Date of Report: September 29, 2015

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: Canyon Creek

B. Fire Number: OR-MAF-015292

C. State: Oregon

D. County: Grant

E. Region: Pacific Northwest (6)

F. Forest: Malheur

G. District: Blue Mountain / Prairie City

H. Fire Incident Job Code: P6JIK8 (0604)

I. Date Fire Started: 8/12/2015

J. Date Fire Contained: 95% contained as of 9/20/2015

K. Suppression Cost: $21,133,082 as of 9/14/2015

L. Fire Suppression Damages Repaired with Suppression Funds

1. Fireline waterbarred (miles): 114.7 miles
2. Fireline seeded (miles): 114.7 miles
3. Other (identify): Safety zones, staging areas and drop points are in the process of being rehabilitated. Road drainage work was installed where suppression activities warranted so.

M. Watersheds:

HUC 6 subwatersheds affected by the Canyon Creek Fire. Percent of watersheds burned are reported in parentheses.

Subwatershed Name	Total Subwatershed Acres (Percent Burned)	Unburned or Very Low Acres	Soil Burn Severity		
			Low Acres	Moderate Acres	High Acres
Castle Creek-John Day River	22,241 (35%)	675 (3%)	2,741 (12%)	3,707 (17%)	573 (3%)
Dog Creek-John Day River	17,640 (23%)	885 (5%)	2,454 (14%)	611 (3%)	133 (1%)
East Fork Canyon Creek	15,844 (100%)	1,775 (11%)	5,801 (37%)	5,912 (37%)	2,357 (15%)
Indian Creek	19,103 (73%)	2,384 (12%)	6,062 (32%)	4,845 (25%)	719 (4%)
Lake Creek	21,996 (9%)	570 (3%)	1,139 (5%)	237 (1%)	13 (0%)
Laycock Creek	18,073 (1%)	22 (0%)	130 (1%)	67 (0%)	15 (0%)
Lower Bear Creek	17,231 (5%)	99 (1%)	702 (4%)	34 (0%)	(0%)
Lower Canyon Creek	16,207 (75%)	545 (3%)	4,140 (26%)	3,594 (22%)	3,894 (24%)
Luce Creek-John Day River	22,378 (0%)	0 (0%)	1 (0%)	(0%)	(0%)
Middle Bear Creek	13,848 (11%)	153 (1%)	1,201 (9%)	116 (1%)	(0%)
Middle Canyon Creek	18,602 (96%)	294 (2%)	8,380 (45%)	5,852 (31%)	3,275 (18%)
Shaw Gulch-John Day River	19,662 (26%)	155 (1%)	4,137 (21%)	854 (4%)	42 (0%)
Starr Creek-Silvies River	36,128 (1%)	20 (0%)	242 (1%)	11 (0%)	2 (0%)
Strawberry Creek-John Day River	20,130 (3%)	137 (1%)	454 (2%)	75 (0%)	(0%)
Upper Bear Creek	19,161 (23%)	975 (5%)	2,830 (15%)	562 (3%)	4 (0%)
Upper Canyon Creek	23,327 (100%)	1,155 (5%)	11,656 (50%)	9,448 (41%)	1,040 (4%)
Van Aspen Creek-Silvies River	20,484 (2%)	50 (0%)	264 (1%)	22 (0%)	8 (0%)
Grand Total	**342,055 (32%)**	**9,895 (3%)**	**52,334 (15%)**	**35,946 (11%)**	**12,076 (4%)**

N. Total Acres Burned: 110,221 total acres

NFS Acres(90,566) BLM (2,670) State of Oregon (0) Private (16,984)

O. VegetationTypes: Vegetation types within the fire area consist of a combination of forested and non-forested habitats between 3,382, and 9,042 feet elevation. The forested vegetation types represented are Douglas fir (20,862 acres), Engleman spruce (1,955 acres), lodgepole pine (6,400 acres), ponderosa pine (9,490 acres), subalpine conifer (5,123 acres), western juniper (961 acres) and white fir/grand fir (37,645 acres). The non-forested habitats include shrub dominated (2,417 acres), wetlands (6 acres), grassland, (4,762 acres) and meadows (157 acres). There were 3,989 acres of non-vegetated habitat within the fire.

P. Dominant Soils: There are four dominant soil types in the burned area. These soils are strongly dependent on the underlying geology and the slope aspect. Soils that formed on the Canyon Mountain Ophiolite sequence are derived from igneous rocks. This soil type is typically clay to clay loam soil and contains gravel and cobbles. Soils that formed on the Strawberry Volcanic lava flows are typically loams to clay loams. The soils that formed on the marine sedimentary rocks of the Izee Terrane are typically loam to silt loams that contain gravel. A large part of the burned area has been blanketed in recently deposited volcanic ash erupted from Mount Mazama in southern Oregon 7,700 years ago. The Mazama derived soils are silts to silt loams that are typically found on north facing slopes. The Mazama soils were found to be highly productive relative to the other soil types. This soil type typically experienced higher soil burn severity due to the abundance of fuels in this high productivity soil. High severity soil burn conditions are found mostly in the western part of the fire where the fire originated on north facing slopes blanketed in recent volcanic ash. In general erosion rates in the forested regions of the Malheur National Forest are low.

Parent Rock	Soil Texture	Acres	Percent of Fire Area
Canyon Mountain ophiolite	Clay loam	16,592	15%
Strawberry Volcanics	Loam to clay loam	17,137	16%
Marine sedimentary rocks	Loam to silt loam	21,039	19%
Recent Mazama ash	Silt loam	52,629	48%

Q. Geologic Types: The Canyon Creek Complex is underlain by an intricate geology of accreted terranes, sedimentary rocks, and lava flows. The Canyon Mountain Complex (Early Triassic) is an ophiolite sequence composed of peridotite, serpentinite, and quartz diorite. This rock type underlies 35% of the burned area and is located in the north western part of the fire in the Canyon Creek watershed. The Clarno Formation (Tertiary) is a sequence of interbedded volcanic clastic sedimentary rocks and lava flows. This formation underlies 4% of the burned area and occurs in the Berry Creek drainage. This unit is important because it is locally prone to landslides and debris flows. The Strawberry Volcanics (Miocene) are basaltic andesite lava flows erupted from vents near Strawberry and Lookout mountains. They underlie 27% of the burned area, and blanket most of the eastern part of the fire in the Strawberry Wilderness. Rocks of the Izee Terrane, a sequence of marine sedimentary rocks, (Late Triassic) underlie the southwestern part of the fire. These rocks underlie 22% of the burned area. The remaining 12% of the burned area is underlain by smaller units of sedimentary and volcanic rocks as well as recent deposits of alluvium.

R. ESA Fisheries Overview and Miles of Stream Channels by Order or Class: See Table Below

Streams	Miles
Perennial	207
Intermittent	288
Ephemeral	29
Cannel, Ditch or Pipeline	9
Grand Total	**533**

Within the Canyon Creek Complex the main concern for fisheries values are occupied and designated critical habitat for Mid-Columbia Steelhead trout and bull trout. Mid-Columbia River Steelhead are listed as Threatened under the Endangered Species Act (ESA), and the John Day River basin has one of the four "major population groups" that make up the Mid-Columbia River steelhead "Distinct Population Segment". The majority of streams within the fire perimeter (occupied or unoccupied) drain into the upper mainstem John Day River, with a current steelhead population of intermediate size and at moderate status in terms of viability. The major limiting factors for the upper mainstem fish already include degraded floodplain and channel structure, altered sediment routing, water quality (high temperatures), altered hydrology, and passage obstruction in smaller tributaries (NMFS 2009). All are factors which the post-fire impacts may further degrade. Bull trout are listed as Threatened, under the ESA, with two local populations extinct (Pine Creek and Canyon Creek), the Indian Creek population is very limited, and the upper John Day River mainstem population is considered to be in much better status with distribution in tributary streams (ODFW Native Fish Status Report).

Stream Total Miles	Bull Trout (miles occupied)	Bull Trout Critical Habitat	Steelhead (miles occupied)	Steelhead Critical Habitat
533	4.7	12.1	90	93.8

S. Transportation System

Trails: 66.9 miles

Roads: See Table Below. “Other Roads” are primarily private land roads.

Maintance Level	Miles
1-Basic Custodial Care (closed)	109.5
2-High Clearance Vehicles	171.4
3-Suitable For Passenger Cars	9.9
4- Moderate Degree of User Comfort	7.3
5-High Degree of User Comfort	7.3
Other Roads	5.3
Total Road Miles	314.9

PART III - WATERSHED CONDITION

A. **Burn Severity (acres):** Total: 9,893 (unburned); 52,319 (low); 35,936(moderate); 12,073 (high)
NFS Land: 8,870 (unburned); 40,638 (low); 30,851 (moderate); 10,208 (high)

B. **Water-Repellent Soil (acres):** 22,044 acres (20% of the fire area)

C. **Soil Erosion Hazard Rating (acres):** Due to the lack of soil survey data necessary to evaluate Erosion Hazard Rating, that metric is not determinable.

D. **Erosion Potential:** 1.1 tons/acre – 5.0 tons/acre on non-Mazama ash derived soils and 30-60 tons/acre on slopes of >10% with high severity burn in Mazama ash derived soils under conditions of water erosion. In addition we estimate 500-600 tons/acre of erosion potential in areas of high severity burn in Mazama ash derived soils by wind erosion, which was observed to have already occurred in the western portion of the burned area, specifically on Rattlesnake Ridge. In the eastern part of the burned area modeled values for soil erosion rates are low, 0.5 tons/acre in Indian Creek and 1 tons/acre in Pine Creek. Due to fire activity during BAER assessment these locations were not field observed.

E. **Sediment Potential:** 378 cubic yards/square mile on non-Mazama ash soils. Field observations of significant fluvial deposition existing in Deer and Berry creeks indicate a potential for additional materials to be entrained during flow events.

F. **Debris Flow Potential:** The USGS Post-Fire Debris Flow Hazard Model was used to assess the Combined Hazard of each drainage in the burned area. The Combined Hazard Rating takes into consideration both the likelihood of occurrence and volume of available sediment. While the likelihood of debris flow occurrence in any particular drainage in the burned area is low, the Combined Hazard of a drainage may be higher based on the predicted volume of material available for transport. The Combined Hazard rating map (Figure 5) shows low to moderate hazard rating for the drainages on the forest. The Combined Hazard for individual stream segments illustrates a few key areas with Combined Hazards that are higher relative to the rest of the forest. These areas include Vance Creek and drainages on private land on the west side on Canyon Creek.

