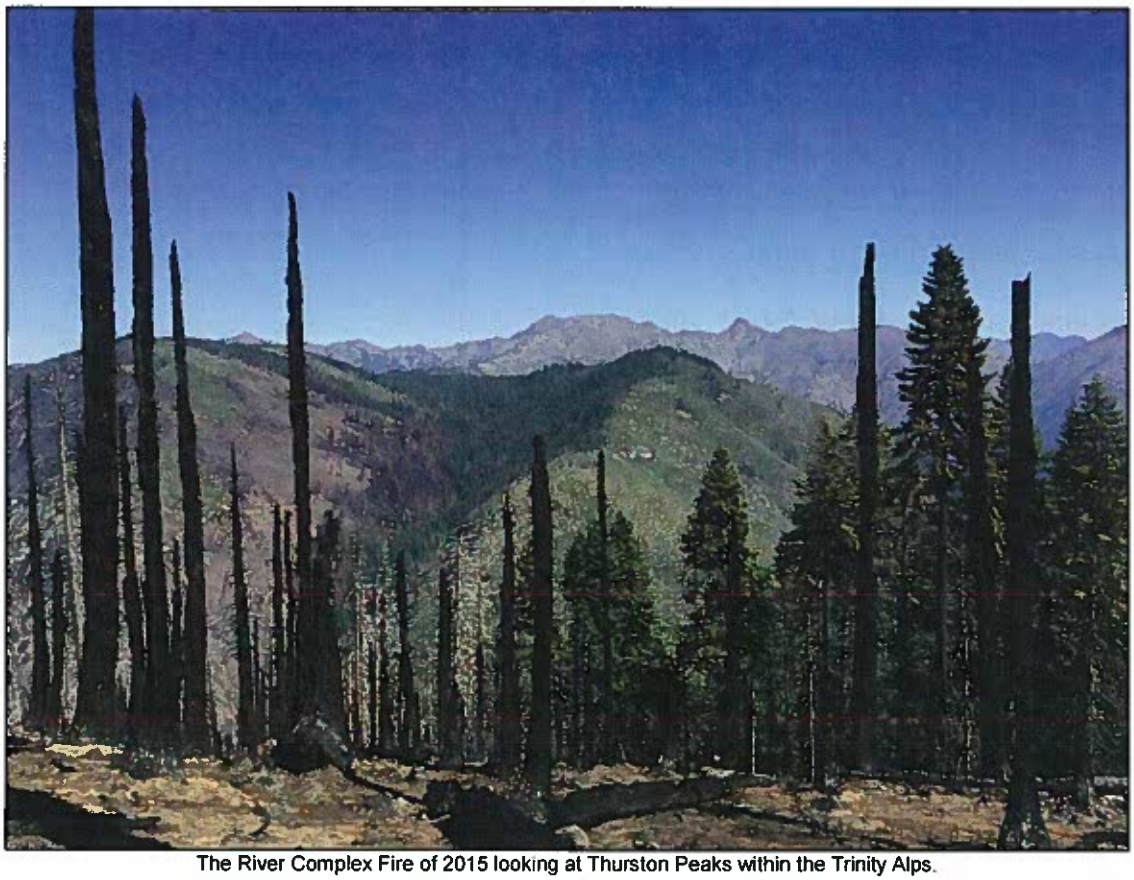
USDA-FOREST SERVICE FS-2500-8 (7/08)
Date of Report: 10/1/15

RIVER COMPLEX FIRE BURNED-AREA REPORT
(Reference FSH 2509.13)

PART I - TYPE OF REQUEST



The River Complex Fire of 2015 looking at Thurston Peaks within the Trinity Alps.

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: River Complex Fire

B. Fire Number: CA-SHF-002066

C. State: CA

D. County: Trinity

E. Region: 5

F. Forest: Shasta-Trinity

G. Districts: Trinity River Management Unit

H. Fire Incident Job Code: P5J0HR

I. Date Fire Started: July 31, 2015

J. Date Fire Contained: September ??, 2015

K. Suppression Cost: $30?? million

L. Fire Suppression Damages Repaired with Suppression Funds
1. Dozerline repaired / waterbarred: 30 out of 38 miles as of 9/11/2015
2. Hand line repaired: 17 out of 20 miles as of 9/11/2015

M. Watershed Number and Name:

HUC12	NAME	Acres
180102111001	Virgin Creek	24,088
180102111003	East Fork New River	26,352
180102111004	Devils Canyon	17,649
180102111005	Quinby Creek-New River	21,387
180102111006	Big Creek	12,282
180102111007	Bell Creek-New River	21,722
180102111103	Big French Creek	24,686
180102111105	Don Juan Creek-Trinity River	21,351
180102111106	McDonald Creek-Trinity River	19,838
180102111107	Sharber Creek-Trinity River	19,590
180102111202	Cedar Creek	16,752
180102111203	Horse Linto Creek	25,301
180102110903	Middle North Fork Trinity River	13,646

N. Total Acres Burned: River Complex: 77,805
NFS Acres (76,997 (Shasta-Trinity = 70,354, Six Rivers = 6,644)), Private (808)
Wilderness Acres (25,486 (Shasta-Trinity = 24,098, Six Rivers = 1,388))

O. Vegetation Types:

The dominant vegetation communities within the fire perimeter include Conifer (gray pine, Douglas-fir, incense-cedar and ponderosa pine), Hardwood (bigleaf maple, red alder, Pacific madrone, tan oak,

white oak, black oak, and canyon live oak), Mixed Conifer and Hardwood Forest/Woodland and Shrub (mixed and montane chaparral).Vegetation communities were classified based on information obtained from CALVEG (USDA, 2009), A Manual of CA Vegetation (CNPS, 1997), and CA Wildlife Habitat Relationships information system (CWHR) (CDFW, 2015) (refer to the table below for additional associated communities). A table of vegetation types within the burn area is displayed below, and a general vegetation map is displayed in Appendix A of the General Botany Report.

Vegetation Community	Acres
Conifer	34,258
Hardwood	7,304
Mixed	33,073
Shrub	2,925
Barren	86
Herb	152
Urban/Agriculture	7
Total	77,805

P. Dominant soils: Neuns, Chaix, Deadwood, Goulding, and Holland

Q. Geologic Types: Metasedimentary rock (chert, argillite) of the Jurassic Eastern Hayfork Terrane occupies the bulk of the River Complex, while granitic rock (diorite, tonalite, and gabbro) of the Ironside Mountain Pluton occupies the western quarter. There are also some small bodies of ultramafic rock (pyroxenite and serpentinite) scattered through the fire area, and a minor amount of Quaternary sediments (stream terrace deposits) along the valley of New River.

R. Miles of Stream Channels by Order or Class: 141 Miles Perennial, 234 Miles Intermittent, 42 Miles Ephemeral

S. Transportation System:
- Roads: 139 (121.25 FS, 17.5 County, 0.25 private) miles
- Trails: 22 miles

Roads with the River Complex Burned Area

County	18
Forest Service	121
1 - Basic Custodial Care (closed)	31
2 - High Clearance Vehicles	53
3 - Suitable for Passenger Cars	24
4 - Moderate Degree of User Comfort	10
P - Private	0.2
Grand Total	139

PART III - WATERSHED CONDITION

A. Soil Burn Severity by total and FS (acres):

Soil Burn Severity (Acres)						
Ownership	Very Low or Unburned	Low	Moderate	High	Grand Total	Percent
Non Forest Service	459	332	17	0	808	1
Forest Service	28,813	33,912	11,899	2,373	76,997	99
Grand Total	29,272	34,244	11,916	2,373	77,805	100
Percent	**38**	**44**	**15**	**3**		

Note: A detailed spreadsheet including soil burn severity acres in each forest unit and in wilderness is avialable in the project file.

Interpreting the Soil Burn Severity Map: Fire Intensity vs Soil Burn Severity

Parameters commonly used to define fire intensity or burn severity on vegetation are flame height, rate of spread, fuel loading, thermal potential, canopy consumption or tree mortality. Soil burn severity for BAER analysis considers additional surface and below-ground factors that relate to soil hydrologic function, runoff and erosion potential, and vegetative recovery. Indicators of soil burn severity include degradation of surface structure, loss of soil organic matter, and consumption of fine roots and formation of water repellent layers. River BAER Soil Scientists followed standard soil burn severity mapping methods fully described in the Field Guide for Mapping Soil Burn Severity (http://www.fs.fed.us/rm/pubs/rmrs_gtr243.pdf).

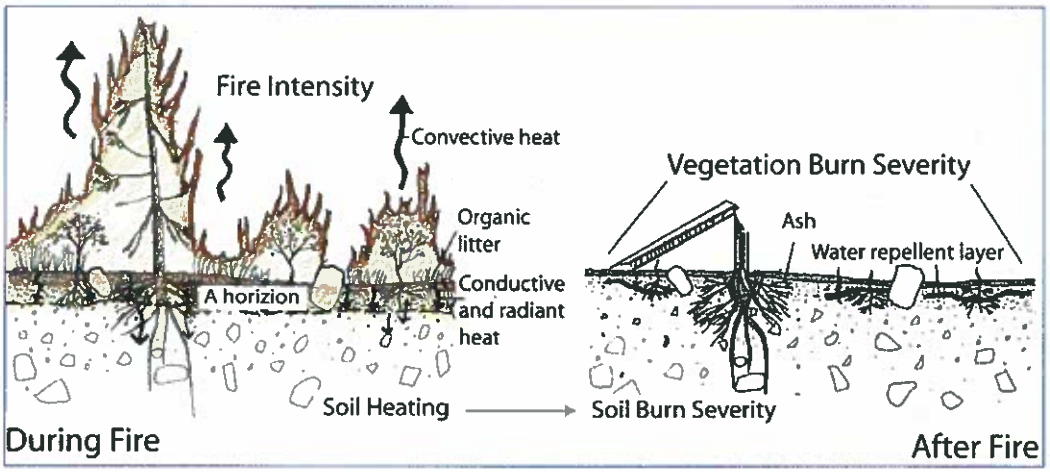
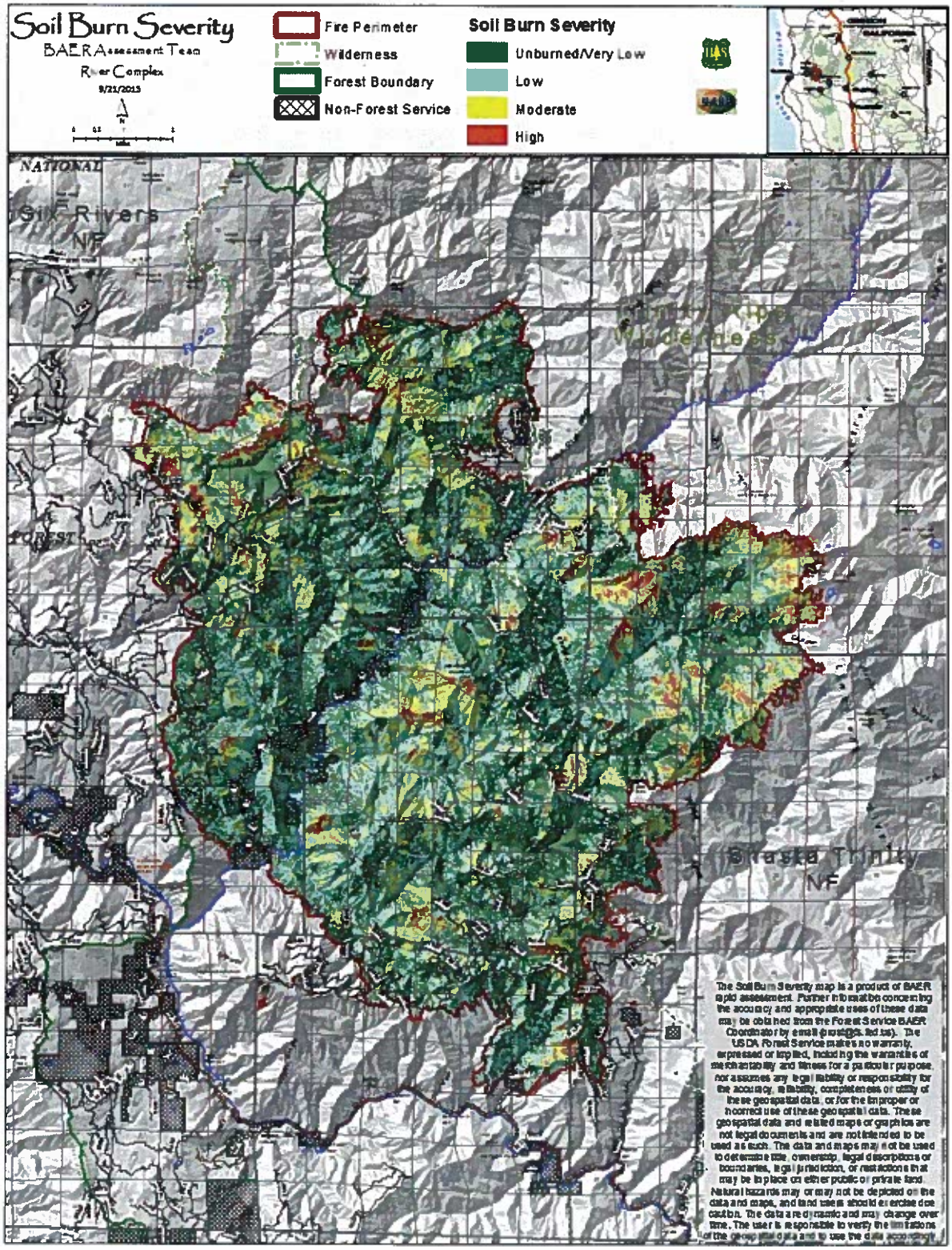


Figure 2 Illustrates the effect of fire intensity on above-ground vegetation and below-ground soil properties (Graphics by Mike Hankinson, National Park Service)

The following soil burn severity map (Figure 1) illustrates the general soil burn severity pattern on the landscape.

