Report Date: 10/26/2015

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

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

[X] 2. Interim Report #1
[X] 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: **Stouts Creek Fire**

B. Fire Number: **OR-73S-000090**

C. State: **Oregon**

D. County: **Douglas**

E. Region: **06 – Pacific Northwest**

F. Forest: **15 – Umpqua**

G. District: **Tiller**

H. Fire Incident Job Code: **PNJ0GW (1502)**

I. Date Fire Started: **June 26, 2012**

J. Date Fire Contained: **July 30, 2015**

K. Suppression Cost: **$37,000,000 (est.)**

L. Fire Suppression Damages Repaired with Suppression Funds
1. Fireline waterbarred (miles): **19.5 miles total**
2. Fireline seeded (miles): **0 miles total**
3. Other (identify): **29.2 additional miles not believe waterbarred**

M. Watershed Number(s): (6^{th} level hydrologic units, percent of watershed acres within fire perimeter):

6^{th} level HUC	6th level HUC Acres	% of 6th level HUC burned
Hatchet Creek	4,008	99.3%
Callahan Creek	4,509	89.1%
Drew Creek	8,024	83.6%

N. Total Acres Burned: **26,452**
NFS Acres(**14,251**) Other Federal (**5,544**) State (**0**) Private (**6,657**)

O. **Vegetation Types**:
Plant communities affected by the Stout's Creek wildfire and suppression activities on the Umpqua National Forest include three major plant series; white fir (Abies concolor) 54%, Douglas fir (Psuedotsuga mensiesii) 24%, and Western Hemlock (Tsuga heterophylla) 17%, with other coniferous species present in lesser amounts, including incense cedar (Calocedrus decurrens), ponderosa pine (Pinus ponderosa) Jeffrey pine (Pinus jeffreyi), and sugar pine (Pinus lambertiana).

Understory vegetation varies by aspect, elevation and canopy cover, with Poison oak (Toxicodendron diversilobum), Oregon grape (Mahonia nervosa), Salal (Gaultheria shallon) and Rhododendron (Rhododendron macrophyllum) being the most common shrub species under Douglas fir associations. Sword fern (Polystichum munitum), and Ocean spray (Holodiscus discolor) under Western Hemlock, and White fir associations.

Oak Woodland associations occur in small patches within the fire perimeter (4.5%), and are comprised of both canyon live oak (Quercus chrysolepis) and Oregon white oak (Quercus garryiana). Several hardwood species occupy riparian corridors and are primarily comprised of big leaf maple (Acer macrophylla), Red alder (Alnus rubra), and willow (Salix spp.).

Non-forested areas (3.9%) are comprised primarily of dry open meadow complexes such as Callahan and Drew Meadows, with scattered moist meadows and dry rocky outcrops. These meadow systems comprise a mosaic of unique or special habitats within a forested landscape that are often comprised of unique plant communities which include rare or sensitive plant species. Non-forested systems are at a higher risk of being colonized by non-native invasive plants due to the high light environment that most invasive plant species are adapted to.

P. **Dominant Soils:**
Soils formed on steep and very steep side slopes. Most are deep or moderately deep, well-drained, and have moderate to high infiltration rates. Soil texture is primarily loam and gravelly loam. They are capable of supporting forested ecosystems that can be resilient to disturbance, with a natural ability to recover (reestablishment of effective ground cover and vegetation) within a relatively short timeframe (less than 5 years). Primary limitations are steep slopes and high erosion potential. Seedling mortality can also be a problem if litter and duff layers have been removed which increases evaporation and reduces mineralization of nitrogen where it is inherently low in abundance. Shallow soils are also present. They mostly are associated with serpentine parent materials.

One important characteristic of the soils of the area is that they exhibit a slight degree of water repellency, which is mostly considered to be weak to moderate. Post-fire observations in the field showed an increase in the duration of water drop beading on the soil surface of 15 to 60 seconds. This suggests that under dry conditions erosion detachability and runoff rates would become slightly elevated as a result of hydrophobic soil conditions incurred by the fire. Once wetted however, repellency diminishes substantially. Considering this, it is estimated that the post-fire infiltration rate is decreased by about 5 percent. While that could be considered a minor increase, it is substantial enough that on the steepest slopes or those adjacent to streams where fire severity was moderate to high, runoff will be elevated somewhat and sedimentation from accelerated erosion will be very likely for at least several seasons.

Soils within the fire exhibit a moderate degree of productivity. They are capable of supporting forested ecosystems that can be resilient to disturbance, with a natural ability to recover (reestablishment of effective ground cover and vegetation) within a relatively short timeframe (less than 5 years). Primary limitations are steep slopes, high erosion potential, and in places shallow depth to a restrictive layer.

