

Date of Report: 8/9/2012

**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:** Arapaho**B. Fire Number:** WY-ALX-012131**C. State:** Wyoming**D. County:** Albany/Platte/Converse**E. Region:** 02**F. Forest:** MBR**G. District:** Douglas**H. Fire Incident Job Code:** PNGZ04**I. Date Fire Started:** June 29, 2012**J. Date Fire Contained:** Aug. 5, 2012 (90%)**K. Suppression Cost:** \$ 13.1M (CTD July 13, 2012)**L. Fire Suppression Damages Repaired with Suppression Funds (NFS only)**

1. Fireline waterbarred (miles): unknown
2. Fireline seeded (miles): 0
3. Other (identify): XXXX

**M. Watershed Number:** 1018001106 / 1018001107 / 1018000809 / 1018001101**N. Total Acres Burned:** 98,115

[32,485] NFS Acres [8,475] Other Federal [5,269] State [51,886] Private

**O. Vegetation Types:** Ponderosa Pine, lodgepole and aspen woodlands are the dominant vegetation communities within the fire area, but there are numerous large areas of

shrublands and grasses throughout the area. Tree density and understory composition and cover vary with aspect and slope. Common understory plants include Ross sedge, elk sedge, bearberry, bitterbrush, and ribes. Headwater stream valleys are relatively narrow and are dominated by shrub stands of willow, box elder, poplar, and water birch often with conifer overstories and grass/sedge understories and/or aspen stands. Streams transition into wide meandering grass/sedge dominated systems as they leave the steep mountainous areas and enter wide gentle valleys.

- P. Dominant Soils:** The soils are mostly loams and clay loam with a large percentage of rock content in the soil profile. The soils are moderate in erodibility, however the large rock cover provides protection from water erosion. Some of the ridgetops in the fire area are granite outcrops with no vegetation growing on them. The area is not prone to mass movement, although colluvial soil movement on steep slopes is common.
- Q. Geologic Types:** The fire is located on the southern end of the Laramie Peak Range. The geology consists of ancient granite rock thrust up through the sandstone and limestone. The dominant landform is strongly sloping hills to very steep mountain slopes. Highly fractured bedrock outcrops are common to the area (approximately 20 percent of the area). This geology and landforms provided large amount of ground cover of rock fragments. Large and small alluvial fans are common in the area.
- R. Miles of Stream Channels by Order or Class:** 140 Miles Perennial; 324 miles Intermittent.

**S. Transportation System (FS Jurisdiction only)**

**Non-Motorized Trails:** 3.0 miles    **Motorized Trails:** 9.3 miles    **Roads:** 28.6 miles

**PART III - WATERSHED CONDITION (NFS lands only)**

- A. Burn Severity (acres):** 66,580 (68%) (low); 14,249 (15%) (low/mod mosaic); 6232 (6%) (moderate); 10,957 (11%) (high)
- B. Water-Repellent Soil (acres):** 13,843
- C. Soil Erosion Hazard Rating (acres):** 9,239 (low) 41,741 (moderate) 47,135 (high)
- D. Erosion Potential:** 2.1 tons/acre
- E. Sediment Potential:** 207 cubic yards / square mile

**PART IV - HYDROLOGIC DESIGN FACTORS**

- A. Estimated Vegetative Recovery Period, (years):** 3-5 yrs
- B. Design Chance of Success, (percent):** n/a
- C. Equivalent Design Recurrence Interval, (years):** 5 yr
- D. Design Storm Duration, (hours):** 6 hrs

- E. Design Storm Magnitude, (inches): 1.4 inches
- F. Design Flow, (cubic feet / second/ square mile): 40 cfs/mi<sup>2</sup>
- G. Estimated Reduction in Infiltration, (percent): 60%
- H. Adjusted Design Flow, (cfs per square mile): 105 cfs/mi<sup>2</sup>

#### PART V - SUMMARY OF ANALYSIS

##### A. Describe Critical Values/Resources and Threats (narrative):

**Fire Effects Summary:** The Arapaho fire burned approximately 153 square miles in the Laramie Mountains west of Wheatland, WY. The fire burned both forested and non-forested areas in a mosaic pattern, with many unburned areas within the fire perimeter. Fire severity was low in 68% of the burn area; low/moderate mosaic and moderate in 21% of the burn area and high in 11% of the burn area. Field investigation found patchy water repellent soil conditions were common in the high severity burn areas, primarily at the soil surface.

