BURNED-AREA REPORT edited J.Bruggink Aug. 12, 2004
(Reference FSH 2509.13)

PART I - TYPE OF REQUEST

A. Type of Report

[X] 1. Funding request for estimated WFSU-SULT funds
[ ] 2. Accomplishment Report
[ ] 3. No Treatment Recommendation

B. Type of Action

[X] 1. Initial Request (Best estimate of funds needed to complete eligible rehabilitation 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: Red Bull

B. Fire Number: P4A9RZ

C. State: Utah

D. County: Utah

E. Region: R4 – Intermountain

F. Forest: 0418 – Uinta

G. District: D3 – Spanish Fork

H. Date Fire Started: 07/29/2004

I. Date Fire Contained: 08/03/2004

J. Suppression Cost: $1,167,982 (estimate from ICS-290 dated 08/05/2004)

K. Fire Suppression Damages Repaired with Suppression Funds
1. Fireline waterbarred (miles): 8.60 (handline); 6.75 (tractor/dozer)
2. Fireline seeded (miles): 8.60 (handline); 6.75 (tractor/dozer)
(Most of the suppression lines have been waterbarred. Remaining work includes some waterbar construction, pulling berm material back onto the firelines/trails, and seeding. These activities are planned for late summer/early fall when conditions are more favorable.)
3. Other (identify): Scarify Diamond Fork Helibase (2 acres)

L. Watershed Number: 160202020107 – Lower Soldier Creek (6^{th} level HU)

M. Total Acres Burned: 1,836
NFS Acres (1,732) Other Federal (0) State (104) Private (0)
(Data Source: GPS perimeter of fire progression, 08/05/2004)

N. Vegetation Types: Small fires from lightning ignitions are relatively common in this part of Spanish Fork Canyon and have modified the natural vegetation communities. Generally, existing vegetation patterns in the burned area follow elevation and slope gradients. The upland hillsides and structural benches located immediately above The Red Narrows along Soldier Creek supported Pinyon–Juniper and annual grasses prior to the burn. On the steep to very steep terrain, the fire burned oak brush and scattered mountain shrubs including maple, mountain mahogany, and mountain big sagebrush. In unburned areas, perennial grasses were observed growing in the understory. The higher elevation mountainsides surrounding Teat Mountain had small patches of aspen growing within riparian zones and white fir on the northwest, north, and northeast facing slopes (Uinta National Forest, Geographic Information System, 2004).

O. Dominant Soils: Soils mapped within the Stream Canyon (SC) Landtype included Typic Argiborolls, Pachic Argiborolls and Abruptic Paleborolls. The soils occurring on higher elevation mountainsides under the oak brush were classified as being Typic Cryoborolls, Typic Cryoboralfs, Typic Cryorthents and Lithic Cryorthents. The soils occurring upon the Tectonic Mountainsides (TM) were mapped as Typic Haploborolls (Hobble Creek/Diamond Fork - Land Systems Inventory, 1976).

P. Geologic Types: Most of the soils observed within the perimeter of the Red Bull Fire were derived from sediments of the North Horn Formation. This geologic formation consists of calcareous shale interbedded with layers of siltstone and claystone. It is common for landscapes formed in North Horn sediments to become unstable (i.e. soil creep, slumping, and landslides) following ground-disturbances on very steep terrain. A few small areas located directly above The Red Narrows along Soldier Creek and US Highway 6 were derived from isolated deposits of conglomerate. Soils formed in conglomerate commonly have very gravelly, very cobbly or very stony surface textures – meaning, limited water retention properties within the topsoil (Utah Geological and Mineral Survey, 1980).

Q. Miles of Stream Channels by Order or Class: 7.7 total stream miles
Order 1: 6.3 miles
Order 2: 1.2 miles
Order 5: 0.2 miles
(Based on Strahler Stream Ordering System (1964). Data Source: Uinta National Forest, Geographic Information System, 2004.)

