

Date of Report: 09/27/2012

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:** Horsethief Canyon **B. Fire Number:** WY-TDX-000002
C. State: Wyoming **D. County:** Teton
E. Region: 04 **F. Forest:** Bridger Teton
G. District: Jackson **H. Fire Incident Job Code:** PNG7Y4
I. Date Fire Started: 09/08/2012 **J. Date Fire Contained:** 96% contained as of date of report
K. Suppression Cost: \$ 9,000,000 (approximate)
L. Fire Suppression Damages Repaired with Suppression Funds
 1. Fireline waterbarred (miles): 11.6 Total, 4.7 dozer line and 6.9 hand line
 2. Fireline seeded (miles): 0
 3. Other (identify):
M. Watershed Number: 6th-code HUC's: 170401030204 (Cache Creek); 170401030205 (Lower Flat Creek)
N. Total Acres Burned:
 ☒ 3371] NFS Acres ☐ Other Federal ☐ State ☒ Private

- O. Vegetation Types:** Forested: Douglas-fir, lodgepole pine, aspen. Non-Forested: Mixed grass, sagebrush and other upland shrub. Riparian Areas: Willow and sedge.
- P. Dominant Soils:** Mountain slopes with northerly aspects are a mix of deep and very deep skeletal and fine-loamy Mollisols, Alfisols, and some Inceptisols that support mixed conifers. Mountain slopes with southerly aspects generally support sagebrush communities on moderately-deep to deep loamy-skeletal Mollisols and Inceptisols. Aspen groves occupy concave positions on mountain slopes on generally very deep fine-loamy or loamy-skeletal Mollisols. Steep canyon sideslopes have a mix of lithic soils and deep skeletal Inceptisols and Alfisols. The alluvial fan deposit has very deep Mollisols supporting sagebrush communities.
- Q. Geologic Types:** Soil parent materials in the upper Wilson Creek drainage and West Fork Game Creek are dominantly residuum or colluvium derived from sedimentary rock; dominantly red siltstone, sandstone, shale, and limestone with some areas having a mantle of till and reworked loess. Parent materials of the soils on the mountain sideslopes in Wilson Canyon are residuum and colluvium derived from dominantly limestone and other sedimentary rock. The alluvial fan in the drainage of lower Wilson Canyon is dominantly alluvium or mudflow deposits from various types of sedimentary rocks (from the Teton NF Soil Resource Inventory)
- R. Miles of Stream Channels by Order or Class:** Perennial-5; Intermittent-4, Ephemeral-2
- S. Transportation System**
- Trails: 5.5 miles Roads: 0 miles

PART III - WATERSHED CONDITION

- A. Burn Severity (acres):** 998 (**unburned**); 1451 (**low**); 395 (**moderate**); 531 (**high**);
A BARC image was not available so burn severity was mapped using field observations, aerial mapping, and geo-referenced aerial oblique photos. Areas of high burn severity were identified based on ash color and depth, remaining ground cover, soil water repellency, and soil structure. The areas of high burn severity that were assessed in the field had 2-3 cm of white and gray ash, almost total duff consumption, less than 1% scorched soil, generally low potential for needle-cast but patchy canopy consumption in the conifers, and moderate to strong water-repellency at the mineral soil surface. Areas of moderate burn severity were identified based on weak to no water repellency at the mineral soil surface (none at depth), patches of unconsumed litter, and no apparent alteration of soil structure. Low burn severity was identified in timbered sites with a light under-burn under green canopy and considerable duff remaining, and in areas with sparse grass or sagebrush due to light fuel loads.
- B. Water-Repellent Soil (acres):** 728
Based on notes from the rapid field assessment, we assumed that about half of the areas identified as moderate soil burn severity have some weak water-repellency at the mineral soil surface, and all of the acres identified as high soil burn severity have strong water-repellency at the mineral soil surface. Water-repellency in the surface is a common post-fire condition, and will likely dissipate within the year or sooner (Parson et al, 2010).
- C. Soil Erosion Hazard Rating (acres):** 25 (**low**); 175 (**moderate**); 3175 (**high**);

These values were taken from the Teton NF Soil Resource Inventory and summarized for the fire perimeter.