Field observations indicate Berry Creek and Deer Creek debris flow modeling were underestimated with the USGS model. This suggests most of the hazard in the Canyon Creek drainages are understimated. With a NetMap modeling (www.terrainworks.com) analysis based on GEP (Generic Erosion Potential), which is considered the universal driver of shallow failure, regardless of geology or climate, and used in this assessment as a predictor for shallow failure that drives debris flows, the NetMap tool predicts high risk of shallow failure in Sheep Gulch and Deer Creek, and lower risk in Berry Creek. The geologic characteristics, and observed debris flow deposits in the Berry Creek channel indicate the creek and its tributary channels are also at high risk for debris flow. The underlying geology in Berry Creek is the Clarno Formation, a lahar and debris flow lithology prone to landslides.
The high potential for debris flows in Sheep Gulch, Deer Creek, and Berry Creek may contribute considerably to the sediment potential in the event of shallow failure and debris flow.Observations of a debris flow initiated from a small fire (approx 6400 acres) in 2011 within the Berry Creek drainage included loss of bridges, deposits of bedload on alluvial fans, and indicates similar behavior will likely occur at a larger scale with any significant precipitation event.

G.

PART IV - HYDROLOGIC DESIGN FACTORS

A. Estimated Vegetative Recovery Period	5 years
B. Design Chance of Success	80 %
C. Equivalent Design Recurrence Interval	2 years/10 years
D. Design Storm Duration	0.5 hours/ 48 hours
E. Design Storm Magnitude	0.81 inches/ 1.8 inches
F. Design Flow	11.4 cfs/mi^2/10 cfs/mi^2
G. Estimated Reduction in Infiltration	20%
H. Adjusted Design Flow	76.9 cfs/mi^2/23 cfs/mi^2

Summary of Watershed Response

Hydrologic Response: The primary watershed responses of the Canyon Fire are expected to include: 1) an initial flush of ash, 2) rill and gully erosion in drainages and on steep slopes within the burned area, 3) flash floods and spring snowmelt events with increased peak flows and sediment deposition. These responses are expected to be most evident during initial storm events immediately after the fire. Thereafter, responses are expected to become less evident as vegetation is reestablished, providing ground cover, increasing surface roughness, and stabilizing and improving the infiltration capacity of the soils.

Predicted post-fire peak flows show about a 3-fold increase for the 10-year storm from pre-fire, while the 2-year storm shows about a 14-fold increase. Post-fire flows could lead to plugged culverts, flow over road surfaces, rill and gully erosion of cut and fill slopes, erosion and deposition along road surfaces and relief ditches, loss of long-term soil productivity, degradation to T&E designated critical habitat and threats to human safety. Sedimentation and erosion of ephemeral channels is likely to occur at an accelerated rate until vegetation establishes itself and provides ground cover.

Erosion Response: The soil burn severity shows the majority of the burned area falls within the low and moderate soil burn severity levels (47% and 33% respectively). High soil burn severity accounted for 11% of the fire area and the remainder of fire was very low to unburned (9%). The primary areas of high severity burning occurred in the subwatersheds within the Canyon Creek Watershed, resulting in a higher risk to flooding and possible sedimentation affecting water quality, T&E Steelhead, roads, trails, and private residents.

View of Rattlesnake Ridge looking down towards Berry Creek shows high severity burned soil accumulated in draws and prone to erosion.

PART V - SUMMARY OF ANALYSIS

A. Describe Critical Values/Resources and Threats:

Values at Risk:

The table below is Exhibit 02 from FSM 2523.1. This matrix was used to evaluate the risk level for each value identified during this BAER assessment. See FSM 2523.1 for additional information.

Probability of Damage or Loss	Magnitude of Consequences		
	Major	Moderate	Minor
	RISK		
Very Likely	**Very High**	**Very High**	**Low**
Likely	**Very High**	**High**	**Low**
Possible	**High**	**Intermediate**	**Low**
Unlikely	**Intermediate**	**Low**	**Very Low**

The table below is a summary of the values (some of which were not identified as 'critical' per Exhibit 01 from FSM 2523.1) within and along the Canyon Creek fire area, as well as, the threats to those values, the probability of damage or loss, magnitude of consequences and the resulting level of risk. Red shaded cells are those values that rated out as "very high" or "high" risk. Yellow shaded cells rated out "intermediate" risk and white cells rated out "low" or "very low".

Canyon Creek BAER - Forest Service Values At Risk Tracking Table

High / Very High Risk	
Intermediate Risk	
Low / Very Low Risk	
Address in Interim Report	

Category	Value (Life/ Property/ Resources)	Value at Risk	Threat to Value at Risk	Probability of Damage or Loss	Magnitude of Consequence	Risk	Treatment	Notes
Recreation	Life and Safety	Worker Safety at Indian Creek Trailhead	Hazard trees adjacent to trailhead pose threat to life and property	Possible	Major	High	Hazard Tree Mitigation and Hazard Signs **(TH1, P2)**	Hazard tree mitigation is needed to protect worker safety and vehicles related to BAER trail drainage work. Trailhead closed until hazards are mitigated
Recreation	Property	Indian Creek Trail	Inadequate post fire trail drainage resulting in damage or loss of trail	Likely	Moderate	High	Trail Drainage Work **(T4)**	2.25 miles of trail drainage work needed (Sheep Cr Area). Treatment includes Hazard Tree mitigation.
Recreation	Life and Safety	Human Life and Safety along Indian Creek Trail	Rolling rocks, hazard trees, stump holes.	Unlikely	Major	Intermediate	No treatment	Amount of trail use doesn't justify BAER treatment, however hazard signs are proposed.
Recreation	Life / Property	Pine Cr Trailhead/Pine Horse Camp	Hazard trees adjacent to trailhead/camp pose threat to life and restroom	Possible	Major	High	Hazard Tree Mitigation and Hazard Signs **(TH6, P2)**	Restroom was unburned but has hazard trees around it. Horse camp will be closed until hazards mitigated
Recreation	Property	Pine Cr Trail #201	Inadequate post fire trail drainage resulting in damage or loss of trail	Likely	Moderate	High	Trail Drainage Work **(T7)**	0.55 miles of drainage work needed
Recreation	Life and Safety	Human Life and Safety along Pine Cr Trail #201	Rolling rocks, hazard trees, stump holes.	Unlikely	Major	Intermediate	No treatment	Amount of trail use doesn't justify BAER treatment, however hazard signs are proposed.
Recreation	Property	West Fork Pine Cr Trail #200	Inadequate post fire trail drainage resulting in damage or loss of trail	Likely	Moderate	High	Trail Drainage Work **(T8)**	0.6 miles of trail drainage work in lower portion of trail and associated hazard tree abatement.
Recreation	Life and Safety	West Fork Pine Cr start of trail	Rolling rocks, hazard trees, stump holes.	Unlikely	Major	Intermediate	Hazard Tree Mitigation and Hazard Signs **(TH5, P2)**	Start of trail closed until hazards are mitigated
Recreation / Roads	Life and Safety	Human life relative to travel on the 5401-811	Rolling rocks and hazard trees	Possible	Major	High	Gate / closure at the Pine Cr Trailhead / Horse Camp **(R1, P1)**	2 one-lane bridges consumed in fire. Enforce closure with gate near Horse Camp. Closed until hazards eliminated
Recreation	Life and Safety	Old Pine Cr Trailhead	Hazard trees adjacent to trailhead pose threat to life	Unlikely	Major	Intermediate	Will be closed due to above closure	Not a designated trailhead. Closure/Hazard signs as part of above closure. Closed until hazards eliminated
Recreation	Life and Safety	Joaquin Miller Trailhead	Hazard trees adjacent to trailhead	Unlikely	Moderate	Low	No treatment	Hazard tree threat is low due to fire severity
Recreation	Property	Joaquin Miller Trail #219	Inadequate post fire trail drainage resulting in damage or loss of trail	Likely	Moderate	High	Closure / Trail Drainage Work **(T2)**	2.0 miles of drainage work. Hazard tree mitigation included in work. Trail is undermined and needs immediate repair. Trail will need to be closed until undermined area is fixed.
Recreation	Property	Tamarack Trail #202	Inadequate post fire trail drainage resulting in damage or loss of trail	Likely	Moderate	High	Trail Drainage Work **(T1)**	1.0 miles of trail drainage work with associated hazard tree mitigation.

Category	Value (Life/ Property/ Resources)	Value at Risk	Threat to Value at Risk	Probability of Damage or Loss	Magnitude of Consequence	Risk	Treatment	Notes
Recreation	Property	East Fork Canyon Cr Trail #211	Inadequate post fire trail drainage resulting in damage or loss of trail	Likely	Moderate	High	Trail Drainage Work **(T3)**	3.0 miles of trail drainage work with associated hazard tree mitigation.
Recreation	Life and Safety	Worker Safety at East Fork Canyon Cr Trailhead	Hazard trees adjacent to trailhead pose threat to life	Possible	Major	High	Hazard Tree Mitigation and Hazard Signs **(TH4, P2)**	Hazard tree mitigation is needed to protect worker safety and vehicles related to BAER trail drainage work. Trailhead closed until hazards are mitigated
Recreation	Life / Resources	Canyon Meadows Campground	Burned vault is a threat to human safety (i.e.falling in) and open vault is a threat to water quality. Hazard trees also pose threat to life.	Likely	Major	High	Closure / Pump and Cap Vault **(CG1, P2)**	Loss of outhouse structure. Integrity of vault needs assessment. Hazard tree mitigation and hazard signage included in treatment. Campground closed until hazards mitigated
Recreation	Life / Resources	Canyon Meadows Day Use	Burned old vault is a threat to human safety (falling in) and open vault is a threat to water quality. Hazard trees also pose threat to life.	Possible	Moderate	Intermediate	Hazard Tree Mitigation and Decommissio n old toilet **(CG2, P2)**	Hazard tree mitigation is needed to protect worker safety and vehicles related to BAER treatment work. Hazard tree mitigation and hazard / closure signage included in treatment. Closed until hazards mitigated.
Recreation	Life and Safety	Worker Safety at Canyon Mountain Trailhead	Hazard trees adjacent to trailhead pose threat to life	Possible	Major	High	Hazard Tree Mitigation and Hazard Signs **(TH2, P2)**	Hazard tree mitigation is needed to protect worker safety and vehicles related to BAER trail drainage work. Trailhead closed until hazards are mitigated
Recreation	Resources	Canyon Mountain Trail #218	Inadequate post fire trail drainage resulting in damage or loss of trail	Likely	Moderate	High	Trail Drainage Work (**T5)**	2.2 miles of trail drainage work with associated hazard tree mitigation.
Recreation	Life and Safety	Starr Ski/Sled area	Hazard trees adjacent to trailhead pose threat to life	Unlikely	Major	Intermediate	No treatment	Hazard Trees already mitigated, no treatment
Recreation	Life and Safety	Roads End Trailhead	Hazard trees adjacent to trailhead pose threat to life	Unlikely	Major	Intermediate	Hazard Tree Mitigation and Hazard Signs **(TH9, P2)**	Hazard tree mitigation is needed to protect worker safety and vehicles related to BAER trail drainage work. Trailhead closed until hazards are mitigated
Recreation	Life and Safety	Buckhorn Trailhead	Hazard trees adjacent to trailhead	Unlikely	Ha hModerate	Low	No treatment	Hazard trees not imminent
Recreation	Life and Safety	Wickiup Campground	Hazard trees adjacent to campground	Unlikely	Major	Intermediate	No treatment	Hazard trees have been mitigated by suppression