R. Transportation System
Trails: 1.2 miles Roads: 0.0 miles
(Data Source: Uinta National Forest, Geographic Information System, 2004)

PART III - WATERSHED CONDITION

A. Burn Severity (acres):

NFS lands:	352 (19%) low	965 (53%) moderate	165 (9%) high
State lands:	64 (3%) low	3 (0%) moderate	0 (0%) high
All lands:	416 (22%) low	968 (54%) moderate	165 (8%)

(A total of 287 acres (16%) were classified “unburned.”)

B. Water-Repellent Soil (acres): 402
(Calculated based on the following assumptions identified from mapping and field transects: 55% of High Severity acres; 30% of Moderate Severity acres; 5% of Low Severity acres)

C. Soil Erosion Hazard Rating (acres):
679 low 863 moderate 294 high
(Calculated using the percent of acres of soils in each classification within the burned area: 37% low; 47% moderate; 16% high.)

D. Erosion Potential: 7 tons/acre

E. Sediment Potential: 897 cubic yards/square mile

PART IV - HYDROLOGIC DESIGN FACTORS

A. Estimated Vegetative Recovery Period (years): 2-5

B. Design Chance of Success (percent): 80

C. Equivalent Design Recurrence Interval (years): 2

D. Design Storm Duration (hours): 1

E. Design Storm Magnitude (inches): 0.70

F. Design Flow (cubic feet/second/square mile): 25

G. Estimated Reduction in Infiltration (percent): 55

H. Adjusted Design Flow (cfs per square mile): 33

PART V - SUMMARY OF ANALYSIS

A. Describe Watershed Emergency:

Threats to Human Life and Property - The Red Bull Fire burned headwaters of Rough Hollow and Knoll Hollow near Teat Mountain. The burned area is upslope of The Red Narrows reach of Soldier Creek, a steep constricted section of the Spanish Fork Canyon. Located in the canyon is U.S. Highway 6, a regionally significant transportation route that connects Interstate 15 and Interstate 70. U.S. Highway 6, including The Red Narrows section, is considered to be one of the most dangerous roads in the U.S. due to high numbers of vehicles traveling through the narrow canyon. This narrow canyon is also an important utility corridor, with two rail lines and four power lines located parallel to the highway and Soldier Creek.

Forest trails #076 and #202 are located in and downslope of the burned area, and are well used by all-terrain vehicles (ATV) riders during the snow-free season. In the days preceding the BAER

assessment (August 1 through August 3), localized thunderstorms dropped just under one-half inch of rain over the fire area. Aerial and field reconnaissance identified rills and gullies had developed from this precipitation, transporting ash and sediments that filled the inlet basins and plugged the culverts along the trail.

The geologic formation underlying the Red Bull Fire vicinity is the North Horn Formation. This formation consists of calcareous shales, interbedded with layers of siltstone, mudstone, and claystone. These sediments are inherently landslide prone, especially following natural or management induced disturbances. In the high precipitation years of 1983-84, several thousand points of failure were recorded in the North Horn Formation on the Wasatch Plateau in central Utah. The most dramatic event occurred approximately 6 miles west of the fire, where a large mountainside became saturated and failed, filling the valley bottom with rock, mud, and debris. This hillslope failure backed up water from Spanish Fork, creating a reservoir that inundated the community of Thistle.

The effects of the fire will likely include reduced stability from loss of vegetative cover, decreased transpiration, and loss of hillslope anchoring capabilities of mid to late seral vegetation. These factors increase the probability for soil detachment and movement, including slumping and debris flows, which could directly affect human health and safety of people traveling the Forest roads and trails, and transportation and utility infrastructure in the Red Narrows.

Threats to Water Quality - Nearly all of Rough Hollow and the headwaters of Knoll Hollow were moderately to severely burned in the Red Bull Fire. Soils within the moderate and high severity zones exhibited a moderate to strong degree of water repellency. This condition has modified the existing site hydrologic function to the point that infiltration will be restricted or prevented at the soil surface. This will increase the potential for sheet, rill, and gully erosion. Hydrophobic conditions may persist for a period of three or more years following the fire. The elevated potential for debris flows and surface erosion threatens water quality for sensitive Bonneville Cutthroat trout and the Leatherside Chub populations in Soldier Creek.

