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

Date of Report: August 23, 2007

BURNED-AREA REPORT
(Reference FSH 2509.13)
Hopson's Edits in Red Underline (8/29/2006)
Edits for Interim/Accomplishment Report in Blue (8/23/2007)

PART I - TYPE OF REQUEST

A. Type of Report

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

B. Type of Action

[.] 1. Initial Request (Best estimate of funds needed to complete eligible rehabilitation measures)

[X] 2. Interim Report
[X] Updating the initial funding request based on more accurate site data or design analysis
[X] Status of accomplishments to date

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

PART II - BURNED-AREA DESCRIPTION

A. Fire Name: Snow Canyon

B. Fire Number: NV-HTF-001103 (P Code P4C4N5)

C. State: NV

D. County: Elko

E. Region: 4

F. Forest: Humboldt-Toiyabe

G. District: Mountain City

H. Date Fire Started: 8/20/06 @ 19:20

I. Date Fire Contained: 8/27/2006

J. Suppression Cost: $2,073,000 (estimated 8/25/06)

K. Fire Suppression Damages Repaired with Suppression Funds: A total of 22.8 miles of fireline were re-contoured and seeded with surpression funds in 2006.

L. Watershed Number: 170501050101, 17501050113, 17051050102, 1705010103

M. Total Acres Burned: NFS Acres(11,907) BLM (2,356) State (0) Private (7,630)

N. Vegetation Types:
Mountain Big Sagebrush – Antelope Bitterbrush Plant Community - This plant community makes up about 928 acres or 8% of the burned area, and is primarily located in the lower foothills and alluvial fans. The dominant vegetation is antelope bitterbrush (Purshia tridentata) and mountain big sagebrush (Artemisia tridentata ssp. vaseyana). Other common species include yellow rabbitbrush (Chrysothamnus viscidiflorus), serviceberry (Amalanchier alnifolia), basin wildrye (Leymus cinereus), Indian ricegrass (Achnatherum hymenoides), slender wheatgrass (Elymus trachycaulis trachycaulis) and bluebunch wheatgrass (Pseudoroegneria spicata).

These plant communities will be slow to recover from the burn, since mountain big sagebrush and antelope bitterbrush usually do not resprout after fire. A few islands of these shrubs were left unburned and will provide a seed source for shrub re-establishment, but it is likely these sites will take about 10 years to recover. Perennial bunch grasses were evident in the burned area and live roots were located within one inch of the surface. If it rains this growing season, there is a chance these perennial grasses may resprout, but most should be up and growing by spring. It will likely be at least two years before the herbaceous vegetation recovers vigor. Cheatgrass (Bromus tectorum) is present in this plant community, but does not appear to be spreading as the population of perennial species has provided adequate competition.

Mountain Big Sagebrush Plant Community - This plant community makes up about 5171 acres or 43% of the burned area. It is located on moderately on foothill and mountain slopes. This is the largest plant community within the burned area.

Mountain big sagebrush (Artemisia tridentata vaseyana) is the dominant plant species. Other species that occur in this plant community are bitterbrush (Purshia tridentata), snowberry (Symphoricarpos oreophilus), currant (Ribes spp.), Basin wildrye (Leymus cinereus), Idaho fescue (Festuca idahoensis), Indian ricegrass (Achnatherum hymenoides), mountain brome (Bromus carinatus), slender wheatgrass (Elymus trachycaulis trachycaulis), and bluebunch wheatgrass (Pseudoroegneria spicata).

These plant communities will be slow to recover from the burn, since mountain big sagebrush does not resprout after fire. A few islands of mountain sagebrush were left unburned and will provide a seed source for shrub re-establishment, but it is likely these sites will take about 10 years to recover. Perennial bunch grasses were evident in the burned area and live roots were located within one inch of the surface. If it rains this growing season, there is a chance these perennial grasses may resprout, but most should be up and growing by spring. It will likely be at least two years before the herbaceous vegetation recovers vigor. Cheatgrass (Bromus tectorum) is present in this plant community, but does not appear to be spreading as the population of perennial species has provided adequate competition.

Low Sagebrush Plant Community - This plant community is about 3661 acres or 30% of the burned area. It is located primarily on the ridgelines, higher mountain slopes and some of the high benches within the burned area. The dominant species in this plant community is early, low sagebrush (Artemisia arbuscula longiloba). Other associated species include Idaho fescue (Festuca idahoensis), squirreltail (Elymus elymoides), Sandberg's bluegrass (Poa secunda), milkvetch (Astragalus spp.), biscuitroot (Lomatium spp.) and longleaf phlox (Phlox longiloba).

