Uinta National Forest

Escaped Fire Incident

Initial BAER Report

Cascade II

United States Department of Agriculture | **Forest Service** | **Uinta National Forest** | **88 West 100 North P.O. Box 1428 Provo, UT 84603-1428**

File Code: 2520 Date: October 10, 2003
Route To:

Subject: Cascade II Fire Incident – Initial BAER Reports

To: Regional Forester, R-4
Attn: Jeff Bruggink, Regional Soil Scientist

Enclosed with this letter is the Initial Burned-Area Emergency Response (BAER) Report for the Cascade II Fire Incident that contains our request for a total of $814,022 in additional WFSU-SULT funds. This incident occurred above Deer Creek Reservoir, Utah within the Lower Provo Management Area on the Pleasant Grove Ranger District of the Uinta National Forest. This fire burned 7,828 acres of Forest Service, State and private land. We recommend land, channel, and roading treatments as emergency measures to protect human life and property along with significant resource and ecosystem values in the burned-area. Also, we recommend specific actions to monitor the implementation and effectiveness of these necessary BAER treatments.

Resource Specialists have been on-the-ground and have developed recommendations that will not result in a detrimental effect to the human environment. Their assessments of existing conditions are documented in the enclosed BAER Report. BAER consists of emergency actions needed to prevent loss of lives and property or to mitigate unacceptable resource degradation. I have reviewed the plan and determined that this is emergency in nature and the actions will have insignificant impacts.

/s/Paul B Gauchay for
PETER W. KARP
Forest Supervisor

Enclosures

Cc:
Bert Kulezsa, R4, Deputy Regional Forester
Reese Pope, BAER Team Leader, Uinta NF

United States Department of Agriculture | **Forest Service** | **Washington Office** | **14th & Independence SW**
P.O. Box 96090
Washington, DC 20090-6090

File Code: 2520-3/6520 **Date:** October 16, 2003
Route To:

Subject: Approval of the Initial Burned Area Emergency Rehabilitation Funding- Cascade II Fire, Uinta National Forest

To: Regional Forester, R-4

We have received your letter of October 14, 2003, requesting initial funding authority for the Cascade II Fire on the Uinta National Forest. The standards for approving emergency actions are found in FSM 2523 and FSH 2509.13. The BAER work to be accomplished on State and Private lands must qualify for funding through Wyden amendment authorities. Please see FSM 1580 and FSH 1509.11 for guidance in applying the Wyden amendment.

The request is approved as follows:

Table 1. Cascade II/BAER-NFS Lands		Table 2. Cascade II/BAER – Wyden Area	
Land Treatments	$ 250,124	Land Treatments	$ 403,909
Channel Treatments	$ 12,150	Channel Treatments	$ 4,050
Roads and Trails	$ 58,749	Roads and Trails	$ 7,920
BAER Evaluation	$ 66,549		
Monitoring	$ 10,530		
Total	$ 398,102	Total	$ 415,879
Total BAER Approval			$ 813,981

The BAER Team costs are approved to the extent of actual salary, travel, and per diem costs incurred. Administrative personnel working in support of the rehabilitation survey are considered members of the team. Contracting and administration costs of implementing treatments should be reflected in treatment costs.

Interim reports or requests may be submitted as needed to describe revised costs estimates or needs. If project implementation is incomplete by September 30, 2004, an interim status report is required by December 10, 2004. If submitting supplemental funding requests, a brief report of accomplishments to date will aid review of the request. This report should reflect all costs and accomplishments during FY 2004. Please send a final FS-2500-8 describing treatment units completed and their costs within 60 days after completing the treatments

/s/ Deanna J. Stouder (for)
JAMES T. GLADEN
Director, Watershed, Fish, Wildlife, Air, and Rare Plants
cc: BAER

CASCADE II Location Map

(Click on Link to download map)

Cascade II Fire Location Map (230 KB)

CASCADE II Vicinity Map

(Click on Link to download map)

Cascade II Fire Vicinity Map (1438 KB)

CASCADE II Previous Black & White Image 1997

(Click on Link to download map)

Cascade II Black & White Image 1997 (951 KB)

Date of Report: October 10th, 2003
Edited J.Bruggink 10/13/03 9:00am
Edited S. Hazelhurst 10/14/03 11:45am

USDA - FOREST SERVICE / BURNED - AREA REPORT

(Reference FSH 2509.13)

PART 1 … 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 stabilization measures)

( ) 2. Interim Report

( ) Updating the initial funding request based on more accurate site data and design analysis

( ) Status of accomplishments to date

( ) 3. Final Report - following completion of the emergency work

PART 2 … BURNED - AREA DESCRIPTION and FIRE LOCATION

A. Fire Name: Cascade II

B. Fire Number: P48247 / UT-UIF-000802

C. State: Utah

D. County: Wasatch … # 051

E. Region: R4 / Intermountain

F. Forest: Uinta … # 0418

G. District: D2 … Pleasant Grove

H. Date Fire Started: 09-23-2003 @ 1705

I. Date Fire Contained: 09-29-2003 @ 1900

J. Date Fire Controlled: 10-06-2003 @ 1630

K. Suppression Costs: $ 2,500,000 (estimated final cost) … taken from the ICS - 209 dated 10-06-2003

L. Fire Suppression Damages Repaired with EFFS – PF12 Funds: (listed for the entire burned-area)

- Fireline Waterbarred (miles) ~ 3 ¾ miles of hand lines and 7 ½ miles of dozer lines
- Fireline Re-seeded (miles) ~ 3 ¾ miles of hand lines and 7 ½ miles of dozer lines
- Other Damages … (identify) ~ ½ mile of dirt road was widened along lower Decker Creek

(Note) – another 2 ½ miles of dozer line was constructed outside the burned-area on private lands

M. Watershed Numbers: 160202030501 … Provo - Deer Creek
(6th field HUCs) 160202030405 … Deer Creek Reservoir / Provo River

N. NFS Acres Burned: 3,324 **Total Acres Burned:** 7,828

Other Land Ownerships … list as follows (acres):

(X) Private - 2,780 (X) Wasatch Mountain State Park - 1,485 (X) Deer Creek State Park - 239

O. Vegetation Types:	The majority of the burned-area consisted of mountain shrubs including oakbrush, maple, mountain big sagebrush, birchleaf mountain-mahogany, snowberry, bitterbrush and Wyoming big sagebrush (83 %); some of the lands surrounding the Deer Creek Reservoir had supported perennial and annual grasses along with scattered upland shrubs (7 %); a few mountainsides located on NFS lands had a mixture of aspen with spruce-fir – especially on the north aspects (7 %); the Provo - Deer Creek area had a distinct riparian zone consisting of species adapted to soils having a perched high water table (2 %) and the remaining areas were rock outcrops having < 10 % vegetative cover (1 %). (Uinta National Forest / GIS Database)
P. Dominant Soils:	The benches, foothills and ridgetop areas occurring in close proximity to Deer Creek Reservoir have soils classified as Typic Calcixerolls, Typic Argixerolls and Pachic Argixerolls; the low elevation mountainsides of Wasatch Mountain State Park have soils identified as being Lithic Argixerolls, Lithic Haploxerolls and Typic Haploxerolls; the high elevation mountain landscapes occurring on NFS lands have Pachic Cryoborolls, Argic Pachic Cryoborolls while the riparian zones observed along Provo - Deer Creek have both Fluventic Haploxerolls and Cumulic Haploxerolls with small inclusions of wetland areas. (USDA - SCS / Soil Survey Report for the Heber Valley Area, 1976)
Q. Geologic Types:	The burned-area has several types of geologic formations and surficial deposits. Most of the southern ½ of the fire has soils derived from latite parent material; much of the land administered by Wasatch Mountain State Park has soils formed in mixed shales; the vast majority of NFS lands have soils weathered from either limestone or sandstone; the Cascade Springs area was actually shaped from

	glacial deposits, while the Provo – Deer Creek drainage has inherited its land resources from mixed alluvial sediments. (Utah Geological and Mineral Survey, 1980)

R. Miles of Stream Channels by Order: (Strahler 1952 method, within the fire perimeter)

- **Provo - Deer Creek drainage**

Zero: -0- 1st: 9.1 2nd: 1.8 3rd: 6.2 4th -0- 5th: -0-

- **Deer Creek Reservoir drainage**

Zero: -0- 1st: 8.1 2nd: 1.1 3rd: 0.7 4th -0- 5th: -0-

S. Transportation Systems: (occurring within the fire perimeter)

Trails … ¾ mile (USDA - Forest Service)
Trails … 0 miles (Private Ownership)
Trails … 0 miles (State Parks - 2)

Total Trails … ¾ mile (Cascade Springs Site)

Roads … 8.92 miles (USDA - Forest Service)
Roads … 6.59 miles (Private Ownership)
Roads … 7.83 miles (State Parks - 2)

Total Roads … 23.34 miles

PART 3 … WATERSHED CONDITION / NFS PROBLEM INVENTORY

A1. Mapping of the Burn Severity Zones: (7,828 total acres occur within the perimeter of the Cascade II - Fire)

1,406 High (18 %) 3,580 Moderate (46 %) 2,842 Low / Unburned (36 %)

A2. Mapping of the Burn Severity Zones: (NFS lands … 3,324 acres)

308 High (9 %) 1,573 Moderate (47 %) 1,443 Low / Unburned (44 %)

B. Estimation of Water-Repellent soils occurring within the different Burn Severity Zones:
(NFS lands … 3,324 acres)

216 High (70 %) 786 Moderate (50 %) 72 Low / Unburned (5 %)

Overall Total = 1,074 acres (~ 32 % of the NFS acreage)

C. Rating Soils for Potential Erosion Hazards within the Fire Perimeter: (NFS lands … 3,324 acres)

High	Moderate	Low
632 (19 %)	1,463 (44 %)	1,229 (37 %)

D. Potential for Accelerated Erosion Losses without applying emergency stabilization treatments: **(Numbers below are estimates based upon erosion modeling. Actual amounts can vary significantly from the numbers below. The amounts shown below should only be used to compare the magnitude of change in erosion potential rather than actual predicted amounts)**

1st Year	2nd Year	3rd Year	4th Year
28.5 tons/acre/year	13.3 tons/acre/year	7.6 tons/acre/year	4.6 tons/acre/year

Overall Total = 26,898 tons

(additional erosion over a 48 month period)

(Source) – Disturbed WEPP model … http://www.forest.moscowfsl.wsu.edu/fswepp/

E. Total Sediment Potential: 4,544 tons / mile ^{2} … according to the PSAIC sediment yield model

PART 4 … HYDROLOGIC DESIGN FACTORS with CALCULATED RISK and CLIMATE EVALUATIONS

The following table is for the Provo - Deer Creek drainage:

A. Estimated Vegetative Recovery Period: 3 years
B. Design Chance of Success: 80 percent
C. Equivalent Design Recurrence Interval: 50 year
D. Design Storm Duration: N/A *
E. Design Storm Magnitude: N/A *
F. Design Flow: 22.4 ft^3 / sec / mi^2
G. Estimated Reduction in Infiltration: 7 percent
H. Adjusted Design Flow: 24.0 ft^3 / sec / mi^2

(Note *) – the design flow of Provo - Deer Creek at the confluence of the South Fork of Provo – Deer Creek is based upon USGS published equations that estimate the magnitude and frequency of flood-peak discharges based on analysis of gage station data in the region (USGS, 1999)

PART 5 … SUMMARY OF SURVEY & ANALYSIS

WYDEN AMENDMENT

"The Wyden Amendment authorizes the Forest Service to enter into cooperative agreements with willing Federal, tribal, State, and local governments, private and nonprofit entities and landowners for the protection, restoration, and enhancement of fish and wildlife habitat and other resources on public or private land, for the reduction of risk for natural disaster where public safety is threatened, or for a combination of both that benefit resources on NFS lands within the watershed."

The 27.0 square mile Provo Deer Creek drainage contains lands owned by the State of Utah, Uinta National Forest (NF) and other private entities. The State of Utah owns 4.8 square miles, the Uinta NF 18.6 square miles and private entities 3.6 square miles. The headwater area of the watershed is managed primarily by Wasatch State Park. The Uinta National Forest manages the western portion of the watershed, while the eastern and southern portions are privately held.

The Uinta NF is recommending to treat National Forest System Lands with Burned Area Emergency Response (BAER) funds in an attempt to protect water quality, aquatic habitat, recreation facilities, and road infrastructure. BAER Treatments include: straw wattles, aerial seeding and mulching, channel structures, and road reconditioning. Provo Deer Creek provides culinary water to communities in Salt Lake and Utah Counties as well as a rural subdivision within the watershed.

Treatments covered by Forest Service BAER funds cover only National Forest System Lands within the western part of the Provo Deer Creek watershed. The majority of the eastern half of the watershed burned with high or moderate burn intensity and is managed by the Wasatch Mountain State Park and other private land owners. Due to this fact, it is imperative that areas affected by the Cascade II Fire on State and private lands within the Provo Deer Creek watershed be treated.

The Wyden Amendment provides the Forest Service a tool to operate more efficiently across multiple ownerships. The Amendment gives the Forest Service authority to treat upstream State and private lands affected by the Cascade II Fire. Treatment of these lands, in conjunction with the Forest Service BAER Program, will benefit National Forest System lands by reducing impacts to resources such as: soil productivity, water quality, fish and aquatic habitat, recreational facilities and road infrastructure.

The Wyden Amendment allows the Forest Service to develop collaborative relationships with State and private entities. For the Amendment to work, cost-share agreements with the State of Utah and private landowners are desireable. For example, the State may provide a helispot and staging area within Wasatch Mountain State Park for implementation of BAER treatments. This opportunity would reduce the cost of treatment implementation by lowering flight time as well as eliminating the cost of leasing a helispot.

The Cascade II Fire burned over 7,800 acres on a mosaic of federal, state, and private lands. The Initial BAER Assessment illustrates that critical values at risk exist within and downstream of the burned area. Culinary water supplies for over one million people, important habitat for fish and wildlife, and transportation and recreational facilities all have the potential to be impacted by the Cascade II Fire. The Wyden Amendment helps ensure that risks to the above mentioned resources will be substantially reduced.

A. Describe the Watershed Emergency:

- **THREATS TO WATER QUALITY** … the Cascade II Fire affected watersheds that supply irrigation and culinary water to Utah and Salt Lake Counties. These counties are home to over 1 million people combined. Two major watersheds were affected by the recent fire incident. Streams on the western half of the fire drain to Provo Deer Creek while streams on the eastern half drain to Deer Creek Reservoir. Drinking water is supplied to Provo, Orem and Salt Lake City as well as a small subdivision (Canyon Meadows) whose source of drinking water is from Provo Deer Creek just below the Forest boundary. The Provo River main stem and Deer Creek Reservoir are major suppliers of culinary water for the Salt Lake/Utah County area.

  The main threat to water quality is the delivery of ashy sediment and nutrients into drinking water sources, mainly Provo Deer Creek, Provo River, and Deer Creek Reservoir and the threat of sediment and nutrients flowing into Cascade Springs. Effects to water from increased runoff and erosion are most likely to occur in the next 2 - 3 years during spring runoff and / or summer / early fall thunderstorms in

fire affected areas without ground cover. Prior to the Cascade II incident, streams and rivers in the area were buffered with healthy riparian stands and the upland areas had thick dense stands of mountain brush. The fire burned large areas of upland vegetation and several areas in riparian communities that normally buffer sediment and nutrient transport and protect water quality. Also, there are steep hillsides immediately adjacent to the riparian areas that were burned mainly along the perennial Provo Deer Creek and along many ephemeral streams. Deer Creek Reservoir is currently listed on the State of Utah / 2002 - 303(d) List for temperature and dissolved oxygen. Additional sediment or nutrients transported to the Deer Creek Reservoir may further impact water quality. The fire burned the mountain brush that surrounds Cascade Springs leaving the spring at risk for increased sediment and nutrient loading.

- **LOSS OF LONG - TERM SOIL PRODUCTIVITY** … most of the soils occurring within the HIGH severity burn zones of the Cascade II Fire exhibit a moderate to high degree of hydrophobicity (water-repellency) at sampling depths of ½ to 3 inches below the ground surface. Hydrophobic soils are common after wildland fire and are a temporary condition that may persist for a period up to 3 years. Hydrophobic soil conditions greatly modify the burned area hydrologic function by restricting, and in some cases preventing, water infiltration into soils, thus increasing water runoff and the potential for increased soil erosion.

  Prior to the burn, the maximum threshold for soil loss tolerance was estimated to be at 4.6 tons/acre/year (Disturbed WEPP – Soil Erosion Model) within the Cascade Springs area. Immediately after the burn, initial soil loss has the potential for accelerated rates of erosion of up to 28.5 tons/acre/year – and, at the end of Year Two is estimated at 13.3 tons/acre/year. Although these are estimates with +- 50% or more reliability the estimates indicate a potential increase of erosion amounts of a magnitude of 5-7 in the burn area.

  Soil associations found in very steep terrain and classified as loamy soil textures, occur in the HIGH burn severity areas within the Cascade II Fire perimeter on Forest Service, Wasatch Mountain State Park, and private lands. These soil associations are characterized as having rapid runoff with high erosion hazard. Each of the HIGH burn severity zones are either upslope from, adjacent to, or drain immediately into Provo Deer Creek, which is the primary culinary water source for the Canyon Meadows housing community.

  A MODERATE burn severity zone which is immediately adjacent to Provo Deer Creek, south of Cascade Springs, contains a thin 6-inch topsoil horizon. Future soil productivity will be negatively impacted by any loss of these slightly hydrophobic, thin top soils. In addition, due to the large drainage area and the long continuous slopes associated with these denuded east-facing hillsides, an imminent threat to sediment delivery is posed for Provo Deer Creek.

  Wasatch County's main transportation route into Cascade Springs is located within Wasatch Mountain State Park. This road is threatened by very steep (40% to 60% slopes), north facing HIGH burn severity slopes and south facing MODERATE burn severity slopes, both with loamy soils. This primary transportation corridor is threatened by debris flows in a major rainfall event. Additionally, it should be noted that the ephemeral, riparian corridor that once existed in this steep, short canyon is occupied by the road surface, diverting drainage directly into the Cascade Springs area and away from the natural channel located at the lower end of the canyon.

Cascade Springs Road, FSR 114 … road is two-laned and paved, connecting the Alpine Loop, SR 92, to the Cascade Springs Interpretive Site. The road may not be closed until the normal winter closure. Many culverts are 15" in diameter and most are only partially open or are entirely inoperable. Under these conditions, the culverts may not be able to sufficiently handle increased water flows and may overtop the road, leading to dangerous driving conditions or road closures. Increased pore pressures in the road prism may cause damage to the road. The road passes directly through the burned area and is mostly bordered by low and moderate intensity burns. Several culverts have been identified that allow the road to cross specific drainages impacted by high intensity burns that run a risk of increased water flows.

Little Deer Creek Road, FSR 475 … road is accessible to four-wheel drive vehicles. It continues south from the Cascade Springs Road and provides an outlet to Provo Canyon. Road may be subject to RS2477 claims, and may not be closed until normal winter closure. The road contains native surface with three culverts that are damaged or silted in. Under these conditions, the culverts may not be able to sufficiently handle increased water flows and may overtop the road, leading to dangerous driving conditions or road closures. Because of the nature of the native surface, the road is susceptible to erosion, rutting, and other water damage. The road is located near the Provo Deer Creek stream channel. Without proper drainage structures, sediment from the road will enter the waterway.

Bear Canyon Road, FSR 196 … road is a native surface road within the fire boundary. It passes through areas of high and moderate intensity burns. The road provides access to the Bear Canyon Spring that services the Cascade spring water system. The water system needs to be monitored to verify that there are no adverse effects due to the fire. There are no drainage structures on the road. The road is narrow and has worn deep into the ground with the road surface being 1.5 feet below the surrounding ground. Because of the nature of the native surface, the road is susceptible to erosion, rutting, and other water damage. There is a waterline buried under a portion of the road. Erosion of the road could lead to unearthing the water line.

The road that continues east from Cascade Springs into Wasatch Mountain State Park … is steep, with grades greater than 10%. It is located in the bottom of the drainage. Both faces on either side of the road are burned with high and moderate intensity burns with steep slopes. In a major event, the water will be channeled down the road and threaten the Cascade Springs facility. The road is a native surface and highly susceptible to erosion due to the steep grades.

Host site with a Septic Tank and Drainfield … in a major event the ground could become saturated and the effectiveness of the waste-water treatment could be compromised. Waste water must not be allowed to surface, or enter the ground water. Additionally, there is the potential of damage due to soil erosion or movement. Should the ground become saturated, the septic tank will be lifted out of the ground due to buoyancy.

Another drainfield … that supports the comfort station at the Cascade Springs facility is located west of the road that continues next to Deer Creek. Above the road is a drainage that passes through a culvert to the area where the drainfield is located. Again, in a major event the ground could become saturated and the effectiveness of the waste-water treatment system could be compromised. Waste water must not be allowed to surface, or enter the ground water. Additionally, there is the potential of damage due to soil erosion or movement.

There are several locations in the burned-area where the lack of vegetation could encourage illegal off-road use. This could cause severe resource damage and accelerate erosion.

Off-Forest Locations …

Decker Canyon … is fed by tributaries that have high intensity burns. The roads will experience high flows through the culverts. These roads are also native surface. Because of the nature of the native surface, road is susceptible to erosion, rutting, and other water damage. These roads will be needed for other resource protection activities, including access to power lines and railroad.

The Heber Valley Railroad … is a privately operated railroad and represents an economic interest. The railroad is eligible for the National Register of Historic Places. The railroad crosses the major drainages, Decker Canyon and Provo Deer Creek, and other 1st and 2nd order drainages. The major culverts have large amounts of debris at the inlet, are silted in, or have vegetation clogging the channel. The culverts and railway could be compromised by a major event. The railway was closed during the fire, but has since reopened.

Canyon Meadows … a small community, takes its water directly out of Provo Deer Creek, approximately 30 feet downstream from the Forest Boundary, on private property. The collection device consists of a 12" diameter pipe, with a ½" screen secured to its end laid directly in the stream. The system provides culinary and irrigation water for a community of about 42 homes. Treatment includes coagulation, flocculation, filtration and disinfection, as required for treatment of surface water by the State of Utah Drinking Water Rules. The system stores treated water in a tank that has an effective volume of 130,000 gallons. The system is operated daily during the irrigation season and twice a week during the winter on an as needed basis. The system is equipped with online turbidity monitoring, but there is no warning system provided for influent water.

- **FS / CASCADE SPRINGS - RECREATION SITE** …

The Cascade Springs area containing the interpretive materials and facilities sustained low to intense burning. The area that sustained the most heat is in the upper springs area on the west and south west side. Most of the riparian area appears to be unaffected. A dry stream bed, diversion ditch, and steep hillside pose erosion problems, if left unprotected, in the event of a heavy rain or spring runoff which would cause ash and silt to contaminate the springs.

The Cascade Springs VIS 8323 site north of the main spring area was developed for drinking water in 1985. It has been intermittent since 1985, but has produced water in high water years such as 1996. It is connected to the Bear Canyon system currently providing potable water to Cascade Springs VIS, and will be used as supplemental water in the event it starts flowing again. The post and rail fence that burned defined the dry spring area. A cement ditch around the west side of the spring diverts runoff water from the asphalt Cascade Springs road 114 away from the spring to prevent contamination. The State Division of Drinking Water requires a minimum cover of topsoil over a spring site. Erosion of the topsoil would compromise the viable integrity of the spring source and contaminate the water supply.

- **NOXIOUS WEEDS and INVASIVE PLANT SPECIES** … due to both the fire itself and the suppression activities are of immediate concern to the Uinta NF / BAER Team. Populations of Canada thistle, Musk thistle, Scotch thistle, Leafy spurge, Dalmation toadflax, Cheatgrass and Field bindweed were present within the fire area prior to the ignition. The loss of vegetation cover and soil disturbance caused by the fire has opened up an " invasion window " for colonization by noxious weed species in previously uninfected areas.

Canada thistle (*Cirsium arvense*) - Is a colony-forming perennial from deep horizontal roots. Is highly aggressive and difficult to control.

Musk thistle (*Carduus nutans*) - Invades disturbed areas spreading rapidly and forming dense stands which crowd out desirable species.

Scotch thistle (*Onopordum* acanthium) - Large colonizer in disturbed areas. Can form dense stands that are impregnable to large mammals.

Leafy spurge (*Euphorbia esula*) - Colonizer that has an extensive root system that can sucker. Forms dense colonies that out compete native vegetation

Dalmation toadflax (*Linaria genistifolia*) - Is a deep rooted invader that crowds out native vegetation.

Cheatgrass (*Bromus tectorum*) - Winter annual that can vigorously compete with natives for early spring and early summer moisture. Cheatgrass cures early in the summer providing flashy fuels early in the fire season.

Field bindweed (*Convolvulus arvensis*)- Extensive and deep root systems - which give rise to lateral roots that can sucker.

♦ **ADDITIONAL CONCERNS BY THE RESOURCE SPECIALISTS** …

Protection of Bonneville Cutthroat Trout Conservation Habitat … The South Fork Deer Creek contains a genetically pure population of Bonneville cutthroat trout, listed as a Sensitive Species by the Forest Service and, a conservation species by the State of Utah, and has been certified to be whirling disease free. Of particular concern is the area between 0.4 and 1 mile from the confluence with Provo Deer Creek, where the area adjacent to the riparian area burned with moderate intensity. This area has the potential to have a minimal increase in ash and sediment yields resulting strictly from the fire. These potential increases in ash and sediment yields are not expected to damage existing cutthroat habitat within and below the fire perimeter.

Invasive Species Control on Critical Wintering Habitat … The Utah Department of Wildlife Resources (UDWR) has identified 2699 acres of critical elk wintering habitat and 1080 acres of critical deer habitat that has burned, all on private and State lands. Invasive grasses such as cheat grass (Bromus tectorum) existed in the area prior to the Cascade II Fire. This species recovers rapidly following a fire, thereby suppressing native plant growth.

Protection of the Provo River / Class I Fishery from Sedimentation and Nutrient Deposition through the Provo Deer Creek Tributary … The Provo Deer Creek is a tributary to the Provo River, a class 1 fishery. The current situation will allow ash, nutrients and sedimentation to occur within the Provo Deer Creek, which will in turn flow down into the Provo River, a popular fishing destination. Areas of concern extend from directly below the Cascades Springs area until the edge of the burn. The drainage to the northwest of the springs has the potential for sheet erosion to occur and deposit sediments, ash and nutrients into the Provo Deer Creek directly below the springs. The hills and ranges southwest of the springs also have the potential for sheet erosion to occur and deposit sediments, ash and nutrients into the creek. The length of the Provo Deer Creek from the springs south to the edge of the burn currently will allow sedimentation, ash and nutrients to enter the stream.

B. Emergency Treatment Objectives:

The primary objectives of the Cascade II Burned-Area Emergency Response program are to recommend prompt actions deemed reasonable and necessary to effectively protect, reduce or minimize significant threats to human life and property and prevent the unacceptable degradation of both soil and water

resources. The emergency treatments being recommended by the Uinta NF / BAER Team are specifically designed to achieve the following results:

- Maintain Regional and Forest Plan standards for long-term soil productivity and promote the recovery of hydrophobic soil conditions through vegetative re-establishment of severely burned areas.

- Conduct monitoring for early detection and eradication of noxious weed species to ensure the burned-area can recover to a properly functioning condition.

- Establish vegetative cover, trap upland sediment and nutrients, and install structures that will capture mobilized sediment and nutrients to protect downstream culinary water quality, aquatic resources, and fish habitat.

- Protect Provo Deer Creek from increased sediment delivery and possible debris flows as a result of increased burn area runoff. This recommendation falls under the Wyden amendment and includes treatment of HIGH burn severity slopes on Forest Service, State, and private lands inside the Provo Deer Creek watershed.

- Use seeding, straw mulching, and straw wattles within the Cascade Springs watershed to protect main transportation routes, parking lots, and structures from increases in runoff and sediment transport. Seeding and straw mulching is recommended around the entire upper spring and upper parking lot areas to stabilize erosive soil and ash, especially on steep slopes. Straw wattles will be used along the upper path area and hillside to catch erosive material. The existing diversion ditch bank has eroded in a 10 ft. wide area which has allowed runoff to create another gully that descends directly onto the asphalt path. Straw wattles and restructure of the ditch bank are needed in the gully.

- Clean out the cement ditch so it flows properly to carry any ash and erosion away from the spring. Reseed spring area to prevent erosion of topsoil.

- Ensure that increased flows will be able to move through the drainage structures on the Cascade Springs Road and not impact the road prism integrity. Armor inlets and outlets of culverts in critical drainages, specifically Bear Canyon and Provo Deer Creek.

- Prevent the Little Deer Creek Road from rerouting and concentrating overland runoff that can produce and deliver sediment to the channel network via the road prism. Keep erosion from unearthing the sewer line buried at the bottom of the cutslope along the road, as well as prevent the road from washing out or becoming impassable to protect possible RS2477 rights.

- Prevent the Bear Canyon Road and from rerouting and concentrating overland runoff that can produce and deliver sediment to the channel network via the road prism. Keep erosion from unearthing the water line buried beneath the Bear Canyon Road.

- Prevent “ The Cove ” Road from rerouting and concentrating overland runoff that can produce and deliver sediment to the channel network via the road prism.

- Prevent large amounts of water accumulation from being concentrated and rerouted on the road east of Cascade Springs within Wasatch Mountain State Park. Reroute the flows to the natural drainage and ensure the culvert will support the increased flows.

- Prevent any septic tanks and drainfields within the burned area from becoming saturated by slowing flows that will encourage infiltration upslope and divert flows around the facility.

- Discourage illegal off-road use in all recovering areas.

Off - Forest Locations …

- Prevent the Little Deer Creek Road from concentrating and rerouting overland runoff that can generate and deliver sediment to the channel network via the road prism. In addition, prevent road from washing out or becoming impassable

- Ensure that increased flows will be able to move through the drainage structures on the Heber Valley Railroad and not affect the integrity of the railroad prism.

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

Land … 80 % Channel … 75 % Roads … 80 %

D. Probability of Accomplishing Treatment Success:

< ---------- Years after Treatment ---------- >

	1	3	5
♦ **Land**	**70 %**	**80 %**	**90 %**
♦ **Channel**	**80 %**	**75 %**	**70 %**
♦ **Roads & Trails**	**90 %**	**85 %**	**80 %**

E. Cost of Taking No-Action: (including potential loss) Some of the impacts directly related to taking no action on this fire incident would include contaminating the culinary water supply of the residents living in the affluent community of Canyon Meadows (~ $ 21,000,000 worth of property); secondly, if ash, sediment and debris becomes transported into Deer Creek Reservoir and the Provo River … it will adversely affect the recreation activities and drinking water supply for the residents of Utah and Salt Lake Counties (~ 1,000,000 people). This situation actually occurred during CY 2000 when a small episode of flooding from the East Vivian Fire contaminated the drinking water supply in Provo River for a period of about 1 week. This caused Provo City and the Central Utah Water Conservancy District to acquire its water elsewhere in order to match the demands of its customers. Their back-up in this situation was to draw water from Deer Creek Reservoir. In this particular instance, if sedimentation runs off the burned areas, both the Provo River and the Deer Creek Reservoir will be affected leaving no back up water supply. This could eventually impact 3 treatment facilities within Salt Lake County and 1 treatment facility in Utah County. The USDA – NRCS has described the current situation as being **Urgent and Compelling** in its request for EWP funds. Other important values include the transportation surfaces located within the perimeter of the burned-area, potential impacts to the FS / Cascade Springs Recreation Site and affects to the State of Utah and private lands.

Dave Picher, Chief Engineer with the Central Utah Water Conservancy District evaluated the impacts as follows:

> *"The cost the agencies would potentially incur would be the cost to replace the water from other sources, but during certain times of the year the Provo River water is the primary source and could not be replaced by other sources. The cost of replacement water varies between $50.00 and $300.00 per acre foot, averaging $150.00 per acre foot. The quantities of water for culinary use average 206 acre feet per day during October 15 to April 30 ($30,900/day); 830 acre feet per day from May 1 to August 31 ($124,500/day); and 326 acre feet per day from September 1 to October 15 ($48,900/day). From the estimated costs it is clear that multiple rain storm events and flash floods or snow melt runoff could increase the estimated impacts to exceed $1,000,000.00 per year. The estimated impacts are only for drinking water uses and do not include other impacts such as the aquatic fishery uses, especially the endangered species, June Sucker, native only to the Provo River."*

F. Cost of the Recommended BAER Treatments on NFS Lands: (including loss) Approximately $ 1,250,000 … since the treatments are expected to be about 70 to 90 % effective during the 1st year after the burn.