Surface erosion and mass wasting are the inherent hillslope processes, accelerated typically by disturbance, principally wildfire or intense precipitation and high runoff events. A temporary condition, erosion generally becomes accelerated when effective ground cover and a protective forest cover have been removed, or when runoff has been concentrated. When such conditions occur, soils are exposed to erosive forces such as raindrop impact and overland flow that can result in rills and gullies that signify an accelerated rate of surface erosion. The steepest slopes are most prone, particularly where soils are shallow, are somewhat water repellent, or where there is a subsurface restrictive layer. Soils that have developed from granitic colluvium are easily detachable, having low cohesiveness and structure, and relatively low amounts of organic carbon and thin A horizons.

On the steepest of slopes, the risk of debris slides is high. Shallow soils on steep slopes in first- and second-order headwater drainages are most prone. The probability of debris slides is typically relative to the occurrence of a notable storm or precipitation event of low frequency but high magnitude, which can be exacerbated by the removal of a protective canopy and diminished root strength.

Q. **Geologic Types:**
Most of the Stouts Creek fire burned within the Klamath Mountains physiographic province, with a lesser portion extending into the Western Cascades province. Geologic formations within this portion of the Klamath Mountains province consist primarily of highly weathered metamorphic and plutonic igneous rocks, including schist, serpentine, decomposed granitics, and granodiorite. All of which are highly erosive, particularly on steep slopes. In the Cascade province rocks are comprised of relatively younger volcanic tuffs, breccias, and flow rocks such as andesite and basalt.

Parent Materials that Underlie the Stouts Creek Fire

Parent Material	Percent of Total Area
Granitic	50
Metamorphic	38
Igneous	11
Colluvial, Alluvial, Glacial	1

The elevation range of the entire fire is between 960 at the mouth of Hatchet Creek to 3,897 feet near the southern end of Wildcat Ridge. Topography is dominated by highly dissected mountains with ridges and long steep side slopes. Slopes are dominantly 30 to 90 percent. Nearly one-third of the acreage within the fire has slopes that exceed 50 percent. Drainages are generally narrow and confined.

R. Miles of Stream Channels by Order or Class: **Perennial: 26.6 miles Intermittent: 81.6 miles**

S. Transportation System: **Trails: 0 miles Roads: 75.7 miles**

PART III - WATERSHED CONDITION

Burn Severity on NF Lands (acres): **4,192** (Low/unburned) **4,980** (low) **4,131** (moderate) **948** (high)

Acres by Burn Severity on FS Lands in 6th-Field Hydrologic Units

6th-Field Subwatershed	High	Low	Low/unburned	Moderate	Total
Corn Creek-South Umpqua River	212	825	404	1,070	2,510
Dismal Creek-Cow Creek	0	49	73	8	130
Drew Creek	216	2,693	2,701	1,398	7,007
Lower Elk Creek	485	1,303	940	1,566	4,294
Middle Elk Creek	1	87	36	67	191
South Fork Cow Creek	0	6	0	7	14
Stouts Creek	35	17	37	16	104

Grand Total	948	4,980	4,192	4,131	14,251

B. Water-Repellent Soil (acres): **5,079**

C. Soil Erosion Hazard Rating (acres):
5,273 (low) **5,700** (moderate) **3,278** (high)

D. Erosion Potential: **6.7** ton/acre

E. Sediment Potential: **3,752** cubic yards / square mile

PART IV - HYDROLOGIC DESIGN FACTORS

A. A. Estimated Vegetative Recovery Period, (years): **1 to 5**

B. Design Chance of Success, (percent): **75%**

C. Equivalent Design Recurrence Interval, (years): **5**

D. Design Storm Duration, (hours): **24 hours**

E. Design Storm Magnitude, (inches): **3.2"**

F. Design Flow, (cubic feet / second/ square mile): **119 cfs/sq. mi.**

G. Estimated Reduction in Infiltration, (percent): **48%**

H. Adjusted Design Flow, (cfs per square mile): **176 cfs/sq. mi.**

PART V - SUMMARY OF ANALYSIS

Background: The Stouts Fire, located near the community of Milo, was reported on July 30, 2015 at 1:00 p.m. Fire investigators determined that the fire was human caused and appears to be related to an individual mowing grass in violation of a Regulated Use Closure. Firefighters from the Douglas Forest Protective Association and volunteer fire departments responded to the fire. When firefighters arrived, they found a fast moving fire already several acres in size. Hot, windy conditions combined with very dry fuels caused the fire to grow extremely fast and sparked numerous spot fires. The intensity of the main fire, combined with the numerous spot fires, caused the Stouts Fire to "blow up," going from several hundred acres to approximately 6,000 acres in a matter of hours.