Category	Value (Life/ Property/ Resources)	Value at Risk	Threat to Value at Risk	Probability of Damage or Loss	Magnitude of Consequence	Risk	Treatment	Notes
Recreation	Resources	Table Mountain Trail	Inadequate post fire trail drainage resulting in damage or loss of trail	Likely	Moderate	High	Trail Drainage Work **(T6)**	1 mile of drainage work needed
Recreation	Life / Property	Worker Safety at Table Mountain Trailhead on 651 Rd	Hazard trees adjacent to trailhead and debris	Possible	Major	High	Hazard Tree Mitigation and Hazard Signs **(TH7, P2)**	Hazard tree mitigation is needed to protect infrastructure and worker safety and vehicles related to BAER trail drainage work. Trailhead closed until hazards are mitigated.
Recreation	Life / Property / Resources	Trails and Trailheads on east end of the fire	Hazard trees adjacent to trailheads and inadequate post fire trail drainage resulting in damage or loss of trail	___	___	___	___	To be assessed when the eastern perimeter of the fire cools. Potential treatments would be included in an Interim 2500-8 Report
Botany / Weeds	Resources	Canyon Mountain native plant communities where no invasive plants have been documented.	Spread of invasive plants into native and sensitive plant habitats. Known species posing threat include, but not limited to Dalmatian toadflax (*Linaria dalmatica*), scotch thistle (*Onopordum acanthium*), medusahead rye (*Taeniatherum caput-medusae*)	Likely	Moderate	High	3.8 miles of survey / detection (1.4 trail miles, 2.4 miles road) **(L1)**	3 species on the Region 6 sensitive species occur in the area. One species endemic and anther restricted in range. Susceptibility to invasion and erosion. Invasive plants documented within 0.5 miles.
Botany / Weeds	Resources	Pine Creek native plant communities where no invasive plants have been documented.	Spread of invasive plants into native and sensitive plant habitats. Known species posing threat include, but not limited to, houndstongue (*Cynoglossum officinal),* spotted knapweed (*Centaurea stoebe spp),* medusahead rye *(Taeniatherum caput-medusae)*	Likely	Moderate	High	11.8 miles survey / detection (1.5 trail miles, 10.3 miles road) **(L1)**	2 species on the Region 6 sensitive species occur in the area and one species of notable concern. Susceptibility to invasion and erosion. Invasive plants documented within 2.5 miles of FS lands.

Category	Value (Life/ Property/ Resources)	Value at Risk	Threat to Value at Risk	Probability of Damage or Loss	Magnitude of Consequence	Risk	Treatment	Notes
Botany / Weeds	Resources	Indian and West Indian Creek native plant communities where no invasive plants have been documented.	Spread of invasive plants into native habitats. Known species posing threat include, but not limited to, scotch thistle (Onopordum acanthium), medusahead rye (Taeniatherum caput-medusae), Canada thistle (*Cirsium arvense*), tansy ragwort (*Senecio jacobaea*)	Likely	Moderate	High	13.4 miles survey / detection (1.7 trail miles, 11.7 miles road) **(L1)**	Concern for native habitats based on proximity to private lands where several invasive plants have been documented, including medusahead rye. Spread of invasive plants into the wilderness is a concern due to high burn severity, disturbance and trail/road vectors.
Botany / Weeds	Resources	Fawn & Wall Creek drainages/6510 road system native plant communities where invasive plants are absent or documented in minor amounts.	Spread of invasive plants into native and special scabland habitats. Known species posing threat include, but not limited to, medusahead rye (Taeniatherum caput-medusae), Ventenata (*Ventenata dubia)*, knapweed species (*Centaurea spp.*), St. Johnswort (*Hypericum perforatum),* whitetop *(Cardaria draba)*	Very Likely	Moderate	Very High	17.1 miles survey / detection (6.0 trail miles, 11.1 miles road) **(L1)**	Concern for native habitats based on proximity to private lands where invasive plants have been documented as well as populations documented along county road. Spread of invasive plants into the wilderness is a concern due to high burn severity, disturbance and trail/road vectors. Scablands have a susceptibility of invasive by annual invasive grasses.
Botany / Weeds	Resources	Vance Creek to Bear Gulch drainages native plant communities where invasive plants are absent or documented in minor amounts.	Spread of invasive plants into native and riparian habitats. Known species posing threat include, but not limited to, knapweed species (*Centaurea spp.*), St. Johnswort (*Hypericum perforatum),* whitetop *(Cardaria draba)*	Likely	Moderate	High	9.1 road miles survey / detection **(L1)**	Concern for native habitats based on proximity to private lands where invasive plants have been documented as well as populations documented along state road 395.
Botany / Weeds	Resources	Table Mountain, Middle Fork, Canyon Creek drainages native plant communities where invasive plants are absent or documented in minor amounts.	Spread of invasive plants into native and riparian habitats. Known species posing threat include, but not limited to, knapweed species (*Centaurea spp.*), St. Johnswort (*Hypericum perforatum),* whitetop *(Cardaria draba),* Dalmatian toadflax *(Linaria dalmatica)*	Likely	Moderate	High	38.8 miles survey / detection (2.5 trail miles, 36.3 miles road) **(L1)**	Concern for native habitats based on proximity of invasive plants that been documented along roadsides. Spread of invasive plants into the wilderness is a concern due to high burn severity, disturbance and trail/road vectors.

Category	Value (Life/ Property/ Resources)	Value at Risk	Threat to Value at Risk	Probability of Damage or Loss	Magnitude of Consequence	Risk	Treatment	Notes
Botany / Weeds	Resources	Starr Ridge to Canyon Creek-drainages from Bear gulch to Wickiup Creek/Big Canyon native plant communities where invasive plants are absent or documented in minor amounts.	Spread of invasive plants into native and riparian habitats. Known species posing threat include, but not limited to, houndstongue (Cynoglossum officinal), knapweed species (*Centaurea spp.*), St. Johnswort (*Hypericum perforatum),* Dalmatian toadflax *(Linaria dalmatica).*	Likely	Moderate	High	21.8 road miles of survey / detection **(L1)**	Concern for native habitats based on proximity to private lands where invasive plants have been documented as well as populations documented along roadsides in small amounts. High burn severity and previous disturbance from grazing increase risk of invasion along drainages.
Botany / Weeds	Resources	North of Vance Creek Drainage to Private land boundary- native plant communities where invasive plants are absent or documented in minor amounts.	Spread of invasive plants into native habitats.	Unlikely	Moderate	Low	No Treatment	Area has high burn severity, but no documented invasive plants. Area is gated off for access so has a low risk of invasives spread
Botany / Weeds	Resources	Whitebark Pine (*Pinus albicaulis*) and Snowline spring parsley (*Cymopterus nivalis*) occurrence and suitable habitat.	Spread of invasive plants into native habitats and loss of habitat and species to high burn severity. Whitebark pine is a candidate species for federal listing	Unlikely	Moderate	Low	No Treatment	Little potential for invasion or soil erosion since burn severity was so low and high elevations
Botany / Weeds	Resources	Native or naturalized communities	Spread of invasive plants into native habitats.	___	___	___	___	To be assessed when the eastern perimeter of the fire cools. Potential treatments would be included in an Interim 2500-8 Report
Roads / Hydro/ Fish	Resources / Property	Roads and Fisheries Critical Habitat in Vance Cr / 3920 Road Area	Increased flood magnitude and hydrologic response resulting in loss or damage to roads and subsequent degradation to critical habitat	Likely	Moderate	High	Storm Proofing, Armored Drain Dip, Storm Patrol and removal of 2 culverts	See the Roads Report for specific locations and details.
Roads / Hydro / Fish	Property / Resources	Road 6510 road system; Fawn Cr / Alder Gulch area	Increased flood magnitude and hydrologic response resulting in loss or damage to roads	Likely	Moderate	High	Storm Proofing, Armored Drain Dips, Storm Patrol, Riser Installation **(R3, R4, R7, R8)**	See the Roads Report for specific locations and details. One culvert was assessed on the 6510 at MP 0.79 for upsizing, but minimum and most cost-effective treatment was determined to be storm patrol.