G. Skills Represented on the Burned-Area Survey Team:

(X) Soils (2)	(X) Geology	(X) State Parks (2)	(X) TES … Plants
(X) Hydrology (2)	( ) Contracting	(X) TES … Wildlife	(X) Fire Dispatch
( ) Ecology	(X) Helicopter Crew	( ) Research	(X) Archeology
(X) GIS Staff (2)	( ) Range	(X) District Staff (2)	(X) Engineering
(X) TES … Fisheries	(X) USDA - NRCS	(X) Utah - DWR	(X) Lands Specialist
(X) Botany (2)	(X) USDI - BOR	(X) Public Affairs	(X) BAER Assistant

Co-Team Leaders: Reese Pope (Ecosystem Group Leader / Uinta National Forest)
Michael D. Smith (Soil Scientist / Fishlake National Forest)

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H. **Treatment Narrative - NFS Lands with BAER Funds:**

(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** …conduct aerial seeding on 923 acres of high elevation landscapes using a Type III helicopter East of Provo – Deer Creek ($87, 685); use a fixed-wing aircraft to seed another 144 acres

on a landslide bench located south of the Cascade Springs area along the Provo – Deer Creek ($9, 168); hand seed about 11 acres of fragile riparian zones located in several places along the Provo – Deer Creek drainage ($2,838); aerial mulch 490 acres of severely burned terrain using a Type III helicopter – the application rate will be 1 ton / acre ($449, 330); hand mulch another 11 acres in the vicinity of Cascade Springs using a Type II / Fire Crew ($7, 117);

- place 10,000 linear feet of straw wattles in fire-damaged areas along the Provo – Deer Creek drainage south of Cascade Springs ($21, 000); place 5,000 linear feet of straw wattles using a Type III helicopter West of Provo – Deer Creek transport ($23, 000); at the Cascade Springs Interpretive site: clean the diversion ditch ($200), place another 5,000 linear feet of straw wattles directly adjacent to the springs ($10, 500), install 60 feet of V-Mesh fence in a channel to trap debris ($900), hand seed and mulch another 39 acres located near the springs ($35, 295). (Total … $636, 533)
- Project inspectors will evaluate land treatments during implemention to assure contract specifications are being met. Some of the critical contract implementation questions for the contracting officer's representative (COR) include the following (Total $7,000):

  Seeding
  - Was the seed purchased certified to be free of noxious weed species ?
  - Was the seed tested for its germination rate?
  - Were the Helitack and ground crew of sufficient number to support the operation?
  - Was the proper Helispot selected for the mission with respect to safety and turn-around time between flights?
  - Was the seed protected from moisture prior to its application on-the-ground?
  - What was the soil moisture content at the time of the seeding?
  - What were the weather conditions at the time of seeding – especially wind speed and wind direction?
  - How did the pilot keep track of his flight lines … on-board GPS unit, orange flagging dropped from the seeding bucket or support crew working on-the-ground?
  - Was the seed pre-coated with a micronutrient powder to enhance its germination rate?

  Mulching
  - Was the straw product certified to be free of noxious weeds?
  - What was the moisture content of the straw at the time of application; was it considered ideal for spreading the mulch?
  - Was the straw delivered to the staging area / helispot when it was needed for the treatment?

  Straw Wattles
  - Were the correct number of straw wattles applied to the landscape?
  - Were the wattles staked down into the ground every 4 feet using 24 " wood stakes?
  - Were the wattles placed flush against the ground surface?
  - Was the site preped before the treatment was implemented?
  - How many wattles could the Helitack Crew safely sling at one time using an 18 x 18 ' cargo net under a Type III helicopter?
  - Was the spacing on the wattles correct and according to manufacturer recommendations?

- **Seed Mix Used for Hand Seeding of Riparian (*)**

Plant Species	Pounds PLS / acre	Cost per Pound	Cost per Acre
Cereal Barley	35	$0.30	$10.50
Blue Wildrye	1	$4.25	$4.25
Kentucky Bluegrass	1	$1.00	$1.00
Thickspike Wheatgrass	2	$2.00	$4.00
Creeping Wild Rye	2	$7.25	$14.50
Seed Total (~$34.25 / acre for 23 acres)			$788.00
Misc. supplies (rakes, 1 belly grinder, gloves, PPE)			$250.00
Total Seed Mix and Supplies			***$1,038.00***

- **Seed Mix Used for Hand Seeding of Uplands (*)**

Plant Species	Pounds PLS / acre	Cost per Pound	Cost per Acre
Cereal Barley	30	$0.30	$9.00
Mountain Brome	4	$2.25	$9.00
Slender Wheatgrass	4	$1.50	$6.00
Blue Wildrye	0.5	$4.25	$2.13
Sandberg Bluegrass	1	$3.50	$3.50
Thickspike Wheatgrass	2	$2.00	$4.00
Seed Total (~$33.63 / acre for 39 acres)			$1,312.00
Misc. supplies (rakes, 1 belly grinder, gloves, PPE)			$250.00
Total Seed Mix and Supplies			***$1,562.00***

- **Seed Mix Used for Helicopter Seeding of Uplands (*)**

Plant Species	Pounds PLS / acre	Cost per Pound	Cost per Acre
Cereal Barley	30	$0.30	$9.00
Mountain Brome	4	$2.25	$9.00
Slender Wheatgrass	4	$1.50	$6.00
Blue Wildrye	0.5	$4.25	$2.13
Sandberg Bluegrass	1	$3.50	$3.50
Thickspike Wheatgrass	2	$2.00	$4.00
Seed Total (~$33.63 / acre for 923 acres)			$31,040.00
Misc. supplies (flagging, target flags, 8 rolls plastic covreing)			$1,000
Total Seed Mix and Supplies			***$31,040.00***

* ***NOTE:*** Seed mixes were developed with the intention of: 1) providing quick cover for high and moderate intensity burn areas, 2) breaking up hydrophobic soil conditions on high intensity burn areas, 3) reducing sediment transport from the burn area, 4) reducing impacts to downstream water quality and aquatic habitats, 5) reducing the risk of noxious weed establishment within the burn area, and 6) following 2003 Uinta National Forest Land and Resource Management Plan Goals, Objectives, Standards and Guidelines for vegetation management.

- **Channel Treatments** … place 1, 080 feet of channel fence in the drainages of Bear Canyon and Provo – Deer Creek along the tributaries leading into the drainage from the landslide bench. ($ 16,200)

- **Roads and Trail Treatments …** in areas along the paved road leading into the FS / Cascade Springs site from the Sundance Resort, clean culverts along 4.3 miles of the road ($7,998); re-condition 3.78 miles of road surface affected by the burning disturbance in Bear Canyon ($15,220); replace and enlarge 1 culvert located under the paved road surface ($16,952); replace and enlarge 1 culvert located under a native road surface ($6,460); use 20 yd ^{3} to riprap culvert inlets at several locations on NFS lands ($2, 860); install 600 linear feet of diversion ditches around a septic drainfield to protect the Cascade Springs site from accelerated rates of erosion ($1,260); obliderate 0.59 miles of road on Wasatch Mountain State Park ($4,900; Wyden Authority area); channel shaping and stabilization activities above the road at Cascade Springs ($3,180); to prevent a loss of water control and spend 20 days on contract administration. ($7,560) (Total …$66,390)

- These treatments will also be reviewed during implementation to assure compliance with contract specifications. Most importantly, COR inspectors will determine if the road treatments (culvert cleaning and / or replacement, re-conditioning of the transportation surfaces, constructing waterbars with hand crews etc.) were completed in a timely manner. (Total…$200)

- **Structures …** None ($ -0-)

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)

During Year # 1, monitoring activities need to be conducted in connection with the IMPLEMENTATION of authorized BAER treatments on NFS lands.

The aerial seeding needs to be reviewed to determine if the correct seed mix was actually applied to the intended landscapes; secondly, monitoring will indicate if the aircraft selected for the job effectively seeded the recommended treatment areas. Monitoring needs to review whether or not the 45 ft ^{3} / Isolair Seeding Bucket (helicopter operations) or seeding hopper (fixed-wing) were correctly calibrated at a rate of ~ 60 seeds / ft ^{2} for the seeding operation.

The aerial mulching treatment needs to be monitored for its rate of application (~ 1 ton / acre) on severely burned landscapes. Did the treatment achieve its objective of getting 60 to 70 % ground cover within the HIGH burn severity zones? Was the aircraft selected for the job (i.e. Kmax, Long Ranger 206 / L-1, A-Star / B-3, Bell 205 etc) considered to be appropriate?

(Note) – we suggest using an A-Star / B-3 helicopter for its incredible functionality and reasonable cost to spread the straw mulch. From past experience, we know the aircraft is suited for this type of mission because it has ample lift and maneuvers well in our high elevation, mountainous type terrain.

Did the mulching-by-hand achieve the desired results at the FS / Cascade Springs Recreation Site? Should more of the burned-area have been treated with mulching-by-hand using a Type II Fire Crew? Was the application rate of the mulch at 1 ton / acre really appropriate on NFS lands? Should a rate of 1½ tons / acre be applied to the steeper terrain of Bear Canyon for erosion control measures?

Did straw wattles actually limit erosion and trap sediment at Cascade Springs to protect the FS / Recreation Site? Were the wattles effective in protecting the water quality of Deer Creek Reservoir and Provo – Deer Creek? Could silt fences have been used more effectively? Would straw-bale check dams have worked better? Did upland big game animals (deer, elk and moose) disturb the wattles after the treatments were implemented? How many ft ^{3} of soil material was trapped as sediment behind the wattles? Could the

trapped sediment be used for reforestation activities? Were the wattles placed on terrain considered to be too steep? Were 30 ” wood stakes required to anchor the wattles in some areas?

Was the right size selected for the culvert replacements? Should more road closure gates have been recommended by the BAER Team? Should additional roads or trails be obliterated within the burned-area? Was it appropriate to re-open the burned-area to vehicular travel following control of the fire? Did the culverts get cleaned under the Heber Valley Railroad? Were there any issues related to water quality in either Deer Creek Reservoir or Provo – Deer Creek associated with the transportation surfaces? Did the roading treatments suggested … match the anticipated flows of a 2 – Year, 5 – Year or 10 – Year storm event?

Did the areas of concern for noxious weeds get monitored in a timely manner by the Ecologists or Botanists? Did the fire disturbance cause these weeds to spread across the landscape? What plans does the Forest have to eradicate these undesired plant species? Has the location of these noxious weeds been entered into the corporate GIS database for future BAER monitoring activities? If the distribution of noxious weeds becomes a significant problem following the burn … does the project need to be entered into the NFPORS Database to request NFP / KP2 funding to address the issue?

(Year 1 … $10,530)

****

During Years 2 and 3, the Uinta National Forest will continue to monitor the EFFECTIVENESS of the implemented BAER treatments. What species worked well within the broadcast seeding. Did we get new vegetation occurring in the treatment areas from the seeding? Was the straw mulch effective at limiting accelerated rates of erosion from the burned-area? Are the noxious weeds spreading throughout the burn? This would be an opportunity to set-up several photo points within the burned-area. Monitoring would take place during storm events, following strom events and throughtout the spring, summer and fall seasons. A final report would be prepared by the Forest following 3 years of making monitoring observations. Monitoring results would be shared with other Ranger Districts, Forests, Regional Offices and the Washington Office. An Interim BAER Report would be submitted in Years 2 and 3 in order to acquire the additional monitoring funds needed to complete the task.

(Year 2 … $10,215 and Year 3… $10,625)

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A detailed MONITORING PLAN has been included with this Initial BAER Report which discusses all of the intended actions currently being planned by the resource specialists and staff of the Pleasant Grove Ranger District; the plan includes a financial table which itemizes all the expected costs associated with conducting monitoring activities for a 3 year period of time. If necessary, the plan will be modified to reflect changes in the FS / BAER program … or, if additional treatments are implemented in the burned-area based upon the findings of an Interim BAER Report.

Part 6 – Emergency Stabilization Treatments and Source of Funds by Land Ownership

Table 1. Cascade II/ BAER -NFS Lands

Line items	Units	Unit Cost	# of Units	WFSU SULT $
A. Land Treatments				
Helicopter Seeding NFS Lands (BAER Funded) and State and Private Lands in L. Provo Deer Creek Subdrainage (BAER-Wyden funded)	acre	$95.00	167	$15,865
Fixed-wing high elevation seeding	acre	$63.67	144	$9,168
Hand seeding riparian	acre	$258.00	10	$2,580
Hand mulch riparian	acre	$647.00	10	$6,470
Helicopter Mulching NFS Lands (BAER Funded) and State and Private Lands in L. Provo Deer Creek Subdrainage (BAER-Wyden funded)	acre	$917.00	138	$126,546
Straw wattles with helicopter transport (5,000' in moderate intensity area west of Provo Deer Creek)	feet	$4.60	5000	$23,000
Straw wattles (5,000' along riparian area below moderate intensity area west of Provo Deer Creek; and 1,000' along base of high intensity area east of Provo Deer Creek and south of Cascade Springs)	feet	$2.10	6000	$12,600
Cascade Springs clean ditch	site	$200.00	1	$200
Cascade Springs straw wattle	feet	$2.10	5000	$10,500
Cascade Springs V-mesh fence	feet	$15.00	60	$900
Cascade Springs hand seed	acres	$258.00	39	$10,062
Cascade Springs hand mulch	acres	$647.00	39	$25,233
COR inspector	ea	7000	1	7,000
Subtotal Land Treatments				*$250,124*
B. Channel Treatments				
Channel fence (30' fences w/ 5 in The Cove drainage; 8 in Bear Canyon; 5 ea. at mouth of Tribs 1 & 2; 4 in two drainages in mod burn area w of Provo Deer Cr)	feet	$15.00	810	$12,150
Subtotal Channel Treatments				*$12,150*
C. Roads and Trails				
Clean culverts and open debris basins	miles	$1,860.00	4.3	$7,998
Recondition road, mechanical	miles	$4,026.00	3.03	$12,199
Install 36" culvert, asphalt surface	linear feet	$326.00	52	$16,952
Install 36" culvert, native surface	linear feet	$64.60	100	$6,460
Riprap culvert inlet and outlet	Cu Yd	$143.00	20	$2,860
Channel shaping and restoration	site	$3,180.00	1	$3,180
Install diversion ditches around septic drainfield	linear feet	$2.10	600	$1,260
Survey, Design, and Contract Administration	day	$280.00	28	$7,840
Subtotal Roads & Trails				*$58,749*
D. Structures				
E. BAER Evaluation				
FS BAER team (survey and initial report)	days	$4,550.00	13	$59,150
FS BAER team (travel)	days	$118.50	34	$4,029
FS BAER supplies	Each	2357	1	$2,357
FS BAER helicopter	hr	$675.00	1.5	$1,013
Subtotal Evaluation				*$66,549*
F. Monitoring				
Soil and Hydrology	Job	5710	1	$3,210
Erosion Control Seeding	Job	8650	1	$4,150
Noxious Weeds	Job	1900	1	$1,900
Archeological Sites	Job	850	1	$850
Engineering	job	700	1	$420
Subtotal Monitoring				*$10,530*
G. Totals				**$398,102**

Table 2. Cascade II / BAER - Wyden Authority Area

Line items	Units	Unit Cost	# of Units	WFSU SULT $
A. Land Treatments				
Helicopter Seeding NFS Lands (BAER Funded) and State and Private Lands in L. Provo Deer Creek Subdrainage (BAER-Wyden funded)	acre	$95.00	756	$71,820
Hand seeding riparian	acre	$258.00	1	$258
Hand mulch riparian	acre	$647.00	1	$647
Helicopter Mulching NFS Lands (BAER Funded) and State and Private Lands in L. Provo Deer Creek Subdrainage (BAER-Wyden funded)	acre	$917.00	352	$322,784
Straw wattles (4000' along Provo Deer Creek in high intensity area north of Cascade Springs road)	feet	$2.10	4000	$8,400
Subtotal Land Treatments				*$403,909*
B. Channel Treatments				
Channel fence (30' fences w/ 5 in Thomas Canyon and 4 at head of Trib 1)	feet	$15.00	270	$4,050
Subtotal Channel Treatments				*$4,050*
C. Roads and Trails				
Recondition road, mechanical	miles	$4,026.40	0.75	$3,020
Obliterate road	miles	$8,305.08	0.59	$4,900
Subtotal Roads & Trails				*$7,920*
D. Structures				
E. BAER Evaluation				
F. Monitoring				
G. Totals				**$415,879**

Table 3. Cascade II NRCS - EWP

Line items	Units	Unit Cost	# of Units	EWP ($)
A. Land Treatments				
Helicopter seeding - State and Private Lands (EWP funds)	acre	$123.00	1007	$123,861
Fixed-wing low elevation seeding	acre	$95.36	1768	$168,596
Hand seeding riparian	acre	$214.00	12	$2,568
Helicopter mulching - State and Private Lands (EWP funds)	acre	$448.00	652	$292,096
Subtotal Land Treatments				*$587,121*
B. Channel Treatments				
Channel fence	feet	$15.00	30750	$461,250
Subtotal Channel Treatments				*$461,250*
C. Roads and Trails				
Recondition road, mechanical	miles	$4,026.40	3.67	$14,777
Recondition road, salvage/replace existing gravel, mechanical	miles	$4,026.40	0.46	$1,852
Clean culverts and open debris basins, railroads	miles	$3,443.27	3.79	$13,050
Riprap culvert inlet and outlet	Cu Yd	$143.00	28	$4,004
Subtotal Roads & Trails				*$33,683*
D. Structures				
E. BAER Evaluation				
F. Monitoring				
G. Totals				**$1,082,055**

PART 7 … APPROVALS

1. **Forest Supervisor:** _____*/s/ Pete W. Karp* **Date:** ***October 10, 2003***_____

2. **Regional Forester:** ***_/s/ William P. LeVere for***_____ **Date:** ____10/14/03_____

NARRATIVES … SPECIALIST REPORTS

INTRODUCTION

September 23, 2003 the Uinta National Forest prepared to ignite a scheduled prescribed fire. The Spot Forecast was complete. At 0945 the wind was 0-1 SW, temperature 58 degrees, the Forecast was for a blocking high pressure system to continue to dominate. No drastic changes in the weather pattern were expected for the rest of the week. Warm and dry conditions were to continue over the next several days. A trough passing by to the northeast of the State was forecasted to increase mixing slightly over the next couple days and cool temperatures slightly the following day. High pressure was then forecasted to reestablish behind the trough and temperatures would begin to warm on Thursday. Planned ignition time of the prescribed fire: 1200 MDT 09/23/03.

Later that afternoon, at 1705 MDT, the Cascade II Fire Incident was established. The escaped fire incident burned 7,828 acres of Uinta National Forest, Wasatch State Park, Deer Creek State Park and private lands before containment was declared at 1900 on 09/29/2003. Primary plant communities affected by this fire include: Oak/Maple, Aspen, Mixed Mountain Shrub and sagebrush/grassland and riparian communities. Also damaged was The Cascade Springs Interpretive Site, the most heavily used developed recreation destination on the Pleasant Grove Ranger District. Rowdy Muir was the Incident Commander for the Type 2 Overhead Team assigned to this fire.

(Kathleen Twitchell, BAER Team Assistant and Michael D. Smith, Soil Scientist)

FIRE INTENSITY / BURN SEVERITY ZONES

The Uinta NF / BAER Team worked as a cohesive unit to determine the contrasting burn severity zones occurring within the perimeter of the Cascade II Fire Incident. We utilized aerial reconnaissance flights Type III helicopters (A-Star/B3) along with on-the-ground sampling activities to observe site indicators such as 1) depth and color of ashes; 2) size and amount of live fuels consumed; 3) organic litter consumption; 4) condition of plant root crowns; 5) soil crusting and 6) the degree and class of water repellency existing within the topsoil. In addition, we purchased SPOT satellite imagery of the recently burned-area on 10-28-2002 which included a fire intensity map. These products were used to refine the fire perimeter, produce a preliminary burn severity map to ground truth in the field, and were used to identify values-at-risk. The resulting product was a high quality display of burn severity for the Cascade II Fire Incident. The accurate mapping of the different burn severity zones is a critical step in the survey of the burned-area because it determines the overall potential for flooding within the disturbance along with identifying specific flood source sites occurring within the perimeter. The term BURN SEVERITY refers to the fire's effect on the watershed -- not necessarily on its intensity (fire intensity) as determined by overall flame height, canopy consumption or rate-of-spread. It's important to understand that the correct identification of burn severity remains "the key measure" concerning the severity of a particular burn and strongly implies its related impacts on the surrounding ecosystem.

Burn Severity Zones according to Land Ownership
(Cascade II Fire Incident)
< ---------- ***(acres)*** ---------- >

	Unburned / Low	Moderate	High	Totals
FS	1,443	1,573	308	3,324
State of Utah	661	580	479	1,720
Private	739	1,426	619	2,784
Totals	2,843	3,579	1,406	7,828

MAPPING BURN SEVERITY ZONES ... An efficient strategy is to sample sites on-the-ground that are initially estimated during reconnaissance flights as being within high, moderate, or low burn severity classes. Burn severity zones may cross 1) watershed boundaries, 2) vegetation types and 3) topographic features.

1. LOW BURN SEVERITY. On **low burn severity** sites the duff layer is partially consumed by the fire and very little heating of the soil surface layer occurs. The fire does not affect the soil hydrologic properties. Many unburned roots and seeds that are in the surface soil will aid in vegetating the burned areas. Natural re-vegetation on these sites will occur quickly. Typically, unburned trees and shrubs are present and provide cover that reduces soil erosion. Management activities using ground-based equipment are unlikely to increase soil erosion over that of similar unburned sites.

2. MODERATE BURN SEVERITY. **The moderate burn severity** sites have slightly altered surface soil structure, reduced numbers of fine roots and less seed viability in the soil surface. Natural re-vegetation on these sites is slower than a low burn severity site. In most places the duff is reduced to a layer of charred litter. Hydrophobic soil, or soil that as result of fire has a slightly glazed or impermeable layer right at the surface, conditions may occur under moderate burn severity sites, but are usually spotty and short-lived. Sites with moderate burn severity are more likely to lead to increased soil erosion if they are disturbed by ground based logging equipment or other disturbances. However, erosion control practices are effective on these sites and must be applied. These soils are also susceptible to physical disturbance caused by equipment.

3. HIGH BURN SEVERITY. **High burn severity** sites have modified surface soil properties. The surface soil structure has broken down, and a strong hydrophobic layer may be present. Soil conditions and a lack of organic duff layer or protective vegetative cover allows for rain-impact erosion at the surface, reduced infiltration, and increase the potential for erosion and runoff. There are few viable roots or seeds in the upper several inches of the soil. The natural re-vegetation on these sites is slow. Immediately after the fire these areas will usually experience accelerated water runoff and erosion for a period of time, until a vegetative cover becomes established and the hydrophobic conditions dissipate. These soils require special mitigation measures and management practices to

reduce the potential for even further soil erosion. The potential for erosion is highest on the steep slopes that burned with a high burn severity.

WATER REPELLENT SOILS … Water-repellent soils can occur naturally. Burned-areas with high intensity fires of long residence times are candidates for intensified water-repellent conditions. In addition, soil texture, moisture content, plant communities and depth of litter also affect the development or degree of water-repellency as a result of the fire incident. Evaluate all areas with intensified water-repellent conditions resulting from the fire as potential flood source areas.

1. **Degree of Water-Repellency**. The degree of water-repellency is based on the amount of time required for the absorption of a drop of water on a dry soil surface:

    a. **WEAK** … Less than 10 seconds.

    b. **MODERATE** … Between 10 and 40 seconds.

    c. **STRONG** … Longer than 40 seconds.

2. **Classes of Water-Repellency**. Classes of water repellency are based on the following rating system:

    a. **LOW** … No strong repellency except at the immediate soil surface and no moderate repellency below ½ inch. Repellency is very spotty in occurrence.

    b. **MEDIUM** … Some moderate repellency below ½ inch, but no strong repellency below 1 inch.

    c. **HIGH** … Moderate repellency between 3 and 6 inches or strong repellency below 1 inch. The degree of repellency is uniform in extent.

(Michael D. Smith, Soil Scientist; Kathleen Twitchell, BAER Team Assistant; and Bekee Megown, Fish and Wildlife Biologist)

GIS TECHNOLOGY

Cascade II / Fire Incident (30)

1. General Vicinity Map showing the Location of the recent Fire Incident
2. Detailed Vicinity Map with Shaded Relief showing the recent Fire Incident
3. Black & White Image from 1997 showing Pre-Burn Conditions
4. Land Ownership within the Fire Perimeter
5. Fire Progression Map of the Escaped Fire Incident
6. Burn Severity Zones occurring within the Burned-Area
7. Vegetative Communities occurring prior to the Disturbance
8. Geologic Formations within the Fire Perimeter
9. Pre-Historic Landslides occurring in the Burned-Area
10. Soil Survey Map of the Burned-Area
11. Suitability for Conducting Broadcast Seeding within the Burned-Area
12. Slope of the Upland Terrain occurring within the Fire Perimeter
13. Subwatersheds and Drainage Basins occurring within the Fire Perimeter I
14. Subwatersheds and Drainage Basins occurring within the Fire Perimeter II
15. Selected Drainages with High Severity Burns
16. Precipitation Zones occurring within the Burned-Area
17. Deer … Critical Winter Range Habitat
18. Deer … Critical Winter Range Habitat and Agricultural Lands
19. Elk … Critical Winter Range Habitat
20. Elk … Critical Winter Range Habitat and Agricultural Lands
21. Bonneville Cutthroat Trout and Riparian Habitat
22. Noxious Weeds occurring within the Burned-Area
23. Transportation Surfaces occurring within the Burned-Area
24. Methods of Seed Application
25. Rates for the Application of Straw Mulch
26. Land Treatments - Forest Service
27. Transportation / Water and Wastewater Treatments
28. Land Treatments - Wyden Authority
29. Land Treatments - NRCS / EWP funds
30. National Fire Plan / Key Point 2 - Rehabilitation and Restoration Treatments

This information was compiled from multiple source data and may not meet the U.S. National Mapping Accuracy Standard of the Office of Management and Budget. For specific data source

dates and / or additional digital information … please contact the GIS Staff located at the Forest Supervisor's Office on the Uinta National Forest in Provo, Utah. These maps have no warranties as to their overall content, technical accuracy, or suitability for a particular use.

(KF Burton, GIS Specialist, Reese Pope, Ecosystem Group Leader, Michael D. Smith, Soil Scientist and Bob Rasely, Geologist)

LAND OWNERSHIP

Landownership records of the property within the Cascade II fire perimeter were obtained from the Wasatch County Recorders Office in Heber City, Utah. The records identified National Forest (USA), State of Utah (Utah Parks and Recreation) and private lands. Records were also obtained for landownership outside the fire perimeter to the south of the fire incident in Township 5 South, Range 4 East, Sections 5, 6 and 7; Township 5 South, Range 5 East, Section 1, Salt Lake Base and Meridian. This data was placed in the permanent project file for the Cascade II BAER Report.

(Kathleen Twitchell, BEAR Team Assistant)

SOIL RESOURCES

Starting on September 28, 2003, a Burned Area Emergency Response (BAER) team began an assessment of the ecological impacts from the Cascade II Fire. This report provides information on present and expected impacts to soil resources resulting from the Cascade II Fire. Information is compiled by Robert Davidson, Uinta National Forest Soil Scientist.

Objective: The primary objective of the proposed emergency stabilization plan is to take prompt actions deemed reasonable and necessary to effectively protect, reduce or minimize significant threats to human life and property and prevent unacceptable resource degradation. Recommended BAER treatments are limited to the potential effects of the fire disturbance, to the extent practical, and must remain in compliance with the local Forest Land Resource Management Plan (LRMP). The specific purposes of these prompt actions are:

1. Alleviate emergency conditions and thereby minimize threats to human life and property.
2. Maintain long-term soil productivity and soil hydrologic conditions on severely burned sites. Encourage soil stabilization and healing of hydrophobic soil conditions through prompt vegetation regeneration to help achieve long-term soil productivity and to meet Regional and Forest Plan standards.
3. Prevent permanent impairment of ecosystem structure and function by controlling water, sediment and debris movement related to water quality. Protect Provo Deer Creek from increased sediment delivery and possible debris flows as a result of increased burn area runoff. This recommendation falls under the Wyden amendment and includes treatment

of HIGH burn severity slopes in Forest Service, State, and private lands inside the Provo Deer Creek watershed.

4. Prevent significant damage by increased runoff and sediment delivery to the main transportation routes and to the Cascade Springs area, parking lot, and structures.

Sources of Information: Soil resource conditions were assessed in the field during the week of September 29, 2003 through October 5, 2003. Burn severity was determined using ground and aerial reconnaissance for assessing hydrophobic soils occurrence, riparian conditions, hill-slope conditions and soil values-at-risk.

Soils values-at-risk, soil technical information and specific recommendations are linked with both the USDA Forest Service Soil Quality Standards for the Intermountain Region (FSH 2509.18_2) and the 2003 LRMP for the Uinta National Forest as follows:

1. USDA-FS Intermountain Region – FSH 2509.18 Soil Management Handbook, Chapter 2 Soil Quality Monitoring, Section 2.2 Soil Quality Standards
    a. Soil Quality Standard: Soil resource management must be consistent with Forest Service goals for maintaining or improving long-term soil productivity and soil hydrologic function.
    b. Soil Quality Guidelines: Soil quality guidelines maintain soil properties by setting the limits of disturbance, or thresholds, beyond which there will be long-term losses in inherent soil productivity and hydrologic function. Detectable losses of soil productivity and hydrologic function will occur when disturbance exceeds guideline limits. Therefore, the guidelines represent the upper limit of allowable disturbance.
    c. Application of Soil Quality Standards and Guidelines: Activities that cause damage exceeding soil quality standards and guidelines must include provisions for mitigation of the damage.
    d. Under part (a), Detrimental Soil Disturbance, no more than 15 percent of an activity area should have detrimentally disturbed soil after disturbance. In terms of burn area disturbance, applicable soil disturbance includes (1) Detrimental Soil Displacement and (4) Severely Burned Soil. Soil displacement is defined as the loss of either 5 cm or ½ of humus enriched top soil (A horizon), whichever is less, or the exceeding of the soil loss tolerance value for the specific soil type. For Cascade Springs soils within a 10 mile square area, pre-disturbance soil loss is estimated at 0.6 tons/acre/year (PSIAC Sediment Model). Severely burned soils apply to prescribed fire and natural fires that are managed for resource benefits. Severely burned soils are identified by ratings of fire severity and the effects to the soil. A severely burned soil is generally soil that is within a High Fire Severity burn as defined by the Forest Service BAER program (FSH 2509.13). A HIGH burn severity rating is developed for each fire activity area, and is dependent on local soils and vegetation responses to fire. Potential effects of

severely burned soil include soil humus losses, structural changes, hydrophobic soil characteristics and sterilization.

e. Under part (b), Effective Ground Cover, the minimal effective ground cover following the cessation of disturbance should be sufficient to prevent detrimental soil erosion and loss of long-term soil productivity. Ground cover includes rock, litter, and canopy cover. Above-ground organic matter (part (c)) includes litter and coarse woody debris for maintaining nutrient and moisture supplies to sustain soil productivity.

2. Uinta National Forest 2003 LRMP, Desired Future Condition, Management of Geology and Soils; Chapter 2: Goals and Objectives, Physical Environment; Chapter 3: Standards and Guidelines, Soil and Water Resource Management.

   a. Desired Future Conditions (DFC) for management of geology and soils: Most soils have at least minimal protective ground cover, soil organic matter, and large woody material. Soils have adequate physical properties for vegetative growth and soil-hydrologic function. Physical, chemical, and biological processes in most soils function similarly to soils that have not been disturbed. Degradation of soil quality and loss of soil productivity is prevented. Soil hydrologic function and productivity in riparian areas is protected, preserving the ability to serve as a filter for good water quality and regulation of nutrient cycling. Soil productivity, quality, and function are restored where adversely impaired and contributing to an overall decline in watershed condition.

   b. Goals and Objectives, FW-Goal-1, Physical Environment: Soil, air, and water resources provide for watershed health, public health and safety, long-term soil productivity, and ecosystem sustainability, and meet applicable laws and regulations.

      i. Sub-goal-1-1, G-1-1: Forest Service activities, including those permitted by the Forest Service, maintain or enhance the long-term productivity and physical, chemical, and biological processes and functions of the soil.

      ii. Sub-goal-1-2, G-1-2: Long-term soil productivity is maintained on at least 85 percent of all activity areas.

      iii. Sub-goal-1-3, G-1-3: Sufficient vegetation and litter are left on site to prevent soil movement and maintain soil productivity.

      iv. Sub-goal-1-5, G-1-5: Sufficient vegetation is left on channel banks to catch sediments necessary for stream bank maintenance and floodplain development.

      v. Sub-goal-1-9, G-1-9: Watersheds and their associated stream processes, channel stability, riparian resources, and aquatic habitats are maintained or restored to a functional condition.

      vi. Sub-goal-1-11, G-1-11: All activities on the Forest comply with state and federal clean water standards and applicable permitting processes. To the extent practical through management of activities on the Forest (1) water chemistry is maintained in all surface water where the alkalinity will not

be reduced more than 10 percent of baseline, and (2) management activities do not cause exceedance of State of Utah water quality standards (this monitoring is required by law) or increases in the listing of 303(d) streams.

c. Standards and Guidelines, Soil and Water Resource Management, S&W-1: **Standard:** Maintain or improve long-term soil productivity and hydrologic function of the soil by limiting activities that would cause detrimental soil disturbance. Detrimental soil disturbance consists of severely burned soils, loss of ground cover, or detrimental soil displacement, erosion, puddling, or compaction, as defined in Forest Service Handbook (FSH) 2509.18 and applicable Intermountain Region supplements.

Site Description within the Cascade II Fire Incident Perimeter: The Cascade Springs area and surrounding mountain slopes lie within the Wasatch Mountains section of the Middle Rocky Mountain province. Part of the mountainous area has been glaciated with many soils in the Cascade Springs area formed in glacial drift in old moraines. Other soils formed in residuum, colluvium, and alluvium on the mountain slopes which are classified as steep or very steep.

The mean annual precipitation ranges from 18 inches per year at the Deer Creek Reservoir shoreline to 34 inches per year at the upper elevations of the burn area. Half the precipitation occurs as snow at the reservoir shoreline and more than half the precipitation falls as snow at the upper elevations. On average, the heaviest amounts of precipitation occur during December and January, with a secondary maximum in August when summer thundershowers occur. The frost-free season is about 60 to 130 days per year, depending on aspect and elevation. Generally, precipitation increases and temperature decreases with increasing elevation, but varies somewhat with different slope exposures.

Soil Development: Soil development is controlled in part by precipitation and temperature effects. In general, a change in climate is accompanied by a change in vegetation.