These plant communities will be slow to recover, since low sagebrush does not resprout after fire. A few islands of low sagebrush were left unburned and will provide a seed source for shrub re-establishment, but it is likely these sites will take about 10 to 15 years to recover. Perennial bunch grasses were evident in the burned area and live roots were located within one inch of the surface. If it rains this growing season, there is a chance these perennial grasses may resprout, but most should be up and growing by spring. It will likely be at least two years before the herbaceous vegetation recovers vigor. Cheatgrass (Bromus tectorum) is present in this plant community, but does not appear to be spreading as the population of perennial species has provided adequate competition.

Upland Aspen Plant Community - This plant community makes up about 519 acres or 4% of the burn area. It is located on the mountain and foothill slopes. Aspen (Populus tremuloides) is the dominant species. Aspen is a species that responds vigorously to disturbance by sending up new shoots within a year of the burn. Other species found in unburned areas adjacent to the fire or within the burn are:

Aspen (Populus tremuloides), snowberry (Symphoricarpos oreophilus), currant (Ribes spp.), chokecherry (Prunus virginia), Oregon grape (Mahonia repens), Rosa woodsii (wild rose), Osmorhiza occidentalis (sweet anise), Hackelia floribunda (forget-me-not), nettleleaf horsemint (Agastache urticifolia), Nelson's needlegrass (Achnatherum nelsonii), mountain brome (Bromus carinatus), slender wheatgrass (Elymus trachycaulis trachycaulis) and blue wildrye (Elymus glaucus).

As long as the trees and understory species are healthy, the sites are not heavily grazed and the soil in not highly eroded, it is expected that aspen communities will rebound within two years. It may take up to five years before the trees get tall enough to be free from grazing pressure.

Mountain Shrub Plant Community - This plant community makes up about 1192 acres or about 10% of the burned area, and is primarily located in swales and on foothill and mountain slopes. The dominant plant species are chokecherry (Prunus virginiana), serviceberry (Amalanchier alnifolia), snowberry (Symphoricarpos oreophilus), currant (Ribes spp.), snowbrush (Ceanothus velutinus), elderberry (Sambucus nigra ssp. cerulea) and wild rose (Rosa woodsii). Understory species include Balsamorhiza sagittata (arrowleaf balsamroot), Hydrophyllum capitatum (dwarf waterleaf), Hackelia floribunda (wild forget-me-not), Potentilla spp. (cinquefoil), Lupinus spp. (lupine), Lomatium spp. (biscuitroot), Agastache urticifolia (giant hyssop), Leymus cinereus (basin wildrye), Festuca idahoensis (Idaho fescue), Psuedoroegneria spicata (bluebunch wheatgrass), Elymus trachycaulus (slender wheatgrass), Achnatherum nelsonii (Columbia needlegrass) and mountain brome (Bromus carinatus).

Most of the shrubs that dominate these plants communities are resprouters and many are considered fire dependent for seed germination. By next spring the grasses and shrubs should be sending up shoots and these sites should recover vigor within two to five years.

Mountain Mahogany Plant Community - This plant community makes up about 105 acres or 1% of the burn area. It is located on ridges and near rock outcrops on somewhat shallow, gravelly loams with a high percentage of stones and cobbles in the soil profile.

Mountain mahogany (Cercocarpus ledifolius) is the dominant species. Other species found in within the burn are snowberry (Symphoricarpos oreophilus), mountain big sagebrush (Artemisia tridentata vaseyana), Oregon grape (Mahonia repens), arrowleaf balsamroot (Balsamorhiza sagittata), Indian ricegrass (Achnatherum hymenoides), bluebunch wheatgrass (Pseudoroegneria spicata), and Idaho fescue (Festuca idahoensis).

Mountain mahogany is most often killed by fire, and while there may be some resprouting, it is usually very weak. Much of the mahogany within the burned area was spared due to lack of understory cover to carry the fire. The mahogany that did burn will likely not recover for 20 or more years.

Woody Riparian Plant Community - This plant community occurs extensively throughout the drainages of the burned area. The soils in these drainages tend to be very rocky and the slopes steep. Heavy spring run-off events combined with steep, rocky slopes prevent deposition of sediments to the extent needed for meadow development and keep the erosion potential high. Dominant species include Pacific willow (Salix lucida ssp. lasiandra), thinleaf alder (Alnus incana ssp. tenuifolia), Aspen (Populus tremuloides), and to a lesser extent at lower elevations, black cottonwood (Populus balsamifera trichocarpa). Other species found in unburned areas adjacent to the fire or within the burn snowberry (Symphoricarpos oreophilus), currant (Ribes spp.), chokecherry (Prunus virginia), Oregon grape (Mahonia repens), Rosa woodsii (wild rose), Nelson's needlegrass (Achnatherum nelsonii), mountain brome (Bromus carinatus), slender wheatgrass (Elymus trachycaulis trachycaulis) and blue wildrye (Elymus glaucus).

