USDA-FOREST SERVICE FS-2500-8 (6/06)

Date of Report: 6/9/2010

BURNED-AREA REPORT
(Reference FSH 2509.13)

PART I - TYPE OF REQUEST

A. Type of Report

[X] 1. Funding request for estimated emergency stabilization funds
[ ] 2. Accomplishment Report
[ ] 3. No Treatment Recommendation

B. Type of Action

[X] 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: Beaver Fire

B. Fire Number: CO-UPD-000032

C. State: Colorado

D. County: San Miguel

E. Region: 2

F. Forest: GMUG

G. District: Norwood

H. Fire Incident Job Code: PDFED5

I. Date Fire Started: May 22,2010

J. Date Fire Contained: 6/4/2010

K. Suppression Cost: $1,450,000

L. Fire Suppression Damages Repaired with Suppression Funds
1. Fireline waterbarred (miles): ¼ mile dozer line
2. Fireline seeded (miles): ¼ mile dozer line
3. Other (identify): 7.5 miles travel routes closed and decommissioned

M. Watershed Number: 140300030304 and 140300030305

N. Total Acres Burned: 2742
NFS Acres(2320) Other Federal (422) State (0) Private (0)

O. Vegetation Types: Ponderosa Pine 1206 acres – 46%
Pinon-juniper – 474 acres – 18%
Spruce-fir-aspen – 449 acres – 17%
Cottonwood-Spruce – 71 acres – 3%
Mountain shrub - 440 – 16%

The forb/grass component within the fire was completely consumed; approximately 40-60% of the litter component was completely consumed, although in some areas it is still identifiable as litter. Residual root crowns of the forb/grass component should sprout in some areas where low burn severity occurred. Our field review also suggests that the forb/grass component was late this year due to cooler spring conditions, and that much of what is being observed growing right now is not regrowth, but initial growth that did not burn during the fire, or was singed during the fire. In the Ponderosa Pine, smaller diameter (sapling to pole sized) trees and regeneration were completely scorched or had crown damage of greater than 75%. Damage to the crowns of larger trees varied from 30-75%; although the trees had not yet "candled" the crown damage may be significant enough to result in a relatively high tree mortality rate in areas of moderate to high fire intensity. Field review of the burned areas suggests that there will be significant resprouting of Gambel oak in many areas, although the oak brush is a relatively minor componet within the fire. The root crowns of the oak remained pliable in areas of low to moderate fire intensity, even where the stems were completely consumed.

P. Dominant Soils:

The Beaver Fire area lies with the Uncompahgre National Forest Area Soil Survey. Two soil map units (#13 - Chilson-Delson, moderately deep-Beenom families complex and #30 - Trampas-Delson, moderately deep families complex) account for nearly 59% of the total burn area. These units occur on the planer uplands on either side of McKenzie canyon, with the majority (90%+) above the north rim of the canyon. The soils of unit #13 occur in the uppermost reaches of intermittent drainages on along the fires northeast flank and transition to soil typical of unit #30 as channel dissection increases. Slopes average about 10% and range from nearly level to 25%. Surface layers range from sandy loams, loams, and cobbly loams and subsurface layers from clay loams to cobbly clay loams. Steeper and rockier soils occur on the side slopes adjacent to the lower end of these channels.

An additional 39% of the area is dominated by soil map units #12 - Borolls-Boralfs-Rock outcrop complex and #32 - Ustorthents-Ustochrepts-Rock outcrop complex which both occur along the McKenzie canyon side slopes within the fire. These rugged areas have slopes that range from 50 to 150%. Unit #12 occurs on the north facing aspects supports Ponderosa Pine and mixed conifer, while the drier southern aspects support pinyon-juniper stands.

Q. Geologic Types:
Dakota sandstone forms the prominent cap rock above the Mckenzie Creek canyon. It forms the gently sloping uplands across 65% of the burn area. The steep canyon side slopes that comprise the remaining 35% include the Brushy Basin shale and Salt Wash sandstone members of the Morrison formation.

