USDA-FOREST SERVICE FS-2500-8 (7/00)
Date of Report: 7-8-02

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: Hensel Fire
B. Fire Number: Wy-Mb1F-062

C. State: Wy
D. County: Converse and Albany counties

E. Region: 2
F. Forest: Medicine Bow N.F.

G. District: Douglas Ranger District
H. Date Fire Started: June 7, 2002
I. Date Fire Contained: Estimated 7/8/02
J. Suppression Cost: $6,500,000 as of 7/8/02
K. Fire Suppression Damages Repaired with Suppression Funds
1. Fireline waterbarred (miles): 26 miles
2. Fireline seeded (miles): 0 miles
3. Other (identify):

L. Watershed Number: 101800080802, 101800081001, 101800080801 (minor), 101800080803 (minor)
M. Total Acres Burned: 14,630 acres (based on GIS perimeter. Acreage totals may vary due to different GIS layers and clipping)
NFS Acres (12569) Other Federal (0) State (669) Private (1392)

N. Vegetation Types: Ponderosa Pine woodlands are the dominant vegetation community within the fire area. Tree density and understory composition and cover vary with aspect and slope. Common understory plants include Ross sedge, elk sedge, bearberry, bitterbrush, and ribes. Stands dominated by lodgepole pine grow on the north slopes of Laramie Peak. At the highest elevations subalpine fir and limber pine are the dominant conifers. The lower elevations have patches dominated by bitterbrush shrubland and various grasses. There are also small stands of aspen that grow primarily in draws and along streams in the larger drainages. Stream valleys are relatively narrow and are dominated by three general community types: Shrub stands of willow, box elder, poplar, and water birch often with Ponderosa pine overstories and grass/sedge understories; turf of grasses and sedges in flatter areas and associated with beaver dams; and aspen stands.

O. Dominant Soils: Soils are primarily forming in granitic parent materials. Soils under ponderosa pine woodlands tend to have thick dark coarse textured surface horizons, with high percentage of gravels and cobbles. Soil maps indicate that rock outcrop makes up 20-30% of the area and the remaining soils are often characterized by extreme stoniness or cobbles. Field observations are that rock outcrop may be 40-50% of some ridgetop areas. Up to nearly half of the Ponderosa Pine forest areas may have more developed subsoils with clay enrichment and finer textured surfaces. These soils also commonly have 35-65% rock content. Soils

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in the stream valleys are thick, fine to medium-textured, and have little rock. Erosion hazard ratings are severe (62%) and moderate (35%) for most of the burn area. The two dominant soil types include Catherdral Family (loamy-skeletal, mixed, lithic Haploborolls) and Typic Eutroboralfs.

P. Geologic Types: The North Laramie Range consists of ancient granite rock thrust through Paleozoic and Mesozoic sandstones and limestones, remnants of which can be seen along the flanks of the range and to the east of the Laramie Peak in the Glendo area. Bedrock within the fire area is primarily Precambrian granite. There are several northeast-trending dikes of mafic rock in the Ashenfelder Basin. The stream valleys have Quaternary alluvium usually deposited in a thin veneer amongst granite boulders.

Q. Miles of Stream Channels by Order or Class:
Intermittent: 28 miles Perennial: 17 miles

R. Transportation System

Trails: 26.7 miles Roads: 6.6 miles (some existing roads serve as the fire-line)

PART III - WATERSHED CONDITION

A. Burn Severity (acres)*: 7589 (low) 4848 (moderate) 2180 (high)

*Hensel fire severity class definitions:

High: 80% or more of the crowns and canopy were completely consumed. Duff and litter may have been consumed, but most often, it was a mixture of charred litter and ash, with much of the litter still recognizable. Grass crowns were 80-90% consumed and often roots were dried out, but not destroyed. Up to half of the 1000 hour fuels remain, although they are charred and burned. Hydrophobicity was related to vegetation. It appeared to be high and relatively uniform in the upper elevations under spruce/fir/pine canopy, but more medium and less uniform in the ponderosa pine areas that dominated the lower slopes.
Based on handbook direction, most of the severity indicators are more indicative of moderate or moderately high conditions, although they are more severe relative to other areas within the burn. Increased hydrophobicity and high rock content are expected to add to the increased runoff from these areas and watershed response is expected to be accelerated significantly as a result of the conditions in these areas. Areas mapped as high were 80% or more in the conditions described above.
Moderate: Approximately 40-80% of the canopy was consumed, the remainder was scorched or lightly burned and needle cast is expected to add to the effective ground cover. Duff and litter was mostly charred with less than 50% completely turned to ash. 1000 hour fuels and some fines remained on the ground and in the shrub canopy. Many of the bunchgrass root crowns were completely burned, but the roots were not. Hydrophobicity tended to be moderate and low with only a few areas of strong repellency noted. Areas mapped as moderate were often a mixture of low and high severity and included a varied mosaic, up to 10-15% of the polygon may have isolated patches of high severity burn, 30-50% moderate severity, and the remainder low. Runoff may be increased slightly due to lack of ground cover and slightly increased hydrophobic conditions.
Low: These areas areas were a mixture of low severity and unburned, with <15-20% moderate intensity patches and only very small isolated pockets of high severity burn. Runoff and erosion are not expected to be significantly increased over the unburned conditions from these areas.

B. Water-Repellent Soil (acres): 4064 (2180) 100% + 4848 (50%)

C. Soil Erosion Hazard Rating (acres):
513 (low) 5115 (moderate) 8984 (high)

D. Erosion Potential: 1.2 tons/acre/yr (approx 8 times background rates), up to 5.3 t/a/yr on high intensity burn areas)

E. Sediment Potential: 207 cubic yards / square mile

PART IV - HYDROLOGIC DESIGN FACTORS*

A. Estimated Vegetative Recovery Period, (years): 2-3 yrs

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

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

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

E. Design Storm Magnitude, (inches): 1.7 inches

F. Design Flow, (cubic feet / second/ square mile): 54 cfs/mi^2

G. Estimated Reduction in Infiltration, (percent): 20-50 %

H. Adjusted Design Flow, (cfs per square mile): 66.3 cfs/mi^2

*The attached hydrology specialist report in Appendix A provides specific information by watershed.

PART V - SUMMARY OF ANALYSIS

A. Describe Watershed Emergency:

The Hensel fire burned primarily in the Roaring Fork and Cottonwood Creek sixth level watersheds with a small portion in the Horseshoe Creek sixth level watershed. Sparked by lightning in early June, the fire appeared to be a primarily wind driven event, resulting in mixed intensity and fire duration leading to a highly varied mosaic of burn severities. For much of the burn area, the fire burned rapidly through the crowns, sometimes completely consuming the canopy, however often more than half of the 1000 hour downed fuels and duff and litter were charred rather than consumed, even in the more intensely burned portions. Riparian areas were largely unburned or burned at low intensity except for isolated short stream reaches of high severity.