The woody species that inhabit these plant communities all readily respond to disturbances such as fire and flooding. In many instances, fire stimulates the regrowth of these plants. By next spring many of the shrubs and trees will be resprouting and adequate water will facilitate their growth throughout the summer. In two to five years these sites will be mostly recovered.

Riparian Meadow Plant Communities - These plant communities range from dry meadows to wet meadows, the majority of which occur on private lands (hay meadow) within the Forest boundary. At 59 acres or one-half percent of the overall acres burned, these areas do not constitute much of the overall landscape, but do have a high importance for wildlife habitat and the filtering of water run-off. Most of these areas burned lightly, if at all. However, all the dry meadows observed burned completely. The stream systems in the burn area have few meadows due to steep, narrow topography, high water flows and excessive rock.

The dry meadow systems, which occur primarily on low benches in the Jack Creek watershed, were in a low to moderate functional state, with compacted soils and poor plant composition before the fire occurred. Bulbous bluegrass (Poa bulbosa) is abundant in these systems most likely due to heavy past use. These sites are located adjacent to seeps in the areas outlined below. The areas with bulbous bluegrass will likely not expand as the burn recovers. In fact, a couple years of rest may facilitate the growth of native perennials in these systems.

Rare Plants and Rare Plant Habitat - Three rare plants, Leiberg's clover (Trifolium leibergii), Grime's vetchling (Lathyrus grimesii) and least phacelia (Phacelia minutissima), are found within the burned area. The species are described as follows:

- Grime's Vetchling *(Lathyrus grimesii*) [Species of Concern, G2, S2]: This plant occupies dry, open, shallow, silty clay soils of the Schoonover Formation. This plant grows in relatively barren patches on mostly steep slopes. Associated vegetation is sparse to moderately dense usually dominated by Leiberg's clover in association with bitterbrush (Purshia tridentata), rubber rabbitbrush (Ericameria nauseosa), mountain sagebrush (Artemisia tridentata vaseyana) and bluebunch wheatgrass (Psuedoroegneria spicata). Cheatgrass (Bromus tectorum) and occasionally spurge (Euphorbia esula) may be invasive on these sites.

  The fire burned into a population of this plant on the hillslope above Jack Creek. Due to the sparse vegetation on the site, only a small portion of the site burned, and this was only lightly burned. The fire appears to have incurred little or no damage to the plants.

- Leiberg's Clover (*Trifolium leibergii*) [Species of Concern, G2, S2]: This plant is found on dry, shallow, relatively barren gravel soils, mostly on ridge tops and upper slopes. It is often found in association with low sagebrush (Artemisia arbuscula) and other associated species.

  A population of this plant burned on a ridge between Coffin and Schoonover Creeks. Due to sparse vegetation, the fire intensity was light and remnant islands of low sagebrush remain. The fire most likely had little impact on the population of Leiberg's clover.

- Least Phacelia (*Phacelia minutissima*) [Species of concern, G3, S2]: This plant is found on seasonally saturated, sparsely vegetated, partially shaded to fully exposed areas of bare soil and mud banks in meadows, at perimeters of Veratrum californicum (corn lily), Wyethia amplexicaulis, and/or Populus tremuloides (aspen) stands, in sagebrush swales, along creek bed high-water lines, or around springs, in flat to gently sloping areas. It is a wetland-dependent species.

  The fire burned into a small portion of a population of this plant in the upper reaches of Snow Canyon. Since the fire reached only a small portion of the habitat in the area and since it is a wet site that experienced a light burn intensity, there is likely little impact on the population.

O. Dominant Soils:

Soils in upland areas, which include ridgelines, the higher mountain slopes, and high benches, tend to be shallow to moderately deep to deep very gravelly loams to gravelly clay loams. Cobbles and stones tend to be 10 to 30% of the soil profile.

Soils on lower mountain slopes, foothills, and alluvial fans tend to be moderately deep, gravelly clay loams to loamy clays, often with more than 10% stones and cobbles. They are typically derived from glacial, metamorphic, and sedimentary parent material. Due to the clay content, these soils have a high compaction potential.

Soils in riparian drainages tend to be deep to shallow, extreamely gravelly and range from loams to sandy loams. Gravel and bedrock are major stabilizing factors. The water table tends to be very high with water moving fairly rapidly through the soil profile.

P. Geologic Types: The northern part of the burn is underlain by morraine material from glacial activity along with Paleozoic limestones, sandstones, conglomerates, and some chert and andesite lava. The mid and southern parts of the burn are underlain by more paleozoic sedimentary rocks, mostly carbonates, and some orthoquartzite and quarts siltite. A few areas of glacial deposits are also present.