**Potential Threats to Human Life and Safety:** Burned trees (snags) falling can be a significant hazard after fires. Most snags posing an immediate hazard along open roads were removed as a result of fire suppression activities. Snags have not been cleared along most trails in the burn area, including Friend Park, Harris Park, Laramie River and Roaring Fork trails. The extent of burning along the Laramie Peak Trail is unclear at this time, as there is still active fire in that area. The fire did not create snag hazards in the Friend Park campground. With the exception of roads and trails, public use of most NFS lands within the area is relatively low due to the steep terrain. The BAER Risk Assessment (FSM 2523.1 Ex 2) for roads and the Friend Park Campground (critical values) is intermediate, since the probability for injury or death from burned trees falling is "unlikely" and the magnitude of consequences is "major". **The BAER Risk Assessment (FSM 2523.1 Ex 2) for the Laramie River Trailhead, Friend Park, Harris Park, and Roaring Fork trails (and potentially the Laramie Peak Trail) is "High", since the probability for injury or death from burned trees falling is "possible" and the magnitude of consequences is "major".**

Flooding as a result of increased runoff after fires can increase the risk of drowning, washout roads and limit emergency access. People within and downstream of the burn area are at increased risk of flooding and debris flows. The following watersheds (Figures 1, 2) are estimated to have the greatest potential for increases in flow: Cottonwood Park, Friend Creek, Jack Squirrel Peak, South Fish Creek and Murphy Canyon. Post-fire peak flows are predicted to be 180 to over 400% of pre-fire conditions (Table 1). Increases in peak flows can be expected to persist for 2-3 years after the fire, and with vegetative recovery, begin to decline toward pre-fire levels. **The BAER Risk Assessment (FSM 2523.1 Ex 2) for public safety due to flooding, primarily in the watersheds identified in Table 1, is "Intermediate", since the probability for injury or death from flooding is "possible" and the magnitude of consequences is "moderate".**