Management activities and infrastructure are minimal within the fire perimeter. The Black Mountain road which accesses the Black Mountain lookout is the primary road within the fire. Forest Plan management prescriptions within the fire perimeter include nonmotorized recreation, wildlife emphasis, and a Special Interest Area in the Ashenfelder basin. Downstream uses of water are primarily ditch diversions for agricultural irrigation.

Emergency concerns following the Hensel fire include invasion by noxious weeds, and the effects of the Black Mountain Road on runoff processes and downhill/downstream effects on the Harris Park private lands and the Boy Scout camp.

Threats to ecosytem integrity and long-term soil productivity: Based on recent experience with nearby fires, invasive weeds are expected to expand into disturbed sites in the burn area, specifically along roads, trails, and other disturbed areas. There are known populations of Dalmation Toadflax and Hounds-tongue adjacent to the burn area. Field reconnaissance found individual Canada thistle plants within the burned area. In addition non-local weed seed may have been brought into the burn area on equipment used during the fire; some of the equipment came from areas known to have extensive weed problems.

Monitoring following the 1996 Murphy Ridge fire, approximately 5 miles south of the Hensel fire and in similar topography and vegetation type, found an extensive invasion of Canada thistle as a result of the burn. . Vegetation specialists evaluating the effects of the Murphy Ridge fire, felt that some seed source had been in the soil, but had been suppressed by healthy native vegetation and after the fire occurred, weeds were able to get the upper hand and spread rapidly and aggressively.

Assessment of the Hensel fire area indicates that conditions are similar and that weed infestation as a result of the fire is highly probable and nearly certain, especially in disturbed areas along trail and road corridors (where seed sources are likely to exist or have been introduced) and areas of moderate and high intensity burn (where changes in soil conditions are favorable to weed germination and spread).

For these reasons seeding in high risk areas to reduce the spread of noxious weeds, and subsequent monitoring of noxious weeds in both the seeded and unseeded areas is proposed. If monitoring reveals areas of extensive weed invasion, additional funding may be applied for through interim reports to help control weed populations and promote revegetation by natural species that will provide ground cover to help stabilize the soil, reduce the hydrophobicity, and reduce erosion and loss of soil productivity.

Threats to property: The Black Mountain Road accesses the Black Mountain lookout above the Harris Park subdivision area. It is the primary access into the fire area and the lookout, which is staffed during the summer. The road is a value at risk as well as a source of sediment and concentrated water flow. This road affects hydrologic processes by intercepting dispersed surface and subsurface flow which becomes concentrated on the road prism. Runoff and sediment transport following summer thunderstorms is expected to significantly increase following the Hensel fire. The Black Mountain Road will further exacerbate the effects of the fire by concentrating surface flow and sediment. Delivery of the concentrated flows and sediment to the ephemeral channels will promote downcutting and gullying of the ephemeral draws and intermittent drainages which this road crosses. To ensure the road remains passable and does not cause harm to downstream values and property, treatments are proposed to minimize the concentration of water and transport of sediment to the Harris Park subdivison and Boy Scout camp which lie in the drainage area affected by this road. Treatments focus on ensuring proper function of existing drainage structures, installation of additional drainage structures, hardening of drainage structure outlets, and energy dissipaters, which will also act to trap sediment. Storm patrol of this road after thunderstorms is recommended for one to two years following the fire.

Threats to safety and water quality: Forest Service Road 633 will be affected by the fire in the vicinity north of Harris Park. Following the fire, runoff and sediment transport will increase for several years down the ephemeral drainages in this area. This is of particular concern in the headwaters of Soldier Creek in the South Horseshoe watershed which had one of the highest burn severities in the fire. Observations on 7/4/02 south of Harris Park showed some sediment transport in the ephemerals following a light rainstorm (4-6" ash, soil, litter had been transported and deposited near 2 culverts). The existing culverts should be cleaned prior to summer rainstorms and will need to be cleaned after each rainstorm over the next two summers. Rolling dips should be installed adjacent to these culverts to ensure that if a culvert plugs and fails, that stormwater will cross the road and continue down the drainage rather than run down the road, resulting in resource and road damage. This would minimize sedimentation to the stream system and help to prevent major road failures.

B. Emergency Treatment Objectives:

- Promote re-establishment of native plant communities to prevent the invasion of noxious weeds as a result of the fire through seeding in high risk areas
- Monitor seeded areas and other high risk areas for the spread of noxious weeds and treat if monitoring warrants
- Minimize effects of the Black Mountain Road on downslope properties by providing the necessary drainage to accommodate increased stormflow and sediment, and providing energy dissipators and sediment filters to minimize gullying and erosion downslope of the road
- Reduce effects to water quality and safety on FSR 633 resulting from culvert failure

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

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

D. Probability of Treatment Success

	Years after Treatment		
	1	3	5
Land	75%	80%	90%
Channel			
Roads	80%	90%	90%
Other			

E. Cost of No-Action (Including Loss):$2,899,200
F. Cost of Selected Alternative (Including Loss):$72,500
G. Skills Represented on Burned-Area Survey Team:

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

Team Leader:Liz Schnackenberg assisted by Lisa Bryant

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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:

Seeding: Hand seed 100 acres of high risk burned areas. These are primarily along roads and trails, and in areas adjacent to known weed populations. Seed mix will reflect native species found in the area. Seed rate will be 20 pounds of live seed/acre.

Species	**Percent of mix**
Slender wheatgrass	30%
Idaho fescue	15.2%
Bluebunch wheatgrass	20%
Mountain brome	24%
Big bluegrass	10.2%
Yarrow, white	0.2%
Rose, wild	0.2%
Penstemon, Rocky Mtn	0.2%

Channel Treatments:
None

Roads and Trail Treatments:

- Improve existing drainage on the Black Mountain road to reduce the extended channel network and concentration of increased stormflow. This will be done by cleaning existing drainage structures to ensure they are functioning properly, and replacing culverts which are currently plugged or crushed with rolling dips.
- Add additional drainage structures to the Black Mountain road to reduce the extended channel network and amount of concentrated flow.
- Harden the outlet of existing drainage structures on the primary road within the burn area to prevent headcutting into the road, and development of a gully downstream of the road. This will be done using rock 'aprons' with rock found on site.
- Place sediment traps/energy dissipators at the outlet of drainage structures on the Black Mountain road to trap sediment and reduce the energy of water concentrated by the road. This will be done using native materials such as trees with live crowns that have a high roughness factor for trapping sediment and dissipating energy.
- Add rolling dips adjacent to culverts that may not be able to accommodate the increase in stormflow and sediment load following the fire. The rolling dips will ensure that any water unable to go through the culvert due to either volume or plugging by debris will remain in the stream channel rather than flowing down the road.

