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

Date of Report: 02/07/06

BURNED-AREA REPORT
(Reference FSH 2509.13)

PART I - TYPE OF REQUEST

A. Type of Report

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

B. Type of Action

[ ] 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

[X] 3. Final Report (Following completion of work)

PART II - BURNED-AREA DESCRIPTION

A. Fire Name: Hinman II Fire- Mt. Zirkel complex B. Fire Number: CO-RTF-0509: P25020(0206)

C. State: CO D. County: Routt

E. Region: 02 F. Forest: Routt National Forest

G. District: Hahns Peak-Bears Ears Ranger District

H. Date Fire Started: August 16, 2002 (part 2 of fire) I. Date Fire Contained: expected date 10-4-02

J. Suppression Cost: $13.3 million for entire Mount Zirkel complex (includes Burn Ridge and Hinman fires)

K. Fire Suppression Damages Repaired with Suppression Funds
1. Fireline waterbarred (miles): Dozer line: 1.5 miles, hand-line: 18.4 miles
2. Fireline seeded (miles): None
3. Other (identify):

L. Watershed Number: 140500010601, 140500010603, 140500010605

M. Total Acres Burned: 16,723 acres based on 8-23-02 fire perimeter
NFS Acres(100%) Other Federal ( ) State ( ) Private ( )

N. Vegetation Types: Primary vegetation types burned were spruce-fir with some lodgepole pine.

O. Dominant Soils: Typic or lithic Dystrochrepts that are loamy-skelatal or fine loamy (see soils report)

P. Geologic Types: Glacial deposits formed from Pre-cambrian gneisses (see soils report for more detail)

Q. Miles of Stream Channels by Order or Class: Based on USGS blue-lines
Perennial: 30.3 miles, Intermittent: 12.5 miles

R. Transportation System

Trails: 16.3 miles Roads: 31.2 miles

PART III - WATERSHED CONDITION

A. Burn Severity (acres): 3756 ac (low) 3659 ac (moderate) 2139 ac (high)

B. Water-Repellent Soil (acres): 5,798 acres

C. Soil Erosion Hazard Rating (acres):
1172 ac (low) 9047 ac (moderate) 6533 ac (high)

D. Erosion Potential: Weighted average: 28 Range: 0-54 tons/acre

E. Sediment Potential: Weighted average: 4750 cubic yards / square mile

PART IV - HYDROLOGIC DESIGN FACTORS

A. Estimated Vegetative Recovery Period, (years): 2 years for groundcover, 80 yrs for timber

B. Design Chance of Success, (percent): 80%

C. Equivalent Design Recurrence Interval, (years): 50 yrs

D. Design Storm Duration, (hours): 6 hrs

E. Design Storm Magnitude, (inches): 2.3 inches in 6 hrs

F. Design Flow, (cubic feet / second/ square mile): 40 cfs/mile^2 (N.Fk. Elk River watershed)

G. Estimated Reduction in Infiltration, (percent): 50-80%

H. Adjusted Design Flow, (cfs per square mile): 74.5 cfs/mile^2 (N. Fk. Elk River watershed)

PART V - SUMMARY OF ANALYSIS

A. Describe Watershed Emergency: The Hinman '2' fire started on Friday August 16, 2002 from a spark that jumped the containment line of the original Hinman '1' fire. Once outside of the Hinman 1 fire-line, the Hinman 2 fire spread rapidly by strong winds which pushed it eastward. The fire worked rapidly up the Scott Run and Hole in the Wall drainages in the Hinman Creek sixth level watershed, then pushed into the North Fork and Middle Fork of the Elk River watersheds.

The fire burned through predominantly lodgepole and spruce-fir stands, much of which was affected by the 1997 Routt Divide Blowdown. The Routt Divide Blowdown toppled approximately 13,000 acres of trees of which approximately 4,400 acres were within the North Fork Elk, Hinman Creek and Middle Fork Elk River sixth level watersheds. The spruce-fir stands, whether affected by the blowdown or not, typically have a thick duff layer while the lodgepole stands have a relatively thin duff layer. In areas of high burn severity the fire completely consumed the tree crowns and the duff layer. The only remaining

surface protection following the fire comes from blowdown logs which blew down in a jack-strawed pattern, and are not currently in contact with the ground. During the winter of 1997 an EIS was prepared for salvage of the blowdown that was within a forest products management prescription. Temporary roads were constructed to remove the salvage volume which resulted in additional ground disturbance. While the salvage logging removed some of the dead and down material, smaller diameter material and slash was left on site; the material remaining was consumed during the Hinman Fire. Due to the salvage fewer tree boles are left in the salvaged areas following the fire to protect the soil from raindrop impact.