R. Miles of Stream Channels by Order or Class: 1st order 6.1 miles
2nd order 3.4 miles
3rd 1.8 miles
5th order 2.4 miles

S. Transportation System

Trails: 0 miles Roads: 6.9 miles miles

PART III - WATERSHED CONDITION ON NFS

A. Burn Severity (acres): 1316 (unburned or low) 887 (moderate) 117 (high)

The upland portions of the burn were thoroughly evaluated for severity, for safety reasons the steep canyon walls were not. The high burn severity occurred primarily along the steep canyon walls of McKenzie Creek (see map).The fire on the uplands north of Mckenzie Canyon resulted in a mosaic of low and moderate burn severity burn. Within the moderate and high burn severity the duff layer was charred and mostly consumed,

however, our testing of the soil impacts indicates that soils were not impacted to any significant decree. Bare soil exposure exists within much of the moderate burn severity and most of the high severity. These areas were openings in the original canopy that supported only grass/forb cover with no needle cast accumulation. The grass forb layer was consumed as were some branches of the shrub component up to 0.3/4 inches diameter. The litter/duff and vegetative understory indicators generally confirmed the BARC satellite imagery for the burn area.

B. Water-Repellent Soil (acres):

Water repellency was weak to non - existent;

C. Soil Erosion Hazard Rating (acres):

1016 (low) 480 (moderate) 222 (severe) 601 (very severe)

The "Kw" values for all of the soils within the burn area are less than 0.35 (based on information from the soil survey) due to the considerable amounts of coarse material on the surface. Therefore, the hazard ratings are based solely on the slope breaks for the ratings provided in the NRCS - National Forestry Manual .

D. Erosion Potential: 10% chance of exceeding 1.5 - 23 tons/acre {mean annual 0.3 - 10}.

Erosion potential estimates were made utilizing the disturbed WEPP internet application to 'best fit' on the ground severity and soil/site conditions. The estimates range widely because of the wide range of conditions in terms of burn severity and soil/sites. Three separate scenarios were examined: the mosaic burn pattern on the uplands, moderate and high severity burning on the northern McKenzie canyon aspect, and the no to low severity burn on the southern McKenzie canyon aspect. Extreme conditions were also modeled, which produced from 4 to 33 tons/acre of erosion.

The Soil Survey estimates the soil loss tolerance ranges from 1 to 5 tons per acre for the soils within the burn area. The survey also provides a current erosion rate for the upland soils of 0.1 to 2 tons per acre. The WEPP erosion estimate of 1.5 tons/acre for the upland scenario is within the ranges that are provided in the Soil Survey.

Similar evaluation and comparison on the rugged McKenzie canyon side slopes is problematic because of their extreme slopes, wide soil variability, and the ability to model the complex site conditions in the WEPP application. The Soil Survey soil loss tolerance for the side slopes is estimated at 2 to 3 tons per acre, no estimates for the current erosion rates are provided.

E. Sediment Potential: 450 to 10,500 cubic yards / square mile

Sediment delivery estimates were made utilizing the ERMiT internet application using the 'best fit' available for the three scenarios. The estimates for extreme conditions ranged from 2 to 22 tons/acre. The disturbed WEPP estimates of sediment delivery were similar for the uplands. However the WEPP estimates for the canyon side slopes for the 'best fit' were much lower (4 vs. 18) and much higher for the extreme (33 vs. 22).