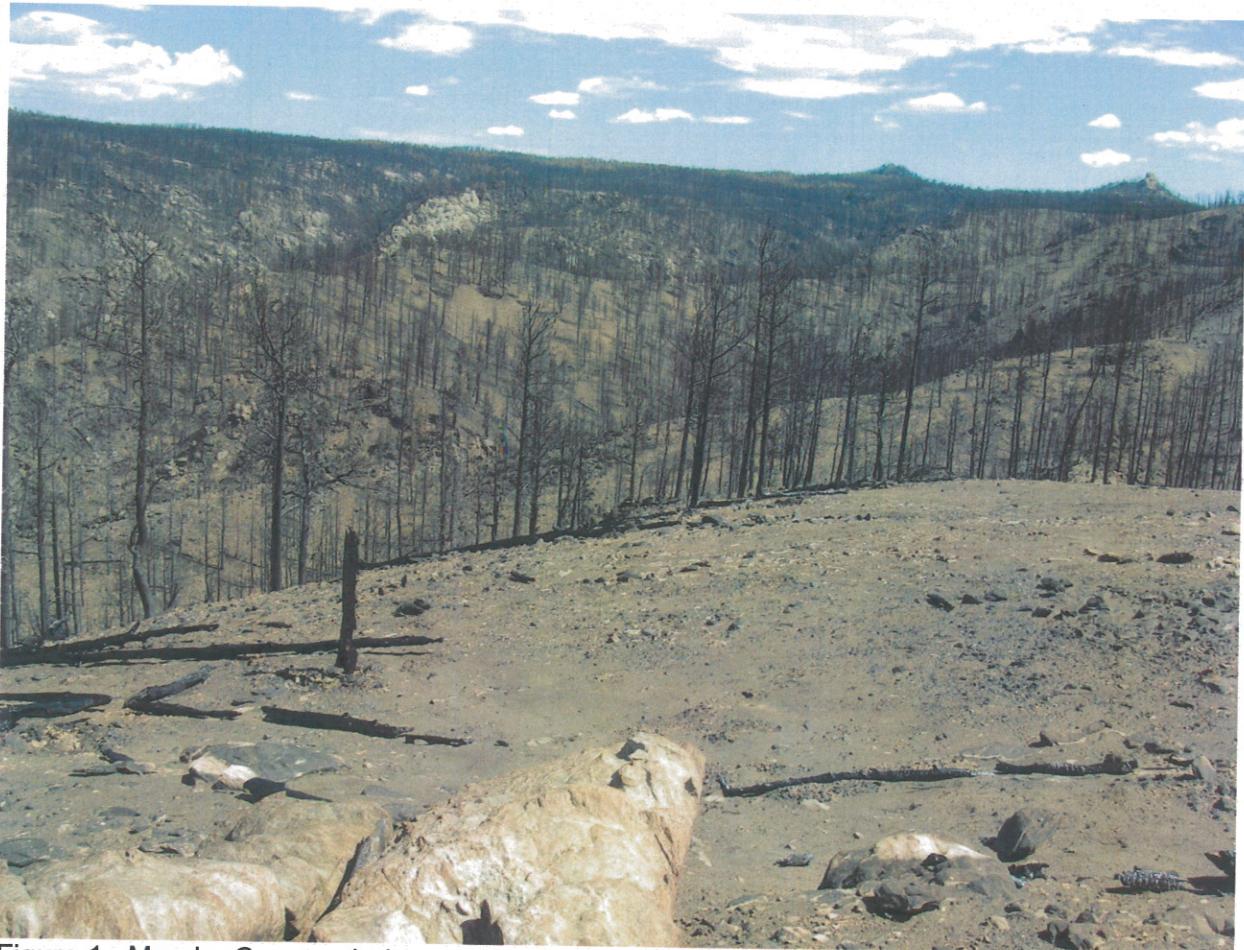


Figure 1. Murphy Canyon drainage. Due to the extent and high severity burn in this drainage, this area has high potential for increased runoff and flooding.

Table 1. Predicted Increase in Runoff from a 5 year, 6 hour Storm Event.

Watershed	Area (Sq. mi.)	Pre-Fire Conditions (cfs)	Post Fire conditions (cfs)	Percent Increase
Cottonwood Park	15.47	654	2034	<b>311</b>
Friend Creek	8.57	386	699	<b>181</b>
Jack Squirrel Peak	2.56	131	246	<b>188</b>
South Fish Creek	13.10	220	941	<b>428</b>
Murphy Canyon	9.13	373	1304	<b>350</b>