Figure 1 – Soil Burn Severity Map for the River Complex

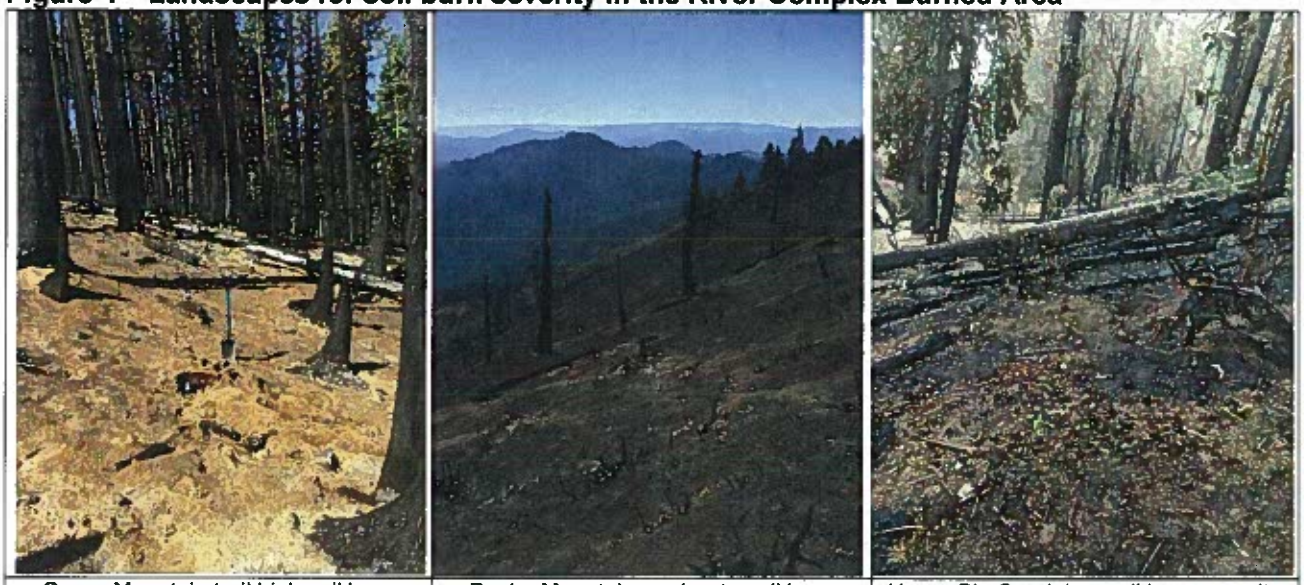


The following pictures (Figures 3 & 4) are companion pictures to show the landscape with mixed mortality due to differing vegetation types, slopes, aspect, and location.

Figure 3 – River Complex Soil Burn Severity Examples

High soil burn severity effects are degradation of surface structure, consumption of soil organic material and formation of water repellent layers	**Moderate soil burn** severity with fire effects of litter and duff removal and char and water repellency to 1 inch below the surface	**Low soil burn severity** due to minimal fire effects on this soil with a clay-loam surface texture

Figure 4 – Landscapes for soil burn severity in the River Complex Burned Area



Green Mountain trail high soil burn severity landscape	Bushy Mountain moderate soil burn severity landscape	Upper Big Creek low soil burn severity landscape

General Soil Burn Severity Patterns, Selected Influencing Factors and Recovery Interpretations (based on field observations)

In comparison with past surrounding and overlapping fires, the River Burned Area has significantly lower relative amounts of moderate and high soil burn severity. The vast majority of the area is a mosaic of unburned and low soil burn severity caused by slow moving under burns and minimal canopy consumption due to alignment of fuels. Patches of moderate and high soil burn severity occurred throughout the burn but are most notable in the Devils Canyon watershed and in the Pine Ridge/Grizzly Camp and Fawn Ridge areas.

Selected Factor Influencing Soil Burn Severity: Weather
Weather conditions which influenced fire behavior and the dominant unburned/low soil burn severity pattern include a persistent smoke inversion, low relative humidity, temperature and low winds. Higher soil burn severity generally occurred under windy conditions during the first 2 days and when the inversion lifted and up canyon winds increased.

Selected Factor Influencing Soil Burn Severity: Terrain
Steep terrain and chimney canyons played a role in fire behavior along with wind patterns. For instance the Little Swede Creek area in the SE portion of the burn area burned at high SBS and during high winds funneled up the saddle to the ridge. In addition, this is a south facing slope which tends to be dryer and hotter for longer periods. South and southwest slopes typically have lower humidity, higher fuel temperatures and are more exposed to summer winds.

Selected Factor Influencing Soil Burn Severity: General Vegetation Type, Density and Fire History
Vegetation cover type, density and fuel loading also likely influenced the soil burn severity patterns. Approximately 64% of the River Complex Burned Area has been impacted by fire within the past 30 years. Where previous fires burned with high severity, recovering fire scars had moderately dense to dense shrub which was completely consumed during the River fire and generally had moderate to high soil burn severity. Conversely, areas with frequent low intensity burns in the past 30 years resulted in low fuel loading which may have reduced soil burn severity from the River fire. At least 2 burned plantations also generated high soil burn severity effects.

Selected Factor Influencing Soil Burn Severity: Soil Type/Surface Layer Texture
Soil type also influenced soil burn severity patterns. Fire effects on soils such as degradation of structure, changes in soil color, consumption of fine roots and depth of water repellent layers were strongly influenced by soil surface texture. In soils with clay loam surface textures, fire effects on soil were commonly minimal and water repellency generally occurred at the surface. In soils with sandy loam and fine-gravelly loam surface textures, fire effects on soil were common to depths of up to an inch and water repellency was observed at depths of up to 8 inches.

Initial Interpretation for Recovery of Hillslope Stability: Ground Cover
Very high rates of needle and leaf cast were observed in forested areas with low and moderate soil burn severity. Thin layers of scorched needles and leaves are providing effective erosion control in these areas. In forested areas that experienced high soil burn severity or areas where shrub cover was consumed, ground cover recovery will be slower. Recovery of low lying vegetation will heavily influence recovery of hill-slope stability in these areas.

Burned Area Response to the First Rainfall Event
On September 16th, a low intensity/long duration precipitation event occurred over the burned area. This wetted the soil but minimal, if any, hill-slope erosion, sedimentation and/or ash transport to stream

channels was observed. Infiltration and retention of this the rain water is likely to promote vegetative recovery.

B. Soil Resource Condition Assessment Sections:

The River Complex fires occurred in the vicinity of Denny, CA; from the headwaters of Horse Linto Creek and the New River south to Ironside Mountain and Del Loma, CA. NFS lands as well as private ownerships were affected. BAER team earth scientists assessed the incident with a whole-watershed approach regardless of ownership. Soil burn severity patterns varied for the fires due to varying topography, fuels, and fire behavior.

Specific dominant soils found in the fire are Chaix, Deadwood, Goulding, Holland, and Neuns primarily resulting in loam and sandy loam soil textures. These soils vary in depth – averaging 68 cm – and are mostly in hydrologic groups B and D. Group B has a moderately low runoff potential, whereas group D has a high runoff potential due in part to slope steepness and proximity to rock outcrops. Just over 80 percent of the River Complex was calculated to have a **moderate** post-fire erosion hazard rating (See Table xx).

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. The low to very low soil burn severity classes still have good soil structure; contain intact fine roots and organic matter with hydrologic function unaltered.

C. Water Repellent Soils:

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 7,570 acres of the River Complex are expected to exhibit water repellent soils. Little to no hydrophobicity was observed in unburned areas within the fire perimeter. Sandy loam soil textures have demonstrated the most consistent and severe water repellency; surface runoff and erosion are expected to be significant in these coarse-grained, steep, sparsely-vegetated slopes. There is high potential for upland soil delivery to the fluvial system, aquatic habitat and water quality will likely experience episodes of sedimentation.

D. Erosion Potential (erosion hazard rating):

Soil texture, climate, slope, rock content and burn severity dictate soil EHR. These ratings are consistent with field observations made during the BAER soil assessment.

Table 1 - Erosion Hazard Ratings

Erosion Hazard Rating	Acres	% of Fire
Low	2,446	3
Moderate	63,675	82
High	11,682	15

E. Sediment Potential:

The ERMiT model attempts to account for hillslope sediment re-deposition. Many modeled hillslopes in this fire have streams at the base of the slope; overland flow could carry fine sediment downslope and deposit it into riparian areas and stream channels.

Table 2 - Predicted erosion rates and amounts for the River Complex

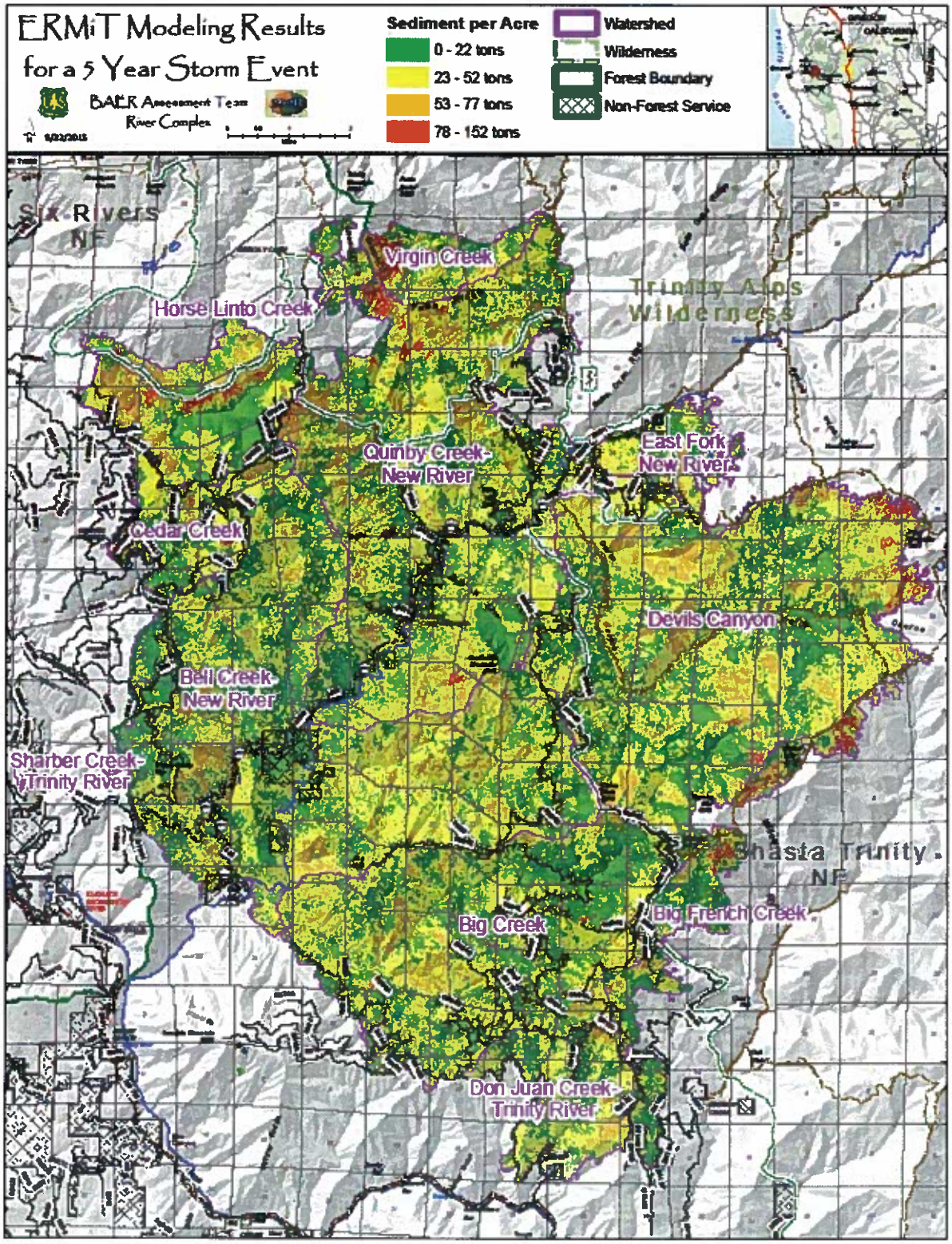
ERMiT Results			
Unit	**2-Yr Storm**	**5-Yr Storm**	**10-Yr Storm**
Tons	1,235,429	2,225,173	2,996,812
Tons/Acre	16	29	39

These watersheds were modeled to determine the amount of erosion to a particular value at risk (culvert, bridge, stream, etc.) each with its own watershed size. The following table displays predicted sediment rates for each of the main watersheds within the River Complex; Bell, Quinby, and Devils Canyon are expected to receive the highest quantities of sediment, mostly due to the large amount acres burned within those basins.

Table 3 - Modelled Hillslope Erosion by Watershed

6th Field Watershed	Acres Burned	Total Sediment Delivered (tons) 5 Yr Storm	Average Sediment Delivered (tons/acre) 5 Yr Storm
Bell Creek- New R.	17,768	504,537	28
Quinby Creek- New R.	16,809	501,037	30
Devils Canyon	16,398	503,104	31
Big Creek	11,457	275,985	24
Horse Linto Creek	4,450	137,266	31
Big French Creek	2,998	80,689	27
Don Juan- Trinity R.	2,668	76,979	29
Cedar Creek	2,110	52,111	25
East Fork New River	1,582	41,353	26
Virgin Creek	1,501	50,932	34
Sharber Creek-Trinity R.	55	1,007	18

Figure 5 – Predicted ERMiT Erosion Rates for the River Complex



Hydrology

The effects the River Complex Fire to hydrology were analyzed with respect to HUC 6 watershed and pour point basins that were selected to evaluate potential impacts to values at risk. Burn severity acres for HUC6 watershed are shown in Table xx.

Table 4: Burn Severity Areas for HUC 6 Watersheds Affected by the River Complex.