The Stouts Creek Fire has been managed under unified command by Oregon Department of Forestry Team 2 Incident Commander Chris Cline and Forest Service Incident Commander Mike Wilde, since August 13. At the height of the incident, there were 1,900 firefighters committed, including firefighting crews, engines, bulldozers, overhead (support personnel), etc. The fire was 100% contained on Sunday, August 30, 2015. The final acreage of the fire was 26,452 acres on the Umpqua National Forest, Roseburg Bureau of Land Management, and private timber lands.

A. Describe Critical Values/Resources and Threats:

Summary of Issues:

Critical Value	Value-at-Risk	Drainage with Value	Risk	Threat Description
Human Life & Safety Property	Roads Motorized Access	Hatchet Creek Callahan Creek Drew Creek	High Very High High	Post-fire watershed conditions threaten the life and safety of visitors using the Forest Service roads and road infrastructure within the fire perimeter. Roads are downslope of high/moderate severity burned areas increasing the risk from debris flows, increased runoff, and rill/gully erosion from over-steepened slopes during storm events. These events can plug culverts, erode roadbeds, and trap the public behind damaged areas. There is also an increased risk from burned, hazard trees, and rockfall.
Natural Resources	ESA Listed (Theatened) Oregon Coast Coho Salmon (*Oncorhynchus kisutch*)	Hatchet Creek Callahan Creek Drew Creek	High Very High Intermediate	Extensive areas of high severity burn occurred in headwater areas of Hatchet and Callahan Creeks and smaller microsheds in Drew Creek. Each of these drainages support Oregon Coast Coho and designated critical habitat (0.7 miles in Hatchet, 3.6 miles in Callahan, and 2.6 miles in Drew). The threat of post-fire runoff, erosion, and debris flows has increased in Hatchet and Callahan Creeks increasing the risk of degrading spawning and rearing habitat. Roads are also likely to be impacted from higher runoff and debris flows, scouring roadbeds and increasing sedimentation to coho habitat.
Natural Resources	ESA Listed (Theatened) Kincaid's lupine (*Lupinus oreganus*)	Callahan Creek	Very High	The removal of ground cover from the fire and fire suppression actions has increased the risk of spreading noxious weeds into occupied habitat of the Callahan Ridge population of Kincaid lupine. Known noxious weed populations are expected to aggressively compete with native species for space and nutrients putting this listed plant species at increased risk.
Natural Resources	Native or naturalized communities non-forested	Hatchet Creek Callahan Creek Drew Creek	Very High Very High High	Field reviews indicate that there is a substantial risk of noxious weed invasion along roads, handlines and dozerlines used during fire suppression activities. This threat is due to the liklihood that some noxious weed seeds were brought into the area by fire equipment and suppression activity within known noxious weed locations within the burn. The slow natural regeneration following moderate to high burn severity also leaves some areas at risk. Known noxious and invasive weed populations are expected to aggressively compete with native species for space and nutrients in burned areas.
Cultural & Heritage Resources	Cultural Sites	Callahan Creek Drew Creek	Intermediate Very High	The fire removed protective vegetation and litter (camouflaging) that obscured artifacts at several historic and native American sites increasing risks to exposed features and artifacts. This could lead to collection and looting of these sensitive sites which would also result in irreversible loss. Risk to historic sites (sawmill site, cemetery, roads, ditchlines) from debris flows, wind erosion, and burned vegetation adjacent to site.

Natural Resources	ESA Listed (Theatened) Northern Spotted Owl (*Strix occidentalis caurina*)	Hatchet Creek Callahan Creek Drew Creek	Low Very High Low	High severity burn areas may increase rill erosion delaying ground cover recovery within Northern Spotted Owl (NSO) critical habitat. These highly erosive areas have the potential to stunt habitat for NSO prey. Transects indicate that it may take 2-5 years for ground cover to fully recover without this erosion.
Property	Domestic Water Sources	Drew Creek Elk Creek S. Umpqua River	Low Intermediate Very High	Ash and sediment can impact water quality for miles downstream until flow from unburned drainages dilutes it. The BAER team believes that flow from Cow Creek, because of its large drainage area, could dilute turbidity and help improve water quality. There are many domestic and agricultural intakes that remove water from the South Umpqua between the fire and Cow Creek that may have impaired water quality during the first few storms that generate erosion from burned hillslopes.
Natural Resource	Soil productivity	Hatchet Creek Callahan Creek Drew Creek	Very High Very High Very High	The risk of accelerated erosion and mass wasting is very high because the forest canopy and effective ground cover have been completely consumed by moderate to high intensity burn. The condition is compounded further by the steep slopes which are underlain by highly erosive decomposed granitics, and a low to moderate degree of hydrophobicity in the surface soil horizons. A 2 or 5-year rainstorm event occurring within several years after the fire will greatly increase the potential for topsoil loss, including the ash from the burned plant litter and duff, and reduce the soil productivity of these sites.