Q. Miles of Stream Channels by Order or Class: 1st order intermittent: 0.8 miles
1st order perennial: 13.1 miles
2nd order perennial: 7.1 miles
3rd order perennial: 3.6 miles

R. Transportation System: Trails: 0 miles Roads: 29.65 miles

PART III - WATERSHED CONDITION

A. Burn Severity (acres): 2,860 (low) 7,733 (moderate) 123 (high) 1,351 (unburned)

The burn severity acreages were calcuated from a Burned Area Reflectance Classification Map (BARC) provided by the U.S. Forest Service's Remote Sensing Application Center (RSAC). The map was varifided during the field assessment.

B. Water-Repellent Soil (acres): 123

C. Soil Erosion Hazard Rating (acres): 1,567 (low) 10,308 (moderate) 503 (high)

D. Erosion Potential: ERMiT is a web-based application that uses Water Erosion Prediction Project (WEPP) technology to estimate erosion on burned and recovering forest, range, and chaparral lands with and without the application of erosion mitigation treatments (Erosion Risk Management Tool (ERMiT) Users Manual (version 2006.01). This model was used to predict erosion on hillslopes in the burned area. Several runs were made with this model; runs for two representative slopes are displayed below. The first run was for the hill north of Jack Creek near the confluence with Chicken Creek. This hill had a 60% slope, consisted of a lot of rock, and the burn intensity was low. The results showed a 10% chance that a quantity of 12.73 tons/acre would not be exceeded within the first year of the fire for untreated slope (see chart below). This figure decreases significantly the second year and in subsequent years. The same model shows a 20% probablility that only 1.97 tons/acres will be exceeded.

Jack Creek North Hill Erosion Potential (tons/acre)

Treatment	Year following the fire				
	1st year	2nd year	3rd year	4th year	5th year
Untreated	12.73	3.65	2.51	2.09	0.98
Seeded	12.73	2.51	2.09	0.98	0.98
Mulch (0.5 tons/acre)	2.28	2.12	2.51	2.09	0.98
Mulch (1 tons/acre)	0.76	0.99	2.51	2.09	0.98
Mulch (1.5 tons/acre)	0.76	0.95	2.51	2.09	0.98
Mulch (2 tons/acre)	0.76	0.94	2.51	2.09	0.98

Values were calculated by the Erosion Risk Management Tool (ERMiT), with and accuracy of plus or minus 50% (Robichaud and others, 2006).

Another run was made on the slope south of Jack Creek. This slope was only 10% but was moderately burned. The result shows a 10% chance that 3.89 tons/acre will not be exceeded the first year. If 20% is used as a probability then the figure is reduced to 0.68 tons/acre for the first year.

Jack Creek South Slope Erosion Potential (tons/acre)

Treatment	Year following the fire				
	1st year	2nd year	3rd year	4th year	5th year
Untreated	3.89	1.61	0.32	0.23	0.13
Seeded	3.89	0.45	0.32	0.13	0.13
Mulch (0.5 tons/acre)	0.40	0.41	0.32	0.23	0.13
Mulch (1 tons/acre)	0.34	0.34	0.32	0.23	0.13
Mulch (1.5 tons/acre)	0.34	0.34	0.32	0.23	0.13
Mulch (2 tons/acre)	0.34	0.33	0.32	0.23	0.13

Values were calculated by the Erosion Risk Management Tool (ERMiT), with and accuracy of plus or minus 50% (Robichaud and others, 2006).

E. Sediment Potential: (Calculated for the same slopes modeled in Part D)

Jack Creek North Hill Sediment Potential (cubic yards/square mile)

Treatment	Year following the fire				
	1st year	2nd year	3rd year	4th year	5th year
Untreated	8,147	2,336	1,606	1,338	627
Seeded	8,147	1,606	627	627	627
Mulch (0.5 ton/acre)	1,459	1,357	1,606	1,338	627
Mulch (1 ton/acre)	486	634	1,606	1,338	627
Mulch (1.5 ton/acre)	486	608	1,606	1,338	627
Mulch (2 ton/acre)	486	602	1,606	1,338	627

Values based on results from the Erosion Risk Management Tool (ERMiT), with and accuracy of plus or minus 50% (Robichaud and others, 2006).

Jack Creek South Slope Sediment Potential (cubic yards/square mile)

Treatment	Year following the fire				
	1st year	2nd year	3rd year	4th year	5th year
Untreated	2,490	1,030	205	147	83
Seeded	2,490	288	205	83	83
Mulch (0.5 ton/acre)	218	262	205	147	83
Mulch (1 ton/acre)	218	218	205	147	83
Mulch (1.5 ton/acre)	218	218	205	147	83
Mulch (2 ton/acre)	218	211	205	147	83

Values based on results from the Erosion Risk Management Tool (ERMiT), with and accuracy of plus or minus 50% (Robichaud and others, 2006).