Outside Burn				Burn Severity							
				Unburned/ Low		Low		Moderate		High	
Watershed	Shed Acres	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%
Bell Creek-New River	21,722	3,954	18	6,343	29	8,742	40	2,460	11	223	1
Big Creek	12,282	825	7	5,050	41	5,014	41	1,237	10	156	1
Big French Creek	24,686	21,687	88	1,385	6	1,033	4	541	2	39	0
Cedar Creek	16,752	14,642	87	772	5	765	5	508	3	65	0
Devils Canyon	17,649	1,250	7	5,967	34	6,863	39	2,498	14	1,071	6
Don Juan Creek-Trinity River	21,351	18,683	88	957	4	1,408	7	195	1	107	0
East Fork New River	26,352	24,770	94	613	2	660	3	303	1	6	0
Horse Linto Creek	25,301	20,850	82	1,725	7	1,310	5	1,012	4	404	2
McDonald Creek-Trinity River	19,838	19,831	100	4	0	3	0	0	0	0	0
Middle North Fork Trinity River	13,646	13,645	100	1	0	0	0	0	0	0	0
Quinby Creek-New River	21,387	4,577	21	5,873	27	7,863	37	2,837	13	236	1
Sharber Creek-Trinity River	19,590	19,535	100	26	0	27	0	2	0	0	0
Virgin Creek	24,088	22,587	94	556	2	555		323	1	67	0

In order to further assess potential values at risk within the fire, pour point basins were identified and mapped (Table 5). These basins are various sizes and are determined by the desired outlet or pour point above a value at risk or area of concern. These sites may be within or downstream of the burned area.The size of the watershed is dependent on the local flow patterns in addition to the need to evaluate a basin for values at risk.

Table 5: Burn Severity Areas for selected Pour Point Basins Affected by the River Complex.

Pour Point Basins	Total Acres	Burn Severity			
		Low -Low/Unburned	Moderate	High	Outside Fire Perimeter
07N04T Spur Road Crossing Trib. to Cedar Creek	339	258	75	6	0
07N26 Road Crossing Trib. to Bell Creek	163	153	10	0	0
05N04 Road Crossing #1 - Trib. to Big Creek	1083	969	96	18	0

05N04 Road Crossing #2 - Trib. to Big Creek	132	118	12	2	0
05N04 Road Crossing #3 - Trib. to Big Creek	106	106	0	0	0
05N04 Road Crossing #4 - Trib. to Big Creek	601	443	148	10	0
05N04 Road Crossing #5 - Trib. to Big Creek	447	302	89	56	0
05N04 Road Crossing - Trib. to Italian Creek	248	225	21	2	0
05N04 Swede Creek Crossing	1319	1060	155	103	0
402 County Road Quinby Creek Crossing	5612	3774	1051	117	670
East Fork Horse Linto Creek Watershed	4123	2253	813	363	694

Pre and Post Fire Peak Flow Model Results:
Soil burn severity information was used to model post-fire runoff response for each HUC 6 and each pour point watershed. Pour point basin pre and post-fire runoff estimates are shown in **Error! Reference source not found.** and **Error! Reference source not found.**. The model developed by Gotvald, et al, 2012 was used to forecast runoff from areas that were burned in the River Complex. It is a regional regression analysis utilizing stream gages on gaged streams in California to estimate water discharge on ungaged streams. The equations for the North Coast region were used which utilizes drainage area and mean annual precipitation of the desired watershed to determine peak discharge for streams in that watershed. StreamStats was used to model pre-fire runoff from each pour point basin. Soil burn severity information was used to model post-fire runoff response for each pour point watershed.

Table 6: Post-fire runoff response for each HUC 6 for the River Complex.

6th Field HUC Subwatershed	Watershed Area Sq mi	Pre '2-yr Qp (cfs)	Post 2-yr Qp (cfs)	Pre '10-yr Qp (cfs)	Post '10-yr Qp (cfs)	Post '2-yr Peak Increase x normal	Post '10-yr Peak Increase x normal
Middle North Fork Trinity River	21.3	1656	1656	3839	3839	1.00	1.00
Virgin Creek	37.6	2815	2998	6405	6763	1.06	1.06
East Fork New River	41.2	2375	2504	5802	6082	1.05	1.05
Devils Canyon	27.6	1663	3238	4095	7482	1.95	1.83
Quinby Creek-New River	33.4	2123	3699	5098	8484	1.74	1.66
Big Creek	19.2	1403	2412	3328	5514	1.72	1.66
Bell Creek-New R.	33.9	2220	3848	5281	8801	1.73	1.67
Big French Creek	38.6	2170	2389	5359	5832	1.10	1.09
Don Juan Creek-Trinity River	33.4	1903	2112	4716	5193	1.11	1.10
McDonald Creek-Trinity River	31.0	1973	1973	4753	4754	1.00	1.00
Sharber Creek-	30.6	2140	2144	5020	5028	1.00	1.00

Trinity River							
Cedar Creek	26.2	1755	1986	4202	4676	1.13	1.11
Horse Linto Creek	39.5	2943	3531	6688	7804	1.20	1.17

Table 7: Post-fire runoff response for each HUC 6 for the River Complex.

Pour Point	Location Identifier	Pre '2-yr Qp (cfs)	Post 2-yr Qp (cfs)	Pre '10-yr Qp (cfs)	Post '10-yr Qp (cfs)	Post '2-yr Peak Increase x normal	Post '10-yr Peak Increase x normal
1	07N04T Spur Road Crossing Trib. to Cedar Creek	76	151	176	329	2.0	1.9
2	07N26 Road Crossing Trib. to Bell Creek	44	67	105	156	1.5	1.5
3	05N04 Road Crossing #1 - Trib. to Big Creek	194	304	459	692	1.6	1.5
4	05N04 Road Crossing #2 - Trib. to Big Creek	28	41	69	99	1.5	1.4
5	05N04 Road Crossing #3 - Trib. to Big Creek	27	35	68	89	1.3	1.3
6	05N04 Road Crossing #4 - Trib. to Big Creek	106	227	256	512	2.1	2.0
7	05N04 Road Crossing #5 - Trib. to Big Creek	79	179	196	404	2.3	2.1
8	05N04 Road Crossing - Trib. to Italian Creek	45	79	115	197	1.8	1.7
9	05N04 Swede Creek Crossing	187	384	470	908	2.1	1.9
10	402 County Road Quinby Creek Crossing	850	1649	1940	3543	1.9	1.8
11	Devils Canyon Creek Watershed	2360	4595	5240	9573	1.9	1.8
12	East Fork Horse Linto Creek Watershed	793	1563	1710	3082	2.0	1.8

Geology

Primary geologic hazards within the River Complex burned area affected by the fire consist of rockfall, debris slides (shallow rapid landslides), debris flows, and to a lesser degree, deep landslides such as slumps and earthflows. Rockfall occurs during and immediately after the fire due to the burning out of woody material holding rock on a hillslope, and also in association with the first significant rains after the fire. Several areas of fire-initiated rockfall were observed along Roads 7N26 and 402, on the west side of New River. Rockfall potential usually returns to pre-fire levels within a few years. Two distinct triggers are at play following the fire which can initiate landslides and debris flows. One is high intensity convective storms which typically occur in summer, and the other is long duration winter storms in winter which often involve snow melt. The summer storms produce rapid runoff due in part to fire-related water repellency in soils, and this generates debris flows, but few landslides of other types. The most likely settings for this to occur are where high and moderate severity fire occurs on headwall basins, old debris slide scars, or other types of steep hillslopes (>65%). Potential for such events

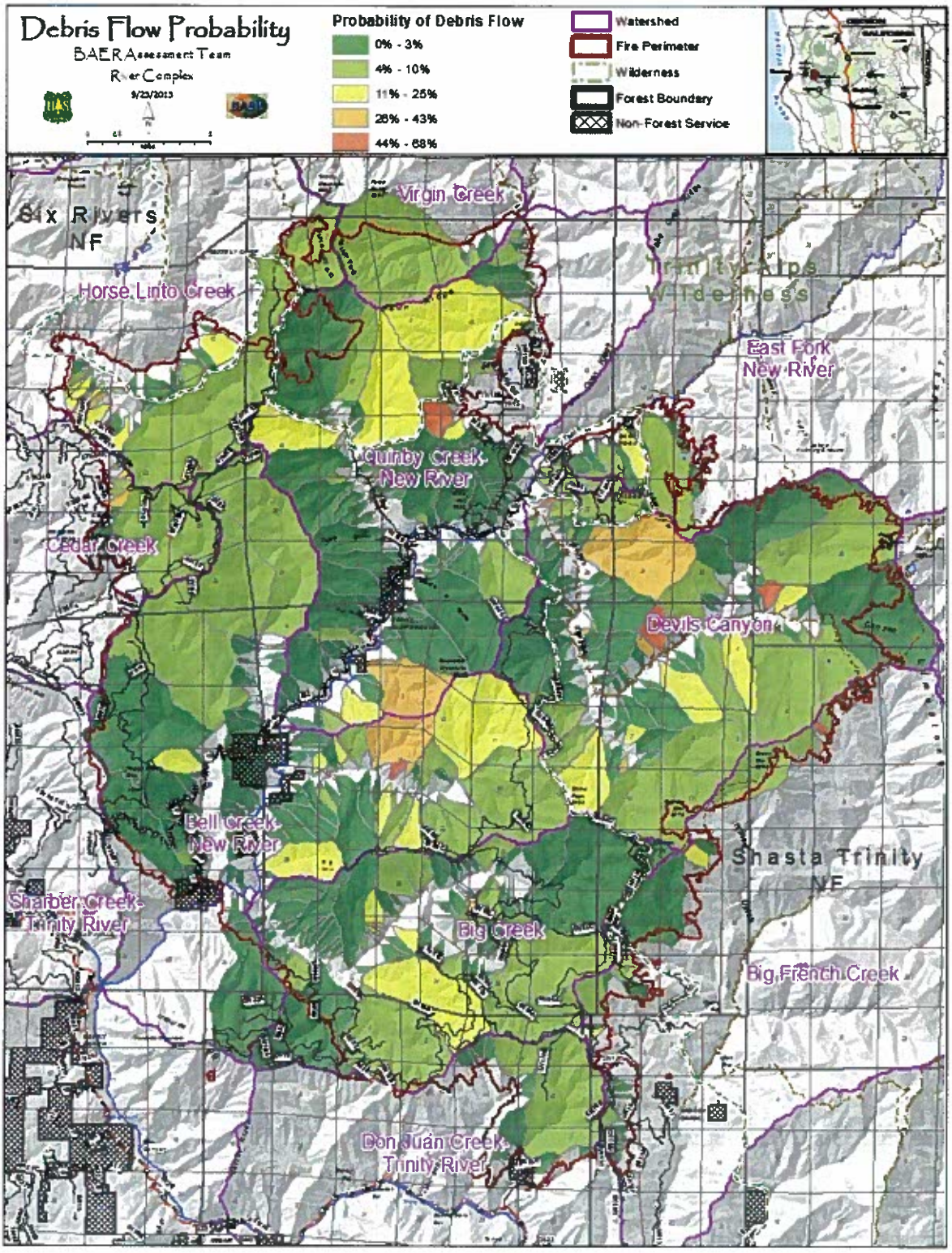
typically recovers to pre-fire levels in less than 5 years. Winter storms saturate the soil and underlying bedrock, and can initiate debris slides along with slumps and earthflows. By removing vegetation, the fire reduces evapotranspiration and removes root support, and both these effects can increase landslide potential. Areas at greatest risk for this are where high and moderate severity fire occur on dormant landslides or earthflows, such as on Jim Jam Ridge or in the vicinity of Caraway Creek, but also in headwall basins, old debris slide scars, or other types of steep hillslopes (>65%), which occupy much of Devils Canyon. This increase in landslide potential can last for 10's of years, until revegetation occurs.

As a result of the removal of vegetation by the fire, channels will likely receive sediment by dry ravel and other processes, and this material will be available for transport during high runoff, facilitated by fire effects. Soils are exposed, and rocks on slopes have lost their supporting vegetation. Roads are at risk from rolling rock, plugged culverts, debris slides and debris flows. Stream channels and ephemeral channels will be flushed of the sediment when high flows eventually occur.

Debris flow probabilities for a 25 year 1-hour storm from the USGS debris flow model suggest that most watersheds have a debris flow potential of 0-10%, some are in the range of 11%-43%, and a few very small watersheds have a debris flow potential of 44-68% (refer to Figure 6 - debris flow probability map). One watershed about a mile south of Denny Campground which enters New River from the east has a potential of 25%-43%, and there is a private cabin on a terrace adjacent to the stream. Observations from the 402 road across New River suggest that the cabin is outside the threat zone, but a field inspection would be necessary to verify this. Another watershed on the east flank of Happy Camp Mountain has a potential of 11%-25%, and a debris flow there would threaten County Road 402, where it crosses the stream on the west side of New River. Some, very small basins on the north side of Devils Canyon have probabilities of 44%-68%, and debris flows there would cross Trail 12W13.

It should be noted that the USGS debris flow model is designed to address relatively short duration, high intensity storms, and no longer duration winter storms. Additionally, it is not yet calibrated for the Klamath Mountains. As such, it should be viewed as an indicator of debris flow potential, rather than as an absolute predictor.

Figure 6 – Predicted Debris Flow Probabilities for the River Complex



Rock fall has already occurred along the road system, particularly on Roads 7N26 and 402, and will continue to occur at an elevated rate at least through the first winter. The probability of damage or loss to people or vehicles traveling the roads from rock fall is estimated to be "possible", and the magnitude of consequences would be "major", and this translates to a risk of "high". Debris flows and landslides are less likely to occur than rock fall, and the potential for damage or loss is "possible", and the magnitude of consequences would be major, yielding a risk rating of "high".

Treatments for debris flow and rock fall hazards include notification of the public of these hazards through warning signs and road closures, notification of other agencies clearing and improvement of catch basins and ditches along roads, maintenance and up-grade of drainage structures, and construction of rolling dips in critical locations along roads.

PART IV - HYDROLOGIC DESIGN FACTORS

A. Estimated Vegetative Recovery Period, (years):	3-5
B. Design Chance of Success, (percent):	80
C. Equivalent Design Recurrence Interval, (years):	2
D. Design Storm Duration, (hours):	6
E. Design Storm Magnitude, (inches):	1.95 - 2.55
F. Design Flow, (cubic feet / second/ square mile):	65
G. Estimated Reduction in Infiltration, (percent):	10
H. Adjusted Design Flow, (cfs per square mile):	85

PART V - SUMMARY OF ANALYSIS

A. Describe Critical Values/Resources and Threats:

Background:
A dry lightning system moved from south to north across the Shasta-Trinity NF in the late afternoon and early evening today on July 30th, 2015. The number of fires initially reported was around 8-10 sometime around 5:00pm, and by 7:00pm the number grew to over 60 new starts. Due to extremely dry conditions and little to no rain with this event, the probability of fire ignition was very high with every lightning strike. Additional fire starts on the north end of Mendocino NF and the east side of the Six Rivers NF were also reported. The lightning event seemed to lose power as it approached the north end of the Trinity Alps Wilderness.

