

BURNED-AREA REPORT

(Reference FSH 2509.13)

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

☒ 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)

A. Fire Name: Quail Fire

B. Fire Number: Ut-NWS-000416

C. State: Utah

D. County: Utah ... # 049

E. Region: R4 / Intermountain

F. Forest: 19

G. District: Plesant Grove

H. Fire Incident Job Code: PNG0MZ

I. Date Fire Started: 3 July 2012

J. Date Fire Contained: 9 July 11, 2012

K. Suppression Cost: \$ 1,100,000

L. Fire Suppression Damages Repaired with Suppression Funds

1. Fireline waterbarred (miles): 1.5

2. Fireline seeded (miles): 0

3. Other (identify): na

M. Watershed Number: HUC_160202011001 Headwaters Dry Creek

N. Total Acres Burned:

[2091] NFS Acres [] Other Federal [] State [129] Private

O. Vegetation Types: Mixed conifers consisting of White fir and Douglas fir were present on the north aspects; scattered Gambel oak with maple and curleaff mountain-mahogany occurred at the lower elevations or upon the warmer south and west facing aspects with small amounts of both mountain big sagebrush and pinyon - juniper intermixed throughout the burned-area.

P. Dominant Soils:

TM2 – Tectonic Mountain Assoc. – (10%) – extremely steep mountain sideslopes dominated by rock outcrop. Slopes range from 80+%. Soils have a gravelly loam texture, poorly developed, and shallow to bedrock.

TM4 – Tectonic Mountain Assoc. – (5%) – Slopes range from 10-65%, northerly aspects, located at elevations above 7,000 ft. Soils are rocky, poorly developed, and shallow to bedrock.

SC4 – Stream Canyon – (10%) – Located on lower stream canyon sideslopes. Slopes range from 50-75%, westerly to southerly aspects, no typical elevation. Soils have cobbly loam textures, are rocky, poorly developed, dry due to aspects, and shallow to bedrock.

SC5 – Stream Canyon – (21%) – Located on lower stream canyon sideslopes. Slopes range generally from 50-75%, northerly aspects, no typical elevation. Soils have gravelly sandy loam texture, higher moisture availability due to aspects, and shallow to bedrock.

SC6 – Stream Canyon – (17%) – Located on stream canyon sideslopes. Slopes range generally from 45-75%, southerly aspects, no typical elevation. Soils have cobbly silt loam texture, rocky, dry due to aspect.

SC7 – Stream Canyon – (18%) – Located on very steep canyon sideslopes. Slopes range generally from 65+%, no typical aspect or elevation. Unit consists of cliff, rock rubble and talus slopes. Where soils have developed they are coarse textured, rocky, dry, and shallow to bedrock.

Q. Geologic Types: Major landforms in the fire perimeter include steep, uplifted block faulted mountains that reach ~9,000 ft elevation and dissected alluvial fan and fan remnants extending down to about 5,000 ft elevation. Geology in the area is primarily the Oquirrh Formation consisting of marine sandstones and limestone with inclusions of both Precambrian and Cambrian age quartzite deposits.

R. Miles of Stream Channels by Order or Class:

Perennial – None	Intermittent – 0	Ephemeral – 7.0
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S. Transportation System

Trails: 0.8__miles Roads: 0__miles

PART III - WATERSHED CONDITION

- A. Burn Severity (acres): 2,070 ac (low) 145 ac (moderate) 5 ac (high)**
- B. Water-Repellent Soil (acres): 0__**
- C. Soil Erosion Hazard Rating – Disturbed (acres):**
 673 (30%) (low) 83 (4%) (moderate) 1,461 (66%) (high)
- D. Erosion Potential: 18-30 tons / acre / 2 years**
- E. Sediment Potential: 11,500 cubic yards / square mile / 2 years**
- F. Slope by acres: 294 ac <40% (13%)**
 547 ac 40-60% (25%)
 1,374 ac >60% (62%)

PART IV - HYDROLOGIC DESIGN FACTORS

- A. Estimated Vegetative Recovery Period, (years): 5
- B. Design Chance of Success, (percent): 80
- C. Equivalent Design Recurrence Interval, (years): 5
- D. Design Storm Duration, (hours): 1
- E. Design Storm Magnitude, (inches): 0.573 in.
- F. Design Flow, (cubic feet / second/ square mile): see table 1.0
- G. Estimated Reduction in Infiltration, (percent): see table 1.0
- H. Adjusted Design Flow, (cfs per square mile): see table 1.0

Table 1 contains design flow estimates for the main drainages on the fire. Other drainages on the Quail Fire were either small or contained small areas of burn.