Erosion/Sediment Delivery Potential

Information collected during the field assessment was used to model the erosion and sediment delivery rates expected in the year following the fire in Wilson Canyon watershed. Two scenarios were modeled using the FS WEPP ERMiT model: The first was a worst-case scenario with a 10% chance of occurring in the first year following the fire, and the second a more likely scenario with a 50% chance of occurring in the first year post-fire. The values modeled in Wilson Canyon will be applied to the entire fire area.

- D. Erosion Potential:** In the first year post-fire, erosion rates are estimated based on modeled sediment delivery rates (average includes unburned acres):

10% probability: 24 tons/acre average in the Wilson Canyon watershed.

50% probability: 1.5 tons/acre average in the Wilson Canyon watershed.

- E. Sediment Potential:** In the first year post-fire, modeled sediment delivery rates are estimated below (average includes unburned acres):

10% probability: 2.4 tons/acre in the Wilson Canyon watershed (1138 cu.yd./sq.mi)

50% probability: 0.15 tons/acre in the Wilson Canyon watershed (71 cu.yd./sq.mi)

PART IV - HYDROLOGIC DESIGN FACTORS

- | | |
|--|--|
| A. Estimated Vegetative Recovery Period, (years): | 3-5 years (recovery of hill slope stability) |
| B. Design Chance of Success, (percent): | 80% |
| C. Equivalent Design Recurrence Interval, (years): | 25 |
| D. Design Storm Duration, (hours): | 1 |
| E. Design Storm Magnitude, (inches): | 0.95 |
| F. Design Flow, (cubic feet / second/ square mile): | 11.5 |
| G. Estimated Reduction in Infiltration, (percent): | 80% |
| H. Adjusted Design Flow, (cfs per square mile): | 57.9 |

Change in Post-Fire Peak Flows – 25 year, 1 hour storm, 0.95 inches

Watershed Name	Pre-fire Estimated Peak Flow (cfs)	Post-fire Estimated Peak Flow (cfs)	Percent of Pre-fire Peak Flow
Wilson Canyon	28	151	539%
West Fork Game Cr.	24	115	479%

PART V - SUMMARY OF ANALYSIS**A. Describe Critical Values/Resources and Threats (narrative):****Human Life and Safety****Public Recreation within and downstream of the burned area**

Increased flood flows of up to 500% of pre-fire flows are predicted for Wilson Canyon and West Fork Game Creek. Trails within and downstream of the burned area are located adjacent to stream channels for much of their length. Members of the public recreating along the trails will be exposed to increased flood risk.

*The probability of impacts to human life and safety is **possible** and the consequences would be **major**. Therefore, the risk is **high**, emergency conditions exist and BAER treatments are recommended.*

Hazardous Trees along Trails

The Wilson Canyon and West Fork Game Creek trails are very popular trails on the Jackson Ranger District. The BAER Team recommends removal of severely burned and/or structurally compromised trees to protect the life and safety of Forest Service workers implementing trail stabilization treatments. BAER Team Specialists identified severely burned hazardous trees along the trails.

*The probability that a hazardous tree would impact human life and safety of BAER treatment crews is **possible** and the consequences would be **major**. Therefore, the risk is **high**, emergency conditions exist and BAER treatments are recommended in areas where BAER trail treatment are approved.*

Occupants of Homes at mouth of Wilson Canyon

Increased flood flows of up to 500% of pre-fire flows are predicted for Wilson Canyon. There are several houses located on or near the alluvial fan at the mouth of the canyon. The houses are located on private land immediately adjacent to NFS lands. The occupants of the houses are at increased risk from the effects of flooding and sediment transport. The surface of the alluvial fan is fairly flat, with little evidence of historic channels, except for two old road beds that track diagonally across the fan from the upstream edge to a point near the homes. These road beds are likely to become concentrated flow paths in the event of a flood. While it is uncertain where flood flows would be directed, the homes and occupants are certainly at increased risk.