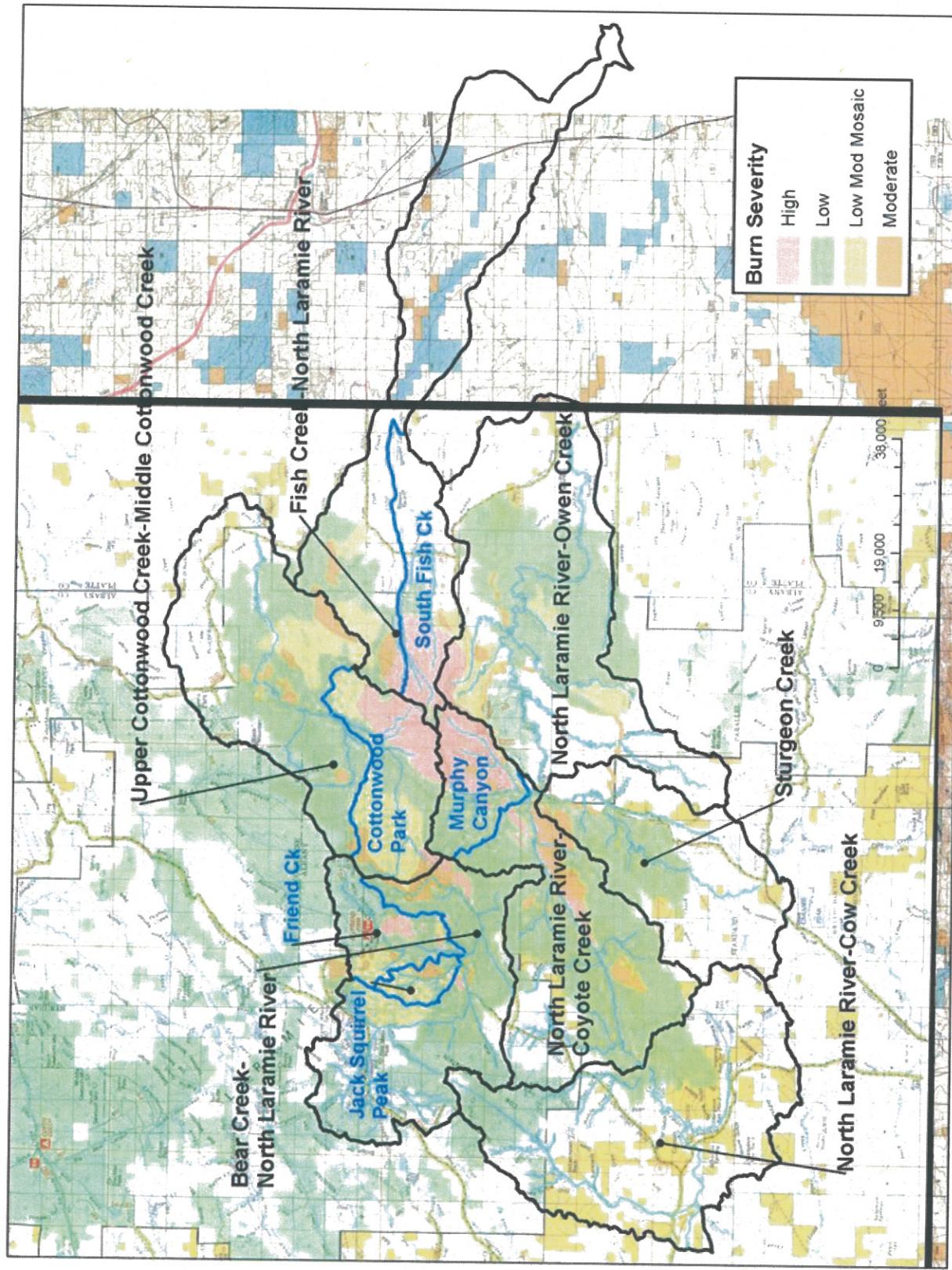


Figure 2. Burn Severity and Watershed Map for the Arapaho Fire. Sixth Level HUC's are in Black, 7th level HUC are in Blue.

**Potential Threats to Property:** Increased runoff and/or sedimentation has the potential to damage property.

Some structures exist on or near the floodplain within and downstream of the burn area, primarily on private lands along Cottonwood Creek and the North Laramie River. Private landowners may choose to work with the NRCS to address any concerns. There are no known structures in or near floodplains on NFS lands in the burn area. **The BAER Risk Assessment (FSM 2523.1 Ex 2) for structures on NFS lands is “Very Low”, since the probability for property damage is “unlikely” and the magnitude of consequences is “minor”.**

