	Unit	Unit Cost	# of Units	Cost
Road Crew Mobilization/Demobilization	Each	\$666	2	\$1,332
Closure Work - Rock Barricades	Each	\$222	3	\$666
Closure Signs/Materials	Each	\$75	3	\$225
Total Campsite Closure Cost				\$2,223

Road and Trail Treatments

Bridge storm inspection and response treatments are needed to ensure that debris jams do not buildup against the auto bridge in Ledgefork CG and the trail bridge on the Smith and Morehouse Trail. Both bridges are located less than 1 mile below the burn scar's lower boundary on Smith and Morehouse Creek, which drains the entire burned area. A hydrologist and/or engineer will inspect the bridges during high flow events for one year following containment of the fire. If debris jams are discovered, equipment will be mobilized immediately to remove the debris jams and prevent potential loss of the structures.

Item	Unit	Unit Cost	# of Units	Cost
Hydrologist/Engineer Inspection	Days	\$350	10	\$3,500
Road Crew Mobilization/Demobilization	Each	\$666	2	\$1,332
Total Storm Inspection and Response Cost				\$4,832


Summary of Treatment/Response Action Costs

Treatment Type	Funding Request
Trail Closures	\$3,023
Campsite Closures	\$2,223
Bridge Storm Inspection and Response	\$4,832
TOTAL COST	\$10,078

Box Canyon Fire BAER-Initial Request and Approval

			NFS Lands				
			Unit	# of	Request	Not Approved	Approved
Line Items	Units	Cost	Units	BAER \$	\$		\$
A. Land Treatments							
None Proposed							
<i>Subtotal Land Treatments</i>				\$0			\$0
B. Channel Treatments							
None Proposed							
<i>Subtotal Channel Treat.</i>				\$0			\$0
C. Road and Trails							
<i>Bridge Storm Inspection and Response</i>							
GS-11 Hvdrologist or Engineer	Davs	\$350.00	10	\$3,500.00			
Equipment Mobilization	Each	\$666.00	2	\$1,332.00			
<i>Subtotal Roads and Trails</i>				\$4,832			\$0
O. Protection and Safety Treatments							
<i>Trail Closure and Warnina Signs</i>							
GS-11 Recreation Staff Officer	Days	\$350.00	1	\$350			
Warning Signs/Materials	Each	\$75.00	3	\$225			
Closure Signs/Materials	Each	\$75.00	6	\$450			
Sign Installation (2 person trail crew)	Davs	\$222.00	9	\$1,998			
<i>Campsite Closures</i>							
Equipment Mobilization	Each	\$666.00	2	\$1,332			
Closure Work - Rock Barricades	Each	\$222.00	3	\$666			
Closure Signs/Materials	Each	\$75.00	3	\$225			
<i>Subtotal Protection and Safetv</i>				\$5,246			\$0
E. Implementation Support							
None Proposed							
<i>Subtotal Support</i>				\$0			\$0
F. BAER Evaluation							
Assessment	Team	\$14,419.00	1	---			
<i>Subtotal Evaluation</i>				---			
G. Monitoring							
None Proposed				\$0			\$0
<i>Subtotal Monitoring</i>				\$0			\$0
H. Totals				\$10,078			\$10,078

PART VII • APPROVALS

1. 
Chad E. Hudson for DAVID WHITTEKIEND
Forest Supervisor (signature)

10/19/2016
Date

2. /s/ Mary Farnsworth (for)
Regional Forester (signature)

10/24/16
Date

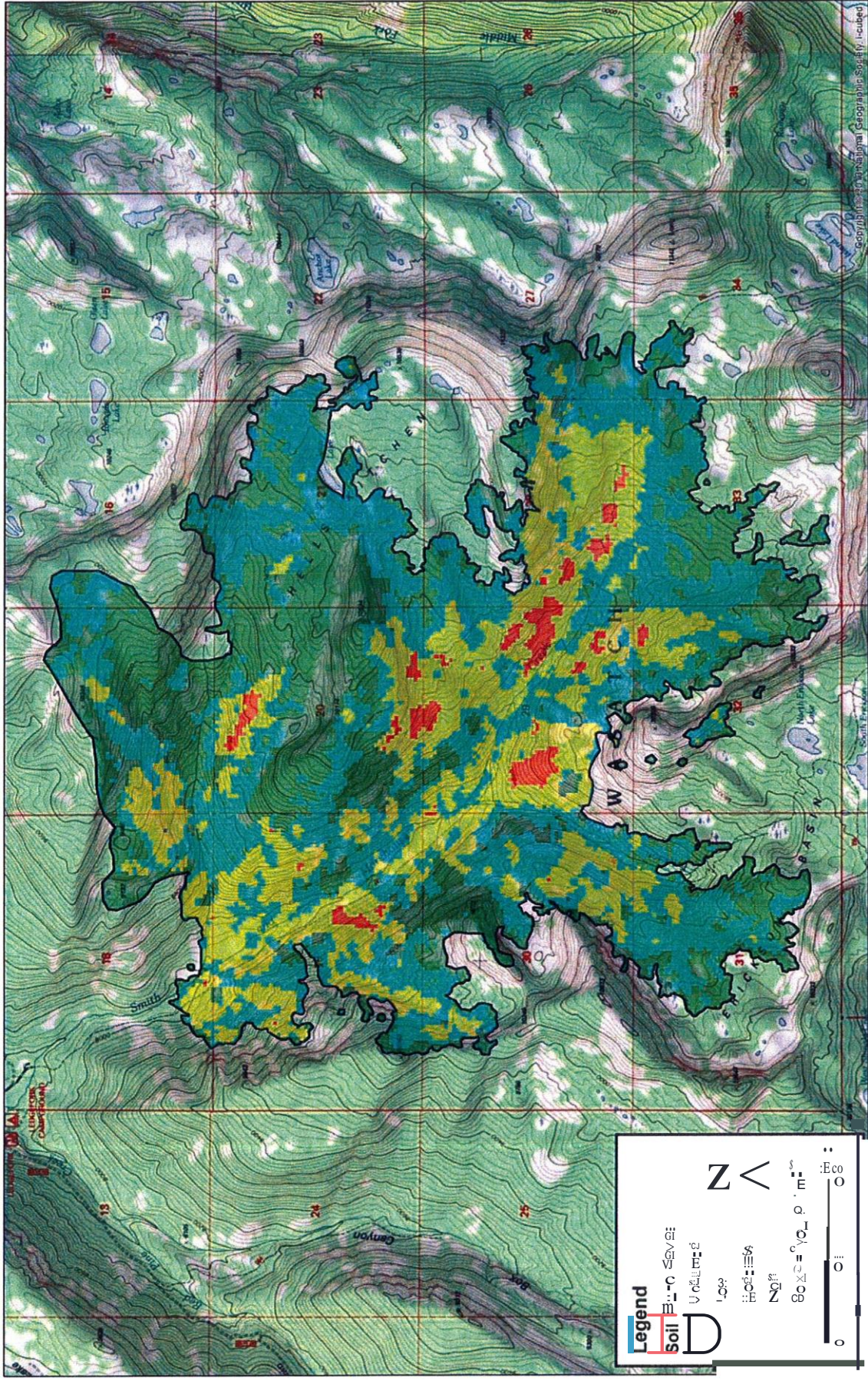


Figure 1: Soil Survey of the Washington State