Date of Report: 10/01/2016

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 (purple font) .
[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: Gap

B. Fire Number: CA-KNF-007501

C. State: CA

D. County: Siskiyou

E. Region: 5

F. Forest: Klamath

G. District: Happy Camp and Oak Knoll B

H. Fire Incident Job Code: 0505 P5KN0

I. Date Fire Started: 08/27/2016

J. Date Fire Contained: 09/17/2016

K. Suppression Cost: $29,673,000

L. Fire Suppression Damages Repaired with Suppression Funds

1. **Fireline waterbarred (miles):**
   Total Suppression Repair Completed on Dozer: 46.7
   Suppression Repair Needed on Dozer: 0
   Total Suppression Repair Completed on Hand: 12.7
   Suppression Repair Needed on Hand: 0

2. **Fireline seeded (miles):** 0

3. **Other (identify):** All roads, staging areas, water drafting sites, etc. disturbed by suppression activities will be repaired to a condition that is as close to pre-fire condition as reasonably possible. Repairs include grading, back-blading berms, pulling vegetation over disturbed areas, re-shaping spur roads, etc.

M. Watershed Numbers:

Soil Burn Severity Acres by Watershed								
HUC	HUC Name	Very Low Burn Severity (Acres)	Low Burn Severity (Acres)	Moderate Burn Severity (Acres)	High Burn Severity (Acres)	Total Watershed Burned (Acres)	Total Watershed Area (Acres)	Percent Watershed Burned
180102061103	Bettenbender Creek-Klamath River	1,093.7	3,223.3	1,621.8	135.6	6,074.4	35,384.8	17.2%
180102061004	Horse Creek	4,609.8	10,689.5	6,130.9	2,295.1	23,725.3	38,943.3	60.9%
180102061005	Kol Creek – Klamath River	614.1	1,764.0	764.3	32.8	3,175.3	17,774.8	17.9%
180102061102	Seiad Creek	6.8	0.5	0	0	7.3	18,759.4	0.0%
180102060903	West Fork Beaver Creek	0.4	0.2	0	0	0.6	20,087.9	0.0%

Table 1: Watershed numbers and burn severity by acres for the Gap Fire.

N. Total Acres Burned:

[x] NFS Acres [ ] Other Federal [ ] State [x] Private

Soil Burn Severity Acres by Land Status					
Land Owner	Unburned-Very Low (Acres)	Low Severity (Acres)	Moderate Severity (Acres)	High Severity (Acres)	Total Burned (Acres)
Klamath NF	4,150	9,811	5,457	1410	21,114
Fruit Growers Supply	1,646	4,144	1,459	218	7,467
Other Private	529	1,722	1,601	550	4,403
Total	6,325	15,678	8,517	2,463	32,983
Total (percent)	19%	48%	26%	7%	

Table 2: Burn severity by ownership for the Gap Fire.

O. Vegetation Types: The botanical communities affected by the Gap Incident vary by elevational gradient which ranges from approximately 1,400 to 6,900 feet. Lower elevation communities are dominated by mixed evergreen forests composed of canyon live oak, California black oak (*Quercus kelloggii* Newberry), madrone (*Arbutus menziesii* Pursh.), big leaf maple (*Acer macrophyllum* Pursh.), and chinquapin (*Quercus chrysolpeis* Liebm.) in the understory, with scattered ponderosa pine (*Pinus ponderosa* Lawson & C. Lawson), Douglas fir (*Pseudotsuga menziesii* Mirb. & Franco), and incense cedar (*Calocedrus decurrens* (Torr.) Florin) in the overstory. Higher elevation communities are characterized as mixed conifer forests dominated by white and/or red fir (*Abies spp.*). Clear-cuts and regenerating plantations are scattered throughout the burn area on both privately owned and Federal land and are primarily composed of ponderosa pine and Douglas-fir as well as early seral shrub fields (multiple species of *Arctostaphylos* and *Ceanothus*).

The Condrey Mountain Botanical and Geological Special Interest Area is characterized by dry, gravelly, openings on upper elevation ridges that consist of low profile herbaceous vegetation dominated by dwarf species of lupine (*Lupinus breweri*), and buckwheat (*Eriogonum spp.*).

The Horse Creek Botanical Special Interest Area runs along a tributary of the Klamath River and encompasses approximately 2 miles of low elevation old-growth riparian forest dominated by Douglas fir, bigleaf maple and Oregon ash (*Fraxinus latifolia* Benth).

P. Dominant Soils:
The Gap Fire occurred in the vicinity of Seiad Valley, CA near highway 96 up Horse Creek and stopping at the PCT (Pacific Crest Trial). NFS lands as well as private ownerships were affected. FS BAER team earth scientists assessed the incident with a whole-watershed approach regardless of ownership. Soil burn severity patterns varied for the fire due to varying topography, fuels, and fire behavior.