Table 1. Soil Development and Description by Climate

Precipitation (in/yr)	Avg Annual Air Temp (^{o}F)	Elevation (ft)	Soil Great Group	Vegetation	Description
16 to 20	44	5500 to 6000	Argixerolls	grasses shrubs	Lime is leached from surface. Lime horizons avg depth 28". Clay horizon at 13" depth and 28" thick with 90-100% base saturation.
20 to 25		6000 to 7000	Argixerolls	grasses shrubs	No accumulation of lime within a 5' depth. Clay horizon at 17" depth and 31" thick with base saturation approximately 85%.
25 to 35	40	7500 to 9000	Cryoborolls Paleborolls Cryoboralfs Paleboralfs	aspen spruce-fir shrubs grasses	No lime in the soil profile. Thick distinct horizons. Clay horizon at 24" depth and 38" thick.

Soil Survey Mapping: The 1976 USDA Soil Conservation Service published the Heber Valley Area, Utah soil survey for parts of Wasatch and Utah Counties. The Heber Valley Area soil survey covers the entire burn (see Cascade II Soils map). The Cascade II Soils map lists soil

map unit symbols and series name within the Cascade II fire perimeter. The following table identifies the soil map unit name for each map unit symbol.

Table 2. Soil Map Unit Name and Subgroup Classification

Soil Map Unit	Map Unit Name	Soil Subgroup
AWF	Agassiz-Wallsburg association, very steep	50% Lithic Haploxerolls 35% Lithic Argixerolls
BGE	Bezzant very cobbly loam, 15-45% slopes	Typic Calcixerolls
BHF	Brad-Rock outcrop complex, 15-65% slopes	60% Lithic Haploxerolls 30% Rock
BKF	Bradshaw v. cobbly v.f. sandy loam, 40-60% slopes	Typic Haploxerolls
BTE	Broadhead soils, 25-40% slopes	Pachic Argixerolls
BWF	Burgi gravelly loam, 40-60% slopes	Cumulic Haploxerolls
BXF	Burgi-Agassiz association, very steep	55% Cumulic Haploxerolls 35% Lithic Haploxerolls
CDE	Clayburn soils, 25-40% slopes	Argic Pachic Cryoborolls
FA	Fluventic Haploborolls	Fluventic Haplobolls
GAF	Gappmayer gravelly f. sandy loam, 40-65% slopes	Boralfic Argixerolls
GWF	Gappmayer v. cobbly f. sandy loam, 40-65% slopes	Boralfic Argixerolls
HFF	Henefer-Bradshaw association, very steep	Pachic Argixerolls
HJC	Henefer soils, 6-10% slopes	Pachic Argixerolls
HJD	Henefer soils, 10-25% slopes	Pachic Argixerolls
HWE	Horrocks-Broadhead association, steep	50% Typic Agrixerolls 35% Pachic Argixerolls
HWF	Horrocks-Boradhead association, very steep	50% Typic Agrixerolls 35% Pachic Argixerolls
MSD	Mult soils, thick solum variant, 5-25% slopes	Argic Cryoborolls
POF	Poleline soils, 40-70% slopes	Pachic Cryoborolls
RO	Rock land	Rock outcrop
RSD	Roundy-Cluff association, hilly	70% Roundy 20% Mollic Cryoboralfs
WBF	Wallsburg-Rock outcrop complex, 20-60% slopes	70% Lithic Argixerolls 20% Rock

The soil map unit descriptions indicate that most of the upland terrain occurring within the Cascade II burn area consists of soils that can be sustained or improved by applied resource management consistent with soil quality standards and guidelines set forth by Region 4 and by the Uinta National Forest LRMP. The soil survey provides interpretive information necessary for assessing treatments within the HIGH burn severity areas.

Fire Severity Rating: The burn severity map for the Cascade II fire displays distinct areas of LOW, MODERATE and HIGH burn severity as determined by the BAER team based on burn intensity, hydrophobic soil conditions, and surface root conditions. The following table shows the percent area by land ownership for each burn severity, including unburned land.

Table 3. Burn Severity Acres and Percent by Land Ownership and by Provo Deer Creek Watershed

Land Description	Total Area (acres)	Burn Severity							
		Area (acres)				Percent			
		High	Mod	Low	Unburned	High	Mod	Low	Unburned
Forest Service	3324	308	1573	1112	331	9	47	33	10
Private & State	4504	1098	2006	1006	394	24	45	22	9
Entire Cascade II	7828	1406	3580	2118	724	18	46	27	9

Burn									
Provo Deer Creek Watershed	18069	748	1884	1404	14033	4	10	8	78

Soil hydrophobic conditions within the HIGH burn severity areas were classified as moderate to high hydrophobicity. MODERATE burn severity areas were characterized as having low to moderate soil hydrophobicity. Because soil hydrophobicity restricts water infiltration and promotes increased runoff, increased flooding potential with increased soil erosion is likely on the steep to very steep mountain slopes within HIGH burn severity areas.

Both high and moderate burn severity areas are characterized by denuded landscapes with near total consumption of live plant material, plant litter, and woody debris. Therefore, there is insufficient live plant cover, surface litter and large woody debris to protect the soil surface against raindrop impact (dynamic splash), thus increasing the likelihood of active erosion potential. Post fire soil erosion negatively impacts long-term soil productivity because remaining parts of the seed bank, nutrients, organic matter and microorganisms have been removed from the soil ecosystem.

Post fire soil conditions and increased erosion results in less diverse vegetation communities, soils with diminished water holding capacity and a general reduction in biomass, even after the burned areas regain vegetative growth (USDA, 1998). In addition, soil nutrient compounds become non-point pollutants when carried offsite during storm events (USDA, 1998). These outcomes have the likelihood of negatively impacting Provo Deer Creek during a major storm event, polluting the water with nutrients and increased sediment loads. The significance of these outcomes will likely render the water unusable for the Canyon Meadows subdivision, and also have negative impacts on the Provo River water quality.

Severely burned areas are susceptible to invasion of noxious weeds and other exotic species, including Canada thistle, musk thistle, cheat grass, whitetop, houndstongue and spotted knapweed. Since these species have been documented in the area prior to the burn, their likelihood of increased invasion is a real threat to the ecosystem balance. Noxious weed establishment can diminish long-term soil productivity and hydrologic conditions. Invasive weeds increase bare ground, possibly due to their allelopathic effects on other desirable native species, thus decreases overall fibrous root mass and canopy cover. The unprotected soil is then susceptible to accelerated erosion. Once invasive weed become established, the likelihood of having a healthy native plant community is diminished.

As seen in the table above, the HIGH burn severity area occupies 9% of Forest Service lands and 18% of the entire burned area. The HIGH burn severity areas have a high risk to increased flooding and excessive soil erosion. The majority of the burn area is classified as MODERATE burn severity and occupies 47% of Forest Service lands and 46% of the entire burned area. By definition, these Moderate burn severity areas have moderately hydrophobic soils and may present a risk to increased flooding and soil erosion during a major storm event. LOW burn severity areas occupy 33% of Forest Service lands and exhibit limited hydrophobicity and do not present a high risk of flooding or erosion.

Potential for accelerated soil erosion within the HIGH burn severity units without applying emergency stabilization treatments are estimated at 28.5 tons/acre/year for the first year, 13.3 tons/acre/year for the second year, 7.6 tons/acre/year for the third year, and 4.6 tons/acre/year thereafter (Forest Service WEPP soil erosion model). This model estimates the amount of soil movement that may occur on hillsides within a watershed. Overall, the soil erosion potential over a 4 year period is 26,898 tons, if no emergency treatments are applied to the HIGH burn severity areas.

Soil Values-at-risk: Values-at-risk associated with the Cascade II fire include:

- Long-term soil productivity and hydrologic function is a risk from hydrophobic soil conditions, diminished vegetative cover, increased opportunity for invasive weeds, and loss of topsoil resources through erosion.
- Water quality of domestic water supplies from Provo Deer Creek, Deer Creek Reservoir, and Provo River is at risk from increased sedimentation, carbon and nutrient loading.
- Cascade Springs recreation area infrastructure and fragile riparian ecosystem are at risk from increased sedimentation and soil erosion.
- Provo Deer Creek and South Fork Deer Creek riparian conditions, including fish habitat are at risk from increased sedimentation and nutrient loading.
- Travel routes into Cascade Springs area from Wasatch County are threatened by increased soil erosion, including increased road prism erosion with concentrated flows and possible debris flows.

Recommendations for Emergency Treatments: Adequate treatments should be implemented to mitigate threats to values-at-risk and to remain in compliance with the Uinta NF LRMP and Region 4 Standards and Guidelines.

- HIGH burn severity areas within the burn are subject to diminished long-term soil productivity and soil hydrologic function, resulting in the increased potential for flooding hazards, soil erosion and sediment delivery to streams, riparian areas, roads, infrastructure and other landscapes if the sites are not stabilized. These areas need to be seeded and mulched. Recommended treatment includes all HIGH burn severity areas. Forest Service lands and lands within the Provo Deer Creek watershed should be administered by the Forest Service under the Wyden amendment.

  Establishing plant growth will stabilize these sites, add organic matter, help preserve and increase soil structure and maintain long-term soil productivity and hydrologic function. Vegetative cover provides protection from rain-drop splash and impact, thus lessening the soil erosion. Seeding and resulting vegetation establishment helps break up hydrophobic soil conditions. Desired plant establishment provides competition against noxious weeds, limiting their proliferation.

- A MODERATE burn severity zone which is immediately adjacent to Provo Deer Creek, south of Cascade Springs, contains a thin 6-inch topsoil horizon. Future soil productivity will be negatively impacted by any loss of these slightly hydrophobic, thin top soils. In addition, due to the large drainage area and the long continuous slopes associated with these denuded east-facing hillsides, an imminent threat to sediment delivery is posed for

Provo Deer Creek. To protect long-term soil productivity and minimize topsoil loss, including sediment delivery to Provo Deer Creek, broadcast seeding and use of straw wattles are needed along these MODERATE burn severity slopes. Contour soil raking to help bring the broadcast seed into intimate contact with the soil, will help encourage seed germination and seedling survival.

- LOW burn severity sites do not require treatment. Vegetation in these areas was charred and some was left unburned, creating a mosaic pattern. The soils were not observed to be hydrophobic. The root crowns of perennial grasses were found to be unburned beneath the soil surface and will begin to re-grow when the site receives adequate moisture. In some cases, re-growth was already observed by the BAER teams shortly after the fire. These surviving roots continue to anchor the soil on the site, lowering the risk of soil erosion. There is generally a viable seed bank left in the soil after a low intensity burn, which will contribute to plant re-establishment of the natural vegetation.

References

U.S. Department of Agriculture, Forest Service, Pacific Southwest Region, 1998. Burned-area emergency rehabilitation techniques course.

USFS WEPP. Forest Service Interfaces for the WEPP Computer Model. William J. Elliot, Project Leader, David E. Hall, Computer Programmer/Analyst, Dayna L. Scheele, Civil Engineer. U.S.D.A. Forest Service Rocky Mountain Research Station and San Dimas Technology and Development Center.

(Robert Davidson, Soil Scientist)

HYDROLOGY: RUNOFF AND STREAM SEDIMENTATION HAZARDS

On September 28, 2003, a BAER team was assembled to assess conditions resulting from the Cascade II Fire. This report contains information compiled by Charles R. Condrat, Wasatch-Cache National Forest hydrologist and Chad Hermandorfer Uinta National Forest hydrologist on past, present and expected future hydrologic and watershed conditions for the Cascade II Fire.

Summary: The drainages impacted most significantly by the Cascade II Fire are Provo Deer Creek (3rd order drainage), and unnamed 1st and 2nd order drainages that drain into Provo Deer Creek and Deer Creek Reservoir.

Sources of Information: Resource conditions resulting from the Cascade II Fire were reviewed in the field from September 29, 2003 through October 5, 2003. The BAER team made aerial reconnaissance flights and on-the-ground visits. From a hydrological standpoint, the main objectives for the field visits were to develop a burn severity map, locate areas containing hydrophobic soils, review channel morphology and riparian conditions, inspect hill slope conditions, inventory values-at-risk and determine needs for stabilization.

Values-at-risk: Values-at-risk are items located within or downstream of the fire and subject to hazards caused by the burn. These hazards could include flooding, erosion, or sediment. Hydrologic values-at-risk for the Cascade II Fire are:

- Culinary water quality of Deer Creek Reservoir, Provo River downstream of the reservoir, and Provo Deer Creek. Water from the Provo River main stem and Deer Creek Reservoir is one of the major culinary water supplies for the Salt Lake/Utah County area. The Canyon Meadows subdivision is located at the bottom of the Provo Deer Creek watershed and its culinary water source is located on Provo Deer Creek about 0.8 miles below the lower end of the burned area.
- Water quality of Cascade Springs a popular recreation area holding fish within pools of the spring.
- Sport fishery in Deer Creek Reservoir, Provo River downstream of the reservoir, and Provo Deer Creek. Provo River below Deer Creek Reservoir is a Class I fishery and Deer Creek Reservoir is a very popular recreation area for boaters, fishermen, and bathers. The lower end of the burned area in the Provo Deer Creek watershed burned 2.3 miles above the Provo River and the fire burned immediately adjacent to the west side of Deer Creek Reservoir.
- A pure strain of Bonneville Cutthroat trout, a USFS sensitive fish and MIS species is present in the South Fork Deer Creek drainage where the fire burned along the north side of the drainage.
- A railroad grade is located below the burned area just above Deer Creek Reservoir. Water flowing from the burned area could be impounded behind the railroad grade and may cause harm to the railroad bed.
- Roads in the fire area may be eroded by water and debris particularly in drainages that have been highly burned and that would concentrate water at their outlets.

Watersheds and Water Features: The Cascade II Fire burned within two sixth-order watersheds named Provo Deer Creek (160202030501) and Deer Creek Reservoir Provo River (160202030405). Utah is in the fifth year of a drought and current stream discharge may not be representative of normal conditions.

Water features in the Provo Deer Creek watershed include perennial and ephemeral streams, springs, and a few small ponds. Most of the streams in the Provo Deer Creek watershed are ephemeral and flow during the spring runoff and during infrequent high intensity thunderstorms. The main channel of Provo Deer Creek and the South Fork of Deer Creek are the main perennial channels within the Provo Deer Creek watershed. On October 1, 2003, discharge in the Provo Deer Creek above Cascade Springs is about 0.4 cubic feet per second (cfs) and below the spring is about 4 cfs indicating the Cascade Springs add about 3.6 cfs of water in the channel. During this same time, the South Fork of Deer Creek was flowing about 0.05 cfs (25 gallons per minute) near the confluence of Provo Deer Creek. The ephemeral streams are located on steep to moderately steep drainages and are about 2 to 5 feet wide. In addition to Cascade Springs another spring named Tooth Spring is located in the burn area in the upper end of the South Fork Deer Creek. Two small ponds are located about 0.5 miles west Tooth Spring.

The only perennial stream near the burn in the watershed above Deer Creek Reservoir is Decker Creek whose source is Decker Spring located about 2.3 miles above Deer Creek Reservoir. The north east edge of the fire burned along this creek for about 1.2 miles. The flow in this channel is les than 1 cfs. One other unnamed spring and no ponds are located in the burned area of the drainages west of Deer Creek Reservoir.

Water Quality: The beneficial uses for the waters in the Provo Deer Creek and Deer Creek Reservoir Provo River watersheds are 1C (drinking water), 2B (contact recreation), 3A (cold-water aquatic life), and 4 (agriculture). In Utah's 2002 – 303(d) list of waters, the State of Utah lists Deer Creek Reservoir as impaired for temperature and dissolved oxygen.

Flood and Sedimentation Risk: A flood frequency analysis is used to assess increases in flood volume using regional equations developed by the USGS (USGS 1999) and Table 1 shows these values for culvert sizing in selected drainages.

Table 1. Estimated discharge for selected return period (RP) storms in specific drainages.

Drainage Name	Total Area (acres)	Discharge (cfs)					
		2 year RP	5 year RP	10 year RP	25 year RP	50 year RP	100 year RP
Provo Deer Creek above South Fork Deer Creek	10,257	110	180	234	301	359	409
South Fork Deer Creek above Provo Deer Creek	3,776	40	73	100	135	165	193
Bear Canyon above Cascade Springs Road	1,131	25	42	55	71	85	97
Provo Deer Creek above Cascade Springs Road	6,521	88	143	183	233	275	312
Tributary 1 east of Provo Deer Creek	189	4	8	12	17	21	25
Tributary 2 east of Provo Deer Creek	312	6	12	17	24	30	35

The areas and percent burn severity are presented for specific drainages above culverts as shown in Table 2. Tributary 1 and 2 drainages have about 50 percent or greater high severity burn above the culvert which are at risk of sediment and debris movement through them.

Table 2. Area and percent of burn severity in specific drainages

Drainage Name	Total Area (acres)	Burn Severity					
		Area (acres)			Percent		
		High	Mod	Low	High	Mod	Low
Provo Deer Creek above South Fork Deer Creek	10,257	748	1,724	926	7.0	16.8	9.0
South Fork Deer Creek above Provo Deer Creek	3,776	0	160	478	0.0	4.2	12.7
Bear Canyon above Cascade Springs Road	1,131	174	303	13	15.4	26.8	1.1
Provo Deer Creek above Cascade Springs Road	6,521	107	183	235	1.6	2.8	3.6
Tributary 1 east of Provo Deer Creek	189	119	53	7	63.0	28.0	4.0
Tributary 2 east of Provo Deer Creek	312	155	77	74	49.7	24.7	23.7

Increases in water yield resulting from the fire is not likely to be measurable because the vegetation type does not consume much water comparatively to coniferous forest and the recovery time for establishing mountain brush vegetation is short, usually in 2 to 3 years.

Sediment modeling was conducted using the PSAIC model developed by the Natural Resources Conservation Service. This model estimates the amount of sediment yield that may occur at the bottom a watershed. Sediment modeling for the Cascade II Fire indicates that the highest risk of sedimentation is from the first three storms following the fire where the sediment yield estimate is 3.75 tons/acre compared to a pre-fire value of 0.6 tons. This value would fall back to 1.75

tons/acre at the end of the first year and then to 1 tons/acre at the end of the second year. The highest risk of sedimentation is during the first few storms with an increase in sediment yield of greater than 6 times compared to pre-fire conditions.

The drainages of most concern are Bear Canyon and Tributaries 1 and 2 because of the high percentage of high burn severity, especially in the upper part of the watersheds, and the outlets of these watersheds flow directly into the Provo Deer Creek channel. High intensity storm events in the upper part of these watersheds could cause a mudflow to concentrate in the drainage bottom and scour material that has been depositing there for many years. This material would be transported down the channel bottom and deposited in the Provo Deer Creek riparian area and stream channel. If this occurs there would be a pulse of sedimentation into Provo Deer Creek and could cause high sediment and nutrient concentrations at the Canyon Meadows culinary intake and in the Provo River which is a delivery for culinary water for Salt Lake and Utah County communities.

The hillside to the west of Provo Deer Creek below Cascade Springs is a long, moderately-steep surface that is relatively smooth and breaks over a steep slope about 200 feet long just above about a 25 to 50 foot-wide riparian area. This slope doesn't have many areas to break up the flow of runoff and has large areas that were burned, many that burned in the riparian area to the channel, and is now without vegetative cover protecting the soil. If a high intensity storm were to occur in this area, the lack of ground cover and the smooth surface may cause sheet flow that may carry sediment and nutrients to Provo Deer Creek with the same effects to downstream users as described above.

Recommendations: The main value at risk is drinking water used by Canyon Meadows community and communities in Utah and Salt Lake counties. There is a risk that sedimentation and nutrients resulting from soil erosion and movement of soil and ash from the burned area would decrease the water quality of drinking water in Provo Deer Creek, Deer Creek Reservoir, and the Provo River that are sources of drinking water for these communities. High quality water from the mountains is very important for the communities along the Wasatch-Front that use these waters from culinary, fishery, and irrigation purposes. Treatments that reduce the risk of soil erosion and resulting sedimentation will help to protect these valuable waters.

Several treatments are recommended to reduce the risk of sedimentation of Provo Deer Creek and Deer Creek Reservoir due to the burn. Seeding and mulching high severely burned areas in Bear Canyon, on the east and west sides of Provo Deer Creek, and in the drainages flowing into deer Creek Reservoir will greatly reduce the risk of sediment and ash movement from the most impacted areas of the burn. Treatments such as channel fences, swale fences, straw bale barriers, and straw wattles will reduce the ability of water to carry sediment down the channel if runoff occurs before vegetation is established. Cleaning culverts and constructing proper road drainage on roads affected by the burn will allow water to pass through roads instead of eroding the road surface or causing a road blowout from water impounded behind a plugged culvert.

In summary, the treatments are expected to reduce the risk of water quality degradation in areas most susceptible to erosion and debris flow by reestablishing vegetation as quickly as possible,

placing barriers to debris movement in ephemeral stream channels, and cleaning culverts and providing proper drainage to roads affected by the burn.

Monitoring: Monitoring that is recommended for water quality is to review treatments that were put in place to control sediment and debris flow concerns. This would include observing the reestablishment of vegetation, observe the collection of sediment behind structures such as channel fences and straw wattles, and the deposition of sediment particularly in the riparian areas and mouths of ephemeral drainages that flow into Provo Deer Creek and Deer Creek Reservoir, and Cascade Springs. The purpose of recommended monitoring for water quality is to observe the effectiveness of the treatments and to determine if the treatments were adequate to protect water quality and if additional treatments are necessary.

REFERENCES

USGS. 1999. The National Flood-Frequency Program – Methods for Estimating Flood Magnitude and Frequency in Rural Areas in Utah. U.S. Geological Survey Fact Sheet 124-98. September 1999.

(Charles R. Condrat, Hydrologist)

BOTANICAL ASSESSMENT, TES PLANT SPECIES, NOXIOUS WEEDS AND INVASIVE SPECIES

The Cascade II fire created a mosaic pattern of burned and unburned areas throughout the area. Within the burned areas there was a mosaic pattern of burn intensity and severity. Satellite imagery and observation flights were used to target areas within the larger burned areas for transecting. Transects through those areas indicated that the majority of the fire was moderate in intensity and severity, interspersed with islands of high and low severity. Riparian areas that were completely burned over experienced resprouting in less than one week after the fire passed through.

With respect to botanical issues, three primary areas to evaluate are Threatened, Endangered and Sensitive species (TES) populations, noxious weed invasions and vegetation recovery. The purpose of this report is to address such post-fire ecological and botanical concerns, and to make recommendations for enhancing vegetation recovery and overall ecosystem health.

Pre-Fire Conditions

The primary plant community affected by the Cascade II fire is oak/maple and other shrub communities (66%). The fire area also burned in aspen (5%), conifer (1%), sagebrush grasslands (7%), riparian corridors and meadows (3%), rock outcrop/cliff communities (1%), and sagebrush with mixed mountain shrub (17%).

The following table lists vegetation types estimated for the three landownership categories, and the burn intensity acres for each:

Vegetation Types	Acres Burned per Land Owner by Intensity (H – High; M – Moderate; L – Low; and U – Unburned)												TOTALS
	NFS				State				Private				
	H	M	L	U	H	M	L	U	H	M	L	U	
Aspen	40	221	32	137					--	--	--	--	430
Perennial grass w/ mt. big sage	--	1	14	--	22	8	--	--	357	59	76	1	538
Riparian and meadow	13	19	85	9	--	13	54	5	--	--	--	--	198
Oak/maple, other mt. shrubs	205	1161	763	134	381	403	259	186	220	1037	205	174	5128
Sagebrush w/ other mt. shrubs	3	150	200	7	48	155	121	7	42	330	264	15	1342
Conifer	--	12	9	25	27	1	23	6	--	--	--	--	103
Rock outcrop communities	47	10	9	19	--	--	--	--	--	--	--	--	85
Totals	308	1574	1112	331	478	580	457	204	619	1426	545	190	7824*

* The total burn area was calculated at 7828 acres, water constitutes 4 acres within the BOR lands currently managed by the state.

Threatened and Endangered Plant Species

No populations of Endangered, Threatened or Candidate plant species are known to be in this burned area. Small patches of suitable habitat for the Ute Ladies'-tresses orchid were found in 1999.

Ute Ladies'-tresses orchid (Spiranthes diluvialis)
This orchid is federally listed as "Threatened". It occurs in continually saturated soil with sunny to partly shaded exposures, in wet meadow sites and along streams between 4000 and 6800 feet elevation. The nearest known populations are located along the main stem of the Provo River. Surveys for this species were conducted along eight miles of streams and springs for the prescribed burn project, in August and September 1999, which was blooming season. Very little suitable habitat was found; only near the springs and seeps. No populations of the orchid were found.

Given that the plant occurs only in saturated soil, no severe adverse direct effects are expected from burning. Current year's growth might be topkilled if it was still green, but the underground structures are very unlikely to have been hurt. Burning dried out leaves would not hurt the dormant plants. Longer term effects of burning a population site are likely to be positive. The orchid resents being shaded by taller riparian shrubs, and declines in vigor under such situations. A fire burning taller riparian canopy could result in increased vigor, until the shrubs grew tall and dense again.

Sensitive Species

Dainty moonwort (Botrychium crenulatum)
There is only one recorded population of this moonwort fern species in Utah, in a wet meadow at 9400 feet elevation on the Uinta National Forest, about 30 miles east of the Cascade II fire. Moonworts are very small, prone to staying underground without showing a leaf aboveground for years at a time, and hard to find. This species' known habitat tends to be continually saturated soil. The plants of the known population are known to be dormant underground by mid-September. We believe there is potential habitat for this species within the fire area, but expect no impacts to any plants of this species from the fire.

Rockcress draba (Draba globosa)
This perennial forb occurs in alpine tundra, often in rock stripes, talus or meadows at 10,300 to 12,500 feet elevation. The species has not been found in or near the fire area. The highest elevation of the fire area is lower than the lowest recorded suitable habitat elevation. There will be no effect to this species.

Barneby woody aster (Aster kingii var. barnebyana)
This aster is found on rock outcrops in mountain mahogany and oak communities between 7300 to 7600 feet elevation. No populations are known from within or anywhere near the fire area, but much of the fire area occurred in such vegetation and elevations.

Garrett bladderpod (Lesquerella garrettii)
This perennial forb is found on talus or other rocky sites in alpine tundra, sub-alpine meadows, spruce-fir and pine communities between 9000 and 12, 000 feet elevation. No populations of the bladderpod have been found anywhere near the fire area. The fire area does not include elevations high enough to qualify as potential habitat. There will be no effect on this species.

Wasatch jamesia (Jamesia americana ssp. macrocalyx)
This shrub occurs on cliffs or steep rocky sites between 5600 and 10,500 feet elevation, in mountain brush and spruce-fir communities. The Cascade II fire area includes the reported location of a population of this species, on the Wasatch State Park. The population was discovered in the 1880s and apparently never revisited. The element occurrence recorded inside the fire area was searched for but not relocated during post-fire surveys. Location information for this species may be erroneous. The slopes where the occurrence was reported was minimally affected by the fire. There was a low intensity, low severity under story burn that left the over story intact and unburned. Due to the nature of the habitat of *Jamesia americana* and the fire behavior in the area, it is unlikely that this species was adversely affected by the fire.

Another known Jamesia location is reported from 1964, a few miles west of the fire area. It may be that there are unknown populations within the fire area, since some areas of rock outcrop occur. The 1999 Biological Evaluation (page 9) noted there was possible habitat at rock outcrops at the head of Bear Canyon.

Draft Sensitive Species

Wasatch fitweed (Corydalis caseana ssp. brachycarpa)
This perennial forb has a recorded population within the fire area, along Bear Creek. It may occur elsewhere in the fire area's riparian zones. The most likely location of the population burned with low to moderate intensity. No living Corydalis plants were seen in post-fire surveys. No fire effects information exists for this species, but information on related Corydalis species indicates any existing burned plants would have been killed, but fairly rapid re-establishment would be expected from seed in the local soil or seed blown in from elsewhere. Corydalis species in general are listed as early colonizers of burned habitat.

Noxious Weed Invasion

The District Ranger is directed (FSM 2523.04d) to "monitor burned areas to ensure rehabilitation treatments and other measures are functioning as planned and are effective. Monitor for the post-fire presence of invasive species. Maintain treatments to keep them functioning as designed. Use monitoring results to plan follow-up actions, including the control of invasive species. " The treatment of noxious weeds will prevent permanent impairment of ecosystem structure and function in compliance with FSM 2523.02.

As awareness of the problems associated with the introduction of invasive plants species increases (see Executive Order 13112 in appendix), it becomes important to immediately evaluate the magnitude of any invasions quickly as possible and then take aggressive control action. Fire suppression activities in 2003 may have caused the introduction of some invasive species through transport by engines, dozers, and crew transport vehicles.

The suppression actions for this fire resulted in construction of about 4 miles of dozer line. The majority of this line is immediately adjacent to areas receiving high amounts of motorized recreation, where the land is already disturbed. Additionally, access into the fire area is available from a number of points that cross these dozer lines. Ground disturbance from recreational activities will provide a greater opportunity for invasive species to establish due to the repeated entrance into the area by vehicles that most likely are not weed-free. The dozer lines will provide corridors along the fire perimeter into which weeds can establish, and then move into the burned area and onto the Forest.

At a minimum, these dozer lines should be monitored for the presence of invasive species each spring for 3 years. Monitoring will, by necessity, be **coordinated with the Wasatch County Weed and Pest Control District**. The BAER implementation team and Wasatch County Weed and Pest Control Supervisor should complete coordinated surveys in 2004 through 2007.

The **Pleasant Grove Ranger District** will incorporate further monitoring and treatment of any new or expanded populations found on the Forest into the annual noxious weed program, requesting funding from appropriate sources. Treatment methods must be evaluated to determine the most appropriate course of action. Any action taken on National Forest System land must be fully compliant with the National Environmental Protection Act (NEPA). It is anticipated any chemical treatment activities will fall under the current NEPA decisions for

noxious weed control on the Uinta National Forest (USFS 1994) and the provisions of the LMP. Any proposed deviation from the approved treatment methods will require additional NEPA, which will be the responsibility of the Forest to complete. All herbicide application activities on the Forest will be conducted by certified applicators (either contracted or Forest Service licensed personnel) as required by FSM 2154.2.

Noxious weed invasions, due to both the fire itself and suppression activities are of immediate concern. Populations of Canada thistle (*Cirsium arvense*), musk thistle (*Carduus nutans*), Scotch thistle (*Onopordum acanthium*), leafy spurge (*Euphorbia esula)*, Dalmation toadflax (*Linaria genistifolia),* cheatgrass (*Bromus tectorum)* and field bindweed (*Convolvulus arvensis*) were present within the fire area prior to the ignition. The loss of vegetation cover and soil disturbance caused by the fire has opened up an "invasion window" for colonization by noxious weed species in previously uninfected areas.

- Canada thistle (*Cirsium arvense*) – Is a colony-forming perennial from deep horizontal roots. Is highly aggressive and difficult to control.
- Musk thistle (*Carduus nutans*)- Invades disturbed areas spreading rapidly and forming dense stands which crowd out desirable species.
- Scotch thistle (*Onopordum* acanthium)- Large colonizer in disturbed areas. Can form dense stands that are impregnable to large mammals.
- Leafy spurge (*Euphorbia esula)*- Colonizer that has an extensive root system that can sucker. Forms dense colonies that out compete native vegetation
- Dalmation toadflax (*Linaria genistifolia)*- Is a deep rooted invader that crowds out native vegetation.
- Cheatgrass (*Bromus tectorum)*- Winter annual that can vigorously compete with natives for early spring and early summer moisture. Cheatgrass cures early in the summer providing flashy fuels early in the fire season.
- Field bindweed (*Convolvulus arvensis*)- Extensive deep root system which give rise to lateral roots which can sucker.

Establishment of populations of any one or combination of these species would decrease wildlife habitat productivity and soil stability, and could lead to additional accelerated soil erosion from the burned area in future.

Relevant Forest Plan Direction

The new Uinta National Forest Land and Resources Management Plan (LMP), signed in May 2003, contains Standards and Guidelines applicable to vegetative stabilization following a wildfire.

Weeds-1 **Standard:** Only certified noxious weed-free hay or feed is allowed on National Forest land, including hay or feed for use by recreational livestock. Any materials such as hay, straw, or mulch that are used for rehabilitation and reclamation activities shall be certified weed-free.

Weeds-9 **Standard:** For at least three years after a project is completed, treat invading noxious weeds, as needed, on areas impacted by ground-disturbing operations.

Weeds-15 **Guideline:** For all proposed projects and activities, implement appropriate mitigation measures to prevent the establishment and aid the control of noxious weeds.

Veg-9 **Guideline:** Revegetation should be initiated as promptly as practical. Seed only where natural regeneration of desirable species is unlikely or is expected to be slow. Select low nutrient demanding native species to reduce the need for fertilization. Spot re-seed as necessary.

Veg-13 **Guideline:** All vegetation management activities should mimic the natural pattern, structure, and composition of vegetation on the landscape (within the historic range of variability).

Veg-14 **Guideline:** Vegetation treatment units should be of sufficient size and number to disperse the effects of wildlife and livestock grazing.

Aqua-1 **Standard:** Trees shall not be felled into streams, lakes, or bogs except when needed to improve aquatic habitat.

Aqua-10 **Standard:** Unless pesticide label requirements or other considerations require greater distances, minimum pesticide spray distances (buffers) from live water are as follows:

- Backpack spraying operations: 20 feet.
- Other mechanized applications (e.g., truck or all-terrain vehicle mounted equipment): 50 feet.

The use of fluridine or the Environmental Protection Agency-approved over-water formulation of glyphosate for treatment of water in open sewage lagoons is exempt from these limitations.

Aqua-11 **Guideline:** Direct, non-spray application of pesticides to individual plants or other similar narrowly targeted treatment needs (e.g., gopher or insect control) that avoids application to the ground may be conducted within the specified buffers for live water as stated in Aqua-10.

