Date of Report: 10/2/2006

BURNED-AREA REPORT
(Reference FSH 2509.13)

PART I - TYPE OF REQUEST

A. Type of Report

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

B. Type of Action

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

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

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

PART II - BURNED-AREA DESCRIPTION

A. Fire Name: Cascade Crest Complex: Puzzle

B. Fire Number: 273

C. State: Oregon

D. County: Linn/ Jefferson

E. Region: Region 6

F. Forest: Willamette & Deschutes

G. District: Detroit and Sisters

H. Fire Incident Job Code: P6C4KA

I. Date Fire Started: 8-19-2006

J. Date Fire Contained: Pending

K. Suppression Cost: $ 6,923,627 (as of 9/18/06)

L. Fire Suppression Damages Repaired with Suppression Funds
1. **Fireline waterbarred (miles)**: 12
2. **Fireline seeded (miles):** 0
3. **Other (identify):** 6 miles of fireline treated with MIST Tactics within wilderness for rehab.

M. Watershed Number: 1709000501

N. Total Acres Burned: Willamette NF 6256 / Deschutes NF 84
[6340] NFS Acres [ ] Other Federal [ ] State [ ] Private

O. Vegetation Types: **:** In upper elevations, mountain hemolock, Pacific sliver fir and subalpine fir plant associations dominate (70%). Special habitats such as riparian, meadows, and rock outcrop comprise the remaining 30%

P. Dominant Soils: The soils for the fire parallel the elevation changes and are primarily of glacial origin. They are defined by the Willamette National Forest Soil Resource Inventory as follows:

A) Land types 194 and 195 occur at the lower elevations from about 3800 to 4800 feet. They moderately deep to deep land types derived from glacial till and volcanic materials. Typically they occur on uneven glacial benches and steeper side slopes that range from near zero to 80% or so. These land types support Western hemlock and Pacific silver fir plant communities.

B) Land types 73 and 74 occur from elevations of about 4400 feet to 5800 feet. As before, they are also moderately deep to deep land types derived from glacial till and volcanic materials. Typically they occur on uneven glacial benches and steeper side slopes that range from near zero to 70% or so. However, these land types support Mountain hemlock plant communities with varying amounts of Lodgepole Pine, Subalpine Fir, Engelmann Spruce and the occasional Alaskan yellow cedar.

C) Land types 81 and 82 occur at the highest elevations, primarily along the Cascade crest. These land types are comprised of volcanic rock outcrops and red to black volcanic sands and cinders. Side slopes range from near flat to over 70% and grow primarily Lodgepole Pine and mountain hemlock.

D) Land types 16 and 17 are found across a wide range of elevations from 3800 to over 5500 feet. They moderately deep to deep land types derived from alluvium, glacial till glacial outwash and volcanic materials. Side slopes generally range from near zero to about 40%, but can locally be much steeper. These land types specifically occur along valley bottoms, streams and toe slopes. They are primarily stream terrace deposits or alluvial fans. Land type 16 contains Western hemlock and True fir plant communities. Land type 17 is found at the higher elevations and contains Mountain hemlock and Lodgepole Pine.

Q. Geologic Types: The basic geology of the Puzzle Fire is entirely within the High Cascade physiographic province. Bedrock is entirely comprised of basaltic lava flows and/or cinder / ashfall accumulations. The entire area has been extensively glaciated by several Pleistocene glacial episodes. Elevation ranges from about 3700 feet on the western boundary at Puzzle Creek to around 6700 feet on the eastern boundary along the Cascade Crest at North and South Cinder Peaks.