Table 1.0 Design Flow estimates for selected drainages for the 2009 Big Pole Fire

Drainage	Area (mi ²)	¹ Design Flow (cfs/mi ²)	¹ Adjusted Design Flow (cfs/mi ²)	Estimated Reduction in Infiltration (percent)	Estimated Prefire Discharge from Design Storm (cfs)	Estimated Postfire Discharge from Design Storm (cfs)
Box Elder	2.5	10.4	49	79	26	124
Wadsworth	0.7	0.1	96	99	0	63
Willow	0.5	0.0	74	99	0	35

¹Discharge estimates were calculated using WILDCAT4 computer model

PART V - SUMMARY OF ANALYSIS

- A. Describe Critical Values/Resources and Threats:** The fire severely burned the headwaters of Box Elder and Wadsworth Canyons. The upper canyons are dominated by debris-flow and snow avalanche-dominated channels. Slopes are steep and average 60-80%. A high risk exists of increased surface erosion due to lost ground cover, reduced soil strength over a 5-8 year period as conifer roots decay, and subsequent risk of landslides and/or debris flows. Mouth of canyons are large, composite alluvial fans located on lands owned primarily by the City of Alpine and which are rapidly being developed for private residences. Risk is high over the next 3-5 years that large-magnitude summer thunderstorm or heavy spring runoff will result in downstream property damage on alluvial fan.

The risk of flooding from a wildfire is shown in the flooding that occurred after the Oak Hills Fire burned in 2000. The Oak Hills fire occurred immediately south of the Quail fire and burned the upper two-thirds of in Preston Canyon, a 442 acre drainage. The size, vegetation, soil, geology and environmental conditions are similar to Box Elder and Wadsworth and Willow Canyons in the Quail Fire. Three debris flows have occurred since the Oak Hills wildfire. One event occurred on August 21, 2001 in Preston Canyon and no property damage occurred. However, two debris flows occurred on September 6, 2002 after 0.5 inches of rain fell during a 15-minute period. The precipitation intensity equates to a 25 to 50 year storm, which is beyond the realm where slope treatments effectively reduce risk. During this event, one debris flow carrying roughly 10,000 cubic yards flushed out of Preston Canyon into the community of Alpine, Utah and a smaller flow, estimated to be about 2,500 cubic yards, came out of Smooth Canyon and flowed into the east side of town. During these events, sediment and water damaged one house below Preston Canyon. Based on this evidence it is likely that similar events may occur from the Quail Fire.

Within NFS lands:

- 1) Water Transmission Facilities: In conversations with Alpine City staff, there are irrigation diversion structures and pipelines on NFS lands that are located in the canyon bottoms of Box Elder and Wadsworth Canyons. In Box Elder Canyon the diversion structure consists of a cement box with grate on it located in the stream channel and water is carried through a pipeline to the north side of the canyon. In Wadsworth Canyon the diversion structure consists of a wooden headgate on a spring and water is carried through an old clay pipe system. The facilities in both of these canyons are at risk of damage from a flood event. No treatments are recommended by Alpine City for these facilities because any protection measures would be ineffective. Alpine City would rather clean and repair the facilities rather than invest money into protection at this time (Personal comments from Shane Sorenson, Alpine City Engineer during a meeting at Alpine City office on July 10, 2012).
- 2) Special Status Areas: All FS land within the fire area is designated Wilderness. Numerous State, Federal and Uinta Wasatch Cache NF designated noxious weeds were observed inside the fire area on private land adjacent to NFS land. Of concern are the infestations of squarose knapweed, spotted knapweed and myrtle spurge. These species have been documented as aggressive and very environmentally detrimental. Since the knapweeds are known to produce thousands of wind dispersed seeds, it can be expected that the seed has already been spread onto NFS land. Knapweed seeds are hardy and are suspected to remain dormant in the soil for up to five years. Knapweeds are also known to establish rapidly in disturbed areas and have been known

to rapidly invade burned areas. It can be expected that there are viable seeds within the fire area which pose a threat to the recovery of the Wilderness area.