Structures:
No Forest Service structures were identified as at risk within the fire area other than road culverts.

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 weed monitoring: Based on experience from the Murphy Ridge fire in 1996, noxious weeds are likely to expand in the burned area. Monitoring of areas seeded or areas with high potential for noxious weeds will be initiated in June 2003. Monitoring will include field observations and photo points. GPS technology will be used to document weed infestation locations and the data entered into the GIS system for tracking. If monitoring reveals noxious weed infestation, a treatment plan will be developed and an interim 2500-8 report filed to request additional fund for treatment of weeds. All treatments will follow protocols and guidelines established in the Medicine Bow-Routt National Forests Weed Environmental Assessment. Monitoring will focus on high risk areas including those adjacent to known populations, as well as a helispot located within the fire perimeter. Monitoring will also include seeded areas to measure effectiveness of seeding at reducing infestation. At the end of each season a monitoring report will be sent in with the interim 2500-8 report, with results of the prior season's work.

Road treatments: Monitoring of the implementation and effectiveness of these erosion control measures would allow the district to adjust treatments to protect structures and soil and water resources downstream. The monitoring would include photo points, measurement of soil deposited behind woody debris, soil movement, and rill and gully formation. These measurements would be correlated to rainfall events. This monitoring would occur after each significant rainstorm for the next three years (five rain events per season were used in the cost estimate). Any significant findings will be reported at the end of each season with the annual interim 2500-8 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	$	Units	$	$
A. Land Treatments										
Hand seeding	ac	$100	100	$10,000			$0		$0	$10,000
Contract administration	days	$250	10	$2,500			$0			$2,500
				$0			$0		$0	$0
				$0			$0		$0	$0
Subtotal Land Treatments				$12,500			$0		$0	$12,500
B. Channel Treatments										
				$0			$0		$0	$0
				$0			$0		$0	$0
Subtotal Channel Treat.				$0			$0		$0	$0
C. Road and Trails										
Drainage cleaning	each	$100	25	$2,500			$0		$0	$2,500
Additional drainage	each	$350	25	$8,750			$0		$0	$8,750
Replace culverts	each	$750	3	$2,250			$0		$0	$2,250
Harden dip outlets	each	$200	25	$5,000						$5,000
Energy dissipators	each	$100	45	$4,500			$0		$0	$4,500
Storm patrol	each	$1,000	5	$5,000			$0		$0	$5,000
Subtotal Road & Trails				$28,000			$0		$0	$28,000
D. Structures										
Info letters to residents	each	750	2	$1,500			$0		$0	$1,500
				$0			$0		$0	$0
Subtotal Structures				$1,500			$0		$0	$1,500
E. BAER Evaluation										
Salary				$13,500			$0		$0	$13,500
Per diem				$1,300			$0		$0	$1,300
RSAC imagery				$700						$700
F. Monitoring:weeds	days	250	12	$3,000			$0		$0	$3,000
Road treatments	each	1000	5	$5,000						$5,000
G. Totals				**$65,500**			**$0**		**$0**	**$65,500**

PART VII - APPROVALS

1. */s/ Mary H. Peterson* — 7-10-02
   Forest Supervisor (signature) — Date

2. */s/Margo Lamphere (for)* — 7/10/02
   Rick D. Cables — Date
   Regional Forester (signature)

APPENDIX A: Hydrology Specialist Report

Hensel Fire – Baer Team

Hydrology Specialist Report

Carol Purchase
Hydrologist
Medicine Bow – Routt National Forest

July 3, 2002

The Hensel Fire covers portions of 3 watersheds; the Roaring Fork of Horseshoe Creek, the headwaters of Soldier Creek and a portion of Cottonwood Creek including Falls Creek.

Table 1. Percent of Watershed by Burn Intensity

Watershed	% High	% Moderate	% Low	% Unburned
Roaring Fork	7.0	20.6	17.2	55.2
Cottonwood Creek	2.7	3.9	17.9	75.5
Soldier Creek (S.Fk. Horseshoe Cr)	9.7	0.9	5.7	83.8
Horseshoe Cr.	0	<1% of total	<4% of total	

Less than five percent of the Horseshoe Creek sixth level watershed was directly affected by the fire. Of the area burned, approximately 140 acres were of moderate intensity, and 600 acres were mapped as low intensity. Due to the fact that most of the area burned was of low intensity and that it comprises such a small portion of the watershed, Horseshoe Creek was not considered to have been significantly affected by the fire.

Roaring Fork has the greatest percentage burned, with a little under half of the watershed within the fire. The watersheds of Ashenfelter and Saltlick, tributaries of Roaring Fork were completely within the fire. Ashenfelder was burned most intensely, as the fire burned hot in the upper watershed and with a moderate burn along the rest of the stream. Saltlick Creek has a cooler burn with less intense burns throughout it's watershed.

Headwaters of these streams are rocky ephemeral stream channels, which flow down into intermittent and perennial streams. Generally the perennial, low gradient stream reaches have beaver dams, adjacent wetlands, frequent large woody debris, and well developed riparian areas vegetated with willow and other riparian shrubs.

Downstream of the fire, Roaring Fork and Horseshoe Creek are moderate gradient (2-4%) large cobble - small boulder dominated stream channels. The main stem of Cottonwood Creek is a low gradient, gravel bed stream meandering through a wide valley bottom used as rangeland. This creek has good riparian brush through most of the reach, but has downcut several feet due to grazing, road crossings and other disturbances on Private land.

In the high intensity burn portions of the fire, the steeper headwater areas often burned up to the stream channel. Generally, low gradient stream reaches did not burn as hot. Green riparian brush and wet meadows were observed during an aerial survey of the fire on June 30. Even in the hotter burn areas, the riparian shrubs and grass are expected to recover quickly as most areas did not burn hot enough to kill the root systems.

Peak streamflows will increase for several years. Streamflows are predicted to increase from 7% to 23%. The Roaring Fork will have the greatest increase in streamflow as more of this watershed was burned. These increases in stormflows will decrease within a few years as the grass and shrubs recover, reducing the hydrophobic character of the soils to pre-fire conditions.

