

USDA-FOREST SERVICE

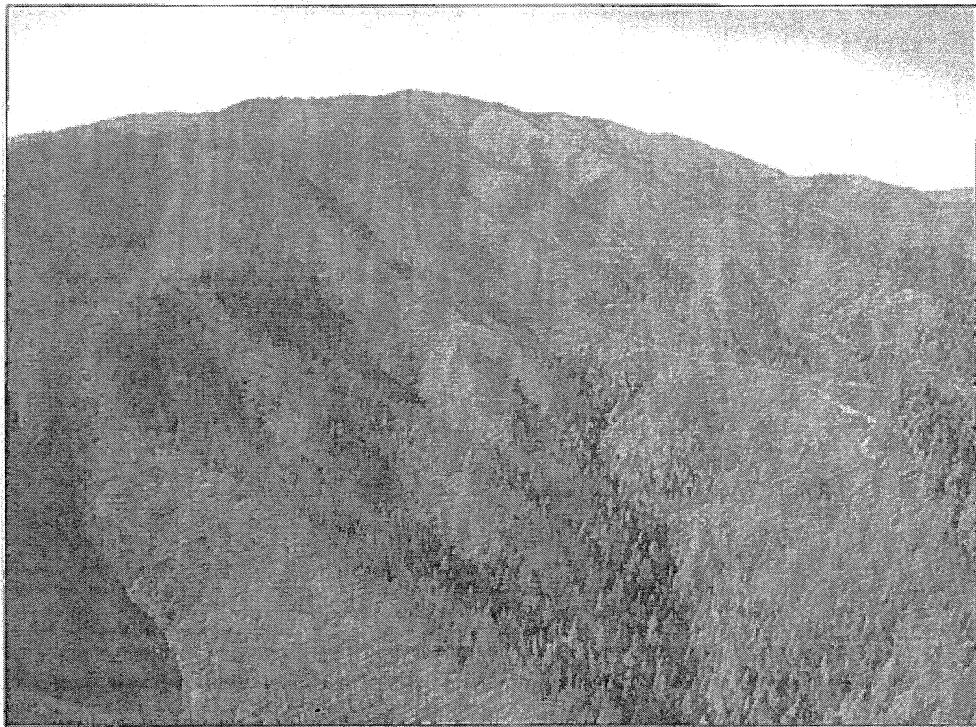
FS-2500-8 (7/08)

Date of Report: 9/25/12

Interim Request 1: 10/26/12

Interim Request 2: 2/5/13

Interim Request 3: 5/28/13

BAGLEY FIRE BURNED-AREA REPORT
(Reference FSH 2509.13)**PART I - TYPE OF REQUEST**

Bagley Fire burned hillslopes looking at Happy Hunting Grounds with Shoeinhorse Mtn. in the background.

A. Type of Report

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

B. Type of Action

- 1. Initial Request (Best estimate of funds needed to complete eligible stabilization measures)
- 2. Interim Report # 3
 - 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: Bagley Fire B. Fire Number: CA-SHF-002744
- C. State: CA D. County: Shasta
- E. Region: 5 F. Forest: Shasta-Trinity
- G. District: Shasta Lake H. Fire Incident Job Code: P5G6JV
- I. Date Fire Started: August 18, 2012 J. Date Fire Contained: September 15, 2012
- K. Suppression Cost: \$35 million
- L. Fire Suppression Damages Repaired with Suppression Funds
1. Dozerline repaired / waterbarred: 46 miles
 2. Hand line repaired: 15 miles
 3. Hand line still needing repair (LNP): 7 miles
- M. Watershed Number: 180200030907 Iron Canyon, 180200030908 Tunnel Reservoir, 180200031101 Upper Squaw Creek, 180200031102 Middle Squaw Creek, 180200040401 Hawkins Creek, 180200040402 Clairborne Creek, 180200040403 McCloud River below dam.
- N. Total Acres Burned: 46,010
NFS Acres(32,360) Other Federal () State () Private (13,650)
- O. Vegetation Types: Mixed conifer/hardwood with ponderosa pine, Douglas fir and white fir with montane chaparral on shallow south-facing soils.
- P. Dominant soils: 40 soil map units: various gravelly sandy loams, and very gravelly loams, mostly mod-deep to deep, and mostly soil hydrologic group B. Specific dominant soils include Goulding, Holland, and Neuns.
- Q. Geologic Types: Geologic Types: Redding terrane (carbonate, metasediments, and metavolcanics, volcaniclastics), Western Cascades (basalt and andesite), and several plutons (quartz diorite and granodiorite).
- R. Miles of Stream Channels by Order or Class: 75 Miles Perennial, 113 Miles Intermittent, 145 Miles Ephemeral.
- S. Transportation System:
- Trails: 14 miles Roads: 46 miles

PART III - WATERSHED CONDITION

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

		Soil Burn Severity (Acres)				Total	Percent
Ownership		Unbrnd/V.Low	Low	Moderate	High		
Forest Service (STNF)		8094 18%	15546 34%	5547 12%	3173 7%	32360	70%
Sierra Pacific Industries		1927 4%	6111 13%	3108 7%	2136 5%	13282	29%
The Nature Conservancy		76 0.2%	218 0.5%	40 0%	5 0%	339	1%
PG&E		13 <0.1%	16 <0.1%	0 0%	0 0%	29	0%
Total		10110	21891	8695	5314	46010	
Percent		22%	48%	19%	11%		100%

B. Water-Repellent Soil by total and FS (acres): Water repellency is a primary element of the soils effects in this fire: severe repellency is widespread and mostly continuous throughout the fire area, occurring in all soil burn severity classes from the bottom of the surface-charred layer (generally 1-2 inches deep), and varying in thickness from $\frac{1}{2}$ - 2 inches in low SBS to 4-8 inches in high SBS. Repellency will be largely responsible for moderate soil burn severity expected to have a watershed runoff response similar to high. Repellency also occurred naturally in unburned areas, usually beginning at about 2 inches depth and 1-2 inches thick but repellency was greatly exacerbated by the fire in these very gravelly loam soils. Without repellency, these soils have rapid infiltration rates and surface runoff and erosion would normally be localized to shallow soil areas and/or steep slopes. It is estimated that about 80% of the fire area has water repellency elevated by the fire.

C. Soil Erosion Hazard Rating by total acres: high erosion hazard ($35\% = 16,104$); moderate hazard ($60\% = 27,606$), low hazard ($5\% = 2,300$).

D. Erosion Potential:

Total fire area: 35 tons per acre for a 5 year runoff event, as determined using WEPP-ERMiT (Water Erosion Prediction Project – Erosion Risk Management Tool, USDA General Tech. Report, RMRS-GTR-188).

Bagley ERMiT estimated sediment production for the 2, 5, and 10-year design storms

Bagley ERMiT	Total Acres	Acres Burned	% Burned	2-year event		5-year event		10-year event		Debris Flow Potential
				tons/ac	tons	tons/ac	tons	tons/ac	tons	
6th Field Watersheds										
McCloud River										
Hawkins ck.	11402	2920	26	16	46720	29	84680	58	169360	Low
Clairborne ck.	10217	6278	61	16	100448	33	207174	60	376680	Low to High
McCloud River below dam	17081	5452	32	14	76328	34	185368	64	348928	Low to Intermediate
Squaw ck.										
Upper Squaw ck.	26820	18398	69	16	294368	38	699124	68	1251064	High to Very High
Middle Squaw ck	14768	2938	20	18	52884	39	114582	72	211536	Intermediate
Pit River										
Tunnel ck.	33255	549	2	14	7686	37	20313	64	35136	Low
Iron Canyon ck.	14436	9450	65	13	122850	33	311850	58	548100	Low to Intermediate
Total Fire	127979	45985	36	15	702914	35	1596336	63	2916763	

E. Sediment Potential:

ERMIT estimates and accounts for hillslope re-deposition with sediment production numbers are delivery to the bottom of the hillslope. Many modeled hillslopes in this fire have streams at the base of the slope and sediment is deposited into ephemeral and intermittent streams. Therefore it is roughly estimated that 60% of sediment estimates above would be delivered to the fluvial system.

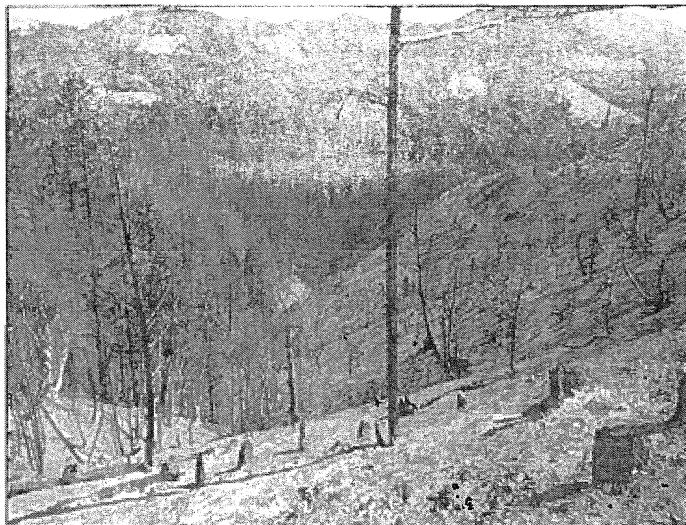
PART IV - HYDROLOGIC DESIGN FACTORS

A. Estimated Vegetative Recovery Period, (years):	<u>5 - 15</u>
B. Design Chance of Success, (percent):	<u>80%</u>
C. Equivalent Design Recurrence Interval, (years):	<u>2</u>
D. Design Storm Duration, (hours):	<u>6</u>
E. Design Storm Magnitude, (inches):	<u>2.8</u>
F. Design Flow, (cubic feet /square mile):	<u>134</u>
G. Estimated Reduction in Infiltration, (percent):	<u>80%</u>
H. Adjusted Design Flow, (cf per square mile):	<u>241</u>

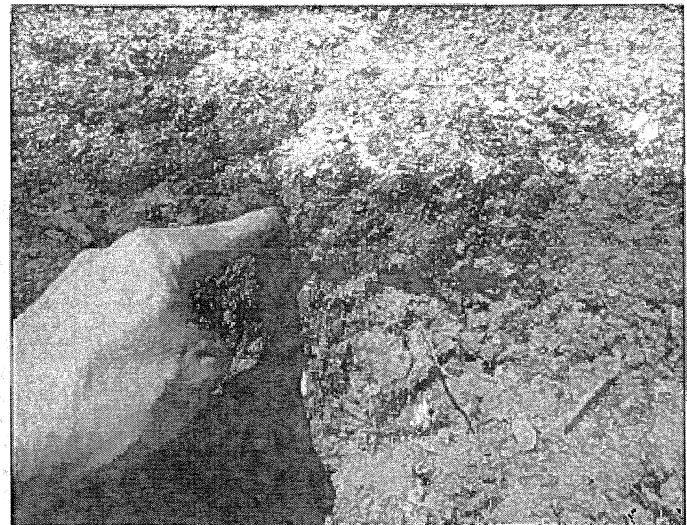
PART V - SUMMARY OF ANALYSIS**A. Describe Critical Values/Resources and Threats:**

Background: The Bagley Fire started on Monday, July 23, 2012 twenty-two miles southeast of Burney, California in Shasta County. The Bagley Fire was started by lightning on Bagley and North Pass Mountains. It slowly spread for the first few days and on the 23 to 26th it spread rapidly due to strong winds and burning into old decadent timber/brush stands along Squaw Creek. Initially they were small lighting fires (<150 acres) consuming ground fuel. But on August 24-25th winds exploded the fire and in two days the fire grew 10,000 acres. Approximately 30% burned at high and moderate soil burn severity (see soil burn severity map below). The rest of the fire was either low or very low soil burn severity. It is very important to understand the difference between *fire intensity* or *burn severity* as discussed by fire behavior, fuels, or vegetation specialists, and *soil burn severity* as defined for watershed condition evaluation in BAER analyses. Fire intensity or burn severity as defined by fire, fuels, or vegetation specialists may consider such parameters as flame height, rate of spread, fuel loading, thermal potential, canopy consumption, tree mortality, etc. For BAER analysis, we are not mapping simply vegetation mortality or above-ground effects of the fire. Soil burn severity considers additional surface and below-ground factors that relate to soil hydrologic function, runoff and erosion potential, and vegetative recovery.