3) Wilderness: U.S. Forest Service Policy (FSM 2320) is summarized below:

Permit emergency burned area rehabilitation only if necessary to prevent an unnatural loss of the wilderness resource or to protect life, property, and other resource values outside of wilderness. Normally use hand tools and equipment to install selected land and channel treatments. (FSM 2423.43b) Use indigenous or appropriate naturalized species to reestablish vegetation where there is no reasonable expectation of natural healing. Use non-motorized equipment to accomplish improvement objectives. Only imminent threat to important values downstream justifies the use of motorized equipment. (FSM 2423.43a)

- 4) Heritage Resources: On 7/12/12, U-W-CNF Heritage staff field inspected 3 historic mining adits/prospects, and sections of historic clay pipe that was used for water conveyance. The historic dates of the adits/prospects, and the sections of clay pipe are unknown, however, all are over 50 years old. The clay pipe likely dates prior to 1900, and the adits are also likely of the same vintage or earlier. At this time the Heritage staff does not recommend any mitigation or special protection measures for these resources.
- 5) Soil Productivity: There is a risk to the ecological integrity and future soil productivity of the burned area. Soils in the area in general have low productivity potential due to the steepness of the area. Soils are not well developed and easily erode. Loss of vegetation has increased the erosion potential and can further reduce future productivity. Even after vegetation has re-established it will take many years for the duff and litter layers to accumulate and decades for the soil stability and soil nutrient stores to rebuild. In addition, there is the potential for the area to be compromised by invasive weed species. Invasive weeds have the potential to cause a decline in soil productivity by altering soil nutrient availability, water holding capacity, and erosion potential.
- 6) Threatened, Endangered and Sensitive Species: Protect threatened species and their habitat from unnatural events. No aquatic or terrestrial TES species occur within the fire area. There are no known TES plant species within or below the fire area. No TES species are expected to be impacted by post fire events.
- 7) Invasive/Noxious Weeds: The risk of increased infestations of noxious weeds is high due to existing populations within the fire perimeter, it is likely that some treatment will be necessary.
- 8) Trail: A portion of the Dry Canyon Trail crosses through the fire area. Fire crews that rehabilitated the suppression lines also removed hazard trees located along that trail.

On Non NFS lands:

- 1) On non NFS lands there is a risk to human life and property from impaired watershed conditions. The appropriate Federal agency to assist those that have their property threatened by flooding is the Natural Resource Conservation Service (NRCS) through their Emergency Watershed Protection Program.
- a) Communities, and Residences: Because of the burn, several residences may be threatened from large debris flows associated with potential summer thunder storms or spring runoff. West of the mouth of Box Elder Canyon, one house west just west

- of a cement culvert on Box Elder Circle is at risk. A house just south of the main gully is at risk to sheet and rill erosion from the steep burned slopes above it. At the mouth of Willow Canyon, a detention basin is in place and will provide some flood detention for two homes below it. It is not known whether the size of structure is adequate to protect homes below it.
- b) Public and Domestic Water Supplies: Review of these features were evaluated by BAER team members and Alpine City staff. Locations of public water supplies were identified at the mouth of Box Elder and Wadsworth Canyons. It was determined that the water supply below Box Elder would not be impacted by a flood event because any potential flood flow would be channeled away from the culinary water source.
 - c) Water Transmission Facilities: Willow Canyon has a flood detention basin, on non NFS land, with a grate and pipeline that diverts water downstream into the storm drainage system. This facility is expected to detain flood flows, however, it is not clear whether it has the capacity to contain the potential flood events. At very low risk, are two buried pipelines in gravel road three quarters of a mile west of Box Elder Canyon mouth. There is a irrigation canal nine tenths of a mile to the west of the Box Elder Canyon mouth. It is possible that flood waters could reach this canal which would act as a detention barrier to some degree.
 - d) Road and Bridges: If a debris flood jams flows out of the mouth of Box Elder Canyon, the culvert on Box Elder Circle road is at risk of jamming with debris. This may result in flood waters eroding the road and culvert.
- 2) Soil Productivity: There is a risk to the ecological integrity and future soil productivity of the burned area. Most of the soils lie on steep or moderately steep terrain, have low productivity, are not well developed, and easily erode. Loss of vegetation has increased the erosion potential and can further reduce future productivity. Even after vegetation has re-established it will take many years for the duff and litter layers to accumulate and decades for the soil stability and soil nutrient stores to rebuild. In addition, there is the potential for the area to be compromised by invasive weed species. Invasive weeds have the potential to cause a decline in soil productivity by altering soil nutrient availability, water holding capacity, and erosion potential.
- 3) Threatened, Endangered and Sensitive Species: See item 6) in the preceding section (Within NFS lands).
- 4) Invasive/Noxious Weeds: See item 7) in the preceding section (Within NFS lands).