Table 2. Predicted Increases in Peak Flows from a 10 year Storm Event

Watershed	Pre-fire Peak Flows (cfs)	Post Fire Peak Flows (cfs)	Percent Increase

Roaring Fork	1590	1961	23
Cottonwood Creek	285	332	17
Soldier Creek	1664	1775	7

Due to the increased runoff, primarily from hydrophobic soils, peak flows and sediment are expected to increase over the next several years. Peakflows are predicted to increase from 7% to 23% in response to a 10 year, 6 hour rainstorm. The Roaring Fork will have the greatest increase in flows and sedimentation due to the higher percentage of the watershed within the fire. As the grass and shrubs recover, most of the fire effects will diminish within two years. The first substantial rainstorm will result in a flux of ash and fine sediment through the stream channels down into the lower gradient stream reaches downstream of the fire. This sediment will be deposited in the floodplains during large storms, expanding riparian areas and aquatic habitat. It is expected that fine sediment deposition in the stream channel will increase over the next several years and then decline to pre-fire conditions.

Threats to Human Life and Property

The greatest threat to human life and property are related to the effects of increased runoff and soil erosion on roads and road crossings. An additional threat is to foot bridges and cabins located near the creeks which drain the fire area.

Black Mountain Road is a 4wd road which switchbacks up Black Mt. and is the access route for the Fire Lookout and several trailheads. Much of this road goes through high and moderate burn intensities. The increased runoff and soil erosion associated resulting from the fire will be exacerbated by the road concentrating stormflow runoff. There is a substantial risk that if additional drainage structures, flow dissipation and erosion control measures are not implemented, serious resource damage, such as gully systems will develop. There is also the risk that the concentrated runoff and erosion will damage the Boy Scout Camp, cabins and spring water systems that are located downslope of the road.

The roads which travel around the fire on the east side have increased risk of culvert failure due to plugging of culverts from the expected increase in peak flows and sediment load. The greatest risk is to the culvert where Falls Creek crosses Albany County Road 71. This culvert should be replaced with a larger culvert with flared inlet. As well, the eroding road cutslope adjacent to the creek should be stabilized to decrease risk of failure due to plugging of the culvert from excessive sedimentation.

Smaller culverts along both County Road 71 and National Forest System Road (NFSR) 633 (Esterbrook Road) are also at risk of plugging.

A large storm event, such as a 10 year or 25 year rainstorm in the next 2 years would pose an increased risk to cabins and footbridges located near stream channels due to the increase in peak flows expected from the fire. This is especially true of the cabins along the Roaring Fork of Horseshoe Creek. The cabin and footbridge just upstream of the confluence of Roaring Fork and Horseshoe Creek are the structures most at risk. Cabins along the headwaters of Soldier Creek above NFSR 633 may also be at risk from increased flows.

A bridge on NFSR 633 crosses Horseshoe Creek several miles below the fire boundary. This bridge appears to be sized large enough to allow large floods and so is not considered to be at risk. Similarly, where Cottonwood Creek crosses County Road 71, the culvert is sized large enough to pass large flows and so is not at risk.

Recommended Treatments

Black Mountain Road (NFSR 667)

The steep, rocky, 4 wheel drive road winds up to the Black Mountain Lookout. The road has approximately 25 rolling dips (waterbars) and three small culverts (18”) in ephemeral draws near the top of the mountain. The culverts are partially plugged, two being effectively non-functional. These culverts are extremely difficult if not impossible to clean, and should be replaced with rolling dips. The existing rolling dips are functional, but likely

need frequent maintenance even under pre-fire conditions. The fire will significantly increase runoff and sediment movement for the next several years. Maintenance of existing drainage features and construction of additional drainage is needed accommodate the additional flow and sediment predicted as a result of the fire. The additional drainage features will reduce soil erosion and watershed impacts, prevent road failure and decrease the risk to the Boy Scout Camp and private cabins downslope from the road. Placing rock flow dissipaters at dip outlets where needed, in addition to placing woody debris below the dips will further reduce soil erosion and the risk to structures and watershed resources from this road.

To ensure the road does not cause harm to downstream values and property, this road will need cleaning of dips and possibly replacement or augmentation of woody debris below dips after each rainstorm. Storm patrol of this road would need to continue for two to three years after the fire.

Monitoring of the implementation and effectiveness of these erosion control measures would allow the district to adjust treatments to protect structures and soil and water resources downstream. The monitoring would include photo points, measurement of soil deposited behind woody debris, soil movement, and rill and gully formation. These measurements would be correlated to rainfall events. This monitoring would occur after each significant rainstorm for the next three years (five rain events per season were used in the cost estimate).

Cost:

Treatments	Number	Unit Cost	Treatment Years	Total Cost
Clean existing rolling dips	25	100	Yr 1	2,500
Install new rolling dips	20	350	Yr 1	7,000
Replace culverts with rolling dips	3	750	Yr 1	2,250
Place debris below dips on road	45	100	Yr 1	4,500
Rock flow dissipators	25	200	Yr 1	5,000
Storm Patrol	5 patrols per season	2000	Yr 1-3	30,000
Implementation and Effectiveness Monitoring	5 storm events	1,000	Yr 1-3	15,000

Esterbrook Road (NFSR 633)

This road will be affected by the fire in the vicinity of Harris Park. The fire will increase runoff and sediment transport for several years down the ephemeral drainages in this area. The existing culverts should be cleaned prior to summer rainstorms and will need to be cleaned after each rainstorm over the next two summers. Rolling dips should be installed just downslope from these culverts to ensure that if a culvert is plugged that the water will cross the road rather than run down the road, resulting in erosion, resource and road damage.

Cost: $ 1500 for 5 rolling dips at 300 per dip.

Recommendations:

Cottonwood Park Road (Albany County Road 71)

Runoff and sediment from the Falls Creek drainage and from several tributaries of Cottonwood Creek may affect stream crossings along this Albany County road. The Falls Creek road crossing is at significant risk of failure in the event of a large rainstorm. This culvert is currently undersized for the drainage and peak flows are expected to increase significantly for Falls Creek due to the large amount high intensity fire in the drainage. Currently a 4-foot (inside diameter) concrete pipe is located at this stream crossing. A large amount of sediment is contributed to the crossing by a eroding cutslope just adjacent to the stream crossing. This

sediment already partially blocks the drainage. With the additional pulse of sediment and higher flows expected after the fire, this culvert structure is at risk of failing. A larger galvanized culvert, with inlet with flare could be installed which would increase capacity significantly. The eroding cutslope should also be stabilized to reduce sedimentation of Falls Creek and to reduce problems with this drainage structure.

The other small stream crossings along this road will plug up more frequently after rainstorms for the next several years and so will need maintenance after each storm to keep them functional.

Send Informational Letters to Residents Downstream of the Fire.

Higher peak flows and sediment loads on the creeks draining the fire area will occur for several years. As this risk is only in the event of a large rainstorm, and as no practical methods exist to reduce peak flows, information to the potential affected landowners is the recommended response. Residents should be informed that they should be aware of the risk of higher flows, sedimentation of the river channel and possibly increased bank erosion. The residents along Roaring Fork and Horseshoe Creek just below the forest boundary are the most likely to be affected. Fords, foot bridges and cabins near the stream channels may be at risk in the event of a large rainstorm. Also cabins along the small drainages north of Harris Park in section 3 will see increased flow due to the more intense burn in that area. The cost estimate includes locating the addresses for all of the residents and writing the informational letter.