B. Emergency Treatment Objectives:

The goal of the burned area emergency rehabilitation is to:

- Reduce threats to personal injury and/or human life to users of roads in high and moderate severity burn areas in Hatchet, Callahan, and Drew Creeks by installing rolling dips, overflow structures, culvert risers, energy disipators, and enlarging culverts that could plug.
- Reduce threats to personal injury and/or human life by installing warning signs and road storm patrols.
- Control expected invasion of noxious weeds within the area, especially along and adjacent to Forest roads and dozer lines used by fire equipment and in existing populations within the Stouts Creek fire boundary.
- Place woody debris structures to capture and deposit hillslope debris flows and gully erosion material over 3 stream miles in Callahan Creek to minimize damage to existing habitat (pools and spawning areas).
- Reduce vandalism, theft and damage of a cultural site in Drew Creek by adding protective mulch to obscure artificats until natural vegetative reestablishes itself.
- Identify appropriate monitoring activities that estimate the effectiveness of emergency stabilization treatments and identify necessary maintenance and continuation of other approved BAER activities.

Objective:

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

Land **80** % Channel **70** % Roads/Trails **70** % Protection/Safety **85** %

D. Probability of Treatment Success

	Years after Treatment		
	1	3	5
Land (Noxious Weeds)	70	80	80
Land (Cultural Protection)	85	85	85
Channel (Tree Falling)	70	95	95
Roads (Drainage and Erosion Control)	70	85	85
Protection/Safety (Hazard Trees)	100	100	100
Protection/Safety (Road Warning Signs)	100	100	100
Protection/Safety (Drainage and Erosion Control)	70	85	85

E. Cost of No-Action (Including Loss): Refer to Values at Risk (VAR) spreadsheet for specific information

The VAR analysis summary identified that the total treatment cost is estimated at $226,567 with an expected benefit of $827,534. The summary implied minimum value of protecting non-market resource critical values is justified for the treatments proposed in this BAER assessment. The expected benefit/cost ratio was 3.7.

F. Cost of Selected Alternative (Including Loss): Refer to (VAR) spreadsheet for specific information

G. Skills Represented on Burned-Area Survey Team:

[✓] Hydrology	[✓] Soils	[ ] Geology	[✓] Range
[ ] Forestry	[✓] Wildlife	[ ] Fire Mgmt.	[✓] Engineering
[ ] Contracting	[ ] Ecology	[✓] Botany	[✓] Archaeology

[✓] Fisheries [ ] Research [✓] GIS [ ] Landscape Arch

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Team Members:
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Aaron Roe - Botanist
Brandy Albin - Engineer
Sidney Post - Hydrologist
Steve Clark - Fisheries Biologist
Ryan Johnson – Silviculturist
Carley Smith – Cultural Resources

H. **Treatment Narrative:**

Land Treatments:

Cultural Treatments

Purpose of Treatment: New features and artifacts are present following impacts from fire. In most cases, historic and Native American site locations have had forest litter, duff, and grasses removed from the surface of these areas. The protective vegetation (camouflaging) has contributed to protection in the past, but with all surface vegetation and a 3-inch to 8-inch duff layer being removed, features and artifacts are newly exposed for the first time. This could lead to collection and looting of these sensitive sites which would also result in irreversible loss of data. Use mulch at the Perdue Homestead as necessary to increase camouflage to prevent destruction and loss of artifacts.
General Description: The Stouts Creek fire burned across Hatchet, Callahan, and Drew Creeks. The fire occurred in areas that had high use for American Indian groups in the past. These three drainages are key streams on the Tiller Ranger District, and have been used by native groups for over 9,000 years. Over 12 sites potentially eligible for National Register of Historic Places were burned over the course of the fire.
Location (Suitable) Sites: The emergency stabilization efforts will be performed at the Perdue Homestead and Camp Creek (if suppression funding does not cover all needed mitigation measures). Monitoring will occur on the other historic and archaeological sites.
Design/Construction Specification(s): Weed free shredded mulch will be spread at the Perdue Homestead to cover and protect cultural resource materials exposed by the fire.