Specific dominant soils found in the fire are Holland, Skalan, Callam, Deadwood, and Olete families, having mostly loam and sandy loam soil textures. Coarse fragment rock content in the upper horizons is variable, averaging approximately 30 percent by volume. Surface gravels and boulders in many areas of the fire are the only remaining source of groundcover. These soils vary in depth – averaging 68 cm – and are mostly in hydrologic groups A, B, and C with the majority having a B rating. Group B has a moderately low runoff potential, whereas group C has a higher runoff potential due in part to slope steepness and proximity to rock outcrops. Just over 26% of the Gap Fire was calculated to have a moderate *post-fire* erosion hazard rating.

The high and moderate soil burn severity classes have evidence of severe soil heating in a patchy distribution – increased runoff and accelerated erosion are likely. Some of these areas do have good needle-cast potential, which is expected improve groundcover in the short-term. The low to very low soil burn severity classes still have good soil structure, contain intact fine roots and organic matter, and hydrologic function is largely unaltered.

Q. Geologic Types:
The Gap fire lies within the Klamath Mountains Physiographic Province, and is underlain predominantly by Paleozoic and Mesozoic metavolcanic and metasedimentary rock, along with minor amounts Quaternary sediments in the valleys. Tectonic processes accreted numerous terranes to the western margin of North America and two of these occur within the fire area: the Rattlesnake Creek and Condrey Mountain Terranes.

The Condrey Mountain Terrane consists mainly of metavolcanics, serpentinite, graphite schist, and Greenschist. A small amount of Blueschist is found within the northeastern corner of the fire perimeter where it intrudes into the Condrey Mountain Blueschist Geologic Special Interest Area (SIA). The terrane also includes the dioritic batholith which occupies O'Neill Ridge where it forms the headwaters of Sambo Gulch in the southern part of the fire complex.

The Rattlesnake Creek Terrane occupies the far western quarter of the fire complex. This Terrane is an accretionary mélange consisting mostly of metavolcanics and highly dismembered ophiolite including slabs of serpentinite and peridotite. Scattered bodies of serpentinite and peridotite diapirs occur within this Terrane, some of which were confirmed to contain naturally occurring asbestos. There are two rock quarries on Road 47N8, both on private land, that contain large pickup-sized boulders of asbestos (chrysotile and tremolite) lying exposed on the surface.

These Terranes were intruded by granitic plutons, and the largest in the fire area forms the headwater ridges of Robinson, Crawfish and Fish Gulches in the southwestern part of the complex. Plutons in the Klamath Mountains typically form sandy granitic soils and can be particularly prone to shallow debris slides and debris flows in steeper watersheds after wildfire. Granitic lands on the Klamath Forest about 10 miles west of the fire area (near Seiad Valley) experienced extensive debris flows in July of 2015 after having been burned in 2014.

R. Miles of Stream Channels by Order or Class:

Flow Regime by Severity (Miles)					
Flow Regime by Land Status	**Very Low Severity (Miles)**	**Low Severity (Miles)**	**Moderate Severity (Miles)**	**High Severity (Miles)**	**Total (Miles)**
Klamath NF and Private					
Intermittent	9.6	17.6	6.9	2.2	36.3
Perennial	13	28.8	7.8	0.4	49.7

Table 3: Burn severity within stream channels on the Gap fire.

S. Transportation System

Trails: 0 **FS Roads:** 128.4 miles **County Roads:** 3.3 miles **State:** 0 **Private Roads:** 3 miles

Miles of Roads by Severity					
	Very Low Severity (Miles)	**Low Severity (Miles)**	**Moderate Severity (Miles)**	**High Severity (Miles)**	**Total Burned (Miles)**
Klamath NF	32.5	67	24.5	4.4	**128.4**
County	0.5	1.8	1	0	**3.3**
Private	12.7	32.1	13.5	2.2	**60.5**
State	0	0	0	0	**0**