PART IV - HYDROLOGIC DESIGN FACTORS

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

B. Design Chance of Success, (percent): 60

C. Equivalent Design Recurrence Interval, (years): 10

D. Design Storm Duration, (hours): 6

E. Design Storm Magnitude, (inches):

F. Design Flow, (cubic feet / second/ square mile): 3.4

G. Estimated Reduction in Infiltration, (percent): 25

H. Adjusted Design Flow, (cfs per square mile): 5.8

Beaver Fire BAER field hydrologic threat evaluation was conducted on 28 and 29 May 2010. The Beaver Fire directly affects two 6th Code HUCs. It burned approximately 2% (447 of 24,708 acres) of the Species Creek-San Miguel River Drainage 14030030305, and approximately 7% (2,194 of 30372 acres) of the McKenzie Creek Drainage 14030030304. The Fire burned primarily in an unnamed drainage tributary to McKenzie Creek that drains the area North and West of Craig Point. This drain will be referred to as Craig Point Draw. It was concluded from field observations that the threat from the Beaver fire to the stream channel network, associated aquatic systems, and downstream man-made structures appear to be minimal. McKenzie Creek was observed to be prepared to handle increased post-fire stream flows with a large broad floodplain and little readily recruitable large woody debris. The most likely areas of possible mass movement or debris flow that could affect the stream network are well upstream of currently occupied fish habitat and man-made structures.

McKenzie Creek was investigated from where it flows under San Miguel County Road 47Z, just upstream of where it becomes tributary to the San Miguel River. This reach of McKenzie was examined to assess the extent to which the drainage's response to the fire might threaten the county bridge. Approximately one mile of McKenzie Creek remained unburned above the bridge. This reach of the stream is a Rosgen Channel Type B2 characterized by a large width to depth ration, moderate entrenchment, channel material dominated by cobble (2.5 – 10 inch) to boulder (>10 inch) size classes, and stable well vegetated banks (Figure1). No fish were observed in McKenzie Creek even though abundant, high quality, riffle/pool habitat existed. The creek appeared to be currently flowing at approximately 1-3 cfs. A moderate amount of recruitable large woody debris was observed in the channel. The woody material in the channel was mainly found in jams that were not in the currently flowing portion of the channel but were within the floodplain. These jams could possibly be recruited with increased stream discharge expected after the fire, but all jams appeared to be adequately anchored into the channel and never completely occupied the floodplain allowing adequate alternate flow options. Overall the reach appeared to be prepared to adequately manage the possible post-fire increased flows from the McKenzie drainage. The channel's large coble and boulder lining in combination with the it's broad shallow floodplain and distribution of large woody debris jams suggest that the channel frequently sees flashy large volume runoff. Since less than 10% of the watershed's area has been affected by the fire, there should be little threat to the county road bridge from the expected design storms over the next 5 years while vegetation reestablishes itself in the burned area.

Craig Point Draw was surveyed at its point of confluence with McKenzie Creek. The lower reaches of Craig Point Draw are Rosgen A2 channel type characterized by a consistently steep gradient, cobble to boulder sized bed material, low width to depth ratio, and high entrenchment (Figure 2). The Creek was not flowing at the time of the survey. At its confluence with McKenzie creek multiple abandoned depositional features suggest that the creek has historically carried debris flows down its channel, likely a response to previous fires. This geomorphologic response was even better observable at the unnamed drainage that drains the south side of Craig Point. Burn severity along the lower reach of the creek was moderate with small portions of low. All of the leaves were burned from riparian vegetation but small branches and roots remained fully intact. The remaining root material should assist the channel in maintaining its bank stability during increased post-fire flow events but debris flow events are possible from the highly erodible soils of the Craig Pt Draw and other south facing side slope drainages tributary to lower McKenzie Creek. The affect of these debris flows should be buffered by McKenzie creek before it reaches the San Miguel River.

Upper reaches of Craig Point Draw were visited in the field on 29 May 2010. The creek was accessed from the North and inspected from the edge of the moderately burned area just east of where the creek bends to the south. The portion of Craig Point Draw within the areas mapped as moderate burn intensity area appeared to be similar in character to the lower reaches observed the previous day at the confluence with McKenzie Creek. The upper reaches of Craig Point draw were lightly burned maintaining the integrity of much of their riparian vegetation. The channels were a Rosgen type B4 with moderate slopes, stable banks, and gravel to cobble sized bed material. These upper reaches appear to be capable of maintaining their current condition during heightened post-fire flows.