Kincaid's Lupine

Purpose of Treatment: Treatments are designed to reduce the risk of colonization of noxious weeds in designated Critical Habitat for a federally listed plant species. There is currently no NEPA covering herbicide treatment on the Tiller Ranger District for new noxious weed infestations; therefore all weed treatments will be manual. Seeding with native grasses is recommended to prevent consecutive invasion of burned areas by noxious weeds. Seeding with an appropriate native seed at the Kincaid's lupine site will greatly reduce the rate of spread of noxious weeds into the surrounding native plant communities. All seed used to prevent the establishment of noxious weeds on Forest Service lands has been collected from the Umpqua National Forest from the appropriate seed zone and grown out for propagation.

General Description: There is only one documented population of a federally listed threatened, Kincaid's lupine within the Stouts Creek Fire. Although the burn itself was low to moderate intensity, it consumed the existing native vegetation surrounding the Kincaid's lupine population making it vulnerable to colonization by surrounding non-native invasive plants including Italian thistle, mullein, and medusahead rye. In addition, there is also the potential introduction of new invasive plant seeds brought in by fire vehicle traffic, and foot traffic into the area. Non-native species can aggressively colonize and quickly overtake recently burned areas effectively crowding out native species.

Location (Suitable) Sites: Callahan Ridge above the 3220 (300)-320 spur

Design/Construction Specifications: Seed with native grass species in and around the Kincaid's lupine site to reduce the risk of the newly created bare ground caused by the fire from being colonized by noxious weeds.

Noxious Weeds EDRR

Purpose of Treatment: Prevention, combined with early detection and rapid response, is the most effective means of controlling noxious weeds and protecting native plant communities. There is currently no NEPA covering herbicide treatment on the Tiller Ranger District for new noxious weed infestations; therefore all weed treatments will be manual. Seeding with native grasses is recommended to prevent consecutive invasion of burned areas by noxious weeds and promote native plant community establishment after fire. Although studies have shown mixed results with seeding after fire (Peppin *et al*. 2010, Stella *et al.* 2010), recent seeding trials on the Tiller Ranger District after the Whisky fire conclude that seeding with native grasses had up to 60% more vegetative cover than unseeded areas, and is an effective treatment to prevent non-native species from colonizing post-fire on the Tiller Ranger District (Report by Upekala Wijayratne 2015). Seeding with an appropriate native seed mix in heavy to moderate burn intensity adjacent to roads, dozer lines, and staging areas particularly where they intersect sensitive serpentine meadows will greatly reduce the rate of spread of noxious weeds into the surrounding native plant communities. All seed used to prevent the establishment of noxious weeds on Forest Service lands has been collected from the Umpqua National Forest from the appropriate seed zone and grown out for propagation.

General Description: Native plant communities in serpentine meadows are unique habitats for sensitive plant species and are highly susceptible to invasion by noxious weeds due to the high light environment. Field reviews by Forest Service BAER team indicate that there is a substantial risk of noxious weed invasion. There are 11 species of non-native invasive plants (Canada thistle, medusahead, diffuse knapweed, spotted knapweed, etc.) on the Oregon Department of Agriculture's List of Noxious Weeds documented within the burned area. Dozerlines, retardant drops and fire suppression traffic heavily impacted these unique plant communities. Miles of dozerline and heavy fire suppression traffic travelling from areas of existing noxious weed infestations greatly increases the risk of introducing noxious weed seeds to adjacent native plant communities that were burned within the Stouts Creek Fire perimeter

Location (Suitable) Sites: Dozerlines and retardant drops that occur adjacent to or within sensitive serpentine meadows with R6 listed sensitive plant populations that were burned at moderate to high

severity in Callahan and Drew meadow complexes, as well as dozerlines, handlines, staging areas, drop points, safety zones, helispots within the Stout's Creek fire perimeter.

Design/Construction Specifications: Survey for and manually treat any new infestations of ODA listed noxious weeds that occur in high priority sites.

Channel Treatments:

Callahan Creek Tree Falling

Purpose of Treatment: This treatment is recommended because hillslope treatments on high severity burned areas in Callahan Creek headwaters would not provide enough effective ground cover for the first year and would not be the most economically feasible treatment given the large number of acres involved (see Soils-Hydro report for rationale details). Since effective and economical mitigation of landslide and debris torrent initiation was not deemed feasible, it is anticipated that sediment and associated material from erosion would reach Callahan Creek and fill in pool habitat and spawning gravels that is critical for Oregon Coast Coho. The directionally falling of 125-190 trees at 19 sites in Callahan Creek was deemed as the best treatment to minimize adverse scour and burying of listed (Threatened) Oregon Coast Coho habitat. This emergency treatment has been shown to be effective on the Umpqua National Forest (Fontaine, 2002; Rusk et al., 2015).

General Description: Directionally falling 125-190 riparian trees at 19 sites. Work will include layout of the falling treatment, oversight of implementation, and implementation monitoring to determine if trees have been felled to specifications and if additional trees are required.