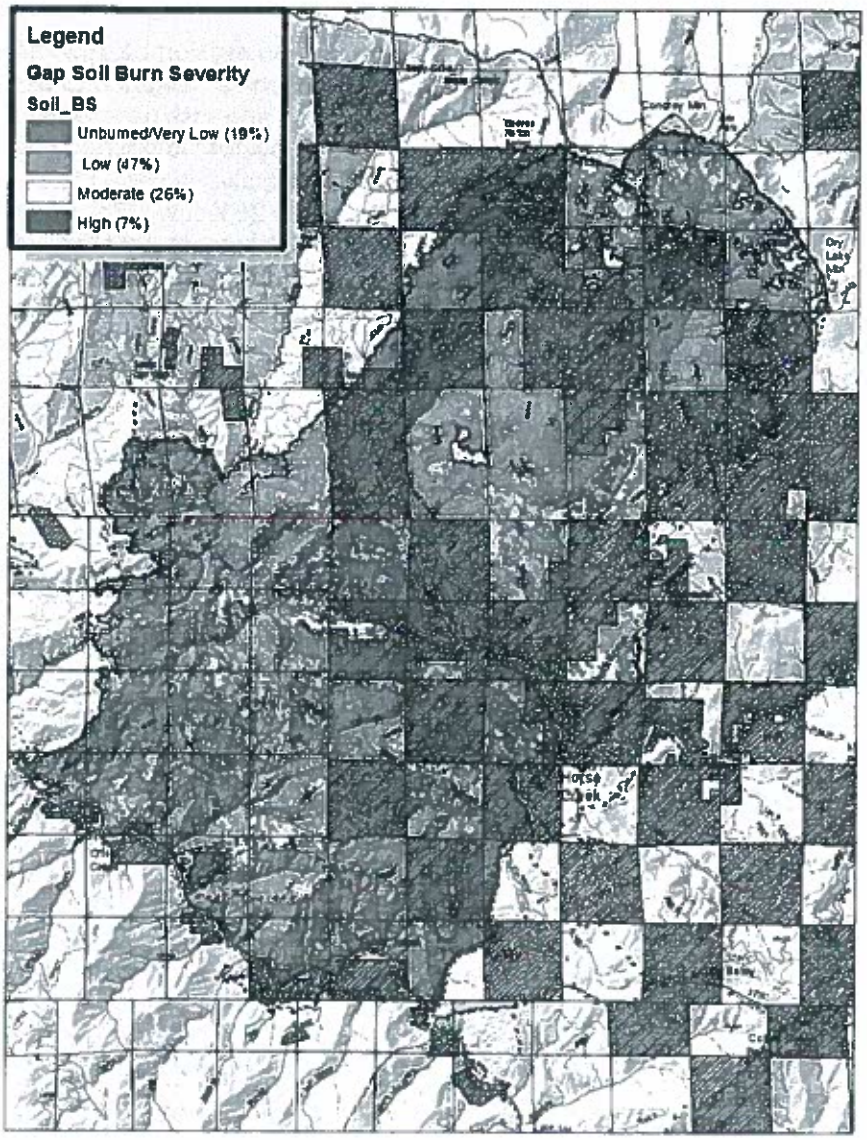
Table 4: Burn severity within road prisms and by ownership on the Gap Fire.

PART III - WATERSHED CONDITION

The Gap Fire burned 32,983 acres west of Yreka, CA on the north side of the Klamath River and primarily in the watershed of Horse Creek from August 27th with containment on September 17th (Figure 1). The fire burned in an area of "checkerboard ownership" with 7,467 burned acres on Fruit Growers Supply property and 4,403 acres on other private land. The remaining acres are within the Klamath National Forest. Soil burn severity was highest in several locations in the central areas of the fire and along the main stem of Horse Creek, in Maple Gulch and in the middle reach of Buckhorn Creek, both tributaries to Horse Creek.

A. Burn Severity (acres):						
	Unb./Very Low	6,325	(19%)	Low	15,678	(48%)
	Moderate	8,517	(26%)	High	2,463	(7%)

Figure 1: Gap Fire soil burn severity map



B. Water-Repellent Soil:

Water repellency is present – though not typically continuous across higher soil burn severity patches – and varies in degree based on soil texture and, to a lesser extent, aspect. Consequently, water repellency is expected to exacerbate runoff production. Up to 10,980 acres of the Gap Fire are expected to exhibit water repellent soils. Little to no hydrophobicity was observed in unburned areas within the fire perimeter. Gravelly to extremely gravely loam soil textures with moderate to high burn severity have demonstrated the most consistent and severe water repellency; surface runoff and erosion are expected to be significant in these steep slopes. There is high potential for upland soil delivery to the fluvial system; aquatic habitat and water quality will experience episodes of sedimentation.

C. Soil Erosion Hazard Rating:

In order to assess the potential risk of a given soil to erode, an erosion hazard rating (EHR) system was developed in R-5 (FSH 2505.22). The EHR system is designed to assess the relative risk of accelerated sheet and rill erosional processes and was developed primarily for land use activities such as agriculture or logging. The rating system is based on soil texture, soil depth, clay content, infiltration, amount of rock fragments, effective surface cover, slope gradient, and climate. The Gap Fire was calculated to have a 25% low, 73% moderate, and 2% high post-fire, erosion hazard rating (See Table 5). These ratings are *post-fire*, with infiltration and cover variables altered as appropriate based upon field observations during assessment.

Erosion Hazard Rating	Acres	Percent
Very High	0	0%
High	681	2%
Moderate	23,960	73%
Low	8,339	25%
Total	**32,980**	**100%**

Table 5: Erosion Hazard Rating

Figure 2: Soil burn severity. High on the left, moderate in the center, and low on right.