PART IV - HYDROLOGIC DESIGN FACTORS

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

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

C. Equivalent Design Recurrence Interval, (years): 25

D. Design Storm Duration, (hours): 6

E. Design Storm Magnitude, (inches): 1.6

F. Design Flow, (cubic feet / second/ square mile): 17.0

G. Estimated Reduction in Infiltration, (percent): 1

H. Adjusted Design Flow, (cfs per square mile): 17.2

PART V - SUMMARY OF ANALYSIS

A. Describe Watershed Emergency:

Threats to Human Life: During the fire, an engineer inspected the Jack Creek Bridge and determined that it had been significantly damaged by fire (Rockwell 2006). For safety, it was recommended that the bridge be closed to public access until it could be replaced or repaired. A temporary low water crossing on private land was created to allow fire engines to pass during suppression activities. While the Jack Creek Bridge is not on the Forest, it is owned and maintained by the Forest as an access route. With the exception of the burned bridge over Jack Creek, the field assessment within and downstream of the burn confirmed that there are no other situations where human life was threatened.

Threats to Property: Field reviews within and downstream of the burn confirmed that there are no situations where private property is within flood prone areas. Therefore, the effects of the fire do not appear to have created any significant threats to private property.

Threats to Drainages: The field assessment within and downstream of the burn confirmed that there are no significant threats to water quality in the intermittent drainages. There will be sediment and ash output and minor, inconsequential changes to chemical quality, but the effects to on-site and downstream water quality are expected to be minor.

Threats to Long-term Soil Productivity and Ecosystem Integrity: The following Invasive and noxious weed species have been identified as a threat to long-term soil productivity and ecosystem integrity within the burned area:

Bull Thistle (*Cirsium vulgare*) - This thistle is native Europe and Asia and is on the Federal and Western States noxious weed lists. It grows in wetland, sagebrush and aspen habitats.

Bull thistle occurs along the roads and streams in the burned area. The weed inventory map showed known populations from Jack Creek drainages, Marsh Creek and an unnamed creek south of Snow Canyon. During the field inspection of the burn, bull thistle was also found in Snow Canyon and China Creek drainages.

Fire creates conditions that are favorable to the spread of bull thistle and may result in large stands of this species. Colonies of bull thistle do not adequately protect soil from erosion by water.

Musk Thistle (*Carduus nutans*) - This thistle is native to Europe, Asia and North Africa. It is an aggressive noxious weed introduced into the United States and is on the Nevada and Federal Noxious Weed lists. It can grow in most habitats in this part of Nevada, but does not usually grow at high elevations or in sites that are very hot and dry.

According to the weed inventory, it is known from the Jack Creek and Snow Canyon areas of the burn. Musk thistle colonization may be enhanced after fire. An increase in musk thistle could result in a loss of native vegetation. The native vegetation, which has finer roots and produces more ground litter, is much better adapted to hold soil in place during water and wind erosion events than the tap-rooted thistles.

Cheatgrass (*Bromus tectorum*) - Cheatgrass is a non-native invasive annual species that can obtain a competitive advantage over native species after fire. This competitive advantage is created by loss of shade and litter cover on the soil surface and loss of water retention and infiltration with burned soils.

Cheatgrass invasion could limit the watershed function to the top few inches of soil, increase the future fire frequency, degrade rare plant habitat, and create a pocket population that could invade adjacent areas and limit the site capability of the area to produce forage and shelter for wildlife.

According to the Humboldt-Toiyabe Forest Vegetation Map, roughly 21% of the burned area is susceptible to cheatgrass invasion. These areas, however, are primarily along the lower benches that burned at a light to moderate intensity. Additionally, a field inspection showed a slight burn layer on the surface of the soil along the benches, as well as evidence of perennial bunchgrasses with live roots just below the burned soil surface. These conditions will likely limit the spread of cheatgrass.

Threats to Fish Habitat: The Snow Canyon Fire impacted eight fish-bearing streams on Forest Service land: Boyd Creek, Chicken Creek, Coffin Creek, Jack Creek, Marsh Creek, Mill Creek (and "Mill Creek #2"), Schoonover Creek, and Snow Canyon Creek. Other non-fish-bearing streams (Bull Creek and China Creek) or drainages for which there was no direct impact (Winters Creek) are described in the hydrology report.