Most of the fuels in the high severity burn areas were extremely dry and readily consumed, particularly in the blowdown patches. While the remaining tree boles will provide some surface protection during rain storm events, the lack of surface contact will not have a significant effect on trapping either ash or sediment. As a result, the potential for increased surface erosion following storm events including spring snowmelt runoff is greatly increased in areas of high and moderate burn severity (see Soils Report).

Burning of the surface duff layer resulted in development of a strong hydrophobic layer at the soil surface that was uniform across the high and moderate burn severity areas. This hydrophobic layer severely limits infiltration during storm events which significantly increases storm runoff and surface erosion (see Soils Report). Depending on the topography of the watershed and proximity of high burn severity areas to the channel network, the increases in surface erosion will significantly increase sediment input to the stream system. Increases in storm runoff coupled with increases in the sediment load can result in channel instability and degradation of fish habitat.

There is a concern that the lack of ground cover coupled with strongly hydrophobic soils will result in a loss of long-term soil productivity. Erosion rates will increase from essentially zero tons per acre in the unburned areas to approximately 50 tons per acre in areas of high and moderate burn severity; over 50 percent of the burned area is considered high or moderate severity. In large areas of high burn severity maintaining long-term soil productivity is important in meeting Routt Forest Plan direction and Standards and Guidelines which are outlined in the Watershed Conservation Practices Handbook (FSH 2509.25).

There was a high concentration of blowdown patches within the North Fork Elk River watershed, particularly in the Lost Dog, English Creek, and Agnes Creek subwatersheds. All of these patches were consumed in the fire, as well as much of the remaining standing conifer stands following the blowdown. As a result, approximately 34% of the North Fork Elk River watershed was affected by the fire with 23% of the watershed considered high or moderate burn severity. Within the Hinman Creek watershed 19% of the watershed was affected by the fire, with 12% of the watershed in high or moderate burn severity.

Storm flow from the Hinman Fire is expected to be 190% of normal for the 50 year, 6 hour storm event in the North Fork Elk River watershed, and 140% of normal in the Hinman Creek watershed. The combined effects of the Hinman Fire, Routt Divide Blowdown, past timber harvest, and ongoing spruce-beetle epidemic will increase peak flows in the Elk River. Peak flows typically occur during spring snowmelt and are a function of both the depth of snowpack as well as the snowmelt pattern. The probability of increased flooding downstream in the Elk River, particularly in the vicinity of the community of Clark is high, although it largely depends on snowpack and melt patterns. Residences and property bordering the Elk River should be notified of the potential for increased flooding and sediment loads following the fire.

Much of the riparian vegetation along Lost Dog and English Creeks in the North Fork Elk River watershed was consumed in the fire. As a result there is little vegetation to protect the banks from erosion during runoff events. This will result in braiding of the channels in the lower gradient reaches, and further incision and streambank erosion in the higher gradient reaches. Overall approximately five miles of stream channels within the Lost Dog 7th level subwatershed (which includes English Creek) are expected to become unstable following the fire.

The greatest areas of concern are in the upper half of both the Lost Dog and English creek subwatersheds, and a portion of the Agnes Creek subwatershed in the Mount Zirkel wilderness since these areas have high burn severity on steep slopes which drain directly into the creeks where there is no buffer between the burned hillslopes and the creek. There is no riparian vegetation remaining to help stabilize the creeks and dissipate the energy of increased storm flows and snowmelt runoff. As a result, the combination of the Routt Divide blowdown, spruce-bark beetle epidemic, and the Hinman 2 fire, water and sediment yields are expected to be even greater in the Lost Dog, English Creek, and Agnes Creek subwatersheds. Management prescriptions for the Lost Dog and English Creek areas are primarily 5.11- general forest and rangelands with the very headwaters designated as 1.32- backcountry recreation nonmotorized. Agnes Creek lies in the Mount Zirkel Wilderness.