D. Erosion Potential:

Quantitative erosion figures were estimated using the ERMiT batch model. ERMiT (Erosion Risk Management Tool) is an application developed by USFS Rocky Mountain Research Station (USFS, RMRS-GTR-188, 2007) specifically for use with post-fire erosion modeling. The model estimates only sheet and rill erosion, which occurs when rainfall exceeds infiltration rates, and surface runoff entrains surface soil particles. The model does not account for shallow landsliding or gullying, stream-bank erosion, road effects, or fire-line erosion and gullying, which could present large additional sources of sediment entering streams.

ERMiT models erosion potential based on single hillslopes, single-storm "runoff events," and post-fire soil burn severity. Hillslopes include soil and topography inputs. Soil inputs include texture and matrix rock content, which were based upon soil map unit information and field verified in many areas of the fire as part of the assessment. Generalized hillslope gradients and profiles were developed in GIS by soil map unit, subwatershed, and soil burn severity class to account for fairly site specific differences in topography.

Three hundred and fifty-one representative hillslopes were modeled in ERMiT for this fire. Soil erosion estimates are based upon watershed areas within the fire perimeter only; unburned watershed areas outside the fire area were not modeled. A 5-Year event was modeled in ERMiT to determine if the estimated soil erosion for the fire area would affect soil productivity. For the 5-year event (20% probability); an estimated average 805,633 tons of sediment may be produced (22 tons/acre). Increased hillslope erosion is expected to occur throughout the fire area, especially within those areas in the high soil burn severity.

ERMiT Results			
	2 Yr Event	5 Yr Event	10 Yr Event
Tons	363,156	805,633	1,033,999
Tons/Acre	10	22	29

Table 6: ERMiT averages for return-period "runoff events"; stated model accuracy is +/- 50%

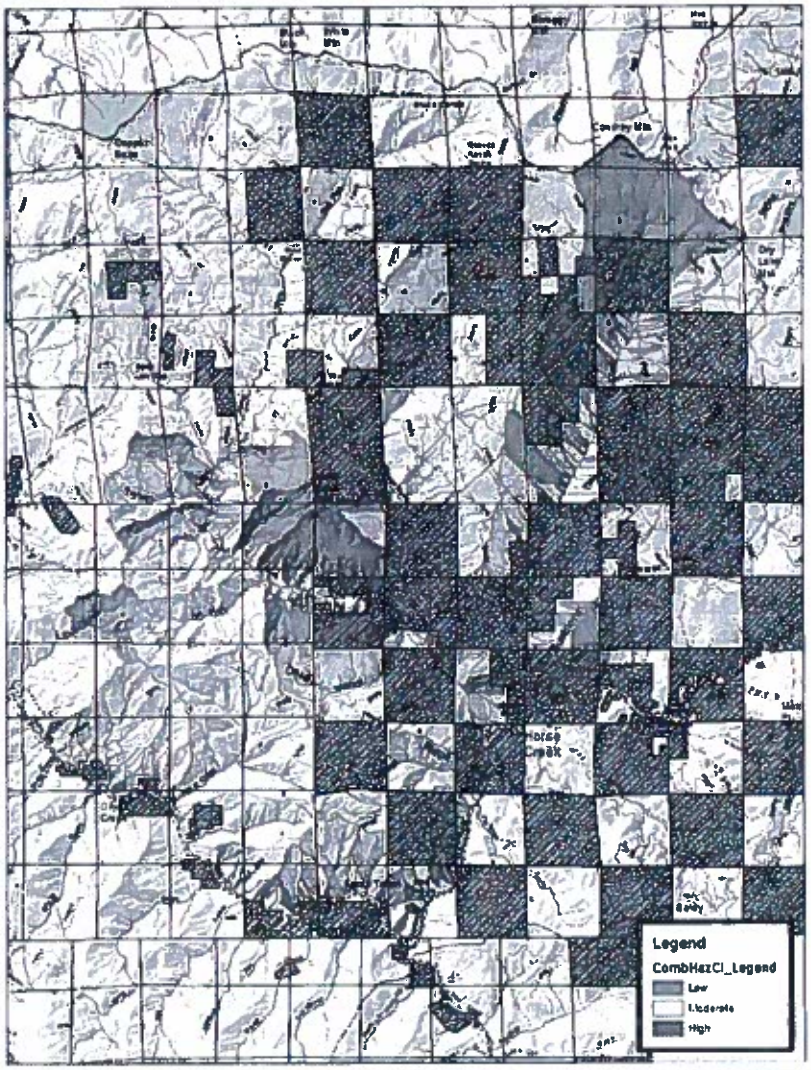
E. Sediment Potential:

GeoWEPP runs indicate 78% delivery ratio, for 20 tons per acre for a 5-year runoff event. This is just for estimated hillslope sheet and rill erosion, exclusive of other erosional processes such as gullying, mass failure (landslides), and debris flows.