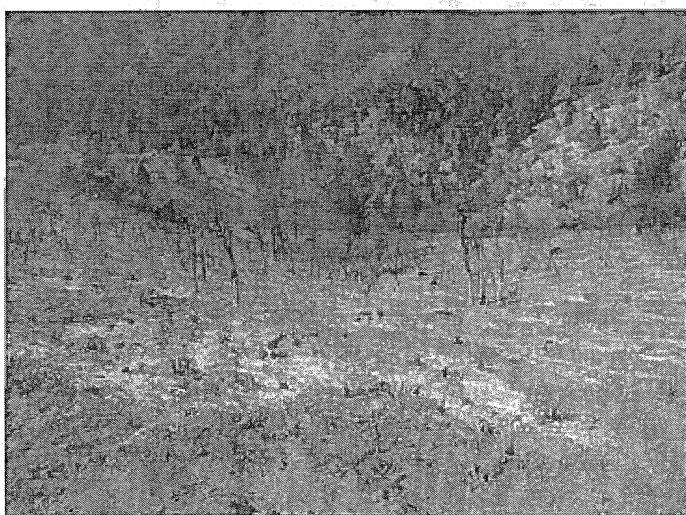
General trends are ponderosa pine/brush areas were moderate to high soil burn severity with 80 to 100 percent timber mortality especially on west and south-facing slopes. North-facing mixed conifer stands areas had moderate to low soil burn severities and with 30 to 70 percent mortality (see pictures below).



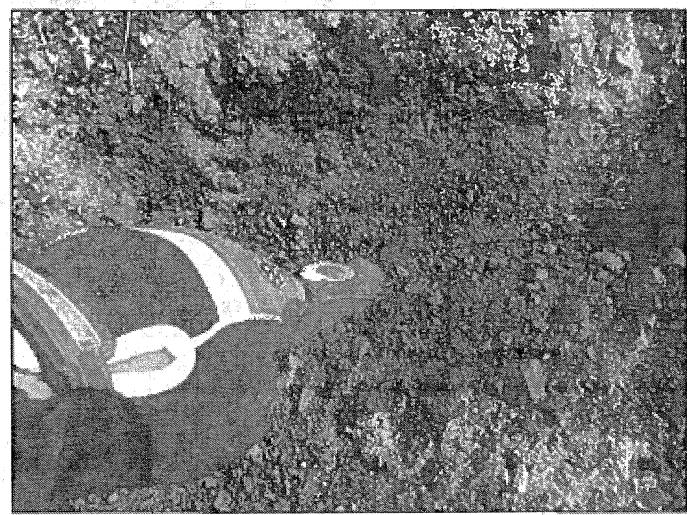
High soil burn severity in mixed pine/brush in U. Squaw Ck.



High soil burn severity with char to 2" in Upper Squaw Creek.



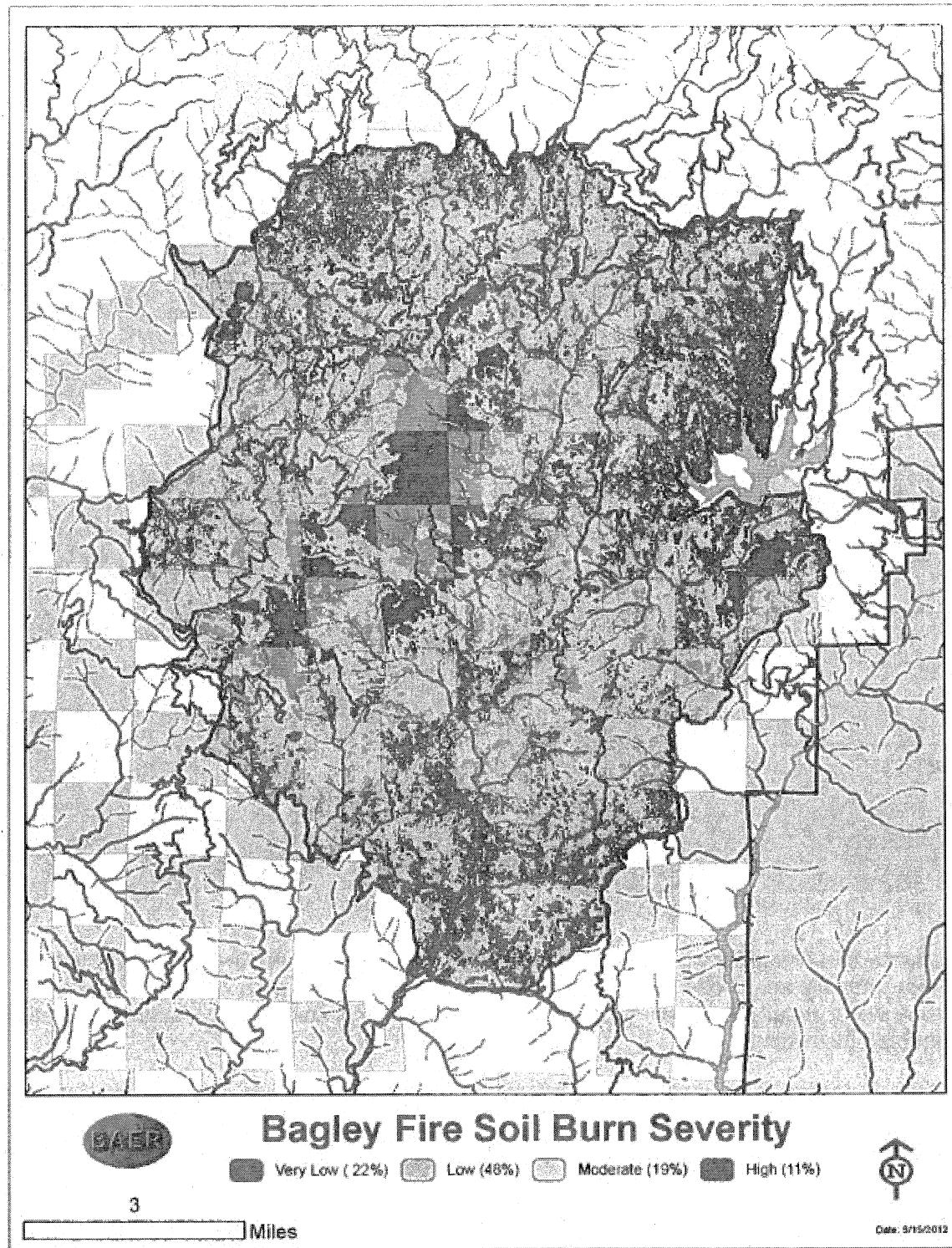
High soil burn severity in scrub oak along Bagley Mtn.



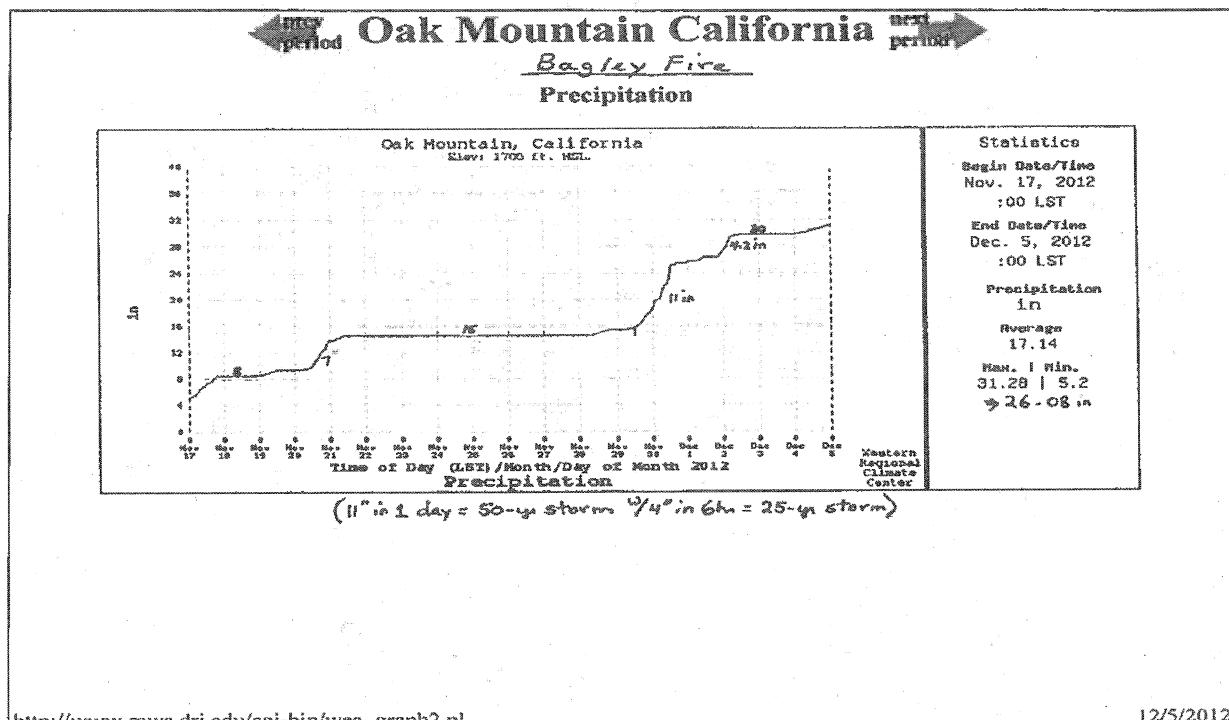
High soil burn severity with char to 4 inches with repellency

Water repellancy is running from 2 to 8 inches deep depending on soil texture and vegetation that was burned. Steep gravelly scrub oak/manazinita areas that were either south or west-facing burned hot leaving strong water repellancy down to 8 inches. Deep char and soil organic matter destruction was also present (see pics above).