There are private, State, County, and Forest Service roads within and immediately downstream of the burn area. The Fletcher Park (Cty 716), Harris Park (Cty 714), Cottonwood Park (Cty 710) and Bear Creek (Cty 77/NFSR 671) roads are the major arterial access routes in and downstream of the fire area. There are numerous lower standard National Forest System Roads and motorized trails within the burn area. Potential post-fire impacts include damage to the road and motorized trail systems due to increased runoff that may exceed the capacity of existing drainage features (e.g. bridges, culverts, ditches, water bars, driveable dips), cause severe erosion to the road surface and/or deposition of sediment and ash on the road surface. Roads are also likely to exacerbate the risk of flooding and erosion by collecting and concentrating surface water and delivering it to hill slopes or stream channels. Flash flooding, debris flows, ash and sediment deposition, plugged culverts, and surface erosion have already occurred on many of the roads in and downstream of the burn area as a result of rain events since the fire. **The BAER Risk Assessment (FSM 2523.1 Ex 2) for roads and motorized trails is “Very High”, since the probability for property damage is “very likely” and the magnitude of consequences is “major”.**

There are no known stock ponds or irrigation ditches on NFS lands within the fire perimeter, however these features do exist on other lands in and downstream of the burn area. Changes in operations (e.g. close headgates during flow events), increased maintenance (e.g. cleaning ash and sediment from ditches and reservoirs) and preventative measures (e.g. harden spillways to minimize risk of failure) may be warranted in some cases. **The BAER Risk Assessment (FSM 2523.1 Ex 2) for stock ponds and irrigation ditches on NFS lands is “Very Low”, since the probability for property damage is “unlikely” and the magnitude of consequences is “minor”.**

No surface public water supplies are located within or immediately downstream of the burn area, therefore **the BAER Risk Assessment (FSM 2523.1 Ex 2) for public water supplies is “Very Low”, since the probability for property damage is “unlikely” and the magnitude of consequences is “minor”.**



Figure 3. NFSR 642 culvert plugged with ash and sediment resulting in water flowing over road.



Figure 4. Fletcher Park Road (County #133). Surface erosion due to increased runoff and inadequate drainage.

**Potential Threats to Critical Natural or Cultural and Heritage Resources:** Several areas within and adjacent to the Arapaho fire have burned in other fires over the past couple decades. These lands have generally revegetated quickly (1-3 years) and provide a good indication of the recovery potential for the Arapaho burn area.

Increased soil erosion is expected until the area revegetates. Erosion and ash movement have already been observed in many locations. There is evidence of old alluvial fans in many locations throughout the burn area (Figure 5), suggesting that significant erosion has occurred in the past and may occur again throughout this landscape during high intensity precipitation events over high severity burn areas. Estimated rates of soil erosion are expected to be within the natural range of variability for the geographic area and do not pose a threat to soil resources, although other critical values such as roads may be affected. The BAER Risk Assessment (FSM 2523.1 Ex 2) for soils is "Intermediate", since the probability for damage is "possible", and the magnitude of consequences is "moderate".



Figure 5. Old alluvial fan in Murphy Canyon valley bottom.

The riparian areas below 8,100 feet (e.g. Bear Creek, Friend Creek, Arapaho Creek, Murphy Canyon, Clark Draw, Roundtop Mtn tributary to Bear Creek) are considered potential Preble's Meadow Jumping Mouse habitat (a Threatened Species). The mouse has been found in Murphy Canyon. A review of the riparian areas in the burn area found that conditions ranged from high severity burn in riparian areas to riparian areas that were essentially unburned. Ash and sediment deposition in some riparian areas that provide potential habitat for Prebles has

already been observed as a result of post-fire precipitation events. There is also the potential for invasive species to expand into these riparian areas. **The BAER Risk Assessment (FSM 2523.1 Ex 2) for Prebles Jumping Mouse Habitat is "High", since the probability for damage is "likely", and the magnitude of consequences is "moderate".**

Noxious weed infestations have been documented within the burn area. Species include Houndstongue, Canada Thistle, Dalmation Toadflax, Leafy Spurge and Cheatgrass. Based on observations from other fires in the area over the past couple decades, these weed species are expected to spread quickly within the burn area and pose a threat to wildlife habitat quality and quantity, ecosystem function and landscape appearance. **The BAER Risk Assessment (FSM 2523.1 Ex 2) for invasive species is "High", since the probability for damage is "likely", and the magnitude of consequences is "moderate".**