Category	Value (Life/ Property/ Resources)	Value at Risk	Threat to Value at Risk	Probability of Damage or Loss	Magnitude of Consequence	Risk	Treatment	Notes
Roads / Hydro / Fish	Resources	Hydrologic function of 1518 Middle Fork Canyon Floodplain and Designated Critical Habitat	Increased flood magnitude and hydrologic response resulting in loss of hydrologic function and subsequent degradation to critical habitat	Very Likely	Moderate	Very High	Remove old road fills within active floodplain **(C3)**	Remove three sections of roadfill (approximately 2200 cubic yards). See the Fisheries Report for specific locations and details
Roads / Hydro / Fish	Property	1520 road system	Increased flood magnitude and hydrologic response resulting in loss or damage to roads and subsequent degradation to critical habitat	Likely	Major	Very High	Storm Proofing, Armored Drain Dips, Storm Patrol, Riser Installation **(R3, R4, R7, R8)**	50 + ft deep road fills. See the Roads Report for specific locations and details. Road also proposed to be gated (see other treatments within this table)
Roads	Life and Safety	Human Life	Loss or injury of people traveling on roadway due to hazard trees and rolling rocks	Likely	Major	Very High	Gate roads until safe to open and enforce closure **(R1, P7)**	Roads closed with gate until hazards are mitigated. Closure enforcement is also proposed
Roads / Hydro / Fish	Property and Resources	1530 Road Crossing at Canyon Cr	Increased flood magnitude and subsequent debris resulting in loss or damage to roads and subsequent degradation to critical habitat	Possible	Major	High	Storm Patrol **(R8)**	16 foot wide open bottom arch. A fair amount of moderate burn severity upstream and expected increase in floating debris. Road also proposed to be gated (see other treatments within this table.
Roads / Hydro / Fish	Property and Resources	1530-739 road	Increased flood magnitude and hydrologic response resulting in loss or damage to roads and subsequent degradation to critical habitat	Likely	Moderate	High	Storm Patrol **(R8)**	Crazy Creek Area
Roads / Hydro / Fish	Life / Property	Pine Cr area road 5401-787 with culvert (Bear Gulch)	Hazard trees and increased flood magnitude and hydrologic response resulting in loss or damage life and roads	Possible	Major	High	Storm Proofing culvert, armored drain dip, hazard tree abatement, hazard signage **(R3, R7 R9, P1)**	Road traverses Forest Land, but accesses private land. One end already gated. See the Roads Report for specific details.

Category	Value (Life/ Property/ Resources)	Value at Risk	Threat to Value at Risk	Probability of Damage or Loss	Magnitude of Consequence	Risk	Treatment	Notes
Roads / Hydro / Fish	Property / Resources	Area east of Hwy 395 and south of County Road 65 and FS Road 15 (1516 and 6500 road systems)	Increased flood magnitude and hydrologic response resulting in loss or damage to roads and subsequent degradation to critical habitat	Likely	Moderate	High	Storm Proofing, armored drain dips and storm patrol **(R3, R7, R8)**	Applies to areas of high burn severity. See Roads Report for specific locations and details. One culvert was assessed on the 1516-997 at MP 0.01 for upsizing, but minimum and most cost-effective treatment was determined to be drain dip installation and storm patrol.
				Possible	Moderate	Intermediate	No Treatment	Applies to areas with low and minor amounts of moderate burn severities. See Roads Report for specific locations and details.
Roads / Hydro / Fish	Life / Property / Resources	West Fork Indian Cr 5401 road system and Indian Cr Area	Increased flood magnitude and hydrologic response resulting in loss or damage to roads and subsequent degradation to critical habitat	Likely	Moderate	High	Storm Proofing, armored drain dips and storm patrol **(R3, R7, R8)**	See Roads Report for specific locations and details.
Roads / Hydro / Fish	Property	Overholt Area - 7101 Road System	Increased flood magnitude and hydrologic response resulting in loss or damage to roads and subsequent degradation to critical habitat	Likely	Moderate	High	Storm Proofing, armored drain dips and storm patrol **(R3, R7, R8)**	See Roads Report for specific locations and details.
Roads / Hydro / Fish	Property / Resources	FS Crossings on the 15 Road	Increased flood magnitude and hydrologic response resulting in loss or damage to roads and subsequent degradation to critical habitat	Possible	Major	High	Storm Patrol **(R8)**	See the Roads Report for specific locations and details. Canyon Cr and Big Canyon
Roads / Hydro / Fish	Property / Resources	Roads and Fisheries Designated Critical Habitat	Increased flood magnitude and hydrologic response resulting in loss or damage to roads and subsequent degradation to critical habitat	—	—	—	—	To be assessed when the eastern perimeter of the fire cools. Potential treatments would be included in an Interim 2500-8 Report. Road treatments may include Road Regulatory Safety signs.
Archy	Resources	Cultural Resource Sites - Classified information	Damage or loss of historic structures from tree fall	Very Likely	Major	Very High	Hazard tree abatement **(H1)**	Vance Creek, Site 06010101221
Archy	Resources	Cultural Resource Sites - Classified information	Damage or loss of resource data from erosion or unauthorized removal	Very Likely to Likely	Major to Moderate	Very High to High	Archy On Going Assessment **(H2)**	45 Eligible Cultural Resource Sites

Category	Value (Life/ Property/ Resources)	Value at Risk	Threat to Value at Risk	Probability of Damage or Loss	Magnitude of Consequence	Risk	Treatment	Notes
Archy	Resources	Cultural Resources Sites - Classified information	Damage or loss of cultural resources from post-fire conditions	___	___	___	___	To be assessed when the eastern perimeter of the fire cools. Potential treatments would be included in an Interim 2500-8 Report.
Soil / Hydro / Fish	Resources	Soil productivity and hydrologic function in Berry Cr and Sheep Gulch areas and downstream T&E Designated Critical Habitat	Loss of soils from post-fire erosion with flashier hydrologic response and subsequent degradation to Designated Critical Habitat	Likely	Moderate	High	Mulch application (Fall 2015) **(L3)**	Sheep Gulch drainage was filtered out of the potential mulch treatment area due to slopes greater than 50% as well as high percentage of rock. Berry Cr drainage is a high priority for treatment for fall 2015. Wood Mulch is preferred over straw per wind event during fire that moved upper 4 inches of ash off some areas of high burn severity. Hydro flow response is expected to increase. Private land at bottom of drainages. Drainages are 3 and 5 miles above Canyon City
Soil / Hydro / Fish	Resources	Soil productivity and hydrologic function in Vance Cr and downstream Designated Critical Habitat	Loss of soils from post-fire erosion with flashier hydrologic response and subsequent degradation to Designated Critical Habitat	Likely	Moderate	High	Mulch Application (Fall 2015) **(L3)**	Vance Cr drainage is a high priority for treatment for Fall 2015.
Soil / Hydro	Resources	Soil productivity and hydrologic function (water quality) in Byram Creek Municipal Watershed for Canyon City	Loss of soils from post-fire erosion with flashier hydrologic response resulting in degradation to water quality and subsequent degradation to Designated Critical Habitat	Likely	Moderate	High	Interagency Coordination **(P4)**	Infrastructure is not on NFS lands, however a portion of the watershed is on NFS lands. Landscape treatment not justified due to slopes greater than 60% with high rock composition.
Soil / Hydro / Fish	Resources	Soil productivity and hydrologic function in Pine and Indian Cr and downstream Designated Critical Habitat	Loss of soils from post-fire erosion with flashier hydrologic response and subsequent degradation to Designated Critical Habitat	Likely	Moderate	High	Mulch Application (Fall 2015) **(L3)**	Indian Cr has Bull Trout and Steelhead Designated Critical Habitat. These areas are tentatively proposed to be treated in the spring of 2016 if monitoring and post-fire conditions indicate the need

Category	Value (Life/ Property/ Resources)	Value at Risk	Threat to Value at Risk	Probability of Damage or Loss	Magnitude of Consequence	Risk	Treatment	Notes
Soil / Hydro / Fish	Resources	Soil productivity and hydrologic function in Canyon, East Fork Canyon and Wall Cr and downstream Designated Critical Habitat	Loss of soils from post-fire erosion with flashier hydrologic response and subsequent degradation to Designated Critical Habitat	Likely	Moderate	High	Mulch Application (Spring 2015) **(L3)**	These areas are tentatively proposed to be treated in the spring of 2016 if monitoring and post-fire conditions indicate the need.
Range	Resources	Critical Habitat	Cattle	___	___	___	___	Range evaluation was limited in initial assessment. May be assessed in Interim.
Hydro / Fish	Property / Resources	Hydrologic function and T&E Critical Habitat	Increased flows are expected to increase potential for instream erosion and floating debris that will compromise hydrologic function and integrity of downstream culverts/roads. Subsequent damage to T&E Critical Habitat and downstream life and property	Likely	Moderate	High	Log Jam Catchment Structures **(C1, C2)**	Porous Log Jams located in Vance Cr (2), near Wickiup Campground (1), Middle Fork Canyon Cr (3), mainstem Canyon Cr (2) below dam, Fawn Springs (1), Overholt (5). Wilderness areas include Berry (5), Sheep (5), Pine (5) and Indian (5) Creeks.
Hydro / Fish	Property / Resources	Hydrologic function and T&E Critical Habitat	Increased flows are expected to increase potential for instream erosion and floating debis that will compromise hydrologic function and integrity of downstream culverts/roads. Subsequent damage to T&E Critical Habitat and downstream life and property	___	___	___	___	There may be additional areas considered. Additional treatment area would be included in an Interim 2500-8 Report.
Area	Life and Safety	Human Life / Safety on NFS and downstream	Increased flow and debris	Possible	Major	High	Early Warning System Coordination **(P3)**	Funding request for administration of special use permit and agency coordination. System will be purchased with other non-BAER funds
Area	Life and Safety	Human life and safety relative to entering NFS burned areas	Hazard trees, debris, rolling rocks pose threat to human life	Possible	Major	High	15 Road Hazard Signs **(P1)**	See Roads Report for specific locations and details.

Category	Value (Life/ Property/ Resources)	Value at Risk	Threat to Value at Risk	Probability of Damage or Loss	Magnitude of Consequence	Risk	Treatment	Notes
Area	Life / Property	Canyon Meadow Dam	Increased flow and debris that may compromise integrity of dam and subsequent downstream life and property	Unlikely	Major	Intermediate	Interagency Coordination **(P4)**	Expected flows are unlikely to compromise structure integrity. Team recommends periodic inspection of dam by ODFW and/or USFS during and after storm events.
Area	Property	On-Forest Diversion Structures	Increased flow and debris impacting use of diversion structures	Likely	Moderate	High	Interagency Coordination **(P4)**	Inform those who may potentially be impacted by additional flow and debris.
Area	Life and Safety	Human Life / Safety associated with Road 15 Guard Rail	Human Safety compromised due to burned up / loss of guard rail posts	Possible	Major	High	Replace Posts on Guard Rail **(R6)**	Two locations to replace posts near MP 10. 12 posts total to be replaced
Area	Life and Safety	Human Life and Safety associated with slope failure along Hwy 395	Post-fire slope failure	Possible	Major	High	Interagency Coordination **(P4)**	One area of primary concern located south of Hwy 395/Vance Creek Crossing where there is a large cut slope above Hwy 395.

