

Date of Report: 12/08/2003

BURNED-AREA REPORT
(Reference FSH 2509.13)**PART I - TYPE OF REQUEST****A. Type of Report**

- ☐ 1. Funding request for estimated WFSU-SULT funds
☒ 2. Accomplishment Report
☐ 3. No Treatment Recommendation

B. Type of Action

- ☐ 1. Initial Request
- ☐ 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: Hayman****B. Fire Number: CO-PSF- 404, 428, 469****C. State: CO****D. County: Jefferson, Teller and Douglas****E. Region: 02****F. Forest: Pike****G. District: South Park, South Platte, Pikes Peak****H. Date Fire Started: 6/8/2002****I. Date Fire Contained: 7/2/2002****J. Suppression Cost: \$39,000,000 (7/3/2002)****K. Fire Suppression Damages Repaired with Suppression Funds**

1. Fireline waterbarred (miles): 30
2. Fireline seeded (miles): 40
3. Other (identify): 0

L. Watershed Numbers: 101900020105, 101900020101, 101900020104, 101900010403, 101900020106, 101900010607, 101900020805, 101900020804, 101900020107, 101900010406, 101900010401**M. Total Acres Burned: 137,784 acres**

NFS- 116,947 acres State- 373 acres Private- 20,464 acres

N. Vegetation Types: PIPO/MUFIL, PSME/MUMOL**O. Dominant Soils: Sphinx, Sphinx/rock outcrop, and Legault****P. Geologic Types: Pikes Peak batholith (DG)**

Q. Miles of Stream Channels by Order or Class:

Perennial (including lakes)- 188 miles

Intermittent- 182 miles

R. Transportation System:

Trails: 145 miles

Roads: 250 miles (All ownerships)

Parts III-IV same as initial request, have been omitted from this report.

PART V - SUMMARY OF ANALYSIS

Land Treatments

Ground-based hydro-mulching (with seed) from existing roads: For high severity burn areas that can be reached by existing roads, truck-mounted hydro-mulching will occur for an area approximately within 300 feet either side of the road. This will occur on 25 miles of high severity burn. Ground-cover amounts will be 2000 pounds/acre. Seed rate will be appropriate for the particular species of non-persistent annual grasses applied.

Initial estimate was for 1,455 acres at \$1,803 per acre for a total of \$2,623,365. Actual cost came in at \$946 per acre with 1,493 acres treated for a total of \$1,412,378 under the completed contract.

Aerial hydro-mulching (with seed): For the high severity burn areas feeding into the South Platte River ***below Cheesman dam***, that cannot be reached by existing roads, aerial hydro-mulching will occur on approximately 1,500 acres. The intent of the treatment is to prevent loss of topsoil, improve infiltration rates and replace organic litter consumed by the fire. Focus will be on ridge-tops and upper 1/3-slope positions. Application rate will be 2000 pounds/acre, and the mulch and tackifier to be used by the contractor will be suitable for 20-60% slopes. Seed rate will be appropriate for the particular species of non-persistent annual grasses applied.

Initial estimate was for 5,500 acres at \$3,003 per acre for a total cost of \$16,516,500. In an attempt to treat more acres more cost effectively, 4,000 acres that were planned for this treatment were shifted over to the aerial dry mulch treatment. Actual cost was \$2,938 per acre with 1,562 acres treated for a total of \$4,588,736 under the completed contract.

Aerial dry-mulching: For the high severity burn areas that cannot be reached by existing roads, dry mulching will occur on approximately 15,000 acres. The intent of the treatment is to prevent loss of topsoil, improve infiltration rates and replace organic litter consumed by the fire. Focus will be on ridge-tops and upper 1/3-slope positions. Application rate will be 2000 pounds/acre, and the mulch used by the contractor will be suitable for 20-60% slopes.

In 2002, initial estimate was for 4,500 acres at \$710 per acre for a total of \$3,195,000. Four thousand acres of treatments originally intended for the more costly aerial hydro-mulching was shifted to the dry mulching treatment. Cost savings provided for from the reduction of the aerial hydro-mulching acres provided for an additional 5500 acres of treatment of high severity burn in need of treatment based on flooding that has taken place over the summer. Contract cost was awarded at \$495 per acre, with 7,710 acres treated for a total of \$3,816,450. This contract was terminated for convenience to the government prior to the contract completion. Note that settlement costs to the contractor are currently pending. Final contract costs may be double the amount of what has been estimated at this time.