Debris flow potential maps were modeled by the US Geological Survey to assist the Forest Service in assessing post-fire hazards. This model is sensitive to moderate + high soil burn severity on slopes > 40% steepness. There are numerous small watersheds along Horse Creek modeled as having high potential to generate debris flows. Although, due to the small size of the watersheds, these debris flows would not be expected to be large. Debris flows are an erosional

process that cannot be effectively prevented or mitigated with conventional (non-engineered) BAER treatments; engineered treatments require longer time frames and usually cannot be implemented prior to damaging events, as required by BAER directives.

Figure 3: USGS debris flow modeling – hazard map combining ratings for probability and volume (m^3) delivered; this particular map is based on a 15 min 24 mm/hr rainfall intensity event.



PART IV - HYDROLOGIC DESIGN FACTORS

A. Estimated Vegetative Recovery Period, (years): 3-5 years

B. Design Chance of Success, (percent): 90%

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

D. Design Storm Duration, (hours): 12

E. Design Storm Magnitude, (inches): 2

F. Design Flow: 10.8 cubic feet per second per square mile

G. Estimated Reduction in Infiltration: 44%

H. Adjusted Design Flow : 15.5 cfs per square mile

HU12 Drainage	Pre-fire Q5	Q5 from unburned and low	Q5 from moderate	Q5 from high	Post-fire Q5 from the fire	Post fire total HU12 Q5	Change in Q5 flow post fire
Bittendbender Creek – Klamath River	3489	540	321	51	912	3864	11%
Horse Creek	3798	1658	1034	609	3302	4953	30%
Kohl Creek – Klamath River	1894	318	166	15	499	2090	10%
Seid Creek	1987	2	0	0	0	2	0%
West Fork of Beaver Creek	2111	0	0	0	0	2112	0%

Table 7: Five year peak storm flow (Q) for watersheds of the Gap Fire with both pre- and post-fire values and the percent of increased runoff.

PART V - SUMMARY OF ANALYSIS

A. Describe Critical Values/Resources and Threats (narrative):

The following is a brief summary of the values within and along the fire area as well as the threats to those values in association with the effects of the Gap Fire.

Values at Risk:

The risk matrix below, Exhibit 2 of Interim Directive No.: 2520-2010-1, was used to evaluate the Risk Level for each value identified during Assessment:

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

Table 8: BAER Risk Assessment rating table; additional verbeage describing rating elements is in the BAER Manual.

Critical Value	Value At Risk	Potential Threat	Probability of Damage or Loss	Magnitude of Consequences	Risk	Treatment	Comments
Human Life and Safety / Property	Private Homes on lower Buckhorn, Middle and Horse creeks	Debris Flow, flooding				Share information with the NRCS to assist home owners	Not a BAER critical value; values are on private land
Property	FS Roads	Flooding, culvert failures, debris flows, diversion of flow down roadways, washouts	Likely	Major	Very High	Varied treatments to culverts and crossings; numerous additional critical/rolling dips	
Natural Resources	Soil Productivity	Erosion in areas of high burn severity	Likely	Moderate	High	No treatment	Modeled sediment reductions minimal; not feasible to implement before damage
Natural Resources	Anadramous Fisheries	Sedimentation in spawning areas	Likely	Moderate	High	No treatment	Modeled hillslope treatment has minimal effect; road treatments will help
Natural Resources	Native Plant Communities	Invasive plants infesting native plant communities	Likely	Major	Very High	Early Detection; Rapid Response (EDRR)	Detect and respond to weed infestations in the spring using the EDRR protocol
Natural Resources	Water Quality	Sedimentation	Very Likely	Moderate	Very High	No treatment	No effective treatments across such a large area
Cultural Resources	Historic Cabin	Erosion and flooding	Unlikely	Moderate	Low	No treatment	Unlikely to flood or be affected post fire
Cultural Resources	Other archaeological sites	Erosion and flooding	Unlikely	Moderate	Low	No treatment	

Table 9: Gap fire values at risk and associated risk assessment.

Values at Risk Narratives:

1. Human Life and Safety:

Rockfall and hazard trees for KNF visitors and staff: **High Risk.** Along NFS and cost-share roads there is a "possible" probability of hazards affecting persons in route, and the magnitude of consequences, injuring or killing a person, is "Major." The rating of possible is because there are no campgrounds, recreation facilities, or other destination areas where people congregate and linger in stationary fashion; thus risk can be mitigated with hazard warning signs, which are included in the roads package.

