USDA-FOREST SERVICE FS-2500-8 (7/00)

Date of Report: 08/20/01

BURNED-AREA REPORT
(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: Elk Mountain Complex

B. Fire Number: H20953

C. State: South Dakota, Wyoming

D. County: Custer, Weston

E. Region: 02

F. Forest: Black Hills

G. District: Hells Canyon

H. Date Fire Started: 07/30/2001

I. Date Fire Contained: 08/06/2001

J. Suppression Cost: $5,700,000 (estimate) <$5,185,680 as of 8/8>

K. Fire Suppression Damages Repaired with Suppression Funds
1. Fireline waterbarred (miles): 35.0
2. Fireline seeded (miles):25.9
3. Other (identify):

L. Watershed Number:

M. Total Acres Burned: 25,090
NFS Acres(15,611) Other Federal (3,792 - BLM) Wyoming State Land (47) Private (5,640)

N. Vegetation Types:Ponderosa Pine; Blue Grama/Buffalo Grass; Mountain-Mahogany/Bitterbrush/Skunkbush

O. Dominant Soils:Hopdraw, Paunsaugunt, Gurney, Vanocker, Rockoa, Lakoa, Sawdust, Cushman, Crownest, Tassel, Shingle

P. Geologic Types: Pierre Shale, Inyan Kara, Morrison, Spearfish, Minnelusa

Q. Miles of Stream Channels by Order or Class: 83.3 miles intermittent

R. Transportation System

Trails: miles Roads: 111.5 miles

PART III - WATERSHED CONDITION

A. Burn Severity (acres): 17,869 (low) 3,051 (moderate) 4,176 (high)

B. Water-Repellent Soil (acres): 3,341

C. Soil Erosion Hazard Rating (acres):
18,810 (low) ___ (moderate) 6,278 (high)

D. Erosion Potential: 23 tons/acre

E. Sediment Potential: 3,975 cubic yards / square mile

PART IV - HYDROLOGIC DESIGN FACTORS

A. Estimated Vegetative Recovery Period, (years): 3-5

B. Design Chance of Success, (percent): NA

C. Equivalent Design Recurrence Interval, (years): 2 *

D. Design Storm Duration, (hours): 1

E. Design Storm Magnitude, (inches): 2

F. Design Flow, (cubic feet / second/ square mile): 1

G. Estimated Reduction in Infiltration, (percent): 90% on High and Mod Burn Severity

H. Adjusted Design Flow, (cfs per square mile): 640

	Design Storm			
Watershed Size (acres)	**2 year, 1 hour**	**5 year, 30 min**	**25 year, 1 hour**	**50 year, 1 hour**
100	125 cfs	250 cfs	278 cfs	316 cfs
500	519 cfs	924 cfs	1153 cfs	1312 cfs
1000	854 cfs	1406 cfs	1926 cfs	2196 cfs
5000	1234 cfs	1613 cfs	2987 cfs	3436 cfs

PART V - SUMMARY OF ANALYSIS

(For a more detailed description of the analysis see the Elk Mountain Complex Burned Area Emergency Stabilizations and Rehabilitation Plan.)

The Elk Mountain Complex consists of two fires: the Elk Mountain II and the Roger's Shack fires totaling 25,090 acres in the southern Black Hills. The Elk Mountain II fire occurred on the steep slopes of Elk Mountain and the flatter benches to the west, southeast of Newcastle, WY. The Roger's Shack fire occurred on slopes on both sides of Hell Canyon, southwest of Custer, SD. The Roger's Shack fire burned a portion of Hell Canyon immediately below the Jasper Fire that burned 83,508 acres in 2000. The area is within the Black Hills physiographic region. Elevations in the Elk Mountain II Fire range from 4064 feet in the southwest corner of the fire to 5662 feet at the Elk Mountain Lookout. Slopes range from nearly flat in the western portion of the fire to 80% or more on the slopes of Elk Mountain and the walls of canyons. Elevations in the Roger's Shack Fire range from 4280 feet at the southern end of Hell Canyon to 5380 feet in the northeast portion of the fire. Slopes are generally less steep than on Elk Mountain, except along canyon walls.