B. Emergency Treatment Objectives:

The primary objective of this Burned Area Emergency Response Report is to recommend prompt actions deemed reasonable and necessary to effectively protect, reduce or minimize significant threats to human life and property and prevent unacceptable degradation to natural and cultural resources. The application of these BAER treatments are expected to minimize on-site and downstream damages to the identified values at risk previously mentioned. The emergency treatments being recommended by the Canyon Creek BAER Team are specifically designed to achieve the following results.

Proposed Land Treatments

The objective of the land treatments are to:

1. Promote and protect native and naturalized vegetative recovery by reducing the spread of noxious weeds (L1).
2. Protect upland slopes and riparian areas to allow for natural recovery of designated Critical Habitat for Steelhead and Bull trout (L3).
3. Protect current soil productivity especially in those areas of high soil burn severity (L3)
4. Protect hydrologic function and increase flow attenuation (L3)
5. Protect heritage cultural resources from irreversible damage (H1,H2)

Proposed Road and Trail Treatments

The objective of the road and trail treatments are to:

1. Protect road and trail investments from becoming impassible and damaged due to post-fire flooding. (R3, R4, R7, R8, C3, T1-T8)
2. Reduce sedimentation into streams degrading water quality and Steelhead Critical Habitat (R3, R4, R5, R7, R8, C3, T1-T8)
3. Improve culvert capacity to reduce the potential for road failure due to increased flows (R4)

Proposed Protection/Safety Treatments:

The objective of the protection/safety treatments are to:

1. Protect human life and safety by raising awareness through posting hazard warning signs at recreation sites, trailheads, and when entering the burn area. (R1, P1, P2)
2. Temporarily prevent motor vechicle assess into parts of the fire area, helping to mitigate post fire hazards. (P2)
3. Coordinate with other entities and provide assistance in processing a Special Use Permit for placement of early warning rain gages. (P3)
4. Protect public safety through administrative closure (and enforcement). (R1, P5)
5. Protect worker and public safety by replacing damaged guardrail posts. (R6)
6. Protect worker and public safety by removing hazard trees along roads and trailheads. (R9, T1-T9)
7. Protect infrastructure and public safety through removal of hazardous debris and capping toilet vaults. (CG1, CG2)

Proposed Channel Treatments

The objective of the channel treatements are to:

1. Protect Designated Critical Habitat (steelhead and bull trout) and hydrologic function. (C1, C2)

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

Land **75** % Channel **75** % Roads/Trails **85** % Protection/Safety **90** %

D. Probability of Treatment Success

	Years after Treatment		
	1	3	5
Land	70	80	90
Channel	NA	NA	NA
Roads/Trails	90	90	90
Protection/Safety	85	90	95

E. Cost of No-Action (Including Loss): Critical values identified in Section A would be damaged or lost. Cost of the no action is estimated to be 14.6 million dollars.

F. Cost of Selected Alternative (Including Loss): Total cost of the action alternative (including loss) is 5.2 million dollars.

G. Skills Represented on Burned-Area Survey Team:

[x] Hydrology	[x] Soils	[X] Geology	[ ] Range	[x] Recreation
[ ] Forestry	[ ] Wildlife	[ ] Fire Mgmt.	[x] Engineering	[x] Public Information
[ ] Contracting	[ ] Ecology	[X] Botany/Invasives	[x] Archaeology	
[X] Fisheries	[ ] Research	[ ] Landscape Arch	[x] GIS	

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Steve Hanussak –Engineering
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Kate Olsen- Fisheries (t)
Dan Armichardy – Fisheries
Robert Gentry – Recreation (t)
Eric Amstad – Recreation (t)
Dennis Benson - Recreation
Dorothy Thomas - GIS
Paul Claeyssens - Archaeology

H. Treatment Narrative:

Land Treatments:

L1 - Invasive Weed Detection and Treatment: Invasive plant surveys and treatment along the Forest Service roads that were of high to moderate burn severity, and where non-native invasive plants are absent or present in small amounts, will be necessary to prevent spread and dispersal of non-native invasive plants into newly burned and disturbed areas. Although moderate burned areas may have some intact vegetation or may experience needle fall, it is not sufficient enough to prohibit the spread and establishment of invasive plants. Many of the species that will targeted for survey and control, such as houndstongue and knapweeds, are able to survive, establish and spread even in moderately burned areas. The focus will be on locations where fire suppression may have introduced invasive plants, areas adjacent to known weed sites and road systems that have been previously disturbed and will have a greater potential for invasive plants to establish. These road systems are intermixed with areas characterized by steep drainages, sensitive plant and riparian areas (including critical fish habitat). The road systems are primary vectors for weed spread and Early Detection/Rapid Response will allow treatments to occur before these species are able to spread.

Survey and potential treatments will also focus on trails leading into the Strawberry Mountain Wilderness and sensitive species habitat that occur in moderate and high burn severity areas near known invasive plant sites. 13.1 miles of trail and 102.7 miles of road will be surveyed and 200 acres will be treated. Total treatment and survey request is $40,592.

Treatment	Units	Unit Cost	# of Units	Total Cost
Invasive Plant Surveys/detection	miles	$84	115.8	$9,727
Invasive Plant treatments	acres	$154	200	$30,864

L3- Mulching – 2,449 acres (1,149 acres of non-wilderness and 1,300 acres of wilderness) of mostly high soil burn severity are proposed to be treated this fall within Berry Cr, Vance Cr, Pine Cr and Indian Cr. There is an additional spring mulch treatment proposed for 961 acres if monitoring shows the need.

Treatment units were derived from evaluation of the critical BAER values at risk, including: critical habitat for Columbia River Steelhead and Bull Trout (Isolated Bull Trout population only in Indian Creek), hydrologic function, and soil productivity. Treatment has additional benefits to downstream values including, State and County roads, rural homes, channel diversion structures and the towns of Canyon City and John Day. Designated wilderness values of scientific, conservation, and education and other values such as recreational and scenic will not be negatively affected by the proposed treatments. A Minimum Resource Decision Guide will be completed prior to any activities in wilderness.

85% of the proposed mulching treatment area lies within Mazama ash soils. These high severity burn areas have been identified for lack of ground cover and to be at risk of soil loss. This soil was deposited volcanically rather than eroded from parent bedrock. The loss of this highly productive soil will have long lasting effects to vegetation (which will remain diminished) and indefinite decrease in runoff attenuation. In addition, hydrologic response and function may be threatened due to increased flows and sediment.

The process for deriving where potential treatments may occur started by evaluating areas of high and moderate severity with slopes of 20-50%. Slopes below 20% and greater than 50% are considered not to be effective for mulching treatment. The remaining areas were grouped into polygons large enough to be effective using an aerial mulch platform (helicopter). Treatment areas were further refined by using an image produced by satellite showing where canopy still exists within dead trees. These areas would not need to be treated due to the robust potential for natural needle cast providing ground cover. Unfortunately this post fire imagery wasn't available for the entire fire area. Interpretation from what was received revealed that the majority of the

area with moderate burn severity still has an intact canopy. Treatment polygons were further refined through an aerial flight to ensure area within unit boundaries would be effective for treatment.

During the fire, one localized area of the Berry Creek drainage experienced winds of 50 mile per hour and greater due to its upwind canyon orientation. This localized area was observed to be primarily comprised of Mazama ash derived soils. Approximately 48% of the fire area is comprised of these types of soils. Portions of this area experienced significant wind erosion, where soil was removed from ridges and deposited in draws. Approximately 500-600 tons/acre was estimated as available for wind transport and erosion. A field check on September 25 indicated that much of the wind driven material remains in the drainage, but concentrated in the draw bottoms and hillside terrace features. It was determined that wood shred produced on-site would be the most effective treatment. Mulching will be most effective before another wind event, as the fine ash is very vulnerable to wind erosion.

As a result of fire suppression efforts, numerous piles of slash and trees were produced, and are currently being shredded as a potential product to mulch with. Staging locations for mulch were inspected for noxious weeds, and approved for having a low potential for spreading noxious weeds. Local wood shred is considered to have an additional benefit over imported straw; the reduction of introducing noxious weeds, especially within the wilderness.

Post-Fire wind erosion showing the susceptibility of A-Horizon Mazama derived soils in an area of the fire.

Photos below and to the right illustrate wind-blown burnt soil accumulations on the hillslopes and in the draws in the Mazama ash derived soils on Rattlesnake Ridge on 9/25/2015.

Additional acres were evaluated for treatment but eliminated from funding request due to limited implementation time. Remaining treatments will be reevaluated in the spring to determine if a BAER emergency still exist. Total mulch request: $3,918,400.

Treatment	Units	Unit Cost	# of Units	Total Cost
L3 – Mulch (Non-Wilderness)	Acre	$1,600	1,149	$1,838,400
L3 – Mulch (Wilderness)	Acre	$1,600	1,300	$2,080,000

H1- Cultural Resource BAER Hazard Tree Abatement– Cultural Resource Site 06040101221, Vance Creek Powder Houses are Eligible to the National Register of Historic Places and are threatened by unstable soils, burned trees and snags that are Very Likely or Likely to inflict Moderate to Major damage to the structures. Therefore it is recommended that danger/hazard trees be directionally felled in the immediate vicinity of each structure.

Treatment	Units	Unit Cost	# of Units	Total Cost
Cultural Resource Hazard Tree Abatement	Each	$50	10	$500

H2- Cultural Resource BAER Extended Assessment– BAER extended assessment treatment is needed to ensure features or subsurface remains are not damaged or exposed by erosion or soil movement. Qualified Archaeologists and/or Archaeological Technicians will perform extended BAER assessments of selected sites whose critical values are Very Likely to have a magnitude of consequence (loss of scientific data present in the archaeological deposits) of Major as the result of exposure of the site due to burn severity and/or the susceptibility to deposition of erosional overburden over the cultural resources as the result of rain, rain on snow events and spring run-off.

Treatment	Units	Unit Cost	# of Units	Total Cost
Cultural Resource Assessment	Each	$800	9	$7,200

Road and Trail Treatments:

R3- Install Armored Dip: Culverts within the burned area were found to have current pipes undersized for post-fire short-term increased storm runoff. These have been identified at risk for flash flooding, mud/debris flows, and loss of water control. Armored dips provide increased capacity and reduce risk from fillslope erosion and downcutting to the road infrastructure. The structures also reduce adverse effects to soil, water, and aquatic habitat from fillslope erosion.