Location (Suitable) Sites: The directionally falling of trees at 19 sites in Callahan Creek from stream mile 0.2 to 3.6. Most felled trees would be located immediately downstream of headwater stream tributary channels from high severity burn slopes, in depositional reaches to maximize stability.

Design/Construction Specifications:

- Layout of the specific felling treatments shall involve two experienced USFS personnel, including a "C"-qualified faller with experience felling large trees in burned areas and a fish biologist, and;
- These personnel shall identify trees deemed safe and reasonably probable to directionally fell into mainstem Callahan Creek at or below bankfull channel height, and;
- At least half of the trees selected for felling, and a minimum of three per constructed in-stream structure, shall be greater than or equal to 24-inch diameter-at-breast height (dbh), with lengths greater than or equal to 1.5 times bankfull channel width, and;
- All trees selected for felling shall be greater than or equal to 15-inch dbh, with lengths greater than or equal to 1.5 times bankfull channel width, and;
- A minimum of four and maximum of 10 trees shall be felled for each constructed in-stream structure, and;
- A minimum of 125 and maximum of 190 trees shall be felled in-stream, and;
- Traffic control will need to be established for some felling sites within close proximity to Forest Road 3230, and;
- Implementation monitoring shall consist of in-field assessment of felled tree structures by a USFS fish biologist.

Roads and Trails Treatments:

Road Drainage Reconstruction

Purpose of Treatment: The severity of burn in some watersheds, combined with road location, high likelihood of damage by heightened runoff and accelerated erosion has increased the risk to road infrastructure. The purpose of these treatments is to increase roadway stabilization to pass large water flows and associated bedload and protect road template from increased flows and decrease the chances of washing road fill into adjacent drainage structures and flow channels. Dips and low water crossings will

be placed down flow from culverts that will possibly fail. In situations where placement of rolling dips or low water crossing is not feasible the culvert will be replaced. The replaced culverts will be upsized to manage the increased flows.

General Description: The minimal treatments required to remedy these issues are:

- Replace undersized culverts to increase the flow and debris passage capacity to prevent road damage.
- Overflow Structures – Overflow structures reduce risk from fillslope erosion and down cutting the road infrastructure. The structures also reduce adverse effects to soil, water, and aquatic habitat from fillslope erosion.
- Drain Dips – Roadway dips modify the road drainage by altering the template and allowing surface flows to run off the road to prevent any excessive erosion of the surface. The armor consisting of rip rap is placed where runoff could possibly cause erosion to the road surface and fillslope.
- Cross drains (waterbars) – Purpose and function is similar to rolling drain dips except the length of the structure is more abrupt and is recommended for roads that do not receive any or very little traffic.
- Culvert Cleaning – Culvert cleaning includes the cleanout of catchment basins, inlets and outlets. The cleanout of catchment-basins below the inlet of the culvert is done to capture the sediment transported from the channel or ditch. Capturing the sediment will help in preventing the culvert inlet from being partially plugged or completely buried. Culvert outlet cleanout is done to remove any material that would impede the flow of water through the outlet of the culvert.
- Ditch Cleaning – The cleanout of drainage ditches is required to remove any debris that may deflect the flow out of the ditch and also to ensure the flow reaches the outflow structure.
- Roadside Stream bank Stabilization – Placement of riprap to protect road fillslope from increased stream flows that leads to the loss of the road itself and to decrease the risk of washing road fill into adjacent streams.
- Debris Deflector – The debris deflector is required to route the major portion of medium to large floating debris away from the culvert entrance in order to protect the existing culvert from filling with torrent materials.

Location (Suitable) Sites:

1. The existing pipes are undersized for passing pre-fire flows and need to be upsized to pass predicted post fire flows. The pipes are located along Forest Service Road 3230, which is a major access route
   - Mile post 4.32 existing culvert size 24" should be upsized to 36" Corrugated steel pipe.
   - Mile post 4.62 existing culvert size 48" should be upsized to 72" Corrugated steel pipe.
     - Differing site conditions have increased the cost of this crossing by approximately $25,000. Original fill material consisted of organic material over blue clay, neither of which are suitable. Fill removal and replacement resulted in additional trucking and materials costs.
   - Mile post 5.68 existing culvert size 24" should be upsized to 36" Corrugated steel pipe.
2. Install overflow pipes with spillways and energy dissipater.
   - Road 3230 MP. 7.48
   - Road 3230 MP. 7.68
3. Add Cross Drains to existing roads.
   - Road 3201-811 MP. 0-1.85
   - Road 3200-700 MP. 0-1.64
   - Road 3200-705 MP. 0-.51
   - Road 3201-800 MP. 1.56-2.53
4. Add bevel cut to inlets and install armored dips
   - Road 3230 MP. 5.12
   - Road 3230 MP. 5.35
5. Install armored dip
   - Road 3220 MP. 11.31
   - Road 3220-705 MP. .27
   - Road 3201-814 MP. .88