Cost: $750

Work with the NRCS and Conservation Districts to Inform Downstream Water Users of Effects of the Fire.

Irrigators and other water users along Horseshoe Creek, and to a lesser extent, Soldier and Cottonwood Creek will see increased sedimentation of ditches and other diversion structures. More frequent cleaning of ditches, intake structures and headgates may be necessary for several years. The NRCS would be the best avenue for informing these water users. Costs include the personnel time to work with the NRCS and local Conservation Districts to get the information out to all of the downstream water users.

Cost: $750

Peak Flow Calculations - **Hensel Fire - BAER Report July 3, 2002**

by Carol Purchase, Medicine Bow - Routt NF

Rational Method:

Q=CIA

Q Peak Flow (cfs)
C Runoff Coefficient
I Rainfall Intensity (in/hr)
A Drainage Area (acres)

Duration of Design Storm:

Time of Concentration = tc=L^1.15/(7700 H^0.38)

L Length of longest stream in watershed
H Elevation difference between high and low point of watershed

Time of Concentration Calculation

Watershed	High Point	Low Point	H	L	Tc
Roaring Fork of Hellroaring Creek	6040	9920	3880	58000	1.69
Falls Creek	5900	7040	1140	15000	0.57
Soldier Creek	5500	7100	1600	24000	0.86
Cottonwood Creek	5900	10200	4300	56000	1.56

Note: Elevations from usgs 1:24,000 topo maps, stream length measured by using a map wheel on 1:24:000 topo maps

6 Hour design storm was used as it is the lowest duration design storm with precipitation data available.

Precipitation Frequency from the NOAA atlas located at:
http://www.wrcc.dri.edu/pcpnfreq/wy10y6.gif

Watershed Condition

	Total Acres	High	Mod	Low
Roaring Fork	18930	1323	3908	3253
Soldier Creek	3394	328	30	192
Cottonwood Creek	19811	529	771	3545

Percent Burned	% High	% Mod	% Low	% Unburned
Roaring Fork	7.0	20.6	17.2	55.2
Soldier Creek	9.7	0.9	5.7	83.8
Cottonwood Creek	2.7	3.9	17.9	75.5

Peak Flow Calculation 10 year 6 Hour Storm Event

Design storm = 1.7 inches over 6 hours: .28 inch/hr

Hensel Fire BAER Report

Pre-Fire Conditions

Watershed	Runoff Coef.	Area (acres)		Peak Flow
Roaring Fork	0.3	18930	0.28	1590
Soldier Creek	0.3	3394	0.28	285
Cottonwood Creek	0.3	19811	0.28	1664

Post Fire Conditions:	Runoff Coefficient:
High Intensity Burn - 100% strongly hydrophobic soils	0.8
Moderate Intensity Burn - 50% moderately hydrophobic soils	0.5
Low Intensity or Unburned	0.3

Runoff Coefficient Weighted Average Calculation

Watershed	% High Int	% Mod int	% low or unburned	Weighted Average
Roaring Fork	6.99	20.64	72.37	0.38
Soldier Creek	9.66	0.88	89.45	0.35
Cottonwood Creek	2.67	3.89	93.44	0.32

Post Fire Peak Flows

Watershed	Runoff Coefficient	.	Area	I	Peak Flow
Roaring Fork	0.37		18930	0.28	1961
Soldier Creek	0.35		3394	0.28	333
Cottonwood Creek	0.32		19811	0.28	1775

Formulas and runoff coefficients from Dunne and Leopold (1978). Watershed area calculated from watersheds delineated in the N.F. GIS system. Burned areas were measured from a paper map by hand planimetry.

Form 2500-8 Hydrologist Design Factors

B. Design Chance of Success – 75- 80%
C. Design Recurrence Interval – 10 year
D. Design Storm Duration – 6 hour
E. Design Storm Magnitude – 1.7 inches
F. Design Flow:

Watershed	Pre-fire Peak Flows (cfs)
Roaring Fork	1590
Cottonwood Creek	285
Soldier Creek	1664

G. Estimated Reduction in Infiltration: 20 – 50 %

H. Adjusted Design Flow:

Watershed	Post Fire Peak Flows (cfs)
Roaring Fork	1961
Cottonwood Creek	332
Soldier Creek	1775

APPENDIX B: Soils Specialist Report

Soils Report – Hensel Fire
July, 2001
Jim Barott and Lisa Bryant
Douglas RD, Medicine Bow Routt NF

Soil Resource Condition Assessment:

A. Initial Concerns:

Prior to conducting the BAER assessment, the following potential concerns were identified: potential threat to human life and property on structures (homes, bridges, roads, diversion structures, etc…) downstream of burned areas, degradation of water quality and fish & amphibian (leopard frog) habitat, degradation of Preble's jumping mouse habitat, weed invasion (based on recent experience from a nearby fire), loss of soil productivity due to accelerated erosion, a potential safety hazard due to a newly exposed mine adit.

B. Findings of the Ground Survey:

Access to the fire area was limited. Burn intensity mapping was accomplished via helicopter, use of remote sensed imagery and ground verification in locations accessible by road. The team also noted that while the perimeter was considered secure, a significant portion of the interior was continuing to burn. Burn severity and affected acres within the interior are likely to change somewhat until the fire is extinguished by rain or snow.

The fire appeared to be a primarily wind driven event, resulting in mixed intensity and fire duration leading to a highly varied mosaic of burn severities. For much of the burn area, the fire burned rapidly through the crowns, sometimes completely consuming the canopy, however often more than half of the 1000 hour downed fuels and duff and litter were charred rather than consumed, even in the more intensely burned portions. Using definitions from FSH 2509.13 and refining them for the survey area based on observations and local knowledge three classes of burn severity were developed and are defined as follows:

High: 80% or more of the crowns and canopy were completely consumed. Duff and litter may have been consumed, but most often, it was a mixture of charred litter and ash, with much of the litter still recognizable. Grass crowns were 80-90% consumed and often roots were dried out, but not destroyed. Up to half of the 1000-hour fuels remain, although they are charred and burned. Hydrophobicity was related to vegetation. It appeared to be high and relatively uniform in the upper elevations under spruce/fir/pine canopy, but more medium and less uniform in the ponderosa pine areas that dominated the lower slopes.

Based on handbook direction, most of the severity indicators are more indicative of moderate or moderately high conditions, although they are more severe relative to other areas within the burn. Increased hydrophobicity and high rock content are expected to add to the increased runoff from these areas and watershed response is expected to be accelerated significantly as a result of the conditions in these areas. Areas mapped as high were 80% or more in the conditions described above.