Cultural/Heritage resources within the area were found to be in stable condition with no identified imminent threats to the properties. **The BAER Risk Assessment (FSM 2523.1 Ex 2) for Cultural/Heritage resources is "Very Low", since the probability for additional property damage is "unlikely" and the magnitude of consequences is "minor".**

**Summary:** Based on our evaluation of fire effects in relation to human life and safety, property and critical natural, cultural and heritage resources, we have determined that there are imminent threats and/or emergency conditions as a result of the Arapaho fire. Post-fire runoff and flooding poses a potential safety concern and has already caused extensive damage to the road and trail system in and downstream of the burn area. Habitat for the threatened Prebles Meadow Jumping Mouse was impacted by the fire and habitat conditions may deteriorate as a result of sediment deposition and/or invasive species. Invasive species are present within the burn area and are likely to aggressively expand in high severity burn areas. BAER treatments are recommended to address these critical values at risk.

#### B. Emergency Treatment Objectives (narrative):

**ROADS & MOTORIZED TRAILS:** The purpose of the road and motorized trail treatments is to reduce the risk of a) transportation system drainage failure that could compromise emergency access, b) damage to the road surface and infrastructure, c) increased erosion and sedimentation and d) downstream damage.

**NON-MOTORIZED TRAILS:** The purpose of the non-motorized trail treatments is to reduce the risk of a) damage to the trail surface and infrastructure, b) increased erosion and sedimentation, c) downstream damage and d) reduce the risk to human life and safety.

**PREBLES JUMPING MOUSE HABITAT:** The purpose of the Prebles habitat treatment is to increase the rate of revegetation in severely burned areas and reduce the potential for expansion of invasive species.

**INVASIVES:** The purpose of the invasive species treatment is to detect, contain, and control the expansion of invasive species within the fire perimeter, especially along roads and trails, which are known corridors of existing populations.

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

**Land 90% Channel XXX% Roads/Trails 50%\* Protection/Safety XXX%**

\*Some road damage has already occurred. Road work planned to be completed ASAP, later this summer/fall or early next spring before runoff and 2013 storms.

**D. Probability of Treatment Success**

		<b>Years after Treatment</b>		
		<b>1</b>	<b>3</b>	<b>5</b>
<b>Land</b>	75%	80%	90%	
<b>Channel</b>	XXX	XXX	XXX	
<b>Roads/Trails</b>	75%	80%	90%	
<b>Protection/Safety</b>	XXX	XXX	XXX	

**E. Cost of No-Action (Including Loss):**

**ROADS & MOTORIZED TRAILS:** The costs associated with damage to roads and motorized trails is expected to be high, but difficult to quantify as the location and severity of damage depends on the intensity and location of future precipitation events. Flooding and debris flows in the area have already occurred, causing damage to road surfaces, drainage features, and downstream resources. Costs are being incurred to cleanup and repair damage resulting from flooding and debris flows. Costs associated with damage to infrastructure are expected to increase if treatments are not implemented (e.g. if a plugged culvert is not cleaned out, there is a higher probability the road will wash out and cost more to repair). There are also costs associated with the loss of access on roads and trails that may be impassable due to storm damage, including the potential loss of emergency access.

**NON-MOTORIZED TRAILS:** The costs associated with damage to trails is expected to be moderate, but difficult to quantify as the location and severity of damage depends on the intensity and location of future rainfall events. Flooding and debris flows in the area have already occurred, causing damage to trail surfaces, drainage features, and downstream resources. Costs associated with damage to infrastructure are expected to increase if treatments are not implemented (e.g. if a waterbar is not cleaned out, there is a higher probability that the trail surface will wash out and cost more to repair). There is the potential for loss due to increased safety risk to humans.

**PREBLES JUMPING MOUSE HABITAT:** The fire has already changed habitat conditions for this species. There is potential for loss or degradation of habitat, which may affect this species, but is difficult to quantify in dollar terms.