*The probability of impacts to human life and safety is **possible** and the consequences would be **major**. Therefore, the risk is **high**, emergency conditions exist and BAER treatments are recommended. Recommended treatments would also address property risk on private lands, and natural resource risk (soil productivity/hydrologic function) on NFS lands.*

PROPERTY**Trails**

Three trails could be affected by post-fire erosion, flooding and debris flows; Wilson Canyon, West Fork Game Creek, and Game Creek. The majority of the Wilson Canyon and West Fork Game Creek trail lengths are within the burn perimeter. The Game Creek trail is located downstream from the burn. All of these trails are located within the Greater Snow King Recreation Area. Due to this area's location adjacent to the town of Jackson, the trails receive heavy non-motorized use. Use of this area is estimated at nearly 75,000 annual visits with many residents using the trails daily. Over the past decade, the community has invested considerable financial and volunteer labor towards improving the trail system.

Following trails surveys, it is anticipated that approximately 3.0 miles of the Wilson Canyon trail and 2.5 miles of the West Game Creek trail could be impacted by increased runoff, erosion, and debris flows. Impacts include loss of trail tread through erosion, and/or sediment deposition on the trail. Trail segments that are at increased risk are located on steep terrain, or are located within or adjacent to moderately or severely burned slopes. While the Game Creek trail is located outside the burn perimeter, increased peak flows from the burn upstream could impact the trail where it is located adjacent to Game Creek.

*The probability that these trails would be impacted by post wildfire run-off and/or erosion is **likely** and the consequences would be **moderate**. Therefore, the risk is **high**, emergency conditions exist and BAER treatments are recommended.*

NATURAL RESOURCES

Soil Productivity and Hydrologic Function

Increased flood flows of up to 500% of pre-fire flows are predicted for Wilson Canyon. An alluvial fan is located at the mouth of the canyon. The surface of the alluvial fan is fairly flat, and rather than containing a sorted mixture of particle sizes ranging from boulder and cobbles to fines that are typically found on fans, field observations indicate deposition of loamy soils to a depth of greater than 20 inches. There is no evidence of historic channels crossing the fan, indicating that previous flood events may have spread out across the fan and deposited suspended material. However, two old, non-system roads track diagonally across the fan from the upstream to the downstream edge and the wheel ruts provide a flow path across the fan. It is likely that flood flows would be captured by the roads. Flows would be concentrated and extensive soil erosion and gulying would occur along the flow path, leading to a loss of soil productivity and hydrologic function. Two non-system trails in lower Wilson Canyon are also likely to provide flow concentration that will increase erosion and sedimentation.

*The probability of impacts to soil productivity and hydrologic function is **likely** and the consequences would be **moderate**. Therefore, the risk is **high**, emergency conditions exist and BAER treatments are recommended. Recommended treatments would also address life/safety and property risk on private lands.*

Native Plant Communities

Known infestations of several noxious weed species (including Dalmatian toadflax, musk thistle, and Canada thistle) exist within or adjacent to the burned area. Several noxious weed species have been actively treated with herbicides over the past 3-4 years. Cheatgrass also occurs within the burned areas. Disturbance from fire has created suitable habitat for weed populations to expand because of mortality of native perennial grasses. There are approximately 156 acres of mapped weeds within the burn perimeter, of which cheatgrass occupies 27.5 acres.

The concern for threats to native plant communities from cheatgrass is particularly high. The combination of suitable habitat and available propagules increases the risk of conversion of native plant communities to cheatgrass communities following fire. Areas of high and moderate

burn severities are the most suitable for cheatgrass establishment. Cheatgrass dominated areas are fire prone. The combination of increased likelihood of fire in cheatgrass dominated areas and the spread of cheatgrass following fire creates a positive feedback loop. Cheatgrass populations are currently limited on the Forest. There is great concern about its spread, and because of the limited acreage of the populations, there is the opportunity to effectively treat it.