A. Describe Watershed Emergency:

(1) Watershed Response: Approximately 23% of the Elk Mountain II fire and 36% of the Roger's Shack fire experienced moderate to high burn severity. In these areas watershed response is expected to be high. Increased runoff is likely to cause hillslope erosion and mobilize sediments currently stored in the drainages. Recovery of grasses, forbs and shrubs is expected to occur in most areas within 3 to 5 years. Some high severity areas may not fully recover for ten or more years. Once the vegetation has recovered the watershed is expected to return to pre-fire conditions.

There are no perennial streams within either fire. Streams are intermittent or ephemeral. Thus, channels are generally not well defined except where they are incised. Streams that may not have flowed water in decades are expected to flow significant amounts of water after thunderstorms for the next several years. Watershed response is predicted to be similar to the 2000 Jasper fire located in the southern Black Hills. The Jasper fire is located less than ½ mile upstream of the Roger's Shack fire and is approximately 8 miles upstream of the Elk Mountain II fire. It burned 83,508 acres. The first significant rainfall that occurred on the Jasper Fire came in June 2001. The initial flush of water mobilized mostly ash and small floatable debris. In July 2001 another significant storm occurred. Water yields from this storm mobilized in-channel sediments resulting in debris flows from watersheds as small as 1/10 acre. The July 2001 storm, yielding approximately 2 inches of precipitation, is estimated to have a recurrence interval of 2 to 5 years.

The majority of the watersheds within the Jasper fire are not expected to recover for 2 to 3 more years with some not recovering for another 10 years. There will be cumulative effects from all three fires several miles downstream.

(2) Values at risk: Users of roads and trails as well as people living downstream from the burn are at risk of death or injury from possible high flows originating within the burn. Four private residences are at a moderate to high risk of flooding along with access roads to private residences. Several archeological sites on federal land are potentially at risk from sedimentation and erosion, in particular, petroglyphs within Whoopup Canyon are at risk of eroding due to debris descending from the top of the canyon. Several road crossings are at risk from high flows and possible plugging of culverts. Certain trees, along roads, damaged or killed by the fire pose an immediate threat to public safety. Slate Spring is at risk of sedimentation. This spring feeds a stock tank which provides water for wildlife and cattle. Many areas near and within the burn are infested with noxious weeds. These weeds can spread to other areas within the burn. Vegetation recovery within the burn may be compromised if domestic livestock are allowed to graze in the first few years following the burn.

B. Emergency Treatment Objectives: Armored dips and grade sags are planned for several locations on roads to allow floodwaters to flow over roads without doing damage. Trees posing an immediate hazard to workers or the public along roads will be removed. Seeding is proposed for approximately 2000 acres of burned land adjacent to known populations of noxious weeds to reduce erosion and spread of weeds into the burn area. Noxious weed will be controlled to prevent their spread into the burned area. Temporary fencing is proposed to prevent access by domestic livestock thus allowing vegetative recovery. Six assessment are proposed in order to provide for more detailed information on possible treatments that may mitigate or prevent damage resulting from increased flows (See Part H. Treatment Narrative**:** Assessments). Monitoring is planned to assess soil loss and hydrologic function; post-burn vegetative recovery; and noxious weed invasion. Monitoring may lead to requests for funds for further treatments.

C. Probability of Completing Treatment Prior to First Major Damage-Producing Storm:

Land 100 % Channel ___ % Roads 80% % Other ___ %

D. Probability of Treatment Success

	Years after Treatment		
	1	3	5
Land	50%	80%	90%
Channel			
Roads	70%	80%	90%
Other			

E. Cost of No-Action (Including Loss): $1,740,000

F. Cost of Selected Alternative (Including Loss): $976,799

G. Skills Represented on Burned-Area Survey Team:

[x] Hydrology	[x] Soils	[x] Geology	[x] Range	[ ]
[x] Forestry	[x] Wildlife	[x] Fire Mgmt.	[x] Engineering	[ ]
[ ] Contracting	[ ] Ecology	[x] Botany	[x] Archaeology	[ ]
[ ] Fisheries	[ ] Research	[ ] Landscape Arch	[x] GIS	

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H. **Treatment Narrative:**

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

Land Treatments:

Aerial Seeding - Seeding will serve as an immediate and long-term ground cover to decrease surface erosion, help in prevention and spread of non-native and noxious weed species.