**INVASIVES:** The costs associated with expansion of invasive species is expected to be high, especially due to the difficulty of treatment in this rugged landscape. Initial treatments to contain and control expansion will be the most cost effective means to address invasive species. The

costs associated with expansion of invasive species into native vegetation communities can be significant, but is difficult to quantify in dollar terms.

**F. Cost of Selected Alternative (Including Loss): \$316,550**

**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"/> Engineering
<input type="checkbox"/> Contracting	<input type="checkbox"/> Ecology	<input 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:** Dave Gloss

**Email:** dgloss@fs.fed.us    **Phone:** 307.326.2510    **FAX:** 307.326.5250

The Arapaho fire burned National Forest System lands, Bureau of Land Management lands, State and private lands. The Forest Service Burn Area Emergency Response (BAER) program is designed to address post-wildfire emergency conditions on NFS lands. The Natural Resources Conservation Service (NRCS) Emergency Watershed Protection (EWP) program is designed to address emergency conditions on other lands. The following NRCS representatives participated in the Arapaho Fire Burn Area Emergency Response assessment:

Bailey Rapp, NRCS District Conservationist, Platte County. 307.322.9060 x118

Ruben Vasquez, NRCS District Conservationist, Albany County. 307.745.3698

**H. Treatment Narrative:** These proposed treatments are for National Forest System lands and National Forest System Roads and Trails or roads and trails under NFS maintenance jurisdiction. Treatment recommendations for other lands will be at the discretion of the NRCS and other entities.

**Land Treatments:**

**INVASIVE PLANT DETECTION AND TREATMENT:** Surveys will be conducted within the fire perimeter, especially along roads and trails that are known corridors of existing populations, to identify any infestations of invasive species that are occurring and have potential to expand as a result of the fire. Treatments of newly found and expanding infestations will focus on these priority species: Houndstongue (*Cynoglossum officinale*), Dalmatian Toadflax (*Linaria dalmatica*), Leafy Spurge (*Euphorbia esula*), Cheatgrass (*Bromus tectorum*) and Canada Thistle (*Cirsium arvense*). Treatments are intended to contain and control the expansion of these invasive species. Cheatgrass (*Bromus tectorum*) treatments are recommended only in and adjacent to Prebles habitat. Both herbicide and biocontrol treatments are recommended.

**PREBLES JUMPING MOUSE HABITAT:** Severely burned riparian areas that are Prebles habitat, and which do not have adequate natural regrowth, will be seeded with a native grass and forb mix. There are an estimated 325 acres to treat. Hand application is expected due to the inaccessibility of the areas recommended for treatment. Domestic livestock grazing is recommended to be excluded from the seeded areas for a period of no less than one year and no more than three years to allow for the best vegetative recovery of these key areas.

**Channel Treatments:** No channel treatments are proposed on NFS lands.

**Roads and Trail Treatments:**

**ROADS & MOTORIZED TRAILS:** Treatments are recommended on nearly all National Forest System Roads and Motorized Trails within the Arapaho burn area. The following treatments are recommended:

- Temporary (until vegetative recovery) road/area closure of NFSR 621 through Murphy Canyon during summer rainfall months is recommended to protect public safety from the increased risk of flash flooding.
- Storm inspection and response on all National Forest System Roads and Trails within the Arapaho burn area. Clear and maintain existing drainage features (e.g. culverts, ditches, rolling dips, waterbars, leadout ditches) and repair damage to road surface and infrastructure as needed.
- Provide additional drainage features, such as rolling dips, waterbars, and culverts.
- Enlarge existing culverts and cross drains.
- Armor ditches and culvert inlets/outlets. Install check dams in ditches to reduce velocities.
- Temporary and/or permanent removal of culverts and replacement with armored low water crossings.