Debris flows on private property: **Not Rated.** Private homes,outbuildings and propety in lower Horse, Buckhorn and Middle creeks could have potential threats from debris flows post fire. Debris-flow modeling of the fire area (Figure 3) showed a high probability for debris flows in multiple areas along Horse Creek and at least one location along Middle and Buckhorn creeks each. Most, but not all, of these locations are not near homes. Due to the small sizes of the catchments, debris flows are not likely to be large in these areas.

Even smaller debris flows and landslides are big events the cannot be effectively treated under BAER protocols. Private land issues are also not directly addressed through BAER as these are not on NFS lands. Thus risk assessment was not conducted, but concerns discovered during the assesssment will be communicated to NRCS for possible follow-up with landowners.

There were no other human life and safety issues identified during the BAER assessment.

2. Property

Flooding, erosion, culvert failures, undermining of KNF roads: **Very High Risk.** Forest roads, as property and an infrastructure investment, are a BAER critical value. Numerous risks to roads occur in the fire area. Damage from post-fire events is rated "likely" in areas within or below slopes having high soil burn serverity. The magnitude of consequences is "major" since there are many such road segments and stream crossings in the area. Road failures are very expensive to repair and/or reconstruct after damage is done; preventive treatments are a fraction of the cost. As a connected VAR, T&E coho salmon spawning habitat is present in Horse Creek; there is little such habitat in the greater vicinity, so it is considered high-value critical habitat. Road prism and crossing failures would have highly damaging impacts to fisheries, in addition to others substantial sediment inputs to the fluvial system.

Homes on private land were also considered as property within the fire area, but not a BAER critical value. As with Human Life and Safety above, these values are not upon NFS lands, so risk assessment is not conducted, but concerns and modeling information regarding flooding or debris flow hazards is shared with NRCS for possible follow-up with landowners directly.

There were no other property VARs identified.

3. Natural Resources

Native plant communities – invasive pant infestation: **Very High Risk.** Invasive plants infesting native plant communities were given a probability of "Likely" since there are many sources for invasive plant seeds in the area and in association with the fire, including some such plants in

the ICP fire camp area. Such circumstances provide ample opportunities for weed introduction and spread. The magnitude of consequences is "Major" due to this area being currently relatively free of noxious weeds, unlike unfortunate impacts of invasive plants seen elsewhere in many areas of KNF, particularly along road corridors. Treatments are proposed.

Water quality – erosion and sedimentation: **Not Rated.** It is recognized there will likely be a reduction in water quality for waters used for agricultural supply in Horse Creek. This is a non-FS private value, so risk rating was not conducted, and concerns should be communicated to NRCS to work with landowners directly. Fires and post-fire erosion are natural processes; fine sediments will flush through the fluvial systems in time, but short-term impacts are expected.

Coho salmon spawning habitat – sedimentation: **High Risk.** Sedimentation into salmon spawning gravels was recognized as a BAER critical value, with coho and stealhead present. Due to high burn severity close to spawning streams this was given a probability of "Likely." Due to the adaptability of the fish the impacts were deemed "Moderate" for risk rating of "High."

Soil productivity and hydrologic function: **High Risk.** Loss of soil productivity particularly in areas of high burn severity was recognized as a high risk. Erosion impacts (on-site) are "Likely" with a magnitude of consequences "Moderate" because soils are considered a non-renewable, non-recoverable loss. That said, fires and post-fire erosion are natural processes, these ecosystems have evolved and adapted to periodic fire impacts, and the *ecological* function of soils is fairly resilient and recoverable in the mid-term. Treatments (hillslope mulch) were considered to benefit soil productivity, fisheries, and water quality in tandem, but were not pursued following modeling results indicating low reductions in delivered sediments.

4. Cultural Resources

Historic cabin – erosion and flooding impacts: **Low Risk.** A historic cabin not far from a river channel was assessed by the team archaeologists and hydrologist. It was determined that the probability of erosion and flooding impacts at this site was "unlikely." The magnitude of consequences remained "Moderate" if damage were to occur to a historic cabin, for a risk rating of Low.

All other historic sites – erosion, flooding, debris flows impacts: **Low Risk.** Eighteen sites were reviewed for the Gap Fire and 16 were visited. In most cases these are historic mining sites with no expected post fire damage or impacts. The probability of damage was seen as "Unlikely," with a "Moderate" magnitude of consequences, for a risk rating of Low.

B. Emergency Treatment Objectives (narrative): 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 of natural and cultural resources. And to that end, where natural recovery or other administrative actions (e.g. closure) are deemed insufficient or ineffective. The application of BAER treatments would minimize on-site damages to the identified values at risk. The emergency treatments being recommended by the BAER assessment team are specifically designed to achieve the following objectives.