Treatment	Units	Unit Cost	# of Units	Total Cost
Armored Dip Installation	Per Dip	$2,200	22	$48,200

R4- Install Riser: Several identified existing pipes are undersized for passing pre-fire flows and need to have risers with perforation installed to pass predicted post fire flows.

Treatment	Units	Unit Cost	# of Units	Total Cost
Riser Installation	Riser	$800	6	$4,800

R5- Pull Culvert: Three stream crossing culverts were identified as being undersized with high potential to plug and fail. Removal of these culverts will reduce damage to downstream resources and property.

Treatment	Units	Unit Cost	# of Units	Total Cost
Pull Culvert	Culvert	$900	3	$2,700

R6- Replace Guardrail Posts: Two sets of guardrails were found to have structural damage to the posts on Forest Service Road 15. This county road accesses private property and for public and worker safety these posts should be replaced. THE RO HAS ASKED US TO PULL THIS ITEM, SO IT IS PULLED FROM THE FINAL COST SHEET ON PAGE 27.

Treatment	Units	Unit Cost	# of Units	Total Cost
Replace Guardrails	Guardrails	$2,500	2	$5,000

R7 – **Storm Proofing**: Install cross drains where they will be most efficient and necessary. Clean culverts, drain ditches, and catchment basins of sediment and debris. Units "Days" includes the cost of personnel and equipment.

Treatment	Units	Unit Cost	# of Units	Total Cost
Storm Proofing	Days	$1,000	18	$18,000

R8- Storm Patrol: Storm inspection/response will keep culvert and drainage structures functional by cleaning sediment and debris from the inlet between or during storms. This work will be accomplished through Forest Service Road Crew, equipment rental, and general labor.

Treatment	Units	Unit Cost	# of Units	Total Cost
Storm Patrol	Days	$1,000	25	$34,000

R9- Hazard Tree Falling- Hazard tree falling associated with safety of implementation of BAER road implementation projects.

Treatment	Units	Unit Cost	# of Units	Total Cost
Hazard Tree Falling	Faller Team Days	$1,100	8	$8,800

TH- Trailheads- Hazard trees will be addressed for the protection of trail crew implementing the trail stabilization work. Total request is for $7,500.

Treatment	Units	Unit Cost	# of Units	Total Cost
TH1-Indian Creek TH – Hazard Tree Mitigation	Trees	$50	20	$1,000
TH2-Canyon Mountain TH – Hazard Tree Mitigation	Trees	$50	30	$1,500
TH4-East Fork Canyon Creek TH – Hazard Tree Mitigation	Trees	$50	30	$1,500
TH5-West Fork Pine Creek TH	Trees	$50	5	$250
TH6-Pine Creek TH & Horse Camp – Hazard Tree Mitigation	Trees/	$50	30	$1,500
TH7-Table Mountain TH - Minimal Hazard Tree Mitigation	Trees	$50	30	$1,500
TH-9Road End TH – Hazard Tree Mitigation	Trees	$50	5	$250

T. Trail Stabilization and Hazard Mitigation– Work will include installing drainage (rolling grade dips, grade reversals, knicks), water bars (only where necessary, and then only with rock), and snagging trees as appropriate for worker safety. This work is necessary to protect the trail asset by diverting anticipated increases in surface runoff on the trail. This request also includes felling of hazard trees along the portion of trail to be worked on to mitigate safety concerns.
Total request is for $88,200.

Trail Name & #/Treatment	Units	# of Units	Unit Cost	Total Cost
T1-Tamarack Creek # 202/Drainage	Miles	1	$7,000	$7,000
T2-Joaquin Miller #219/Drainage	Miles	2	$7,000	$14,000
T3-East Fork Canyon Creek #211/Drainage	Miles	3	$7,000	$21,000
T4-Indian Creek #364/Drainage	Miles	2.25	$7,000	$15,750
T5-Canyon Mountain #218/Drainage	Miles	2.2	$7,000	$15,400
T6-Table Mountain #217 & connector/Drainage	Miles	1	$7,000	$7,000
T7-Pine Creek #201/Drainage	Miles	0.55	$7,000	$3,850
T8-West Fork Pine Creek #200/Drainage	Miles	0.6	$7,000	$4,200

CG Campgrounds –This cost estimate is for mitigating damage to campgrounds or other day use facilities. Primary work pertains to removal of hazard trees for infrastructure protection. Work will also include minimal removal of debris (hazards from exposed metal, concrete, nails and other building materials), as well as pumping of human waste and closure of vault. **Total request is for $5,500.**

Treatment	Units	Unit Cost	# of Units	Total Cost
CG1- Canyon Meadow CG/H&S	Lump	$2,500	1	$2,500
CG2-Canyon Meadow Dispersed Site/H&S	Lump	$3,000	1	$3,000

Protection/Safety Treatments:

P1 – Road Hazard Signs: Inform users of the dangers associated with entering/recreating within a burned area as well as inform them of objects and closures to help ensure that users are able to access the correct routes in a safe manner. **Total request is for $4,700**

Treatment	Units	Unit Cost	# of Units	Total Cost
Installation of warning signage	Sign/Post	$100	47	$4,700

P2- Trail Hazard Signs: In addition to the initial installation, there will be a need to monitor and reinstall signage as it becomes worn or is otherwise damaged. **Total request is for $9,425**

Treatment	Units	Unit Cost	# of Units	Total Cost
Trail Hazard Signs	Sign/Post	$41.89	225	$6,525
Maintenance – 12 months	Reposting	$25	116	$2,900

R1- Gate Installation: Road closures will be enforced with gates at three identified locations. These gates will reduce the threat to life and safety. The roads should be reevaluated and re-opened when hazards are no longer a threat. **Total request is for $9,000.**

Treatment	Units	Unit Cost	# of Units	Total Cost
Gate Installation	Gates	$3000	3	$9,000

P3- Early Warning Coordination: On going coordination is required to provide assistance in processing a Special Use Permit for placement of early warning rain gages.

Treatment	Units	Unit Cost	# of Units	Total Cost
Early Warning Coordination	Days	$400	8	$3,200

P4- Interagency Coordination: On going interagency coordination for the Canyon Creek fire is considered essential for keeping city, county, state, and other agencies informed and relaying the BAER assessment findings.

Treatment	Units	Unit Cost	# of Units	Total Cost
Interagency Coordination	Days	$400	40	$16,000

P5- Administrative Closure Enforcement: Within the Canyon Creek fire perimeter, areas are being recommended for closure due to the threats to life and safety. Administration to enforce the closure includes FPO patrols, public information, and LEO oversight.

Treatment	Units	Unit Cost	# of Units	Total Cost
Administrative Closure Enforcement	Days	$300	45	$13,500

Channel Treatments:

C1- Log Jam Placement (Not Wilderness): Fourteen locations have been identified directly below Moderate and High burn severities for Log Jam catchment structures. These structures will help trap debris, sediment and increased bedload while preventing movement of this material downstream into T&E Designated Critical Habitat as well as culverts (and possibly blocking and causing failure). These log jam structures will also maintain and enhance floodplain function in areas of steelhead critical habitat. The locations and number of proposed structures are as follow: Vance Creek 2, Canyon Creek 3, Middle Fork Canyon Creek 3, Fawn Springs 1, and Overholt Creek 5. These stream reaches have been mapped in NETMAP as having high intrinsic value for steelhead. Log jams will consist of 10-15 large trees placed across the entire floodplain and intertwined such that material will be trapped. Some locations are specifically located above a large property investment (culvert) and/or a road that is important to maintain open for traffic (such as Hwy 395).

Treatment	Units	Unit Cost	# of Units	Total Cost
Log Jam Placement (Not Wilderness)	Log Jams	$3,223	14	$45,122

C2- Log Jam Placement (Wilderness): Five subwatersheds in Strawberry Mountain Wilderness have been identified within the Canyon Creek Fire for placement of log jam catchment structures. These subwatersheds include Sheep Gulch, Deer Creek, Berry Creek, Pine Creek, and Indian Creek; each would receive 3-5 log jam structures. Berry, Pine and Indian Creeks are designated critical habitat for steelhead (inside and outside of wilderness) while Indian Creek is designated as critical habitat for bull trout. Within all these drainages, there are great percentages of high and moderate burn severity. The structures proposed for non-Critical Habitat creeks would help maintain critical resource values in the downstream Critical Habitat. Designated wilderness values of scientific, conservation, and education and other values such as recreational and scenic will not be negatively affected by the proposed treatments. A Minimum Resource Decision Guide will be completed prior to any activities in wilderness. The hydrologic response modeling resulted in the following modelled changes in flows:

Drainage	**Pre-fire Modeled Flow**	**Post-Fire Modeled Flow**
Deer Creek	24 cfs	77 cfs
Sheep Gulch	46 cfs	91 cfs
Berry Creek	71 cfs	246 cfs
Pine Creek	97 cfs	183 cfs
Indian Creek	145 cfs	238 cfs

All drainages exhibit 2 to 3 times increase in flows with associated debris and bedload. It should be noted that legacy impacts include logging in the Deer Creek drainage in wilderness. Remaining stumps are not expected to be as efficient as large woody material in helping breaking up debris flow energy in wilderness and leading to private structures immediately below the wilderness boundary. The 2003 BAER Guidance Paper for Treatments in Wilderness states that treating in Wilderness can be justified "to protect unnatural loss of the wilderness resource and to protect life, property or other resource values outside of wilderness." These four drainages have those values for critical habitat within wilderness and outside of wilderness downstream.

The project would incorporate large log jams in appropriate locations where valley types are wide and gradients are lower and where tributaries that drain the burned Mazama ash soils join main channels. This is important because these soils are not bedrock derived and are the most productive soils on the forest. Objectives would be to trap debris and bedload within the wilderness to attenuate run-off, bedload, and maintain channel stability in the drainage. The proposed actions would help protect the above stated values including soil productivity, hydrologic function, and Critical Habitat. A helicopter would be used to place 10-15 large logs with root wads per site. See attached appendix for more detail on effectiveness on large woody structures. Load and staging sites will be located outside of the wilderness as near as possible to minimize "turn" time for the helicopter. Total requested cost is $273,400.