Loss of Soil Productivity - The soils within the burn area originate from the North Horn Formation, which is inherently unstable in a disturbed condition. Long-term soil productivity and site hydrologic function are at risk from moderate to strong hydrophobic ground conditions, diminished vegetative cover, and the loss of topsoil through sheet, rill and gully erosion in the high severity burn areas located in the upper Rough Hollow and tributary drainages leading into Knoll Hollow.

The majority of the fire area was classified as having a moderate burn severity. By definition, these moderate burn severity zones have moderately hydrophobic soils and may present a risk to increased flooding and soil erosion during a major storm event. The moderate severity burn areas revealed more fine roots in the surface soil than the high burn severity areas.

Prior to the burn, the maximum soil loss thresholds are estimated from 0.07 to 0.32 tons/acre/year (WEPP soil erosion model) within the Soldier Creek, The Red Narrows, and Teat Mountain areas (dependent on slope, soils, and pre-fire vegetation). After the first year, soil losses from the burned area are estimated at 0.34 to 26 tons/acre/yr (dependent on slope, post-fire vegetation, soils, and burn severity). This is an increase of 81 times over the pre-fire erosion rates. These elevated soil loss estimates are not consistent with Region 4 Soil Quality Standards and Guidelines, which set the

upper limits of allowable soil disturbance, or thresholds, beyond which there will be long-term losses to soil productivity and hydrologic function.

Noxious Weeds and Invasive Plant Species – The loss of vegetative cover and soil disturbance caused by the fire and fire suppression activities has opened an "invasion window" for colonization by noxious weed species in previously uninfected areas. Populations of Canada thistle, Scotch thistle, and cheatgrass were present within the fire area prior to the ignition. In addition, Russian thistle (tumbleweed), whitetop, musk thistle, squarrose knapweed and dyer's woad can be found very near the fire area.

Canada thistle (Cirsium arvense) - Is a colony-forming perennial from deep horizontal roots. Is highly aggressive and difficult to control. Most common in riparian zones.

Scotch thistle (Onopardumacanthium) - Invades disturbed areas spreading rapidly and forming dense stands which crowd out desirable species. Most common along roads and trails.

Cheatgrass (Bromus tectorum) - Winter annual that can vigorously compete with natives for early spring and early summer moisture. Cheatgrass cures early in the summer providing flashy fuels early in the fire season.

Dyer's Woad (Isatis tinctoria) - A taprooted annual that can spread widely in suitable uplands.

Russian Thistle (aka tumbleweed) (Salsola iberica) - An annual, mostly of lower elevations, that can spread widely and densely from seed.

Musk Thistle (Carduus nutans) – Another thistle that invades disturbed areas, spreading rapidly and forming dense stands which crowd out desirable species. Most common along roads and trails.

Hoary Cress (aka Whitetop) (Cardaria draba) – A creeping colonizer that out-competes native grasses and forbs, mostly in rolling uplands and roadsides.

Squarrose Knapweed (Centaurea virgata) – A highly competitive, long lived taprooted perennial, that has been a problem in Utah County for many years.

B. Emergency Treatment Objectives: The primary objective of the BAER Team was to identify if emergency conditions exist and recommend prompt, reasonable actions to effectively protect, reduce, or minimize significant threats to human life and property and prevent unacceptable degradation of soil and water resources. The recommended emergency treatments are designed to maintain Regional and Forest Plan standards for long-term soil productivity and achieve the following objectives:

Objective 1: Treat severely burned hillslopes that pose a threat to human life, property, and important natural resources, and where fire-induced erosion would result in unacceptable degradation of soil and water resources. This would be accomplished by promoting the recovery of hydrophobic soil conditions through vegetative establishment on severely burned areas, thereby increasing ground cover on these areas to reduce accelerated erosion from expected increases in overland flows. Straw mulching severely burned areas will increase ground cover and moisture retention; aid vegetation establishment and decrease the potential for erosion and debris flows.