Looking at the soil burn severity map below shows multiple areas that have the majority of moderate and high soil burn severity. The main areas are along Squaw Creek and Iron Canyon Creek being at high risk due to flooding and sedimentation affecting water quality, fish habitat, roads, and private residents below.

Bagley Fire Soil Burn Severity Map:

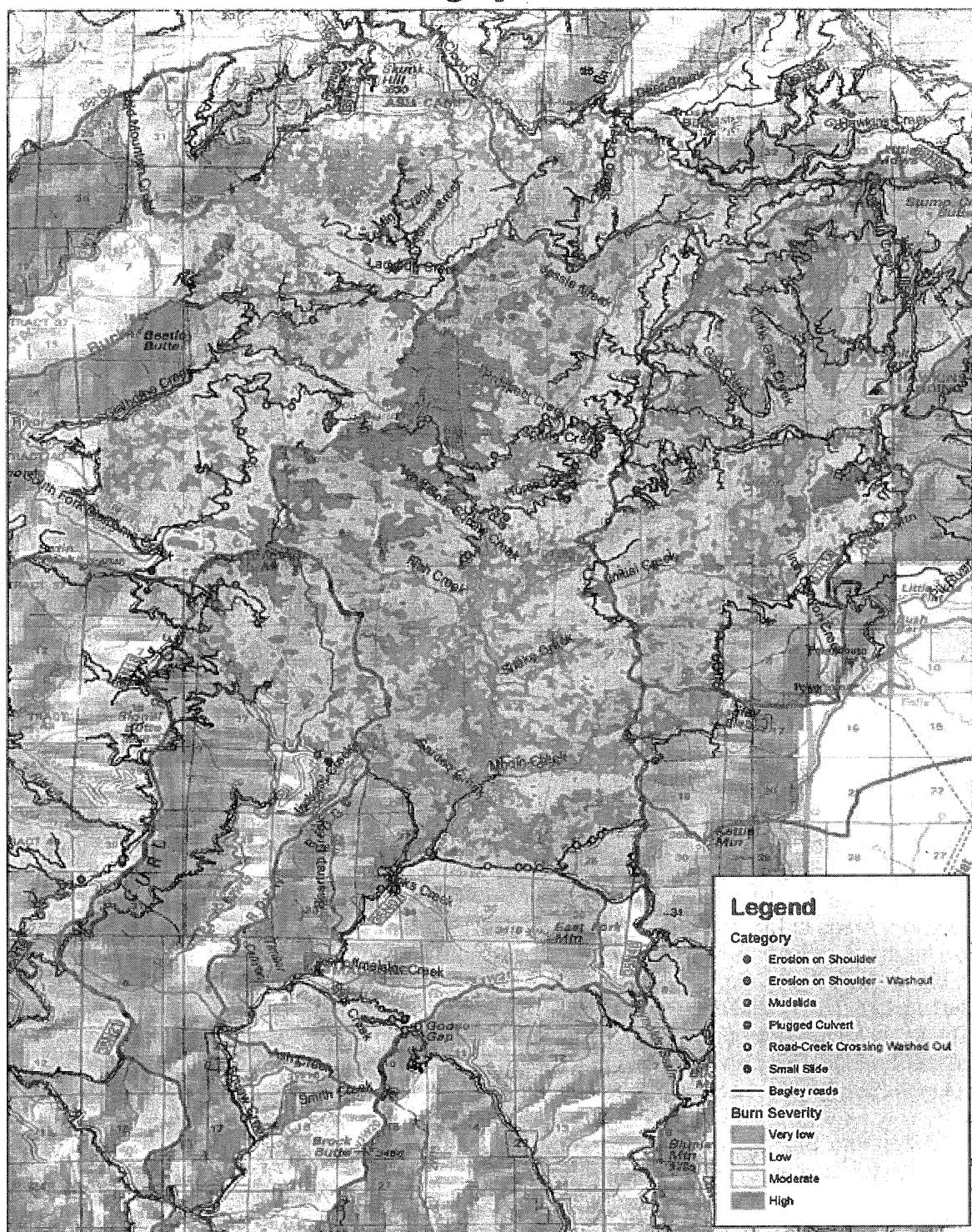
On November 20th to December 5th, three large storms hit the Bagley Fire area dumping 26 inches of rain equivalent to a 50-year storm event followed by two 25-year storm events. Extensive erosion occurred overwhelming most BAER treatments and causing severe road damage (see attached Bagley Fire BAER Storm Monitoring Report, 2013). The hydrograph below (Oak Mtn. near Iron Canyon @ 3,500 ft.), shows an event that dumped 9 inches of rain in 3 hours and two following events that were 17 inches in 24 hours for a total of 26 inches in 5 days. These events caused extensive erosion in the moderate to high soil burn severity areas impacting Squaw Creek watershed, roads, private residents along Squaw Creek, and Shasta Lake 10 miles below.



Outside fire perimeter only stream crossings had damage vs. fire storm damage in low burn severity was sheet and rill erosion, moderate burn severity had riling and some rutting, high burn severity with trees had rutting and gullying, where high burn severity in clearcuts/plantations had deep gullying, debris flows, and small landslides. BAER treatment effectiveness ranged from fair to poor depending on treatment location. Areas of low burn severity (Hawkins Creek area) in timber suffered the least. Treatment effectiveness for the Van Sicklin area was poor with many areas of the 37N48 eroded or crossing partially to completely blown-out. Upper Squaw Creek areas of moderate to high burn severity were severely compromised (roads 37N95, 37N86, 37N68). Most crossings were breached or blown out and culverts plugged. The same for Lower Squaw Creek area, blown crossings and failing road fills (34N17, 35N07). Fire perimeter roads (Fenders Ferry and Hawkins roads) suffered moderate damage of road fill failures, crossing blow-outs, plugged culverts, to road cut failures (see storm damage map below).

Additionally, debris into Shasta Lake far exceeded expectations with McCloud River and Squaw Creek producing excessive quantities of small to large woody debris.

Bagley Fire



This interim request is being submitted to address BAER roads initially identified that suffered additional damage and other roads within the fire perimeter that had only minimal BAER treatments but suffered major damage due to these storms. Also to address excessive woody debris deposited into Shasta Lake requiring removal. The emphasis of this request for additional funds is to avoid further damage to roads by repairing damaged road-fills, cleaning-out plugged culverts and removal of dangerous excessive woody material in Shasta Lake.

The Interim 3 request, addresses the 37N48 road (the main access road into the fire area from the north). During the storms in December of 2012 and subsequent snow storm in January 2013 (that covered the upper part of the Bagley fire in 5 feet of snow), the 37N48 road has sustained additional damage. At one location, a culvert plugged up causing a fill slope slide, which initially took out approximately two-thirds of the road width but now after the snow has melted the road is completely gone leaving a gaping gully. At two other locations, culverts initially plugged causing the loss of approximately one-quarter to one-third of the road width. But after the snowmelt in these areas the losses are now one-half to two-thirds of the road width. Additionally areas where there were plugged culverts now have one-quarter to one-third of the road width gone. These areas are now in danger of further failure due to the unstable fill-slopes and plugged culverts, as well as restricting access for other BAER work needed in the Bagley area (see attached damage reports).

Values at Risk: (on a per watershed basis)

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

Life: The steep nature of the burned environment creates potential hazards for flooding downstream along McCloud River and Squaw Creek that could affect residents along its banks. The burn has increased flooding potential by removing vegetative cover that reduces erosion and runoff (see hydrology and soil report for details).

Risk Assessment – Threat to residents and campers at Ad-Di-Na, Ash Camp, Fisherman's Loop, and the McCloud River club at Claiborne Creek along McCloud River.

Probability of Damage or Loss: Unlikely. This determination is due to the lack hydrologic response from the burn by using a 2-year 6-hour storm modeling that shows moderate levels of flooding. Campsites are on the 100-year floodplain that are larger than anticipated flows.

Magnitude of Consequence: Major. This determination was made based on the potential outcome of campers or residents being flooded out or injured.

Risk Level: Intermediate – Warning signs considered for threats to human life or safety.

Risk Assessment - Threat of flooding for Private Residents along Squaw Creek, as well as campers at Madrone, and Chirpchatter campgrounds below Squaw Creek.

Probability of Damage or Loss: Possible. This determination is based on the post fire runoff values of three times higher runoff for a 6-hour, 2-year design storm.

Magnitude of Consequence: Major. This determination was based on the change in watershed response that could threaten the lives of campers.

Risk Level: High - Potential exists for flooding that could injure residents or drivers along lower roads. Treatments will be considered to address these issues.

Risk Assessment- Threat to life at the Bollibokka Club along lower McCloud River due to flooding.

Probability of Damage or Loss: Unlikely. River floodplain opens up allowing for more capacity.

Magnitude of Consequence: Major. This determination was based on the change in watershed response that could cause flooding.

Risk Level: Intermediate – No treatments were considered except releasing BAER information to the public.

Risk Assessment- Threat to life due to floating debris in Shasta Lake.

Probability of Damage or Loss: Likely. With anticipated flows in Squaw and McCloud River floatable woody debris will be greatly increased posing hazard to boaters on Shasta Lake. This happened and far exceeded what was expected.

Magnitude of Consequence: Major. Collision with large logs could cause extensive damage and threat to boater safety. Currently we have excessive debris and only half the winter has occurred with spring rains to come.

Risk Level: Very High – Treatments considered due to threats to life.

Risk Assessment- Threats to life of travelers due to hazard trees along Legacy Jeep Trails; Bagley 35N46, 37N15Y & Garden Ridge 46N40.

Probability of Damage or Loss: Likely. Many down trees and many posed to come down with wind events.

Magnitude of Consequence: Moderate. OHV riders could be injured by falling trees or down logs.

Risk Level: High – Treatment of temporary closure due to threats to life.

Property: Based on the watershed response, the BAER Assessment team determined that residences and private property within and below the fire area are at increased risk of flooding as a result of the Bagley Fire. Forest roads within the fire area will be repaired as a result of suppression activity which is critical to protect road-bed and associated infrastructure. But because of the expected increase in watershed response, the assessment team feels that significant damage could occur on roads

throughout the fire perimeter due to undersized culverts and poor drainage (see hydrology report for details).

Risk Assessment - Private Property below Wheeler Ranch along Squaw Creek with Madrone & Chirpchatter campsites also along lower Squaw Creek.

Probability of Damage or Loss: Possible. This determination is due to the predicted change in watershed response because of moderate and high burn severity hillslopes above homes and campsites. Flooding and debris flows are possible for homes and campsites along Squaw Creek.

Magnitude of Consequence: Moderate. This determination was made based on the change in watershed response.

Risk Level: Intermediate - Treatments could be considered for threats to property.

Risk Assessment – Private property, Nature Conservancy Cabin, and the McCloud River Club located along McCloud River and Claiborne Creek.

Probability of Damage or Loss: Possible. This determination is due to the predicted change in watershed response because of burned hillslopes above structures and campsites. Flooding and debris flows are possible.