Treatment	Units	Unit Cost	# of Units	Total Cost
Log Jam Placement (Wilderness)	Log Jams	$13,670	20	$273,400

C3- Removal of Road Fill: Three identified roads have culverts removed from a past project. However, the road fills were left in the floodplain. Floodplains on the Middle Fork Canyon Creek in this area range from 150-250 feet wide. Removed culvert locations have a small 30 foot wide notch that the stream flows through. Hydrologic function is currently compromised due to this constriction, while lack of floodplain access decreases the creek's ability to dissipate flows. In addition, the potential high flows that the Middle Fork Canyon Creek could experience would compromise the hydrologic function of the floodplain to dissipate flows, store sediment and debris, along with possible headcuts that would result from the focused flow through these gaps. Removal of these road fills will allow the stream to have complete access to floodplains during floods to dissipate energy, allowing for debris deposition and maintaining designated critical habitats for steelhead. Leaving these road fills will focus flows in a small area, possibly cause headcuts and reduce critical habitat effectiveness. Total request is for $9,000.

Treatment	Units	Unit Cost	# of Units	Total Cost
Removal of Road Fill	Road Crossings	$3,000	3	$9,000

I. Monitoring Narrative:

M1 - Effectiveness monitoring includes the following components:

1). How effective was the prescribed treatment in reducing infestations or prevention of erosion?
2). Were all Project Design Features effectively implemented? If not why?
3). Are there any treatment recommendations for follow up treatment?

Treatment	Units	Unit Cost	# of Units	Total Cost
Monitoring of Treatment L1	Days	$317.33	6	$1,904
Monitoring of Treatment L3	Days	$400	15	$6,000
Monitoring of Treatment C2	Days	$700	30	$21,000

Part VI – Emergency Stabilization Treatments and Source of Funds

		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(L)										
L1-Invasive Survey/ Detection	miles	$84.00	115.8	$9,727	$0		$0		$0	
L1-Invasive Plant Treatment	acres	$154	200	$30,864	$0		$0		$0	
L3-Mulching (Non- Wilderness)	acres	$1,600	1149	$1,838,400	$0		$0		$0	
L3-Mulching (Wilderness)	acres	$1,600	1300	$2,080,000			$0		$0	
H1-Cultural Hazard Trees	lump	$500	1	$500			$0		$0	
H2-Cultural Extended Assessment	each	$800	9	$7,200	$0		$0		$0	
Subtotal Land Treatments				$3,966,691						
B. Channel Treatments										
C1-Log Jam Placement (Non-Wilderness)	Log Jam	$3,223	14	$45,122	$0		$0		$0	
C2-Log Jam Placement (Wilderness)	Log Jam	$13,670	20	$273,400	$0		$0		$0	
C3-Removal of Road Fill	Road Crossing	$3,000	3	$9,000	$0		$0		$0	
Subtotal Channel Treat.				$327,522	$0		$0		$0	
C. Road and Trails (R-T)										
R3- Install Armored Dip	Armored Dip	$2,200	22	$48,400	$0		$0		$0	
R4- Riser Installation	Riser	$800	6	$4,800	$0		$0		$0	
R5- Pull Culverts	Culvert	$900	3	$2,700	$0		$0		$0	
R6- Replace Guardrail Posts:	Guardrail	$2,500	0	$0	$0		$0		$0	
R7- Storm Proofing	Days	$1,000	18	$18,000	$0		$0		$0	
R8- Storm Patrol	Days	$1,000	25	$25,000	$0		$0		$0	
R9- Harard Tree Falling	Faller Team Days	$1,100	8	$8,800	$0		$0		$0	
TH(1-7)- Trailheads Protection	Trailhead	$1,071	7	$7,500	$0		$0		$0	
T(1-8) Trail Stabilization	Miles	$7,000	12.6	$88,200	$0		$0		$0	
CG(1-2) Campgrounds	Campground	$2,750	2	$5,500			$0		$0	
Subtotal Road & Trails				$208,900	$0				$0	
D. Protection/Safety (R-P)										
P1- Trail Hazard Signs	Sign/ Post	$42	225	$9,425	$0		$0		$0	
P2- Road Hazard Signs	Sign/ Post	$100	47	$4,700	$0		$0		$0	
R1- Gate Installation	Gate	$3,000	3	$9,000	$0		$0		$0	
P3-Early Warning Coordination	Days	$400	8	$3,200	$0		$0		$0	
P4-Interagency Coordination	Days	$400	40	$16,000	$0		$0		$0	
P5-Administrative Closure Enforce	Days	$300	45	$13,500	$0		$0		$0	
Subtotal Structures				$55,825	$0		$0		$0	
E. BAER Evaluation										
Canyon Ck BAER				$131,264	$0		$0		$0	
F. Monitoring (M)										
Monitoring of Treatment L1	Days	317.33	6	$1,904	$0		$0		$0	
Monitoring of Treatment L3	Days	400	15	$6,000	$0		$0		$0	
Monitoring of Treatment C2	Days	700	30	$21,000						
				$28,904	$0		$0		$0	
Subtotal Monitoring				$4,587,842			**$0**		**$0**	
G. Totals										
Previously approved										
Total for this request				**$4,587,842**						

PART VII - APPROVALS

1. /S/ Steven K. Beverlin — September 29, 2015
   Forest Supervisor (signature) — Date

2. /s/ Rebecca Lockett Heath (for) — October 5, 2015
   Regional Forester (signature) — Date

Appendix A. Rational and Justification for Large Wood Treatments within Wilderness.

Prepared by: Aquatics Staff; Blue Mountain Ranger District; Malheur National Forest.

A need exists to add large wood to several critical streams located in the Strawberry Mountain Wilderness. Steelhead Critical Habitat is a value at risk in Indian, Pine, and Berry Creeks. While Sheep Gulch and Deer Creek are not Steelhead Critical Habitat, they provide a high sediment loading stream to Canyon Creek's Critical Habitat. Indian Creek also contains Bull Trout Critical Habitat.

Large wood jams composed of 30 trees larger than 15 inch diameter would be constructed below tributary confluences and would be imperative to the dispersion of the sediment pulses, retention and gradual release of the sediment downstream (Short et al. 2015). These wood jams would span the valley from one toe slope to the other and would impound sediment and prevent the re-establishment of continuous bedload throughput down the length of the channel. These jams would be concentrated below tributary confluences that experienced high burn severity, high erosion potential, and have steep slopes. Confluence junctions with the mainstem channels are biological hotspots, where hyperheic exchange often occurs (Ebersole et al. 2015). Research has shown that wood inputs to the stream may take up to 5 – 7 years before becoming functional instream, following a high severity wildfire. Field observations in Deer Creek observed cut stumps of large trees that would have provided the large wood recruitment located within 25 feet of the streambanks. Other observations indicate that dead standing trees post fire tend to break up very easily and "chunks in" losing the potential to function and capture sediment and debris as a whole tree would, thus limiting geomorphic functions of obstructions.

While the wood will not capture all the sediment originating from the hillslopes, it will cumulatively reduce downstream erosion rates in conjunction with the hillslope mulching treatments. The other key objective is to break up sediment transport so that peak flows stay in the clear water zone (less than 20% volumetric sediment concentration). We believe if these debris jams ***were not*** present, peak flows could lead to hyperconcentrated flow (20-47% sediment by volume) before transitioning into a debris flow (greater than 47% sediment concentration) and have the potential to runout and threaten life and property downstream (Welcker 2011). We observed high mortality on riparian shrubs that had stabilized significant fluvial deposition in the valley bottoms of Deer and Berry Creeks. This material is ripe for sediment transport downstream.

Short et al. (2015) showed that these large wood jams created longitudinal discontinuities that were colonized by beaver that maintained hydrologic function over the long term. Storing the ash and soil on floodplains behind these jams have been found to increase soil productivity and seed propagule retention (Osei et al. 2015).

Canyon Creek through Canyon City has been extensively modified through past dredge mining and channelization. The channel has a limited cross sectional area and any additional sediment being deposited has a high threat to life and property. Sheep Creek is the source of a large debris flow that could provide large bed load. Adding large wood to Sheep Creek could break up the run out lengths of a debris flow reaching Canyon Creek. Furthermore, Highway 395 below Sheep Gulch has a history of flooding the road and damaging infrastructure.

The soils report suggests there will be 30 tons of soil eroded per acre following a 5 year storm event.

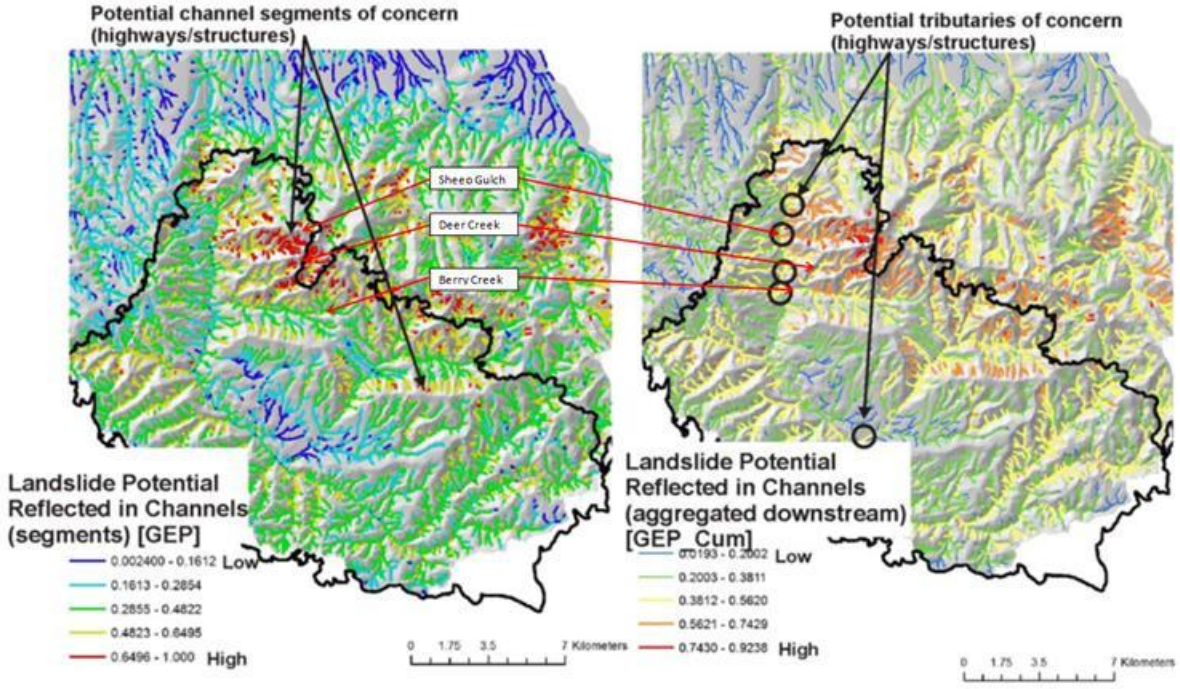
- Sheep Gulch has 344 acres of high severity area that could produce 10,320 tons of soil. The sediment storage for one debris jam with a height of 2 meters, a length of 25 meters and a width of 27 meters would be approximately 2,295 tons. Three debris jams are proposed to store a total of 6,885 tons.