Elk Mountain Complex Broadcast Seeding Mixture

COMMON NAME	SCIENTIFIC NAME	LBS/ACRE
Little bluestem	Schizachyrium scoparium	3
Sideoats grama	Bouteloua curtipendula	2
Western wheatgrass	Agropyron smithii	3
Indian ricegrass	Oryzopsis hymenoides	3

Non-Native Invasive Plant Control – Control noxious/non-native weeds adjacent to areas where noxious weeds were identified prior to the fires. BLM and Forest Service contracts will be with either County Weed and Pest Districts, or with private contractors. All spraying will be in accordance with BLM and Forest Service management plans and approved Environmental Assessments, using BLM and Forest Service approved herbicides. Follow-up control in subsequent years on all new infestation sites as identified through noxious weed monitoring surveys.

Temporary Protective Fences - Construction of the proposed fences is needed to ensure that natural regeneration of vegetative communities occurs to provide wildlife habitat, and prevent erosion within the fire. Construction of the proposed fence is required to maintain allotment boundaries for control and management of livestock. Without these fences livestock can access the burned areas and natural regeneration would be affected. Both temporary and permanent fence will allow livestock operators to graze livestock on private lands without adversely affecting their operations.

Channel Treatments: *None*

Roads and Trail Treatments:

Culvert and Road Protection - To armor road prism, protect road fill, and prevent loss of road prism from runoff flows. Road fills with culverts on FSRs 118.1A, 118.1M, and 118.1N cross intermittent drainage channels. These crossings are at risk of increased flows and sediment generated by the Elk Mountain II Fire. To avoid costly culvert replacement, an overflow channel designed as a grade sag over the fill will reduce the risk of fill failure at these sites.

Install Armored Dips for Road Protection - To maximize the ability of unpaved roads to handle anticipated high runoff loads, to protect the road prism, and prevent mass failure of roads during storm events. Install 9 armored dips to protect roads from post-fire flood effects.

Structures: *None*

I. **Monitoring Narrative:**

Monitor Watershed Condition - Soil monitoring would be used by local managers to assess watershed condition for use in decisions related to the fire. Additionally, this monitoring would be used to identify if watershed conditions deteriorate so that prompt treatment could be prescribed and implemented. Water and precipitation monitoring would be used to evaluate changes in hydrologic function as a result of the fires. It will also be used to evaluate the design of drainage treatments on roads and any treatments that may be prescribed as a result of the hydrologic risk analysis for structures or roads. This monitoring will allow modifications to the design of treatments or the hazard assessment to be made in a timely manner if deficiencies are noted.

Monitor Noxious Weed Invasion - Conduct monitoring within the burned areas of the Elk Mountain complex in order to detect invasive/noxious weed introduction and spread on suppression lines, roads, intensive burn areas, and other disturbed areas within the Elk Mountain Complex area.

Monitor Vegetation Reestablishment (Treatment and Non-Treatment) - The purpose of the treatment is to determine when the burned vegetative communities have recovered , and to monitor vegetation reestablishment and soil cover. We will evaluate whether vegetation regeneration is satisfactory to meet management objectives.

J. BAER Evaluation Narrative:

BAER Team analysis and Plan Preparation - This specification accounts for the costs of the preparation, planning, and evaluation process spent to produce the Elk Mountain Complex BAER Plan. The specification includes all costs associated with the BAER team preparing the plan, travel arrangements and accommodations while in the area, equipment needed to assess all potential values at risk. In addition, it will cover the printing costs of the final plan, which needs to be distributed among team members and all cooperating agencies.

Cultural Resource Risk Assessment and Mitigation Development - To assess damages from fire effects and assess the risk of potential storm flood/debris flows upon previously documented cultural resources. Evaluate any previously recorded sites which have not been evaluated and which have been affected by the fire or may be affected by proposed emergency stabilization projects for other resource values. Develop proposed stabilization treatment plans for any cultural resource sites identified as at risk. Conduct cultural resource inventories for any emergency stabilization project areas identified for other resource values in this BAER report.