Potential Treatments Analysed

There are several treatments that have been used to reduce erosion and flooding from fires (listed below). These treatments have a variety of effectiveness in reducing erosion, sedimentation or downstream flooding based on fire severity, slope, aspect, soil types, topography and magnitude of precipitation events.

The Quail fire started in the foothills above Alpine City, in grass and rapidly progressed into the Gamble oak and up slopes of 60-80% vegetated with mixed mountain shrubs. Soils within the fire perimeter are highly erosive, shallow, and located on steep, dry slopes with sparse vegetation. The hillsides have evidence of dry ravel (downward movement of soil due to gravity) and slumping (mass movement of soil). The channels in Box Elder,

Wadsworth and Willow Canyons are steep and have had active movement of rocks and boulders.

Listed below are potential treatments and the assessment of their effectiveness for the Quail Fire area.

Hillside Treatments:

Aerial and ground seeding – generally ineffective on slopes greater than 40 percent because of potential to be removed with wind and rain. The oak, maple, and some of the mountain shrub that burned should aggressively resprout so that these areas will not need revegetation treatment. Seeding would require consistent gentle rains in order to germinate seed and ensure plants could grow large enough to become effective in soil holding capabilities. Seeding would need to occur in late fall or early spring in order to increase success.

For the Quail fire the majority of the fire area is 60-80 percent slopes. Establishment of vegetation due to seeding would not occur for another year. Ground Seeding in the Quail Fire would be unsafe on the steep slopes and could be cost prohibitive. In the Quail Fire almost all of the area had a low to moderate burn severity. Seeding is generally not recommended for these severities in order to avoid competition with native species that will regenerate.

Mulching – Success of mulching is variable. In the areas of highest concern (steep and erosive) on the Quail Fire it is likely mulching would likely be unsuccessful due to wind and rain events washing mulch off.

Silt Fence- Due to the steep slopes they are ineffective because of the reduced capacity to hold sediment and the ability to keep the structures in place. They would require continued maintenance.

Contour Trenching/ Tilling/Ripping – All of these methods require the use of heavy equipment which can normally operate safely on slopes less than 30 percent, very little of which is on the NFS lands portion of the burn. Machinery can generally not be used within the wilderness boundary. The slopes in Quail Fire area that are less than 30 percent are extremely limited.

Straw wattles- Straw wattles should not be placed across drainage swales and channels with more than 2 acres of contributing drainage area because they are not sturdy enough to resist the forces of concentrated flows. They can be used on slopes greater than 45 percent but in order to be effective numerous rows would have to be installed close together. Installation labor would be intensive, very expensive, and a safety concern of working on such steep slopes.

In Channel Treatments:

In channel treatments include: straw bale check dams, log grade stabilizers, channel debris clearing, log dams, rock grade stabilizers, and straw wattle dams. None of the in-channel treatments listed above would be effective because the channels are steep, and these treatments have little capacity to detain water and sediment. Previous events occurring out of Preston Canyon after the Oak Hills fire produced such high volume of

material (12,000 cubic yards), and events such as this would overwhelm these structures.

Out channel treatments:

Detention Basin – Are highly effective, if built to capacity, in detaining flood and sediment flows. Detention basins have to be built on moderate to low slopes with large vehicle access to the basin in order to clean out the basin and have sufficient capacity.

Road Treatments:

There are no roads on NFS lands however roads on private lands below the FS boundary could benefit from clearing debris from culverts or culvert upgrading and installing trash racks at the culvert inlet to catch debris.

- B. Emergency Treatment Objectives (narrative):** The objective for the treatment is to provide “Early Detection and Rapid Response” of noxious weed infestations in order minimize their establishment in Lone Peak Wilderness Area.

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

Land 90% **Channel** na% **Roads/Trails** na % **Protection/Safety** na%

D. Probability of Treatment Success

	Years after Treatment			
	1	3	5	
Land	90	30	10	
Channel	na	na	na	
Roads/Trails	na	na	na	
Protection/Safety	na	na	na	na

- E. Cost of No-Action (Including Loss):** \$24,000

- F. Cost of Selected Alternative (Including Loss):** \$12,690

G. Skills Represented on Burned-Area Survey Team:

☒ Hydrology ☒ Soils ☐ Geology ☐ Range
☒ Forestry ☐ Wildlife ☐ Fire Mgmt. ☐ Engineering

☐ Contracting ☒ Ecology ☒ Botany ☐ Archaeology
☒ Fisheries ☐ Research ☐ Landscape Arch ☒ GIS

Team Leader: Charlie Condrat, Forest Hydrologist

Email: ccondrat@fs.fed.us **Phone:** 801-999-2173 **FAX:** XXX

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.)