Magnitude of Consequence: Moderate. Flooding at the 5 or 10-year design storm could cause moderate levels of damage. A 2-year design storm would cause only minor damage.

Risk Level: Intermediate - Treatments could be considered for threats to property.

Risk Assessment- Iron Canyon PG&E Infrastructure from erosion and debris flows.

Probability of Damage or Loss: Possible. Erosion, debris flows, and landslides could damage road access to critical infrastructure.

Magnitude of Consequence: Moderate. Damage of roads could happen due to land instability due to dead trees that will culminate in 3 to 5 years when these root systems fail.

Risk Level: Intermediate - Treatments will be considered for threats to property.

Risk Assessment: The Bollibokka Club along lower McCloud River could possibly be damaged due to flooding.

Probability of Damage or Loss: Unlikely. This area of the McCloud River opens up and is not as confined so it is unlikely to flood.

Magnitude of Consequence: Moderate. In the unlikely event of flooding moderate damage could occur if a 10-year design storm happened.

Risk Level: Low – A slight chance of risk due to capacity of area and no treatments will be considered except release of BAER information.

Risk Assessment: Microwave Towers - Tamarack Ridge burned hot and destroyed all vegetation. This area is dominated by brush and will resprout rapidly.

Probability of Damage or Loss: Unlikely. Erosion on this ridge will be slight and will cause little damage to the tower footings.

Magnitude of Consequence: Minor. Little consequences of damage with this level of erosion.

Risk Level: Very Low - No treatments will be prescribed.

Risk Assessment: Landline Boundaries have been destroyed in moderate and high soil burn severity areas.

Probability of Damage or Loss: Likely. Field investigations showed excessive damage to land boundaries and confusion of ownership could cause trespass from private landowners.

Magnitude of Consequence: Minor. Private landowners are mostly large timber corporations that have land surveyors that will correctly determine their lands, but smaller landowners could mistakenly trespass.

Risk Level: Low - No treatments will be prescribed.

Risk Assessment: Forest Service roads & road signs are damaged or at risk due to severely burned hillslopes. Many roads have plugged culverts or undersized culverts that could fail thus putting road crossing at risk. After the December storms more culverts are plugged and many sections road-fill are eroded and failing needing immediate attention.

Probability of Damage or Loss: Very 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: High. This determination was made based on the amount of damage that would occur if culverts were temporarily plugged and roadfills fail.

Risk Level: Very High – Treatments will be considered to protect roads.

Risk Assessment: Pacific Crest Trail had some spot fires that burned portions of the PCT.

Probability of Damage or Loss: Unlikely. This determination is based on the unlikely expectation that increased erosion and sediment will occur and run down the trail-tread destroying the trail. Field examinations showed low burn severity spot fires that pose little erosion risks to the PCT.

Magnitude of Consequence: Minor. This determination was made based on the amount of damage that would occur from trail-tread erosion from low soil burn severity spots.

Risk Level: Very Low - No treatments will be prescribed.

Risk Assessment: Squaw Creek Trail is a historical trail that has recently been identified due to the fire burning away vegetation so trail is visible.

Probability of Damage or Loss: Possible. Erosion is possible but this area is mostly low burn severity.

Magnitude of Consequence: Moderate. Erosion down this trail could lower the trails longevity and damage its significant.

Risk Level: Intermediate -- No treatments at this time but if the trail has excessive treatments may be necessary.

Risk Assessment: Legacy Jeep Trail 37N15Y, Bagley 35N46 & Garden Ridge 46N40 trails are at risk due to steep sections without erosion protection features.

Probability of Damage or Loss: Likely. Steep burned hillslopes that will cause excessive erosion onto these trails and at crossings.

Magnitude of Consequence: Moderate. Many crossings and steep trail sections will be damaged in moderate and high burn severity areas.

Risk Level: High - Treatments will be considered to protect motorized trails.

Water Quality, Water Control, Quantity, and Fisheries: The most noticeable effects of post fire effects on water quality would be increased sediment and ash from the burned area into drainages and water-bodies in and downstream of the fire area. During storm events this will increase turbidity and contribute to pool filling. Due to the moderate and high burn severity, water quality and quantity is expected to be significantly affected as a result of the Bagley Fire within the Lower Squaw Creek, Iron Canyon Reservoir, LadyBug Creek and Claiborne Creek (see Hydrology Specialist Report). Squaw Creek is a residential water source for numerous homes which has 45% of watershed burned hot (moderate and high soil burn severity) above. McCloud River, Squaw Creek and multiple tributaries, and Iron Canyon Creek are fisheries for native residential trout and spawning gravels could be impacted by increased sedimentation. Aquatic plants and animals also could be affected by flooding, turbidity and sediments in favorable habitat (see hydrology and fisheries report).

Risk Assessment- Water quality of private residences water intake systems of Squaw Creek.

Probability of Damage or Loss: Possible. This determination is due to the change in watershed response and predicted increased turbidity affecting the drinking water for domestic water sources along Squaw Creek.

Magnitude of Consequence: Moderate. This determination is due to the change in watershed response especially for the 5 and 10-year response.

Risk Level: Intermediate - No treatments at this time but if excessive flooding treatments may be necessary at the site by NRCS.

Risk Assessment- Water quality and water control of Shasta Lake from runoff of Squaw Creek and McCloud River.

Probability of Damage or Loss: Likely. Runoff will be high and sediments will be deposited into Shasta Lake causing some turbidity and filling.

Magnitude of Consequence: Minor. With the size of Shasta Lake these levels of turbidity and filling will be of minor magnitude as shown during the winter months of the Bear Fire of 2003

and the Motion Fire of 2008 where levels of turbidity were moderate and posed no significant issues to downriver users.

Risk Level: Low - No treatments will be prescribed.

Risk Assessment- Water control of Iron Canyon Reservoir due to increased runoff.

Probability of Damage or Loss: Unlikely. The watershed above Iron Canyon Reservoir burned mostly low to very low soil burn severity so runoff levels will only be slightly elevated.

Magnitude of Consequence: Minor. Some increase in flows and sediments from the main streams into Iron Canyon Reservoir but only minor.

Risk Level: Very Low - No treatments will be prescribed.

Risk Assessment – Sensitive Fish Species and Sensitive Amphibian Species in Lower Squaw, Iron Canyon and Ladybug Creek.

Probability of Damage or Loss: Likely. This determination is due to the change in watershed response and increased bed-load turbidity affecting the fish habitat.

Magnitude of Consequence: Very High. This determination is due to the change in sediments in the water and spawning gravel embeddedness that could occur.

Risk Level: High - No treatments at this time but if excessive flooding and sedimentation occurs local treatments may be necessary besides selected natural recovery.

Risk Assessment – General aquatics that could be affected by streambed embeddedness.

Probability of Damage or Loss: Likely. This determination is due to the change in watershed response and increased bed-load turbidity and embeddedness affecting the benthic macroinvertebrates.

Magnitude of Consequence: Minor. This determination is due to the change in sediments in the water and gravel embeddedness that could occur.

Risk Level: Low - No treatments will be proposed.

Threatened, Endangered, and Sensitive Plants: The potential values at risk for sensitive plants include the stability and viability of sensitive plant populations. Shasta Ageratina, Shasta County Arnica, Veiny Arnica, Northern Clarkia, Jelly Lichen, Howell's Lewisia, English Peak Greenbriar are the sensitive plants known to occur within the Bagley Fire area and one federally listed threatened species occurs immediately outside the fire boundary. All are likely to survive the fire; the annual species had completed its life cycle by the time of the fire, and the other four are long-lived perennials with well-developed root systems. One roots in cliff crack systems. All of the species are adapted to a periodic disturbance regime resulting from either flooding or fire. Weed introduction and spread into occurrences of sensitive plants as a result of fire suppression activities or fire effects could reduce the quality of the habitat from high quality to lower quality. A dense infestation of a noxious weed such as oxeye daisy or

yellow starthistle could greatly reduce or eliminate occurrences of a federally listed species. Such an invasion is likely given the close proximity of noxious weed populations and severe ground disturbance near the sensitive plants. By exposing large areas of bare ground, the fire and suppression activities created conditions conducive to the spread of the noxious weeds known to be within and adjacent to the fire area. Furthermore, suppression activities likely vectored noxious weed seed into or through the burned area (see Botany report).

Risk Assessment – T&E Botany Species and Sensitive Plants could be at risk due to invasive weed displacement.

Probability of Damage or Loss: Unlikely. All of these species are resilient to disturbance but with strong competition due to invasive weeds habitat extent and quality will be greatly reduced.

Magnitude of Consequence: Minor. All of these species are resilient to fire and will repopulate the area by reseeding or re-sprouting but are likely to be excluded by a number of noxious weeds known to occur in the vicinity and likely to be spread into the rare plants' habitat. None of the known occurrences of sensitive plant species were directly affected by fire suppression activity but suppression activities associated with this fire have a high potential to spread invasive weeds.

Risk Level: Very Low - No treatments are planned.

Risk Assessment – Invasive weeds displacing natives.

Probability of Damage or Loss: Likely. This is due to the size and complexity of this fire using rapidly deployed mechanical equipment that could have been contaminated with invasives from another previous assignment.

Magnitude of Consequence: Moderate. All of these species are resilient to fire and will repopulate the area by reseeding or re-sprouting but are likely to be excluded by a number of noxious weeds known to occur in the vicinity and likely to be spread into the rare plants' habitat. None of the known occurrences of sensitive plant species were directly affected by fire suppression activity but suppression activities associated with this fire have a high potential to spread invasive weeds.

Risk Level: High - Treatments will be considered to address this risk.

Threats to Ecosystem Stability: There are moderate threats to ecosystem stability (geologic stability and soil productivity) due to moderate debris flow potentials and loss of production capacity of the soils (see geology and soils report).

Risk Assessment – High soil burn severity increasing debris flow and soil erosion potentials.

Probability of Damage or Loss: Likely. Highest area of debris flows and soil erosion is most likely in the upper Squaw Creek watershed. This indeed happened...

Magnitude of Consequence: Moderate. High levels of soil erosion and shallow debris flows will have moderate consequences to water quality, downstream habitat, and soil productivity. These

soils are moderately deep rocky sandy loams that will develop erosional pavements as sheet erosion takes place.

Risk Level: High – These areas are very steep (>60% slopes) and have mixed ownership making them unsuitable for treatment. Natural recovery will occur in the next 5 to 10 years creating areas of brush and grass.

Risk Assessment – Limestone caves do occur within the fire perimeter especially around Garden Ridge and North Fork Mountain. These areas are now open and exposed to vandalism.

Probability of Damage or Loss: Possible. These areas are in high burn severity making them accessible to vandalism and dryer for sensitive species.

Magnitude of Consequence: Moderate. With increased human traffic resources could be damaged along with habitat for sensitive species.

Risk Level: Intermediate – Future assessments need to be conducted to evaluate all cave resources and fire damage to propose effective treatments.

Threats to Cultural Resources: Archival research and GIS analysis indicates that several cultural sites occur on Forest Service lands within the Bagley Fire perimeter. Post-fire assessment field work, conducted by the NRA heritage program manager, detected 2 sites (see archeology report).