R. Miles of Stream Channels by Order or Class: Perennial, class II and III 13.3 miles; Intermittent, class IV; 32 miles

S. Transportation System

Trails: 9.2 miles (inside fire perimeter) Roads: 0 miles
1.9 miles (outside fire perimeter)

PART III - WATERSHED CONDITION

A. Burn Severity (acres): 6031 (**low)** 309 **(moderate)** 0 **(high)**
1. Fire Intensity (acres): 2496 (underburned) 868 (mixed) 2929 (stand replacement) 47 (rock)

B. Water-Repellent Soil (acres): 0

C. Soil Erosion Hazard Rating (acres): 5400 **(low)** 310 **(moderate)** 630 **(high)**
(Generated on basis of a percenage of fire area)

D. Erosion Potential: 3.5 **tons/acre**

E. Sediment Potential: 2000 **cubic yards / square mile**

PART IV - HYDROLOGIC DESIGN FACTORS

A. Estimated Vegetative Recovery Period, (years): 35

B. Design Chance of Success, (percent): 95

C. Equivalent Design Recurrence Interval, (years): 2

D. Design Storm Duration, (hours): 24

E. Design Storm Magnitude, (inches): 4

F. Design Flow, (cubic feet / second/ square mile): 21

G. Estimated Reduction in Infiltration, (percent): 0

H. Adjusted Design Flow, (cfs per square mile): 26
Given a rain-on-snow event, predicted flows could increase 300 percent (based upon the Jefferson Creek gage during the 1996 rain-on-snow event).

PART V - SUMMARY OF ANALYSIS

A. Describe Critical Values/Resources and Threats :

1. Human Life and safety (Post Fire Hazards, and Danger Trees);
2. Property (Facilities, and Trails)
3. Critical Natural /Water Quaity, Soils, Vegetation,Wilderness, and Cultural)

- High and Moderate burn severity will increase snow pack and likely lead to higher peak flows. Higher peak flows could threaten existing roadways at stream crossing in the lower segments of Puzzle and Marion Creek watersheds. These crossing have drainage structures that were not sized or designed to handle the higher peak flows. Drainage failure would lead to road wash-out , which could threaten the public.

- The High and Moderate burn severity will increase snow pack, which will elevate peak flows. Storm runoff from rain on snow events could incorporate debris material from debris slides, which would elevate the risk of channel scour and flooding in lower segments of Puzzle and Marion Creeks. The risk of flooding could threaten private property, numerous summer homes, and users utilizing public facilities.

- Cultural resource sites are known to be within the Puzzle fire. Some may have been impacted and may require treatment to protect heritage values. The Forest Archeologist will be funded to complete appropriate surveys and assessments. In compliance with 36 CFR 800, tribal consultation concerning BAER activities will occur.

Forest Service facilities at risk include: *system trails* leading to Mount Jefferson Wilderness Area; *dispersed campsites* in Puzzle and Marion watersheds and *system roads in* Marion creek. National Forest system roads, trails, and other facilities were designed to handle pre-burn runoff events and were not designed to handle elevated concentrated runoff.

2. *Loss of Soil Productivity*

Soils within the fire perimeter vary from low to high inherent productivity, generally on an elevational and aspect gradient. Soils are generally moderately deep with a layer of ash or cinders over glacial till or outwash. Listed below are the expected effects of the Puzzle Fire on Soil Productivity:
Direct effects to the soil resource were observed to be within a range that is not expected to alter physical or chemical conditions enough to affect the return of vegetation on these sites.

- Notable burn effects such as discolored soil or deep deposits of gray ash are not spatially located in areas large enough to map and were observed to be present on less than 8 to 12% of the area. They occurred as a result of the consumption of down woody material and are distributed equally across all burn intensities.
- Seed sources of herbaceous annual grasses and forbs are likely to have survived, as seen in previous large fires on the district over the last four years.
- Shrub sprouting from existing root collars and seeds is also expected to occur over the next few months.

B. Emergency Treatment Objectives:

1. Protect the public and agency employees from identified threats by:
    a. Posting hazards/warning signs on trails and trailheads

   b. Removing safety hazards and obstructions on trails to allow restoration work.
2. Minimize destruction of property identified by:
   a. Controling drainage problems associated with trails
   b. Rehabilitating areas of trail that poise the greatest risk to riparian and water quality resources.
3. Prevent unacceptable resource damage identified by:
   a. Reducing effects of soil erosion on trails
   b. Preserving cultural sites and values
   c. Treating weed infestations from known/outside sources
   d. Re-posting wilderness boudary

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

Land 80**%** **Channel** **%** **Roads/Trails** 60**%*** **Protection/Safety** 95**%**

***Due to timing of the fire and the risks of sending personel into the fire are this fall a low probability is being used. After the winter and snow fall brings down the hazards it is expected that a high probability will occur.