In late spring of 2003, a reassessment of vegetation establishment, hydrophobic soil conditions, and hillslope stability was conducted to evaluate threats specific to life and property. As a result of this evaluation, another 4,447 acres of high severity burn was aerially mulched with straw following seeding with annual grasses.

Aerial Seeding: Fixed-wing aircraft were used to seed 19,300 acres in 2002. Approximately 3,300 acres were seeded where contour scarification practices were being implemented to expedite that work. The remaining 16,000 acres seeded in 2002 were areas of high severity burn slated for straw mulching immediately following the fire. In 2003, another 5,061 acres of high severity burn were seeded using fixed wing aircraft. Areas seeded in 2003 were aerially mulched with straw as described. Excluding the price of the seed, cost to seed the 24,361 acres ran \$17.74 per acre for a total of \$432,212. Seed was applied at approximately 80 pounds per acre.

Seeding: All seed purchased and applied was limited to non-persistent annual cereal grasses. The mix of barley and triticale was intended to germinate quickly providing effective ground cover and soil stabilization to meet emergency watershed stabilization needs. Although not sterile, these species do not readily reseed, dropping the system in two to three years so as not to compete with the establishment of the native vegetation. All seed was tested to comply with Colorado's noxious weed free standards. In 2002, approximately 1.8 million pounds of seed was purchased to be used in conjunction with hydromulching, straw mulching and contour scarification projects. In 2003 an additional 420,800 pounds of seed was purchased to be applied prior to and in conjunction with straw mulch. Total grass seed costs amounted to \$641,381 at an average purchase price of 29 cents per pound.

Noxious weed spot-treatment and biological control :

Apply immediate herbicide spot control treatments to known weed infestations along identified areas on NFS lands (approximately 195 acres). Targeted sites have been ground-truthed and pose a threat for the establishment, seed set and expansion into vulnerable fire areas. The purpose of the treatment is to prevent the establishment and expansion of noxious weeds in the burned areas and into uninfested areas directly outside of the burn. All treatments will comply with the Pike and San Isabel National Forest Noxious Weed EA. All herbicide requirements will be followed. See the specification sheet and map in the project file for additional details.

In 2002, initial estimate was for 210 acres treated at \$495 per acre for a total of \$103,950. Actual cost was \$35,970 for 370 acres at \$97.22 per acre.

In 2003, 1,200 acres of new infestations of noxious were located and treated with herbicide at a cost of \$172,389. Small populations of diffuse knapweed, yellow toadflax, and Canada thistle were treated with biological agents. Costs associated with biological control were minimal and not charged as a BAER activity.

Mechanical scarification by ATV, with seed: Scarification and seeding will occur on selected high severity burn areas that pose a threat to downslope values and on-site soil erosion. A total of 9,1678 acres will be treated. Areas will be treated with a chain link harrow pulled behind an ATV on the contour and seeded with a short-lived nurse crop of grass to reestablish cover for erosion prevention and ecological site stabilization. The harrow will break up the hydrophobic soil surface and will also increase infiltration. Seed rate will be appropriate for the particular species of non-persistent annual grasses applied.

Initial estimate was for 15,000 acres at \$42.50 per acre for a total of \$637,500. Actual cost was \$457,466 for 9,167 acres at \$49.90 per acre. Part of the acres initially identified for ATV scarification was found to be too steep and dissected for safe operation; hand crews were used to seed and scarify these steeper areas as described below. Hazard tree felling for safety of the ATV operators and required heritage clearance is included in the cost of this project.

Hand Crew scarification, with seed: Scarification and seeding will occur on selected high severity burn areas that pose a threat to downslope values and on-site soil erosion. A total of 3,958 acres will be treated. Areas will be treated by raking contour strips with McClouds and seeded with a short-lived nurse crop of

grass to reestablish cover for erosion prevention and ecological site stabilization. Raking will break up the hydrophobic soil surface and will also increase infiltration. Seed rate will be appropriate for the particular species of non-persistent annual grasses applied.