Risk Assessment: Prehistoric and historical sites do exist within the fire perimeter and could be exposed to erosion and vandalism.

Probability of Damage or Loss: Possible. Due to the high level of burning, sites could be exposed to erosion and vandalism.

Magnitude of Consequence: Moderate. Wheeler Ranch and Squaw Creek trail are open and exposed so vandalism could occur along with moderate levels of erosion.

Risk Level: Intermediate – No treatments will be proposed except relying on natural recovery.

Threats to Wildlife: There are wildlife concerns for the Bagley Fire due to T&E species (NSO packs) that occur in the fire perimeter that burned (see wildlife report).

Risk Assessment: T&E Wildlife Species, Sesitive Wildlife Species and Habitat was affected by the Bagley fire in areas that burned extensively (high and moderate soil burn severity).

Probability of Damage or Loss: Likely. Due to the high level of burning two NSO owl packs were destroyed. Three other owl packs were only slightly affected.

Magnitude of Consequence: Minor. Consequence of the fire and considered a take.

Risk Level: Low. The remaning owl packs have low risk due to low or very low soil burn severity creating better habitat. No treatments are porposed.

B. Emergency Treatment Objectives: To allow safe passage of water to protect infrastructures and watersheds from accelerated sheet and rill erosion. To protect watersheds from the spread of invasive weeds and unfettered OHV access.

Risk determination is dependent on the design storm selected and downstream values at risk. By using an average storm (2-year event) emergency planning measures can be designed to mitigate and minimize anticipated risks. Using a 2-year design storm the values at risk can be evaluated to determine if an emergency exists. Emergency determination matrix displayed below shows if an emergency exists (based on probability of damage or loss vs. magnitude of consequences).

Bagley Values @ Risk Emergency Determination Matrix

Bagley Risk Matrix	Probability	Magnitude of Consequences		Risk	
		Life	Property	Life	Property
Infrastructure					
Iron Canyon PG&E Infrastructure	Possible	None	Moderate	N/A	Intermediate
Madrone	Possible	Major	Moderate	High	Intermediate
Chirpchatter	Possible	Major	Moderate	High	Intermediate
Ah-Di-Na	Unlikely	Major	Moderate	Intermediate	Low
Fishermans Loop	Unlikely	Major	Moderate	Intermediate	Low
Ash Camp	Unlikely	Major	Moderate	Intermediate	Low
McCloud River Club	Possible	Major	Moderate	High	Intermediate
Bollibokka Club	Unlikely	Major	Moderate	Intermediate	Low
Pvt Residence along Squaw ck.	Possible	Major	Moderate	High	Intermediate
Microwave Towers - Tamerack	Unlikely	None	Minor	N/A	Very Low
Nature Conservancy Cabin	Possible	None	Moderate	N/A	Intermediate
Landline Boundaries	Likely	None	Minor	N/A	Low
Fish/Aquatics					
T&E Fish Species	Unlikely	None	Minor	N/A	Very Low
Sensitive Fish Species					
Lower Squaw	Likely	None	Very High	N/A	High
Iron Canyon	Likely	None	Very High	N/A	High
Lady Bug	Likely	None	Very High	N/A	High
T&E Amphibians Species	Unlikely	None	Minor	N/A	Very Low
Sensitive Amphibians Species	Likely	None	Very High	N/A	High
Water Quality					
Pvt Residence	Possible	None	Minor	N/A	Low
Shasta Lake	Likely	Moderate	Minor	N/A	Low
Water Control - sediment introduced and filling					
Shasta Lake	Likely	None	Minor	N/A	Low
Iron Canyon	Unlikely	None	Minor	N/A	Very Low
Floating Debris in reseviors	Likely	Major	Moderate	Very High	High
Roads					
Roads	Very Likely	None	Moderate	N/A	Very High
Road Signs					
Non Motorized Trail					
PCT	Unlikely	None	Minor	N/A	Very Low
Squaw Creek Trail	Possible	None	Moderate	N/A	Intermediate
Legacy Jeep Trails					
Bagley 35N46	Likely	Moderate	Moderate	High	High
Garden Ridge 46N40	Likely	Moderate	Moderate	High	High
37N15Y	Very Likely	Moderate	Moderate	Very High	Very High
Cultural					
Pre/Historical Sites	Possible	None	Moderate	N/A	Intermediate
Wildlife					
Habitat	Likely	None	Minor	N/A	Low
T&E Wildlife Species		None		N/A	
Sensitive Wildlife Species		None		N/A	
Soil Productivity					
High Burn Severity	Likely	None	Moderate	N/A	High
Geology					
Caves	Possible	None	Moderate	N/A	Intermediate
Botany					
T&E Botany Species	Unlikely	None	Minor	N/A	Very Low
Sensitive Plants	Unlikely	None	Minor	N/A	Very Low
Invasive Weeds	Likely	None	Moderate	N/A	High
Silviculture - Long term recommendations					

C. Probability of Completing Treatment Prior to Damaging Storm or Event:Land 90 % Channel - % Roads/Trails 85 % Protection/Safety 90 %**D. Probability of Treatment Success**

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

E. Cost of No-Action (Including Loss): \$1,250,000**F. Cost of Selected Alternative (Including Loss): \$328,360****G. Skills Represented on Burned-Area Survey Team:**

- | | | | | |
|---|--|---|---|---|
| <input checked="" type="checkbox"/> Hydrology | <input checked="" type="checkbox"/> Soils | <input checked="" type="checkbox"/> Geology | <input type="checkbox"/> Range | <input checked="" type="checkbox"/> Castral |
| <input checked="" type="checkbox"/> Forestry | <input checked="" type="checkbox"/> Wildlife | <input type="checkbox"/> Fire Mgmt. | <input checked="" type="checkbox"/> Engineering | <input type="checkbox"/> |
| <input type="checkbox"/> Contracting | <input type="checkbox"/> Ecology | <input checked="" type="checkbox"/> Botany | <input checked="" type="checkbox"/> Archaeology | <input type="checkbox"/> |
| <input checked="" type="checkbox"/> Fisheries | <input type="checkbox"/> Research | <input type="checkbox"/> Landscape Arch | <input checked="" type="checkbox"/> GIS | |

Team Leader:Brad RustEmail:brust@fs.fed.usPhone: 530-226-2427FAX: 530-226-2485**H. Treatment Narrative for Forest Service:**

(Describe the emergency treatments, where and how they will be applied, and what they are intended to do. This information helps to determine qualifying treatments for the appropriate funding authorities.)

Land Treatments: Invasive weed detection surveys, and hazard tree removal for project implementation are the selected treatments (see treatment map).

The proposed treatments on National Forest System lands can help to reduce the impacts of the fire, but treatments will not completely mitigate the effects of the fire. The treatments listed below are those that are considered to be the most effective on National Forest System lands given the local setting including topography and access.

Natural Recovery: Vegetation in the mixed conifer and fir forests will recover slowly. Even in areas of moderate soil burn severity, the canopy was mostly killed and the seed source removed. The dominant vegetation type within the Bagley fire perimeter is mixed conifer and Douglas-fir forest.

Species composition tends to follow elevation and temperature gradients ranging from Douglas-fir/white fir at the highest areas in the northern portion of the burn area to ponderosa pine/gray pine/chaparral in the lowest, warmest areas at the southern end of the burn area.

South-facing slopes are often dominated by large areas of hardwood and chaparral vegetation. These areas tend to have low productivity due to topographic position and geologic parent material. The remainder of the fire perimeter is highly productive due to soil quality and high rainfall. Historically, these areas have demonstrated a high capacity to recover from disturbance (*Lower McCloud Watershed Assessment*, 1998).

Invasive Plants: Treatment Description. Noxious Weed Detection Surveys

All dozer lines on or within fire perimeter should be surveyed in 2013, with new infestations hand treated and mapped.

Dozer lines are generally mapped with varying levels of quality in different parts of the fire area, so number and length of lines in the GIS database can only be considered to be estimates. Line location and number should be validated in the field as treatments proceed. Using the GIS database, there are 32.7 miles of dozer lines on or within the fire perimeter.

Treatment Cost. 1) EDRR surveys and treatments of known weed infestations, 21 miles of dozer line, 7 miles of hand line, and 10 acres of identified miscellaneous sites (staging areas, drop points, drafting sites, sling sites, spike camps, helispots) totaling approximately 100 acres: \$39,240.

Monitoring	unit	cost	miles	total
Noxious Weed Detection Surveys	miles	1200	32.7	39,240

Hillslope mulching treatment by helicopter was not selected due to values at risk were not great enough for cost and effectiveness and lack of treatable ground on forest lands due to steepness of slopes (many areas >60% and mixed ownership with private timber companies).

Channel Treatments: none

Roads and Trail Treatments: Road stormproofing and OHV motorized trail stormproofing (see treatment map).

Road Treatments:

Road stormproofing will consist of removing outside berms where appropriate, installing critical dips and to allow safe passage of anticipated increased water flows due to burned landscapes. Hazard trees will be removed where crews are working for safe ingress and egress.

Treatment Objective: Minimize the risk of road failure in the burn area through the placement and maintenance of effective water control measures. Prevent the channeling of water on roads. Ensure the diversion of runoff in controlled intervals to reduce erosion and further watershed degradation.

These threats are primarily focused on the effects of increased runoffs on road surfaces and road crossings. There are also threats to user safety caused by the fire. The specific threats include:

- Undersized/plugged and misaligned culvert pipes.
- Degradation of road surface drainage profile causing runoff to flow down the road.
- Erosion at pipe and dip outlets with no energy dissipaters.
- Berms and/or through cuts that channel water on road surface with inadequate drainage relief and erosion protection.
- Damaged or failed over side drains.
- Large fills with heavy woody debris and sediment above culvert pipes.
- Assumed average ~ 1 stump hole per 2 miles road in high/moderate burn areas. (Assumption for all roads based on roads observed)
- Open cat lines that could suffer erosion and pose a safety concern if not closed.
- Burned up road number signs.

The following treatments were identified as BAER treatments for the Bagley Fire burned area (for more information see Roads Specialist Report in the project record).