Moderate: Approximately 40-80% of the canopy was consumed, the remainder was scorched or lightly burned and needle cast is expected to add to the effective ground cover. Duff and litter was mostly charred with less than 50% completely turned to ash. 1000 hour fuels and some fines remained on the ground and in the shrub canopy. Many of the bunchgrass root crowns were completely burned, but the roots were not. Hydrophobicity tended to be moderate and low with only a few areas of strong repellency noted. Areas mapped as moderate were often a mixture of low and high severity and included a varied mosaic, up to 10-15% of the polygon may have isolated patches of high severity burn, 30-50% moderate severity, and the remainder low. Runoff may be increased slightly due to lack of ground cover and slightly increased hydrophobic conditions.

Low: These areas were a mixture of low severity and unburned, with <15-20% moderate intensity patches and only very small isolated pockets of high severity burn. Runoff and erosion are not expected to be significantly increased over the unburned conditions from these areas.

The results of the field reconnaissance and burn intensity mapping shows approximately 17% of the area burned at high severity, 49% at moderate and the remainder low. The bulk of the high severity burn areas were concentrated in the headwaters of the Ashenfelder drainage. Increased acreages of water repellent soils were calculated assuming 100% of the high severity burn areas and 50% of the moderate severity burn areas had increased hydrophobicity; this was based on field observations and measurements of unburned and burned soils.

Additional Information:

Dominant Soils: Soils are primarily forming in granitic parent materials. Soils under ponderosa pine woodlands tend to have thick dark coarse textured surface horizons, with high percentage of gravels and cobbles. Rock outcrop makes up 15-30% of the area and the remaining soils are often characterized by extreme stoniness or cobbles. Much of the Ponderosa Pine forests are growing on soils with greater development, clay enriched subsoils, and finer textured surfaces. These soils also commonly have 35-65% rock content. Soils in the stream valleys are thick, fine to medium-textured, and have little rock. The two dominant soil types include Cathedral Family (loamy-skeletal, mixed, lithic Haploborolls) and Typic Eutroboralfs.

Approximately 35% of the soils are rated as having a moderate erosion hazard, 62% are rated as severe erosion hazard, and the remaining 3% are considered low. The high rock content of the soils, coarse textures, low cohesion (granitics), and high rock outcrop in the surrounding area, coupled with steep slopes contribute to the erosion potential in this area.

There appears to be a low to moderate level of hydrophobicity in some of the forested soils, although it is more pronounced and uniform under the subalpine fir than the ponderosa pine. For the purposes of this assessment calculations and estimates of reduction in infiltration were considered relative to the background levels, in other words, we looked at increased hydrophobicity above background levels.

The universal soil loss equation was used to estimate erosion in tons per acre. Prior to the burn estimates of erosion are well within the 1 Ton/acre/year soil loss tolerance for forested soils, a weighted average soil loss for the affected area was estimated at .14 t/a/yr. After the fire, considering loss of soil cover, increased hydrophobicity, and acres burned at various severities, erosion is estimated to be 8 times the background levels (1.2 t/a/yr); within the high intensity burn areas it is likely to be over 30 times background levels (5.2 t/a/yr), at least in the first year and then gradually approaching background levels as vegetation recovers.

The delivery coefficient for eroded materials was assumed to be about 30%, which is fairly typical of these types of soils and watersheds. Based on that assumption, sediment potential was estimated to be approximately 207 yd^3/mi^2 post burn. Due to the concentration of high severity burn within the Ashenfelder & Soldier drainages, there will likely be higher erosion and sedimentation rates there than elsewhere in the fire, where burn severities had a more mixed pattern.

Loss of soil productivity was identified as a potential value at risk. Areas of high erosion are likely to be localized in the steeper portions of the upper watersheds. Given the rocky nature of the soils, poor access, and mixed burn intensities, although various slope treatments were considered, none are being recommended as feasible. The best strategy for recovery is to encourage rapid recovery of vegetation. One factor that occurs in the area that might affect rapid vegetation recovery is grazing. It is recommended that grazing cease within the burn area for the remainder of this season and that it be delayed in the following growing season until after seed set and shatter. Areas of highest hydrophobicity were most often associated with steep rocky areas that are not suitable for grazing and so cattle were not considered as a surface scarification treatment.

Vegetation Types: Ponderosa Pine woodlands are the dominant vegetation community within the fire area. Tree density and understory composition and cover vary with aspect and slope. Common understory plants include Ross sedge, elk sedge, bearberry, bitterbrush, and ribes. Stands dominated by lodge pole pine grow on the north slopes of Laramie Peak. At the highest elevations sub alpine fir and limber pine are the dominant conifers. The lower elevations have patches dominated by bitterbrush shrubland and various grasses. There are also small stands of aspen that grow primarily in draws and along streams in the larger drainages. Stream valleys are relatively narrow and are dominated by three general community types: Shrub stands of willow, box elder, poplar, and water birch often with Ponderosa pine overstories and grass/sedge understories; turf of grasses and sedges in flatter areas and associated with beaver dams; aspen stands.

Geologic Types: The North Laramie Range consists of ancient granite rock thrust through Paleozoic and Mesozoic sandstones and limestones, remnants of which can be seen along the flanks of the range and to the east of the Laramie Peak in the Glendo area. Bedrock within the fire area is primarily Precambrian granite. There are several northeast-trending dikes of mafic rock in the Ashenfelder Basin. The stream valleys have Quaternary alluvium usually deposited in a thin veneer amongst granite boulders.

General Climate: Precipitation ranges from less than 15" to more than 25" at higher elevations. Lower elevations are often somewhat dry in winter and much of the annual precipitation occurs between April and September. Above 8000 feet, winter precipitation becomes more important and more than 65% falls as snow between October and May. Prevailing winds are from the south or southeast in the spring and summer and from the west to north in the winter.

Field Observations:

6/30/02 In the vicinity of the Black Mtn Lookout and the road leading up to it:
stop 1 (near lookout): extremely bouldery and stony (approx 40% Rock Outcrop); 90% plus of the canopy is consumed; black ash/charred litter ½-1" deep over 25-30% of the soil surface; extreme hydrophobicity -- >2-5 min for penetration, > 2" deep;

compared hydrophobicity to a teeny unburned inclusion in similar vegetation types several hundred yards away and found only medium hydrophobicity at the surface and none below ¼ inch.

Vegetation consists of sub alpine fir, limber pine, a few lodge pole pine and fewer aspen. Understory seemed to be somewhat sparse with grasses and common juniper.

Team discussed burn intensity and decided that most of the soil surface indicators were moderate, although the canopy and hydrophobicity were more high or severe.