This specific treatment was not part of the initial request. These acres were identified to be completed by ATV, however safety issues made treatment by hand crew a more viable option. Hazard tree felling for safety of the hand crews and required heritage clearance is included in the cost of this project. Actual cost was \$965,453 for 3,958 acres at \$243.92 per acre.

Flood warning signs/system: Twenty-five "Flash Flood Warning" signs have been ordered and installed at key locations across the fire, primarily at ingress points into the burn area. In addition, a flood-warning system utilizing three Remote Automated Weather Stations (RAWS) will be installed. A full-maintenance contract with BIFC will be used.

Initial estimate was adequate to cover the cost of the flood warning signs. Three NIFC RAWS were installed within the burn area by FS personnel from Boise, Idaho at no cost to this project. One Forest Hydrologist (GS-11) worked part-time throughout the implementation period to coordinate efforts with state and county agencies in the development of an early warning system for the entire burn area consisting 20 monitoring devices. Coordination costs are included in the overhead portion of this report.

"Colorado Cares Day" on 8/3/2002- Scarification, seeding and mulching: For the "Colorado Cares Day" on August 8, 2002, a variety of treatments will be installed to use the services of up to 1000 volunteers. Scarification will occur using hand-rakes, and whirly-bird seeders will spread seed. Straw mulch will be applied to areas that are seeded. Port-a-potties and drinking water will be supplied.

Initial cost estimate was for \$8,700. Final cost estimate is \$16,500. Flagging unit boundary, hazard tree felling, heritage clearance, and unanticipated overhead support contributed to the increased costs.

Spot-treatment of at-risk Heritage sites: Two sites are at risk from high flows and erosion. At these sites, strategically placed straw bales with re-bar anchoring will be placed to divert anticipated flood flows away from the sites.

Initial estimate of \$1,340 was adequate to cover cost to protect two heritage sites.

NFS burn above private land treatments: There is a significant amount of private land within the Hayman Fire. In many locations, high severity burn occurred on NFS property directly above and upslope of private residences. During the BAER field assessment, six sites were identified for special treatment in addition to the slope treatments that are to occur above (further upslope). Treatments were prescribed, by site, for each of these six. Treatments include sandbag berm deflectors and directional felling.

Initial estimate of \$12,438 was adequate to cover costs of sandbagging or directional felling to protect six residences.

Channel Treatments: none

Roads Maintenance: In anticipation of flood flows from the burn area, a variety of practices will be implemented to ensure safe travel and reduce sediment sources from system routes. A variety of practices were employed to address road damage to critical access routes and reduce runoff and sediment associated with the system roads throughout the burn.

Initial road maintenance was estimated at \$90,400. Damaging rain storms over the duration of the project were largely responsible for road maintenance costs to be higher than originally expected. Combined total maintenance costs amounted to \$225,844.

The following table summarizes road work for 2002 and 2003 into five categories. Separate costs estimates for each activity were not available at the time of this report.

Activity	Units	# of Units
Grading & Ditch Cleaning	miles	103
Waterbarring & Repair	miles	43
Armoured Road Dips/Low Water Crossings sites		40
Culvert Cleaning	sites	31
Washouts Repaired	sites	21

Road closures: Extensive temporary road closures are necessary due to safety concerns (hazard trees, boulders rolling from steep burned slopes, and aerial rehab treatments), possible road washouts and flash floods, and to aid in the rehabilitation of burned lands. Closure methods primarily be gates with combination locks to facilitate access in and out of the burned area by the many private residents with the perimeter. Portable barricades will be used for rapid closure of open roads that may require closure during storms. Cost for 36 gates and labor to install them amounted to \$61,902.

Effectiveness Monitoring: Following the completion of fire suppression activities, hillslope treatment effectiveness monitoring was initiated by Robichaud (Rocky Research Station) and MacDonald (Colorado State University). This monitoring was deemed suitable to fulfill BAER program monitoring needs, and consequently a decision was made to provide logistical support through an in-service agreement with RMRS and a cooperative agreement with CSU, rather than developing additional monitoring sites with BAER funds.