The River Complex Fires consist of 5 large fires ranging from about 4,000 to 15,000 acres on steep terrain surrounding Denny with large dead snags in thick brush left over from several past fires or un-thinned conifer plantations.

Summary of Post Fire Burned Watershed Conditions and Post-Wildfire Watershed Processes and associated BAER Values at Risk (summarized from Section III of this report)

Soil Burn Severity: Only three percent of the burned area had high soil burn severity, 15% had moderate soil burn severity, 44% had low soil burn severity and the remaining 38% had very low soil burn and/or remained unburned. In comparison with past surrounding and overlapping burned areas, the River Burned Area has significantly lower relative amounts of moderate and high soil burn severity. The vast majority of the area is a mosaic of unburned and low soil burn severity caused by slow moving

under burns and minimal canopy consumption due to alignment of fuels. Patches of moderate and high soil burn severity occurred throughout the burn but are most notable in the Devils Canyon watershed and in the Pine Ridge/Grizzly Camp and Fawn Ridge areas.

Soil Erosion Hazard and Post Fire Erosion Potential: Comparing potential pre and post fire soil erosion is generally useful. Under moderately dense to dense forests, ground cover is high and rates of erosion are typically less than 2 tons/acre. ERMiT modelling predicts erosion rates in the region of 15-30 tons/acre for these areas. This dramatic response response is largely due to removal of ground cover, particularly in areas with moderate and high soil burn severity. In low and moderate soil burn severity areas, recovery of ground cover through needle cast is already occurring and will serve to reduce erosion potential over much of the of the burned area.

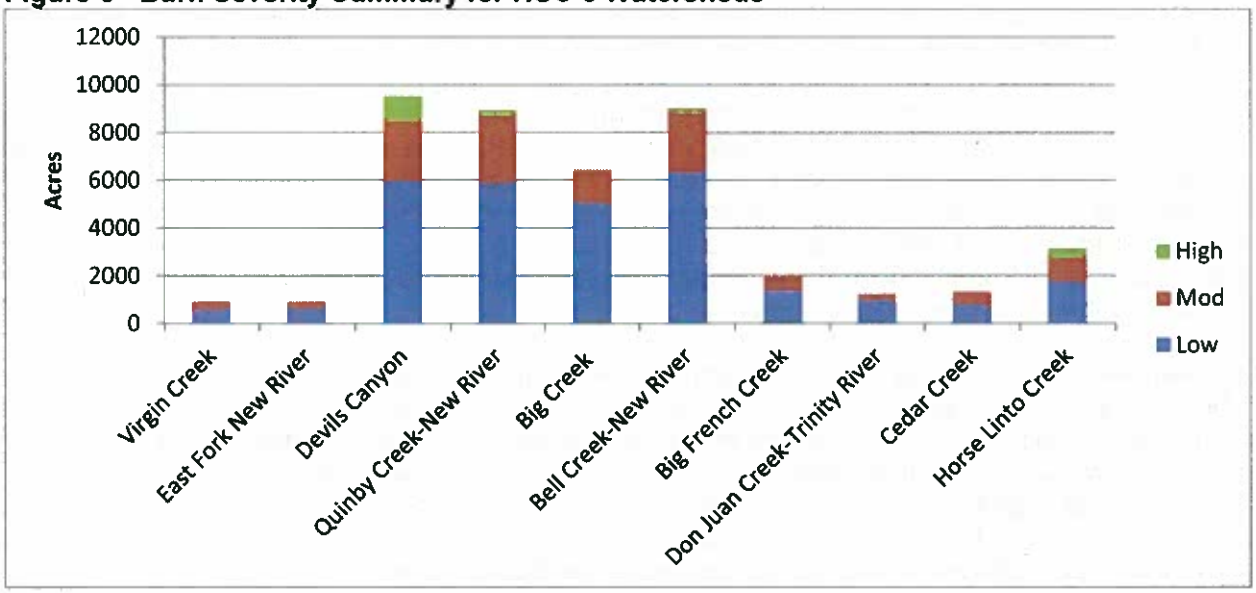
Water Repellent Soil Results: On soils with clay loam surface textures, fire effects on soil were commonly minimal and water repellency generally occurred at the surface. In soils with sandy loam and fine-gravelly loam surface textures, fire effects on soil were common to depths of up to an inch and water repellency was observed at depths of up to 8 inches. Although water repellency was not typically continuous across higher soil burn severity patches, it is expected to exacerbate runoff production. Up to 7,570 acres of the River Complex are expected to exhibit water repellent soils. Little to no hydrophobicity was observed in unburned areas within the fire perimeter.

Post Fire Peak Flow Model Results:

HUC 6 and Pour Point Basin Fire Severity Summary: The Devils Canyon, Quinby Creek-New River, Big Creek and Bell Creek-New River watersheds had over 75% of their total area burned in the River Complex Fire (Figure 6). The Devils Canyon Creek Watershed experienced the greatest fire activity (93% of watershed area burned). Devils Canyon Creek Watershed also had the most acres burned at high and moderate severities (6% and 14%, respectively). It is noteworthy that high severity fire was not clustered in any single HUC 6 watershed and was scarce over the rest of the fire area.The Horse Linto Creek Watershed had the second greatest area of high severity acres at 2% and the Quinby Creek-New River, Big Creek, and Bell Creek-New River each had approximately 1% of their watershed areas burned at a high severity. In this overall context only Devils Canyon Creek clearly stands out as being the most affected by high severity fire.

While the HUC 6 numbers suggest limited impacts at the HUC 6 watershed scale, smaller watershed areas that have proportionately more area burned at high and moderate severities may experience locally greater impacts associated with fall and winter runoff events. For example the East Fork Horse Linto Creek drainage had 9% of its area affected by high severity fire. Similarly the Swede Creek drainage above the 05N04 Road had 8% of its area burned at high severity.

Figure 6 - Burn Severity Summary for HUC 6 Watersheds



Summary of River Complex BAER Values at Risk

Based on field observations and assessment of burned watershed conditions and expected responses (summarized above) and inventory of values at risk, the BAER team identified potential for post wildfire impacts on the following BAER values at risk:

Human Life and Safety

- Increased risk for forest personnel and the general public to be impacted by rolling rocks, flooding, debris flow and/or landslides and hazardous trees

Property

- USFS system roads and road
- USFS Wilderness Trails
- Water diversion and conveyance infrastructure

Natural Resources

- Critical habitat for Coho Salmon in New and Trinity Rivers and in Swede and Devils Canyon Creeks
- Wild and scenic river corridors (New and Trinity Rivers)
- Water for domestic and agricultural uses
- Native or naturalized plant communities
- Soil productivity and hydrologic function

Wildlife and Cultural/Heritage Resources:

- The BAER Team was unable to recruit a Wildlife Biologist and Archeologist. This report includes a request for BAER funds for a Wildlife Biologist and Archeologist to review burned area conditions and BAER projects, identify potential issues and/or values at risk and complete required external consultation and provide clearances.

Detailed descriptions of the type, location and spatial extent of potential impacts are summarized in the following table. Risk assessments and recommended BAER response actions (treatments) are included.

Risk Assessment Process:

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

Values at Risk Matrix:

The values at risk (VAR) matrix displayed in Table 8 below summarizes values at risk, post wildfire threats and risk ratings. Values with high or very high risk ratings are addressed, where possible, with BAER response actions (treatments). Generally, response actions are not recommended for values with low and intermediate risk ratings.

Table 8 - River Complex Values at Risk Matrix, BAER Treatments and other recommended Post-Fire Response Actions

River Complex BAER Risk Matrix											
Value at Risk	Post Fire Threats	Magnitude of Consequences				Risk			Treatment to Manage Potential Post Wildfire Impacts			
		Probability	Life	Property	Critical	Life	Property	Critical	Life	Property	Natural Resources	Other
Human Life and Safety												
Increased risk for impacts to human life and safety within burned area particularly along burned area and roads	Loss of ingress/egress rolling rocks flooding and debris flow fire weakened trees	Possible	Major			High			Area closure and installation of closure and warning signs at major points of entry			Notify NRCS County transportation and emergency services and local communities
Increased risk for impacts to human life and safety within burned area particularly along burned area trails	Loss of ingress/egress rolling rocks flooding and debris flow fire weakened trees	Likely	Moderate			High			Area closure and installation of closure and warning signs at trailheads			
Infrastructure												
NFS Roads at risk [5N04 5N13 5N13C 5N18 6N04 6N19 7N01 7N03 7N03C 7N04 7N04L 7N10A 7N10L 7N10N 7N15 7N16 7N25 28N04]	Excess of road based impacts to drainage and road drainage features	Likely		Moderate			High			Install rolling dips repair fill slopes from bypasses install critical dips construct earthen berms pull culverts or storm patrol			In addition to lowering risk to road assets the proposed treatments also reduce post wildfire threats to life safety and natural resources
Impacts to Dailey Quarry road/pit		Possible		Moderate			Intermediate			Inform landowners (pits plugs)			Notify NRCS County transportation and emergency services and local communities
Dailey Road (CR 422) stream crossings at Dailey Bell Panther Gumby Falls and Mills Creek		Likely		Moderate			High			Replacement culvert cleaning and storm patrol			Provide info to County
Increased signs at trailheads and along trails	Increased risk trail users could get lost	Possible	Major			High			Trail closure	Closure signs & warning signs at trailheads		
Water diversion and conveyance infrastructure		Likely		Moderate			High			Notify Special Uses Coordinator and NRCS		
Use of Level 1 (Closed) Roads		Likely		Minor			Low					
Aquatics												
SONCC Trout Aquatic species of Coho salmon (New River)	SONCC Coho salmon Post-fire turbidity ash and sediment delivery are expected to result in displacement or mortality of individuals within or immediately downstream from the burned area	Likely			Moderate			High		Inventory	This treatments are proposed specifically for protection of fisheries habitat but proposed roads treatments will reduce risk	Notify NOAA Fisheries
SONCC Critical Habitat of New River (temperature and sediment)	SONCC Coho salmon critical habitat. Post fire turbidity ash, and sediment delivery are expected to reduce water quality and other primary constituent elements for 1-3 years	Likely			Moderate			High		Inventory		Notify NOAA Fisheries
Smoke Creek fish passage structure for steelhead below and under Hwy 299		Likely			Moderate			High				Notify CalTrans
Water Quality												
Domestic water users (Smith Gulch Ranchera Creek creek's and unnamed springs)		Possible		Major		High			Risk		Water for irrigation and domestic use	Recommend water testing
Big Gumby Panther Baron Devils and Fawn creeks erosion causing turbidity & sedimentation into New River		Likely			Minor			Low	None			notify NOAA& NRCS Community
Wilderness Trails												
New River Trail (TR34)	Erosion of trail tread, impacts to trail at crossings trail blockage by eroded soil dry ravel and or falling burned trees Loss of ingress/egress to an inhabited drainage basin	Likely		Moderate			High			Storm inspection and response		
Devils Canyon Trail (TR13)	Erosion of trail tread, impacts to trail at crossings. trail blockage by eroded soil dry ravel and or falling burned trees	Likely		Moderate			High			Trail crossing armoring trail storm proofing treatments storm inspection and response		Cost estimate assumes use of chemicals will be authorized
Green Mountain Trail (17W08)	Erosion of trail tread, impacts to trail at crossings trail blockage by eroded soil dry ravel and or falling burned trees	Likely		Moderate			High		Closure signs	Storm proofing treatments include improving existing and lengthening trail cross drainage Storm inspection and response		
Cultural												
Potential arch sites to vandalism and erosion		Possible		Moderate			Intermediate			Arch. site evaluation and follow-up treatments		SHPO
Wildlife												
Habitat for RSO		Possible			Moderate			Intermediate		Wildlife evaluations and follow up treatments		Meet consult with FWS
Soil Productivity												
Loss of soil productivity at high to moderate SBS areas	Generally this threat is limited to high soil burn severity areas which occupy less than 3% of the burned area	Likely			Moderate			High				None for sheep and cattle
Wild and Scenic River Corridor												
Wild and Scenic River Corridor	Potential impacts to wild and scenic corridor ORVs (roads from fisheries) and ecological functioning condition	Possible			Minor			Low				Assessment of ORVs needed
Geology												
Outcrops Damage to life or infrastructure	Increased rock fall potential	Possible	Major	Moderate		High	Intermediate		Area Closures Warning signs			Notify NRCS, County transportation and emergency services and local communities
Outcrops Damage to life or infrastructure	Increased debris flow potential rock fall and landslide potential	Likely	Major	Moderate		High	High		Area Closures Warning signs			Notify NRCS, County transportation and emergency services and local communities
Botany												
Native plant communities and sensitive species habitats	Establishment or spread of invasive weeds such as Bull thistle Yellow Star thistle and Saint Johnspart along access roads	Likely			Moderate			High				Monitor weed detection survey Treatment by weed pulling and application of chips Close road 7N03

Life and Safety Value at Risk: Forest Users and Personnel: The BAER team identified increased risk for potential impacts to life and/or safety of Forest visitors and personnel entering the burned area. Potential threats include rolling rocks, flooding, debris flows and/or landslides, sediment or debris delivery to hazardous trees, loss of road or trail tread, and loss of ingress/egress. Generally, increased risk occurs within or directly down-slope from high and moderate burn severity areas.

The proposed burned area closure for Forest visitors will limit exposure. Installation of warning signs outreach efforts to share key information from the BAER report will also lower the probability that life and/or safety could be impacted by post wildfire processes.

- Probability of Damage or Loss: Possible
- Magnitude of Consequence: Major
- Risk Level: High

Private Property (Property and Life Safety): Private Homes and Structures: The BAER team did not identify any private residences or structures at increased risk from post wildfire processes. However, extensive inventory of structures and other values on private land was not conducted. Information sharing and outreach efforts with NRCS, County departments of transportation and emergency services and potentially affected communities are proposed to increase awareness of burned area conditions and potential impacts to private values.