The loss of native plant communities with disturbance from fire has created suitable habitat for some of the other noxious and invasive species, most notably a suite of thistles and knapweeds. These species require open spaces and relatively little competition from native plants to occupy a site. Once established these noxious and invasive species tend to exclude all but a few native plants.

*For cheatgrass, the probability of impacts to native plant communities is **very likely** and the consequences would be **major**. Therefore, the risk is **very high**, emergency conditions exist and BAER treatments are recommended. For other invasive plants, the probability of impacts to native plant communities is **likely**, the consequences would be **moderate**. Therefore the risk is **high**, emergency conditions exist and BAER treatments are recommended.*

CULTURAL AND HERITAGE RESOURCES

No cultural resources were adversely affected by the fire or suppression activities and no treatment or protective measures are necessary for cultural resources. There are no values at risk. Additional cultural resource survey may be required if ground disturbing treatments are proposed for the protection of other resources in the burn area. The level and extent of additional cultural resource surveys will depend on the location and type of treatment being proposed. Costs for surveys are included in the BAER treatment costs. No emergency exists and no BAER treatments are recommended.

Summary of BAER Risk Assessment

Threat Identification	Critical Value	Probability of Loss	Magnitude of Consequence	BAER Risk
Public Recreation	Human Life and Safety	Possible	Major	High
Hazardous Trees	Human Life and Safety	Possible	Major	High
Occupants in Floodplain	Human Life and Safety	Possible	Major	High
Trails	Property	Likely	Moderate	High
Soil Productivity Hydrologic Function	Natural Resources	Likely	Moderate	High
Native Plants - Cheatgrass	Natural Resources	Very Likely	Major	Very High
Native Plants – Other Invasives	Natural Resources	Likely	Moderate	High

B. Emergency Treatment Objectives (narrative):

Land Treatments: The objective of obliteration and pitting of the non-system roads at the mouth of Wilson Canyon is to prevent flow capture and channelization of flood flows, and to

reduce soil erosion and gully by concentrated water flow. This would also serve to reduce flooding and sedimentation threats to property and human safety on private lands adjacent to the Forest boundary.

The objective of drainage installation and stabilization of the non-system trails in lower Wilson Canyon is to reduce water flow concentration and consequent soil erosion from the burned hillslope.

The objective of weed detection and treatment is provide for recovery of native vegetation by preventing the establishment and spread of invasive plants and noxious weeds into the recently burned area.

Trail Treatment: The objective of trail stabilization and drainage treatments is to reduce the risk of damage to property (system trails) by reducing erosion and sedimentation of the trail surface. The objective of storm patrols is to ensure that existing and new drainage structures remain functional beyond the first storms.

Protection/Safety Treatments: The objective of hazardous tree removal is to reduce the threat of hazardous trees to the life and safety of personnel implementing BAER trail stabilization and drainage and storm patrols on the system trails.

The objective of installing warning signs is to reduce threats to life and safety of recreational users by warning that they are entering a burned area with an elevated risk of flooding, and warning against access into hazardous areas off the trail system. Signs also serve to accelerate natural recovery by limiting off-trail travel.

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

Land 90% Channel N/A Roads/Trails 90% Protection/Safety 90% Because the fire occurred in early fall, and intense thunderstorms are most likely to occur during mid to late summer, there is sufficient time to implement treatment that there is a high probability of completing treatment before the first damaging storm.

D. Probability of Treatment Success

	Years after Treatment		
	1	3	5
Land	90	90	100
Channel	N/A	N/A	N/A
Roads/Trails	90	90	100
Protection/Safety	90	90	100

E. Cost of No-Action (Including Loss): \$62,500

Note: Cost is loss of market resource value on NFS lands only and does not include non-market values for life/safety on NFS and non-NFS lands, non-market NFS natural resource values, or market values on non-NFS lands directly adjacent to NFS lands.