Stop 2. (farther down the Black Mtn Lookout Rd in Ponderosa Pine type)
Seems to be more moderate burn intensity, some ¼ inch fuels left on saplings, > 60% canopy burned; hydrophobicity was moderate at the surface, slight or low below ¼-1/2". Of 6 test sites in the area, 2 had stronger hydrophobicity at greater than ½ inch. 30-40% of canopy had charred needles remaining that could potentially provide cover; effective ground cover consists of 20-25% coarse frags, 5-10% burned bunchgrass crowns, and 15-25% charred litter (although it often wasn't >1/2 inch thick); 75-80% of the grass crowns seemed to be completely burned and roots heated enough to kill them.

July 1, 2002:
Point 1: Location: SE ¼ of NW ¼, Sec. 33, T. 28N. R. 71W; Just southeast of Rock Mountain, primarily in a draw. For all of the points 1a to 1h, ponderosa pine is dominant, aspen is present, especially near the draw.

Point 1a: Lower side slope, draw at the bottom, rock outcrop on the ridge. Most 1000 hour fuels are partially charred; A slight organic layer (<1/2 inch) remaining below the burned ash; Soils appear well drained; 40% stones on the surface; 20% crown cover remaining; Moderate hydrophobicity.

Point 1b: Lower on the slope than point 1a.
Most 1000 hour fuels are partially charred; Sandy loam texture at the surface; Granitic parent material; Soils appear well drained; 50-65 percent slope on the upper slopes, near the ridgeline. 5 to 25% slope on the lower slopes near the draw; Root crowns present, a few is resprouting; Moderate hydrophobicity.

Point 1c: Isolated patches of strong hydrophobicity in areas of moderate.

Point 1d Toeslope position.
Nearby is a spring at the bottom of the draw, aspen is growing near the spring; 10% crown cover; Moderate hydrophobicity.

Point 1e: Appears to have had a small rain event; Toeslope position, but higher than point 1d;
Sandy loam surface texture; Two thistle seedlings present; Low to moderate hydrophobicity.

Point 1f: Side slope.
Moderate hydrophobicity; Overall, relatively smooth slopes near the draw, more complex slopes near the ridgeline. Slope lengths are approx. 50 to 150 feet long.

Point 1g: Side slope position, higher than point 1f. 50% stones and boulders. Root crowns present. Two thistle seedlings present. A few shrubs sprouting. 25 % slope. Moderate to strong hydrophobicity.

Point 1h: Upper side slope position.
70% stones and boulders; about 50% slope; Low hydrophobicity.

Point 1i: On the ridge top, Rock Mountain.
Burn severity was less than other points, low to moderate; Hydrophobicity was low to moderate.

Point 2:
Location: SW ¼ of SE ¼, Section 9, T. 27N. R. 71W. Southwest of Harris Park.
Primarily ponderosa pine, but some aspen, especially near the draw; 2% canopy remaining, The most burned that we have seen so far; Sandy loam surface texture; Most soils appear well drained, except near the draw; 1000 hour fuels partially charred; A few areas have high burn intensities, but most areas appear moderate; Root crowns remaining; Some rock outcrops, especially on the ridge. Overall, 10% stones on the surface; Entire area within sight is burned, no unburned islands visible; Slope lengths are estimated from 50 to 150 feet long; Steeper slopes (approx. 50-65%) along the rocky ridge. About 10-25% near the draw; Slopes are relatively smooth; Moderate to strong hydrophobicity.

APPENDIX C: Vegetation and Rangeland Specialist Report

Vegetation and Rangeland Resources Report for the Hensel Fire
BAER Assessment
July 3, 2002

Noxious Weeds and Invasive Plants
Noxious weeds and invasive plants are expected to expand into the burn area, specifically along roads, trails, and other disturbed sites. The area has not been surveyed, but some weeds were seen during the field reconnaissance. There are several factors that increase the risk of infestation as well as the spread of existing weeds. Weed seed sources are adjacent to the burn area. Aggressive species such as Canada thistle and Dalmatian Toadflax occur on lands near the burn area. Non-local weed seed (such as knapweed and leafy spurge) may have been brought into the burn area on equipment used during the fire. Most of the equipment on the fire was local, but a few vehicles came from areas known to have weed infestations. Disturbed ground provides ideal habitat for weed seed and there are several sources in the burn area. There are about 4.5 miles of road, trails, and dozer line that were freshly disturbed from human and vehicle traffic during the fire. There is also one know safety zone/helispot (estimated 5 acres) in the north part of the burn area. The burn itself reduces competition from native plants and soil chemistry encourages weed seed germination. In the Murphy Ridge/Bear Head fire, we experienced the rapid expansion of existing weeds into burned areas. The Forest is requesting funds to monitor weed expansion, seed areas of high disturbance along travel ways and treat areas as necessary.

Treatment Plan
Monitor noxious weed and invasive species expansion into the burn area. This information will be GPS and entered into the GIS system. The initial monitoring will occur in mid to late June of 2003. It is important that the monitoring is thorough and that as many weed infestations as possible are detected.

In the fall of 2002 hand seed those areas of high disturbance along travel ways. This includes 2 miles of the Black Mtn. Road (48 acres), both sides of a 1.5 mile road/dozer line south of Harris Park (36 acres) and 1 mile of trail that was used for access (12 acres). These areas will be seeded with a native seed mix at a rate of 20 pounds of live seed/acre. The seed mix is:

Species	Percent of mix
Slender Wheatgrass	30%
Idaho Fescue	15.2%
Bluebunch Wheatgrass	20%
Mountain Brome	24%
Big Bluegrass	10.2%
Yarrow, white	0.2%
Penstemon, Rocky Mountain	0.2%
Rose, Wild	0.2%

Based on the initial monitoring, treat those infestations along travel ways and drainages. Then as resources allow treat those infestations in the interior of the burn area. The hard to access areas, may be treated with bio-control agents (bugs). Based on the ground cover in adjacent unburned areas, it is estimated that the burn area may have up to 200 acres of weed infestation.

Grazing will be deferred until 2003, after seed ripe on the primary grasses. The allotments will be evaluated after grazing in 2003 and the season of use will be set for 2004.

Follow up monitoring needs to be completed in the 2004 and 2005, with additional treatment for 3-5 years. Continue annual monitoring and treatment until control is achieved. In 2004, it is likely that some of the existing weed infestations will have been controlled but new infestations will occur requiring additional acres of treatment. With thorough monitoring and treatment, these should be reduced by 2005. With the initial seeding of the disturbed areas and the re-establishment of native grasses and shrubs by 2005, competition should

increase and the amount of bare ground should be reduced, helping reduce the occurrence of weed infestations.