The fish of primary interest in the named drainages is redband trout (*Oncorhynchus mykiss*), an inland form of rainbow trout considered Sensitive by the Nevada Department of Wildlife, and thus of special interest to the Humboldt-Toiyabe National Forest. Also present in several of the larger streams is Paiute sculpin (*Cottus beldingi*), a native fish; and while introduced brook trout (*Salvenlinus fontinalus*) has been recorded historically, none have been found in recent surveys since the cessation of its stocking.

The mileage directly impacted for each stream in the Snow Canyon fire varied from 0.1 mile (Boyd Creek) to 4.0 miles (Snow Canyon Creek). The table below details the estimated impact length, as well as total stream length (as determined via topographic map) and the fish-bearing length. Because the extreme headwaters of most drainages in the fire area are either dry or have minimal flow in the summer, or may contain barriers to upstream migration, the fish-bearing length is generally not equal the total length.

Name	Impacted Length	Total Length	% Total Impacted	Fish-Bearing Length	% Fish-Bearing Impact
Boyd Creek	0.1 miles	2.3 miles	4%	1.3 miles	8%
Chicken Creek	0.6 miles	3.6 miles	17%	2.0 miles	30%
Coffin Creek	0.7 miles	1.5 miles	47%	0.6 miles	100%
Jack Creek	3.8 miles	5.5 miles	69%	4.2 miles	90%
Marsh Creek	0.4 miles	2.7 miles	15%	1.9 miles	21%
Mill Creek	0.5 miles	1.8 miles	28%	1.4 miles	36%
"Mill Creek #2"	0.2 miles	0.6 miles	33%	0.6 miles	33%
Schoonover Creek	1.4 miles	2.5 miles	56%	1.7 miles	82%
Snow Canyon Creek	4.0 miles	5.0 miles	80%	4.9 miles	82%
TOTAL	11.7 miles	25.5 miles	46%	18.5 miles	63%

In most cases, less stream miles were impacted than miles known to be inhabited by fish. The exception is Coffin Creek; and both Jack Creek and Snow Canyon Creek recorded some degree of impact over most of the fish-bearing length.

The burn intensity along streams varied between unburned, low, and moderate severity. While Schoonover Creek, Marsh Creek, Boyd Creek, and Mill Creek were largely unburned or low intensity, the other streams were a mixture with the majority moderate.

The field review encountered dead redband trout on Jack Creek (9 fish) and Snow Canyon Creek (20 fish), all larger than 8 inches. At the same time, smaller fish were seen alive in the same drainages. As no retardant entered the streams, a fire-induced elevation in temperature, possibly combined with a related decrease in dissolved oxygen, is likely responsible for the fish kills.

The streams in the fire area typically measure between mid-50° F to mid-60° F during the summer months. The lethal temperature for redband (rainbow) trout is approximately 77° F, although higher temperatures can be withstood if the fish is slowly acclimated (Bjorn and Reiser 1994). Generally, rainbow trout seek cooler water when temperatures are between 73.4° F and 77° F (Bjorn and Reiser 1994). Larger fish unable to leave the impacted areas during the fire may not have been able to find appropriate refugia from the cumulative effects of elevated summer water temperatures made hotter by fire and a possible temporary decrease in dissolved oxygen (warmer water contains less oxygen). On

the other hand, small fish able to take advantage of seep and spring outflows, else subsurface upwelling located within the stream substrate, may have preferentially survived, as evidenced by the observations of the field team.

The primary concern of the Fish Biologist to affected fish-bearing streams on Forest Service land is the elevation of water temperature and potential for erosion.

The removal of riparian vegetation in the burn area may cause temperature elevation due to loss of shade. As mentioned prior, the streams in the area may already have naturally elevated stream temperatures. Lack of shading vegetation could compound summer highs, thus impacting where fish are distributed and potentially instigating additional kills in those areas fish are not able to leave.

The vegetation specialists expects riparian vegetation, where impacted, to recover quickly. As riparian regrows, temperatures will moderate. Fine sediments may impact fisheries. For instance, sediment may smother algae that macroinvertebrates graze upon, thus decreasing numbers of these aquatic insects, an important supply of fish food. Fine sediment can also fill in spawning gravels, negatively impacting breeding. The hydrology and soils specialist does not anticipate erosion issues, especially as the riparian recovers.

The fish kill is not of high concern because it was a transient direct effect due to the fire. Once the fire passed, allowing stream temperatures to decrease and dissolved oxygen to elevate, the immediate danger was gone. Both Jack Creek and Snow Canyon Creek have healthy populations of redband trout; and both drainages include fish-bearing portions that were either out of the fire perimeter, else were of unburned or low intensity. Fish remain present in both creeks.

No additional treatments, beyond those already recommended for natural vegetation recovery, are required at this time.