- Road 3230 MP. 4.82

6. App Splash apron (energy dissipater)
   - Road 3220 MP. 10.75
   - Road 3230 MP. 4.89

7. Install Debris Deflector
   - Road 3220 MP 11.31

Design/Construction Specifications:

- Culvert Installation – Install culverts in locations as directed by the Engineer. Culverts shall have sufficient slope to allow water to flow while keeping the velocities to a minimum.
- Forest Service personnel will oversee and inspect the work.
- Work shall be performed to FP-03 Specifications and Supplemental Specifications.
- New culvert shall be set to match channel gradient but not to exceed.
- Headwalls for both inlet and outlet shall be rip rapped for 8 feet each side of the pipe and for 3 feet over the top of the pipe, measured from the end of the pipe vertically.
- Rip rap is to be Class 4 or better. The depth/thickness of the rip rap is to be 1.5 the largest rip rap diameter. Key rip rap shall be a minimum of 2 vertical feet below the drainage channel.
- The top of the splash pad for the outlet of the culvert is to be level with the culvert invert. Splash pad is to be 9 feet wide and 10 feet long, class 4 or better rip rap, sloped to match grade, keyed to a thickness of 1.5 times the largest rip rap diameter.
- Extra attention shall be paid to compaction and ensuring that culvert is compacted according to standards. Compaction is highly critical because of expected pressure from the increased flows. Use caution with heavy equipment around the pipe to ensure that the pipe is not distorted due to equipment activity and that adequate cover is provided prior to any equipment crossing over the top of the culvert.
- Acceptable material removed during excavation may be used for backfill and bedding.
- Drain Dips (with or without armor) – Construct rolling dips per Forest Service standards. Place rip rap across the roadway and on the fill slopes where potential runoff can occur if flow was to overtop the roadway from a plugged culvert or excessive runoff.
- Waterbars – Construct waterbars per Forest Service standards. Place enough waterbars

Protection/Safety Treatments:

Hazard Warning and Closure Signs for Roads

Purpose of Treatment: The severity of burn in some watersheds, combined with road location, high possibility of debris flow has increased the risk to road users. 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.

General Description: Install sixteen "Burn Area Fallen Rock and Debris" warning signs at designated locations. Signs will warn users of the increased hazards associated with entering burned areas. Work includes furnishing and installing new posts, mounting hardware, and all other incidentals necessary to mount signs, at locations designated by authorized Forest Service personnel.

Location (Suitable) Sites:

FS Road #1610000 MP 1.3 Entering Burned Area Fallen Rock and Debris
FS Road #1613000 MP 3.8 Entering Burned Area Fallen Rock and Debris
FS Road #1613000 MP 0.1 Entering Burned Area Fallen Rock and Debris
FS Road #1616000 MP 0.4 Entering Burned Area Fallen Rock and Debris
FS Road #3100000 MP 8.1 Entering Burn Area No Stopping Next 9 Miles
FS Road #3200000 MP 2.4 Entering Burned Area Fallen Rock and Debris
FS Road #3200000 MP 0.7 Entering Burned Area Fallen Rock and Debris
FS Road #3200000 MP .13 Entering Burned Area Fallen Rock and Debris

FS Road #3200000 MP 0.1 Entering Burned Area Fallen Rock and Debris
FS Road #3201000 MP 0.9 Entering Burned Area Fallen Rock and Debris
FS Road #3220000 MP 0.4 Entering Burned Area Fallen Rock and Debris
FS Road #3220000 MP 0.1 Entering Burned Area Fallen Rock and Debris
FS Road #3230800 MP 0.2 Entering Burned Area Fallen Rock and Debris
FS Road #3230000 MP .10 Entering Burn Area No Stopping Next 10 Miles
FS Road #3230000 MP 0.1 Entering Burned Area Fallen Rock and Debris
FS Road #3230000 MP 7.4 & 7.7 Caution Road Surface Changes Ahead

Design/Construction Specification(s): FHWA Standard Specifications for Roads and Bridges on Federal Highway Projects (FP-03) with Forest Service supplemental specifications. Sign and Poster Guidelines for the Forest Service EM7100-15

Hazard Tree Falling for Roads

Purpose of Treatment:

- Remove identified hazards trees to reduce the threat to workers installing road treatments and the public using high traffic roads (Level 3 and roads to private property inholdings).
- Mark hazard trees within high-risk areas where collapse or breakdown of the tree is expected to occur within the year.
- Place trees on contour (where possible) in locations that do not adversely affect road drainage.