The objectives of the treatments are to:

1. Protect human life and safety by signing hazards for awareness, closing roads, protecting escape routes, and reducing impacts from flooding and debris flows by treating Forest Service Roads, as well as coordinating with NRCS for private property values at risk.
2. Protect Forest Service investment in road infrastructure by improving road surface drainage and eliminating diversion potential by the construction of critical/rolling dips, improving culvert inlet capacity by cleaning and installing end sections, and storm-patrol. Protect against high risk of large fill failures with overflow/relief culvert installations, additionally ensuring road integrity and safe ingress/egress by local residents on NFS roads.
3. Protect critical habitat of federally listed Coho Salmon by treating Forest Service Roads.
4. Protect ecological value of native plant communities, currently in uninfested condition, by detecting and treating sites where introduction of noxious weeds may have occurred following fire suppression activities, and other uninfested sites in proximity of known weed sources.

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

Land N/A (weeds) **Roads/Trails** 85% (75% Interim) **Protection/Safety** 95%

D. Probability of Treatment Success

	Years after Treatment		
	1	3	5
Land	80	85	90
Roads/Trails	90	90	85
Protection/Safety	90	90	80

E. Cost of No-Action (Including Loss): Roads: construction/reconstruction estimated at $800K per mile. If all identified sites proposed for treatments were to fail, requiring 100-200 feet of complete reconstruction each, cost of repair would be approx. $7.5 million. Weeds: non-market value. Cost of no action would be loss of native plant communities and ecosystem stability, which would be a major long-term consequence, costing vastly more inputs to recover later. More likely the area would be written off as lost to the weed battle, as with other examples on the Forest.

F. Cost of Selected Alternative (Including Loss): Roads approx. $490K; weeds approx. $10K. Additional $135,870 for interim request treatments.

G. Skills Represented on Burned-Area Survey Team:

[X] Hydrology [X] Soils [X] Geology [] Range
[ ] Forestry [ ] Wildlife [ ] Fire Mgmt. [X] Engineering

[ ] Contracting [ ] Ecology [X] Botany [X] Archaeology
[X] Fisheries [ ] Research [ ] Landscape Arch [X] GIS

Team Leaders: Dave Young and Joel Despain
Email daveyoung@fs.fed.us; jddespain@fs.fed.us
Phone: (530) 226 2545 (Young); (530) 934 1152 (Despain)

Team:
Dave Young, Team Leader
Joel Despain, Team Co-Lead
Cathy Carlock, Logistics
Joe Blanchard, Soils
William Tripp, Soils (t)
Dave McComb, Hydrology
Jennifer Ford, Hydrology (t)
Juan de la Fuente, Geologist
Dennis Veich, Geologist (t)
Erin Lonergan, Botany
Peter Schmidt, Heritage
Brianna Murphy, Heritage (t)
Ken Bigelow, Engineering
Lori Jackson, Engineering
Ben Molitor, Engineering (t)
Bill Wall, Fisheries
Travis Coughlin, GIS
Elaine Elliott, GIS (fill-in)

Notable: The assessment was prolonged beyond 7 days from the containment date because of lack of availability of BAER specialists and staggered arrival of specialists.

H. Treatment Narrative:

Land Treatments:

L-01 EDRR: Reduce the potential for establishment of new noxious weed infestations in native or naturalized communities, particularly establishment of new noxious weed infestations in highly susceptible burned areas, prevent spread of existing infestations, and decrease rate of spread of weed density from existing infestations.

Invasive plants and weed assessments will be conducted in FY2017 for Early Detection and Rapid Response (EDRR) on any new infestation located within the fire perimeter. Treatments will occur at proper phenology of each species to ensure maximum control. This treatment will be supplemented by natural re-vegetation.

Treatments to mitigate the noxious weed emergency include initial detection surveys and concurrent treatment (hand-pulling) of any small noxious weed populations located during surveys. Detection surveys will be conducted along completed fire lines, drop points, staging areas, and existing roads where invasion by noxious weeds is most probable. Surveys will start in the un-infested areas on the North perimeter of the fire, and conclude where known noxious weeds are mapped, and become prevalent. Surveys will begin in 2017 during seasonally appropriate times for detection of target noxious weed/invasive plant species.

All newly discovered noxious weed populations will be mapped and entered into the National Resource Inventory System (NRIS) according to National protocol. Treatment will be recorded as directed by the same National protocols. Noxious weed treatment will consist of hand pulling to root depth and if seed is present, plants will be bagged and disposed of properly.

A map of specific locations to be surveyed and important design criteria are provided in Appendix B of the specialists report.

BAER land treatments to protect soil productivity, water quality and salmon spawning habitat were not recommended by the BAER team due to the large area, high cost, and lower likelihoods of reduced risk with treatment.