Threats to Heritage Resources: Based on the initial observations in the field and the prefield research identifying cultural resources in the burned area, there does not appear to be any site that requires implementation of emergency treatments to stabilize or protect from unacceptable degradation. No National Register eligible sites or unrecorded sites, that have a high probability of meeting the eligibility criteria for listing in the NRHP, are susceptible to extreme erosional processes or unauthorized excavation. Due to the rocky nature of the ground, minimal erosion is expected at identified sites.

Since no cultural resource sites have been identified for emergency treatments, no treatment types have been identified. The treatments proposed this report for the burned bridge and weeds will not impact any cultural resource sites and, therefore, no additional work is required under section 106 regulations.

B. Emergency Treatment Objectives:

The goals of the burned area emergency rehabilitation are to:

- Allow for the natural recovery of native plant communities in a timely fashion in order to reduce or eliminate a threat to long-term soil productivity and protect the ecological integrity of the ecosystem.
- Protect human life and property at the fire damaged bridge over Jack Creek.

Treatment objectives to achieve the goals are:

- Control expected invasion by bull thistle (*Cirsium vulgare*) and musk thistle (*Carduus nutans*) through herbicide application.
- Rest areas of the burn from grazing within the guidelines provided by the Forest Plan.
- Insure public safety by closing the fire damaged Jack Creek Bridge with barricades and warning signs.
- Insure public safety by hardening the temporary low-water crossing at Jack Creek with gravel.

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

Land **90** % Channel **NA** % Roads **NA** % Roads **90** %

D. Probability of Treatment Success

Treatment	Years after Treatment		
	1	3	5
Land*	75	85	90
Channel	NA	NA	NA
Roads**	75	NA	NA
Noxious Weeds	75	85	90

*Natural regrowth of vegetaton with rest from grazing.
**Bridge safety/low-water crossing.

E. Cost of No-Action (Including Loss): $1,400,124

The no-action cost was calculated using the BAER cost/risk analysis worksheet (USDA Forest Service, 2006). Costs associated with noxious weed treatment and potential loss of grazing fees were evaluated in the analysis. The cost of not implementing bridge safety measures is an unkown and was not included in the analysis.

F. Cost of Selected Alternative (Including Loss): $357,145

The cost of the selected alternative was calculated using the BAER cost/risk analysis worksheet (USDA Forest Service, 2006). Direct costs associated with weed monitoring and bridge safety/low-water crossing costs were evaluated as well as the cost associated with the risk of failure in the first year following treatment.

G. Skills Represented on Burned-Area Survey Team:

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

Team Leader: Ron Hudson
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H. Treatment Narrative:

Land Treatments: Areas of the burn will be rested from grazing within the guidelines provided by the Forest Plan. Areas to be rested will be specified in annual operating plans for each allotment. If monitoring indicates that invasive plants, lack of recovery, or unauthorized livestock use are concerns, the timeline to reintroduce livestock grazing may be extended.

Accomplishment: (Cost $0.00) The burned areas were rested from livestock grazing during the Fall of 2006 and the entire 2007 grazing season. Rest from grazing will continue through the 2008 season.

Noxious Weeds: As described in the monitoring narrative below, monitoring for noxious weeds will be conducted by the district weed treatment crew in the spring and fall of 2007. As noxious weeds are documented, they will also be treated with herbicide by the crew.

Accomplishment: (Cost $1,706.69) In first two weeks of June, 2007, the burned area was monitored for noxious weeds. In general, no new infestations were observed, the exception being Hounds tongue (*Cynoglossum officinalr* L) and Yellow spine thistle (*Cirsium Oclrocentrun)*. The Yellow spine thistle had

sporadic infestations on most of the roads. Yellow spine thistle is native to the Great Plains. However, in the Great Basin, this species tends to show invasive characteristics and is being treated by the Forest as an invasive species. Houndstongue was also observed, which is the first occurrence of this species on the Independence Mountains. This species was located on the Jack Creek Road.

Noxious weed infestations that were present before the fire have expanded; these include Bull thistle, (*Cirsium vulgare)*, Scotch thistle (*Onopordum acanthium* L), Hoary Cress (*Cardaria draba* L) and Common Burdock (*Arcitium Minus)*.

All noxious weed species were treated with herbicides. Total acreage treated was approximately 2-3 acres.

The bulk of the noxious weeds we might see would be either biannual or perennials. In both cases, the first year growth could easily be missed. It is therefore necessary for the noxious weed monitoring to be continued for at least one more year. Because of the continued threat of noxious weed invasion, additional funding for continued weed monitoring in the 2008 field season is requested through this interim report.

Vegetation Recovery and Soil Stabilization: The soils in this area are very high in rocks, cobbles and gravels, which tend to provide soil stability, and the pre-fire vegetation appears to have been primarily native and in good health. Given rest from human-caused disturbances, the burn area should become resilient within two years and recover completely within five to ten years. Other than a rest from grazing in areas determined by the team, no treatment is recommended.