Invasive/noxious weed invasion is an emergency situation caused by the Quail Fire. Treatments to mitigate the emergency on lands managed by the Uinta-Wasatch-Cache NF would be to implement "Early Detection and Rapid Response" for weeds. This would include: inventory, mapping, and treatment of any existing infestations found. Since there is a high likelihood of expansion of noxious and invasive species post-fire, during the one-year emergency stabilization period monitor the fire area to determine the presence of and spot-treat any small/isolated invading weed populations discovered within or near the fire area, to prevent noxious weed spread on NFS lands. Monitoring will be focused in (but not limited to) burned areas adjacent to existing known populations, in areas where fire containment activities occurred on NFS lands, and next to roads and/or trails.

Alpine City, Highland City, State Division of Lands and Forestry, and NRCS representatives met and discussed treatment opportunities on lands below the Forest boundary (non-NFS lands). No need or measures to mitigate threats to Highland City were identified. Alpine City is coordinating with the NRCS and state, and is considering three treatments: (1) placement of large rocks/small boulders in the Box Elder Canyon drainage to catch debris that might wash off the fire, (2) placement of jersey barriers at key locations along this drainage to divert flows around facilities, and (3) cleaning in/around water intake structures in Box Elder Canyon after flood/debris flow events (see Part V, Water Transmission Facilities section of this report).

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.)

Monitoring will consist of visually observing the burned area over several weeks during the spring and summer of 2013 and will be focused in (but not limited to) burned areas adjacent to existing known populations, in areas where fire containment activities occurred on NFSs, and next to roads and/or trails.

Part VI – Emergency Stabilization Treatments and Source of Funds						Interim #			
A. Land Treatments									
weed treatment (GS5 10 hr day)	48	169.79	48	\$8,150	\$0	\$0	\$0	\$0	\$8,150
Materials (Chemicals/Tru	1	3100	1	\$3,100	\$0	\$0	\$0	\$0	\$3,100
GS 11 Botanist	4	360	4	\$1,440	\$0	\$0	\$0	\$0	\$1,440
<i>Insert new items above this line!</i>				\$0	\$0	\$0	\$0	\$0	\$0
<i>Subtotal Land Treatments</i>				\$12,690	\$0	\$0	\$0	\$0	\$12,690
B. Channel Treatments									
				\$0	\$0	\$0	\$0	\$0	\$0
				\$0	\$0	\$0	\$0	\$0	\$0
				\$0	\$0	\$0	\$0	\$0	\$0
<i>Insert new items above this line!</i>				\$0	\$0	\$0	\$0	\$0	\$0
<i>Subtotal Channel Treat.</i>				\$0	\$0	\$0	\$0	\$0	\$0
C. Road and Trails									
				\$0	\$0	\$0	\$0	\$0	\$0
				\$0	\$0	\$0	\$0	\$0	\$0
				\$0	\$0	\$0	\$0	\$0	\$0
<i>Insert new items above this line!</i>				\$0	\$0	\$0	\$0	\$0	\$0
<i>Subtotal Road & Trails</i>				\$0	\$0	\$0	\$0	\$0	\$0
D. Protection/Safety									
				\$0	\$0	\$0	\$0	\$0	\$0
				\$0	\$0	\$0	\$0	\$0	\$0
				\$0	\$0	\$0	\$0	\$0	\$0
<i>Insert new items above this line!</i>				\$0	\$0	\$0	\$0	\$0	\$0
<i>Subtotal Structures</i>				\$0	\$0	\$0	\$0	\$0	\$0
E. BAER Evaluation									
				---		\$0	\$0	\$0	\$0
<i>Insert new items above this line!</i>				---	\$0	\$0	\$0	\$0	\$0
<i>Subtotal Evaluation</i>				---	\$0	\$0	\$0	\$0	\$0
F. Monitoring									
				\$0	\$0	\$0	\$0	\$0	\$0
<i>Insert new items above this line!</i>				\$0	\$0	\$0	\$0	\$0	\$0
<i>Subtotal Monitoring</i>				\$0	\$0	\$0	\$0	\$0	\$0
G. Totals				\$12,690	\$0	\$0	\$0	\$0	\$12,690
Previously approved									
Total for this request				\$12,690					

PART VII - APPROVALS

1. /s/ David C. Whittekiend
Forest Supervisor (signature)

7/19/2012
Date

2. /s/ Deborah Oakeson (for)
Regional Forester (signature)

7/26/12
Date