Roads and Trails:

RT-01 ROADS: There are multiple unacceptable risks to road infrastructure identified, including FS and FS-cost-share roads, that necessitate road treatments to mitigate risks of road prism or crossing failures caused by increased post-fire flows.Treatments are of the following geric types:

Treatment[1]	Justification
Restore drainage (MILE)	Protecting the investment in principle and secondary routes. Maintain important and/or critical administrative and public access.
Rolling Dip (EA)	Minimize damage to the road surface and template by hardening road surface and diverting water off the road at intermittent channels. Minimizes fill-slope deterioration.
Rip Rap (CY)	Protects upstream fill slopes and dissipates energy to minimize erosion and help prevent head cut on fill slopes.
Drop Inlet (EA)	Prevents culvert inlet obstruction in basin situations.
Flared End Section, Inlet (EA)	Improves hydraulic capacity and enhances free debris passage capability of existing culverts. Reduces the probability of the culvert plugging.
Culvert Replacement (EA) (Replacement/Upsizing)	Damaged culverts have reduced capacity than what the crossing was initially designed. Replacing (or upsizing if 100-year flow shows the damaged culvert to be undersized) Increases the capacity of the drainage structure to handle the expected increase flows from the burned area. Decreases the probability of road failure.
Overflow (Relief) Culvert Installation (EA)	Many small culverts are installed in deep fills with the inlet partially buried with a high probability of plugging. Installing other treatments not practical or economical given the depth/amount of fill & topography of site.
Drop Inlet Cover (EA)	Prevents culvert inlet obstruction in basin situations.
Down Drain w/ Elbow (LF/EA)	Protection of fill slopes on outside of road form expected increase in run-off
Storm Patrol-Response (MILE)	Maintain transportation system integrity and protect public safety.

Exact location, number, and itemized cost information is present in the Engineering specialist's Roads Report and Appendix. Treatment objectives are to restore functionality to a small number of damaged culverts, increase flow capacity of other culverts (inlet/outlet modifications), install numerous critical dips and rolling dips to prevent diversion of flows down the roads rather than

across in the event of culvert plugging, as well as armoring dips and fill in specific locations. In few locations, relief culverts are proposed in addition to critical dips, intended to further reduce risks of mass fill failure where large volumes of fill materials are involved at the crossing. Additional locations for relief culverts are proposed for this interim funding request, also involving large fill volumes on priority roads where access must be maintained.

Public Safety is affected due to a significantly increased hazard resulting from destabilized rock slopes, falling trees, and damage to traffic safety structures and signs. Additionally some roads (46N50 & 12 Roads) provide the only escape routes for local residents from natural disasters including flood and fire; these roads must remain open and accessible. Hazard warning signs are proposed at strategic locations as part of the roads package of treatments to mitigate risk (normally itemized in Protection and Safety).

Protection and Safety:

Private homes in lower Horse, Buckhorn and Middle creeks may have potential threats from post-fire debris flows. Debris-flow modeling of the fire area by USGS (Figure 3) showed a high probability for debris flows in multiple areas along Horse Creek and at least one location along Middle and Buckhorn creeks each. Due to the small sizes of the catchments, debris flows are not likely to be large in these areas.

However, even smaller debris flows and landslides are *hillslope processes* that have no effective treatments to recommend under BAER for reducing risks. Private lands are also outside the scope of the BAER program. Thus, the probability of a debris flow, the likely magnitude of such an event and the overall risk were not assessed for the Gap BAER.

The action on the part of the Forest Service will be to consult and share information with the Natural Resource Conservation Service (NRCS) that works with private landowners.

PART VII - APPROVALS

1. Forest Supervisor (Klamath NF) (signature) — Date: 13 Oct 2016

2. R5 Regional Forester (signature) — Date: 10/21/2016

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										
Weeds Detection Survey and Treatments	mile	$ 96	105	$10,080	$0		$0		$0	$10,080
		$ -	0	$0			$0	$0.00	0	$0
Insert new items above this line!										
Subtotal Land Treatments				$10,080	$0		$0		$0	$10,080
B. Road and Trails										
Initial Road Request	Each	$ 488,922	1	$488,922	$0		$0		$0	$488,922
Interim-1 Road Request	**Each**	**$ 135,870**	**1**	**$135,870**			$0		$0	**$135,870**
		$ -	1	$0						$0
Insert new items above this line!										
Subtotal Road & Trails				$624,792	$0		$0		$0	$624,792
C. Protection/Safety										
Hazard Warning Signs	Each	$ -	1	$0						$0
		$ -	1	$0	$0					$0
Subtotal Protection/Safety				$0	$0		$0		$0	$0
E. BAER Evaluation										
	Each	$ 53,301	1	$53,301	$0		$0		$0	$53,301
Insert new items above this line!				---	$0		$0		$0	---
Subtotal Evaluation				---	$0		$0		$0	---
G. Totals				**$634,872**						**$634,872**
Previously approved				$499,002						$499,002
Total for this request				**$135,870**						**$135,870**