Gutshall basin is a small catchment that flows directly to the San Miguel River. The drainage originates on the Mesa top between McKenzie Canyon and San Miguel River Canyon. The lower third of the basin is very steep and has nearly all burned. Average channel gradient over this reach is 20% and the basin sideslopes ranges from 50% to 70%. Material in the drainage bottom varies in size from sand up to boulders larger than 5 ft in diameter. Erosion on the steep slopes is a combination of fluvial and colluvial processes. There is evidence of periodic debris flow deposition stored in the channel behind large rock clusters. At the mouth of the canyon a large fan is lacking, but material has likely been removed in the canyon by both the river and when the highway was constructed.

PART V - SUMMARY OF ANALYSIS

Describe Critical Values/Resources and Threats:

Burned severity was determined using a BARC image dated 5/27/2010. Image quality was good and field investigation conducted by the team on 5/28 and 29 confirmed that estimates of burned severity provided by the BARC image were very representative.

Due to the presence of soil moisture and fire behavior (high intensity, but short duration) only 117 acres were judged to be in the high burn severity category. However, within the fire there is a high erosion hazard that is a function of steep slopes that are no longer anchored by vegetation. The expected response following fire will be a significant increase in soil movement and sediment delivery until which time as the sites stabilize, which will be largely dependant upon re-establishment of litter and live ground cover.

Critical values on the Forest include site productivity and threats from Cheatgrass expansion due to loss of existing herbacous vegetation. Cheatgrass currently exists within the fire perimeter and is likely to expand aggressively.

Just below the fire there are public safety and property considerations threatened by the likely debris flows originating within the burned area which threaten State Hwy 145 and the McKenzie Bridge on County Rd 47Z. Should the structure under Hwy 145 at the mouth of Gutshall basin catestrophically fail it would cost upwards of $1,000,000 to replace. The Forest is being assisted in its debris flow potential assessment by Dr. Sue Cannon of the USGS. We requested an emergency assessment of post-fire debris-flow hazards from Craig Point Draw, Goat Pen Reservoir Drain, and Gutshall Creek, portions of which were recently burned by the Beaver fire. This assessment was requested in response to concerns that debris flows produced from Gutshall Creek might impact State Highway 145, and debris flows generated from Craig Point Draw and Goat Pen Reservoir Drain basins might dam McKenzie Creek, the failure of which could result in flows that might also damage State highway 145. This assessment is based on the models and approach described in Cannon and others (Geological Society of America Bulletin, 2010) to determine the probability that each of the three basins will produce debris flows and the volume of the possible debris-flow response at the basin outlets in response to a given set of storm events. The models used for this assessment indicated a low potential for debris flows from the three basins. After consultation with both County and State road departments most of the concern was focused on the Gutshall drainage which crosses beneath Hwy 145 along the San Miguel River. Although there is potential for debris flows with between 6,500 and 12,000 cubic yards of material in Gutshall Creek, it would take a 50 to 100 year storm and even then the probability is less than 5%.

The primary emergency within the Beaver fire is the very high potential to expand the occupancy of invasive plant species into areas that burned. Cheatgrass (*Bromus tectorum)* is the species of greatest concern, along with Canada thistle (*Cirsium arvense)* and musk thistle (*Carduus nutans)* that are also present in the area. Cheatgrass is present immediately adjacent to and within the fire, and was observed in full bloom along Forest Development Road #513 (Craig Point Road). Canada thistle was also observed adjacent to the Craig Point Road and exists along many system and non-system roads within and adjacent to the burned area. Monitoring previous fire treatments in similar plant communities, including the nearby Craig Draw fire has demonstrated that, while results are variable, seeding of fires has proven to be effective at reducing the infestation of cheatgrass, particularly when native perennial species are used. Monitoring also shows a significantly higher canopy cover of cheatgrass on unseeded sites. (Johnston 2007). On steeper slopes the germination and establishment of the prescribed species is anticipated to be less than that of more moderate slopes, which is acceptable, in view of the objective to provide competing vegetation to reduce expansion of cheatgrass into new areas.