F. Cost of Selected Alternative (Including Loss): \$31,950 (Expected benefit =\$43,750)

VARTool Calculation Spreadsheet available in project file

G. Skills Represented on Burned-Area Survey Team:

<input checked="" type="checkbox"/> Hydrology	<input checked="" type="checkbox"/> Soils	<input type="checkbox"/> Geology	<input checked="" type="checkbox"/> Range
<input type="checkbox"/> Forestry	<input checked="" type="checkbox"/> Wildlife	<input type="checkbox"/> Fire Mgmt.	<input checked="" type="checkbox"/> Recreation/Trails
<input type="checkbox"/> Contracting	<input checked="" type="checkbox"/> Ecology	<input checked="" type="checkbox"/> Botany	<input checked="" type="checkbox"/> Archaeology
<input type="checkbox"/> Fisheries	<input type="checkbox"/> Research	<input type="checkbox"/> Landscape Arch	<input checked="" type="checkbox"/> GIS

Team Leader: Carl Chambers, Forest Hydrologist, Arapaho-Roosevelt National Forest

Email: cchambers@fs.fed.us **Phone:** 970-295-6633 **FAX:**

BAER Team Members

Hydrology	Trevi Robertson
Soils	Kara Green
Range/Weeds/Botany/Ecology	Tyler Johnson/Dave Cottle
Wildlife	Kerry Murphy
Recreation	Linda Merigliano
Archeology	Jamie Schoen
GIS	Zack Muirbrook/Brian Goldberg

H. Treatment Narrative:

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

Land Treatments:

Obliteration of non-system roads at the mouth of Wilson Canyon - As described in the Critical Values section above, peak flow modeling predicts increased flood flows that would be delivered to the alluvial fan at the mouth of Wilson Canyon. Two old, non-system road beds track diagonally across the alluvial fan from the upstream to the downstream edge. The wheel ruts provide a flow path across the fan. The roads would be obliterated and pitted by an excavator to eliminate the flow path across the fan, reduce the entrenchment and reduce the risk of the road beds becoming eroding channels. Field observations show a lack of historic channels across the fan indicating that in previous flood events, water spread out across the fan, rather than concentrating flow. Eliminating the flow paths by digging up and pitting the roads would limit loss of soil productivity and restore hydrologic function. Estimated total road length is ½ mile. This treatment would also reduce risk to property and safety of the homeowners on the private lands immediately downslope of the Forest boundary. Note that cost for archeological clearance is included in the costs in Part VI.

Non-system trail drainage - Two steep and poorly located non-system trails are located in lower Wilson Canyon. The trails will intercept flow from the burned slope and provide a path for concentrated water flow. This is likely to result in increased soil erosion and gulying. Drainage would be installed in the trails to prevent the concentration of flow. The trails would also be dug up and pitted near their junctions with the system trail to discourage further use. The trails are about 1 mile in total length. Note that cost for archeological clearance is included in the costs in Part VI.

Weed Detection and Treatment - Noxious weed detection and treatment is recommended to provide for recovery of native vegetation by preventing the establishment and spread of noxious weeds in the recently burned area. Weed treatments would occur in the Fall of 2012 and the Spring of 2013, within 1 year following containment of the fire. Treatment locations would be focused at mapped locations along the southwestern perimeter of the fire near Wilson and Little Horsethief Canyons. Chemical and mechanical (manual methods) would be utilized. Work would be completed in cooperation with Teton County and other cooperators. Details of treatment costs including materials and labor is provided in the we BAER specialist report. While the BAER team Botanist strongly believes that cheatgrass areas should be seeded with native seeds following herbicide treatment, seeding would be accomplished using Forest or other funding.

Channel Treatments: No channel treatments are proposed.

Roads and Trail Treatments:

Trail Stabilization and Drainage - Additional trail stabilization and drainage would be installed along 5.5 miles of the Wilson Canyon and West Fork Game Creek trails within the burned area. Treatments include installation of waterbars and dips with leadout ditches, outsloping, and stabilization of ephemeral drainage crossings. Note that cost for archeological clearance is included in the costs in Part VI.