General Description: Severely burned trees pose a preventable risk to public safety. An urgent significant hazard is identified when the collapse or breakdown of the burned or unstable object is "highly likely to occur within the year and could result in personal injury or death."

Location (Suitable) Sites: Fall hazard trees along the following roads where treatments are proposed:

- Road 1613 MP. 3.75 – 4.75
- Road 1613 MP. 4.75 – 5.44
- Road 1613 MP. 5.44 – 5.64
- Road 3201 MP. 5.43 – 8.02
- Road 3201- 800 MP. 0 – 2.53
- Road 3201-811 MP. 0 – 3.58
- Road 3201- 814 MP. 0 – 1.4
- Road 3200 MP. 4.18 – 11.45
- Road 3220-700 MP. 0 – 1.86
- Road 3220- 705 MP. 0 - .51
- Road 3230 MP. 1.1 – 7.09
- Road 3230 MP. 7.09 – 9.57

Design/Construction Specification(s): None

Road Storm Patrols

Purpose of Treatment: The purpose of patrols are used to identify those road problems such as plugged culverts and washed out roads and to clear, clean, and/or block those roads that are or have received damage. The storm patrollers shall have access to at least a backhoe and dump truck that can be used when a drainage culvert is plugged or soon to be plugged and to repair any road receiving severe surface erosion. The BAER Team considered this treatment to be the minimum necessary to achieve a reduction in risk to the accumulated critical values of:

1. Travelers,
2. Hydrologic function,
3. Road and bridge infrastructure, and
4. Occupied critical habitat.

General Description: Roads within the Stouts Creek Fire contain drainage structures that cross streams located in watersheds that have a high to moderate burn severity. These streams now have the potential for increased

runoff and debris flows. These increases in flows pose a threat to the existing crossings which may result in plugging drainage structures or exceeding their maximum flow capacity. If these flows plug drainage structures the result could be massive erosion and debris torrents further down the drainage due to the failure. Storm inspection/response keeps culvert and drainage structures functional by cleaning sediment and debris from the inlet between or during storms. This work will be accomplished through equipment rental and general labor.

Location (Suitable) Sites: Per the BAER Treatments Catalog, storm patrols are intended for use at the following locations:

1. Road crossings where loss of control of water or exceedance is identified.
2. Road access is necessary throughout the storm season.
3. Road crossings where high sediment and debris is anticipated.
4. Roads susceptible to landslides.
5. Roads with all-season surfacing (aggregate or asphalt).

Other roads within the fire perimeter may be patrolled as necessary depending on the storm magnitude and location.

Design/Construction Specifications:

1. FS personnel will direct the work. The patrols are used to identify those road problems such as plugged culverts and washed out roads and to clear, clean, and/or block those roads that are or have received damage.
2. Immediately upon receiving heavy rain the FS will send out patrols to identify road hazard conditions – obstructions such as rocks, sediment, washouts – and plugged culverts so the problems can be corrected before they worsen or jeopardize motor vehicle users.
3. The road patrols shall bring in heavy equipment necessary to mechanically remove any obstructions from the roads and culvert inlets and catch basins where necessary.
4. All excess material and debris removed from the drainage system shall be placed outside of bank-full channel where it cannot re-enter stream channels.

Monitoring Narrative:

Noxious Weed Monitoring

Kincaid's Lupine - Monitor the efficacy of the noxious weed treatments in the Kincaid lupine site by sampling presence/absence along established transects and compare those data to pre-fire conditions.

Noxious Weeds EDRR - The purposes of the monitoring are to prevent known noxious weed infestations from spreading and/or increasing in density, to detect and rapidly respond to new infestations associated with fire suppression/fire effects of the Stouts Creek Fire. When monitoring actions are initiated, Forest personnel will be equipped to immediately treat to eradicate or control infestations of noxious weeds (i.e. hand pulling, seeding of native species). This allows for the immediate treatment and eradication of infestations as they are discovered. BAER funding authorization will be used for the first year following fire containment to meet objectives above. Existing infestations will also be treated as prescribed by CWMA plans at the same time. As appropriate, these actions may be carried out under a combination of BAER and other management authorities. Treatment and monitoring activities occurring after the first year following the fire will be carried out under non-BAER authorizations.

Cultural Patrols

Patrolling and monitoring of archaeological and historic resources will be required to lessen the chance of vandalism and looting to resources. Monitoring by an archaeologist for the first year is recommended to keep baseline data on the condition of resources in the Callahan and Drew drainages. Monitoring of the Perdue Homestead site is required to assure it retains its character until natural vegetation reestablishes itself in the meadow.