D. Probability of Treatment Success

	Years after Treatment		
	1	**3**	**5**
Land	80	80	95
Channel			
Roads/Trails	60	80	95
Protection/Safety	95	95	95

E. Cost of No-Action (Including Loss): $1,404,000

F. Cost of Selected Alternative (Including Loss): $747,190

G. Skills Represented on Burned-Area Survey Team:

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

Team Leader: R. Strohm / D. Halemeier

Email: rstrohm@fs.fed.us **Phone**: 541-383-5638 **FAX**: 541-383-5531

H. Treatment Narrative:
(Describe the emergency treatments, where and how they will be applied, and what they are intended to do. This information helps to determine qualifying treatments for the appropriate funding authorities. For seeding treatments, include species, application rates and species selection rationale.)

Emergency stabilization treatments are intended to be temporary measures that do not require maintenance or are removed after objectives have been met. Costs covered by emergency funding authority include the removal of treatments when they are no longer needed or the maintenance of treatments when necessary to maintain their effectiveness for up to 3 years.

Treatments should be designed to be self-maintaining over their effective life.

1. Appropriate Measures. Use appropriate measures as follows:

   a. Plant Materials. Mulching, seeding, or planting of grass, forbs, shrubs, or trees are appropriate treatments when needed to reduce unacceptable erosion, to stabilize critical or significant natural or cultural resources, to prevent permanent impairment to critical habitat for Federal and State listed, proposed, or candidate threatened or endangered species, or to prevent detrimental invasion by non-native plants. Use only planted materials that should be effective within two growing seasons. Comply with FSM 2081, Executive Order 13112, and applicable State noxious weed prevention requirements in setting standards for seed, straw, and other plant materials.

   Natural recovery by native species is preferred. When practical, use seeds and plants in burned-area emergency stabilization projects that originate from genetically local sources of native species. When native materials are not available or suitable, give preference to non-native species that meet the treatment objectives, are nonpersistent, and are not likely to spread beyond the treatment area.

   b. Structures. Structural treatments are appropriate when needed to minimize the risk to downstream life and property, to reduce unacceptable erosion, to minimize unacceptable degradation of water quality, to stabilize critical or significant natural or cultural resources, or to protect treated or recovering areas from uses that could cause erosion or interfere with recovery.

   c. Hazard Removal, Warning, and Controls. Stabilization or removal of physical hazards caused or aggravated by the fire that threaten life or property are appropriate treatments when there are no other protection options. Warning, signing, or other measures should be used to limit immediate threats to public safety or to limit public or livestock access in order to protect treated or recovering areas.

   d. Facility Replacement. Replacement of destroyed or damaged minor facilities, such as signs or guardrails, is an appropriate measure when human health or safety is at risk and there are no other protection options.

   e. Consultation. Consultation with other Federal, State, Tribal, and local offices is appropriate to ensure that emergency treatments are compatible with the Endangered Species Act, National Historic Preservation Act, Clean Water Act, and other laws as applicable. Initiate any necessary supporting processes prior to installing ground-disturbing treatments and only within areas considered for treatment.

f. Other Measures.

(1) Patrolling, camouflaging, or burying significant heritage sites are appropriate actions when necessary to prevent a critical loss of heritage site value when looting potential is high. Patrolling should be considered only when there are no other effective alternatives.

(2) Direct treatment of invasive plants introduced or aggravated by the fire or fire suppression activities is appropriate when indirect prevention measures are not practical.

(3) All BAER activities that have the potential to introduce or spread noxious weeds, both terrestrial and aquatic, should include appropriate prevention practices.