Vegetation Recovery

Most of the burn was of moderate severity. While transecting the areas classified as moderate severity, we saw resprouting growth of forbs and grasses coming out of the black, both in uplands and riparian areas. This indicates that many or most existing perennial forbs, shrubs and grasses are still alive in the areas classified at low, moderate and some high fire intensity, and can be expected to recover in the next few years.

Recommendations

Mitigation should include:

- Seeding annual and perennial vegetation in high-impact areas of the burn, for growth in late fall and spring that will help minimize or prevent the flush of ash and sediment flowing into the Provo Deer Creek and the Deer Creek Reservoir.
- Restrict livestock grazing for two years in the burned area, to help ensure establishment of the rehabilitation seeding and maximize biomass providing protective soil cover.
- Monitoring and needed actions that prevent new populations of the above mentioned weed species.
- Relocating the sensitive species mentioned above if possible, and documenting the effects of fire on these populations.

Conclusions

The Cascade II fire burned in several vegetation types and at differing burn intensities, producing a mosaic of vegetative effects. The most common vegetation is oak/maple and other brush communities, and the most common burn intensity is moderate. Most high intensity and some moderate intensity areas should be seeded with annual and perennial species to help provide soil protection. Noxious weeds should be monitored, and any new populations eradicated.

References

Welsh, S.L., N.D Atwood, S. Goodrich and L.C.Higgins. 1993. A Utah Flora. BYU Publishers, Provo, Utah. 682.

Goodrich, S. and E. Neese. 1986. Uinta Basin Flora. USDA Forest Service; Intermountain Region and Ashley National Forest and USDI Bureau of Land Management- Vernal District.

Whitson, T.D. et al. 1996. Weeds of the West. The Western Society of Weed Science in Cooperation with the Western United States Land Grant Universities. Newark, CA.

Wayne Padgett, Ecologist Wasatch-Cache National Forest, Personal Communications. July 2002.

USDA Forest Service. 1999. Biological Assessment/Biological Evaluation of Cascade Springs/North Fork Prescribed Burn Projects. Unpublished. September 1999. Uinta National Forest, Provo, UT.

Utah Department of Natural Resources. Division of Wildlife Resources. 2002. Utah Natural Heritage Program GIS database (Utah Conservation Data Center, GIS Data CD-ROM). Salt Lake City, Utah. May.

(Mike Duncan, Botanist and Denise Van Keuren, Botanist)

WILDLIFE HABITAT AND WINTER RANGE

This specialist report examines the potential effects of the Cascade II Fire on local wildlife and their habitat. The Cascade II Fire occurred above Deer Creek Reservoir, Utah within the Lower Provo Management Area on the Pleasant Grove Ranger District. This fire burned 7,828 acres of Forest Service, State and private land. The Utah Division of Wildlife Resources (UDWR) has identified 2699 acres of critical elk wintering habitat and 1080 acres of critical deer habitat that has burned, all on private and State lands. The table below identifies acres burned at high, moderate, and low intensity within critical wintering habitat.

Species	Acres Burned at High Intensity	Acres Burned at Moderate Intensity	Acres Burned at Low Intensity	Unburned Acres within Burn Area	Total Acres Burned
Elk	683 (25%)	1404 (52%)	428 (16%)	184 (7%)	2699
Deer	123 (11%)	575 (53%)	382 (35%)		1080

Habitat damage assessment and recommendations for rehabilitation will be based on deer and elk habitat requirements.

Pre-Fire Conditions

Primary plant communities affected by this fire include aspen (5%), oak/maple and other brush (66%), conifer (1%), sagebrush grasslands (7%), riparian communities (3%), and mixed mountain shrub and sagebrush (17%). The elevation of the burned areas ranges from 5800 to 8340 feet on Forest Service land and 5450 to 7311 feet on State and private lands. The UDWR identified 3737 acres of deer critical wintering range and 6186 acres of elk critical wintering range along the western slopes above the Deer Creek Reservoir.

The UDWR has one permanent vegetation transect within the Cascade II Fire burn perimeter (UDWR 2002 – Hoovers Hollow Trend Study 17-14-02). At this site cheatgrass provided 73% of the grass cover in 2002. A new exotic to the area was Japanese brome, which occurred in 44% of the quadrants sampled. Less desirable forb species encountered include thistle, hairy goldaster, Dalmatian toad flax, and houdstongue. The UDWR has another permanent vegetation transect approximately one mile southwest of the burn perimeter (UDWR 2002 – Deer Creek Dam Trend Study 17-5-02). At this site cheatgrass was sampled in 52% of the quadrants and contributed 25% to the total grass cover in 2002. This was a decrease from 1996 which showed occurrences in 96% of the quadrants and contribution of 86% to the total grass cover. Less desirable forb species encountered in this transect include Dalmatian toad flax, thistle, houndstongue, yellow salsify, and bur buttercup.

Post-Fire Conditions

The following factors were assessed to interpret post-fire conditions and the implications for wildlife resources.

- Total acres of critical winter range habitat for elk and deer lost to high intensity fire and damaged by moderate intensity fire
- Risk of habitat loss due to invasive species encroachment after fire

To interpret the direct and indirect effects to wildlife resources, it is important to consider the extent of the fire in relation to the entire winter range. The table below shows the amount of acres burned and total acres within critical wintering habitat.

Species	Acres Burned	Total Critical Wintering Range Acres	Percent Critical Wintering Range Burned
Elk	2699	6186	43.6%
Deer	1080	3737	28.9%

Based on a normal winter, we expect little to no big-game winter kill (pers. comm. Nettie Sitting Up and Karen Hartman, USFS). The animals however will be stressed and stressed animals typically produce fewer offspring. We therefore expect a decrease in the deer and elk herds next year. Based on a mild winter, the animals will be able to migrate north where more critical wintering range exists. If the first winter is harsh, then the big-game will most likely migrate south into the canyon or onto agricultural lands (pers. comm. Craig Clyde and Doug Sakaguchi, UDWR).

Adjacent to the critical winter range, north of the Deer Creek Reservoir, is agricultural and range land. Animals may be displaced from the historic critical winter range to the agricultural and range lands. It is expected that during a normal winter, depredation on nearby farm and agricultural lands will increase. During a harsh winter, depredation may be significant. In anticipation of the normal depredation problems, the UDWR has started the process of distributing mitigation tags. Under this program, in order to mitigate losses, the land owners may, under the supervision of a UDWR biologist, receive mitigation permits to take up to 10% (or a maximum of 20 animals) of the depredating herd on range land and are not limited on take within agricultural land (pers. comm. Craig Clyde and Doug Sakaguchi, UDWR).

Relevant Forest Plan Direction

Although the critical winter range that was burned by the Cascade II Fire occurred on State and private lands, the Forest Service recommends the State and private lands consider the management objectives and guidelines outlined in the Uinta National Forest 2003 Land Resource Management Plan. The fire occurred within the Lower Provo Management Area and is managed with an emphasis on restoring vegetative conditions to achieve ecosystem health (2003 Uinta National Forest Land and Resource Management Plan p 5-74). Management is focused on providing a diverse composition of non-forested vegetation (2003 Plan p 5-74). Resources are maintained or improved to achieve desired conditions for habitats of threatened, endangered, sensitive, and Management Indicator Species, which include deer and elk (2003 Plan p 4-5).

Aquatic and terrestrial habitat guideline 7 (2003 Plan p 3-44) states that “Surface disturbances should receive prompt re-vegetation efforts using native species desirable for wintering big-game.”

The 2003 Land and Resource Management Plan Goal 2, Sub-goal 25 states "Maintain stable and upward conditions in big-game winter range habitats and improve downward trend sites" (2003 Plan p 2-10).

Recommendations

- Elk and deer winter range is targeted for rehabilitation in the high, moderate and low intensity burn areas on private and state lands. Seeding the area was discussed with Bob Rasely (NCRS), Doug Sakaguchi (UDWR), and Forest Planner Reese Pope at the BAER meeting on October 2, 2003. All parties concur that seeding within the burn areas would help the area to recover for big-game, suppress the spread of cheatgrass, an invasive species, as well as reduce sedimentation, ash and nutrient deposition into the Deer Creek Reservoir. A mix of *native* grasses, forbs and shrubs is recommended for use in the reseeding process. UDWR has offered to supplement the seed mix NCRS will use on big-game winter range within the burn area, with forbs and shrubs. The seed mix, seeding rate, and the application methods used for seeding have yet to be determined.
- Restrict vehicle use in the reseeded burn areas until vegetation has reestablished sufficiently.
- The 2003 Land and Resource Management Plan grazing guideline 12 recommends that livestock be deferred from grazing "…in areas disturbed by wildland fire or other natural events until vegetation has reestablished sufficiently, but for no less than two growing seasons" (2003 Plan p 3-27).

Conclusion

The Cascade II Fire burned 7,828 acres of private, State and Forest Service administered lands. The fire consumed 43.6% of the available critical elk wintering habitat and 28.9% of the critical deer habitat, all on private and State lands. Seeding in these areas with a mix of *native* grass, forbs and shrubs will reduce surface run-off, reduce the encroachment of noxious and invasive species, and improve elk and deer winter range habitat.

The impacts to the critical range are expected to diminish over the next 1-3 years as grasses and browse species grow back (pers. comm. Craig Clyde, UDWR). As with past fires (NFP 2002a and NFP 2002b), we expect forage production and quality to improve due to the removal of overgrown brush allowing new, tender growth to emerge and be utilized by big-game species.

Literature Cited

Clyde, Craig. 2003. Personal Communication. Wildlife Biologist with Utah Division of Wildlife Resources. (801) 491-5678.

Department of Natural Resources. Division of Wildlife Resources. 2002. Utah Big Game Range Trend Studies 2002 Volume 1 Central Region. Publication Number 03-14. Report for Federal Aid Project W-82-R-47. State of Utah.

Hartman, Karen. 2003. Personal Communication. Biologist with US Forest Service, Spanish Fork Ranger District. (801) 798-3571.

National Fire Plan. 2002a. Improving Habitat and Reducing Fire Risk. Idaho. http://www.fireplan.gov/reports/55-63-en.pdf

National Fire Plan. 2002b. Rapid River Prescribed Burn in Payette National Forest. Idaho. http://www.fireplan.gov/reports/62-70-en.pdf

Rasely, Bob. 2003. Personal Communication. Geologist with Natural Resource Conservation Service. (801) 524-4563.

Sakaguchi, Doug. 2003. Personal Communication. Regional Habitat Manager with Utah Division of Wildlife Resources. (801) 491-5645.

Sitting Up, Nettie. 2003. Personal Communication. Biologist with US Forest Service, Pleasant Grove Ranger District. (801) 785-3563.

US Department of Agriculture. Forest Service. Uinta National Forest. 2003. Land and Resource Management Plan Revision. Provo, Utah.

Waters, Jeff. 2003. Personal Communication. Wildlife Biologist with US Forest Service, Heber Ranger District. (435) 654-0470.

(Bekee Megown, Fish and Wildlife Biologist)

FISHERIES

This specialist report examines the potential effects of the Cascade II Fire on local fisheries and fish habitat. The Cascade II Fire started at the end of September 2003. The incident occurred on the Lower Provo Management Unit on the Pleasant Grove Ranger District within the Uinta National Forest. The fire impacted over 7,800 acres of Forest Service, State and private land. The fire area contained 25.37 miles of intermittent and perennial streams. The intermittent streams were not flowing at the time of the Cascade II Fire. Provo Deer Creek and South Fork Deer Creek are the only perennial streams within the fire perimeter that support a fishery. Provo Deer Creek contains brown trout and stocked rainbow trout and is a recreational fishing destination. South Fork Deer Creek contains a genetically pure population of Bonneville cutthroat trout, listed as a Sensitive Species by the Forest Service, and as a Conservation Species by the State of Utah, which has been certified to be whirling disease free. This pure population of Bonneville cutthroat trout is a potential source population for reintroduction purposes. Deer Creek Reservoir, a popular fishing area, is adjacent to the south east perimeter of the burn area. The NRCS specialist report and EWP response will address issues related to Deer Creek Reservoir.

The following table summarizes the miles and percent of the two perennial streams that support a fishery as well as the percent of each stream that was burned at various intensities:

Stream Names	Mile of Stream w/in Fire Boundary	Mile of Stream Burned at High Intensity	Mile of Stream Burned at Moderate Intensity	Mile of Stream Burned at Low Intensity	Mile of Stream Unburned w/in Fire Boundary
Provo Deer Creek	3.55	0 (0%)	0.26 (7%)	2.98 (84%)	0.31 (9%)
SF Deer Creek	0.55	0 (0%)	0 (0%)	0.55 (100%)	0 (0%)

Pre-Fire Conditions

Primary plant communities affected by this fire include aspen (5%), oak/maple and other brush (66%), conifer (1%), sagebrush grasslands (7%), riparian communities (3%), and mixed mountain shrub and sagebrush (17%). Previous prescribed fire activity has occurred west of the burn perimeter and has fully recovered. There is currently no timber harvesting within the burn perimeter, although livestock grazing does exist.

Fine sediments in South Fork Deer Creek average 17% and studies have shown that once fine sediments surpass 20%, trout reproductive success declines rapidly and above 40% recruitment is lost (Meeham, 1991).

Post-fire Conditions (Existing and Anticipated)

Several factors were considered to assess post-fire conditions and the implications for aquatic resources.

- The extent of stream habitat disturbance relative to the entire Provo Deer Creek and Deer Creek Reservoir watershed
- Distribution of stream habitat that received high intensity burns
- Observed fish mortality
- Barriers to fish migration as a result of the fire that would limit re-establishment of populations displaced by the burn
- Loss of riparian habitat and sediment related fire effects

To interpret the direct and indirect effects to aquatic resources it is important to consider the extent of the fire in relation to the entire watershed. The Cascade II Fire burned more than 7,800 acres of private, State, and Forest Service administered land. The fire affected 3.55 miles of Provo Deer Creek and 0.55 miles of South Fork Deer Creek. The Provo Deer Creek drainage is approximately 11.47 miles long from the confluence to the headwaters, and the South Fork Deer Creek is approximately 4.64 miles. High intensity fire impacted 13 acres (6.5%) of riparian habitat within the total burn perimeter. Moderate and low intensity fire impacted about 32 acres (16.2%) and 139 acres (70.6%) of riparian area, respectively, while 13 acres (6.6%) were unburned. There are 197 acres of riparian habitat within the burn perimeter which comprises 3% of the total burn area.

The distribution of burned areas will allow fish populations to persist during the recovery of riparian vegetation. Short-term effects to the fishery may include an increase in ash and fine sediment from the fire during and after storm events. Depending on storm length and intensity, the ash could occur as a pulse through the stream channel lasting several hours. After 2-3 moderate to high intensity storms, impacts from ash will decrease significantly, however sediment can occur as suspended solids and may be more long term. The main concerns with ash and sediment delivery are related to the Provo Deer Creek and Deer Creek Reservoir due to the possibility of sheet erosion from the upslope areas. If a high intensity storm occurs, the potential exists for transport of excessive fine sediments which could reduce spawning success.

Another area of concern is the existence of noxious weeds interspersed throughout the riparian area adjacent to Provo Deer Creek. This was observed during our field survey along the Provo Deer Creek from the confluence with South Fork Deer Creek to approximately one mile upstream.

Additionally, there is an anticipated risk of sedimentation and nutrient deposition through the Provo Deer Creek tributary into the Provo River, a popular Class 1 Fishery. Areas of concern extend from the northwest slope above the Cascade Springs area south to the edge of the burn.

There was an area observed during the field surveys along the South Fork Deer Creek (between 0.4 and 1 mile from the confluence with the Provo Deer Creek) where the area adjacent to the riparian area burned with moderate intensity, however the majority of the riparian habitat along this creek burned at low intensity and therefore should be adequate to catch the possible sedimentation.

Long-term negative effects of the Cascade II Fire to the fishery will be minimal if vegetation is re-established in the burned portions. The moderately burned and lightly burned riparian areas will recover quickly because vegetation was not totally removed. The intensely burned areas will recover less quickly, but are buffered from the creek by riparian vegetation that should recover quickly.

Relevant Forest Plan Direction

Current fisheries management objectives and guidelines for the Uinta National Forest are outlined in the Uinta National Forest 2003 Land and Resource Management Plan. This forest plan emphasizes goals of “healthy, self-sustaining riparian communities, habitat for viable populations of aquatic life, and conditions for natural stream dynamics” (2003 Forest Plan p. 2-11).

The Cascade II Fire occurred within the Lower Provo Management Area which is located within the Northern Bonneville Geographic Management Unit for Bonneville cutthroat trout, a Management Indicator Species. Streams within the management area were historically inhabited by Bonneville cutthroat trout and are managed to protect and maintain populations (2003 Forest Plan p. 2-7). A guideline included in the plan outlines that for Bonneville cutthroat trout streams, “total soil resource commitment should be limited to no more than 4 percent of the riparian area acreage with this prescription within the watershed” (2003 Forest Plan p. 3-44).

An additional goal within the 2003 Forest Plan states "streams are managed to provide a recreational fishery and sufficient habitat is maintained to ensure that the stream's recreational values are maintained" (2003 Forest Plan p. 2-7).

Recommendations under BAER

- No treatments are recommended along the South Fork Deer Creek at this time. The riparian area adjacent to the creek appears to be intact and able to catch the minimal sedimentation yield that is expected to occur. Monitoring should occur after spring run-off and after significant rain events in order to assess the effects of the fire on the Bonneville cutthroat trout population.
- A combination of seeding and mulching on the slopes to the northwest and southwest of Cascade Springs is recommended to reduce sheet erosion and prevent sedimentation, ash, and nutrients from entering the Provo Deer Creek. A combination of straw wattles, silt fences, seeding and mulching can be used along the length of stream from the springs south to the edge of the burn in order to reduce the sedimentation, ash and nutrients from entering the Provo Deer Creek.
- Monitoring should occur in Provo Deer Creek after spring run-off and after significant rain events in the fall in order to assess the effects of the fire related to debris and sediment loading and stream bank stability.

Recommendations under NFP/KP2
These recommendations must be entered into NFPORS FY2004 Database

- Sample South Fork Deer Creek using appropriate methods to determine the potential contamination of Whirling Disease. Contamination would be a result of the fire suppression activities only and not as a result of the fire (FY2004 and FY2005).

Task	Resource	Estimated Time	Cost/Year
Fish Sampling	Biologist	2 days ($30/hr)	$480
	Technician	5 days ($12/hr)	$480
Fish Processing	Biologist	1 day ($30/hr)	$240
	Technician	1 day ($12/hr)	$100
Shipping + Materials			$170
Testing	Outsource	30 fish @ $20 ea.	$600
Analysis & Report	Biologist	1 day ($30/hr)	$240
Subtotal			*$2310*
Overhead		30%	$690
Total per year			**$3000**
Total For 2 Years			***$6000***

Conclusions

The Cascade II Fire impacted over 7,800 acres of private, State, and Forest Service administered land. There were no stream miles burned at high intensity within the two fish-bearing perennial streams, however 7% of Provo Deer Creek burned at moderate intensity. High intensity fire impacted 13 acres (6.5%) of riparian habitat within the total burn perimeter. There are 197 acres of riparian habitat within the burn perimeter which comprises 3% of the total burn area. Provo

Deer Creek contains brown trout and stocked rainbow trout and is a recreational fishing destination. South Fork Deer Creek contains Bonneville cutthroat trout. It is anticipated that the segment of the South Fork Deer Creek impacted by the Cascade II Fire will completely recover. There is a high probability that sediment and ash will flow into Provo Deer Creek, therefore efforts to stabilize the hillsides above the creek will reduce adverse effects to fish and aquatic resources.

Literature Cited

Meehan, W. R., editor. 1991. Influences of forest and rangeland management on salmonid fishes and their habitats. American Fisheries Society Special Publication 19.

US Department of Agriculture. Forest Service. Uinta National Forest. 2003. Land and Resource Management Plan Revision. Provo, Utah.

Utah Department of Natural Resources. Division of Wildlife Resources. 1997. Conservation agreement and strategy for Bonneville cutthroat trout (Oncorhynchus clarki utah). Leo Lentsch, Yvette Converse, and Jane Perkins. Publication number 97-19. March.

Utah Department of Natural Resources. Division of Wildlife Resources. 2000. Range-wide conservation agreement and strategy for Bonneville cutthroat trout (Oncorhynchus clarki utah). Leo D. Lentsch, Catherine A. Toline, Jeff Kershner, J. Michael Hudson, and Janet Mizzi. Publication number 00-19. December.

(Kate Schwager, Fish and Wildlife Biologist)

TES ANIMALS

Threatened, Endangered and Candidate Species

The threatened (T), endangered (E), and candidate (C) species list for Utah County include the bald eagle (T) (*Haliaeetus leucocephalus*), Western yellow-billed cuckoo (C) (*Coccyzus americanus occidentalis*), and Canada lynx (T) (*Felix Canadensis*). The following are discussions of species occurrences, habitat and determinations of effects from the Cascade II Fire.

Bald eagle
Based on knowledge of the area and past surveys, the bald eagle does not nest within or near the Cascade II Fire due to lack of habitat (USFWS 1983, UDWR 1999). Potential winter roost sites in the Provo River and downstream in Deer Creek should not be affected by the fire. There would be no direct or indirect effects to bald eagles as they have not yet returned for the winter and no critical habitat has been affected. There should be no cumulative effects to the eagle as potential foraging habitat would not be lost or significantly modified to render it unusable. The Cascade II Fire should have no effect on the species.

Western yellow-billed cuckoo
This species requires large blocks of riparian habitat consisting of cottonwood, willows and a dense understory. Suitable habitat does not exist within the burn area. The Cascade II Fire should have no effect on the species.

Canada lynx
There is no suitable or designated critical habitat within the Cascade II Fire area. The lynx require boreal forest habitat of both typical old growth and an early successional structure, relying heavily on snowshoe hare as prey. Lynx Analysis Units (LAUs) were identified with guidance from the USDI Fish and Wildlife Service, on the north end of the Heber Ranger District. These areas are considered potential primary habitat; anything outside the units is potential secondary habitat. As primary habitat exists only on the Heber Ranger District and not the Pleasant Grove Ranger District, the Cascade II Fire should have no effect on the species.

Sensitive Species

The Forest Service sensitive species list includes the spotted bat (*Euderma maculatum*), fisher (*Martes pennanti*), Western big-eared bat (*Corynorthinus townsendii pallescens*), flammulated owl (*Otus flammeoulus*), three-toed woodpecker (*Picoides tridactylus*), northern goshawk (*Accipiter gentiles*), spotted frog (*Rana pretiosa*), Colorado River cutthroat trout (*Oncorhynchus clarki pleuriticus*), and Bonneville cutthroat trout (*Oncorhynchus clarki utah*). The following are discussions of species occurrences, habitat and determinations of effects from the Cascade II Fire.

Spotted bat
Spotted bats have the potential to occur within the Cascade II Fire area (Kistler, 1996). Spotted bats occur in a wide variety of habitats from desert to montane coniferous forests, including ponderosa pine, pinyon/juniper woodland, canyon bottoms, open pasture, and hayfields (NatureServe Explorer 2001). Few roosts have been found, but spotted bats are thought to roost in cracks and crevices in rocky outcrops, cliffs, and canyons. Spotted bats have been recorded in American Fork Canyon and in the city of Provo (UDNR 2002b). Bats are difficult to study and little is known about the distribution or habitat use patterns of spotted bats on the Uinta National Forest. Fire will likely impact vegetation and thus insect abundance and composition, but over time the vegetation patterns will move closer to properly functioning conditions and pre-settlement conditions, which are the conditions under which spotted bats and other native species evolved. The fire may impact spotted bat individuals or habitat, but is not likely to contribute to a trend towards federal listing or cause a loss of viability to the population or species.

Fisher
Fishers occur in a wide variety of forested landscapes but they typically select late-successional forests over other habitats and avoid large non-forested areas (Powell and Zielinski 1994). The only fisher record in Utah Division of Wildlife Resource's GIS database is a record of tracks that were observed at Trial Lake in the western Uinta Mountains in 1938; the state's Natural Heritage Program classifies the fisher as "Reported in state, but occurrence questionable" (UDNR 2002b). It is unlikely that fishers occur in Utah (UDNR 1998). As little late-successional forests occurred within the Cascade II Fire perimeter (less than 5% of the total burn area) and due to the

unlikelihood of fisher in the area, it is our determination that the Cascade II Fire will have no impact to fisher.

Western big-eared bat
Western big-eared bats have the potential to occur within the Cascade II Fire area (Kistler, 1996). Caves, abandoned mines, and adits are the primary habitat determinants for the species. Impacts to the riparian areas which are prime foraging habitats due to the abundance of insects could potentially affect the bats that might occur in this area. The fire may impact Western big-eared bat individuals or habitat, but is not likely to contribute to a trend towards federal listing or cause a loss of viability to the population or species.

Flammulated owl
On the Uinta National Forest, flammulated owl nests have primarily been found in cavities in aspen trees within stable aspen or seral aspen forest types. The increase in late-successional aspen forests that has resulted from decreased wildfire occurrence may have benefited flammulated owls. Within the Cascade II Fire perimeter, only 5% of the vegetation community was comprised of aspen, and of that almost 2% was left unburned. The fire will eventually move landscape vegetation patterns closer to properly functioning conditions and pre-settlement conditions, which are the conditions under which flammulated owls and other native species evolved. The fire may impact flammulated owl individuals or habitat, but is not likely to contribute to a trend towards federal listing or cause a loss of viability to the population or species.

Three-toed woodpecker
The three-toed woodpecker is considered common in the Uinta Mountains but uncommon elsewhere in the state (UDNR 1998). It is frequently detected in spruce/fir forests on the Uinta National Forest. Populations have been shown to increase in some areas three to five years after forest fires (Spahr et al. 1991). Up to 75 percent of its diet consists of wood-boring beetles and caterpillars that attack dead or dying conifers (NatureServe Explorer 2001). Fire suppression activities are potential threats (Spahr et al. 1991). The Cascade II Fire will move landscape vegetation patterns closer to properly functioning conditions and pre-settlement conditions, which are the conditions under which three-toed woodpeckers and other native species evolved. There will be no negative impacts to this species.

Northern goshawk
Goshawks occur widely throughout the Uinta National Forest (UDNR 2002b). They typically nest in areas with a mix of Douglas-fir/white fir and aspen forest types. The Forest has been monitoring goshawk population trend since 1996 by monitoring territory occupancy. There is no evidence that territory occupancy has declined between 1996 and 2002 (USDA 2002). The Cascade II Fire will move vegetation conditions toward desired future conditions, and is unlikely to negatively impact goshawk viability.

Columbia Spotted frog
Existing populations are known to occur along the Provo River below and above Jordanelle Reservoir, the upper Provo River east of Woodland, and on Diamond Fork River below the Forest boundary. In 2002, Columbia spotted frogs were observed by UDWR biologists on

Bureau of Reclamation property within the proclaimed Uinta National Forest boundary in the lower Diamond Fork drainage (UDNR 2002a). This is the only population known to occur within the proclaimed Forest boundary, but populations on the upper Provo River are close to the Forest boundary, and it is possible that additional populations will be discovered on Forest land in the near future. As the population is found upstream from the Cascade II Fire, it is unlikely that this species will be affected.

Colorado River cutthroat trout
The Uinta National Forest has four management areas (defined at the fifth level HUC watershed) that are part of the Colorado River system that contain native cutthroat trout populations. Colorado River cutthroat trout have been extirpated from the majority of streams on the Forest. Remnant populations have been found in the West Fork Duchesne River, Upper Currant Creek, Willow Creek, and the Right Fork of White River. As the Cascade II Fire will not affect any of these water bodies, there will be no affect to the Colorado River cutthroat trout.

Bonneville cutthroat trout
SEE SPECIALIST REPORT FOR FISHERIES

Determinations and Requirements

The Cascade II Fire did not affect any threatened, endangered, or candidate animal species. Potential habitat may have been damaged for two sensitive bat species and one sensitive bird species. The spotted bat, Western big-eared bat, and flammulated owl have potential habitat within the burn area. The fire may impact the individuals or habitat, but is not likely to contribute to a trend towards federal listing or cause a loss of viability to the population or species.

The Bonneville cutthroat trout was affected by the Cascade II Fire. Please see the specialist report for Fishery and Aquatic Resources for effects to the Bonneville cutthroat trout.

Literature Cited

Kistler, K. 1996. Compilation of Literature References regarding Spotted and Big-eared bats. Unpublished. On File at Heber Ranger District Office.

NatureServe Explorer. 2001. Comprehensive reports for various animal species, collected on various dates, all prior to September 2002. Version 1.6. Arlington, Virginia. Available: http://www.natureserve.org/explorer.

Powell, R. A., and W. J. Zielinski. 1994. Fisher. In *The scientific basis for conserving forest carnivores: American marten, fisher, lynx, and wolverine in the western United States, edited by* L. F. Ruggiero, K. B. Aubry, S. W. Buskirk, L. J. Lyon, and W. J. Zielinski. U.S. Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station, Fort Collins, Colorado. General Technical Report RM-254. Pp. 38-73.

Spahr, Robin, Lori Armstrong, Duane Atwood, and Mike Rath. 1991. Threatened, endangered, and sensitive species of the Intermountain Region. U.S. Department of Agriculture, Forest Service, Intermountain Region. Ogden, Utah. Excerpt on three-toed woodpecker.

Utah Department of Natural Resources. Division of Wildlife Resources. 1998. Inventory of sensitive species and ecosystems in Utah. Sensitive vertebrate and invertebrate species and ecosystems: A progress report. [Internet]: www.utahcdc.usu.edu/ucdc/ViewReports/vertrpt.pdf.

———. 1999. Personal communication with Dennis Shirley regarding distribution of known bald eagle and peregrine falcon nests in Northeast Utah.

———. 2002a. New spotted frog population discovered in Utah [online article]. 12 September. [Internet]: http://www.wildlife.utah.gov/news/02-09/frogs.html. Accessed 8 February 2003.

———. 2002b. Utah Natural Heritage Program GIS database (Utah Conservation Data Center, GIS Data CD-ROM). Salt Lake City, Utah. May.

U.S. Department of Agriculture. Forest Service. Uinta National Forest. 2002. Uinta National Forest 2002 goshawk survey results. Provo, Utah.

US Fish and Wildlife Service. 1983. Northern States Bald Eagle Recovery Plan. Denver, CO.

(Bekee Megown, Fish and Wildlife Biologist)

HERITAGE SPECIALIST REPORT

A total of 15 known archaeological sites occur within the perimeter of the Cascade II Fire. Six are on National Forest System lands, one is on private land, and eight are on Utah State Parks lands. This report recommends whether or not emergency treatments are necessary to protect the sites against erosion or other post-fire effects. It discusses the sites and treatment recommendations by management area.

Sites can be adversely affected by a number of different actions after a fire. Chief among these is erosion. For example, ancient American Indian campsites (which consist of a scatter of surface artifacts as well as buried stratified deposits) may be vulnerable to loss of buried deposits during any post-burn soil erosion. Sites can also be adversely affected by post-fire ground disturbing treatments such as construction of debris basins. They are also vulnerable to illegal artifact collection until vegetation cover is reestablished.

Heritage Resources on National Forest System Lands

The majority of the area within the fire perimeter on the Uinta National Forest was previously surveyed for heritage sites as part of prescribed burn planning. The focus of this survey was to locate sites with potentially flammable elements (such as cabins), and other sites which might be vulnerable to post-fire erosion. So although not all sites which might exist in this area have been identified, we at least have a better understanding of potential post-fire effects on heritage sites on this portion of the fire.

Table 1: Summary of heritage sites located on National Forest System lands:

Site # and Type	National Register Status	Burn Intensity	Site Stability	Emergency Treatment Needed?	Proposed post-fire soil stability treatment in area
42 WA 129 American Indian Campsite	Eligible	Moderate	Potentially unstable; slopes are up to 15º.	Yes	Hand seeding with mulch; this will be done as part of general watershed treatments in the area.
42 WA 130 American Indian Campsite	Eligible	Moderate	Good; relatively level slope	No; grasses on the site are adequate	None; natural regeneration
42 WA 131 American Indian Campsite	Eligible	Low	Good; relatively level slope	No; grasses on the site are adequate	None; natural regeneration
42 WA 233 American Indian Campsite	Eligible	Low	Good; relatively level slope	No; grasses on the site are adequate	None; natural regeneration
42 WA 236 American Indian Campsite	Eligible	Low	Good; relatively level slope	No; grasses on the site are adequate	None; natural regeneration

Six of the seven known archaeological sites located on the Uinta National Forest are ancient American Indian sites. The seventh site is a historic ditch which is Not Eligible for the National Register (42 WA 279) and therefore does not qualify for consideration under BAER; however, the site is not vulnerable to post-fire effects as only a small portion of it was within the burn perimeter.

All of the six American Indian campsites are Eligible for the National Register and can be considered under BAER. However, most of them are in relatively stable settings, and burned lightly or moderately with sufficient ground cover still on the site to provide for regeneration of existing vegetation. As a result, emergency treatment is only recommended on one of the sites, 42 WA 129. This will be done as part of the overall watershed treatments, which will include hand seeding and mulching. The seed should not be deeply raked into the surface of this site in order to protect the distribution of surface artifacts. As a result, the Forest Archaeologist should be included in the implementation of the hand mulching portion of the BAER treatments.

Heritage Resources on Private Land

No formal heritage resource inventories have been conducted in the past on private land. However, one site had been identified by local historians which is Eligible for the National Register of Historic Places. This was not directly impacted by the fire, except for some minor smoke staining. The site is in an area with low erosion rates and good soil stability when in an

unburned condition. As a result, no post-fire erosion which might adversely affect the site is expected. This area, however, is proposed for aerial seeding as part of Emergency Watershed Protection, which would increase watershed stability, thereby benefiting the immediate stability of the soils on and around the site.