- Berry Creek has 1,678 acres of high severity area that could produce 50,340 tons of soil. The sediment storage for one debris jam with a height of 2 meters, a length of 35 meters and a width of 33 meters would be approximately 3,927 tons. Four debris jams are proposed to store a total of 15,708 tons.
- Pine Creek has 514 acres of high severity area that could produce 15,420 tons of soil. The sediment storage for one debris jam with a height of 2 meters, a length of 25 meters and a width of 25 meters would be approximately 2,125 tons. Three debris jams are proposed to store a total of 6,375 tons.

"The 1903 'flash flood' in Heppner, Oregon has been well documented because it killed over 200 people as it moved through town [Whistler, 1903; Murphy, 1904; Byrd, 2009]. The flow through town was said to, 'defy all laws of gravitation by carrying on their current great masses of stone and iron' [Byrd, 2009]. The descriptions of an extreme summer thunderstorm that quickly produced runoff and eroded parallel gullies down the steep, treeless hillslopes and mobilized boulder-sized material off the hillslopes are all indicative of bulking debris flow processes [Murphy, 1904; Byrd, 2009]" (Welcker 2011).

These images represent NetMap's landslide and debris flow potential for Sheep, Deer and Berry Creeks.

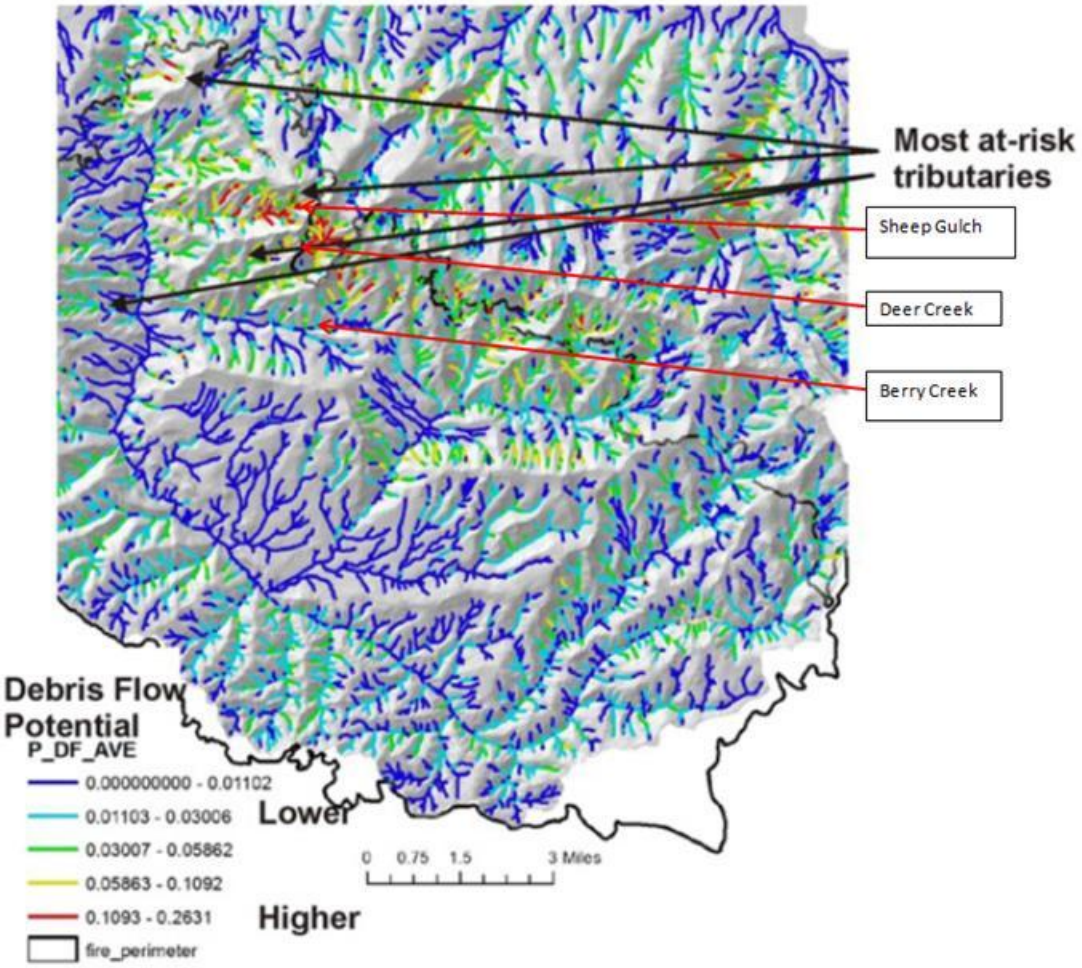
Figure 1. NetMap shallow failure landslide potential with red arrows pointing at Sheep Gulch, Deer and Berry Creeks.



Generic Erosion Potential at Segment Scale

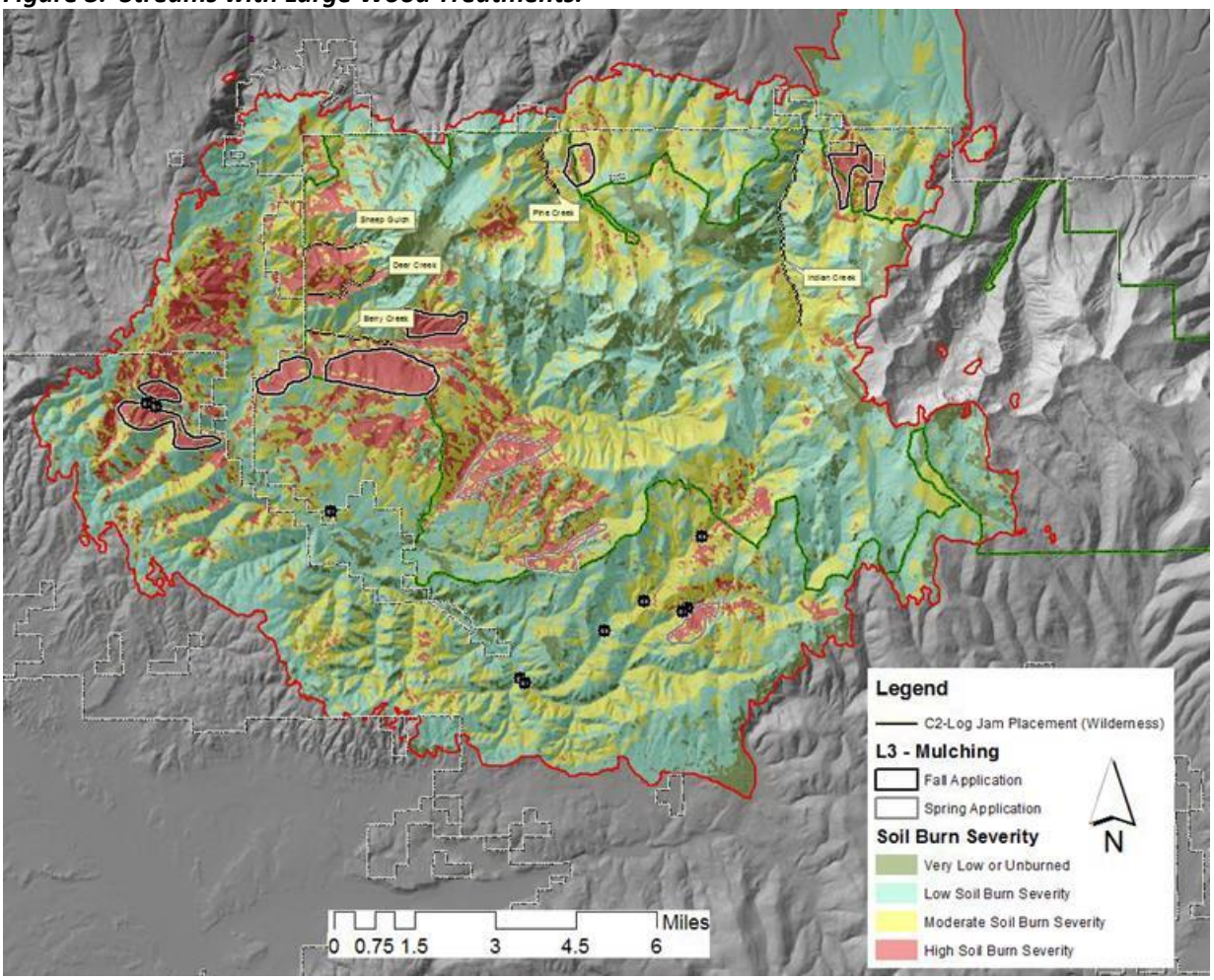
Cumulative Generic Erosion Potential Aggregated Downstream

Figure 2. NetMap susceptibility of tributary debris flow with red arrows pointing at Sheep, Deer and Berry Creeks.



Tributaries of Canyon Creek that drain Canyon Mountain. Elevation changes from 8,000 to 4,000 feet within 2-3 miles.

Figure 3. Streams with Large Wood Treatments.



Five streams proposed for Log Jam Placement in Wilderness, mulching and other wood placement

References:

Ebersole, Joseph L., et al. "Predicting the occurrence of cold-water patches at intermittent and ephemeral tributary confluences with warm rivers." Freshwater Science 34.1 (2015): 111-124.

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Osei, Nana A., Angela M. Gurnell, and Gemma L. Harvey. "The role of large wood in retaining fine sediment, organic matter and plant propagules in a small, single-thread forest river." Geomorphology 235 (2015): 77-87.

Welcker, C., 2011. Bulking debris flow initiation and impacts (PhD Thesis) University of Idaho, Moscow (179 pp.).