Other concern areas include the north and west sides of Zinc Mountain, south of Scott Run Creek. Field reconnaissance found this area to have a high burn severity. A small precipitation event in early September resulted in development of debris flows in which the ephemeral draws downcut up to five feet. Debris from these debris flows was deposited at the bottom of the slope with some of it reaching Scott Run Creek. These ephemeral draws will continue to concentrate water and erode during subsequent runoff events.

A third concern area includes a steep patch of blowdown which burned at high to moderate intensity down to the streambank of the Middle Fork of the Elk River below Slavonia. The strong hydrophobic layer coupled with steep slopes is likely to result in significant surface erosion, and perhaps the development of debris flows during precipitation events. Any surface erosion or debris from this burn area will be delivered directly to the Middle Fork of Elk River since no buffer exists, and this could significantly increase sediment concentrations. There are also some isolated patches of high burn severity immediately adjacent to the mainstem of the North Fork Elk River where the fire consumed all vegetation on both sides of the river. This will contribute sediment and ash directly to the mainstem from the adjacent steep sideslopes.

The North Fork Elk River from the Mount Zirkel Wilderness boundary down to the confluence with the Middle Fork Elk River, and the Middle Fork from Slavonia down to the confluence with the South Fork Elk River are eligible for Scenic River designation under the 1968 Wild and Scenic Rivers Act as amended (USFS, 1979). Interim management direction of eligible study rivers prior to a decision by Congress as whether to be included in the Wild and Scenic river system is to protect the outstanding values which make these segments eligible. This includes protecting the free-flowing character, water quality, and scenic values.

A spruce beetle epidemic that resulted from the Routt Divide blowdown has spread rapidly through all three of the watersheds affected by the Hinman Fire. As a result, much of the unburned timber is dead or dying from either the spruce beetle epidemic or the recent rise in mountain pine beetle activity. The combination of increased peak storm flow due to the uniformly strong hydrophobic layer coupled with mortality of the remaining spruce and lodgepole trees will significantly alter the hydrologic regime. It is recommended that actions be taken to 1) minimize soil erosion in order to maintain soil productivity, particularly since such large areas burned at high or moderate intensity, 2) maintain the forest road system by ensuring adequate drainage on the roads, and that existing drainage structures are capable of accomodating the increase in water and sediment yields that will occur as a result of the fire, and 3) that downstream users are aware of the potential for increased flooding and sedimentation following the fire.

B. <u>Emergency Treatment Objectives:</u>

1) Decrease the erosion from the uplands in order to maintain long term site productivity and ecosystem function
2) Reduce impacts to stream channel stability and water quality

3) Restore watershed function
4) Maintain the Forest Service Transportation system.
5) Reduce the threat to public safety by informing the public of the hazards that may exist from the wildfire.
6) Promote re-establishment of native plant communities to prevent the invasion of noxious weeds as a result of the fire.
7) Protect the values identified through the Management Area Prescriptions in the Routt Forest Plan
8) Monitor the effectiveness of the BAER treatments.
9) Monitor the potential spread of noxious weeds.

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

Land **70** % Channel ___ % Roads **90** % Other ___ %

D. Probability of Treatment Success

	Years after Treatment		
	1	3	5
Land	70	80	90
Channel			
Roads	80	90	95
Other			

E. Cost of No-Action (Including Loss): Long-term soil productivity and ecosystem function are unmeasurable

F. Cost of Selected Alternative (Including Loss): $5,944,291

G. Skills Represented on Burned-Area Survey Team:

[X] Hydrology [X] Soils [X] Geology [X] Range [ ]
[X] Forestry [X] Wildlife [ ] Fire Mgmt. [X] Engineering [ ]
[ ] Contracting [ ] Ecology [ ] Botany [X] Archaeology [ ]
[X] 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: Land treatments include aerial hydro mulching, road based hydro mulching, aerial straw mulching, aerial seeding, and mechanical scarification. The hydro mulching and seeding will provide ground cover to reduce surface erosion from precipitation and spring snowmelt which will help to maintain long-term soil productivity and reduce the quantity of sediment delivered to the stream system.

Aerial straw mulching: Aerial straw mulching will consist of using weed-free straw that will be applied via a helicopter. Mulch rates will be applied at a rate of 2000 pounds per acre which equates to a maximum depth of two inches. Mulch will be applied on isolated concern areas adjacent to the North Fork Elk River and Middle Fork Elk River mainstems which are managed as scenic river corridors. Ground cover of 60 percent or more has been shown to reduce erosion to pre-fire levels. Reducing surface erosion and the quantity of ash and sediment delivered to the stream system will help to reduce the effects of the fire on water quality, and to maintain long-term soil productivity in the scenic river corridors.