Objective 2: Mitigate the risk of flood events to human life, property, and important recreational resources. Reduce the risk for resource damage to and from roads/trails as a result of increased fire related runoff and debris flows. This objective would be met by installing signs to inform the public of potential flooding and debris flow hazards near watersheds burned in the fire. Additionally, 3 culverts and their inlet basins on the Forest Trail 076 were plugged with ash and sediment from the burned area. Debris and sediment was mobilized and deposited as a result of thunderstorms that occurred during fire suppression efforts. The culverts are undersized and need replaced. Subsequent thunderstorms and accelerated runoff could result in flows overtopping the trail prism, causing the fill material to mobilize thereby adding unwanted sediment to the channel.

Objective 3: Retard the invasion of undesirable weed species into the fire area and encourage soil stabilization through vegetative recovery on severely burned hillslopes. This would be accomplished by including a seed mixture with the straw mulching. Additional mitigations to restrict livestock grazing or trailing through the area would increase potential of meeting this objective.

Objective 4: Provide a ~~long-term~~ monitoring plan to monitor the effectiveness ~~ensure the success~~ of rehabilitation treatments, to meet the objectives outlined in this report.

C. Probability of Completing Treatment Prior to First Major Damage-Producing Storm:
Land: 80% Channel: n/a Roads: 80% Other: n/a

D. Probability of Treatment Success:

	Years after Treatment		
	1	3	5
Land	70	75	80
Channel	n/a	n/a	n/a
Roads/Trails	75	85	95
Structures	n/a	n/a	n/a

E. Cost of No-Action (Including Potential Loss): $404,882

F. Cost of Selected Alternative (Including Loss): $315,571

G. Skills Represented on Burned-Area Survey Team:

[2] Hydrology	[3] Soils	[ ] Geology	[1] Range	[ ] (other)
[ ] Forestry	[ ] Wildlife	[ ] Fire Mgmt.	[ ] Engineering	[ ] (other)
[ ] Contracting	[1] Ecology	[ ] Botany	[1] Archaeology	[ ] (other)
[ ] Fisheries	[ ] Research	[1] GIS	[ ] Landscape Architect	

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Faye Wheeler, GIS Support, Uinta NF
Denise VanKeuren, Ecologist, Uinta NF
Charmaine Thompson, Archeologist, Uinta NF
Renae Bragonje, Rangeland Management Specialist, Uinta NF

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: Aerial seeding and mulching are necessary to protect against surface soil erosion and to help re-establish protective vegetation cover on HIGH burn severity hillsides located in the northern part of the burn that drain directly into Rough Hollow or Knoll Hollow. The application rate for aerial straw mulch is 1 to 1.5 tons per acre. Soil suitability, climate, and market availability were factors considered in selecting species included in the seed mix. The following seed mix has been used on a number of BAER projects over the last five years: The seeding rate with the mix identified below will be approximately 65 PLS per square foot.

Seed Mix for Mid-Elevation Landscapes			
Plant Species	**Pounds PLS/Acre**	**Cost / Pound**	**Cost / Acre**
Sterile triticale	30.0	$1.35	$40.50
Mountain Brome	3.0	$2.50	$7.50
Slender Wheatgrass	3.0	$1.85	$5.55
Sandberg Bluegrass	2.5	$4.00	$10.00
Thickspike Wheatgrass	3.0	$2.50	$7.50
Bluebunch Wheatgrass	1.0	$3.00	$3.00
Total Seed Cost			**$71.05**

Cost Estimate for Land Treatments: $1120/acre x 162 acres = $181,440
(heli-mulch: $900/acre; aerial seeding: $220/acre)

Channel Treatments: n/a

Roads and Trail Treatments: On FS Trail #076, replace culverts with oversized culverts to ensure storm-generated flows do not wash out the trail. Locate signs at the trailhead and near drainages of possible debris flows or flash floods may occur as a result of severe weather. Two culverts are located in drainages where headwater basins burned at high severity. One culvert is located outside the area of fire effects, funds other than WFSU-SULT will need to be used for this culvert.