Property Value at Risk: Water Diversion and Conveyance Infrastructure:
The BAER Team identified several permitted water diversions. The BAER team did not complete an extensive inventory of all water diversions in the burned area. It is likely these diversions and associated water conveyance and/or storage infrastructure could be impacted by sediment and/or debris. In most cases, adaptive responses such as shutting down diversions when sediment laden flows occur could be an effective mitigation strategy If the consequences are moderate, the risk rating is high. Information sharing and outreach efforts with the USFS permit administrator, NRCS, and potentially affected parties are recommended to increase awareness of burned area conditions and potential impacts to water infrastructure.

Property Value at Risk: Forest Service Roads

As described in the BAER roads, hydrology and geology reports there is potential for significant damage to occur on roads within the fire perimeter. In addition to impacts to Forest Service roads, this report also describes increased risk for the safety of road users and the potential for erosion or failure of roads to exacerbate impacts to water quality and/or fish habitat.

Potential impacts to roads include erosion of road tread, damage to road drainage features, sediment or debris deposition on roads and impacts to road crossings. Road fill slope failures and compromised road subgrades caused by tree root and log burning under roads were also observed. For complete details see engineering report in project folder.

Risk Assessment – Forest Service roads

- Probability of Damage or Loss: Likely. This determination is based on the expectation that increased erosion and sediment will occur and could plug drainage structures along roads.
- Magnitude of Consequence: Moderate. This determination was made based on the amount of damage that would occur if culverts were temporarily plugged.
- Risk Level: High

Property Value at Risk: Forest Service Trails

The values at risk are segments of trail systems. As a direct consequence of the fire there is a large risk of damage to trails caused by high rates of post fire run-off, soil erosion, and dry ravel. In addition, fire-damaged trees will fall across trails. Not only will this added material result in trail tread eroding flow patterns, but it will also obscure trail definition, causing users to wander off the established trail, especially at switchbacks. Repeated off-trail travel will eventually re-define a new trail that will most likely be non-conducive to natural water flow and subject to erosion.

Some segments of the system trails have been found to be at high risk of damage and/or loss. These findings are based on on-the-ground surveys, their proximity to moderate and high burn severity areas, and erosion hazard modeling based on slope, soil characteristics, and burn severity. The trails with segments found to be at high risk within the River Complex are the New River Trail (7E05), the Devils Canyon Trail (12W13), and the Green Mountain Trail (12W08). The New River Trail has two segments with pre-fire slumping issues. These pre-existing risks to the trail will be exacerbated by post-fire conditions. They will require post-storm inspection and may require emergency repairs in order to maintain access to an inhabited mining claim. The mid-slope portion of the Devil's Canyon Trail crosses sixteen tributaries, eight of which originate in areas of moderate or high soil burn severity. These crossings are at high risk of erosion, and substantial portions of the trail are likely to become covered by dry ravel and downed trees. In addition, the upper 0.8-mile segment of this trail in an area of moderate soil burn severity and is at high risk of erosion damage and loss of trail definition. Segments of the Green Mountain Trail totaling 2.0 miles are in or near areas of moderate or high soil burn severity and are at high risk of erosion damage and loss of trail definition. For complete details see Recreation report in project folder.

- Probability of Damage or Loss: Likely.
- Magnitude of Consequence: Moderate.
- Risk Level: High

Water Quality – Human Use Value At Risk: Impacts to Domestic water users (Scotts Gulch, Rancheria Creek creeks and Un-named Springs)

Numerous small water systems are scattered throughout the River Complex fire area. The majority of these water systems are associated with private property and are located on mid to lower slopes of the New River and other drainages. Burn severity mapping indicates that these systems were not directly impacted by high severity fire, however many of the systems are located below hillslopes that burned at in the River Complex. Systems that take water from streams in burned watershed will likely experience issues with turbidity and potential damage to system infrastructure during fall and winter storms. Systems that take water from springs will have a lower potential for impacts.

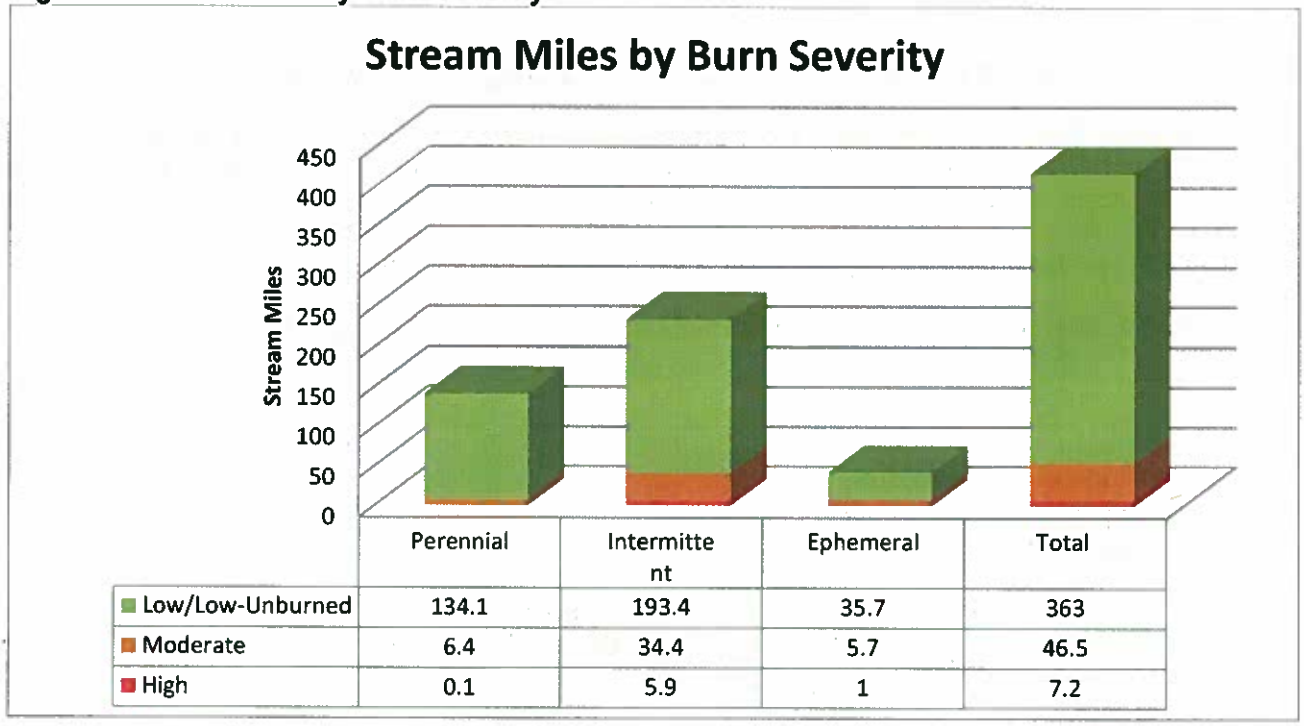
- Magnitude of Consequences: Major
- Probability of Damage or Loss: Possible
- Risk: High

Treatments: Share assessment information with water users and NRCS. Increase maintenance at water intake facilities. Monitor system during storm events. Consider adding storage to ensure a clean water source during high turbidity events. Also see recommended treatments for water diversion and conveyance infrastructure.

Natural Resource Value at Risk – Water Quality and Aquatic/Riparian Habitats

The River Complex burned a total of 417 miles of perennial, intermittent and ephemeral streams in 10 HUC 6 watersheds. There are about 141 miles of perennial streams, 234 miles of intermittent streams and 42 miles of ephemeral streams within the fire perimeter. Figure shows the miles of channel located within each burn severity type. Many of these channels have burned previously in the numerous fires that have occurred over the past 16 years. Field reviews suggest that stream channels that were located in previous burn areas did not burn as hot as those that located in areas that had not burned within the past 30 years (though this was not always the case – e.g. East Fork Horse Linto Creek).

Figure 7: Stream Miles by Burn Severity.



	Perennial	Intermittent	Ephemeral	Total
Low/Low-Unburned	134.1	193.4	35.7	363
Moderate	6.4	34.4	5.7	46.5
High	0.1	5.9	1	7.2

Based on burn severity mapping the River Complex has had similar effects to the previous fires. High and moderate severity burn areas have mostly occurred in headwater drainages burning though ephemeral and dry intermittent draws. Field observations by BAER personnel indicate that perennial channels in the River Complex generally experienced low severity burns that affected understory vegetation but left most overstory vegetation intact. The field observations agree with a GIS analysis that looked at channel types and burn severity within the River Complex. The analysis indicates that the vast majority of the stream miles that were affected by the burn were located within low to low-unburned severity areas and less and only 6.4 and 0.1 miles of channel were burned at moderate or high severities, respectively.

The probability of damage to some aquatic and riparian habitats is likely particularly for aquatic/riparian channel networks that are located within and downstream of high and moderate severity burn areas, but the overall risk to the entire channel network is low. The potential for impacts is greatest in the headwater channel network where ephemeral and intermittent channels burned at higher severities. These channels will likely see an influx of fine and course sediments that will be routed to downstream perennial channels. Water temperature could also be affected in areas where the majority of the

channel canopy (understory and/or overstory) has been removed. Recovery of channel canopy cover will be variable and take years to decades depending on the vegetation types that were lost in the fire.

- Magnitude of Consequences: Minor
- Probability of Damage or Loss: Likely
- Risk: Low

Treatment: No channel treatments are recommended. Treatments associated with road stream crossings will effective in reducing the probability of damage or loss of aquatic and riparian habitats located downstream of the treatment areas.

Natural Resource Value at Risk Description – New River Wild and Scenic River Corridor

The New River Wild and Scenic River Corridor was also analyzed for burn severity effects. The New River Wild and Scenic River corridor occupies 4,397 acres within the River Complex Fire Perimeter (0.25 miles on either side of River). The New River mostly burned at low to low/unburned severities (Table 9). The New River has 7.3 miles of Wild, 5.0 miles of Scenic and 8.7 miles of Recreation Wild and Scenic River designations (Shasta-Trinity National Forest FEIS, 1994).

Table 9: New River Wild and Scenic River Corridor Burn Severity Acres

Wild and Scenic Corridor	Low / Low-Unburned	Moderate	High
Acres and (%)	4260 (97%)	136 (3%)	<1 (0%)

- Magnitude of Consequences: Minor
- Probability of Damage or Loss: Unlikely
- Risk: Very Low

Treatment: No treatments recommended for Wild and Scenic River Corridor specific to this value at risk. See Fisheries and Water Quality and Aquatic/Riparian habitat treatments for additional information of protection of water and fisheries resources.

Natural Resource Value at Risk – Water Quality

Runoff and flooding will be expected in areas that burned moderate to high with flows increasing from 40 to 110%. This will overwhelm many crossings causing accelerated erosion and sedimentation.
Access to private property in the burn area was limited; therefore, reviews included aerial reconnaissance and air photo interpretation. No buildings or other improvements appear to be at risk of flooding, due to these features being situated well away from stream channels.

- Magnitude of Consequences: Moderate
- Probability of Damage or Loss: Unlikely
- Risk: Low

Treatment: Share assessment information with private property owners and NRCS.
Increased post-fire flood flows may overwhelm existing NFS road crossing structures, causing washouts, and stream diversion down the road. This can result in a threat to public safety, damage to infrastructure, and increased sediment delivery to downstream channels. In order to determine whether

increased post-fire flows will threaten existing crossing structures, the predicted peak-flows were compared to culvert capacity charts produced by the Federal Highway Administration (Lester, 1972).

- Magnitude of Consequences: Moderate/High
- Probability of Damage or Loss: Likely
- Risk: High/Very High

Treatment: Implement Forest Service road treatments identified in the roads report. Share assessment information with County

Turbid water from the burned area will impact the quality of domestic and irrigation water within and downstream of the complex. This impact will be short-term and only occur during and shortly following storm events.

- Magnitude of Consequences: Minor
- Probability of Damage or Loss: Very likely
- Risk: Low

Treatment: Share assessment information with water users and NRCS. Increase maintenance at water intake facilities. Consider adding storage to ensure a clean water source during high turbidity events. For complete details see Hydrology report in project folder.

Natural Resource Value at Risk Description – Fisheries

SONC Coho salmon:
The designated critical habitat in the Trinity River is outside (downstream) of the River Complex fire perimeter. However, the River Complex burned over portions of New River, East Fork New River, Devils Canyon, Fawn Creek, Bell Creek, Swede Creek and Italian Creek; primarily at low to moderate intensity and severity. Fire behavior in these drainages appears to have been moderated by higher fuel moistures in the riparian areas. Unburned vegetation (including canopy) remains along the majority of the streams within the River Complex. The prevailing stream gradients in the affected tributaries of New River and Trinity River within the River Complex perimeter are greater than 4%. These tributaries are source and transport reaches that are expected to efficiently deliver and route bedload (sediment) downstream to response reaches in New River and Trinity River. Further sediment routing, sorting and storage in New River and Trinity River will be dependent on the frequency, magnitude and duration of post-fire discharges.

Approximately 8.2 miles of the designated critical habitat in Devils Canyon is within the River Complex perimeter, and burned over at low intensity and severity, leaving the riparian corridor intact. However, portions of the headwaters of Devils Canyon were burned at moderate to high severity and intensity. There is a substantial amount of moderate and high soil burn severity within these upper drainages least downstream to the New River confluence. The prevailing stream gradient in Devils Canyon is greater than 4 is expected to result in increased peak discharges with sediment and ash delivery to Devils Canyon. Approximately 70% of mainstem Devils Canyon is a transport reach that is expected to efficiently route bedload (sediment) downstream to New River. Further sediment routing, sorting and storage in New River will be dependent on the frequency, magnitude and duration of post-fire discharges. However, there are four short response reaches in Devils Canyon (approximately 30% of the mainstem) that are expected to aggrade, store and sort bedload in the aftermath of the fire. No

road-stream crossings were noted in Devils Canyon, which will facilitate fish dispersal and recolonization in the aftermath of the fire.