Tribal Consultation Activities, Compliance and Rehabilitation - Consultation is mandated by the National Historic Preservation Act, the Achaeological Resources Protection Act, the American Indian Religious Freedom Act, the Native American Graves Protection, Repatriation Act, and associated Federal legislation. These consultations will allow Native American representatives to have input into the planning process for treatments proposed for archaeological sites in the burn

Hydrologic Risk Analysis (Homes & Other Property) - Hydrologist will conduct a hydrologic hazard assessment and prepare report including the development of treatment recommendations to address identified hazards. Assess risk from the entire watershed above identified value at risk. Define the potential risks associated with water, mud and debris flows and provide estimated discharge and volume of materials available for mobilization in channels and on slopes relative to rainfall events of varing intensities and durations. Determine where deposition is likely to occur. Produce a map with specific hydrologic hazard locations and a written report including observations, conclusions, treatment recommendations, design specifications for specific treatments (including probability of success), and detailed cost estimates.

Road and Dam Assessment and Mitigation Development - All Forest Service and private roads within the Elk Mountain Complex will be analyzed by engineering and hydrology personnel who will recommend actions to prepare and protect the roads from erosive effects of the increased water runoff caused by the fires. Two earthen dams will also be analyzed to determine the potential risk of failure caused by substantially increased flows, and the impact of a flood downstream should the dams fail.

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

Line Items	Units	Unit Cost	# of Units	WFSU SULT $	Other $	# of units	Fed $	# of Units	Non Fed $	Total $
A. Land Treatments										
Aerial Seeding (V1)	acres	$183.22	1705	$312,390		367	$130,996		$0	$443,386
Non-Native Invasive Plant Control (V2)	acres	$160.50	500	$80,250			$0			$80,250
Temporary Protective Fences (V5)	miles	$1,936.39	15.25	$29,530						$29,530
Permanent Protective Fences (V5)	miles	$9,232.82				17	$156,958			$156,958
Reforestation Cone/Seed Collection (F2)	bushells	$53.00		$0		30	$1,590		$0	$1,590
Subtotal Land Treatments				$422,170			$289,544		$0	$711,714
B. Channel Treatments										
				$0			$0		$0	$0
Subtotal Channel Treat.				$0			$0		$0	$0
C. Road and Trails										
Culvert and Road Protection (R3)	Stream Crossing	$1,430.00	5	$7,150			$0		$0	$7,150
Install Armored Dips for Road Protection (R4)	Stream Crossing	$1,218.00	9	$10,962			$0		$0	$10,962
				$0			$0		$0	$0
Subtotal Road & Trails				$18,112			$0		$0	$18,112
D. Structures										
				$0			$0		$0	$0
Subtotal Structures				$0			$0		$0	$0
E. BAER Evaluation										
Fund Implementation Team Leader (O4)	year			$0		1	$61,860		$0	$61,860
BAER Team analysis and Plan Preparation (O5)	each			$128,217		1	$71,232		$0	$199,449
Cultural Resource Risk Assessment and Mitigation Development (C2)	acre	$28.74	300	$8,622		500	$14,370		$0	$22,992
Cultural Resource Risk Assessment and Mitigation Development in the BLM ACEC (C3)	acre	$50.21		$0		1440	$72,302		$0	$72,302
Tribal Consultation Activities, Compliance and Rehabilitation (C4)	each			$5,000			$28,489		$0	$33,489
Hydrologic Risk Analysis (5 Homes & Other Properties) (W1)	each			$8,920			$0		$0	$8,920
Road and Dam Assessment and Mitigation Development (R2)	miles	$530.00	43	$22,790			$0		$0	$0
				$0			$0		$0	$0
Subtotal BAER Evaluation				$173,549			$248,253		$0	$399,012
F. Monitoring				$0			$0		$0	$0
Monitor Watershed Condition (W2)	acres	$2.55	15611	$39,808		3792	$9,670		$0	$49,478
Monitor Noxious Weed Invasion (V3)	acres	$13.60	1705	$23,188		357	$4,855		$0	$28,043
Monitor Vegetation Reestablishment (Treatment and Non-Treatment) (V4)	acres	$0.38	15600	$5,972		3790	$2,240		$0	$8,212
Subtotal Monitoring				$68,968			$16,765		$0	$85,733
G. Totals				**$682,799**			**$554,562**		**$0**	**$1,214,571**

PART VII - APPROVALS

1. /s/ John Twiss — 08/20/01
   Forest Supervisor (signature) — Date

2. /s/David A. Heerwagen **for** — 08/23/01
   Regional Forester (signature) — Date