Cost Estimate: WFSU-SULT = $6,800 (other funds = $3,000 for one culvert)
Culvert Replacement: $3,000/culvert x 3 culverts = $9,000
Signs: Trailhead signs: 2 @ $250 = $500; Trail Signs: 4 @ $75 = $300

Structures: n/a

Non-Federal Treatments: Recommendations to Utah Department of Transportation (UDOT) and Union Pacific Railroad for the appropriate measures to ensure public safety and protect property.

UDOT

- Post warning signs along U.S. Highway 6, west of the Red Narrows and east of Knoll Hollow, to inform public of potential flooding and debris flow hazards.
- Perform regular culvert maintenance (cleaning) to assure debris and vegetation do not clogging culverts.
- Install jersey barriers along U.S. Highway 6 at mouths of tributaries (H3 and H4) to reduce potential for debris to enter road prism.

Union Pacific Railroad

- Monitor box culvert and trestle below tributary H1 after storm events for increased flows and debris accumulations.

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 is the periodic assessment of BAER treatments to evaluate their success and/or failure, recommend adjustments to treatments and report on these findings to management. Forest Service Manual 2523.03 directs that the implementation and effectiveness of treatments, as well as the consequences of decisions not to treat certain areas, will be monitored. Forest Service Handbook 2509.13, Section 61.1 requires that, as a minimum, the following conditions be monitored:

- ✓ The effectiveness and proper functioning of stabilization measures, including hill slope treatment, road/trail drainage facilities, and channel structures.
- ✓ Need for re-treatment, maintenance and removal of temporary structures.
- ✓ Quality and quantity of water leaving the burned area and the location and causes of problems.
- ✓ Rate of recovery of vegetation.
- ✓ Effects of resource utilization, restoration activities and emergency stabilization measures on each other.

The BAER Team has prepared a detailed Monitoring Plan, which is summarized below. More specificity is provided in detailed Monitoring Plan.

Implementation Monitoring: The purpose of implementation monitoring is to determine if the treatments were conducted as prescribed. Some of the critical implementation questions to be monitored are:

- ✓ Were treatments implemented as designed, in the planned locations, and within acceptable timeframes?
- ✓ Were the materials (e.g. seed, straw, etc.) of appropriate quality?
- ✓ Were proper water quality and noxious weed Best Management Practices employed during implementation?
- ✓ Were treatment costs with the funding authorization?

Implementation monitoring will primarily be accomplished through contract administration. The Contract Daily Summaries prepared by the COR and/or contract inspector(s) can provide the information to answer the above questions.

Effectiveness Monitoring: This monitoring is designed to answer the question, "Did the BAER treatments provide the planned protection and stabilization of the burned area?" Stated another way, were the emergency treatments effective in meeting the objectives, and if not, why? Per the Forest Service Handbook (2509.13, 62.23), this monitoring includes on-the-ground review by a team of emergency response specialists, normally 2-3 growing seasons after the burn but may also be after the first runoff season or after unusual climate. Both successes and failures are to be addressed, along with reasons. Sensitive areas are given priority. Questions to be addressed in effectiveness monitoring include:

- ✓ Did the seeding result in timely re-establishment of vegetative cover, and did this stabilize the soil?
- ✓ Did the mulching facilitate revegetation and reduce erosion?
- ✓ Did the culvert replacements effectively route runoff events?
- ✓ Did vegetation recover as predicted?
- ✓ Did the treatments restrict the spread of undesirable plant species?