The designated critical habitat in the Italian Creek drainage is outside (downstream) of the River Complex fire perimeter. The River Complex burned over the extreme headwaters of the Italian Creek drainage at low intensity and severity. Unburned vegetation remains along nearly all of Italian Creek and its tributaries. Therefore, this drainage is not expected to exhibit a marked increase in erosion and sediment delivery in the aftermath of the fire. Baer Team reconnaissance noted one 36" CMP stream crossing (FR 5N04) on an intermittent headwater channel of Italian Creek. This culvert has the potential to plug with floatable debris in the aftermath of the fire. The prevailing stream gradient in mainstem Italian Creek is greater than 4%, which is generally not conducive to Coho salmon essential feeding, breeding or sheltering behaviors.

Approximately 1.8 miles of the designated critical habitat in Swede Creek is within the River Complex perimeter, and burned over at low intensity and severity, leaving the riparian corridor intact. However, the headwaters of Swede Creek were burned at moderate to high severity and intensity. The substantial amount of vegetation mortality and moderate-to-high soil burn severity within this sub-watershed is expected to result in increased water temperatures and peak discharges with sediment, turbidity and ash delivery to Swede Creek downstream to the Trinity River confluence. The Hwy 299 crossing of Swede Creek is augmented with wooden baffles throughout and a fish ladder at the outlet. This arch is a bankfull constriction. Post-fire flows with associated bedload and debris pose a threat to the structural integrity of the baffles and fish ladder. The prevailing stream gradient in mainstem Swede Creek is greater than 4%, which is generally not conducive to Coho salmon essential feeding, breeding or sheltering behaviors.

Approximately 1.4 miles of the designated critical habitat in Bell Creek is within the River Complex perimeter, and burned over at low intensity and severity, leaving the most of the riparian corridor intact. Fire behavior in this drainage appears to have been moderated by higher fuel moistures in the riparian areas. However, the several patches in the headwaters of Bell Creek were burned at moderate severity and high intensity. The minor amount of vegetation mortality and moderate soil burn severity within this drainage is not expected to result in increased peak discharges, but may produce sediment, turbidity and ash delivery to Bell Creek downstream to the New River confluence. The prevailing stream gradient in mainstem Bell Creek is greater than 4%, which is generally not conducive to Coho salmon essential feeding, breeding or sheltering behaviors.

Additional observations:
The County Road 402 crossing of Quinby Creek is comprised of twin 13' CMP culverts. This stream crossing is an AOP barrier, due to slope and perched outlets. No fish were observed upstream of this structure. Approximately 0.25 miles upstream of the County Road 402 crossing of Quinby Creek is an 8' tall log crib dam water diversion structure with 12" PVC water line. During BAER reconnaissance, this structure was diverting over 50% of the Quinby Creek stream discharge into the water line, which was routed toward Denny. This water diversion structure is an AOP barrier, due to the height of the log crib dam. There is approximately one mile of stream habitat with less than 4% gradient in Quinby Creek upstream of the County Road 402 crossing and the log crib dam water diversion structure. This low-gradient stream habitat is generally conducive to Coho salmon essential feeding, breeding or sheltering behaviors.

The potential for a significant disruption of essential feeding or sheltering behaviors of juvenile SONC Coho salmon during the drafting/dipping operations may not be discountable. All dozer lines were rehabilitated with slash and water-bars as needed minimize or avoid erosion and sediment delivery to potentially occupied Coho salmon habitat. Therefore, the quantity of sediment delivery from the fireline

construction to occupied Coho salmon habitat is expected to be insignificant. There were reported deliveries of fire retardant to streams on NFS lands. Therefore, the potential for lethal or sub-lethal affects to juvenile SONC Coho salmon within or downstream from surface water contaminated by retardant may not be discountable. Burnout operations occurred along the firelines. There is no conspicuous demarcation between the area affected by the burnout operation and the area affected by the advancing wildfire. Low soil burn severity was observed adjacent to the vast majority of the firelines, as indicated by incompletely consumed duff and intact roots. However, moderate and high soil burn severity resulted from reported burnout operations on the west side of FR 5N13C and FR 5N13E, in the headwaters of Swede Creek. Given the distance between the SONCC Coho salmon critical habitat in Swede Creek and the observed moderate to high soil burn severity along the FR 5N13C, the potential for sediment and ash delivery from the burnout operations to SONCC Coho salmon critical habitat is not discountable.

Risk Assessment - Fisheries

- Probability of Damage or Loss: Likely.
- Magnitude of Consequence: Moderate.
- Risk Level: High

The risk assessment is based on:
SONCC T&E Aquatics species of Coho salmon (New River): SONCC Coho salmon: Post-fire turbidity, ash, and sediment delivery are expected to result in displacement or mortality of individuals within or immediately downstream from the burned area.

SONCC Critical Habitat of New River (temperature and sediments): SONCC Coho salmon critical habitat: Post-fire turbidity, ash, and sediment delivery are expected to reduce water quality and other primary constituent elements for 1-3 years.

No land treatments are proposed specifically for protection of fisheries habitat but proposed roads treatments will reduce risk. Information sharing with CalTrans on anticipated impacts to a fish passage structure near HW 299 is recommended. NOAA fisheries should also be notified. For complete details see Aquatics report in the River BAER project folder.

Natural Resource Value at Risk: Soil Productivity

Soil productivity on steeper slopes could be compromised in the areas that have burned at high soil burn severity and contain a water repellent layer. Portions of Devils Canyon, Bell, and Quinby Creek are at risk based on a lack of soil cover, deep soil charring, and steep slopes that could erode productive topsoil. For complete details see Soils report in project folder.

Risk Assessment – Soil Productivity.

- Probability of Damage or Loss: Likely.
- Magnitude of Consequences: Moderate.
- Risk: High

Natural Resource Value at Risk: Threatened and Endangered, Sensitive, and Invasive Plants

Plant Communities of the River Complex Burned Area

Elevation range approximately 963-7079 feet

Plant Communities	mixed conifer/hardwood with ponderosa pine and Douglas fir
	montane chaparral
	springs and seeps*
	serpentine outcrops & barrens*
	alder/willow riparian woodland*
* = special habitats	perennial and ephemeral/intermittent streams*

There are no known locations of federally Threatened or Endangered plant species within the fire area. There are Forest Service Sensitive or Survey and Manage species locations within the fire area.

Forest Sensitive & Endemic Botanical Species

No federally listed Threatened or Endangered plant species or their critical habitats are known to occur within the River Fire Complex. Six Forest Service Sensitive or Forest Plan Endemic plant species are documented within that same area. They are shown in the following table.

Scientific Name	Common Name	Symbol
Cypripedium fasciculatum	clustered lady's slipper	CYFA
Cypripedium montanum	mountain lady's slipper	CYMO2
Lewisia cotyledon var. *heckneri*	Heckner's Lewisia	LECOH
Erythronium citrinum var. *roderickii*	Roderick's fawnlily	ERCIR
Penstemon filiformis	Threadleaf beardtongue	PEFI2
Sedum obtusatum ssp. *paradisum*	Canyon Creek stonecrop	SEOBBP2

Recommendations: Re-visit known populations and document any damage to them. Determine if there are any measures that may be possible to aid their recovery and implement them. Monitor the recovery. These steps and the costs involved are unknown quantities until such time as the field visits can be made.

Invasive plants and Noxious Weeds

The following table refers to known invasive plant and noxious infestations along major access roads to the fire perimeter. Additional weeds populations were observed in developed and repeatedly disturbed areas adjacent to the burn. Priority infestations for treatment are those adjacent to dozerlines, hand lines, drop points and riparian areas.

Invasive plant species known to occur in or within 1 mile of the River Fire are shown in the following table.

Scientific Name	Common Name	Symbol	CDFA Weed List
Hypericum perforatum	St. Johnswort	HYPE	
Centaurea solstitialis	star thistle	CESO3	
Cirsium vulgare	bull thistle	CIVU	B
Cynosurus echinatus	hedgehog dogtail	CYEC	

The value at risk is the ecosystem health and integrity of the native plant communities within the burned areas. The threat is the potential loss of that health and integrity due to new invasive plant introductions and invasive plant spread from existing infestations which could inhibit the return of the native plant communities and crowd out recovering native vegetation resulting in nonfunctioning or poorly functioning ecosystems. The deep taproots of these aggressive species are able to access soil water previously utilized by native vegetation, making it unavailable to the new growth of the native species. For these reasons, loss of the ecosystem health and integrity of the native plant communities from weed invasion in the burned area is an emergency requiring mitigation.

A weed washing station arrived a few days after the fire began and was used on equipment accessing the fire area. Although a weed washing station was set up for vehicles and heavy equipment to mitigate the spread of invasive/or noxious weeds it is anticipated that these existing infestations along access roads to the fire may contribute an added threat to the overall risk (refer to the Noxious Weed Report). Some of the individuals were burned, however significant patches of infestations persisted and seeds in the soil probably survived due to their high heat tolerance and low/moderate burn intensity. There is a high potential for these infestations to hinder the regeneration of native vegetation, especially in the early seral stages, through increased fire intervals and competition for nutrients.

The value at risk ratings and treatments for the fire are as follows:

Risk Assessment – River Complex Fire Invasive Plants

- Probability of Damage or Loss: Likely. There is a likely probability of spread and introduction of non-native invasive plants into areas disturbed by the fire.

- Magnitude of Consequences: Moderate. Damage to these plant communities would be considerable and long-term. Fire suppression related activities along dozerlines, helicopter landings, drop points and hand crew activities may have introduced yellow star thistle, hedgehog dogtail, St. Johnswort and bull thistle.

Risk Level: High. Weed detection surveys would occur in the priority areas of dozer lines, drop point, roads, and small, known invasive plant infestations would be conducted outside the fire. Rapid response treatments by manual removal would occur where new, small invasive plant occurrences are discovered. Where large invasive plant occurrences are discovered, additional funding for treatment of these sites may be requested. For complete details see Botany report in project folder.

B. Emergency Treatment Objectives:

To allow safe passage of water to protect infrastructures, watersheds, cultural sites, and fish habitat from accelerated sheet and rill erosion. Also, to protect watersheds from the spread of noxious weeds. Risk determination is dependent on the design storm selected and downstream values at risk. By using a set of average storms (2, 5, and 10-year events) emergency planning measures can be designed to mitigate and minumize anticipated risks. Using a 2-year design storm the values at risk can be evaluated to determine if an emergency exists for a typical winter storm.

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

Land **80** % Channel **n/a** % Roads/Trails **95** % Protection/Safety **90** %

D. Probability of Treatment Success

	Years after Treatment		
	1	3	5
Land	90%	85%	80%
Channel	n/a	n/a	n/a
Roads/Trails	95%	90%	85%
Protection/Safety	95%	90%	85%

E and F. Summary of VARTool Calculations (see Appendix D):

- Market Resource Values (direct losses and loss of use): $10,180,000
- River Complex Treatment Cost: $497,589
- Expected benefit of treatment $4,991,000
- Benefit/cost ratio=10.1

The VARTool Calculation Spreadsheet is available in project file. As described in this report, threats to life/safety and non-market cultural and ecological values exist throughout the burned area. These values were decribed in the VARTool Assessment but not considered in the benefit/cost ratio. Although not represented in the calculations, all proposed treatments reduced risk for multiple market and non-market values at risk. These important indirect benefits are not represented in the calculations.

G. Skills Represented on Burned-Area Survey Team:

Hydrology	Soils	Geology	Engineering	Recreation
Fisheries	GIS	Botany	Noxious Weeds	Forestry

Note: The team was unable to recruit a Wildlife Biologist and an Archeologist but funds will be requested for BAER project review and consultation as needed.

Team Leader: Brad Rust	Email: brust@fs.fed.us	Phone: 530-226-2427	FAX: 530-226-2485

Tina Lynsky	District Ranger	tlynsky@fs.fed.us
Dave Young	BAER Team Coordinator	dyoung@fs.fed.us
Cathy Carlock	Logistics	ccarlock@fs.fed.us

H. Treatment Narrative for Forest Service:

Land Treatments:

Noxious Weed Detection Surveys (**Table 10**)
Completion of weed inventory and treatments along access roads, dozer lines, staging areas, known sensitive and invasive plant populations and rare plant suitable habitat will be the primary focus. The secondary survey priorities will be along riparian areas, handlines, drop points and helispots. Surveys of the general habitats in the burned area will be the lowest priority. All locations of weed species will be mapped, using the Shasta-Trinity NF invasive Weed List. Surveys would be completed using the NRIS protocol available at the national website: http://fsweb.nris.fs.fed.us/products/TESP Invasive Species/documentation.shtml. Results would be entered into the NRIS database.

Surveying will include documentation and hand pulling new weed occurrences at the time of inspection, where practical. New weed occurrences will be pulled to root depth, placed in sealed plastic bags, and properly disposed. All dozer lines on Forest Service land that are associated with this fire should be surveyed in 2016, with new infestations mapped and all infestations hand treated.

Seeding and MulchingTreatments
Roadways are the primary conduit of noxious weed introduction as weed seeds and plant parts are carried on the tires and undersides of vehicles. Noxious weeds are typically introduced closest to the road and spread along disturbed or suitable habitat if left unchecked. To discourage noxious weed introduction on constructed dozer line leading into the interior of the fire, intersections of dozer lines and accessible roads should be seeded with native seed and mulched with weed-free straw. Chipping the first 50 feet of intersections of dozer lines that intersect with actively used roads with on-site woody material to a depth of 4-6 inches should discourage noxious weed introduction, which should discourage spread further down individual dozer lines.

Table 10 – Noxious Weed Detection and Response Survey

Noxious Weed Survey and Hand Pulling				
Item	**Unit**	**Unit Cost**	**# of Units**	**Cost**
1 GS-11 botanist	Days	$385	10	$3,850
2 GS-7 weed technicians	Days	$440	100	$44,000
Supplies	Each	$2,000	1	$2,000
Vehicle gas mileage	Miles	$0.22	25,000	$5,500
Vehicle FOR	Month	$5.00	50	$250
			Total Cost	**$53,560**
Chipping Treatment				
Item	**Unit**	**Unit Cost**	**# of Units**	**Cost**
1 GS-9 Engineer	Days	$300	5	$1,500
1 Chipper w/ crew members	Days	$1000	5	$3,600
Vehicle gas mileage	Miles	$0.22	800	$176
Vehicle FOR	Days	$5.00	5	$25
			Total Cost	**$5,301**
			Final Cost	**$58,861**

Natural Recovery
Vegetation in the mixed conifer will recover slowly. Even in areas of moderate soil burn severity, the canopy was mostly killed and the seed source removed. Stands with an element of Ponderosa pine and Doug fir will likely recover more quickly, since at least a few mature trees are likely to have survived to produce seed into newly exposed mineral soil. The montane chaparral shrubs were mostly killed by the fire, but fire stimulates manzanita seeds stored in the soil to germinate along with madrone and other re-sprouting species.