Land Treatments:
Treatment #H1 & #H2 - There is the potential for adverse effects to heritage resources as the result of other proposed BAER treatments along 11 miles of trail with the Puzzle Fire. Consequently there is a need for heritage resource inventories and possibly mitigation treatments for these proposed BAER treatments. It is estimated that the cost for field inventory, documentation and Section 106 consultation. If heritage sites will be adversely effected by proposed BAER Treatments, then additional mitigation measures and consultation with Oregon SHPO, as well as area tribes, will be necessary.

Treatment #B1 - Weed infestations are known just outside the fire perimeter. Treatment is necessary to prevent weed introduction, establishment, and spread into the burned area. The goal is to protect native plant communities and rare plants. This would involve surveying and hand removal of noxious weeds in disturbance areas along the perimeter of the fire area, and random survey of interior intensively burned areas.

Channel Treatments: None recomended

Road and Trails Treatments: T5 Slope stabilization directly upslope of trails, scatter across sideslope organic onsite material to reduce the energy associated to overland flow and reduce localized concentration of sediment and drainage related impacts to the trail system.

1. **Treatment #T1 – Improve Trail Drainage**: Install drain dips on 11 miles of trail to reduce the effects of accelerated surface erosion from anticipated fire effects. Dips will vary from rolling out-slope dips to water-bars constructed from peeled and anchored native wood material. This treatment will occur on trail segments within moderate and high intensity burn areas where the risk of accelerated surface erosion is expected. This treatment will be implemented on the following trail systems: Pacific Crest National Scenic Trail and main system trails leading to Pacific Crest Trail.

2. **Treatment #T2 – Improve Trail Access—Down Trees:** A number of fire-killed trees are falling and blocking trail access. Trail log out will be necessary on 11 miles of trail in order to gain access to sections of trail that need trail drainage treatment (**T#1**). If access is not provide to accomplish BAER treatment T#1, the Deschutes and Willamette NF could loose approximately 5-11 miles of system trails; 3 miles of which are the Pacific Crest National Scenic Trail. Only

large downed trees or jack-strawed down trees will be logged-out with BAER funds. The remaining downed trees will be logged out with appropriated or fire recovery funds.

3. **Treatment #T3** – **Improve Trail Access—Burned Bridges:** Some of (2) the trail bridges on major systems trails leading to Pacific Crest National Scenic Trail have been consumed by the fire. Stream crossing will limit access for implementation of trail drainage treatments (**T#1**) and pose safety concerns for work crews. If access is not provided to accomplish BAER treatment T#1, the Deschutes and Willamette NF could loose approximately 5-11 miles of system trails. Install temporary trail bridges to provide access for trail drainage treatments **(#T1**). Only temporary bridge structures will be covered by BAER funds. Final bridge installations will be with appropriated or fire recovery funds.

4. **Treatment #T4 – Website Development/Trailhead Hazard Signing:** Develop content on the Willamette NF web site, and post hazard signs at approximately 14 trailheads to inform recreationists of post fire hazards. Project hazard signing and web development crew to consist of 2 persons for 14 days.

5. **Treatment #T5 – Adjacent Slope Stabilization:** Steep slopes adjacent to trails affected by the fire including the Pacific Crest National Scenic Trail itself, will be suceptible to significant erosion (this was observed after the B&B Complex of 2003). This treatment will occur on trail segments within moderate and high intensity burn areas where the risk of accelerated surface erosion is expected. Slope stabilization consisting of the spreading and arrangement of fine and course woody materials will be needed to stabilize soils to prevent further erosional damage.

1. **Treatment #R1 - Puzzle Bridge:** Calculation of the drainage area and the proposed increase in peak flow warrants consideration of replacing the Puzzle Creek Bridge. 200% increase in flows jeopardizes the bridges ability to pass predicted volume of water under a 100 year flood scenario (2600-2900 CFS). This bridge was designed for a 50 year storm (1,145 CFS) when built in 1950. Footings of the exiting structure are undermined and would be further be compromised under predicted flow conditions. (see Dave Nordienson Note, Willamette National Forest Bridge Engineer) Replacement of bridge for a 100 year flow would reduce risk to public health and safety.

2. **Treatment #R2 – Rock Drain Dip:** Design and install a temporoary rocked drain dip on the Northwest side of the Puzzle bridge to pass the additional estimated peak flow capasity around the structure.