Robichaud's sites consist of six small watersheds instrumented with sediment traps and weirs. Each watershed is gauged with an ultrasonic level sensor that measures the surface below it (water, ground, mud, sediment, whatever). Each weir has a 90 degree v-notch and a stage recorder so we can measure the flow through the weir. Each set of three weirs has a tipping bucket rain gauge (they're now equipped to measure snow for the winter). A full weather station measures rainfall, air temperature, relative humidity, soil moisture, solar radiation, wind speed, and wind direction. Each set of three weirs and the weather station has a CR10 (Cambell Scientific Recorder model 10) datalogger that is battery powered and solar charged.

MacDonald has set up 14 paired swales watersheds with silt fence sediment traps that is located near a recording weather station.

Cost to carry out these monitoring activities for one season's worth of data collection amounted to \$160,000. Further BAER support for this effectiveness monitoring will be determined on an annual basis for the next two years. The monitoring plan proposal is attached to this document.

An additional \$6,500 has been included under effectiveness monitoring to cover the cost of the assessment team review that took place in July of 2003. This two-day review provided the opportunity to original assessment team members to see first-hand how their plan was implemented and how successful planned treatments were for their intended purpose.

PART VI -- EMERGENCY REHABILITATION TREATMENTS AND SOURCE OF FUNDS BY LAND OWNERSHIP

			NFS LANDS		Other	OTHER FED		OTHER LANDS		All
			Unit	# of		# of	Fed	# of	Non Fed	
Line Items	Units	Cost	Units	SULT \$	\$	units	\$	Units	\$	Total
A. Land Treatments										
Road hydro-mulching	acres	946.00	1,493	1,412,378						\$1,412,378
Aerial Hydro-mulching	acres	2,937.73	1,562	4,588,736						\$4,588,736
Aerial Dry-mulching	acres	648.68	12,157	7,885,976						\$7,885,976
Hand Crew scarification	acres	243.92	3,958	965,435						\$965,435
Mechanical scarification	acres	49.90	9,167	457,433						\$457,433
Heritage sites	sites	670.00	2	1,340						\$1,340
NFS-Above Pvt Land Treatments	project		1	12,480						\$12,480
Noxious weed treatments	acres	564.81	1,570	208,978						\$208,978
Colorado Cares treatments	project		1	16,500						\$16,500
Flood warning signs	project		1	2,600						\$2,600
Aerial Seeding	acres	17.74	24,361	432,212						\$432,212
Annual Grass Seed	pounds	0.29	2,226,830	641,381						\$641,381
Seed for CUSP	total			61,448						\$61,448
Straw for CUSP	total			18,855						\$18,855
<i>Subtotal Land Treatments</i>				16,705,752						\$16,705,752
B. Channel Treatments										
None planned										
<i>Subtotal Channel Treatments</i>										
C. Road and Trails										
Road Maintenance	project		1	225,844						\$225,844
Road closures	project		1	61,902						\$61,902
<i>Subtotal Road & Trails</i>				287,746						\$287,746
D. Structures										
None planned										
<i>Subtotal Structures</i>										
E. BAER Evaluation										
Team costs	total			120,000						\$120,000
Helicopter time	hours	800.00	6	4,800						\$4,800
Assessment supplies (image, room)	total			11,000						\$11,000
<i>Subtotal BAER Evaluation</i>				135,800						\$135,800
F. Monitoring										
Noxious weed monitoring	project		1	24,900						\$24,900
Treatment Effectiveness Monitoring	project		1	166,500						\$166,500
<i>Subtotal Monitoring</i>				191,400						\$191,400
G. Other										
Incident Management Team/Personnel for Implementation Logistics	project			3,598,750						\$3,598,750
<i>Subtotal Other</i>				3,598,750						\$3,598,750
H. Totals				20,919,448						\$20,919,448

PART VII - APPROVALS

1. Forest Supervisor (signature) _____ Date _____
2. Regional Forester (signature) _____ Date _____

Hayman Fire BAER Effectiveness Monitoring Study

4/9/2003

Management Concern:

In the past, severe fires that have experienced high intensity storms have produced accelerated erosion and flooding that have threatened life, property, and infrastructure. Various BAER treatments may be effective in reducing concentrated runoff and erosion on upper watershed catchment basins.

Objectives:

To evaluate the effectiveness of various BAER treatments in reducing concentrated runoff and erosion and subsequent sediment delivery to streams and reservoirs.