Treatment recommendations:

37N48:

- Clean out culvert inlets-11 @ \$200/ea (\$2,200)
- Remove Outside Berm-0.45miles @ \$400/ mile (\$180)
- Repair Stump hole-1@ \$300/stump hole. (\$300)

37N95:

- Clean out culvert inlets and catch basin -8 @ \$200/ea (\$1,600)
- Clean out and repair smashed culvert inlets and catch basin-2 @ \$300/ea (\$600)
- Remove Outside Berm-0.5miles @ \$400/ mile (\$200)
- Repair Stump hole-2@ \$300/stump hole. (\$600)
- Install rolling dip and construct rock dissipater -2 @ \$950/ dip (\$1,900)
- Construct rocked critical dip to accommodate overtopping and protect the road fills-4 @ \$2,700 each (\$10,800)

37N51Y:

- Clean out culvert inlets and catch basin -2 @ \$200/ea (\$400)
- Clean out and repair smashed culvert inlets and catch basin-1 @ \$300/ea (\$300)
- Brush Channel to prevent culvert plugging 200' (\$550)
- Construct rocked critical dip to accommodate overtopping and protect the road fills-4 @ \$2,700 each (\$10,800)

37N43:

- Clean out culvert inlets and catch basin -4 @ \$200/ea (\$800)
- Brush Channel to prevent culvert plugging 200'- 5 locations (\$2,750)
- Install rolling dip and construct rock dissipater -4 @ \$950/ dip (\$3,800)
- Construct rocked critical dip to accommodate overtopping and protect the road fills-4 @ \$2,700 each (\$10,800)

37N68:

- Riprap outlet dissipater -3 @ \$700/ea (\$2,100)
- Brush Channel to prevent culvert plugging 200'- 2 locations (\$1,100)
- Clean out culvert inlets and catch basin -4 @ \$200/ea (\$800)
- Armor culvert inlet-2 @ \$700/ea (\$1,400)
- Armored Crossing Overflow-2 @ \$30,000/ea (\$60,000)
- Construct rocked critical dip to accommodate overtopping and protect the road fills- 3@ \$2,700 each (\$8,100)
- Install end section on inlet- 3 @ \$2,000 (\$6,000)

37N33A:

- Clean out culvert inlets and catch basin -6 @ \$200/ea (\$1,200)
- Clean out and repair smashed culvert inlets and catch basin-1 @ \$300/ea (\$300)
- Clean Ditch whole length of road-0.68 miles (\$820)
- Install rolling dip and construct rock disapator-12 @ \$950/ dip (\$11,400)
- Install rolling dip with leadoff ditch ~20' and construct rock dissipater - (\$1,050)
- Armor culvert outlet-5 @ \$700/ea (\$3,500)
- Install road closure barrier- (\$1,500)
- Repair drainage at concrete ditch-(\$1,000)
- Armored Crossing Overflow-1 @ \$30,000/ea (\$30,000)

37N33C:

- Clean out culvert inlets and catch basin -2 @ \$200/ea (\$400)
- Clean out and repair smashed culvert inlets and catch basin-1 @ \$300/ea (\$300)
- Clean Ditch whole length of road-0.70 miles (\$850)
- Install rolling dip and construct rock dissipater -2 @ \$950/ dip (\$1,900)

Fire area overall costs:

- Storm patrol-\$13,000 (3 weeks two people)
- Monitoring-\$13,000 (3 weeks two people)
- Signs-\$2,000

The following additional treatments were identified as BAER treatments for the Bagley Fire burned area after suppression repair road engineers and resource advisors identified this road that was initially missed by assessment team due to difficult access and limited time to assess all affected roads (for more information see Road 35N07 Rational for Treatment Report in Appendix D).

Treatment recommendations for Road 35N07:

- Replace 9 existing crossings with rocked low water crossings with riprap dissipaters.
- Construct critical dips at crossings where culverts are not replaced to prevent stream diversion in event of overtopped culvert.

Projected Costs:

For all 9 sites on the 35N07 road the total cost is \$41,000.

The following additional treatments were identified for the Bagley Fire burned area after extensive storm damages from the December mega-storms (for more information see Road Storm Damage Rational in Appendix D).

Treatment recommendations for storm road repair:

- Replace 3 existing crossings with rocked low water crossings with riprap dissipaters.
- Construct critical dips at crossings where culverts are not replaced to prevent stream diversion in event of overtopped culvert.
- Regrade and repair road fill washouts.
- Install one Hilfiker retaining wall.

Projected Costs:

For 35N07 work \$21,000, for 34N17 work \$38,500, and for 37N48 work \$33,800.

Treatment recommendations for 37N48 storm road repair:

- Excavate, clean out existing culverts, and install culvert riser on 6 crossings.

Projected Costs:

- Culvert cleanout and debris removal – 6ea @ \$3,000 ea = \$18,000
- Riser and snorkel installation – 6ea @ \$1,000 ea = \$ 6,000
- Rolling-dips (before and after cx) – 12ea @ 1,000 ea = \$12,000

For 37N48 work \$36,000.

Motorized Trail Treatments:

The values at risk identified for Off-Highway Vehicle (OHV) Recreation are located on Four Maintenance Level 2(ML2) Roads and three are also identified as Legacy Trails. These travel routes are historic Jeep, All-Terrain Vehicle (ATV) and Motorcycle (MCs) trails that are used for OHV Recreation, hunting, sightseeing and for fire suppression. The fire affected 35N07A, 35N46 (01W11), 36N40 (02W32) and 35N15Y (02W11). Due to high and moderate fire activities on these travel routes public safety, road and trail prisms are at risk.

Treatment Types

- Trail Stabilization/Rolling Dips and Outsloping—Rolling dip cross drains are designed to pass slow traffic, while also dispersing water. Rolling dips cost less, require less maintenance and are less likely to fail compared to inboard ditches and culvert pipes. Outsloping will be designed where the road allows such construction. These treatment types fit into the Road and Trail Treatments—Trail Stabilization Category, Rolling Dips Category and Outsloping Roads Category.
- Hazard Tree/Rock Removal—Treatment of hazard trees and unstable rock is prescribed to protect life along roads. Large boulders destabilized by wildfire and severely burned trees pose a preventable risk to public safety. This treatment type fits into the Protection and Safety

Treatments—Hazard Trees and Unstable Rocks Category.

- Warning Signs and Sign Installation—The warning signs will be used to alert drivers and recreational users of existing or potentially hazardous conditions created by the wildfire. The road/trail signs must be replaced as they are a critical value for safety and road/trail prisms. This treatment type fits into the Protection and Safety Treatments—Warning Signs.
- Monitoring—Monitoring will be used to evaluate the effectiveness of the treatments. Photo monitoring and the Soil Conservation Plan will be tools to capture data and progress. The Soil Conservation Plan is attached in Appendix I.

TOTAL PROJECT COST FOR FOREST SERVICE TREATMENTS

Resources at Risk: Legacy Trails located in High to Moderate Burn Areas	Contracts	Time	Supplies	Total
35N07A	\$0	\$0	\$0	\$0
35N46 (01W11)	\$9597	\$4700	\$276.67	\$14573.67
36N40 (02W32)	\$5292	\$4700	\$276.67	\$10268.67
37N15Y (02W11)	\$13545	\$4700	\$276.66	\$18521.66
TOTAL \$43,364				

Protection/Safety Treatments: Burned area road, trail signs, closure signs, and early warning system.

Safety: Posting of areas burned will alert the public to potential dangers of falling trees, rolling rocks, and flooding along creeks. Repair of road and OHV trail signs burned will insure public safety (see treatment map). Closure signs for campgrounds that have potential for flooding with a 2yr-6hr storms (see Burned Area Report (BAR) source of funds for costs at the end of the report).

Protection: Recent forest level decision to open the Bagley burned area to the public (10/22/2012) raises the concerns for potential safety of the public to flooding along lower Squaw Creek. Flood protection measure of early warning detection system RAWS station coordinated with NOAA to notify the general public, homeowners, and campers along Squaw Creek about flooding conditions so they can exit their homes and campgrounds in case of emergency (see BAR for source of funds for costs at the end of the report).

During the first winter following the Bagley Fire there will be an increased potential for the accumulation of debris in Shasta Lake from Squaw Creek. There is a high probability winter storms could wash small to large debris downstream to the reservoir. Dead trees on the streamside could fall into Squaw Creek (which is the size of a river) and be deposited into Shasta Reservoir. Large floating debris will slowly migrate into the reservoir where it will be hazardous to boaters. Treatment to prevent debris into Shasta Lake will be the installation a floating boom in main Squaw Creek cove at Monday Flat. Monday Flat is ideal where debris will entailed and will settle during the summer for disposal. This area opens up below Didallis Recreation Cabins on Squaw Creek and provides an excellent area to trap debris and let it settle for treatment (see Appendix D for map and lake recreation specialist report for design and costs). Total cost for implementation is \$62,140.

Debris Removal: Debris into Shasta Lake far exceeded expectations with McCloud River and Squaw Creek producing excessive quantities of small to large woody debris. Recent storms deposited from

600 to 800 tons of debris into Shasta Lake. Funding from interim 1 request was exhausted by constructing 4 log booms to capture and transporting debris to a larger assessable removal area at Jones Valley. To remove this quantity of debris a contract will be let to an experienced contractor who removed the 1997 storm debris into Shasta Lake. Cost will be \$50/ton for a total request of \$40,000.

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.)

The noxious weed effectiveness monitoring needs identified for the Bagley Fire include the following:

If weeds are detected in 2013 and are spreading in the Bagley perimeter then In 2013 and 2014, treat (with interim request) and reassess areas treated in 2013 to determine the effectiveness of treatments. Adaptive management analysis will determine whether treatments should continue, cease, or be changed to increase effectiveness. Methods of assessment in monitoring years will be the same as used for the original assessments.

Monitor debris inflow to Shasta Lake from tributaries and reservoir shoreline to assess treatment needs.

During the first winter following the Bagley Fire there will be an increased potential for the accumulation of debris in Shasta Lake from Squaw Creek. There is a high probability winter storms could wash small to large debris downstream to the reservoir. Large floating debris will slowly migrate into the reservoir where it will be hazardous to boaters. Treatment to prevent debris into Shasta Lake will be the installation a floating boom in main Squaw Creek cove at Monday Flat. Monday Flat is ideal where debris will entailed and will settle during the summer for disposal. Reservoir elevation will monitored and will determined to calculate the boom length. Monitoring funds are requested for patrolling this inlet to assess the need and timing for debris control measure in response to winter storms. Total cost for assessment is \$3,000.

Monitor the effectiveness of treatments and no treatments to determine overall effectiveness of BAER rehabilitation efforts.

Because potential impacts to fisheries, water quality, and soil productivity were not considered to be watershed emergencies no hillslope and minimal channel treatments were recommended. Another reason for not recommending hillslope and channel treatments in the Bagley Fire area is that both types of treatments were judged to have minimal benefits. Because no hillslope treatments will be applied in the burn area it will be necessary to monitor the effectiveness of no treatments in order to validate that treatments were not required. Monitoring will consist of four field visits to areas that burned at high severities. The effectiveness of 'no treatment' will be evaluated (see BAR for source of funds for costs at the end of the report).

Road Monitoring to evaluate the effectiveness of road treatments

Road treatments costing several hundred thousand dollars will be applied in the Bagley Fire area by the USFS and PG&E (Pit 3-4-5 FERC Project). Effectiveness of these treatments will be evaluated at two levels.

1. Field site visits of actual treatments
2. Air photos

The air photos will be taken as soon as possible this fall (prior to the rains and before the sun angle gets too low), and then re-taken in the spring or summer of 2013. The fall flight will document baseline conditions immediately after the fire, and will allow identification of rills, gullies, and landslides which were present at that time. The summer flight will facilitate an area-wide assessment of the effectiveness of the road treatments, and document the occurrence of debris flows, gullies, and landslides which occurred the first winter. This is necessary to see features on a larger scale for landslide initiation and possible effects on PG&E water conveyance systems and FS roads. If the winter of 2012-2013 is exceptionally mild, the summer flight can be delayed until 2014.