Hillslope mulching
Hillslope mulching was considered but not recommended since slopes were too steep and values at risk were not great enough to justify treatments.

Road and Trail Treatments:

Roads Treatments
The base upon which the roads are built varies from bed rock to sub-surface soils and alluvial deposits. Lack of maintenance of some of the roads has resulted in significant surface and template degradation in a few locations. Although it is recognized that BAER is not intended to correct past maintenance deficiencies, the drastically changed conditions resulting from wildfire impose urgency for correction on some of those situations. The work proposed herein is intended to stabilize the identified roads and structures in preparation for the anticipated increase in erosion potental from storm water runoff. Additionally, several work elements involve public safety hazards or protection of other resources.
The specific recommendations are noted in the Appendices.

Recommended road treatments include installation, improvement or cleaning of culvert inlet structures, relief culverts, overside drains, dips and low water crossings. Debris removal from channels above culverts, out-sloping, storm patrol and closures are also proposed.

Treatments would be implemented on high risk sections of roads downstream from moderate and high soil burn severity burned areas. These treatments were identified as the most cost effective solutions with the highest probability of success to mitigate damage from the post fire stormwater events to the transportation system.

Treatment Objectives: To repair damage caused by the fire, provide safe travel on the public transportation system and to mitigate future damage to the transportation system caused by post fire watershed conditions.

County Road 402: The BAER team recommends outreach and information sharing with the Trinity County departments of transportation and emergency services to discuss burned area conditions and potential post fire impacts on County Road 402 (Denny Road) and on road users.

Road Storm Patrol
General Description: The patrols are used to identify road problems such as plugged culverts and washed out roads, and to clear, clean, and/or close roads that are or have received damage. Those conducting storm patrols shall have rapid access to a backhoe and dump truck that can be used when a drainage culvert is plugged or soon to be plugged, to repair any road having severe surface erosion, or to clean debris from roadside drainage ditches. Patrols will also monitor the movement of large woody debris and make a determination of whether or not the material should be removed before it

contacts the structures.

Locations (Suitable Sites): Patrols are based on the areas expected to have or that did have localized precipitation events. Secondly, patrols should then focus on those roads that receive the most traffic and are of more value to the transportation system.

Design/Construction Specifications:

1. FS personnel will direct the work.
2. Immediately upon receiving heavy rain and spring snowmelt the FS will send out patrols to identify road hazard conditions. Observations of rocks and sediment causing washouts and plugged culverts are identified and corrected before they worsen or jeopardize motor vehicle users.
3. The road patrol personnel bring 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.

Purpose of Treatment: Roads within the River Complex contain drainage structures that cross streams located in watersheds having areas of high to moderate soil burn severity. These flood source areas have a greater potential for increased runoff and debris flows. These increases in flows pose a threat to the existing crossings which may result in plugging culverts or exceeding their maximum flow capacity. If these flows plug drainage structures the result could be unacceptable erosion and debris torrents further down the drainage from the failure of the fill slope of the road. There is an immediate and future threat to travelers along these roads within the burned area due to the increased potential for rolling and falling rock from burned slopes and increased potential for falling trees, flash floods and mudflows. With the loss of stabilizing vegetation, normal storm frequencies and magnitudes can more easily initiate rill and gully erosion on the slopes and it is likely this runoff will cover the roads or cause washouts. These events make for hazardous access along steep slopes and put the safety of users at risk.

Treatment Effectiveness Monitoring: Engineering and District personnel will survey the roads within the fire perimeter after high-intensity winter storms in 2015 and spring 2016 runoff. Survey will inspect road surface condition, ditch erosion, and culverts/inlet basins for capacity to accommodate runoff flows.

Table 11 - Treatment Costs

Shasta-Trinity NF Roads				
Road #	**Description of Work**	**Miles of Road**	**Total Work**	**Cost / Mile**
5N04[1]	Storm proffing with inproved drainage structures and features. Patrol	19.4	$86,400.00	$4,453.61
5N04C	Storm proffing with inproved drainage structures and features.	2.5	$10,700.00	$4,280.00
5N13	Storm proffing with inproved drainage structures and features. Patrol	8.1	$19,830.00	$2,448.15
6N04	Storm proffing with inproved drainage structures and features. Patrol	4.4	$29,420.00	$6,686.36
7N03	Storm proffing with inproved drainage structures and features. Patrol	3.4	$21,335.00	$6,275.00
7N03C	Storm proffing with inproved drainage structures and features.	0.3	$1,950.00	$6,500.00
7N04	Storm proffing with inproved drainage structures and features. Patrol	1.8	$14,290.00	$7,938.89
7N15[2]	Storm proffing with inproved drainage structures and features. Patrol	3.5	$17,100.00	$4,885.71
Shasta-Trinity NF - TOTAL 43.4		**43**	**$201,025.00**	**$4,631.91**
Six Rivery National Forest				
Road #	**Description of Work**	**Miles of Road**	**Total Work**	**Cost / Mile**
7N10	Storm proffing with inproved drainage structures and features. Patrol	2.8	$8,074.00	$2,883.57
7N53	Storm proffing with inproved drainage structures and features. Patrol	3.2	$15,370.00	$4,803.13
Six Rivers NF- TOTAL 6		**6**	**$23,444.00**	**$3,907.33**
	TOTAL WORK		**$224,469.00**	
	Estimated Cost, Force Account (Cost + 15%)		$258,139.35	$5,953.91
	Estimated Cost, Contracting (Cost + 10%+20%)		$296,299.08	$6,833.17

NOTES: 1. Survey of 5N04 was incomplete. Road was blocked by rock fall and large log(s) about ½ mile north of 5N04C. Cost represent estimated quantities for some items on full road and actual surveyed quantities for drainage structures. Actual cost for all necessary work to satbilize road may be 30% more.

2. Maintenance of 7N15 is shared (in practice) with Miller Ranch.

Trails Treatments

Close trails affected by fire (as part of an area closure) and install trail erosion structures (rolling dips, check dams, log erosion barriers, and drainage armoring) to maintain natural drainage patterns and maintain trail stability during increased flows. Rolling dips, check dams, and log erosion barriers (LEBs) will stabilize trail tread and prevent further erosion caused by the loss of vegetation and root systems previously supporting outer trail edge. Armoring key ephemeral drainages is done by placing rock in a rip-rap fashion below trail in drainages to dissipate energy of across trail water flows and prevent down

slope head cutting and trail loss. LEBs may be used in place of rock armoring when rock is unavailable.

The treatments recommended for the New River Trail are post-storm inspection of the problem areas, with emergency repairs if needed. It is estimated that ten inspection/repair patrols, each requiring two people for one eight-hour day, will be required over a six month period (November 2015 through April 2016).

The treatments recommended for the Devil's Canyon Trail are to armor the eight key key stream crossings, with evaluation and possible armoring of eight others, and to install approximately twenty rolling dips on the uppermost 0.8-mile segment of the trail.

The treatments recommended for the Green Mountain Trail include approximately 0.4 miles of berm removal, cleaning/repair of 30 existing rolling dips, installation of 42 new rolling dips, and installation of 10 log check dams.

All treatment costs and time estimates encompass log outs to get crew and mule support to work sites and camp sites as well as felling hazardous trees around campsites and work sites where prolonged exposure to hazard trees will occur. These estimates (as well as for log check dam creation) are based on the assumption chainsaw approval within wilderness areas will still be in place. If traditional primitive tools are to be used time and costs will increase significantly. The probabilities of completing the prescribed treatments before the first significant rains are minimal without the use of power tools.

Estimated costs for these treatments are summarized in the following table.

Table 22 – Trail Treatments per Trail and Total

Trail Treatments				
Item	Unit	Unit Cost	# of Units	Total Cost
New River Trail	project	$4,850	1	$4,850
Devil's Canyon Trail	project	$15,000	1	$15,000
Green Mountain Trail	project	$20,000	1	$20,000
Closure and Warining Signs	project	$500	1	$500
Total				**$40,350**

Trail Storm Patrol

General Description: The patrols are used to identify hillslope erosion that may be causing damage to the trail and to monitor the effectiveness of the trail drainage and stabilization treatment to ensure sustainability of trail facility. The objective is to determine if excessive erosion events are occurring from concentrated trail runoff. Areas of concern will be prioritized where accumulated values increase the magnitude of consequences of loss from damage.

Suitable Sites: This treatment is intended for the Green Mountain and New River Trails.

Treatment Effectiveness Monitoring: A Forest Service employee will monitor the effectivess of the treatments.

Protection/Safety Treatments

Burned Area Closure and Warning Signs

Posting of areas burned will alert the public to potential dangers of falling trees and rolling rocks. For roads, the recommended treatment is installation of closure and warning signs at major points of entry. Roads requiring such signage are Forest Roads 5N13, 5N04, 6N10, 7N04, 7N10, and 7N26 and Trinity County Road 402. For trails, the recommended treatment is installation of closure and warning signs at all trailheads within or leading to the burn area. Trailheads requiring such signage are 6E08 (Horse Ridge), 7E05 (New River), 12W08 (East Fork), 12W11 (Jim Jam), 12W13 (Devil's Canyon), 12W09 (Green Mountain), and 8E08 (French Creek).

Fisheries Management Recommendations

- Monitor water quality, temperature and habitat in New River, Trinity River, Devils Canyon, Bell Creek, Swede Creek and Italian Creek to evaluate concerns regarding post-fire threats to SONC Coho salmon and their designated critical habitat.
- Consult with the Regional Water Board regarding the channel alteration and magnitude of surface water diversion observed during the BAER reconnaissance in Quinby Creek.
- Consult with CalTrans regarding the condition and post-fire threats to the fish passage structure at the Hwy 299 Swede Creek crossing.
- Consult with Trinity County Roads Department regarding fish passage barriers at Bell Creek, Panther Creek and Quinby Creek under County Road 402.
- Inventory AOP at road-stream crossings in Big Creek.
- Inventory water diversions/withdrawals and monitor in-stream flows in Quinby Creek.
- Restore connectivity at identified AOP barriers to facilitate fish dispersal and recolonization in the aftermath of the fire.

Implementation Team Leadership and Coordination

Interagency Coordination:
Interagency coordination started during the fire and continued throughout the BAER Assessment. Continuing this coordination by providing the BAER Assessment Report, specialist reports and attending meetings is anticipated. In addition, letters detailing potential physical responses and impacts from the fire that may influence safety in and downstream of the fire area will need to be composed and sent to all public and private stakeholders at risk from increased sediment and flooding. Funding is requested for agency coordination, Implementation team lead, and for the Forest BAER Coordinator to ensure continued coordination with cooperating agencies, prompt implementation, and tracking of BAER treatments, and installation of burn area warning signs. The facilitation may include: phone calls, meetings, and field trips to the affected areas.

Implementation Team Leadership:
This effort involves communication and coordination with other federal, state, and local agencies with jurisdiction over adjacent lands and inholdings where life and property are at risk from post-fire conditions. Actions include but are not limited to working and coordinating with other agencies on hazard notification systems; permitting the siting of rain gages and soil moisture instruments to monitor conditions within the burn area (in support of National Weather Service forecasts); and exchanging information and coordinating the BAER implementation plan with subsequent recovery plans developed by other agencies.

The initial cost request for this effort includes the management structure as identified below for implementation of the 2500-8. Additional coordination needs may ensue, costs for which will need to be requested on an interim 2500-8.

Part VI – Emergency Stabilization Treatments & Source of Funds, Shasta-Trinity Initial Request

River Complex BAER Treatment Costs - Shasta-Trinity	NFS Lands					Other Lands				Money Left
Line Items	Units	Unit Cost	# of Units	BAER $	Spent $	Units	Fed $	Units	Non Fed $	Total $
A. Land Treatments										
NX Weed Det. Survey	project	$43,384	1.0	$43,384	$0		$0		$0	$0
Seeding and Mulching Treatments	project	$4,294	1.0	$4,294	$0		$0		$0	$0
Subtotal Land Treatments				$47,678	$0		$0		$0	$0
B. Channel Treatments - none										
Subtotal Channel Treatments				$0	$0		$0		$0	$0
C. Road and Trails										
Road Stormproofing (rolling-dips, critical-dips, culvert risers, etc)	project	$211,846	1	$211,846	$0		$0		$0	$0
Road Storm Patrol	project	$26,400	1	$26,400	$0		$0		$0	$0
Green Mtn. trail (12W08) stormproof	project	$20,000	1	$20,000	$0		$0		$0	$0
Devils Canyon trail (12W13) stormproof	project	$15,000	1	$15,000	$0		$0		$0	$0
New River trail (7E05) stormproof	project	$4,850	1	$4,850	$0		$0		$0	$0
Subtotal Road & Trails				$277,896	$0		$0		$0	$0
D. Protection/Safety										
Burned Area Road Warning Signs (large)	ea	$500	2	$1,000	$0		$0		$0	$0
Burned Area Road Warning Signs (small)	ea	$150	6	$900	$0		$0		$0	$0
Burned Area Trail Warning Signs (small)	ea	$150	4	$600	$0		$0		$0	$0
Flood Warning Signs (small)	ea	$200	4	$800	$0		$0		$0	$0
Subtotal Protection				$3,300	$0		$0		$0	$0
E. BAER Evaluation										
Assessment Team	ea	HSBAER	---	---	$85,450	---	$0	---	$0	$0
Subtotal Evaluation				---	$85,450	---	$0	---	$0	$0
F. BAER Coordination & ImplementationTeam										
Implementation Team Leader	day	$400	6	$2,400	$0		$0		$0	$0
COR	day	$380	5	$1,900	$0		$0		$0	$0
Inspector	day	$285	10	$2,850	$0		$0		$0	$0
Wildlife and Archeology Assessements	day	$380	10	$3,800	$0		$0		$0	$0
Subtotal Coordination				$10,950	$0		$0		$0	$0
G. Monitoring										
Road Treatment Monitoring	ea	$500	3	$1,500	$0		$0		$0	$0
Trail Treatment Monitoring	ea	$500	2	$1,000	$0		$0		$0	$0
Subtotal Monitoring				$2,500	$0		$0		$0	$0
H. Totals				**$342,324**	**$0**		**$0**		**$0**	**$0**
Previously approved						Comments:				
Total for this request				**$342,324**						

PART VII - APPROVALS

1. David R. Myers
Shasta-Trinity Forest Supervisor (signature)

10/5/15
Date

2. for Barnie T. Grant
Regional Forester (signature)

10/9/15
Date

Over the next 6 months it is critical that appropriate agencies maintain due diligence and continue to inform the public of the potential hazards resulting from post-fire watershed response.