Parameters:

Tons/acre soil loss; and other soil loss indicators (e.g. rills).

Locations:

Six small catchments (approximately 10 acres each) and 14 paired swales (approximately ½ acre each), all within the Hayman Fire area.

Frequency and Duration:

Monitoring sites were established in FY2002; instrumentation will be maintained for a five year period (FY2002-2006).

Design and Methodology:

Immediately after fire suppression activities ended, hillslope treatment effectiveness monitoring was being established by Robichaud (Rocky Mountain Research Station) and MacDonald (Colorado State University). The BAER team decided that the effectiveness monitoring data from these sites would meet the needs established by the current BAER program and, as a result, decided to provide logistical support to these efforts rather than developing additional sites. In addition, during reconnaissance of the effectiveness monitoring sites, the location and size of the untreated “exclusion” areas (300 ac, 120 ha) were established.

Robichaud (personal communication, 2002) established six small watershed monitoring sites (10 ac, 4 ha) within high burn severity areas of the Hayman Fire Area. Four of the six small watersheds have been or will be treated with (1) aerial hydromulching, (2) aerial dry mulch, (3) contour-felled logs, and (4) salvage logged. Two of the sites have been left untreated as controls. Each site has a sediment trap and weir constructed at the outlet of the watershed. A complete weather station and four tipping bucket rain gages are also installed onsite. After each storm event, the sediment will be collected, measured, and analyzed so that the treated and non-treated watersheds can be compared. These sites will be monitored for 5 years. In addition, 32 rill study plots (300 ft², 27 m²) with silt fence sediment traps (Robichaud and Brown, 2002) have been established to compare treatments. Eight plots of each treatment—straw mulch, wood straw mulch (new product), hand scarification, and untreated controls—are in place and being monitored.

MacDonald (personal communication, 2002) is also monitoring sites within the Hayman Fire area. At the hillslope scale, 14 paired swales (one control and one treated) have been established in Upper Saloon Gulch. Swales range from 0.1 to 2.5 acres (0.06 to 1 ha) in size and have silt fence sediment traps. The treatments being monitored and compared are: (1) ground-based dry mulch, (2) ground based hydromulch, (3) hand scarification and seeding, and (4) aerial hydromulch. Inchannel monitoring sites also have been established within the swales and at downstream locations. Rainfall simulation studies will be conducted in order to augment information about post-fire erosion rates and treatment effectiveness. Changes in percent cover are being monitored to evaluate the effects of the different treatments and recovery rates over time.

Data Storage:

Data management will be the responsibility of Forest Service Research, Moscow, Idaho and Colorado State University.

Reporting:

Reporting will be the responsibility of Forest Service Research and Colorado State University. Annual Progress Reports will be submitted by November 15 of each year. Final Report will be submitted by November 15, 2005.

Costs:

Costs are broken down in the following table (Forest Service Research salaries are contributed). This request is specifically for FY 2003. Subsequent assessment of need and funding requests will be needed for the remaining years.

	Robichaud		
	2003	2004	2005
Salaries			
GS-9 (Temp)	32,000	28,000	28,000
(4) GS-5 3pp	15,500	12,000	12,000
Travel (airline)	4,500	3,500	3,500
Per diem	4,500	4,000	4,000
Lodging	3,000	2,800	2,800
Materials			
Equip. Replace.	4,500	4,500	4,500
Phoneline	1,500	1,500	1,500
Miscellaneous			
Truck & Mileage	4,000	4,000	4,000
Overhead (15%)	10,500	9,000	9,000
Total	\$80,000	69,000	69,000

	MacDonald		
	2003	2004	2005
Salaries	61,000	57,000	52,000
Travel	11,000	10,000	8,000
Materials	5,000	4,000	3,500
Miscellaneous	3,000	3,000	4,000
Total	\$80,000	74,000	67,500

Status Report:

Both sets of catchments were established in 2002 but funding is necessary to continue the studies.

Personnel:

Forest Service Research in Moscow, Idaho and Colorado State University.

Responsible Officials:

Pete Robichaud, Forest Service Research in Moscow, Idaho

Lee MacDonald, Colorado State University

Ken Kanaan and Deb Entwistle, Pike and San-Isabel National Forests