Other applications of the air photos include:

1. Identification of potentially hazardous sites (overlap of high severity fire with hazardous geologic conditions) which may have been missed during the BAER assessment.
2. Validation of the predictive ability of the debris flow model used in the BAER analysis.
3. Monitor landslide movement and identify possible consequences to develop mitigation measures.
4. The cost of the air photos would be on the order of \$12,000 (\$6,000 for each flight).

Cave Damage Assessment Monitoring

Limestone outcrops in the Garden Ridge and North Fork Mountain have numerous caves that had surrounding vegetation burned off with high intensity fire. These areas are open and exposed and need future evaluation to see if treatments are needed to protect Townsend Big-Eared Bats and Shasta Salamanders from habitat destruction by human traffic since these caves are now exposed and are easy to access. Due to the rapid assessment process and limited time adequate assessments were not obtainable to protect these valuable assets (see BAR for source of funds for costs at the end of the report).

OHV Monitoring and Soil Conservation Standard Report

The monitoring report will be submitted at the end of the project performance period along with the final payment request (see BAR for source of funds for costs at the end of the report). The following will be included:

- A. Historical Conditions:
 - a. Previous GYR Forms and any additional photo documentation or written condition assessments.
 - b. All maintenance activities for the past 5 years for cost projections and maintenance scheduling.
 - c. Any other monitoring documentation.
- B. Change Analysis
 - a. Documentation of any changes to water crossings on the affected trail system and pre and post monitoring results.
 - b. Documentation of any changes to drainage structures (drainage dips, water bars, reverse grades, etc) on the affected trail system and pre and post monitoring results.
 - c. When annual maintenance was last performed and justification if it was missed.
- C. Findings:

- a. Document resource benefits found from pre and post project monitoring.
- b. Document activities and how maintenance is affected.
- c. Document activities that result in changes to costs.

D. Conclusions:

- a. State any additional needs for completed work
- b. State successful elements including future cost savings and ecologic protection.
- c. State goals for next year.

See Appendix C below for road and trail monitoring forms.

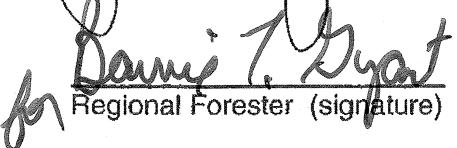
Part VI – Emergency Stabilization Treatments and Source of Funds Interim #_3

Line Items	Units	NFS Lands			Spent \$	Other Lands			Non Fed \$	Money Left Total \$
		Unit Cost	# of Units	BAER \$		# of Units	Fed \$	# of Units		
A. Land Treatments										
NX Weed Det. Surv.	mi	\$1,200	32.7	\$39,240	\$0		\$0		\$0	\$0
<i>Subtotal Land Treatments</i>				\$39,240	\$0		\$0		\$0	\$0
B. Channel Treatments - none										
<i>Subtotal Channel Treatments</i>				\$0	\$0		\$0		\$0	\$0
C. Road and Trails										
Road Stormproofing	project	\$209,306	1	\$209,306	\$0		\$0		\$0	\$0
Road Stormproofing - 35N07	project	\$41,000	1	\$41,000	\$0		\$0		\$0	\$0
Road Storm Repairs	project	\$93,300	1	\$93,300	\$0		\$0		\$0	\$0
Road 37N48 Crossing Repairs	project	\$36,000	1	\$36,000	\$0		\$0		\$0	\$0
OHV Motorized Trial Stormproofing	project	\$43,364	1	\$43,364	\$0		\$0		\$0	\$0
<i>Subtotal Road & Trails</i>				\$422,970	\$0		\$0		\$0	\$0
D. Protection/Safety										
Warning Signs	ea	\$300	20	\$6,000	\$0		\$0		\$0	\$0
Carsonite Trail Signs	ea	\$15	30	\$450	\$0		\$0		\$0	\$0
Early Warning Detection RAWS	ea	\$15,000	1	\$15,000	\$0		\$0		\$0	\$0
Debris Boom Catchments + Installation	ft	\$39	1,600	\$62,144	\$0		\$0		\$0	\$0
Debris Removal	ton	\$50	800	\$40,000	\$0		\$0		\$0	\$0
Coordination with Public & Private	ea	\$1,000	1	\$1,000	\$0		\$0		\$0	\$0
Closure Signs	ea	\$200	10	\$2,000	\$0		\$0		\$0	\$0
<i>Subtotal Protection</i>				\$126,594	\$0		\$0		\$0	\$0
E. BAER Evaluation										
Assessment Team	0520	H5BAER	---	---	\$45,000	---	\$0	---	\$0	\$0
	---	---	---	---	\$0	---	\$0	---	\$0	\$0
<i>Subtotal Evaluation</i>				---	\$45,000	---	\$0	---	\$0	\$0
F. Monitoring										
Road Treatment Monitoring	ea	\$1,000	1	\$1,000	\$0		\$0		\$0	\$0
OHV Treatment Monitoring	ea	\$2,000	1	\$2,000	\$0		\$0		\$0	\$0
Debris Inflow Monitoring	ea	\$3,000	1	\$3,000	\$0		\$0		\$0	\$0
Geological Stabilization Monitoring*	ea	\$6,000	2	\$12,000	\$0		\$0		\$0	\$0
Cave Damage Assessments	ea	\$2,000	1	\$2,000	\$0		\$0		\$0	\$0
<i>Subtotal Monitoring</i>				\$20,000	\$0		\$0		\$0	\$0
G. Totals				\$608,804	\$0		\$0		\$0	\$0
Previously approved				\$291,904						Comments: * Geologic stability monitoring of road treatments to detect possible landslides & debris flows affecting roads.
Total for this interim 1 request				\$133,140						December 2012 storm damage repair, armoring, and debris removal.
Total for this interim 2 request				\$133,300						December 2012-13 storm damage repair on 37N48 road.
Total for this interim 3 request				\$36,000						

PART VII - APPROVALS

1. 
Forest Supervisor (signature)

10/31/13
Date

2. 
Regional Forester (signature)

6/18/13
Date

APPENDICES: Supporting Information:**Appendix A: Resource at Risk - Specialist Reports****Bagley Fire BAER Interim 2 Request Justification:****Further Threats to Road 35N07**

In a previous BAER request we addressed threats to the 35N07 road. Since that time we have had storm damage to the lower part of that road as well as the 34N17 near the intersection of the 35N07 road restricting access to the crossing previously addressed. A section of the 35N07 road washed out around the junction of the East fork and Squaw creek. The crossing at east fork and crooks creek also washed out on the 07 road. The 34N17 road has erosion/slides near the intersection with the 35N07 road. If these locations are not fixed we will have further erosion as well as access problems preventing addressing the road crossings along the East Fork. The specific threats include:

- Road washout on 07 road near East Fork and Squaw creek juncture.
- 35N07 crossing at East Fork and Crooks creek washed out and need some repair work to make passable and protect from further erosion.
- 34N17 near the intersection with 35N07 has five locations where road width is impacted because of erosion/slides on the fill slope or plugged culverts.

Threats to Road 37N48

The 37N48 road is one of the main access roads into the fire area. During the recent storms the road had some major damage. At one location a culvert plugged up causing a fill slope slide which took out about 2/3 of the road width. At two other locations culverts plugged up causing about a 1/4 to a 1/3 of the road width to be lost. These areas are in danger of further failure due to the unstable slopes and plugged culverts as well as restricting access for other work needed in the Bagley area.

Treatment recommendations:**35N07**

- Repair section of washed out road.
- Rework road creek crossing to allow access and create low water crossings.

34N17

- Repair shoulder/road edge erosion to regain road width
- Clean out pipes. Replace where needed.

37N48

- Reconstruct crossing at all three locations
- Install Hilfiker style retaining wall at larger slide

Costs:

35N07 - \$21,000; 34N17 - \$38,500; 37N48 - \$33,800

Justin Nettleton
Bagley Roads Engineer
Shasta-Trinity National Forest

Bagley Fire BAER Interim 3 Request Justification:

During the storms in December of 2012 and subsequent snow storm in January 2013 the 37N48 road has sustained additional damage. At one location, a culvert plugged up causing a fill slope slide, which initially took out approximately two-thirds of the road width but now after the snow has melted the road is complexly gone leaving a gaping gully. At two other locations, culverts initially plugged causing the loss of approximately one-quarter to one-third of the road width. But after the snowmelt in these areas the losses are now one-half to two-thirds of the road width. Additionally areas where there were plugged culverts now have one-quarter to one-third of the road width gone. These areas are now in danger of further failure due to the unstable fill-slopes and plugged culverts, as well as restricting access for other BAER work needed in the Bagley area.

Treatment recommendations for 37N48 storm road repair:

- Excavate, clean out existing culverts, and install culvert riser on 6 crossings with rolling-dips before and after the crossing.

Projected Costs:

For 37N48 work \$36,000.

Justin Nettleton
Bagley Roads Engineer
Shasta-Trinity National Forest

Bagley Fire BAER Interim Request Justification:**Threats to Road 35N07**

Road 35N07 parallels the East Fork of Squaw Creek (fish-bearing perennial stream). This road served as the southern fire line for the Bagley Fire. The northern portion of the East Fork Squaw Creek drainage burned at a high or moderate severity during the fire. Representatives from the Forest Service and Central Valley Water Quality Control Board reviewed conditions on the road on October 3rd and determined that nine stream crossings were at risk of failure due to undersized and partially plugged culverts. All of the drainages that are tributary to the crossings were burned at a high or moderate severity (see southern-most fire perimeter on attached burn severity map). Because these crossings are located immediately adjacent to the East Fork of Squaw Creek there is a high potential for sediment introduction to the creek from the crossing fills. The specific threats include:

- At one location the road alignment was shifted from its original location as a result of large debris flow which occurred more than a decade ago. The road alignment was never properly re-established and the problem was further exacerbated by fire suppression activities. If left untreated there is a high potential for runoff to be diverted down the road this winter and for water quality impacts to the East Fork of Squaw Creek. Because the road was used as the fire line there is also suppression related damage that will be addressed using the P-code for the fire. At the debris flow location fire suppression activities included ditching of a small perennial drainage on the post debris flow fan which has created a mud hole at the crossing.
- Undersized, plugged and misaligned culvert pipes with tributary drainages burned at high or moderate severity.
- Potential erosion at pipe and dip outlets with no energy dissipaters.

- Degradation of road surface drainage profile causing runoff to flow down the road.

Treatment recommendations for Road 35N07:**A). Management treatments:**

- Replace 9 existing crossings with rocked low water crossings with riprap dissipaters.
- Construct critical dips at crossings where culverts are not replaced to prevent stream diversion in event of overtopped culvert.
- Reestablish the original alignment and construct a low water crossing where the road was rerouted around the debris flow. The existing condition is causing a mud hole where rerouted road crosses the creek.

Projected Costs:

For all 9 sites on the 35N07 road \$47,000.