Table 33 – BAER Implementation/Interagency Coordination

Item	Unit	Unit Cost	# of Units	Cost
BAER Implementation Team Leader	Days	$400	8	$3,200
COR	Days	$380	5	$1,900
Inspector	Days	$285	10	$2,850
				$7,950

Wildlife and Archeological Assessments:
Due to the lack of available red-carded wildlife biologists and archeologists BAER assessments were never done and funds are being sought to do the assessments post-BAER. Various BAER team members saw and marked locations of owls and artifacts for these post assessments and are located in the project file.

Table 44 – Post BAER Wildlife and Archeological Assessment Costs

Item	Unit	Unit Cost	# of Units	Cost
Wildlife Assessement	Days	$380	5	$1,900
Archelogical Assessement	Days	$380	5	$1,900
				$3,800

I. Monitoring Narrative:

(Describe the monitoring needs, what treatments will be monitored, how they will be monitored, and when monitoring will occur. A detailed monitoring plan must be submitted as a separate document to the Regional BAER coordinator.)

See Appendix B below for road and trail monitoring.

Part VI – Emergency Stabilization Treatments & Source of Funds, Six Rivers Initial Request

River Complex BAER Treatment Costs : Six-Rivers	NFS Lands					Other Lands				Money Left
	Units	Unit Cost	# of Units	BAER $	Spent $	Units	Fed $	Units	Non Fed $	Total $
A. Land Treatments										
NX Weed Det. Survey	project	$4,820	1.0	$4,820	$0		$0		$0	$0
Seeding and Mulching Treatments	project	$480	1.0	$480	$0		$0		$0	$0
Subtotal Land Treatments				$5,300	$0		$0		$0	$0
C. Road and Trails										
Road Stormproofing (rolling-dips, critical-dips, culvert risers, etc)	project	$30,043	1	$23,443	$0		$0		$0	$0
Road Storm Patrol	project	$6,600	1	$6,600	$0		$0		$0	$0
Subtotal Road & Trails				$30,043	$0		$0		$0	$0
D. Protection/Safety										
Burned Area Road Warning Signs (large)	ea	$700	1	$700	$0		$0		$0	$0
Burned Area Road Warning Signs (small)	ea	$200	2	$400	$0		$0		$0	$0
Subtotal Protection				$1,100	$0		$0		$0	$0
F. BAER Coordination & ImplementationTeam										
Implementation Team Leader	day	$400	2	$800	$0		$0		$0	$0
Subtotal Coordination				$800	$0		$0		$0	$0
G. Monitoring										
H. Totals				$37,243	$0		$0		$0	$0
Previously approved						Comments:				
Total for this request				$37,243						

PART VII - APPROVALS

1. Bridget Smith for — 10/6/15
Six Rivers Forest Supervisor (signature) Date

2. for Barnie T. Gyant — 10/5/15
Regional Forester (signature) Date

APPENDICES: Supporting Information:

Appendix A: River Complex Fire BAER Team

Appendix B: Monitoring for Roads

Appendix C: Road Summaries and Treatments

Appendix D: Summary of Cost-Risk Analysis

Appendix E: Treatment Map for the River Complex Fire

Appendix A: River Complex Fire BAER Team:

NAME	POSITION	EMAIL
Brad Rust	Team Leader	brust@fs.fed.us
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Juan delaFuente	Geologist	jdelafuente@fs.fed.us
Dennis Veich	Geologist (t)	dennisveich@fs.fed.us

Appendix B: Monitoring Protocols:

River Complex Fire
Road Effectiveness Monitoring

The 2500-8 report requests funds to monitor the effectiveness of road treatments on River Complex Fire roads.

4. Monitoring Questions
- Is the road-tread stable?
- Is the road leading to concentrating runoff leading to unacceptable off-site consequences?

2. Measurable Indicators
- Rills and/or gullies forming of the road
- Loss of road bed.

3. Data Collection Techniques
- Photo documentation of site
- Inspection Checklist (attached)

4. Analysis, evaluation, and reporting techniques

- Monitoring will be conducted after storm events. If the monitoring shows the treatment to be ineffective at stabilizing road and there is extensive loss of road bed or infrastructure an interim report will be submitted. A several page report would be completed after the site visit. The report would include photographs and a recommendation on whether additional treatments are necessary.

Road Inspection Checklist

Date:_____ Inspector_____
Time:_____ Forest Road_____

Describe locations reviewed during inspection:_____

_____

_____

Was there road damage?

Was culvert plugged?_____.

GPS _____

Describe damage and cost to repair? (GPS)_____

Photo taken of road damage_____

Recommended actions to repair:_____

River Complex Fire
Trail Effectiveness Monitoring

The 2500-8 report requests funds to monitor the effectiveness of trail treatments on Forest Trails in the River Complex.

1. Monitoring Questions
   - Is the trail tread stable?
   - Is the trail leading to concentrating runoff leading to unacceptable off-site consequences?

2. Measurable Indicators
   - Rills and/or gullies forming on the trail
   - Loss of trail bed

3. Data Collection Techniques
   - Photo documentation of site
   - Inspection Checklist (attached)

4. Analysis, evaluation, and reporting techniques

   - Monitoring will be conducted after storm events. If the monitoring shows the treatment to be ineffective at stabilizing trail and there is extensive loss of trail bed or infrastructure an interim report will be submitted. A several page report would be completed after the site visit. The report would include photographs and a recommendation on whether additional treatments are necessary.

Trail Inspection Checklist

Date:_____ Inspector_____
Time:_____ Forest Trail_____

Describe locations reviewed during inspection:_____

_____

_____

Was there trail damage?
Did the trail crossing fail?_____.
GPS)_____

Describe damage and cost to repair? (GPS)_____

Photo taken of trail damage_____

Recommended actions to repair:_____

Appendix C: Road Summaries and Treatments

River Complex - BAER Roads Report

Appendix A

Shasta-Trinity NF

Road	ML	Mi	Probability	Consequence	Risk	Description/Mitigation
5N04	3	5.3	Possible	Major	HIGH	Low to High severity burn on slopes above the road. The 5N04 is a primary access to the Ironside and Big Mountain areas. The CMP culverts on Italian Creek and a north tributary will require inlet structurs. Swede Creek channel and multiple culvert inlets along the road need to be cleaned. Storm Patrol
5N04	2	18.1	Likley	Major	VERY HIGH	Low to Moderate severity burn on slopes above the road. The 5N04 is a primary access to the Big and Beartooth Mountain areas. Storm Patrol.
5N04C	2	2.5	Likley	Moderate	HIGH	Low to High severity on adjacent slopes. The C spur is located at or near, the ridge crest. It is the only vehicle access to Big Mountain. Clean debris from road surface. Outslope road at outside curves and some other locations (1 mile) Consider Gate for temporary closure. Storm Patrol on this road may be hazardous.
5N13	3	7.1	Likley	Major	VERY HIGH	Low to High severity burn on slopes above and adjacent to road. Primary access to Brooks Ranch and Green Mountain Trailhead. Directionand road number signs have been burnt at intersection with 5N06 Clean culvert inlets. Repair road fill and surface at burnt stumps. Storm Patrol.
6N04	3	4.4	Possible	Moderate	HIGH	Low to High severity burn on slopes above and adjacent to road. Primary access to Green Mountain Trail Head. Clean culvert inlets. Construct dips. Install flared culvert inlets and repair failed 24" drop Inlet. Storm Patrol.
7N03	2	3.4	Likley	Moderate	HIGH	Low to High severity burn on slopes above the road. Access to Jim Jam Ridge Trailhead (Trail 12W11). Clean culvert inlets and install culvert flared inlets, Construce rolling dips. Remove 18" CMP and construct a low-water crossing (ford).
7N03C	2	0.3	Possible	Major	HIGH	Low to High severity burn on slopes above and adjacent to the road. Drainage structures functioning marginally. Recommend Closing Road to answer concerns reported by Botany & Archeology specialists.

Road	ML	Mi	Probability	Consequence	Risk	Description/Mitigation
7N04	2	1.8	Likley	Moderate	HIGH	Low to High severity burn on slopes above and adjacent to the road. Road is located low on slope adjacent to Quimby Creek. Clean culvert inlets and channels 20 yards upstream. Construct rolling and armored dips. Storm Patrol
7N15	3	3.5	Possible	Major	HIGH	Low to High severity burn on slopes above and adjacent to the road. Mid-slope location. Road is the only access to the Miller Ranch.Clean culverts and channels 20 yards upstream from road. Install drop inlets and risers.

Six Rivers NF

Road	ML	Mi	Probability	Consequence	Risk	Description/Mitigation
7N10	2	2.8	Possible	Major	HIGH	Low to Moderate severity burn on slopes above and adjacent to road. Surfaced (Old Chip Seal) located on Lone Pine Ridge. Clean culvert inlets. Storm Patrol
7N53	3	3.2	Possible	Major	HIGH	Horse Ridge NRTLow to High severity burn on slopes above the road. Access to Grizzly Camp Trailhead Horse Ridge National Recreation Trail (6E08). Clean culvert inlets. Construce rolling dips. Storm Patrol.

Appendix D: Summary of Cost-Risk Analysis

River Complex Fires Benefit Cost Analysis:

Total benefits of resources for whole fire FS lands:

All Resource	Value $	
Roads at risk(FS)	$2,500,000	
Trails (Green Mtn, Devils Canyon, New River)	$400,000	
Native plants	$500,000	
Water quality	$1,000,000	
Aquatics/fisheries	$5,000,000	Based on very high value fish habitat
Soil productivity	$160,000	
Public safety	$500,000	Human life and/or safety is not a market value. Estimated cost of injury accident.
Heritage sites	$120,000	

Proability of loss without and with treatments:

All Resource	Proability loss no treatments:	Proabilty loss w/ treatments:	Reduction in proability of loss
Roads at risk(FS)	70%	15%	55%
Trails (chancelulla, east tule, potato)	60%	10%	50%
Native plants	50%	20%	30%
Water quality	80%	45%	35%
Aquatics/fisheries	60%	35%	25%
Soil productivity	45%	35%	10%
Public safety	50%	20%	30%
Heritage sites	35%	20%	15%

Total cost of treatments on Forest Service:

River Complex BAER Costs	NFS Lands					Other Lands				Money Left
Line Items	Units	Unit Cost	# of Units	BAER $	Spent $	Units	Fed $	Units	Non Fed $	Total $
A. Land Treatments										
NX Weed Del. Survey	project	$53,560	1.0	$53,560	$0		$0		$0	$0
Seeding and Mulching Treatments	project	$4,774	1.0	$4,774	$0		$0		$0	$0
Subtotal Land Treatments				$58,334	$0		$0		$0	$0
B. Channel Treatments - none										
Subtotal Channel Treatments				$0	$0		$0		$0	$0
C. Road and Trails										
Road Stormproofing (rolling-dips, critical-dips, culvert rise	project	$383,155	1	$383,155	$0		$0		$0	$0
Green Mtn. trail (12W08) stormproof	project	$20,000	1	$20,000	$0		$0		$0	$0
Devils Canyon trail (12W13) stormproof	project	$15,000	1	$15,000	$0		$0		$0	$0
New River trail (7E05) stormproof	project	$4,850	1	$4,850	$0		$0		$0	$0
Subtotal Road & Trails				$423,005	$0		$0		$0	$0
D. Protection/Safety										
Burned Area Road Warning Signs (large)	ea	$500	2	$1,000	$0		$0		$0	$0
Burned Area Road Warning Signs (small)	ea	$150	6	$900	$0		$0		$0	$0
Burned Area Trail Warning Signs (small)	ea	$150	4	$600	$0		$0		$0	$0
Flood Warning Signs (small)	ea	$200	4	$800	$0		$0		$0	$0
Subtotal Protection				$3,300	$0		$0		$0	$0
E. BAER Evaluation										
Assessment Team	ea	H5BAER	---	---	$85,450	---	$0	---	$0	$0
Subtotal Evaluation				---	$85,450	---	$0	---	$0	$0
F. BAER Coordination & ImplementationTeam										
Implementation Team Leader	day	$400	6	$2,400	$0		$0		$0	$0
COR	day	$380	5	$1,900	$0		$0		$0	$0
Inspector	day	$285	10	$2,850	$0		$0		$0	$0
Wildlife and Archeology Assessements	day	$380	10	$3,800	$0		$0		$0	$0
Subtotal Coordination				$10,950	$0		$0		$0	$0
G. Monitoring										
Road Treatment Monitoring	ea	$500	2	$1,000	$0		$0		$0	$0
Trail Treatment Monitoring	ea	$500	2	$1,000	$0		$0		$0	$0
Subtotal Monitoring				$2,000	$0		$0		$0	$0
H. Totals				**$497,589**	**$0**		**$0**		**$0**	**$0**
Previously approved						Comments:				
Total for this request				**$497,589**						

All Resource	Benefit of treatment	Treatment Cost	B/C ratio	Justified
Roads at risk(FS)	$1,375,000	$383,155	3.6	yes
Trails (chancelulla, east tule, potato)	$200,000	$67,000	3.0	yes
Native plants	$150,000	$39,850	3.8	yes
Water quality	$350,000	natural	none	n/a
Aquatics/fisheries	$1,250,000	natural	none	n/a
Soil productivity	$16,000	natural	none	n/a
Ecosystem Functionality (water, soil, fish, geology)	$1,500,000	$490,000	3.1	yes
Public safety	$150,000	$3,300	45.5	yes
Heritage sites	$18,000	natural	natural	n/a
	$4,991,000	$493,305	10.1	yes

Appendix E: Treatment Map - River Complex Fire