Trail Storm Patrol - Storm patrol is proposed to clean existing and newly installed drainage structures and to repair the trail tread to ensure functionality throughout the thunderstorm season. The BAER team proposes a trail crew of 2-4 people with an estimated four responses on the two trails following thunderstorms in the first year following the fire.

Protection/Safety Treatments:

Hazardous Tree Removal Treatment - BAER Team members identified severely burned hazardous trees over approximately 3.5 miles of the Wilson Canyon and West Fork Game Creek trails. Hazard tree removal to protect the life and safety of workers implementing BAER trail stabilization and storm inspection/response treatments is recommended. Only severely structurally compromised hazardous trees posing an immediate threat to workers implementing BAER treatments would be removed.

Warning Sign Treatment - Install four warning signs at trailheads and trail junctions to reduce threats to life/safety of recreational hikers by warning that they are entering a burned area that has an elevated risk of flooding, and warning against access into hazardous areas off the trail system. Signs would also serve to accelerate natural recovery by limiting off-trail travel.

I. Monitoring Narrative:

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

Proposed monitoring is storm patrol and weed detection. Both are included as part of the recommended treatments. No other monitoring is proposed at this time.

Part VI – Emergency Stabilization Treatments and Source of Funds

Interim #

Line Items	Units	Unit Cost	NFS Lands		Other \$	Other Lands			All Total \$
			# of Units	BAER \$		# of units	Fed \$	# of Units Non Fed \$	
A. Land Treatments									
Non-System roads	mile	\$7,000	0.5	\$3,500	\$0		\$0	\$0	\$3,500
Non-System trails	mile	\$1,700	1	\$1,700	\$0		\$0	\$0	\$1,700
Weed Detection	day	\$500	4	\$2,000					\$2,000
Weed Treatment	day	\$500	16	\$8,000	\$0		\$0	\$0	\$8,000
<i>Insert new items above this line!</i>				\$0	\$0		\$0	\$0	\$0
Subtotal Land Treatments				\$15,200	\$0		\$0	\$0	\$15,200
B. Channel Treatments									
				\$0	\$0		\$0	\$0	\$0
<i>Insert new items above this line!</i>				\$0	\$0		\$0	\$0	\$0
Subtotal Channel Treat.				\$0	\$0		\$0	\$0	\$0
C. Road and Trails									
Trail Stabilization	mile	1700	5.5	\$9,350	\$0		\$0	\$0	\$9,350
Storm Patrol	day	650	4	\$2,600	\$0		\$0	\$0	\$2,600
				\$0	\$0		\$0	\$0	\$0
<i>Insert new items above this line!</i>				\$0	\$0		\$0	\$0	\$0
Subtotal Road & Trails				\$11,950	\$0		\$0	\$0	\$11,950
D. Protection/Safety									
Hazard Trees	mile	1200	3.5	\$4,200	\$0		\$0	\$0	\$4,200
Warning Signs	each	150	4	\$600	\$0		\$0	\$0	\$600
				\$0	\$0		\$0	\$0	\$0
<i>Insert new items above this line!</i>				\$0	\$0		\$0	\$0	\$0
Subtotal Structures				\$4,800	\$0		\$0	\$0	\$4,800
E. BAER Evaluation									
		19250		\$19,250			\$0	\$0	\$0
<i>Insert new items above this line!</i>				---	\$0		\$0	\$0	\$0
Subtotal Evaluation				---	\$0		\$0	\$0	\$0
F. Monitoring									
				\$0	\$0		\$0	\$0	\$0
<i>Insert new items above this line!</i>				\$0	\$0		\$0	\$0	\$0
Subtotal Monitoring				\$0	\$0		\$0	\$0	\$0
G. Totals				\$31,950	\$0		\$0	\$0	\$31,950
Previously approved									
Total for this request				\$31,950					

PART VII - APPROVALS

1. /s/Dale Deiter for

2. Jacqueline A. Buchanan

09/28/12

Forest Supervisor (signature)

Date

3. /s/ Harv Forsgren

10/3/2012

Regional Forester (signature)

Date