The Forest database for cultural resources was consulted to identify known sites in the burned area. Only one historic property (per 36 CFR 800) was located in the burned area and it was monitored by an archaeological technician for damage or impacts from the fire or its effects. The site was found to be located in an area of mosaic, non-severe burning and is in stable condition. The other prehistoric sites in the burn are of types generally not adversely effected by normal burning patterns. No further work was recommended.

B. Emergency Treatment Objectives:

Prevent the explosion of cheatgrass throughout the burned area. Provide for public safety along Hwy 145. Protect site producitivity and accelerate the stabilization of steep and erosive areas that are tributary to the road crossings below the fire and the San Miguel River which is being considered for Wild and Scenic Status.

Getting seed applied as quickly as possible in order to take advantage of a good seed bed is critical, due to the broad ecological amplitude exhibited by cheatgrass. In pinyon-juniper plant communities, cheatgrass is often found to be the most prevalent non-native species, whereas in pine stands, Canada thistle tends to be more prevalent. (Koniak, from The role of wildfire in the Establishment and Range Expansion of Nonnative Plant Species into Natural Areas).

Principal objective will be to establish desireable ground cover as quickly as possible in areas that burned in areas of moderate or moderately high severity or in areas adjacent to established cheatgrass communities. The concern is that no treatment may result in a high percentage of the herbaceous vegetation converting to cheatgrass. With the significant pine mortality that is expected there is a chance of type conversion from a timber type to a range type. Additionally this site is vulnerable to a permanent conversion as the effects of climate change playing out over the next several decades. The sterile annual wheatgrass prescribed in the seed mix should germinate rapidly and provide a quick ground cover. The native perennial grass species will germinate and establish more slowly; slender wheatgrass is relatively short-lived and will not persist more than a few years.

A secondary objective is to reduce soil erosion on the steeper slopes by reducing raindrop impact, increasing ground litter and providing quick establishment of root mass. The Forest is recommended aerial seeding on 834 acres of the fire, using a combination of a sterile annual and perennial native grasses.

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

Land **80** % Channel ___ % Roads/Trails 95 % Protection/Safety **99** %

D. Probability of Treatment Success

	Years after Treatment		
	1	3	5
Land	60	80	90
Channel	NA	NA	NA
Roads/Trails	70	100	100
Protection/Safety	95	NA	NA

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

F. Cost of Selected Alternative (Including Loss):

G. Skills Represented on Burned-Area Survey Team:

[x] Hydrology [**x**] Soils [ ] Geology [x] Range [ ]
[ ] Forestry [ ] Wildlife [ ] Fire Mgmt. [ ] Engineering [ ]
[ ] Contracting [ ] Ecology [ ] Botany [x] Archaeology [ ]
[ ] Fisheries [x] Research [ ] Landscape Arch [ ] 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: Approximately 834 acres of seeding by aerial application is recommended. Seed mix as follows:

Annual Sterile Wheatgrass – 25lbs/acre
Slender Wheatgrass – 1.5 lbs/acre
Bottlebrush Squirreltail - .5 lbs/acre
Sandberg Bluegrass - .5 lbs/acre
Muttongrass - .5 lbs/acre

All but the annual wheatgrass are perennial native species that have proven themselves as well adapted to the area and effective at becoming established when seeded on fires that have historically occurred on the Uncompahgre Plateau.

Seeding will be done as quickly as possible. Anticipate completion by early July and prior to monsoon influence of mid to late July. This will provide sufficient time for annual wheatgrass to germinate and fully develop prior to killing freeze, in early to mid October.

On steeper slopes the germination and establishment of the prescribed species is anticipated to be less than that of more moderate slopes, which is acceptable, in view of the objective to provide competing vegetation to reduce expansion of cheatgrass into new areas.

Channel Treatments: No treatements within the fire. See decription below for treatments at road crossing.