**NON-MOTORIZED TRAILS:** Treatments are recommended on the following National Forest System Non-Motorized Trails within the Arapaho burn area: Friend Park Trail (#609), Harris Park Trail (#616), Roaring Fork Trail (#623), and Laramie Peak Trail (#602). The following treatments are recommended:

- Keep trails closed to ensure public safety until trail treatments can be implemented. Remove hazard trees along trails to ensure BAER implementation crew safety during BAER trail treatments.
- Storm inspection and response on all National Forest System Trails within the Arapaho burn area. Clear and maintain existing drainage features (e.g. culverts, ditches, rolling dips, waterbars, leadout ditches) and repair damage to trail surface and infrastructure as needed.
- Provide additional drainage features, such as waterbars and culverts.

**Protection/Safety Treatments:** Protection and safety treatments are discussed above (e.g. temporary road/trail closures).

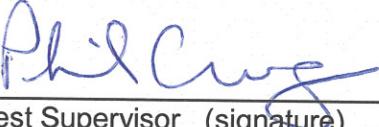
**I. Monitoring Narrative:**

Implementation monitoring will be accomplished during implementation of BAER treatments and is included in treatment cost estimates. Level 1 (FSM 2523.3) effectiveness monitoring is proposed for land treatments and road and trail treatments.

**Part VI – Emergency Stabilization Treatments and Source of Funds - Initial Request**

Line Items	Units	Cost	NFS Lands			Other Lands			All
			# of	BAER \$	Other \$	# of	Fed \$	# of	Non Fed \$
			Units	\$		units	\$	Units	\$
<b>A. Land Treatments</b>									
Invasives	Acres	40	900	\$36,000	\$0		\$0		\$0
Prebles Habitat	Acres	154	325	\$50,050	\$0		\$0		\$0
<i>Subtotal Land Treatments</i>				<b>\$86,050</b>	<b>\$0</b>		<b>\$0</b>		<b>\$86,050</b>
<b>B. Channel Treatments</b>									
<i>Subtotal Channel Treat.</i>				<b>\$0</b>	<b>\$0</b>		<b>\$0</b>	<b>0</b>	<b>\$0</b>
<b>C. Road and Trails</b>									
Storm Patrol	Each	3000	10	\$30,000	\$0		\$0		\$0
Additional drainage	Miles	1500	38	\$57,000	\$0		\$0		\$0
Enlarged drainage	Each	5000	15	\$75,000	\$0				\$75,000
Armoring	Each	250	30	\$7,500	\$0				\$7,500
Culvert - low crossing	Each	3000	15	\$45,000	\$0		\$0		\$45,000
Non-Motor Trail	Miles	2000	3	\$6,000	\$0		\$0		\$0
<i>Subtotal Road &amp; Trails</i>				<b>\$220,500</b>	<b>\$0</b>		<b>\$0</b>		<b>\$220,500</b>
<b>D. Protection/Safety</b>									
Closures, signs, etc	Each	1,000	5	\$5,000	\$0		\$0		\$0
<i>Subtotal Structures</i>				<b>\$5,000</b>	<b>\$0</b>		<b>\$0</b>		<b>\$5,000</b>
<b>E. BAER Evaluation</b>									
Initial Assessment			---	\$5,000			\$0		\$0
<i>Subtotal Evaluation</i>			---	<b>\$5,000</b>			<b>\$0</b>		<b>\$5,000</b>
<b>F. Monitoring</b>									
Level 1 effectiveness	Each	5000	1	\$5,000	\$0		\$0		\$0
<i>Subtotal Monitoring</i>				<b>\$5,000</b>	<b>\$0</b>		<b>\$0</b>		<b>\$5,000</b>
<b>G. Totals</b>									
Previously approved							<b>\$0</b>		
<i>Total for this request</i>				<b>\$316,550</b>	<b>\$5,000</b>		<b>\$0</b>		<b>\$321,550</b>

**PART VII - APPROVALS**

1.   
Forest Supervisor (signature)

8-17-2012  
Date

2. \_\_\_\_\_  
Regional Forester (signature)

\_\_\_\_\_  
Date