Treatment Costs

ITEM	COST
Initial Seeding	96 acres @ $100/acre = $9600
Initial Monitoring	10 days @ $200/day = $2000
Mapping/database Mgt.	2 days @ $250/day = $500
1st Year Treatment	200 acres @ $150/acre = $30,000
Contract prep/oversight	10 days @ $250/day = $2500
1st Year Total Cost	$44,600
2nd Year Monitoring	10 days @ $200/day = $2000
Mapping/database Mgt.	2 days @ $250/day = $500
2nd Year Treatment	200 acres @ $150/day = $30,000
Contract prep/oversight	5 days @ $250/day = $1250
2nd Year Total Cost	$33,750
3rd Year Monitoring	10 days @ $200/day = $2000
Mapping/database Mgt.	2 days @ $250/day = $500
3rd Year Treatment	150 acres @ $150/day = $22,500
Contract prep/oversight	5 days @ $250/day = $1250
3rd Year Total Cost	$26,250
Total Treatment Cost	$104,600

Laramie Columbine

The Laramie Columbine is known to occupy the burn area. This columbine is only found in the Laramie Range in shady crevices of north facing granite boulders and cliffs with pockets of rich soil at 6250-8000 ft. Given the habitat that this species occupies and the fact that it evolved in Ponderosa Pine types with regular fire occurrences, the threat to the population should be low. If Dalmation Toadflax does infest the burn area, there could be an impact to the habitat. The District should include monitoring for this species, in the noxious weed monitoring.

APPENDIX D: Wildlife Specialist Report

07/03/2002

Threatened, Endangered, and Proposed Species
The Preble's Meadow Jumping Mouse is the only federally listed species affected by the fire. The jumping mouse most often occurs in moist habitats, and in particular riparian meadows where tall grass/shrubs are common. All moist, lowland locations within the historical distribution of the jumping mouse that consist of virtually continuous, dense, tall, grassy vegetation, and have an area of at least five acres are considered potential habitat for this species. Based on this habitat description, approximately 5-10% of potential Preble's habitat was burned within this fire. Trapping was conducted in 1998 and 2001 in the Cottonwood Park and Harris Park areas. Six total jumping mice have been captured with external morphological characteristic of the subspecies preblei from these trapping surveys. None of these locations were located within the burn area.

Because of the small percentage of burned riparian areas that are considered potential Preble's habitat, and the regeneration of vegetation already occurring in these areas, the only possible future threat to Preble's habitat is that of a flood event. This threat at this time is considered to be low risk. No treatment is recommended.

Sensitive Species of Concern
There is also known leopard frog habitat located along Roaring Fork Creek. There is some concern that with a big rain storm, there will be an increase in turbidity from ash and sediment running into the stream. With the large percentage of intact riparian vegetation and broken landscape, this is also considered a low risk. No treatment is recommended.

Big Game Species
Big game species within this area include mule deer, elk, and a small band of bighorn sheep. The areas where the lower fire intensity occurred will probably recover enough to provide some grazing for these species. The vegetation in the higher intensity burned areas will probably have a longer recovery time, but these areas were smaller and of less frequency in the whole burned area. The burn will provide beneficial habitat for bighorn sheep, as it opens up more areas for them to utilize. Cumulatively, the fire will promote the regeneration of vegetation, and will improve bighorn sheep habitat. It will also provide better range condition for deer and elk with the increase in grasses and forbs. No treatment recommended.

Raptors
No known raptor locations were located within the burn area. No treatment recommended.

Consultation
Consultation with Mary Jennings of the U.S. Fish and Wildlife Service was initiated on July 1st, 2002 concerning the Hensel fire BAER project. At that time, she had no concerns with any treatment plans being proposed, as they were not taking place within any of the riparian areas.

APPENDIX E: IDT Meeting Notes

The following notes document discussion by the BAER inter-disciplinary team regarding potential threats to life, property, safety, and resources, and how these issues were addressed.

Hensel BAER IDT notes 7/2/02

Reviewed burn intensity and watershed boundaries: Ashenfelder, Salt Lick and Lost Creek all meet and flow into Roaring fork and then these are tributary to Horshoe (lump these for analysis). East and south of Black Mtn road are the falls creek and cottonwood creek watershed (lump these), then a very small portion of the northwest corner are the headwaters of soldier which eventually flows into horshoe creek as well, which creates approx 3 watershed anlysis groups for the fire area.

Note: need to look at a dozer line crossing on a tributary to cottonwood creek that is apparently nasty and needs to be addressed.

Ashenfelder headwaters burned at higher intensity and proportion than other watersheds in the burn area, and is expected to be the higher sediment source area.

Need to note in report that due to the high amounts of unburned and low intensity burn and that the fire is still burning in the interior, there may be need to adjust the 2500-8 in the future, if more of the area burns.

Issues/Concerns/Values:

I.Weeds/invasives
A. assessment– looked at Murphy ridge – issues with Canada thistle, cheat grass, dalmation toadflax, and houndstongue. Expect Canada thistle to invade, there is a source within the burn area in the old slash piles, expect immediate increase in year 1 (based on experience with Murphy's ridge) – may depend on moisture. Dalmation Toadflax, fire area is approx 2 miles north of known infestation (seeds spread primarily through critters), this infestation area has been treated. The upper part of the watersheds and south end of the fire have not been completely surveyed and may have infestations already, potential and habitat is high, but unknown if they exist.
Bromus – proximatey to lower sage and grassland had infestations that moved upslope into the Murphy ridge area, Clark didn't observe much cheatgrass in the adjacent grassland areas, but there is some potential.

Houndstongue – known populations adjacent to fire in Harris Park area

Suppression resources were mostly local, Dozer line is mostly on pvt land, not much on FS, vehicles weren't rinsed though and a few resources were from California, some potential for contamination from suppression efforts, especially along Black Mtn lookout road – good place to focus monitoring efforts

B. Treatments/Mitigations – consider handseeding of high intensity burn areas along road corridors, (native species – primarily wheatgrass), or safety zones (5 acre zone, spotted from helicopter on north end, need to still identify exact location). – its an area of concern but its too remote and large to hand seed and too small to aerial seed for now – check with Clay or Ralph on location/access, for now decision is to include in monitoring, request $$ to treat if necessary or after further assessment.

II. Municipal Water – none

III. Wildlife (TES)
A1- Preble's Meadow Jumping Mouse – no known populations within fire area, however it is potential habitat and there is known populations in Cottonwood creek and downstream of fire. Some risk from weed invasion and not really a huge risk from flooding and destruction of habitat.

B1. treatment/mitigation: fire unlikely to significantly affect habitat, high probability of natural recovery within burn area, percentage wise, only a small percentage of the suitable habitat in the general area actually burned

at high severity. No proposed treatments are likely to affect the habitat. Consider including this a longterm rehab plan and requesting national fire plan $$.