Monitoring Activity 1: Monitor treatment effectivness in~~and re-monitor all of~~ the HIGH burn severity slopes within the northern part of the burn and monitor for evidence of~~or~~ soil loss (e.g. rills and gully development) during the first year following fire. Monitoring will occur during the initial year following fire. Monitoring in years 2 and 3 will be recommended only if an emergency condition has been determined beyond one year and treatments need to be monitored beyond one year. An interim request will be submitted if BAER treatment monitoring is recommended in year 2.~~years 1, 2 and 3 to determine if additional BAER or NFP / KP2 treatments are needed.~~

Cost Estimate: $5,300
(includes helicopter time, field/data collection, materials/supplies, and prepare report)

Monitoring Activity 2: In 2005, monitor the northern perimeter of the fire, the ATV trails, and roads to identify if populations of thistle, noxious weeds, or other undesirable plant species have established. ~~Complete interim 2500-8 reports in 2005 and 2006 for out-year monitoring for thistle and other noxious weeds.~~ Complete an interim 2500-8 report~~s~~, as necessary, to request emergency funding to treat identified thistle populations and other noxious weeds that may establish within the burned area within one year of fire containment. Any invasive or noxious plant treatment needs beyond one year of fire containment will be funded by other program funds. Any non-treatment monitoring beyond the first year of fire containment will be done through other program funds. If an area is recommended for treatment in year 1, an interim effectiveness monitoring request for year 2 will be submitted. ~~.~~

Cost Estimate: $3,200
(Includes 2 days for field/data collection, materials/supplies, and prepare report)

Part VI – Emergency Rehabilitation Treatments and Source of Funds by Land Ownership

			NFS Lands				Other Lands				All
		Unit	# of	WFSU	Other	# of	Fed	# of	Non Fed	Total
Line Items	Units	Cost	Units	SULT $	$	units	Pcode	Units	$	$
A. Land Treatments										
Aerial Seeding	Acre	220	162	$35,640	$0		$0		$0	$35,640
Aerial Mulching	Acre	900	162	$145,800	$0		$0		$0	$145,800
Subtotal Land Treatments				$181,440	$0		$0		$0	$181,440
B. Channel Treatments										
				$0	$0		$0		$0	$0
Subtotal Channel Treat.				$0	$0		$0		$0	$0
C. Road and Trails										
Culvert Replacement	each	3,000	2	$6,000	$0	1	$3,000		$0	$9,000
Trailhead Signs	each	250	2	$500	$0		$0		$0	$500
Trail Signs	each	75	4	$300	$0		$0		$0	$300
Highway Signs	each	400		$0	$0		$0	2	$800	$800
Culvert Cleaning	hour	150		$0	$0		$0	10	$1,500	$1,500
Jersey Barriers	each	220		$0	$0		$0	15	$3,300	$3,300
Subtotal Road & Trails				$6,800	$0		$3,000		$5,600	$15,400
D. Structures										
				$0	$0		$0		$0	$0
Subtotal Structures				$0	$0		$0		$0	$0
E. BAER Evaluation										
Salary	team	16,907	1	$16,907	$0		$0		$0	$16,907
Travel	day	112	16	$1,792	$0		$0		$0	$1,792
Helicopter Use	hour	4.5	701	$3,155	$0		$0		$0	$3,155
Supplies	each	1	1022	$1,022	$0		$0		$0	$1,022
Subtotal Evaluation				$22,876	$0		$0		$0	$22,876
F. Monitoring										
Annual Report	report	1	8500	$8,500	$0		$0		$0	$8,500
Trestle Evaluation	report	600		$0	$0		$0	1	$600	$600
Subtotal Monitoring				$8,500	$0		$0		$600	$9,100
G. Totals				**$219,616**	**$0**		**$3,000**		**$6,200**	**$228,816**

PART VI - APPROVALS

1. /s/ Peter W. Carp _____
   Forest Supervisor (signature) Date

2. /s/ William P. LeVere for 08/12/2004
   Regional Forester (signature) Date