Roads and Trail Treatments:

CDOT will be mitigating potential flood effects the the Gutshall crossing beneath Hwy 145 by doing heavy maintenance within the next several weeks. This includes removal of brush and small trees within the floodway both above and below the crossing. Cleaning material from the large culvert in order to recover capacity and rework the channel below the crossing to improvement floodwater and debris flow passage efficiency. These actions are located on BLM lands and are being funded by the State of Colorado.

Protection/Safety Treatments:

Department of Transportation has been involved in the development of actions necessary to safeguard Hwy 145 and provide for public safety. Coordination with the County Sheriff's Office is resulting in LED warning signage being located on either side of the affected area that can be programed to warn travelers and even adjust highway speeds in rapid fashion based upon storm watches issued by the National Weather Service and transmitted to the County Emergency Coordinator.

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.)

Photopoints have been established within the fire to evaluate response to seeding treatments. In addition it would be desireable to establish several permanent channel cross section surveys in 1st or 2nd order drainages in order to judge reponse to fire disturbance. This would not be a BAER related action. All post fire and post treatment monitoring will occur within the course of other work. No additional funds are requested for monitoring at this time.

J. References

Johnston, Barry C. 2007. Report on Conditions of Selected Wildfires in the Western Uncompahgre Plateau and Surrounding Areas. (draft)

Johnson, M., L.J. Rew, B.D. Maxwell, and S. Sutherland. 2006. The Role of Wildfire in the Establishment and Range Expansion of Nonnative Plant Species into Natural Areas. Bozeman, MT: Montana State University Center for Invasive Plant Management.

Napper, Carolyn 2006. Burned Area Emergency Response Treatments Catalog

Part VI – Emergency Stabilization Treatments and Source of Funds **Interim #**

			NFS Lands				Other Lands			All
		Unit	# of		Other	# of	Fed	# of	Non Fed	Total
Line Items	Units	Cost	Units	BAER $	$	units	$	Units	$	$
A. Land Treatments										
Seed	acres	$60	834	$50,040	$0	23	$1,380		$0	$51,420
Aerial Application	acres	$16	834	$13,344	$0	23	$368		$0	$13,712
Contract Prep/Admin	days	300	10	$3,000	$0		$0		$0	$3,000
Insert new items above this line!				$0	$0		$0		$0	$0
Subtotal Land Treatments				$66,384	$0		$1,748		$0	$68,132
B. Channel Treatments										
Brush cleaning	feet	2.5		$0	$0		$0	400	$1,000	$1,000
				$0	$0		$0		$0	$0
				$0	$0		$0		$0	$0
Insert new items above this line!				$0	$0		$0		$0	$0
Subtotal Channel Treat.				$0	$0		$0		$1,000	$1,000
C. Road and Trails										
Culvert Clean-out	each	2500		$0	$0		$0	1	$2,500	$2,500
				$0	$0		$0		$0	$0
				$0	$0		$0		$0	$0
Insert new items above this line!				$0	$0		$0		$0	$0
Subtotal Road & Trails				$0	$0		$0		$2,500	$2,500
D. Protection/Safety										
LED Signs	each	500		$0	$0		$0	2	$1,000	$1,000
				$0	$0		$0		$0	$0
				$0	$0		$0		$0	$0
Insert new items above this line!				$0	$0		$0		$0	$0
Subtotal Structures				$0	$0		$0		$1,000	$1,000
E. BAER Evaluation										
Salary				$13,164			$0		$0	$0
Insert new items above this line!				---	$0		$0		$0	$0
Subtotal Evaluation				$13,164	$0		$0		$0	$0
F. Monitoring										
				$0	$0		$0		$0	$0
Insert new items above this line!				$0	$0		$0		$0	$0
Subtotal Monitoring				$0	$0		$0		$0	$0
G. Totals				$66,384	$0		**$1,748**		**$4,500**	**$72,632**
Previously approved										

PART VII - APPROVALS

1. /s/ Sherry Hazelhurst (for) June 16, 2010
   Forest Supervisor (signature) Date

2. /s/ R. E. Vann (for) June 18, 2010
   Regional Forester (signature) Date