Table 2. Sites located on Private Land:

Site # and Type	National Register Status	Burn Intensity	Site Stability	Emergency Treatment Needed?	Proposed Post-fire soil stability treatment in area
42 WA 357 American Indian Rock Art	Eligible	Moderate	Good; soils are stable.	No	Aerial seeding is proposed over the site area as part of overall Emergency Watershed Protection.

Heritage Resources Managed by Utah State Parks

A limited number of past heritage surveys have been conducted on State lands and Bureau of Reclamation lands managed by State Parks, and eight sites identified within the burn perimeter. One of these is a historic trash scatter which is Not Eligible for the National Register, and it is not considered in this report.

Six of the sites are American Indian campsites that were identified as Not Eligible for the National Register. However, all of them were given this status between 21 and 27 years ago. Some of them might be considered Eligible for the National Register if their importance were re-considered today. Emergency Watershed Protection funds cannot be used specifically to protect sites which are not eligible for the National Register, and no treatments specific to the sites are recommended. Nonetheless, general watershed restoration efforts in the areas of the sites will benefit the sites as well, and so the overall effect of the EWP project on those sites is reported below.

Table 3. Sites located on Utah State Parks Land:

Site # and Type	National Register Status	Burn Intensity	Site Stability	Emergency Treatment Needed?	Proposed Post-fire soil stability treatment in area
42 WA 8 American Indian Campsite/ Historic Habitation	Not Eligible	Low	Good; relatively level slope	No	Aerial seeding and mulching
42 WA 9 American Indian Campsite	Not Eligible	Low	Good; relatively level slope	No	Aerial seeding and mulching
42 WA 10 American Indian Campsite	Not Eligible	Low	Good; relatively level slope	No	Aerial seeding and mulching
42 WA 36 American Indian Campsite	Not Eligible	Low	Good; relatively level slope	No	Aerial seeding and mulching
42 WA 37 American Indian Campsite	Not Eligible	Low	Good; relatively level slope	No	Aerial seeding and mulching

Site # and Type	National Register Status	Burn Intensity	Site Stability	Emergency Treatment Needed?	Proposed Post-fire soil stability treatment in area
42 WA 38 American Indian Campsite	Not Eligible	Low	Good; relatively level slope	No	Aerial seeding and mulching
42 WA 112 Heber Creeper Railroad	Eligible	Low	Good; relatively level slope	Yes; see Engineering part of this document.	Protection measures include aerial seeding and mulching, as well as cleaning the existing culverts on the railroad grade.

The only site on lands managed by State Parks which has recently been determined to be Eligible for the National Register is the railroad grade currently used by the Heber Creeper. Since this is a functioning railroad, it has been identified as an asset at risk. The same features of the railroad grade within the burn perimeter which make it Eligible for the Register are the same features which are recommended for protection. These include the grade itself and culverts. As a result, any treatments which protect these features will help maintain the historic integrity of the line at the same time. The railroad is discussed in the Engineering section of this report, where the recommended treatment is cleaning out the existing 24 inch culverts along the grade. In addition, aerial seeding and mulching is recommended for the slopes above the grade, as part of overall watershed protection measures.

Recommendations for National Fire Plan/Key Point 2 Rehabilitation/Restoration Work

Past heritage inventories within the fire perimeter do not include all burned areas, and have not identified all types of sites in the area. As a result, there may still be sites which may require additional restoration work. A total of 300 acres of areas with high site probability are proposed for site survey, in order to identify these sites. These high probability areas are based on the locations of known sites in this area of Utah.

Activity	Cost per Acre	Number of Acres	Total Cost
Conduct archaeological survey of high-probability site areas	$7.75	300	$2325.00

(Charmaine Thompson, Archeologist)

ENGINEERING – TRANSPORTATION/WATER/WASTEWATER SYSTEMS

General

The purpose of this report is to examine the potential effects of the Cascade Springs II Fire on transportation systems, culinary water systems, and waste water treatment systems. Issues addressed are:

- Protection of National Forest System Roads

- Channel Crossings
- Sediment Structures
- Channel Relocation
- Source Water Protection
- Water Distribution System Protection
- Waste Water System Protection
- Facility Protection

Three Forest System Roads have been identified as being at risk during high intensity storm water events. These roads are: Cascade Springs Road, FSR 114; Little Deer Creek Road, FSR 475; and Bear Canyon Road, FSR 196. The Cascade Springs Road is a maintenance level 5 road and managed for travel by passenger vehicles and receives annual maintenance. Utah County has maintained this road for the Forest Service under a Schedule A road use agreement.

The Cascade Springs water system currently uses two springs. The spring #03, located in Bear Canyon, was found to be safe from the fire activities. Spring #02 was completely burned over. Damage sustained includes a protective fence around the collection area, and loss of shallow rooted vegetation over the collection area. Other improvements were found to be undamaged. The water system has been tested for bacteria, and has been shut down in compliance with the system's emergency response plan.

The Cascade Springs Water System distribution system was found to be mostly undamaged. One hydrant/fountain was found to have sustained cosmetic damage and will need to be replaced. However, the distribution system is considered safe after an approved chlorination process at startup.

Two waste water systems, one servicing the comfort station at Cascades Springs and one at the host site, were found to be undamaged by the fire; however, the systems are at risk due to increased ground water or overland flow. The waste water may contaminate ground water, if not adequately treated. Waste water may also create a health hazard if it surfaces.

The facilities at Cascade Springs are at risk to debris flows that may move down the channel directly east of the improvement. Care must be given to divert flows to safe locations.

Specifications included in this report reflect approximate cost amounts (rounded in estimation) for the work to be done.

Transportation Systems

Cascade Springs Road, FSR 114

1. Culvert inlets and outlets are plugged and damaged and need to be repaired and cleared. This can be accomplished without cutting the asphalt. Some excavation may be needed to repair the inlet ends. The culverts may be cleared with high pressure water jets. The culverts need to be cleared from milepost 2.5 to 6.8. Catch basins are to be cleared and opened to provide a bottom horizontal dimension of two times the pipe diameter.

Excavate 4 to 6 inches below the pipe invert. There are a total of 34 pipes ranging from 15” to 48” in diameter.

2. The culverts for the Bear Canyon and the Provo Deer Creek drainages need to have the inlets and outlets armored to protect the culverts from losing bedding material. Calculations on predicted flows show that the 48” culvert at Bear Canyon is sufficient to carry the flows generated in a 100 year event. But the culvert on the Provo Deer Creek appears to fail at a 2 year event. The culvert has existed in this location for some time and has not failed. The hydrologic report indicates that the flow will not substantially increase due to the fire; therefore, the culvert shall be monitored for any indications of failure and should be replaced with an adequate culvert as soon as imminent failure is discovered.
3. Work items to be done on the Cascade Springs Road are listed below:
    a. **MP 5.830:** Armor inlet and outlet of 48” culvert on the Bear Canyon drainage with riprap.
    b. **MP 6.445:** Armor inlet and outlet of pipe arch culvert on the Provo Deer Creek with riprap. Care should be given to not damage utilities buried in the shoulder. Monitor the culvert for the next three years to ensure that it is adequate to carry the increased flows from burned areas.
    c. **MP 6.655:** Replace 24” culvert with 36” x 30’ culvert. Sawcut asphalt to provide a bed of ¾” minus approved road base compacted to 95% of standard Proctor. The bed shall adequately support the haunches of the culvert. The replacement culvert is to be placed at 8% grade were possible, with a minimum of 1’ of cover and slopes at 2:1. Armor inlet and outlet with riprap. Care should be given to not damage utilities buried in the shoulder. Cover with road base compacted to 95%. Patch the asphalt pavement with 6” of ½” minus asphalt to create a smooth running surface across the culvert.

Little Deer Creek Road, FSR 475

1. **MP 0.0 to 0.7:** Mechanically out slope road (<2%) where possible and seed all disturbed areas. Because of the rocky nature of the native material, a bulldozer is required for this work. Use a rock rake to remove large diameter rock from the road prism and use a grader to finish the work. Care should be given to protect the sewer line that runs to the drain field at milepost 0.2. There are 4 cleanouts that should be flagged by district personnel prior to the commencement of work. No ditch is allowed next to the cutslope. Install rolling dips at 30 degrees from road cross section, 1’ deep, 20’ wide, and 60’ long. Replacement culverts are to be placed at 8% grade were possible, with a minimum of 1’ of cover and slopes at 2:1. Armor inlets and outlets. Replace the culverts as specified below:
2. **MP 0.05:** Install rolling dip
3. **MP 0.10:** Clean Culvert

4. **MP 0.30:** Replace 24” culvert with 36” x 50’ culvert and armor inlet and outlet with riprap.
5. **MP 0.40:** Clean Culvert
6. **MP 0.60:** Install rolling dip
7. **MP 0.65:** Install rolling dip
8. **MP 0.70:** Install rolling dip to move water to the dispersed area. Do not direct to the existing ditch carrying water directly to the stream.
9. **MP 0.7 to 2.1:** Use a grader to remove berms from the sides of the road and seed all disturbed areas. No ditch is allowed next to the cutslope. Install rolling dips at 30 degrees from road cross section, 1’ deep, across the road, and 60’ long. Rolling dips are to be placed every .05 miles at locations that will not directly discharge water into the stream.
10. **MP 0.80:** Install new 36” x 50’ culvert, and armor inlet and outlet with riprap.

Bear Canyon Road, FSR 196

1. **MP 0.0 to 0.43:** Mechanically outslope road (<2%) where possible and seed all disturbed areas. A road grader will be used for this work. Care should be given to protect the water line that runs under the road. Prior to the commencement of work, district personnel should flag sections of the road under which the water line runs. Because of the water line, the operator should pull soil in from the high berms along the road into the roadway to create drainage structures. Install rolling dips at 30 degrees from road cross section, 1’ deep, 20’ wide, and 60’ long. Ditch out outlets to dissipate water and energy.

Road East of Cascade Springs on Wasatch Mountain State Park

1. Mechanically install rolling dips at 30 degrees from road cross section, 1’ deep, 20’ wide, and 60’ long at frequent intervals. Care should be given to protect the utilities that run next to the Cascade Springs Road. Prior to the commencement of work, district personnel should flag utility locations. Rolling dips should direct water to the north side of the road. At the bend in the bottom of the road, the channel should be restored to its natural location and direct the water flows to the culvert under the Cascade springs Road.

Waste Water Systems

In the drainages above the septic drain fields, drainage structures shall be built to encourage infiltration of the water and dissipate the energy of the water descending the slope. A diversion ditch shall be placed uphill from the drain fields to divert surface water around the area. At the drain field for the Cascade Springs comfort station shall have the culvert discharge directed away from the sewer line and drain field.

Private and State Lands

1. Heber Valley Railroad
    a. Culvert inlets and outlets are plugged and damaged and need to be repaired and cleared. Railroad personnel say that they have specialized equipment for this purpose. The culverts may be cleared with high pressure water jets. The culverts need to be cleared from the Little Deer Creek drainage to the Decker Canyon Drainage. Catch basins are to be cleared and opened to provide a bottom horizontal dimension of two times the pipe diameter. Excavate 4 to 6 inches below the pipe invert.
    b. Large culverts shall be cleared of silt and debris. Vegetation that has clogged the channel shall be removed to prevent congestion in the channel.
2. Decker Canyon Road
    a. Mechanically outslope road (<2%) where possible and seed all disturbed areas. A road grader will be used for this work. Install rolling dips at 30 degrees from road cross section, 1' deep, 20' wide, and 60' long. Clear culverts from debris and armor inlets and outlets with riprap.
3. State Park Road, Across Drainage
    a. Obliterate road using an excavator. Re-contour and seed disturbed areas.
4. Water System Source Protection
    a. Herbicides and fertilizers should not be used in zones of influence for sources for culinary water systems. This could cause spikes in nitrate, a monitored primary contaminant, and the introduction of other harmful chemicals to a potable water supply.

SCHEDULE OF ITEMS
CASCADE II COST ESTIMATE
ENGINEERING - TRANSPORTATION/WATER/WASTEWATER SYSTEMS

DESCRIPTION	MSRMT	UNIT COST	NFS LANDS		OTHER LANDS	
			QTY	COST	QTY	COST
Clean Culverts and open debris basins	Miles	$ 1,860.47	4.30	$ 8,000.00	0	$ 0.00
Recondition Road, Mechanical	Miles	$ 4,026.40	3.03	$ 12,200.00	4.42	$ 17,796.70
Recondition Road, salvage/replace existing gravel, Mechanical	Miles	$ 4,026.40		$ 0.00	0.46	$ 1,852.15
Clean Culverts and open debris basins, Railroad	Miles	$ 3,443.27		$ 0.00	3.79	$ 13,050.00
Install 36" culvert, Asphalt Surface Road	Linear Ft	$ 325.57	52.00	$ 16,929.79	0	$ 0.00
Install 36" culverts, Native Surface Road	Linear Ft	$ 64.60	100.00	$ 6,460.00	0	$ 0.00
Riprap Culvert inlet and outlet	Cu Yd	$ 143.00	20.00	$ 2,860.00	28.00	$ 4,004.00

DESCRIPTION	MSRMT	UNIT COST	NFS LANDS		OTHER LANDS	
			QTY	COST	QTY	COST
Obliterate Road	Miles	$ 8,305.08		$ 0.00	0.59	$ 4,900.00
Channel shaping and restoration	Site	$ 3,180.00	1.00	$ 3,180.00	0	$ 0.00
Install diversion ditches around septic drain field	Linear Ft	$ 2.10	600.00	$ 1,260.00	0	$ 0.00
Survey, Design, and Contract Administration	Day	$ 280.00	27.00	$ 7,560.00	0	$ 0.00
TOTAL				**$ 58,449.79**		**$ 41,602.85**

National Fire Plan

The following work items are required to restore or protect facilities damaged or threatened due the effects of the Cascade Springs II Fire. Barrier rocks will inhibit unauthorized off road use, especially in areas were other facilities are at risk. Specifically, vehicles should be prevented from driving over the septic drain field located immediately west of the Little Deer Creek Road.

1. The Canyon Meadows Community Water System is at particular risk due to increased sediment load in the Provo Deer Creek.
2. The Narrows Dispersed site (Intersection at milepost 2.489 on the Cascade Springs road)
    a. Barrier Rocks shall be placed at the beginning of the unauthorized road traveling north-east from the dispersed camping area to discourage unauthorized motor vehicle traffic.
3. Little Deer Creek Road
    a. **MP 0.20:** Install barrier rock at entrance to septic drain field to prevent access to motor vehicles.
4. Canyon Meadows Source Protection
    a. Use an obsolete low water crossing to construct a settling basin to lower amounts of suspended solids in raw water diverted to the Canyon Meadows treatment plant. The low water crossing is on National Forest System Lands 40' upstream from the Forest boundary and 100' upstream from the point of diversion for the water system. Use geofabric, rock and existing material to improve a log jam to create more a weir to deepen the existing pool of water.
    b. Install a turbidity meter with an alarm to notify the operator of abnormally high concentrations of suspended solids and high turbidity ("slugs") in the raw water supply. The operator could then shut down the system until the water clears or otherwise chemically treats the raw water. The community needs to maintain 70,000-90,000 gallons of treated water in the storage tank for domestic use and fire suppression requirements during times of little or no irrigation use. Total tank volume is 132,000 gallons. The storage can provide water for three to four days if there is no irrigation use on the system.

SCHEDULE OF ITEMS
CASCADE II COST ESTIMATE
ENGINEERING - TRANSPORTATION/WATER/WASTEWATER SYSTEMS

DESCRIPTION	MSRMT	UNIT COST	NFS LANDS		OTHER LANDS	
			QTY	COST	QTY	COST
Install Barrier Rock	Site	$ 1,895.00	2.00	$ 3,790.00		$ 0.00
Install warning system at Canyon Meadows Community Water Treatment Plant	Each	$ 5,000.00	1.00	$ 5,000.00	1.00	$ 5,000.00
Install Sediment Control Structure	Site	$ 3,850.00	1.00	$ 3,850.00		$ 0.00
Survey, Design, and Contract Administration	Day	$ 280.00	6.00	$ 1,680.00	3.00	$ 840.00
TOTAL				**$** 14,320.00		**$** 5,840.00

(Ryan Stone, Civil Engineer)

CASCADE SPRINGS INTERPRETIVE SITE

The Cascade Springs Interpretive site is the most heavily used developed recreation destination on the Pleasant Grove Ranger District. It is enjoyed by local residents from Wasatch, Utah, and Salt Lake counties, and is a major natural scenic attraction for visitors outside of the state. Special use permits are requested for weddings throughout the summer because of its unique outdoor scenic beauty, and it is a destination point for the High Country Tours snowmobiling outfitter guide permit in the winter. Approximately 80,000 people a year visit Cascade Springs, year round.

Cascade Springs is a very unique site. Approximately 7 ½ million gallons of water flow from the springs each day, which equal to 1800 glasses of water each second. The average temperature of the water is 48 degrees year round, which is 5 degrees warmer than normal, so it has traveled from very deep beneath the earth's surface.

Cascade Springs' origins go back some 65 million years to the Pleistocene Age when local bedrock was fractured by movements in the earth's crust. This allowed water to seep through cracks and dissolve underlying limestone layers, creating caverns and underground channels. These subterranean passages serve as reservoirs and conduits for water percolating downward. Water surfacing through some of these channels has created Cascade Springs.

The Cascade Springs site is located at approximately 6200 feet elevation, in the middle of the Cascade II Fire burned area. Prevention of ash and erosion into the Cascade Springs area is important for the viability of the water, wildlife, fisheries, and aesthetics of the site.

Recommendations - BAER

Implementing these measures will help protect the resources at Cascade Springs:

- With recommendations from Reese Pope, Mike Smith and Charles R. Condrat in regards to the watershed treatment of the Cascade Springs upper loop area, the treatment is to provide a protective soil cover. Hand seeding and mulching will be required around the springs to prevent contamination into the water from aerial seeding.
- Erosion protection on the steep hillside in the upper Cascade Springs area in the form of silt fencing and straw waddles will be needed on both sides of the asphalt path, and below the top of the ridge line above the upper loop. Straw waddles are also recommended around the upper parking lot that drops towards the upper springs.
- Standing burnt oak can be cut intermittently on the steep slope and placed on the ground for additional erosion control.
- The diversion ditch bank needs restructuring to reestablish its original shape and retentive properties. Straw waddles and V mesh fencing need to be placed along the restructure and at the end of the ditch where it drops off the hillside towards the lower springs.
- Place V mesh structures in the dry steam bed from the water tank area down to the small foot bridge by the upper spring.

Cascade Springs VIS 8323 Water System and Recommendations

This water system has been intermittently flowing since its development in 1985. It is still a viable water source when it does flow, and augments the existing Bear Canyon system. Regardless of its intermittent use, the State Drinking Water Division requires specific standards to be met:

- Clean out and maintain the existing cement diversion ditch.
- Promptly establish a protective soil cover by seeding the spring area.

Values-at-Risk Covered Under the National Fire Plan

There are a number of facilities that were damaged from the Cascade II fire that will not be covered under the BAER funding. The cost for replacement and/or repair and associated labor costs will need to be funded from the National Fire Plan and/or supplemental funds from the Forest.

- The flush toilet building sustained heat damage to the metal siding above the men's side, as well as the metal trim, and paint on the privacy panel. The metal siding is exposed due to heat melting the powder coated steel. Estimated cost is $1500.
- Five plastic coated expanded metal benches were damaged from the heat. The plastic coating has separated from the frame. The cemented upright supports are intact, but will need some sanding and repainting to prevent rusting. The seat and back support on the five benches will need to be replaced. It is recommended the benches be replaced completely. Estimated cost is $2500.
- One water hydrant wooden box was scorched. It will need to have the wood replaced. Estimated cost is $200.

- Three interpretive signs were scorched on the wooden part bad enough to warrant repair or replacement. Some of the signs had a light scorching, and will be retained as they are. None of metal placards will need to be replaced, although one will need to be cleaned so information is legible. Estimated cost for repainting of supports and replacement of wood is $900.
- Three flexible fiberglass stakes with trail cutting prevention information were burned. They will need to be replaced, in addition to needing several more to prevent illegal trails throughout the burn since the visual vegetation barrier is gone. Estimated cost is 10 x ($15 each) = $150.
- Approximately 100 ft. of post and rail fence burned below Cascade Springs along the Little Deer Creek Road 475. Estimated cost is $100.
- Approximately 450 ft. of post and rail fence enclosing the Cascade Spring VIS 8323 site were burned at high intensity and will need to be replaced. Estimated cost is $2000.
- Two recreation information and regulatory signs along the Cascade Springs road need to be replaced. Estimated cost is $300.
- On the winter closure gate on the Cascade Springs gate, the 4' x 2 ½ ' Road Closed sign and object marker need replacing. Estimated cost is $300.
- The white plastic overflow pipes for the Cascade Spring VIS 8323 were scorched. The spring needs a collection box in order to make the system legal if water starts flowing again, which would negate the need to replace the plastic overflow pipe. This project could be supplemented with other funds to get the collection box that is needed. Replacement of damaged pipe is $300.
- Approximately 50 culvert metal post markers with reflectorized tops are needed to mark culverts along the Cascade Springs, Mill Canyon Peak, and Little Deer Creek roads. This project could be supplemented with Forest roads funds, and implemented when the culverts are cleaned out as part of the BAER specialist report for the transportation system. Estimated cost for posts are $50/ea. X 50 markers = $1000.
- Tooth Springs is a culturally sensitive area that has a water source for wildlife with troughs about ½ miles down drainage. The spring is located in a natural meadow. With the lack of vegetation and nearby trail, it is vulnerable to illegal vehicle encroachment. The long term solution would be to install barrier rock along the road shoulder rather than a post and rail fence that would detract from the natural beauty of the area. Estimated cost is $500.

Approximate total - $10,000

An example of a sign used in Idaho is presented on the following page.

For Your Safety

Portions of the area you are entering were burned during recent fires. Be aware that you may encounter hazards in the forest such as:

- **Ash and Needles on the Trail** – can make trail slippery.
- **Burned-Out Stump Holes** – ground may be weak & unstable.
- **Unstable Dead Trees** – *Especially in windy conditions!*
- **Loose Rocks and Logs** – watch for rolling debris.
- **Flash Flooding and Mud Flows** – especially in areas without vegetation.

Conditions in a burned forest change constantly.

Be alert!

Take proper safety precautions such as:

- Check the weather forecast before you leave.
- Assess current weather conditions in the forest.
- Let someone know where you area.
- Locate your camp away from burned trees.

Recommendations – NFP/KP2

- Obtain a contractor to replace the fascia and trim on the toilet building. Also have contractor scrape and repaint the wooden privacy fence.
- Replace the backs and seats of the 5 fire damaged benches. (Could be done in conjunction with the boardwalk contract scheduled for spring of 2004.)
- Replace wooden hydrant box. Work can be completed by District facilities and maintenance employee.
- Remove all interpretive signs. (This is routinely done by the District recreation program to prevent theft of the signs over the winter). Clean the metal placards with a metal cleaner. Treat all wood with water sealant. Replace old hardware. Replace or rehabilitate the fire scorched wood parts of signs.
- Replace flexible fiberglass signs and augment with new ones in places where they are needed to prevent social trails. Work can be completed with District employees.
- Replace post and rail fence around the Cascade Springs VIS 8323 water system. Work can be completed by District employees.
- Order new regulatory signs along road side and replace damaged ones.
- Replace damaged gate signs.
- Install a water collection box for Cascade Springs VIS 8323 water system.
- Install metal culvert post markers where missing. This can be done with District employees.
- Install barrier rock at the Tooth Springs site along Cascade Springs road 114. Work can be performed by District project manager.

(Melissa Y. Crumpton, Forestry Technician District Facilities Manager)

COORDINATION WITH OTHER AGENCIES AND OTHER LANDS

Bureau of Reclamation

On October 2, 2003, Charles R. Condrat, BAER Team Hydrologist (USFS), met with Steve Noyes, Water Quality Specialist (BOR), and Reed Oberndorfer, Water Quality Director (Central Utah Water Conservancy District), to discuss the conditions within the burn area affecting Deer Creek Reservoir and the Provo River. The BAER assessment and types of treatments that may be applied to the area were discussed. Steve and Reed felt comfortable with the BAER team planning and assessment processes.

On October 6, 2003, Charmaine Thompson, BAER Team Archeologist (USFS), spoke with Barbara Blackshear, Archeologist (BOR) regarding sites near Deer Creek Reservoir. She was satisfied with BAER Team and EWP proposed treatments in the area.

Canyon Meadows Water Treatment Plant

On October 7, 2003, Ryan Stone, BAER Team Civil Engineer (USFS) spoke with Karen Swenson, Water System Operator at Canyon Meadows. Water storage, treatment, processes and potential water quality issues related to the fire were discussed.

Central Utah Water Conservancy District (CUWCD)

On September 30, 2003, Ryan Stone, BAER Team Civil Engineer (USFS) spoke with Gerard, a Plant Operator. Raw water requirements for the plant were discussed. Gerard expressed concerns about fertilizers and retardant drops in the watershed.

On October 6, 2003, Ryan Stone, BAER Team Civil Engineer (USFS) spoke with Monica Hoyt. The water system at Canyon Meadows was discussed. Monica provided Ryan with the Basic Operating Procedures for Canyon Meadows and the operator's name for the Canyon Meadows Treatment Plant.

On October 10, 2003, Reese Pope, BAER Team Leader (USFS) spoke with Dave Picher, Chief Engineer for CUWCD, regarding the potential financial impacts water users would incur if no treatments were implemented. In response to this, Dave faxed Reese a memo outlining the estimated impacts.

Cytozyme Laboratories, Inc. and Tea Tree Products America, Inc.

On October 6, 2003, Denise Van Keuren, BAER Team Botanist, spoke with Greg Flinn, of Tea Tree Products America, distributor for Cytozyme Laboritories, regarding their donation of micronutrient seed supplement powder to test its effectiveness in both aerial and hand seeding areas. Jared Jones with Cytozyme Laboratories faxed the technical specifications to Mike Duncan (BAER Team Botanist with USFS) on October 6, 2003.

Church of Jesus Christ of Latter-day Saints

On September 29, 2003, Denise Van Keuren, BAER team botanist (USFS) spoke with Bert Webster, a retired range specialist, who is advising the church on rehabilitation. He proposed sod-forming grass and a wide variety of forage forbs. He wanted the seed chained in where possible.

Members of the Public

On October 2, 2003, Charmaine Thompson, BAER Team Archeologist (USFS), met with Ken Kohler, archeologist and historian in Midway about the rock art site within the fire perimeter. Charmaine showed him photographs of the site after the burn and described the stability of the soil in that area. Ken was satisfied that the site was not adversely affected by the fire and with the proposed post fire aerial seeding over the rock art site.

National Resource Conservation Service

Throughout the BAER Team analysis (September 29 through October 6, 2003), the BAER Team coordinated with Bob Rasely, Geologist (NRCS). Issued discussed include: burn severity, burn intensity, soil hydrophobicity, soil erosion, sedimentation, geology, pre-fire conditions, treatment options, landslides, and funding issues.

On October 1, 2003, Robert Davidson, BAER Team Soil Scientist (USFS), and Charles R. Condrat, BAER Team Hydrologist (USFS), and Lee Duncan, Hydrological Technician (USFS), had a field visit with Bob Rasely, Geologist (NRCS). B. Rasely suggested swell fences, hay bales, and channel fences as tools to control sedimentation and water run-off.

Provo City Public Works

On October 7, 2003, Merrill Bingham, with Provo City Public Works, left a message for Ryan Stone, BAER Team Civil Engineer (USFS) on his voice mail. Merrill recommended that we contact the Provo River Water Users Association. This association represents the municipalities and water users.

Ronney Property

Ryan Stone, BAER Team Civil Engineer (USFS) and Chad Hermandorfer, BAER Team Hydrologist (USFS) met with Michael Shanks, land owner, on two occasions (October 2, 2003 and October 6, 2003). Fire line rehab and some of the issues relating to the BAER work was discussed. Michael stated that Blake wants his land rehabilitated.

United States Department of Agriculture - Forest Service

On October 2, 2003, Bekee Megown and Kate Schwager, BAER Team Fish and Wildlife Biologists, met with Nettie Sitting Up, Biologist with US Forest Service, Pleasant Grove Ranger District, and Karen Hartman, Biologist with US Forest Service, Spanish Fork Ranger District. Nettie and Karen thought that based on a normal winter, they would expect little to no big-game winter kill. Neither had significant concerns for wildlife and thought that the burn would help improve the winter range within a few years.

On October 2, 2003, Bekee Megown, BAER Team Fish and Wildlife Biologist, met with Jeff Waters, Wildlife Biologist with US Forest Service, Heber Ranger District. Jeff mentioned some possible sensitive species that could occur within the cumulative effects area of the burn; boreal toads, spotted frog, and smooth greensnake. Jeff also provided Bekee with the Biological Assessment / Biological Evaluation for the Cascade Springs / North Fork Prescribed Burn Projects.

On October 7, 2003, Kate Schwager, BAER Team Fish and Wildlife Biologist met with Ron Smith, Fisheries Biologist with Uinta National Forest SO. Kate and Ron discussed the fisheries section, monitoring budget, maps and photos. He said to note that the Bonneville Cutthroat Trout population is a possible source population for reintroduction. One of Ron's concerns was that the fire burned within 300' of the South Fork Deer Creek.

On October 7, 2003, Bekee Megown, BAER Team Fish and Wildlife Biologist called Krissy Wilson, Natural Aquatic Biologist with UDWR. Krissy was not aware of boreal toads, spotted frogs, or smooth greensnakes in the area of the burn. Krissy said that they surveyed for boreal toads and spotted frogs in the area in previous years and didn't find anything. Boreal toads exist in North Fork of American Fork Canyon up in Mineral Basin. Spotted frogs exist throughout Heber Valley – but none that high in elevation. Smooth greensnake have not been surveyed in the central region.

United States Fish and Wildlife Service

On September 26, 2003, Bekee Megown, Fish and Wildlife Biologist with USFWS, was contacted to participate on the BAER team and she agreed. On October 2, 2003, Kate Schwager, Fish and Wildlife Biologist with USFWS, joined the BAER team to assist with fisheries issues.

Utah Division of Wildlife Resources

On October 6, 2003, Denise Van Keuren, BAER team botanist (USFS); Mike Duncan, BAER team botanist (USFS); Bekee Megown, BAER Team Fish and Wildlife Biologist (USFWS); and Doug Sakaguchi, Regional Habitat Manager (UDWR) held a telephone conference to discuss seed mix to be used on burned private lands. We reviewed the mix proposed by NCRS range conservationist and concurred to remove sainfoin and forage kochia, both believed to be invasive and not currently in the area. In place of these species, Doug suggested using yellow sweet clover and/or alfalfa.

On October 7, 2003, Bekee Megown, BAER Team Fish and Wildlife Biologist held a phone conversation with Doug Sakaguchi, Regional Habitat Manager (UDWR) and Craig Clyde, Wildlife Biologist (UDWR) to discuss wintering range and depredation on nearby farms. Based on a normal winter, we expect little to no big-game winter kill. The animals however will be stressed and stressed animals typically produce fewer offspring. We therefore expect a decrease in the deer and elk herds next year. Based on a mild winter, the animals will be able to migrate north where more critical wintering range exists. If the first winter is harsh, then the big-game will most likely migrate south into the canyon or onto agricultural lands. Adjacent to the critical winter range, north of the Deer Creek Reservoir, is agricultural and range land. Animals may be displaced from the historic critical winter range to the agricultural and range lands. It is expected that during a normal winter, depredation on nearby farm and agricultural lands will increase. During a harsh winter, depredation may be significant. In anticipation of the normal depredation problems, the UDWR has started the process of distributing mitigation tags. Under this program, in order to mitigate losses, the land owners may, under the supervision of a UDWR biologist, receive mitigation permits to take up to 10% (or a maximum of 20 animals) of the depredating herd on range land and are not limited on take within agricultural land.

On October 7th and 8th, 2003, Kate Schwager, BAER Team Fish and Wildlife Biologist spoke with Doug Sakaguchi, Regional Habitat Manager (UDWR). Doug coordinated a review of Kate's fisheries section with the relevant fisheries biologists at the UDWR and provided feedback to Kate.

Utah State Historical Society

On October 1st and 3rd, 2003, Charmaine Thompson, BAER Team Archeologist (USFS), consulted with their staff regarding known sites in the area of the Cascade II Fire. On October 3, 2003, she visited the office to obtain copies of site forms. Charmaine described the general affects of the fire and showed them photographs of the rock art site. They expressed satisfaction that we were proposing treatments to increase vegetative cover on sensitive archeological sites.

Wasatch County Health Department

On October 3, 2003, Phil Wright, Director of Wasatch County Health Department, left a voice message on Ryan Stone's, BAER Team Civil Engineer (USFS), voice mail. He stated that the only two water systems that may be affected by the fire would be the Cascades Springs system and the Canyon Meadows system.

(Charmaine Thompson, Archeologist; Denise Van Keuren and Mike Duncan, Botanist/ Ecologists; Chad Hermandorfer and Charles Condrat, Hydrologists; Bekee Megown and Kate Schwager, Fish and Wildlife Biologists; Ryan Stone, Engineer)

Picking up the pieces

Friday, October 03, 2003 - 12:00 AM

Justin Hill THE DAILY HERALD

CASCADE SPRINGS -- A war had been fought here.

It was a classic battle of man against nature, flame against firefighter, and the scars of their war blanketed parts of the mountainous battlefield in black ash. Like an oasis of life in a desert of destruction, the waters of Cascade Springs rushed down a hillside, green growth still thriving though the landscape around it was charred.