FY03: After re-evaluation in the spring 2003, it was determined that aerial mulching would be the most appropriate upland treatment for all areas.
Accomplishments: 1960 acres of high burn severity was aerial mulched in 2003.

FY04: Effectiveness of the aerial mulch treatments was monitored during 2004 to ensure adequate coverage and reduction of surface erosion to protect long-term soil productivity and water quality. In general the aerial mulch reduced erosion. There were isolated locations where the mulch fell in 'clumps.' Revegetation and ground cover was higher in the mulched areas than unmulched. Cheat grass was found associated with the mulch on south facing slopes. There is a concern that this could result in widespread establishment of cheat grass throughout the burn area. High severity burn areas not treated with mulch had minimal revegetation and the potential for surface erosion remains high.

Roads and Trail Treatments: Road treatments will focus on providing adequate drainage to accommodate increased water and sediment flows. This will include:

1) maintaining existing drainage structures will include both hand-cleaning and heavy equipment work
2) adding additional drainage structures where needed to accommodate the increase in runoff and sediment following the fire,
3) armouring of drainage structures which will include culvert inlets and outlets
4) armouring dips
5) converting some culverts that have inadequate passage to dips
6) cleaning road ditches to ensure proper function
7) ensuring adequate capacity in culverts in live-streams to accommodate increased water and sediment yields
8)where appropriate, using straw-bales to trap sediment below relief culverts to minimize sediment transport from the road system into the stream system.

FY03: After spring runoff in 2003, several large culverts were found to have inadequate capacity to accommodate post-fire flood flows. Due to damage to the road system from over-topping of these culverts and the cost of culvert replacement versus decommissioning, it was determined to decommision one road system and remove all culverts following the proper environmental analysis including Roads Analysis. The resulting treatments incorporated the above described treatments except culverts were removed rather than replaced on the decommissioned road system, and gates were installed to protect decommissioned roads.

Accomplishments

Maintain and enhance 118 existing drainage structures
Installed 21 new drainage structures
Removed and replaced 30 culverts with drainage dips
Armoured dips with 245 cubic yards of rock
Installed 3 gates

FY04: Monitoring in FY04 found that in general, the road treatments were effective at reducing surface erosion. Some stream crossing adjusted following spring runoff and may warrant additional work to minimize erosion.

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.)

Noxious weeds: **FY03:** Approximately 725 acres were surveyed for noxious weeds in 2003. 13 sites with Canadian thistle were identifed, and one existing leafy spurge patch of 3.2 acres was found adjacent to the burn area. Revegetation has been slow or nonexistent in the high burn severity areas. The proximity of known noxious weed populations and slow revegetation suggests that the spread of weeds is likely to occur, and monitoring is needed in 2004.

FY04: The two primary goals for weed surveys conducted in the Hinman Burn area in FY04 were to: 1) document any new noxious weed sites as well as monitor increases in existing weed sites; 2) evaluate the effectiveness of the straw bale bombing that was initiated and completed in the fall of 2003 for erosion control.

On 9-14-04, we surveyed the central portion of the Hinman Fire for weed occurrences. There was one new site of yellow toadflax (*Linaria vulgaris*) discovered during the surveys this season (see map). There is one known leafy spurge (*Euphorbia esula*) site on the edge of the Hinman Fire (south central, see map). This leafy spurge site was present before the fire. There are 30+ known sites of Canada thistle (*Cirsium arvense*) within the Hinman Fire. Canada thistle sites that were mapped, represent points within an unmapped polygon (i.e. polygons/areas were not GPSed for these sites). Of the Canada thistle sites documented, many were probably present before the fire. Some of the pre-existing sites have, and will continue to increase in size over time. The attached document contains photos and a list of plant species found in the fire (see attached, this document).

FY05: Due to loss of personnel, no BAER funds were expended in FY05 for monitoring or treatments. Any future monitoring or treatments will be funded out of Forest or other funds, and no additional BAER funds will be spent.

PART VII - APPROVALS

1. /s/ Diane Chung — 2/07/06
   Deputy Forest Supervisor (signature) — Date

2. _____ _____
   Regional Forester (signature) — Date