Accomplishment: (Cost $0.00) The burned areas were rested from livestock grazing during the Fall of 2006 and the entire 2007 grazing season. Rest from grazing will continue through the 2008 season. Cheatgrass (*Bromus techtorum),* does appear to be expanding some after this fire. Primarily on south facing slopes and the lower foot hills on the Forest, and large areas of BLM and private lands adjacent to the Forest. The native perennial grasses, however, appear to be recovering well and are providing competition despite the current drought conditions.

Roads: Given the threat to human life at the burned Jack Creek Bridge, barricades and signs will be used to temporarily close the bridge and allert the public to danger. The Forest Service owns the bridge and has the responcibility to maintain safe access for implementation of BAER treatments, fire emegencies, as well as access to a private residence inholding damaged by the fire. Pending approval of a MOU with the private landowner, the low-water crossing created during surpression activities will be hardened with gravel. The existing low-water crossing was constructed from loose soil and will likely be susceptible to damage from heavy vehicle use and erosion caused by the stream flow and percipitation runoff. This damage could make the crossing unsafe for vehicle passage. **In addition, stabilization of the road crossing would reduce sediment into downstream redband trout habitat (per phone call with Ron Hudson, 8/31/06).**

Given that the low-water crossing is on private land, Wyden authority will be used to complete the BAER treatment. Compliance with the Wyden Ammendment is as follows:

- The expenditure will be done in the interest of public safety,
- A MOU is in the process of being implemented with the private (non-industrial) landowner, and
- The county government has limited funds and personnel to complete the treatment in a timely manner.

Accomplishment: (Cost $2,669.57) Safety barricades and signs were installed at the Jack Creek Bridge as specified above. The stabilization treatment to the low-water crossing, however, was completed by the landowner. All labor, equipment, and gravel material used on the low-water crossing was donated by the landowner (the Mori Ranch). No BAER funding was spent on privately owned land.

I. Monitoring Narrative:

The burned area will be monitored for the presence of noxious and invasive weeds by a district weed treatment crew. New weed locations will be documented with GPS positions and photographs.

Noxious weed monitoring will occur at least once in early summer and once in fall to prevent weeds from maturing in the burned area. Monitoring levels may be increased if weeds are detected in the area. If additional monitoring of treatments is necessary beyond 1 year, an interim 2500-8 request will be submitted. A monitoring report following the first year monitoring results will be submitted before any interim requests are made.

Monitoring for invasive weeds will be conducted in the spring of 2007 to assess the potential for cheatgrass invasion and dominance on the lower benches of the burn area. If initial assessments indicate that further surveys are needed to assess the effectiveness of treatment and need for re-treatment, the Forest will request additional funds at that time.

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										
				$0	$0		$0		$0	$0
				$0	$0		$0		$0	$0
				$0	$0		$0		$0	$0
Insert new items above this line!				$0	$0		$0		$0	$0
Subtotal Land Treatments				$0	$0		$0		$0	$0
B. Channel Treatments										
				$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		$0	$0
C. Road and Trails										
Bridge Closure Signs	each	$263	0	$0	$0		$0		$0	$0
Bridge Barricades	each	$674	0	$0	$0		$0		$0	$0
Low-water crossing	each	$2,000	0	$0	$0		$0		$0	$0
Implementation Crew	total	$900	0	$0	$0		$0		$0	$0
Insert new items above this line!				$0	$0		$0		$0	$0
Subtotal Road & Trails				$0	$0		$0		$0	$0
D. Structures										
				$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		$0	$0
E. BAER Evaluation										
Team (time & travel)	total	$0	0	$0	$0		$0		$0	$0
				$0	$0		$0		$0	$0
Insert new items above this line!				$0	$0		$0		$0	$0
Subtotal Evaluation				$0	$0		$0		$0	$0
F. Monitoring										
Weed Crew	total	2,640	1	$2,640	$0		$0		$0	$2,640
Reporting	total	700	1	$700	$0		$0		$0	$700
Insert new items above this line!				$0	$0		$0		$0	$0
Subtotal Monitoring				$3,340	$0		$0		$0	$3,340
G. Totals				**$3,340**	**$0**		**$0**		**$0**	**$3,340**

PART VII - APPROVALS

Initial Signatures:

1. /s/ kevin Wilmot for — August 30, 2006
   Forest Supervisor (signature) — Date

2. /s/ Mary Wagner for — 09/06/2006
   Regional Forester (signature) — Date

Interim Signatures:

1. /s/ Edward C. Monnig — 09/05/2007
   Forest Supervisor (signature) — Date

2. _____ — _____
   Regional Forester (signature) — Date

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