The flowing water was among the chief concerns of a team of specialists headed by the Forest Service who have descended on the blackened area. Even though it appears the soil's ability to retain water doesn't seem to have been affected greatly by the fire, the roughly 19 specialists, part of the Forest Service Burned Area Emergency Response team, are concerned that a storm could send sediment and ash into the waters of Cascade Springs, Provo Deer Creek and Deer Creek Reservoir.

There seems to be little or no

adverse effect to wildlife, and some infrastructure at Cascade Springs, like benches and signs, have been singed.

"The major concern is water quality," said Bob Rasely, a geologist with the National Resource Conservation Service, during a news media tour Thursday of the fire's damage at Cascade Springs.

Some 7,790 acres were burned in the area around Cascade Springs when a prescribed burn in the area blew out of control on Sept. 23 after winds carried embers past the road and break lines, the Uinta National Forest office has said.

Since fire crews fully contained the blaze earlier this week, the specialists have swarmed the fire site in helicopters and on foot collecting data for a report to the Forest Service Intermountain Region office in Ogden describing what needs to be done to rehabilitate the land. The team is putting the finishing touches on the report, which could include as many as 1,000 photographs and is expected to be submitted next week.

In the report, the team, which came from several different agencies, outlines exactly what has been damaged by the blaze and requests funding for emergency rehabilitation to restore Forest Service lands. Because the fire also damaged state and private lands, Rasely will work with the Forest Service to make recommendations for rehabilitation efforts in those areas.

The team has seven days to prepare the report after a fire has been contained. The highest risk for sediment and ash to get into water bodies is between now and the first snowfall, said team member Charles Condrat, a hydrologist from the Wasatch-Cache National Forest.

"I don't expect a lot of sediment to go off the slopes," he said. "But there's always a risk of a large storm event."

The fire burned at a time when temperatures were cooler and the soil moisture content was higher, conditions for a cooler burn that doesn't cause as much damage to the soil. Near Deer Creek, the presence of sage brush and grasses kept the fire's temperatures low. Hot fires act like a kiln, hardening the soil like clay, so water is easily repelled, said team leader Reese Pope of the Uinta National Forest. The runoff could wash sediment and sand into the bodies of water below.

The fire burned hot at approximately 10-20 percent of the fire site, Pope said. Specialists were still collecting data to put together a map to show the degree that parts of the fire site will absorb rainfall. Mike Smith of the Fishlake National Forest expects to see vegetation in the burned areas by this time next year at 60-70 percent of the fire site.

Some rehabilitation efforts are already underway. Since the firefighting efforts began to wind down, fire crews have been rehabilitating the bulldozer and hand lines, where all the vegetation was stripped, to prevent soil erosion.

While the team finishes its report, the Division of Air Quality is expected to begin its examination into whether the Forest Service followed the procedures as prescribed in the burn plan, said Rick Sprott, director of the Division of Air Quality. The agency, which approved the Cascade Springs burn plan months before the fire and at most two days before the burn was lighted, will take several weeks to finish its investigation, he said.

A second investigation by an interagency team headed by the Forest Service Intermountain Region is expected to begin Oct. 19. The team will examine nearly every aspect of the prescribed burn from the planning stages in the late 1990s -- including the environmental review and burn plans -- and all the advance work.

They will also look at the day the burn was implemented, scrutinizing the qualifications of personnel, the sequence of events and the environmental factors at the site. The team will then forward its report to the regional forester.

♦ ***Justin Hill*** *can be reached at 344-2548 or jhill@heraldextra.com.*

This story appeared in The Daily Herald on page A1.

Burned forest already healing

Fire team hoping to keep ash out of nearby fisheries

By Sharon Haddock
Deseret Morning News

Like a phoenix from the flames, the once-pristine forest charred in last week's wildfire will return after a few peaceful seasons.

So says members of a Forest Service team charged with figuring out what can be done to repair damage to the Cascade Springs area of the Uinta National Forest.

Standing amid charred trees on ash-covered ground, these folks don't try to pretend the 7,790-acre fire that sent clouds of smoke into Utah, Salt Lake and Wasatch counties for nearly a week wasn't a public-relations disaster.

It's no secret: The fire, which was supposed to burn only about 600 acres of the forest that had become overgrown, will haunt them for years to come.

But it could have been worse.

The fire didn't do much damage to Cascade Springs — the wood around a water fountain was singed, and the plastic coating on a steel bench bubbled from the heat of the fire.

While the hillside was blackened and the shrubs around a walking path were burned, the blaze basically missed the main visitor area.

The cool, clear water remains cool and clear. And the trout in the water are still healthy, officials say.

"See, there are some grasses that have already started to come back," said Reese Pope, a leader of the Burned Area Emergency Response Team.

The team is made up of soil specialists, botanists, fish and wildlife experts, representatives from each forest area and an archaeologist. Its job is to assess the damage and recommend rehabilitative steps.

"In many ways, this was a very beneficial fire," said Mike Smith, who specializes in soils. "The ash deposits release the nutrients back into the ecosystem and actually enrich the soil."

Smith said his soil impact tests show low to moderate soil damage. By this time next year, officials said, up to 70 percent of the singed land will have new growth.

Charred trees line the trail at Cascade Springs. The blaze basically missed the main visitor area.

Stuart Johnson, Deseret Morning News

Fish and wildlife specialist Bekee Megown, standing across a stream from a burned mountainside, says a main objective is to limit the ash that gets into the stream.

Stuart Johnson, Deseret Morning News

Bekee Megown, a member of the team that specializes in fish and wildlife, said her concern is for the downstream fisheries.

"We want to limit the ash that gets into the stream," she said. "We're also looking at the critical wintering habitat for the elk and moose."

Hydrologist Charlie Condrat doesn't expect a major change in the total watershed because the flames mostly burned trees that don't require a lot of water.

Officials agree that the next few weeks will determine whether the burned area gets off easy.

"If we could get a good skiff of snow and then cold temperatures, we could seed into that snow and the seeds would hold until spring," Smith said.

"What we don't want is lots of heavy rain," said Pope.

The fire, according to officials, was supposed to clear out the kind of heavy growth that fuels wildfires.

The team is expected to present recommendations within the next two weeks. Those recommendations could include reseeding, removal of dead and burned timber, laying straw or mulch onto denuded ground and stabilizing the soil in areas deemed high risk for mud slides.

Some places may be closed to the public to allow time for recovery.

Suppression teams are repairing areas where firefighters dug fire lines or created channels for water runoff, Pope said.

Another team of experts will probe the actions of the fire crew to determine what went wrong with the controlled burn.

E-mail: haddoc@desnews.com

The Cascade Springs fire caused the coating on this steel bench to bubble and charred the stump next to it. But all in all, the blaze didn't do much damage to the area.

Stuart Johnson, Deseret Morning News

SPECIFICATIONS

CASCADE II BAER – USFS BAER and BAER-Wyden Amendment Funds NFS Lands; Combined NFS and Little Provo Deer Creek Watershed Lands

PART F – SPECIFICATIONS

SPECIFICATION TITLE:	**Helicopter Seeding of Uplands – NFS (BAER Funded) and State and Private Lands (BAER-Wyden Amendment Funded) Within Little Provo Deer Creek**	**JURISDICTIONS:**	Forest Service, State and Private
PART E: LINE ITEM:		**FISCAL YEAR(S) (list each year):**	2004

I. WORK TO BE DONE

Number and Describe Each Task:

A. General Description: Aerial seeding with annual cereal grain and perennial native species will be completed during the fall with contract aircraft and pilots. The need for seeding, seed selection and application rates were developed by the BAER Team in consultation with local staff from the Uinta National Forest, Utah State Parks, USFWS and Utah DWR. Seeding with native species will replenish seed destroyed by the burn, will resist/reduce establishment of undesirable invasive species, and provide permanent ground cover that will decrease erosion and stabilize hill slopes.

B. Location (Suitable) Sites: Seeding locations have been mapped by the BAER Team Vegetation Specialist in consultation with local agency staff. Seeding will be carried out in upland areas of high and moderate burn severity. The affected area is approximately 923 acres (167 NFS lands, 756 other lands). See treatment maps for seeding locations. The seed mix is specified in the "Materials and Supplies" section below, by common name and pounds of Pure Live Seed (PLS) per acre.

C. Design/Construction Specifications:

1. The seed mixture for the Cascade II Fire was complied by the BAER Team Specialists in consultation with local agency and landowner staff, based on agency policies, regulations and mandates. Seed should be tested for purity, germination rates, and be noxious weed free. Before accepting delivery of seed shipment the contractor must provide written evidence (seed label and letter) to the BAER Contracting Officer that the seed conforms to the purity, germination, and noxious weed free requirements in the specification. The BAER Contracting Officer reserves the right to send samples of the mix to a State seed laboratory for purity and weed testing before approval. Test methods specified in *Rules for Testing Seeds, Proceedings of the Association of Official Seed Analyst* will be acceptable for determining the germination rate. Tests should have been conducted in the last 120 days. The BAER Contracting Officer must approve each component of the seed mix before mixing will proceed. The BAER Contracting Officer will send a representative to observe the mixing and bagging process at his/her discretion.

2. Delivery: Deliver pre-mixed certified noxious weed-free seed sold on a pure live seed basis. Deliver to Pleasant Grove Ranger District, Pleasant Grove, Utah.

3. Storage: Seed should be applied as soon as possible after delivery. If immediate application is not possible the seed should be stored as follows:

Preferred storage is either commercial storage building or a near-site storage container. On-site stored seed must be protected from dew and rain. Seed must be stored under cover near a selected airport or helibase site and protected from theft, vandalism, and damage caused by livestock, wildlife, etc.

4. Application Rate: Seed will be applied at 41.5 pounds per acre PLS.

5. Application Method: Pilot will utilize Global Positioning System Equipment during application and according to line-of-sight and personal discretion; will utilize visible markers as necessary for swath continuity within the seeding areas.

D. Purpose of Treatment Specifications: Seeding is an effective erosion control technique provided a consistently uniform cover is obtained prior to the advent of erosive rains. Subsequent establishment is dependent upon favorable precipitation patterns and the effectiveness is directly related to cover density. Seed will be applied during the fall when moisture conditions are favorable. Monitoring should be considered to determine the relative effectiveness of seeding. Supplemental seeding requests may be warranted should the monitoring determine that initial seeding did not meet resource protection objectives. Seeding is being conducted to protect downstream values of life, property and municipal water supply.

II. LABOR, MATERIALS AND OTHER COST:

PERSONAL SERVICES	Cost
<> 1 three-person ground crew to load/unload seed (10-hour day)	$2,683
<> 1 three-person helitack crew to coordinate, supervise, etc	$2,500
<> 1 air operations manager	$2,828
Subtotal - Personal Services	**$8,011**
MATERIALS AND SUPPLIES	
<> Seed Mix (See below) [~ $33.63/acre]	$31,040
--Cereal Barley @ 30 # PLS/ac & $0.30/# = $9.00/acre	
--Mountain Brome @ 4 # PLS/ac & $2.25/# = $9.00/acre	
--Slender Wheatgrass @ 4 # PLS/ac & $1.50/# = $6.00/acre	
--Blue Wildrye @ 0.5 # PLS/ac & $4.25/# = $2.13/acre	
--Sandberg Bluegrass @ 1 # PLS/ac & $3.50/# = $3.50/acre	
--Thickspike Wheatgrass @ 2 # PLS/ac & $2.00/# = $4.00/acre	
<> Misc. supplies (flagging, target flags, 8 rolls plastic covering)	$1,000
Subtotal - Materials and Supplies	**$32,040**
OTHER COSTS	
<> Type II helicopter daily base w fuel truck ($3250/d/ship, 1 ship, 5 days)	$16,250
<> Type II helicopter hourly flight rate ($675/hr/ship @ 225 ac/day w 10% down time)	$22,152
<> BAER Project Manager (assumes 50% of time devoted to this project; GS-12)	$544
<> Other BAER Team support (assumes 2 GS-11/day)	$3,600
<> Per diem ($112/d/person) for ground crew (100% off-Forest)	$1,680
<> Per diem ($112/d/person) for helitack crew (1 crew from off-Forest)	$1,680
<> Per diem ($112/d/person) for air ops	$672
<> Per diem ($112/d/person) for BAER Project Manager and BAER Support Team	$1,344
Subtotal - Other Costs	**$47,922**
TOTAL COSTS	**$87,973**
<> Total Costs for NFS Lands	**$15,917**
<> Total Costs for State and Private Lands	**$72,056**
AVERAGE COST PER ACRE	**$95**

III. RELEVANT DETAILS, MAPS AND DOCUMENTATION INCLUDED IN THIS REPORT:

List Relevant Documentation and Cross-Reference Location within BAER Report: See Vegetative Assessment and watershed treatment map.

PART F – SPECIFICATIONS

SPECIFICATION TITLE:	**Fixed Wing Seeding of Uplands**	JURISDICTIONS:	Forest Service, State and Private
PART E: LINE ITEM:		FISCAL YEAR(S) (list each year):	2004

I. WORK TO BE DONE

Number and Describe Each Task:

A. **General Description:** Aerial seeding with annual cereal grain and perennial native species will be completed during the fall with contract fixed wing aircraft and pilots. The need for seeding, seed selection and application rates were developed by the NRCS and BAER Team in consultation with local staff from the Uinta National Forest, Utah State Parks, USFWS and Utah DWR. Seeding with native species will replenish seed destroyed by the burn, resist/reduce establishment of undesirable invasive species, and provide permanent ground cover that will decrease erosion and stabilize hill slopes.

B. **Location (Suitable) Sites:** Seeding locations have been mapped by the NRCS and BAER Team Vegetation Specialists in consultation with local agency staff. The affected area is approximately 1,912 acres (144 NFS lands, 1768 other lands). See treatment maps for seeding locations. The seed mix is specified in the "Materials and Supplies" section below, by common name and pounds of Pure Live Seed (PLS) per acre.

C. **Design/Construction Specifications:**

1. The seed mixture for the Cascade II Fire was compiled by the NRCS and BAER Team specialists in consultation with local agency and landowner staff, based on agency policies, regulations and mandates. Seed should be tested for purity, germination rates, and should be noxious weed free. Before accepting delivery of seed shipment the contractor must provide written evidence (seed label and letter) to the Contracting Officer that the seed conforms to the purity, germination, and noxious weed free requirements in the specification. The Contracting Officer reserves the right to send samples of the mix component seeds to a State seed laboratory for purity and weed testing before approval. Test methods specified in *Rules for Testing Seeds, Proceedings of the Association of Official Seed Analyst* will be acceptable for determining the germination rate. Tests should have been conducted in the last 120 days. The Contracting Officer must approve each component of the seed mix, before mixing will proceed. The BAER Contracting Officer will send a representative to observe the mixing and bagging process at his/her discretion.

2. Delivery: Deliver pre-mixed certified noxious weed-free seed sold on a pure live seed basis. Deliver to Pleasant Grove Ranger District, Pleasant Grove, Utah.

3. Storage: Seed should be applied as soon as possible after delivery. If immediate application is not possible the seed should be stored as follows:

Preferred storage is either commercial storage building or a near-site storage container. On-site stored seed must be protected from dew and rain. Seed must be stored under cover near a selected airport or helibase site and protected from theft, vandalism, and damage caused by livestock, wildlife, etc.

4. Application Rate: See Table below.

5. Application Method: Pilot will utilize Global Positioning System Equipment during application and according to line-of-sight and personal discretion; will utilize visible markers as necessary for swath continuity within the seeding areas.

D. **Purpose of Treatment Specifications:** Seeding is an effective erosion control technique provided a consistently uniform cover is obtained prior to the advent of erosive rains. Subsequent establishment is dependent upon favorable precipitation patterns and the effectiveness is directly related to cover density. Seed will be applied during the fall when moisture conditions are favorable. Monitoring should be considered to determine the relative effectiveness of seeding. Supplemental seeding requests may be warranted should the monitoring determine that initial seeding did not meet resource protection objectives. Seeding is being conducted to protect downstream values of life, property and municipal water supply.

II. LABOR, MATERIALS AND OTHER COST:

PERSONAL SERVICES	Cost
<> 2 five-person ground crews to load/unload seed (8-hour day)	$8,480
<> 1 air operations manager	$2,610
Subtotal - Personal Services	**$11,090**
MATERIALS AND SUPPLIES	
<> Seed Mix (State and Private Lands) [$65.32/acre]	$115,486
--Sterile Grain @ 25 # PLS/ac & $0.30/# = $7.50/acre	
--Western Wheatgrass @ 3.6 # PLS/ac & $3.50/# = $12.60/acre	
--Bluebunch Wheatgrass @ 1.8 #/ac & $1.25/# = $2.25/acre	
--Intermediate Wheatgrass @ 2.85 # PLS/ac & $2.50/# = $7.12/acre	
--Alfalfa @ 1.2 # PLS/ac & $2.25/# = $2.70/acre	
--Appar Lewis Flax @ 0.5 # PLS/ac & $3.50/# = $1.75/acre	
--Mountain Sagebrush @ 0.1 # PLS/ac & $34.00/# = $3.40/acre	
--Antelope Bitterbrush @ 1.75 # PLS/ac & $16.00/# = $28.80/acre	
<> Seed Mix (NFS) [~ $33.63/acre]	$4,843
--Cereal Barley @ 30 # PLS/ac & $0.30/# = $9.00/acre	
--Mountain Brome @ 4 # PLS/ac & $2.25/# = $9.00/acre	
--Slender Wheatgrass @ 4 # PLS/ac & $1.50/# = $6.00/acre	
--Blue Wildrye @ 0.5 # PLS/ac & $4.25/# = $2.13/acre	
--Sandberg Bluegrass @ 1 # PLS/ac & $3.50/# = $3.50/acre	
--Thickspike Wheatgrass @ 2 # PLS/ac & $2.00/# = $4.00/acre	
<> Conveyor to load seed	$400
<> Misc. supplies (flagging, target flags, 8 rolls plastic covering, PPE)	$1,000
Subtotal - Materials and Supplies	**$121,728**
OTHER COSTS	
<> Contract airplane ($15/acre)	$28,680
<> BAER Project Manager (assumes 50% of time devoted to this project; GS-12)	$1,760
<> Other BAER Team support (assumes 50% of two GS-11/day)	$3,190
<> Per diem ($112/d/person) for crew (100% off-Forest)	$8,960
<> Per diem (assumes 50% of $112/d/person) for air ops	$504
<> Per diem (assumes 50%, $112/d/person) for BAER Project Manager and BAER Support Team	$1,848
Subtotal - Other Costs	**$44,942**
TOTAL COSTS (all 1,912 acres)	**$177,760**
<> Total Costs NFS Lands (144 acres @ $30.04/acre plus seed mix of $33.63/acre)	**$9,168**
<> Total Costs State and Private Lands (1,768 acres @ $30.04/acre plus seed mix of $65.32/acre)	**$168,592**
AVERAGE COST PER ACRE (NFS Lands)	**$63.67**
AVERAGE COST PER ACRE (State and Private Lands)	**$95.36**

III. RELEVANT DETAILS, MAPS AND DOCUMENTATION INCLUDED IN THIS REPORT:

List Relevant Documentation and Cross-Reference Location within BAER Report: See Vegetative Assessment and watershed treatment map.

PART F – SPECIFICATIONS

SPECIFICATION TITLE:	**Hand Seeding of Uplands & Riparian – NFS (BAER Funded) and State and Private Lands (BAER-Wyden Amendment Funded) Within Little Provo Deer Creek**	**JURISDICTIONS:**	Forest Service, State and Private
PART E: LINE ITEM:		**FISCAL YEAR(S) (list each year):**	2004

I. WORK TO BE DONE

Number and Describe Each Task:

A. **General Description:** Hand seeding with annual cereal grain and perennial native species will be completed during the fall with hand labor. The need for seeding, seed selection and application rates were developed by the BAER Team in consultation with local staff from the Uinta National Forest, NRCS, Utah State Parks, USFWS and Utah DWR. Seeding with native species will replenish seed destroyed by the high intensity burn, resist/reduce establishment of undesirable invasive species, and provide permanent ground cover that will decrease erosion and stabilize hill slopes.

B. **Location (Suitable) Sites:** Hand seeding locations have been mapped by the BAER Team Vegetation Specialist in consultation with local agency staff. Hand seeding will be carried out in specific upland, riparian and sensitive areas of high and moderate burn severity. The affected area is approximately 23 acres of riparian habitats (10 on NFS lands, 1 on State land in L. Provo Deer Creek drainage, and 12 acres EWP), and 39 acres of uplands (around Cascade Springs). See treatment maps for seeding locations. The seed mix is specified in the "Materials and Supplies" section below by common name and pounds of Pure Live Seed (PLS) per acre.

C. **Design/Construction Specifications:**

1. The seed mixture for the Cascade II Fire was complied by the BAER Team Specialists in consultation with NRCS and local agency and landowner staff, based on agency policies, regulations and mandates. Seed should be tested for purity, germination rates, and should be noxious weed free. Before accepting delivery of seed shipment the contractor must provide written evidence (seed label and letter) to the BAER Contracting Officer that the seed conforms to the purity, germination, and noxious weed free requirements in the specification. The BAER Contracting Officer reserves the right to send samples of the mix component seeds to a State seed laboratory for purity and weed testing before approval. Test methods specified in *Rules for Testing Seeds, Proceedings of the Association of Official Seed Analyst* will be acceptable for determining the germination rate. Tests should have been conducted in the last 120 days. The BAER Contracting Officer must approve each component of the seed mix before mixing will proceed. The BAER Contracting Officer will send a representative to observe the mixing and bagging process at his/her discretion.

2. Delivery: Deliver pre-mixed certified noxious weed-free seed sold on a pure live seed basis. Deliver to Pleasant Grove Ranger District, Pleasant Grove, Utah.

3. Storage: Seed should be applied as soon as possible after delivery. If immediate application is not possible the seed should be stored as follows:

Preferred storage is either commercial storage building or a near-site storage container. On-site stored seed must be protected from dew and rain. Seed must be stored under cover near a selected airport or helibase site and protected from theft, vandalism, and damage caused by livestock, wildlife, etc.

4. Application Rate: Seed will be applied at 41 pounds/acre PLS in riparian areas and 41.5 pounds/acre PLS on uplands.

5. Application Method: Belly grinder seeders and hand broadcasting with hand raking in certain locations where possible.

D. **Purpose of Treatment Specifications:** Seeding is an effective erosion control technique provided a consistently uniform cover is obtained prior to the advent of erosive rains. Subsequent establishment is dependent upon favorable precipitation patterns and the effectiveness is directly related to cover density. Seed will be applied during the fall when moisture conditions are favorable. Monitoring should be considered to determine the relative effectiveness of seeding. Supplemental seeding requests may be warranted should the monitoring determine that initial seeding did not meet resource protection objectives. Seeding is being conducted to protect sensitive resources and downstream values of life, property and municipal water supply.

II. LABOR, MATERIALS AND OTHER COST:

PERSONAL SERVICES	Cost
<> 1 three-person crew (5 ac/day/crew, 8-hour day, 62 acres)	$4,134
Subtotal - Personal Services	**$4,134**
MATERIALS AND SUPPLIES	
<> Riparian Seed Mix (See below) [$34.25/acre on 23 acres]	$788
--Cereal Barley @ 35 # PLS/ac & $0.30/# = $10.50/acre	
--Blue Wildrye @ 1# PLS/ac & $4.25/# = $4.25/acre	
--Kentucky Bluegrass @ 1# PLS/ac & $1.00/# = $1.00/acre	
--Thickspike Wheatgrass @ 2 # PLS/ac & $2.00/# = $4.00/acre	
--Creeping Wildrye @ 2 # PLS/ac & $7.25/# = $14.50/acre	
<> Seed Mix (See below) [~ $33.63/acre on 39 acres]	$1,312
--Cereal Barley @ 30 # PLS/ac & $0.30/# = $9.00/acre	
--Mountain Brome @ 4 # PLS/ac & $2.25/# = $9.00/acre	
--Slender Wheatgrass @ 4 # PLS/ac & $1.50/# = $6.00/acre	
--Blue Wildrye @ 0.5 # PLS/ac & $4.25/# = $2.13/acre	
--Sandberg Bluegrass @ 1 # PLS/ac & $3.50/# = $3.50/acre	
--Thickspike Wheatgrass @ 2 # PLS/ac & $2.00/# = $4.00/acre	
<> Misc. supplies (rakes, bellygrinder, gloves, PPE)	$500
Subtotal - Materials and Supplies	**$2,599**
OTHER COSTS	
<> BAER Project Manager (assumes 50% of time devoted to this project; GS-12)	$2,400
<> Other BAER Team support (assumes 50% of 2 GS-11/day)	$4,350
<> Per diem ($112/d/person) for crew (100% on-Forest)	$0
<> Per diem ($112/d/person) for BAER Project Manager	$840
<> Per diem ($112/d/person) for BAER Support Team	$1,680
Subtotal - Other Costs	**$9,270**
TOTAL COSTS	**$16,003**
<> Sub-total NFS Lands (BAER)	**$12,648**
<> Sub-Total non-NFS Lands (BAER-Wyden)	**$258**
<> Sub-total State and Private Lands (EWP)	**$3,097**
AVERAGE COST PER ACRE	**$258**

III. RELEVANT DETAILS, MAPS AND DOCUMENTATION INCLUDED IN THIS REPORT:

List Relevant Documentation and Cross-Reference Location within BAER Report: See Vegetative Assessment and watershed treatment map.

PART F – SPECIFICATIONS

SPECIFICATION TITLE:	**Hand Straw Mulching – NFS Lands (BAER funded) and State and Private Lands in L. Provo Deer Creek Sub-Drainage (BAER [Wyden] funded)**	**JURISDICTIONS:**	NFS and State and Private
PART E: LINE ITEM:		**FISCAL YEAR(S) (list each year):**	FY 2004

I. WORK TO BE DONE

Number and Describe Each Task:

A. General Description: Straw mulch is applied by hand as a continuous cover to replace ground cover lost in the fire.

B. Location (Suitable Sites): Areas to be mulched have been mapped by the BAER team and include approximately 49 acres of NFS lands and 1 acre of State and Privately owned lands (total = 50 acres). This includes Cascade Springs and areas along Little Provo Deer Creek.

C. Design/Construction Specifications:
Straw: Baled straw must be certified free of noxious plants listed in the Forest Service noxious plant handbook. Suitable straw includes barley, wheat, pasture grasses, rice, bean and prairie grasses. Species selected should be neutral or compatible with the botanical community where they are being introduced. The straw should be processed in a manner which promotes even distribution. The straw should be dry (less than 15% moisture on an air-dry basis) and loosely baled to facilitate uniformity of spread. For best results the straw should be processed to an average 4-8" stubble length.

Application rates: Application rate will be 1.0 ton/acre and applied as a continuous cover. Total straw = 50 tons of straw applied.

Storage: The straw bales should be delivered and kept dry. This may require use of canvas tarps or plastic covers to protect from precipitation and condensation.

Special ground support and equipment needs: Straw bales can vary from 30 to 100 pounds in weight. Because these are to be hand applied, the straw bales should be around 50 pounds in weight.

Other considerations: Other project work such as seeding should be completed prior to mulching for best seed germination and establishment prospects when protected by the mulch.

D. Purpose of Treatment Specifications: The purpose of straw mulch is to stabilize steep slopes by replacing natural ground cover consumed by the fire. In addition to providing protection from soil erosion, nutrient loss, and sedimentation to streams, mulching helps reduce downstream peak flows by absorbing and slowly releasing runoff caused by bare hydrophobic and compacted soils. Mulching even small areas at the heads of drainages can protect larger downstream areas from the cumulative effects of increased hill slope runoff. Mulching also helps secure seeds that are either stored in the soil or applied as an emergency treatment. These seeds may otherwise be eroded off-site. Finally, mulching maintains a favorable moisture and temperature regime for seed germination and growth. The values at risk being protected by this treatment are long-term soil productivity and the culinary water supply for the Canyon Meadows subdivision and further downstream water supplies for Salt Lake and Utah Counties (population of 100,000 plus).

II. LABOR, MATERIALS AND OTHER COST:

PERSONAL SERVICES	Cost
<> 5-person crew (@ 1-person/acre/day for 50 acres)	$6,890
Subtotal - Personal Services	$6,890
MATERIALS AND SUPPLIES	
<> Straw Delivered to site (1/ton/acre = 50 tons @ $5.00/50# bale)	$10,000
<> Misc. supplies (PPE, gloves, knives)	$300
Subtotal - Materials and Supplies	$10,300
OTHER COSTS	
<> BAER Project Manager (assumes 50% of time devoted to this project; GS-12)	$2,240
<> Other BAER Team support (assumes 50% of 2 GS-11/day)	$4,060
<> Per diem ($112/d/person) for crew (100% of-Forest)	$7,280
<> Per diem ($112/d/person) for BAER Project Manager and BAER Support Team	$1,568
Subtotal - Other Costs	**$15,148**
TOTAL COSTS	**$32,338**
AVERAGE COST PER ACRE	**$647**

III. RELEVANT DETAILS, MAPS AND DOCUMENTATION INCLUDED IN THIS REPORT:

List Relevant Documentation and Cross-Reference Location within BAER Report: See Aerial Mulching Treatments on the Treatment maps in the BAER Report.

** The above estimate is based on an average mulch rate of 1.0 tons per acre using actual production rates (20 tons/ac/day) and typical straw costs ($4.50-$5.00/50# bale delivered) from the Mollie Fire treatments done in FY03, with anticipated delivery to Cascade Springs or Soldier Hollow.

PART F – SPECIFICATIONS

SPECIFICATION TITLE:	**Helicopter Straw Mulching – NFS Lands (BAER funded) and State and Private Lands in L. Provo Deer Creek Sub-Drainage (BAER [Wyden] funded)**	**JURISDICTIONS:**	NFS and State and Private
PART E: LINE ITEM:		**FISCAL YEAR(S) (list each year):**	FY 2004

I. WORK TO BE DONE

Number and Describe Each Task:

A. General Description: Straw mulch is aerially applied by helicopter as a continuous cover to replace ground cover lost in the fire.

B. Location (Suitable Sites): Areas to be mulched have been mapped by the BAER team and include approximately 138 acres of NFS lands and 352 acres of State and Privately owned lands (total = 490 acres). This includes most of the burned portion of the Little Provo Deer Creek drainage which experienced a high intensity burn. In addition, to promote efficiency of operation and cost, the helicopter staging area should be located as near to the project area as practical and be accessible by semi-truck.

C. Design/Construction Specifications:
Straw: Baled straw must be certified free of noxious plants listed in the Forest Service noxious plant handbook. Suitable straw includes barley, wheat, pasture grasses, rice, bean and prairie grasses. Species selected should be neutral or compatible with the botanical community where they are being introduced. The straw should be processed in a manner which promotes even distribution when aerially released from cargo nets. The straw should be dry (less than 15% moisture on an air-dry basis) and loosely baled to facilitate uniformity of spread. For best results the straw should be processed to an average 4-8" stubble length.

Helicopter and hardware needs: The helicopters should be type III class and certified to meet all Forest Service safety requirements. A long-lead cable (at least 100' length) with a four-hook carousel for transporting and individually releasing multiple nets is strongly recommended. The nets should be flat cargo nets. Recommended approximate net sizes and small bale carrying capacity of each are 18' x 18' for carrying 20 or more bales; 15' x 15' for approximately 10 bales; and 12' x 12' for approximately 5 bales. An adequate number of nets should be available to assure helicopter flight time is minimized between loads and carrying capacity is maximized (i.e. for every net in the air, two should be on the ground if loading is done manually). Costs assume 13 days for 2 ships @ 20 tons/day/ship with 10% down time due to weather, etc.

Application rates: Application rate will be 1.0 ton/acre and applied as a continuous cover. Total straw = 490 tons of straw applied.

Storage: The straw bales should be delivered early to the staging area and kept dry. This may require use of canvas tarps or plastic covers to protect from precipitation and condensation.

Special ground support and equipment needs: Straw bales can vary from 30 to over 800 pounds in weight. For small bales a loading crew of 5-8 people would work. The following cost estimate attached was based on actual production rates and bale prices experienced on the FY03 Mollie fire treatment (50# bales).

Other considerations: Other project work such as seeding should be completed prior to mulching for best seed germination and establishment prospects when protected by the mulch.

D. Purpose of Treatment Specifications: The purpose of straw mulch is to stabilize steep slopes by replacing natural ground cover consumed by the fire. In addition to providing protection from soil erosion, nutrient loss, and sedimentation to streams, mulching helps reduce downstream peak flows by absorbing and slowly releasing runoff caused by bare hydrophobic and compacted soils. Mulching even small areas at the heads of drainages can protect larger downstream areas from the cumulative effects of increased hill slope runoff. Mulching also helps secure seeds that are either stored in the soil or applied as an emergency treatment. These seeds may otherwise be eroded off-site. Finally, mulching maintains a favorable moisture and temperature regime for seed germination and growth. The values at risk being protected by this treatment are long-term soil productivity and the culinary water supply for the Canyon Meadows subdivision and further downstream water supplies for Salt Lake and Utah Counties (population of 100,000 plus).