Protection/Safety Treatments: See trail treatment T4

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.)

Monitoring:
Treatment #H1 - Monitor Heritage sites for potential vandalism and surface ground conditions at two sites (061800248, and 06180400273), if erosion is occurring, using local down wood to create erosion control structures would be effective. If extensive surface artifacts are visible, consider

temporary trail closures or disguise wilderness camp sites for a few years until vegetation has reestablished and covered more of the site.

Treatment #B1 - Monitor weed prevention treatment and a brief written report documenting results. This report will evaluate treatment effectiveness, describe problem areas, and suggest future weed control needs and methods. If indications of weed invasions are found in the first year of monitoring, additional funding may be requested.

Treatment #T1 - Monitor trail drainage (drain dips) to ensure they are properly functioning.

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

			NFS Lands				Other Lands				All
		Unit	# of		Other	# of	Fed	# of	Non Fed	Total
Line Items	Units	Cost	Units	BAER $	$	units	$	Units	$	$
A. Land Treatments										
H1 Cultural Site Protection	Day	$350	6	$2,100	$0		$0		$0	$2,100
H2 Cultural Surveys	Day	$240	15	$3,600	$0		$0		$0	$3,600
B1 Weed Treatment	Day	$250	15	$3,750	$0		$0		$0	$3,750
				$0	$0		$0		$0	$0
Insert new items above this line!				$0	$0		$0		$0	$0
Subtotal Land Treatments				$9,450	$0		$0		$0	$9,450
B. Channel Treatments										
				$0	$0		$0		$0	$0
Insert new items above this line!				$0	$0		$0		$0	$0
Subtotal Channel Treat.				$0	$0		$0		$0	$0
C. Road and Trails										
T1 Trail Drainage	Mile	$2,500	11	$27,500	$0		$0		$0	$27,500
T2 Trail Acc-Down Trees	Mile	$350	11	$3,850	$0		$0		$0	$3,850
T3 Trail Acc-Burned Bridges	Each	$600	2	$1,200	$0		$0		$0	$1,200
T4 Trailhead Haz Signing	Each	$350	14	$4,900	$0		$0		$0	$4,900
T5 Trail Slope Stabilization	Acre	$150	45	$6,750	$0		$0		$0	$6,750
R1 Bridge Replacement	Each	$250,000	1	$250,000	$0		$0		$0	$250,000
R2 Rock Drain Dip	Each	$3,000	1	$3,000	$0		$0		$0	$3,000
				$0	$0		$0		$0	$0
Insert new items above this line!				$0	$0		$0		$0	$0
Subtotal Road & Trails				$297,200	$0		$0		$0	$297,200
D. Protection/Safety										
See T4				$0	$0		$0		$0	$0
Insert new items above this line!				$0	$0		$0		$0	$0
Subtotal Structures				$0	$0		$0		$0	$0
E. BAER Evaluation										
BAES Team	LS	$6,000	1		$6,000		$0		$0	$6,000
Insert new items above this line!				---	$0		$0		$0	$0
Subtotal Evaluation				---	$6,000		$0		$0	$6,000
F. Monitoring										
H1 Heritage Sites	Day	$240	5	$1,200	$0		$0		$0	$1,200
B1 Weed Sites	Day	$250	5	$1,250	$0		$0		$0	$1,250
T1 Trail Drainage	Day	$275	10	$2,750	$0		$0		$0	$2,750
Insert new items above this line!				$0	$0		$0		$0	$0
Subtotal Monitoring				$5,200	$0		$0		$0	$5,200
G. Totals				$311,850	$6,000		**$0**		**$0**	**$317,850**
Previously approved										
Total for this request				**$311,850**						

PART VII - APPROVALS

1. /S/ Dallas Emch 10/11/06
   Willamette Forest Supervisor (signature) Date

2. For: /S/ Cecilia R. Seesholtz 10/12/06
   Deschutes Forest Supervisor (signature) Date

3. _____ _____
   Regional Forester (signature) Date