II. LABOR, MATERIALS AND OTHER COST:

PERSONAL SERVICES	Cost
<> 2 six-person ground crews to load/unload hay (10-hour day)	$38,637
<> 2 three-person helitack crew to coordinate, supervise, etc	$18,000
<> 1 air operations manager	$7,069
Subtotal - Personal Services	$63,706
MATERIALS AND SUPPLIES	
<> Straw Delivered to site (1/ton/acre @ $5.00/50# bale)	$98,000
<> Misc. supplies (flagging, target flags, 8 rolls plastic covering)	$1,000
Subtotal - Materials and Supplies	$99,000
OTHER COSTS	
<> Type II helicopter daily base w fuel truck ($3250/d/ship, 2 ship, 17 day/ship)	$91,000
<> Type II helicopter hourly flight rate ($675/hr/ship @ 20 ton/day w 10% down time)	$145,530
<> BAER Project Manager (assumes 50% of time devoted to this project; GS-12)	$3,040
<> Other BAER Team support (assumes 2 GS-11/day)	$11,020
<> Per diem ($112/d/person) for ground crew (100% of-Forest)	$24,192
<> Per diem ($112/d/person) for helitack crew (1 crew from off-Forest)	$6,048
<> Per diem ($112/d/person) for air ops	$1,680
<> Per diem ($112/d/person) for BAER Project Manager and BAER Support Team	$4,032
Subtotal - Other Costs	**$286,542**
TOTAL COSTS (All 490 acres)	**$449,248**
<> Total Costs NFS Lands (138 acres)	**$126,523**
<> Total Costs State and Private Lands (352 acres)	**$322,725**
AVERAGE COST PER ACRE	**$917**

III. RELEVANT DETAILS, MAPS AND DOCUMENTATION INCLUDED IN THIS REPORT:

List Relevant Documentation and Cross-Reference Location within BAER Report: See Aerial Mulching Treatments on the Treatment maps in the BAER Report.

** The above estimate is based on an average mulch rate of 1.0 tons per acre using actual production rates (20 tons/ac/day) and typical straw costs ($4.50-$5.00/50# bale delivered) from the Mollie Fire treatments done in FY03, with anticipated delivery to Cascade Springs or Soldier Hollow.

PART F – SPECIFICATIONS

SPECIFICATION TITLE:	**Helicopter Transported Straw Wattles**	**JURISDICTIONS:**	Forest Service, and State
PART E: LINE ITEM:		**FISCAL YEAR(S) (list each year):**	FY 2004

I. WORK TO BE DONE

Number and Describe Each Task:

A. General Description: Straw wattles are installed by hand to catch ash, debris and sediment washing/eroding off burned landscapes.

B. Location (Suitable Sites): Areas where wattles are to be applied have been mapped by the BAER team. Some of these lands are not readily accessible by road and thus helicopter location of the wattles for hand installation is needed. Five thousand linear feet will be placed along the riparian area below moderate intensity burn area west of Provo Deer Creek.

C. Design/Construction Specifications:
Straw: Straw wattles must be certified free of noxious plants listed in the Forest Service noxious plant handbook. Suitable straw wattle material includes barley, wheat, pasture grasses, rice, bean and prairie grasses. Species selected should be neutral or compatible with the botanical community where they are being introduced.

Application rates: Placement of straw wattles will be conducted using manufactures specifications on a site by site basis.

Storage: The straw wattles should be delivered and kept dry. This may require use of canvas tarps or plastic covers to protect from precipitation and condensation.

Special ground support and equipment needs: Straw wattles are approximately 25 feet in length and 6-9" in diameter. Helicopter support will be needed to transport the wattles to the treatment areas. A helispot will be necessary as a staging area for the project. Pickup trucks will be needed to transport installation crews and other materials to the treatment area.

Other considerations: Straw wattles should be installed perpendicular to the slope along the contour, with the ends of the wattles curved slightly uphill (i.e. to catch runoff and material in it). The ground under the wattles will need to be raked to insure the wattles are in firm contact with the mineral soil, and no gaps under the wattles exist. The wattles should be staked every 4 feet. The ends of adjacent straw wattles will be abutted together.

D. Purpose of Treatment Specifications: The purpose of straw wattles is to: 1) prevent erosion by reducing slope lengths and slowing and spreading water flow, 2) reduce sheet erosion and prevent gully development and 3) impede sediment transport into waterways. The installation of the wattles will reduce the risk of sediment entering Cascade Springs and Provo Deer Creek, protecting water quality and fish and aquatic habitat downstream.

II. LABOR, MATERIALS AND OTHER COST:

PERSONAL SERVICES	Cost
<> 1 six-person crews (8-hour day) (1 wattle/person/30 min)	$1,863
<> 1 three-person helitack crew to coordinate, supervise, etc	$500
<> 1 air operations manager	$580
Subtotal - Personal Services	**$2,943**
MATERIALS AND SUPPLIES	
<> Straw Wattles Delivered to site ($1/foot)	$5,000
<> Wooden Stakes ($0.18 each or $0.05/linear foot)	$250
<> Hammers (3 @ $20/each) plus 4 McClouds @ $20 ea.	$140
<> Misc. supplies (flagging, PPE)	$500
Subtotal - Materials and Supplies	**$5,890**
OTHER COSTS	
<> Type II helicopter daily base w fuel truck ($3250/d/ship, 5 wattles/load, 1 load/10 min)	$3,250
<> Type II helicopter hourly flight rate ($675/hr/ship @ 20 ton/day w 10% down time)	$4,583
<> BAER Project Manager (assumes 50% of time devoted to this project; GS-12)	$789
<> Other BAER Team support (assumes 50% of 2 GS-11/day)	$1,429
<> Per diem ($112/d/person) for ground crew (100% of-Forest)	$1,968
<> Per diem ($112/d/person) for helitack crew (1 crew from off-Forest)	$336
<> Per diem ($112/d/person) for air ops	$224
<> Per diem ($112/d/person) for BAER Project Manager and BAER Support Team	$1,552
Subtotal - Other Costs	**$14,132**
TOTAL COSTS	**$22,965**
AVERAGE COST PER Linear Foot	**$4.59**

III. RELEVANT DETAILS, MAPS AND DOCUMENTATION INCLUDED IN THIS REPORT:

List Relevant Documentation and Cross-Reference Location within BAER Report: See Aerial Mulching Treatments on the Treatment maps in the BAER Report.

PART F – SPECIFICATIONS

SPECIFICATION TITLE:	**Hand Straw Wattles**	**JURISDICTIONS:**	Forest Service, and State lands
PART E: LINE ITEM:		**FISCAL YEAR(S) (list each year):**	FY 2004

I. WORK TO BE DONE

Number and Describe Each Task:

A. General Description: Straw wattles are installed by hand to catch ash, debris and sediment washing/eroding off burned landscapes.

B. Location (Suitable Sites): Five thousand linear feet will be placed throughout 39 acres above Cascade Springs. In addition, 1,000 linear feet will be placed along the base of the 44 acre high intensity burn area east of Provo Deer Creek and south of Cascade Springs as well as 4000 linear feet on 19 acres of Wasatch State Park lands along Provo Deer Creek in high intensity burn area north of the Cascade Springs Road.

C. Design/Construction Specifications:
Straw: Straw wattles must be certified free of noxious plants listed in the Forest Service noxious plant handbook. Suitable straw wattle material includes barley, wheat, pasture grasses, rice, bean and prairie grasses. Species selected should be neutral or compatible with the botanical community where they are being introduced.

Application rates: Placement of straw wattles will be conducted using manufactures specifications on a site by site basis.

Storage: The straw wattles should be delivered and kept dry. This may require use of canvas tarps or plastic covers to protect from precipitation and condensation.

Special ground support and equipment needs: Straw wattles are approximately 25 feet in length and 6-9" in diameter. Wooden stakes are needed secure the wattles on the hill slopes. Pickup trucks will be needed to transport the wattles from the delivery points to the treatment areas.

Other considerations: Straw wattles should be installed perpendicular to the slope along the contour, with the ends of the wattles curved slightly uphill (i.e. to catch runoff and material in it). The ground under the wattles will need to be raked to insure the wattles are in firm contact with the mineral soil, and no gaps under the wattles exist. The wattles should be staked every 4 feet. The ends of adjacent straw wattles will be abutted together.

D. Purpose of Treatment Specifications: The purpose of straw wattles is to: 1) prevent erosion by reducing slope lengths and slowing and spreading water flow, 2) reduce sheet erosion and prevent gully development and 3) impede sediment transport into waterways. The installation of the wattles will reduce the risk of sediment entering Cascade Springs and Provo Deer Creek, protecting water quality and fish and aquatic habitat downstream.

II. LABOR, MATERIALS AND OTHER COST:

PERSONAL SERVICES	Cost
<> 1 six-person crew (8-hour day) (1 wattle/person/30 min)	$3,180
Subtotal - Personal Services	**$3,180**
MATERIALS AND SUPPLIES	
<> Straw Wattles Delivered to site ($1/foot)	$11,000
<> Wooden Stakes ($0.18 each or $0.05/linear foot)	$550
<> Hammers (3 @ $20/each) plus 4 McClouds @ $20 ea.	$140
<> Misc. supplies (flagging, PPE)	$500
Subtotal - Materials and Supplies	**$12,190**
OTHER COSTS	
<> BAER Project Manager (assumes 50% of time devoted to this project; GS-12)	$1,120
<> Other BAER Team support (assumes 50% of 2 GS-11/day)	$2,030
<> Per diem ($112/d/person) for crew (100% of-Forest)	$3,360
<> Per diem ($112/d/person) for BAER Project Manager and BAER Support Team	$1,176
Subtotal - Other Costs	**$7,686**
TOTAL COSTS	**$23,056**
AVERAGE COST PER Linear Foot	**$2.10**

III. RELEVANT DETAILS, MAPS AND DOCUMENTATION INCLUDED IN THIS REPORT:

List Relevant Documentation and Cross-Reference Location within BAER Report: See Treatments on the Treatment maps in the BAER Report.

PART F – SPECIFICATIONS

SPECIFICATION TITLE:	**Road Culvert Replacement/Cleaning/Repair** • **NFS (BAER Funded)** • **State and Private Lands (EWP – Funded)**	**JURISDICTIONS:**	USFS, State, Private
PART E: LINE ITEM:	Clean culverts and open debris basins Clean culverts and open debris basins, railroad Install 36" culverts, Asphalt surface Install 36" culverts, Native surface Riprap culvert inlet and outlet	**FISCAL YEAR(S) (list each year):**	FY2004

I. WORK TO BE DONE

Number and Describe Each Task:

A. General Description: Replacement, cleaning, and repair of road culverts in the Cascade II Fire area. This treatment is necessary protect public safety from road failure and/or un-safe driving conditions. The fire has resulted in a significant potential for overland flow increase. The intent is not to improve roads and trails but to re-establish and strengthen drainage structures so they are capable of resisting failure from higher than normal burned area sheet and channel erosion flows and to provide for safe travel routes.

B. Location (Suitable) Sites: Forest Service Roads 114 and 475 in the center of the burn, and the Heber Valley Railroad on the fire boundary, will need culvert maintenance and replacement. Treatment includes culverts along 4.30 miles of Forest Service system roads, culverts along 3.79 miles of railroad, armoring inlets and outlets of two specific culverts, replacement of one culvert under asphalt, and replacement of two culverts under native surface roads. The site locations are shown on the enclosed treatment map.

Culverts on the Cascade Springs Road are at the following mileposts:

Mile Post	Pipe Diameter	Mile Post	Pipe Diameter
2.64	15"	4.69	15"
2.71	15"	4.86	15"
2.84	30"	4.91	18"
2.91	48"	5.06	18"
3.02	15"	5.21	15"
3.12	15"	5.27	15"
3.30	15"	5.35	15"
3.40	15"	5.45	15"
3.48	15"	5.53	15"
3.73	18"	5.65	15"
3.87	15"	5.73	18"
3.95	18"	5.80	48"
4.05	18"	5.93	18"
4.14	18"	6.11	15"
4.28	18"	6.30	18"
4.36	15"	6.35	18"
4.48	18"	6.55	42"
4.56	15"	6.82	15"
4.62	15"		

C. Design/Construction Specifications:
All work shall comply with Forest Service Specifications for construction of Roads and Bridges, EM-7720-100

Clear pipe culverts along roads and railroads for free and unrestricted flow of water.

Excavate debris basins at culvert inlets in such a way as to provide a minimum of 4' or two pipe diameters (whichever is larger). Debris basins shall be excavated several inches below the pipe invert. Slopes shall be stable.

Use approved rock for riprap to armor the inlets and outlets of culverts. Banks around the culvert shall be rocked. Armoring shall be done at new and replaced culverts that those otherwise noted on the treatment maps.

Sawcut asphalt at a location that will allow for safe excavation of culvert and placement of new culvert. Slopes shall be protected to provide for safe soil stability.

Compact bed for culvert to 95% maximum density and shape to provide for support under the haunches of the culvert. For culverts under asphalt, use approved, ¾" minus road base. Fill over the culvert with approved fill and compact to 95% of maximum density. Fill under asphalt surfaces shall be road base to reduce settlement. Apply tack coat to sawcut edges. Place 6" of approved, ½" minus asphalt over culvert to create a smooth driving surface. Backfill culverts according to the requirements of EM-7720-100.

Repair damaged culvert ends.

Waste shall be disposed offsite at a county landfill, or other approved site.

D. Purpose of Treatment Specifications: This treatment is intended to protect the road and provide safe driving conditions.

II. LABOR, MATERIALS AND OTHER COST:

PERSONNEL SERVICES (Grade @ Cost/Hours X # Hours X # Fiscal Years = Cost/Item): Do not include contract personnel costs here (see contractor services below).	**COST/ITEM**
Clean culverts and open debris basins Resource advisor, engineering technician or watershed specialist for contract preparation, and contract supervision. 1-GS-11 @ $280/day for 6 days	$ 1,680
Hand Crew. 3-GS-3 @ $100/day for 5 days	$ 1,500
Clean culverts and open debris basins, railroad, private land Hand Crew, equivalent of 2-GS-3 @ $100/day for 2.5-days	$ 250
Install 36" culvert under asphalt road Resource advisor, engineering technician or watershed specialist for contract preparation, and contract supervision. 1-GS-11 @ $280/day for 3 days	$ 840
Hand Crew. 3-GS-3 @ $100/day for 4 days	$ 400
Install 36" culvert under native surface road Resource advisor, engineering technician or watershed specialist for contract preparation, and contract supervision. 1-GS-11 @ $280/day for 3 days	$ 840
Hand Crew. 3-GS-3 @ $100/day for 4 days	$ 400
Riprap culverts Resource advisor, engineering technician or watershed specialist for contract preparation, and contract supervision. 1-GS-11 @ $280/day for 1 days	$ 280
Hand Crew. 3-GS-3 @ $100/day for 3 days	$ 300
TOTAL PERSONNEL SERVICE COST	**$ 6,490**
CONTRACT COST (Labor or Equipment @ Cost/hour or day):	**COST/ITEM**
Clean culverts and open debris basins Rubber Tired Backhoe, medium duty with extending bucket plus operator for 5-days. ($800/day x 5 + $100 transport) Water truck with hose plus operator for 5-days. ($480/day X 5)	$ 4,100 $ 2,400
Clean culverts and open debris basins, railroad, private land Rail mounted hoe (provided by railroad) plus operator for 5-days. ($2,560/day x 5)	$ 12,800
Install 36" culvert under asphalt road 36" culvert in place ($50/ft x 52 feet) 6" of asphalt in place ($80/ton X 36.5 tons) Sawcut existing asphalt. ($1.50/ft x 48 ft) Road base in place @ 95% of maximum density ($27/ton x 324.97 tons) Trackhoe, excavation medium duty plus operator for 1-day ($120/day x 1day +$100 transport) Waste Disposal ($0.25/cy x 4814 cy)	$ 2,600 $ 2,920 $ 72 $ 8,774 $ 960 $ 1,204
Install 36" culvert under native surface road 36" culvert in place ($50/ft x 100 feet) Trackhoe, excavation medium duty plus operator for 1-day ($120/day x 1day +$100 transport) Waste Disposal ($100/each x 1 each)	$ 5,000 $ 960 $ 100
Riprap culverts Rubber Tired Backhoe, medium duty with extending bucket plus operator for 1.5-days. ($800/day x 1.5) 6-12" rock. imported ($80/cy X 20 cy)	$ 960 $ 1,600
TOTAL MATERIALS AND SUPPLY COST	**$44,450**
TOTAL PROJECT COST	**$50,940**

III. RELEVANT DETAILS, MAPS AND DOCUMENTATION INCLUDED IN THIS REPORT:

List Relevant Documentation and Cross-Reference Location within BAER Report: See hydrologic assessment and treatment map.

IV. TOTAL COST BY JURISDICTION

JURISDICTION	UNITS TREATED	COST
Uinta NF (BAER Funded)	4.30 miles of road, 37 total culverts	$ 9,680
Uinta NF (BAER Funded)	52' of culvert on asphalt road	$17,770
Uinta NF (BAER Funded)	100' of culvert on native surface road	$ 7,300
Uinta NF (BAER Funded)	20 cubic yards of riprap	$ 3,140
State/Private Land (EWP Funded)	3.79 miles of railroad, 18 total culverts	$13,050
TOTAL COST		**$50,940**

PART F – SPECIFICATIONS

SPECIFICATION TITLE:	**Recondition Road** • **NFS (BAER Funded) and State and Private Lands (BAER-Wyden Amendment Funded) Within Little Provo Deer Creek Watershed** • **State and Private Lands (EWP Funded)**	**JURISDICTIONS:**	USFS, State, Private
PART E: **LINE ITEM:**	Recondition Road, Mechanical Recondition Road, Salvage/replace existing gravel, mechanical	**FISCAL YEAR(S) (list each year):**	FY2004

I. WORK TO BE DONE

Number and Describe Each Task:

A. General Description: Augmentation of road and trail drainage in the Cascade II Fire area. This treatment is necessary to avoid roads and trails collecting overland flow and discharge at concentrated points resulting in accelerated erosion and sedimentation. The fire has resulted in a significant potential for overland flow increase. The intent is not to improve roads and trails but to re-establish and strengthen drainage structures capable of resisting failure from higher than normal burned area sheet and channel erosion flows and to facilitate the hardening of the road surface.

B. Location (Suitable) Sites: Forest Service Roads: 475, 196, a road on the Wasatch Mountain State Park climbing directly out of the Cascade Springs Interpretive site in the center of the burn, and Decker Canyon Road on the fire boundary will need cross drainage augmentation. Treatment includes 2.53 miles of Forest Service system roads, 0.75 miles of roads that directly affect Forest facilities, 3.67 miles of native surface road on State or private lands, and .46 miles of graveled surface road on State land. The road locations are shown on the enclosed treatment map.

C. Design/Construction Specifications:
Clean drainage ditches to restore rolling grade functions.
Remove down slope berms and blade to reestablish an outslope design where practical.
Construct rolling grade dips on roads as necessary to avoid water concentration on the surfaces and/or down slope erosion.
Rolling grade dip spacing by road or trail slope gradient should be approximately as follows: 0-5 % slope – 300'; 5-10% slope – 200'; 10-20% slope – 150'; >20% slope – 100'. Waterbar spacing should be approximately: 0-5 % slope – 250'; 5-10% slope – 150', 10-20% slope – 125'; and >20% slope – 75'.
Where road surface has been improved with gravel, salvage and replace the gravel after reconditioning road.

D. Purpose of Treatment Specifications: This treatment is intended to reduce erosion and sediment potential from the burned areas and to mitigate and reduce watershed and water quality impacts from sources of sediment.

II. LABOR, MATERIALS AND OTHER COST:

PERSONNEL SERVICES (Grade @ Cost/Hours X # Hours X # Fiscal Years = Cost/Item): Do not include contract personnel costs here (see contractor services below).	**COST/ITEM**
Resource advisor, engineering technician or watershed specialist for fluffing in cross drainage locations and areas needing outsloped, contract preparation, and contract supervision. 1-GS-11 @ $280/day for 8 days	$2,240
TOTAL PERSONNEL SERVICE COST	**$2,240**
CONTRACT COST (Labor or Equipment @ Cost/hour or day):	**COST/ITEM**
Forest Service Land	
Dozer, D6 size class with 6-way blade plus operator for 6-days. ($800/day x 6 + $100 transport)	$ 4,900
Road Grader, Medium size, plus operator for 6-days. ($800/day X 6 + $100 transport)	$ 4,900
Rock Rake for 6-days. ($400/day x 6)	$ 2,400
State or Private, directly affecting Forest land/facilities	
Dozer, D6 size class with 6-way blade plus operator for 1.4-days. ($800/day x 1.4 + $100 transport)	$ 1,215
Road Grader, Medium size, plus operator for 1.4-days. ($800/day X 1.4 + $100 transport)	$ 1,215
Rock Rake for 1.5-days. ($400/day x 1.5)	$ 593
State or Private	
Dozer, D6 size class with 6-way blade plus operator for 7.3-days. ($800/day x 7.3 + $100 transport)	$ 5,947
Road Grader, Medium size, plus operator for 7.3-days. ($800/day X 7.3 + $100 transport)	$ 5,947
Rock Rake for 7.25-days. ($400/day x 7.25)	$ 2,901
State or Private, Salvage Gravel	
Dozer, D6 size class with 6-way blade plus operator for 0.8-days. ($800/day x 0.8 + $100 transport)	$ 745
Road Grader, Medium size, plus operator for 0.8-days. ($800/day X 0.8 + $100 transport)	$ 745
Rock Rake for 0.9-days. ($400/day x 0.9)	$ 364
TOTAL MATERIALS AND SUPPLY COST	**$31,875**
TOTAL PROJECT COST	**$34,115**

III. RELEVANT DETAILS, MAPS AND DOCUMENTATION INCLUDED IN THIS REPORT:

List Relevant Documentation and Cross-Reference Location within BAER Report: See hydrologic assessment and treatment map.

IV. TOTAL COST BY JURISDICTION

JURISDICTION	**UNITS TREATED**	**COST**
Uinta NF (BAER Funded)	2.53 miles of road	$14,440
State Directly Affecting Uinta NF (BAER-Wyden Funded)	.75 miles of road	$ 3,024
State/Private Land (EWP Funded)	3.67 miles of road	$14,796
State/Private Land, Salvage Gravel (EWP Funded)	.46 miles of road	$ 1,855
TOTAL COST		**$34,115**

PART F – SPECIFICATIONS

SPECIFICATION TITLE:	**Road Obliteration/Diversion Ditch Construction/Channel Restoration** • **NFS (BAER Funded) and State and Private Lands (BAER-Wyden Amendment Funded) Within Little Provo Deer Creek Watershed**	**JURISDICTIONS:**	USFS, State
PART E: LINE ITEM:	Obliterate road Channel shaping and restoration Install diversion ditches around septic drain field	**FISCAL YEAR(S) (list each year):**	FY2004

I. WORK TO BE DONE

Number and Describe Each Task:

A. General Description: Road obliteration, diversion ditch construction, and channel restoration in the Cascade II Fire area. This treatment is necessary to prevent roads from collecting overland flow and discharge at concentrated points resulting in accelerated erosion and sedimentation. It is also necessary to divert flows back to natural channels and protect facilities from damage. The fire has resulted in a significant potential for overland flow increase. The intent is not to improve roads facilities but to re-establish and strengthen drainage structures capable of resisting failure from higher than normal burned area sheet and channel erosion flows.

B. Location (Suitable) Sites: A road is to be obliterated on the Wasatch Mountain State Park to protect the drainage from increased erosion. The site is shown on the enclosed treatment map. Also shown on the treatment map is the location for channel shaping and restoration at the bend in the road climbing out of the Cascade Springs area into the State Park. There are two septic drain fields that are at risk to high water tables. The site locations are shown on the enclosed treatment map.

C. Design/Construction Specifications:

All work shall comply with Forest Service Specifications for construction of Roads and Bridges, EM-7720-100

Re-contour road by restoring the natural ground topography and loosening soil for vegetation recovery. Restoration shall be done by an excavator to an approved condition.

Restore channel to natural drainage with an excavator to an approved condition. The restored channel shall carry water away from the road and through a newly replaced culvert.

Construct diversion ditches 1.5’ deep and 3’ wide mounding excavated soil on the down slope side. Side slopes shall be at a 2:1 slope. Terminals shall dissipate water energy.

D. Purpose of Treatment Specifications: This treatment is intended to protect the watershed, water quality, road improvements, and wastewater improvements.

II. LABOR, MATERIALS AND OTHER COST:

PERSONNEL SERVICES (Grade @ Cost/Hours X # Hours X # Fiscal Years = Cost/Item): Do not include contract personnel costs here (see contractor services below).	**COST/ITEM**
Channel shaping and restoration Resource advisor, engineering technician or watershed specialist for contract preparation, and contract supervision. 1-GS-11 @ $280/day for 5 days	$ 1,400
Hand Crew. 1-GS-3 @ $100/day for 2 days	$ 200
Install diversion ditches around septic drain fields Resource advisor, engineering technician or watershed specialist for contract preparation, and contract supervision. 1-GS-11 @ $280/day for 1 days	$ 280
Hand Crew. 1-GS-3 @ $100/day for 2 days	$ 200
TOTAL PERSONNEL SERVICE COST	**$ 2,080**
CONTRACT COST (Labor or Equipment @ Cost/hour or day):	**COST/ITEM**
Obliterate Road Trackhoe, excavation, medium duty plus operator for 5-day ($960/day x 1day +$100 transport)	$ 4,900
Channel reshaping and restoration Trackhoe, excavation, medium duty plus operator for 3-day ($960/day x 1day +$100 transport)	$ 2,980
Install diversion ditches around septic drain field Trackhoe, excavation, medium duty plus operator for 1-day ($960/day x 1day +$100 transport)	$ 1,060
TOTAL MATERIALS AND SUPPLY COST	**$ 8,940**
TOTAL PROJECT COST	**$11,020**

III. RELEVANT DETAILS, MAPS AND DOCUMENTATION INCLUDED IN THIS REPORT:

List Relevant Documentation and Cross-Reference Location within BAER Report: See hydrologic assessment and treatment map.

IV. TOTAL COST BY JURISDICTION

JURISDICTION	**UNITS TREATED**	**COST**
State/Private Land (BAER-Wyden Amendment)	.59 miles of road obliterated	$ 4,900
Uinta NF (BAER Funded)	1 location restored	$ 4,580
Uinta NF (BAER Funded)	600' of diversion ditches installed	$ 1,540
TOTAL COST		**$11,020**

CASCADE II BAER – NRCS EWP Funds
State and Private Lands

PART F – SPECIFICATIONS

SPECIFICATION TITLE:	**Helicopter Seeding –State and Private Lands (EWP- Funded)**	**JURISDICTIONS:**	State and Private
PART E: LINE ITEM:		**FISCAL YEAR(S) (list each year):**	2004

I. WORK TO BE DONE

Number and Describe Each Task:

A. **General Description:** Aerial seeding with sterile cereal grain and perennial forage species will be completed with contract aircraft and pilots. The need for seeding, seed selection and application rates were developed by NRCS specialists in consultation with BAER Team specialists, and local staff from UT DWR, UT State Parks and the landowners. Seeding with native and other desirable species will replenish seed destroyed by the high intensity burn, will reduce/resist establishment of undesirable invasive species, will provide permanent ground cover that will decrease erosion, stabilize the slopes, and will provide forage for wildlife and livestock.

B. **Location (Suitable) Sites:** Seeding locations have been mapped by the NRCS in consultation with the BAER Team and local agency staff. The areas to be treated total approximately 1,007 acres (See treatment map for locations). The seed mix is specified in the "Materials and Supplies" section below, by common name and pounds of Pure Live Seed (PLS) per acre.

C. **Design/Construction Specifications:**

1. The seed mixture for the Cascade II Fire was compiled by NRCS specialists, in consultation with BAER Team specialists, and local agency and landowner staff, based on agency policies, regulations and mandates. Seed should be tested for purity, germination rates, and should be noxious weed free. Before accepting delivery of seed shipment, the contractor must provide written evidence (seed label and letter) to the Contracting Officer that the seed conforms to the purity, germination, and noxious weed free requirements in the specification. The Contracting Officer reserves the right to send samples of the mix component seeds to a State seed laboratory for purity and weed testing before approval. Test methods specified in *Rules for Testing Seeds, Proceedings of the Association of Official Seed Analyst* will be acceptable for determining the germination rate. Tests should have been conducted in the last 120 days. The Contracting Officer must approve each component of the seed mix, before mixing will proceed. The Contracting Officer will send a representative to observe the mixing and bagging process at his/her discretion.

2. Delivery: Deliver pre-mixed certified noxious weed-free seed sold on a pure live seed basis. Deliver to Pleasant Grove Ranger District, Pleasant Grove, Utah.

3. Storage: Seed should be applied as soon as possible after delivery. If immediate application is not possible the seed should be stored as follows:

Preferred storage is either commercial storage building or a near-site storage container. On-site stored seed must be protected from dew and rain. Seed must be stored under cover near a selected airport or helibase site and protected from theft, vandalism, and damage caused by livestock, wildlife, etc.

4. Application Rate: Seed will be applied at 37.9 pounds per acre PLS.
5. Application Method: Pilot will utilize Global Positioning System Equipment during application and according to line-of-sight and personal discretion; will utilize visible markers as necessary for swath continuity within the seeding areas.

D. **Purpose of Treatment Specifications:** Seeding is an effective erosion control technique provided a consistently uniform cover is obtained prior to the advent of erosive rains. Subsequent establishment is dependent upon favorable precipitation patterns and the effectiveness is directly related to cover density. Seed will be applied during the fall when moisture conditions are favorable. Monitoring should be considered to determine the relative effectiveness of seeding. Supplemental seeding requests may be warranted should the monitoring determine that initial seeding did not meet resource protection objectives. Seeding is being conducted to protect downstream municipal water supply in Deer Creek Reservoir (supplies water for much of Utah and Salt Lake Counties, population 1,000,000 plus).

II. LABOR, MATERIALS AND OTHER COST:

PERSONAL SERVICES	Cost
<> 1 three-person ground crew to load/unload seed (10-hour day)	$2,683
<> 1 three-person helitack crew to coordinate, supervise, etc	$2,500
<> 1 air operations manager	$2,828
Subtotal - Personal Services	**$8,011**
MATERIALS AND SUPPLIES	
<> Seed Mix (See below) [$65.32/acre]	$65,777
--Sterile Grain @ 25 # PLS/ac & $0.30/# = $7.50/acre	
--Western Wheatgrass @ 3.6 # PLS/ac & $3.50/# = $12.60/acre	
--Bluebunch Wheatgrass @ 1.8 #/ac & $1.25/# = $2.25/acre	
--Intermediate Wheatgrass @ 2.85 # PLS/ac & $2.50/# = $7.12/acre	
--Alfalfa @ 1.2 # PLS/ac & $2.25/# = $2.70/acre	
--Appar Lewis Flax @ 0.5 # PLS/ac & $3.50/# = $1.75/acre	
--Mountain Sagebrush @ 0.1 # PLS/ac & $34.00/# = $3.40/acre	
--Antelope Bitterbrush @ 1.75 # PLS/ac & $16.00/# = $28.80/acre	
<> Misc. supplies (flagging, target flags, 8 rolls plastic covering)	$1,000
Subtotal - Materials and Supplies	**$66,777**
OTHER COSTS	
<> Type II helicopter daily base w fuel truck ($3250/d/ship, 1 ship, 5 day/ship)	$16,250
<> Type II helicopter hourly flight rate ($675/hr/ship @ 225 ac/day w 1007 total acres and 10% down time)	$24,168
<> BAER Project Manager (assumes 50% of time devoted to this project; GS-12)	$800
<> Other BAER Team support (assumes 2 GS-11/day for 5 days each)	$2,900
<> Per diem ($112/d/person) for ground crew (100% off-Forest)	$1,680
<> Per diem ($112/d/person) for helitack crew (1 crew from off-Forest)	$1,680
<> Per diem ($112/d/person) for air ops	$672
<> Per diem ($112/d/person) for BAER Project Manager and BAER Support Team	$1,344
Subtotal - Other Costs	**$49,494**
TOTAL COSTS	**$124,282**
AVERAGE COST PER ACRE	**$123**

III. RELEVANT DETAILS, MAPS AND DOCUMENTATION INCLUDED IN THIS REPORT:

List Relevant Documentation and Cross-Reference Location within BAER Report: See Vegetative Assessment and watershed treatment map.

PART F – SPECIFICATIONS

SPECIFICATION TITLE:	**Hand Seeding of Uplands & Riparian – State and Private Lands (EWP- Funded)**	**JURISDICTIONS:**	State and Private
PART E: LINE ITEM:		**FISCAL YEAR(S) (list each year):**	2004

I. WORK TO BE DONE

Number and Describe Each Task:

A. **General Description:** Hand seeding with annual cereal grain and perennial native species will be completed during the fall with hand labor. The need for seeding, seed selection and application rates were developed by the BAER Team in consultation with local staff from the NRCS, UT DWR, UT State Parks and the landowner. Seeding with native species will replenish seed destroyed by the high intensity burn and will provide permanent ground cover that will decrease erosion and stabilize the slopes.

B. **Location (Suitable) Sites:** Hand seeding locations have been mapped by the BAER Team in consultation with local agency staff. Seeding will be carried out in areas of high and moderate burn severity. These areas to be treated total approximately 12 acres (See treatment map for locations). The seed mix is specified in the "Materials and Supplies" section below, by common name and pounds of Pure Live Seed (PLS) per acre.

C. **Design/Construction Specifications:**

1. The seed mixture for the Cascade II Fire was compiled by the BAER Team Specialists in consultation with local agency and landowner staff, based on agency policies, regulations and mandates. Seed should be tested for purity, germination rates, and should be noxious weed free. Before accepting delivery of seed shipment the contractor must provide written evidence (seed label and letter) to the BAER Contracting Officer that the seed conforms to the purity, germination, and noxious weed free requirements in the specification. The BAER Contracting Officer reserves the right to send samples of the mix component seeds to a State seed laboratory for purity and weed testing before approval. Test methods specified in *Rules for Testing Seeds, Proceedings of the Association of Official Seed Analyst* will be acceptable for determining the germination rate. Tests should have been conducted in the last 120 days. The BAER Contracting Officer must approve each component of the seed mix, before mixing will proceed. The BAER Contracting Officer will send a representative to observe the mixing and bagging process at his/her discretion.

2. Delivery: Deliver pre-mixed certified noxious weed-free seed sold on a pure live seed basis. Deliver to Heber City, Utah.

3. Storage: Seed should be applied as soon as possible after delivery. If immediate application is not possible the seed should be stored as follows:

Preferred storage is either commercial storage building or a near-site storage container. On-site stored seed must be protected from dew and rain. Seed must be stored under cover near a selected airport or helibase site and protected from theft, vandalism, and damage caused by livestock, wildlife, etc.

4. Application Rate: Seed will be applied at 41 pounds per acre PLS.
5. Application Method: Belly grinder seeders and hand broadcasting with hand raking in certain locations where possible.

D. **Purpose of Treatment Specifications:** Seeding is an effective erosion control technique provided a consistently uniform cover is obtained prior to the advent of erosive rains. Subsequent establishment is dependent upon favorable precipitation patterns and the effectiveness is directly related to cover density. Seed will be applied during the fall when moisture conditions are favorable. Monitoring should be considered to determine the relative effectiveness of seeding. Supplemental seeding requests may be warranted should the monitoring determine that initial seeding did not meet resource protection objectives. Seeding is being conducted to protect sensitive resources and downstream values of life, property and municipal water supply.

II. LABOR, MATERIALS AND OTHER COST:

PERSONAL SERVICES	Cost
<> 3 three-person ground crew hand broadcast seed (@ 5acres/8-hr day for 12 ac) @ $106/day/person for 2 people and $300/day/person for 1 person	$1,536
Subtotal - Personal Services	**$1,536**
MATERIALS AND SUPPLIES	
<> Seed Mix (See below) [~ $36.75/acre]	$441
--Cereal Barley @ 35 # PLS/ac & $0.30/# = $10.50/acre	
--Blue Wildrye @ 1 # PLS/ac & $4.25/# = $4.25/acre	
--Kentucky Bluegrass @ 1 # PLS/ac & $1.00/# = $1.00/acre	
--Thickspike Wheatgrass @ 2 # PLS/ac & $2.00/# = $4.00/acre	
--Creeping Wild Rye @ 2 # PLS/ac & $7.25/# = $14.50/acre	
<> Misc. supplies (rakes, 1 belly grinder, gloves, PPE)	$500
Subtotal - Materials and Supplies	**$941**
OTHER COSTS	
<> Archeologist and other BAER Team support (assumes 2 GS-11/day)	$1,800
Subtotal - Other Costs	**$1,800**
TOTAL COSTS	**$4,277**
AVERAGE COST PER ACRE	**$214**

III. RELEVANT DETAILS, MAPS AND DOCUMENTATION INCLUDED IN THIS REPORT:

List Relevant Documentation and Cross-Reference Location within BAER Report: See Vegetative Assessment and watershed treatment map.

PART F – SPECIFICATIONS

SPECIFICATION TITLE:	**Helicopter Straw Mulching – Private and State Lands in Deer Creek Reservoir Sub-drainage (EWP Funded)**	**JURISDICTIONS:**	State and Private Lands
PART E: LINE ITEM:		**FISCAL YEAR(S) (list each year):**	FY 2004

I. WORK TO BE DONE

Number and Describe Each Task:

A. General Description: Straw mulch is aerially applied to the ground by helicopter as a continuous cover to replace ground cover lost in the fire.

B. Location (Suitable Sites): Areas to be mulched have been mapped by the BAER team and includes approximately 652 acres. This includes State and Private lands in the Deer Creek reservoir sub-drainage which experienced a high intensity burn. To promote efficiency of operation and cost, the helicopter staging area should be located as near to the project area as practical and be accessible by semi-truck.

C. Design/Construction Specifications:

Straw: Baled straw must be **certified free of noxious plants** listed in the Forest Service noxious plant handbook. Suitable straw includes barley, wheat, pasture grasses, rice and prairie grasses. Species selected should be neutral or compatible with the botanical community where they are being introduced. The straw should be processed in a manner which promotes even distribution when aerially released from cargo nets. The straw should be dry (less than 15% moisture on an air-dry basis) and loosely baled to facilitate uniformity of spread. For best results the straw should be processed to an average 4-8" stubble length.

Helicopter and hardware needs: The helicopters should be type III class and certified to meet all Forest Service safety requirements. A long-lead cable (at least 100' length) with a four-hook carousel for transporting and individually releasing multiple nets is strongly recommended. The nets should be flat cargo nets. Recommended approximate net sizes and small bale carrying capacity of each are 18' x 18' for carrying 15-20 or more bales; 15' x 15' for approximately 10 bales; and 12' x 12' for approximately 5 bales. An adequate number of nets should be available to assure helicopter flight time is minimized between loads and carrying capacity is maximized (i.e. for every net in the air, two should be on the ground if loading is done manually). Assumes 2 ships for 9 days each (includes 10% down time for weather, etc on which daily rate must be paid).

Application rates: Application rate will be 0.5 ton/acre and applied as a continuous cover. Total straw volume will be about 329 tons.

Storage: The straw bales should be delivered early to the staging area and kept dry. This may require use of canvas tarps or plastic covers to protect from precipitation and condensation.

Special ground support and equipment needs: Straw bales can vary from 30 to over 800 pounds in weight. For small bales a loading crew of 5-8 people would work. The following cost estimate attached was based on actual production rates and bale prices experienced on the FY03 Mollie fire treatment (50# bales).

Other considerations: Other project work such as seeding should be completed prior to mulching for best seed germination and establishment prospects when protected by the mulch**.**

D. Purpose of Treatment Specifications: The purpose of straw mulch is to stabilize the steep slopes by replacing the natural ground cover consumed by the fire. In addition to providing immediate soil protection from erosion and loss of nutrient capital, and the associated sediment deposition in streams, mulching also helps reduce downstream peak flows by absorbing and slowly releasing accelerated overland runoff due to bare soil, hydrophobic soils and compacted soils. Mulching even small areas at the source of floodwaters and other areas critical to slope stabilization (i.e. the case here), can often protect much larger downstream areas from the cumulative effects of hill slope runoff. Mulching also helps to secure seeds that are either stored in the soil, or applied as an emergency treatment, that may otherwise be eroded off-site. It also maintains a favorable moisture and temperature regime for seed germination and growth. The primary values at risk being protected by this treatment are long-term soil productivity on the lands being treated, and the culinary water supply for parts of Utah and Salt Lake Counties in Utah (population of 1,000,000 plus).

II. LABOR, MATERIALS AND OTHER COST:

PERSONAL SERVICES	Cost
<> 2 six-person ground crews to load/unload hay (10-hour day)	$25,758
<> 2 three-person helitack crew to coordinate, supervise, etc	$12,000
<> 1 air operations manager	$4,241
Subtotal - Personal Services	$41,999
MATERIALS AND SUPPLIES	
<> Straw Delivered to site (0.5/ton/acre = 329 tons @ $5.00/50# bale)	$65,200
<> Misc. supplies (flagging, target flags, 8 rolls plastic covering)	$1,000
Subtotal - Materials and Supplies	$66,200
OTHER COSTS	
<> Type II helicopter daily base w fuel truck ($3250/d/ship, 2 ship, 17 day/ship)	$58,500
<> Type II helicopter hourly flight rate ($675/hr/ship @ 20 ton/day w 10% down time)	$96,822
<> BAER Project Manager (assumes 50% of time devoted to this project; GS-12)	$1,920
<> Other BAER Team support (assumes 2 GS-11/day)	$6,960
<> Per diem ($112/d/person) for ground crew (100% of-Forest)	$16,128
<> Per diem ($112/d/person) for helitack crew (1 crew from off-Forest)	$4,032
<> Per diem ($112/d/person) for air ops	$1,120
<> Per diem ($112/d/person) for BAER Project Manager and BAER Support Team	$3,136
Subtotal - Other Costs	**$188,618**
TOTAL COSTS (652 acres)	**$296,817**
AVERAGE COST PER ACRE	**$448**

III. RELEVANT DETAILS, MAPS AND DOCUMENTATION INCLUDED IN THIS REPORT:

List Relevant Documentation and Cross-Reference Location within BAER Report: See Aerial Mulching Treatments on the Treatment maps in the BAER Report.

** The above estimate is based on an average mulch rate of 1.0 tons per acre using actual production rates (20 tons/ac/day with 10% down time) and typical straw costs ($4.50-$5.00/50# bale) from the Mollie Fire treatments done in FY03, with anticipated delivered to Cascade Springs or Soldier Hollow.

MONITORING PLAN – CASCADE II FIRE INCIDENT

Introduction: Why Monitor?

Monitoring is the periodic assessment of BAER treatments to evaluate their success and/or failure, recommend adjustments to treatments and report on these findings to management. The objectives described in the Initial Assessment Report (2500-8) are summarized below:

- **Protection of human-life from fire-induced post-fire events**

- **Prevention of unacceptable adverse impacts to property from fire-induced post-fire events**
  - <> Maintain the integrity of the Cascade Springs Road
  - <> Protect the functionality of the Little Deer Creek Road
  - <> Protect the functionality of the Bear Canyon Road
  - <> Protect the functionality of the Cove Road
  - <> Protect the Cascade Springs water system and septic system

- **Prevention of unacceptable degradation of water quality**
  - <> Prevent unacceptable impacts to culinary water quality for the Canyon Meadows subdivision, and further downstream in Provo River, to the water supply for Central Utah Water Conservancy District (supplies water for Provo, Orem, and several other Utah County and Salt Lake County towns/communities)
  - <> Prevention of unacceptable adverse impacts to critical fisheries habitat (i.e. sediment and ash impacts on water quality and habitat)
  - <> Mitigation of unacceptable adverse impacts to water quality in the unique ecological habitats of Cascade Springs

- **Protection of long-term soil productivity (i.e. preventing unacceptable levels of accelerated soil erosion)**

Forest Service Manual 2523.03 directs that the implementation and effectiveness of treatments, as well as the consequences of decisions not to treat certain areas, will be monitored. This plan will assess BAER measures taken to assist in rapid recovery of the burned sites and nearby lands and resources affected by the burned sites. Direction in this monitoring plan complies with the Uinta National Forest Land and Resource Management Plan. The Forest Service Handbook 2509.13, Section 61.1 requires that, as a minimum, the following conditions be monitored:

1. The effectiveness and proper functioning of stabilization measures, especially road drainage facilities and channel structures.
2. Need for re-treatment, maintenance and removal of temporary structures.
3. Quality and quantity of water leaving the burned area and the location and causes of problems.
4. Rate of recovery of vegetation.

5. Effects of resource utilization, restoration activities and emergency stabilization measures on each other.

District and Supervisors office personnel (with any requested assistance) will be assigned by the Leadership Team to conduct the implementation and the effectiveness monitoring (FSH 2509.13 Section 61.04).

Implementation Monitoring

The purpose of implementation monitoring is to determine if the treatments were conducted as prescribed. Implementation monitoring is part of, and funded with ($7,000) project implementation. Project inspectors will evaluate land treatments during implemention to assure contract specifications are being met. Some of the critical contract implementation questions for the contracting officer's representative (COR) or project leader are:

1. **Broadcast Seeding:**
   - Was the seed purchased certified to be free of noxious weed species ?
   - Was the seed tested for its germination rate?
   - Were the Helitack and ground crew of sufficient number to support the operation?
   - Was the proper helispot selected with respect to safety and turn-around time?
   - Was the seed protected from moisture prior to its application on-the-ground?
   - What was the soil moisture content at the time of the seeding?
   - What were the weather conditions at the time of seeding?
   - How did the pilot keep track of his flight lines?
   - Was the seed pre-coated with a micronutrient powder to enhance its germination rate?
   - Was the proper rate of seed applied to the ground.

2. **Mulching:**
   - Was the straw product certified to be free of noxious weeds?
   - What was the moisture content of the straw at the time of application?
   - Were straw mositure conditions acceptable for spreading the mulch?
   - Was the straw delivered to the staging area/helispot when needed for the treatment?
   - Did the treatment area receive the volume of mulch prescribed?
   - How uniformly was the mulch distributed across the treatment areas?

3. **Straw Wattles:**
   - Were the correct number of straw wattles applied to the landscape?
   - Were the wattles staked down into the ground every 4 feet using 24 " wood stakes?
   - Were the wattles placed flush against the ground surface?
   - Was the site preped before the treatment was implemented?
   - Was the spacing on the wattles correct and according to manufacturer recommendations?

4. **Road Reconditioning:**
   - Do the "as-built" treatments match the BAER plan prescriptions?

- Was the equipment washed as per Forest Plan direction to prevent establishment of new noxious weed infestations?

5. **Explanatory Signs:**
   - Are the signs installed at the designated locations with the intended message?

6. **Channel Fences:**
   - Were the structures placed in the proper locations?
   - Were the structures constructed in a manner that prevents end- and under- flows?
   - Were the structures constructed of materials and in a manner that provides for catching debris while allowing water passage?

7. **Barrier Rock:**
   - Are the barrier rocks of sufficient size to discourage relocation by the public?
   - Are the barrier rocks placed in locations to discourage "end-running"?
   - Are the barrier rocks installed as per the specifications?
   - Was the equipment washed as per Forest Plan direction to prevent establishment of new noxious weed infestations?

8. **Archeological Sites:**
   - Have the required surveys been conducted prior to ground disturbing activities?
   - Are treatments on identified sites implemented according to BAER prescriptions?

9. **Water Testing:**
   - Were perennial streams/water sources disturbed during implemenation?

10. **Untreated Burned Area Monitoring:**
    - Were untreated areas further disturbed during implementation?

Effectiveness Monitoring: Did the expected response occur?

This monitoring is specifically designed to answer the question: Did the BAER treatments provide the planned protection and stabilization of the burned area? Said another way, have the objectives of the treatments been met and if not, why? The purpose is NOT to prove, for example, that increased ground cover reduces erosion; rather, it is to see if the ground cover improvement treatment implemented increased ground cover as desired.

Per the Forest Service Handbook (2509.13, 62.23), this monitoring includes on-the-ground review by a team of emergency response specialists, normally 2-3 growing seasons after the burn but may also be after the first runoff season or after unusual climate. Funds ($10,530) for the first year of this monitoring have been approved through the initial 2500-8. Funds for monitoring beyond year one must be requested annually. Both successes and failures are to be addressed, along with reasons. Sensitive areas are given priority. This monitoring evaluates if the emergency treatments are successful in:

- protecting long-term soil productivity,
- preventing the deterioration of water quality,
- reducing the threats to human life and property and allowing for the management of ecosystems in their properly functioning condition, and
- preventing disturbance of archaeological deposits?

Specific objectives of the treatments are described below:

1. **Broadcast Seeding:** Establish vegetative cover on the site quickly to:
   a) stabilize severely burned soils to maintain long-term productivity and meet Regional and Forest Plan standards,
   b) prevent production and delivery of off-site sediment to the stream channel network,
   c) reduce overland flow caused by rain-drop splash that seals the soil surface,
   d) prevent the spread of existing noxious weed populations.

2. **Mulching:** A protective layer of a material spread on top of the soil in order to:
   a) minimize sedimentation, ash, and nutrient deposition into the streams,
   b) protect seed from wind and sheet erosion,
   c) maintain long-term soil productivity and soil hydrologic conditions on severely burned sites,
   d) encourage soil stabilization and healing of hydrophobic soil conditions through prompt vegetation regeneration to help achieve long-term soil productivity,
   e) conserve soil moisture,
   f) maintain a more even soil temperature, and
   g) provide protection from rain-drop splash and impact, thus lessening the soil erosion.

3. **Straw Wattles:** Straw wattles placed upslope of channels to:
   a) Slow ash and sediment contaminated overland flows, to trap flow borne contaminants, and to reduce down-slope erosion.

4. **Road Reconditioning:** Upgrade/clean culverts, install drivable dips, and outslope portions of the Cascade Springs Road, Little Deer Creek Road, The Cove Road and Bear Canyon Road to:
   a) ensure increased flows caused by the fire in Cascade Springs can be handled,
   b) disconnect the ditch-line from the channel network,
   c) reduce the probability of sediment delivery from stream crossing failures, and
   d) reduce erosion in the roadway leading to loss of roadway prism and/or road drivability.

5. **Explanatory Signs:** Place signs throughout the Cascade II Fire to:
   a) provide for public safety, and
   b) promote fire recovery by communicating the potential flooding hazards and the need to adhere to motorized access restrictions.

6. **Channel fences:** Fences placed within channels to:
   a) capture sediment and debris before reaching live water at Cascade Springs and east and west of Provo Deer Creek,
   b) protect downstream water quality, and
   c) protect fisheries and aquatic resources.

7. **Barrier Rocks:** Provide physical obstructions along roadways and dispersed areas to:
   a) prevent illegal, off-road vehicle use, and
   b) limit vehicle use to protect soil productivity and promote re-vegetation and reduce damaging erosion.

8. **Archeological Sites:** Conduct hand-seeding on sites vulnerable to erosion to:
   a) maintain surface soils and thereby reduce the potential for erosion to adversely affect buried archaeological deposits, and
   b) reduce the potential for illegal artifact collecting on exposed site surfaces.

9. **Water Testing:** Test water at Cascade Springs Culinary Water System to:
   a) ensure that the water source was unaffected by the fire, and
   b) provide for public safety in compliance with the Safe Drinking Water Act.

10. **Untreated Burned Area Monitoring:** Monitor South Fork Deer Creek to:
    a) monitor the ability of the riparian vegetation and the anticipated vegetative growth to capture debris and sediment resulting from sheet erosion along the hill slopes along the east and north of the creek, and
    b) expedited, relevant, and necessary actions must be developed if the riparian and anticipated vegetation prove insufficient to impede significant sedimentation, ash, and nutrients from entering the stream.

11. **Diversion Structure:** Construct a diversion ditch above septic drain fields to:
    a) divert potential floodwater and debris material away from sensitive waste water treatment facilities, should a mass wasting event occur.

General Data Collection Procedures

The information to be recorded and documented will include the dates and type of emergency treatments implemented along with the total number of structures, acres and actual costs associated with these stabilization projects.

Photos will be taken before and after these treatments and locations will be plotted using Global Positioning Systems (GPS). These photo points will be established above, within and below the various treatments. All photos will be collected using a digital camera in order to easily enter the images into interim and final monitoring reports.

Any monitoring item having a specific location will be mapped using Global Positioning Systems (GPS) and loaded into the corporate Geographic Information System (GIS) database (e.g., weed infestations).

The Implementation Team leader will ensure that all data being collected meets the established standards. Data collected for inclusion into the Forest GIS database will meet corporate standards.

For all monitoring projects, as a minimum, record:

- the dates of installation or accomplishment,
- name(s) of person(s) collecting data and name of person, organization, or contractor performing work with a lead contact name if possible,
- types of equipment used,
- time for project completion (length of treatment),
- GPS location as well as a detailed map and narrative of directions to the site,
- short narrative explaining how the job was completed, any problems encountered and how they were solved,
- recommendations for continued use of the treatment on other fire stabilization projects considering both implementation and effectiveness concerns, and
- evaluation of whether treatments supported the “minimum necessary” goal.

Specific Data To Be Collected

Specific data to be collected during and throughout the monitoring process include:

Soils and Hydrology:

- Establish photo points
- Monitoring time frames are before, during and immediately following large precipitation events
- Describe and map evidence of mass wasting, soil movement and deposition
- Describe the effectiveness of the road treatments. Note if additional treatments or maintenance are needed
- Monitor surface soil loss from soil erosion plots

- Collect and compile rain data using rain gauges
- Test water at Cascade Springs Culinary Water System to ensure that the water source was unaffected by the fire ***to be paid through National Fire Plan monies***

Erosion Control Seeding:

- Collect precipitation immediately followed the seeding
- Determine if seed was spread uniformly over all intended treatment sites
- Determine if there is between 50 and 80% soil cover to protect the soil for three years post seeding
- Document which species did well
- Document which species did poorly
- Evaluate methods used to determine whether there are more effective ways of doing business (e.g., erosion blankets) compared with the treatment recommendations presented with the Initial Request for EFFS - FW22 funds
- Establish five photo point locations

Noxious Weeds:

- GPS map of dozer lines constructed to contain the Cascade II Fire
- GPS map of travel-ways that cross the dozer lines and access the interior of the fire
- Annual assessment of the magnitude of infestations, including the following information:
    - GPS map of locations and perimeters or points of infestations
    - Estimates of number of plants per square foot
    - Copies of appropriate Pesticide Use Proposals and Pesticide Use Reports for treatment of target weed species
    - Record of treatment activities (dates, treatment methods, chemicals used)
    - Evaluation of treatment success

Wildlife:

- ***To be monitored under noxious weeds:***
    - Review hydrologist data on water quality
    - Monitor the effectiveness of the seeding within the critical wintering range for deer and elk to determine invasive species control (non-federal lands)
    - Monitor areas not seeded within critical wintering range to determine invasive species presence (non-federal lands)
- ***To be monitored through existing agreements with UDWR:***
    - Utah DWR monitors one winter range trend study for deer and elk on the terrace above Deer Creek Reservoir, within the fire area. This data is collected on a 5-year rotation. Wildlife managers for the Forest Service will use this data to monitor wildlife habitat recovery in the burned area. (for non-federal lands)

Fisheries:

- Establish photo points along the South Fork Deer Creek from 0.4 to 1 mile above the confluence with the Provo Deer Creek to monitor bank stability and sedimentation into the creek
- Monitor the effectiveness of the treatments along the Provo Deer Creek

    - Review hydrologist data on water quality
    - Monitor stream bank stability in field
- ***NFP/KP2 FUNDS (NFPORS FY2004 Database):***
    - Sample South Fork Deer Creek using appropriate methods to determine the potential contamination of Whirling Disease. Contamination would be a result of the fire suppression activities only and not as a result of the fire.
    - Review creel surveys on Provo Deer Creek or relevant portions of the Provo River, if data is collected and baseline data exists
    - Survey South Fork Deer Creek using appropriate stream survey methods to determine impact to Bonneville Cutthroat Trout populations

Archeological Sites on National Forest System Land:

- Evidence of erosion occurring after the fire on the sites (i.e., exposed artifacts, rills, etc)
- Evidence for illegal artifact collection on the sites due to exposure from the fire
- Documentation of archaeological site monitoring will be done through standard Intermountain Antiquities Computer System forms, site sketches, photographs, and GPS points

Engineering:

- Inspect roads for effectiveness of diversion structures or excessive erosion
- Take water samples of the water system
- Inspect the condition of the source collection area and distribution system

Interim Evaluations

The Implementation Team Leader will conduct periodic evaluations (annually as a minimum) with the District and Forest implementation team to assess implementation progress, effectiveness monitoring and to determine if parameters measured and sampling frequency meet the planned objectives.

Reports

- A **draft interim report** will be prepared.

- The overall results will be presented in a detailed report during 2006. This report will be submitted to the Forest Supervisor, other unit District Rangers, the Regional Office and all cooperating agencies and other interested parties.

Annual Financial Requirements

The annual cost of effectiveness and validation monitoring is itemized in the following table. The total cost for Year 1 is $10,530; $10,215 for Year 2; and $10,625 for Year 3. Costs for the first year are higher because of program initiation and establishing the monitoring sites.

(see attached financial worksheet on the following page)

BAER Monitoring - Financial Worksheet	Year 1	Year 2	Year 3
Soil and Hydrology			
Monitoring Soil Erosion – Install sampling point locations and monitor soil erosion at each location in the high severity burn zones. Year 1, 2 days GS11 to plan and write up; 3 days GS5 to conduct sample-point installation, GPS, and monitoring; 1 day for GS7 GIS specialist to map; and supplies - include rebar, photos, GIS support and travel. Year 2, 2 days for GS11 to collect data and write up; 1 day for GS7/9 GIS specialist to map; and supplies - include rebar, photos, GIS support and travel. Year 3, 2 days for GS11 to collect data and write up; 1 day for GS7/9 GIS specialist to map; and supplies - include rebar, photos, GIS support and travel.	$1,090	$855	$900
Monitor Rain Events – Tipping rain gages for documenting time frames before, during and immediately following large precipitation events associated with soil erosion and sedimentation events. • 3-4 tipping rain gauges at $200-250 each • 2 days GS-5 per year for installing and dismantling rain gauges	$960	$970	$980
Monitoring Sediment Deposition - After each of 3 storms, GS-11 specialist @ $290/day for 4 days total time, to walk along Provo Deer Creek riparian area, South Fork Deer Creek riparian area, Bear Canyon, and tributaries east of Provo Deer Creek to observe sediment movements and deposition and to measure depth and volume of sediment collected behind channel fences and straw wattles. Look at intake for culinary water pipe for Canyon Meadows subdivision after a storm event to determine if sediment is reaching this site.	$1,160	$1,210	$1,260
Soil and Hydrology Subtotals	*$3,210*	*$3,035*	*$3,140*
Erosion Control Seeding			
Monitoring - Vegetation Transects - 8 days with two GS-5 and 2 days for 1 GS-11 with materials/supplies to install and measure in Year 1; 9 days for one person to measure in Years 2 and 3 plus materials/supplies; 1 day GS-11 plus 2 days GS-5 to summarize and write report each year	$4,150	$4,320	$4,510
Erosion Control Seeding Subtotals	*$4,150*	*$4,320*	*$4,510*
Noxious Weeds			
Monitoring - Noxious Weed and Shrub Assessment—4 field days (GS-9/11 & GS-5 for one person, 1 write-up day for 1 person, and GIS support for 2 days (total of 7 person days for 3 years)	$1,900	$1,975	$1,900
Noxious Weed Subtotals	*$1,900*	*$1,975*	*$2,055*
Archeological Sites			
Field Visit Assessments - On-site erosion and artifact collection assessment on 4 sites – 1 field day for 2 people (GS-5 and GS-11) and 1 write-up day for 2 people (GS-5 and GS-11) totaling 4 person days per year for 3 years.	$ 850	$ 885	$ 850
Archeological Sites Subtotals	*$ 850*	*$ 885*	*$ 920*
Engineering			
Monitoring - Inspect roads for effectiveness of diversion structures or excessive erosion—1 day observation ($295/day); write-up 1/2 day in Year 1 only	$420	$---	$---
Engineering Subtotals	*$420*	*$---*	*$---*
TOTAL	**$10,530**	**$10,215**	**$10,625**

Recommendations under NFP/KP2

These recommendations must be entered into NFPORS FY2004 Database

Financial Worksheet	Year 1	Year 2	Year 3
Fisheries			
Monitoring - South Fork Deer Creek using appropriate methods to determine the potential contamination of Whirling Disease. Contamination would be a result of the fire suppression activities only and not as a result of the fire (year 1 and year 2).	$3,000	$3,000	$---
Water Quality			
Test water at Cascade Springs Culinary Water System to ensure that the water source was unaffected by the fire • perform full chemical analysis spring first and second years before opening to public (lab fee $600, 1 person for 3 hours @ $14/hour) • perform bacteriological samples for water quality (lab fee $20 each for 6 samples, 1 person for 18 hours @ $14/hour) for first and second years	$1,014	$1,014	$---
Archeological Sites			
Conduct archaeological survey of high-probability site areas ($7.75 per acre for 300 acres)	$2,325	$---	$---
TOTAL	**$6,339**	**$4,014**	**$---**

(Charmaine Thompson, Archeologist; Denise VanKeuren and Mike Duncan, Botanist/ Ecologists; Chad Hermandorfer and Charles Condrat, Hydrologists; Bekee Megown and Kate Schwager, Fish and Wildlife Biologists; Ryan Stone, Engineer; Melissa Y. Crumpton, Forestry Tech District Facilities Manager)

Recommendations under NFP/KP2

These recommendations must be entered into NFPORS FY2004 Database

Financial Worksheet	Year 1	Year 2	Year 3
Fisheries			
Monitoring - South Fork Deer Creek using appropriate methods to determine the potential contamination of Whirling Disease. Contamination would be a result of the fire suppression activities only and not as a result of the fire (year 1 and year 2).	$3,000	$3,000	$---
Fisheries Subtotals	*$3,000*	*$3,000*	*$---*
Engineering			
Install 2 Barrier Rocks at $1,895 each	$3,790	$---	$---
Install warning system at Canyon Meadows Community Water Treatment Plant	$5,000	$---	$---
Install Sediment Control Structure	$3,850	$---	$---
Survey, Design, and Contract Administration (6 days @ $280/day)	$1,680	$---	$---
Engineering Subtotals	*$14,320*	*$---*	*$---*
Interpretive Signs			
The flush toilet building sustained heat damage to the metal siding above men's side, metal trim, and paint on the privacy panel. The metal siding is exposed due to heat melting the powder coated steel.	$1,500	$---	$---
Five plastic coated expanded metal benches were damaged from the heat. The plastic coating has separated from the frame. The cemented upright supports are intact, but will need some sanding and repainting to prevent rusting. The seat and back support on the five benches will need to be replaced. It is recommended the benches be replaced completely.	$2,500	$---	$---
One water hydrant wooden box was scorched. It will need to have the wood replaced.	$200	$---	$---
Three interpretive signs were scorched on the wooden part bad enough to warrant repair or replacement. Some of the signs had a light scorching, and will be retained as they are. None of metal placards will need to be replaced, although one will need to be cleaned so information is legible.	$900	$---	$---
Three flexible fiberglass stakes with trail cutting prevention information were burned. They will need to be replaced, in addition to needing several more to prevent illegal trails throughout the burn since the visual vegetation barrier is gone (10 @ $15 each).	$150	$---	$---
Approximately 100 ft. of post and rail fence burned below Cascade Springs along the Little Deer Creek Road 475.	$100	$---	$---
Approximately 450 ft. of post and rail fence were burned at high intensity enclosing the Cascade Spring VIS 8323 site and will need to be replaced.	$2,000	$---	$---
Two recreation information and regulatory signs along the Cascade Springs road need to be replaced.	$300	$---	$---
On the winter closure gate on the Cascade Springs gate, the 4' x 2 ½ ' Road Closed sign and object marker need replacing.	$300	$---	$---
The white plastic overflow pipes for the Cascade Spring VIS 8323 were scorched. The spring needs a collection box in order to make the system legal if water starts flowing again, which would negate the need to replace the plastic overflow pipe. This project could be supplemented with other funds to get the collection box that is needed.	$300	$---	$---
Approximately 50 culvert metal post markers with reflectorized tops are needed to mark culverts along the Cascade Springs, Mill Canyon Peak, and Little Deer Creek roads. This project could be supplemented with Forest roads funds, and implemented when the culverts are cleaned out as part of the BAER treatment for the transportation system. (20 markers @ $50 ea.)	$1,000	$---	$---
Tooth Springs is a culturally sensitive area that has a water source for wildlife with troughs about ½ miles down drainage. The spring is located in a natural meadow. With the lack of vegetation and nearby trail, it is vulnerable to illegal vehicle encroachment. The long term solution would be to install barrier rock along the road shoulder rather than a post and rail fence that would detract from the natural beauty of the area.	$500	$---	$---
Interpretive Signs Subtotals	*$9,750*	*$---*	*$---*

Financial Worksheet	Year 1	Year 2	Year 3
Water Quality			
Test water at Cascade Springs Culinary Water System to ensure that the water source was unaffected by the fire • perform full chemical analysis spring first and second years before opening to public (lab fee $600, 1 person for 3 hours @ $14/hour) • perform bacteriological samples for water quality (lab fee $20 each for 6 samples, 1 person for 18 hours @ $14/hour) for first and second years	$1,014	$1,014	$---
Water Quality Subtotals	*$1,014*	*$1,014*	*$---*
Archeological Sites			
Conduct archaeological survey of high-probability site areas ($7.75 per acre for 300 acres)	$2,325	$---	$---
Archeological Sites Subtotals	*$2,325*	*$---*	*$---*
TOTAL	**$30,409**	**$4,014**	**$---**

(Charmaine Thompson, Archeologist; Bekee Megown and Kate Schwager, Fish and Wildlife Biologists; Ryan Stone, Engineer; and Melissa Y. Crumpton, Forestry Technician District Facilities Manager)

CASCADE II PHOTO PAGES

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SPOT4 – Satellite Coverage from RSAC (77 KB)
Information Photo Page (867 KB)
BAER Team Members at Work (422 KB)
Burn Severity (312 KB)
Preliminary Infrared Image (237 KB)
Preliminary Classification of Burn Severity based on Satellite Imagery (201 KB)
Final Burn Severity Determination (187 KB)
New growth (325 KB)
Moderate Burn Severity Zones (366 KB)
High Burn Severity Zones (410 KB)
Soil Resources (327 KB)
Potential Problems (304 KB)
National Fire Plan/ Rehabilitation & Restoration Projects (924 KB)
Cascade Springs Interpretive Site Rehabilitation Projects (164KB)
Transportation Surfaces (326 KB)
Noxious Weeds (609 KB)
News Media Tour (184 KB)

CASCADE II Geological Information Map's

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Ownership (910 KB)
Fire Progression (973 KB)
Burn Severity (949 KB)
Vegetation (936 KB)
Geology (1014 KB)
Landslides (830 KB)
Soils (1052 KB)
Suitability for Seeding (950 KB)
Slope (1022 KB)
Watersheds (896 KB)
Watershed Surrounding Cities (1113 KB)
Selected Drainages and High Burn Severity (1167 KB)
Precipitation Zones (1030 KB)
Deer Winter Range (775 KB)
Deer Winter Range and Agricultural Land (969 KB)
Elk Winter Range (983 KB)
Elk Winter Range and Agricultural Land (856 KB)
Bonneville Cutthroat Trout and Riparian Habitat (839 KB)
Noxious Weeds (840 KB)
Transportation Systems (836 KB)
Seed Application Method (905 KB)
Mulch Rate (857 KB)
Land Treatments – Forest Service (848 KB)
Treatments – Transportation/Water/Wastewater (824 KB)
Land Treatments – Covered with Wyden Authority (616 KB)
Land Treatments – NRCS/EWP Funding (981 KB)
Treatments – National Fire Plan (872 KB)