P-Code suppression repair work will fund 13% or \$6,000 of the total work.

The total BAER request is \$41,000.

Soil Burn Severity Map showing the high-moderate section requiring 35N07 road work with BAER funding. The upper eastern part of 35N07 will be addressed with suppression repair funding.



Steve Bachmann and Justin Nettleton
Bagley READ Hydrologist, Bagley Roads Engineer
Shasta-Trinity National Forest
October 17, 2012

Proposal for woody debris capture storage and disposal on the Squaw Creek Arm of Shasta Lake

Monitoring: Flood and Debris Assessment

Shasta Lake, by nature of its size, location and availability of recreation facilities and resources is by far one of the most popular water based recreation sites in Northern California. Boating is bar far the most common form of recreation activity. Floating woody can and has presented a significant navigational impediment and safety hazard to boaters. In the event a sizable amount of woody debris is washed down the Squaw creek arm and into Shasta Lake as a result of increased runoff from the Bagley Incident, efforts will have to be made to contain and dispose of such debris. The following figures for containment and disposal of debris are based on past experience gained from our last major debris event which happened in 1996.

Implementation: Debris Boom Catchment

Debris capture:

Debris capture is most easily accomplished by using a simple catchment boom extending from shore to shore in the upper reach of the lake/stream channel where an influx of debris is expected. Placement of the boom in the channel will depend greatly on lake level, expected flows and projected debris surface area coverage. Logistically speaking, a good location for such a catchment boom on the Squaw Creek Arm would be in the area of Monday Flat. The length of the boom would be about 1600 feet. A boom for such purpose would be constructed of 12"-20"x 32' logs chained and swiveled end to end. Construction and installation of such a boom would take 3-4 people with boats about 5-6 days.

Debris storage:

Once the bulk of the expected debris is captured by the shore to shore boom, it will have to be contained for storage. Debris normally has to be contained for storage as removal directly from the water is too difficult. Once contained, it is simply a matter of waiting for the lake level to drop to such a point the debris becomes deposited on the shore so it may more easily be handled for disposal. Debris may have to be stored for weeks or even months before the disposal process can begin. In order to store the debris, the boom will have to be carefully pursued and towed to the desired storage location where the boom is secured to the shoreline or inlet of choice. The stored debris will have to be monitored in order to ensure its security. Storage will initially take 3 people and boats about 2 days. Monitoring thereafter should take one person a day a week.

Disposal:

The easiest method for disposal might be under contract with a chip handling company. A chip handling company may machine pile and grind debris on site for direct loading into chip trucks. The chips are then sold for cogeneration. In 1997, the cost of removal only of about 21 surface acres at 1782 tons for a chip volume of about 7100 cubic yards cost \$54,431.20.

For the smaller amounts of debris we are more likely to encounter as a result of the Bagley incident, machine piling and hand burning may be more cost effective. This might require the use of a small dozer for piling for 2-3 days and a hand crew for a week.

Estimated cost for debris capture, storage, and disposal.

Capture: Acquisition of materials, construction in installation of booms.

- Salary. 4 persons x \$250/day x 6 days = \$6,000
- Boat time. 40 hours x \$60/hour = \$2,400
- 50 ea, 32' logs = \$12,000
- Chain, swivels, hardware = \$1,500
- **Total estimated capture cost: \$21,900**

Storage: Transportation of debris to disposal site. Weekly monitoring.

- Salary. 14 person days x \$250 = \$3,500
- Boat time. 40 hours x \$60/hour = \$2,400.
- **Total estimated storage cost: \$5,900**

Disposal:

- Contract disposal estimate 300 tons @ \$100/ton: \$30,000
- Dozer and hand crew burning estimate: \$20,000

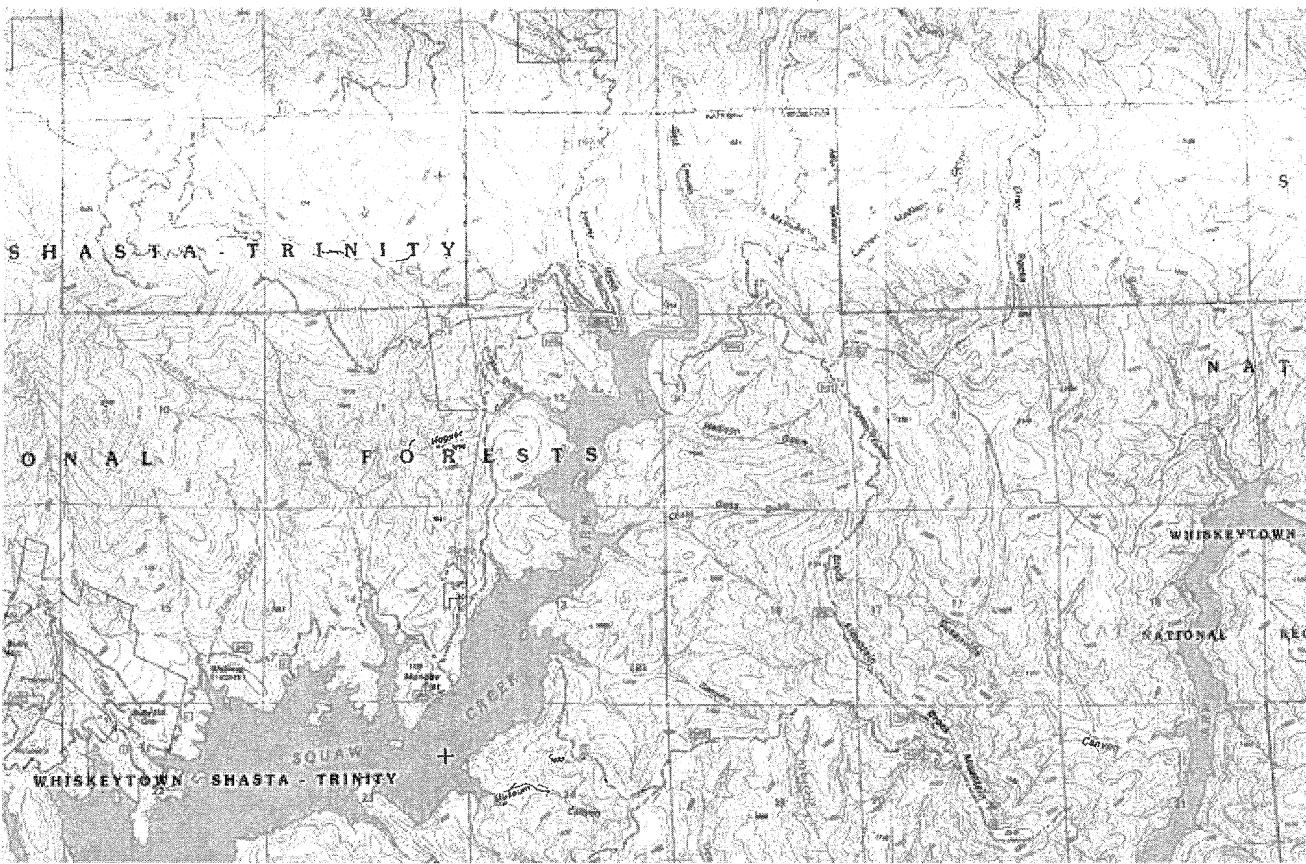
**** estimates do not include planning, NEPA or other related costs. Add additional 30% to cover current costs since cost were estimated using 1996 values.**

Total Cost for Implementation = \$47,800 x 1.3. = \$62,140

Total Cost for Assessment = \$3,000

Troy Nicolls
NRA Assistant Recreation Officer
Shasta Lake Ranger District
530-238-2507

Monday Flat along Squaw Creek inlet:

**Bagley Fire BAER Interim Request 2 Justification:**

Contractor from 1997 storm debris removal based prices due to fuel and current biomass chip value and estimated \$50 per ton for debris removal from Jones Valley. Also mentioned price could vary based on quality of the material (size, density, cleanliness) and availability (proximity to available grinding sites, obstacles, and closed areas). So if we have 600-800 tons that would be \$40,000 at the high end.

Burned Area Emergency Response Engineering Report

Justin Nettleton - USDA Forest Service.
Civil Engineer, Shasta-Trinity National Forest
Todd Moxness - USDA Forest Service
Civil Engineering Technician, Shasta-Trinity National Forest

Objectives: Evaluate the effect of the Bagley fire on the Forest's infrastructure and the possible damage to the infrastructure, forest resources, and surrounding watershed due to increased runoff from burned slopes.

Issues: The issues of concern include current damage and the potential of damage caused by increased runoff. Engineering concerns include culvert blockage and failure, erosion of road surface and road bed, and road damage that poses a safety threat.

Observations:

A). Background information: The fire boundary encloses approximately 150 miles of forest roads with the majority of those roads being maintenance level 1 and 2 roads. Overall the roads are in decent shape but do not have adequate drainage structures to handle the increased runoff expected from the fire damage.

B). Reconnaissance Method: All reconnaissance was completed by vehicle and foot access. Areas of high/moderate burn severity and specific values were the priority for field survey.

C). Findings/Description of Emergency: All road areas surveyed generally have the same issues.

- Undersized/plugged and misaligned culvert pipes.
- Degradation of road surface drainage profile causing runoff to flow down the road.
- Erosion at pipe and dip outlets with no energy dissipaters.
- Berms and/or through cuts that channel water on road surface with inadequate drainage relief and erosion protection.
- Damaged or failed over side drains.
- Large fills with heavy woody debris and sediment above culvert pipes.
- Assumed average ~ 1 stump hole per 2 miles road in high/moderate burn areas. (Assumption for all roads based on roads observed)
- Open cat lines that could suffer erosion and pose a safety concern if not closed.
- Burned up road number signs.

Treatment recommendations:

A). Management treatments:

37N48

- Clean out culvert inlets-11 @ \$200/ea (\$2,200)
- Remove Outside Berm-0.45miles @ \$400/ mile (\$180)
- Repair Stump hole-1@ \$300/stump hole. (\$300)

37N95

- Clean out culvert inlets and catch basin -8 @ \$200/ea (\$1,600)
- Clean out and repair smashed culvert inlets and catch basin-2 @ \$300/ea (\$600)
- Remove Outside Berm-0.5miles @ \$400/ mile (\$200)
- Repair Stump hole-2@ \$300/stump hole. (\$600)
- Install rolling dip and construct rock dissipater -2 @ \$950/ dip (\$1,900)
- Construct rocked critical dip to accommodate overtopping and protect the road fills-4 @ \$2,700 each (\$10,800)

37N51Y

- Clean out culvert inlets and catch basin -2 @ \$200/ea (\$400)
- Clean out and repair smashed culvert inlets and catch basin-1 @ \$300/ea (\$300)
- Brush Channel to prevent culvert plugging 200' (\$550)
- Construct rocked critical dip to accommodate overtopping and protect the road fills-4 @ \$2,700 each (\$10,800)

37N43

- Clean out culvert inlets and catch basin -4 @ \$200/ea (\$800)
- Brush Channel to prevent culvert plugging 200'- 5 locations (\$2,750)
- Install rolling dip and construct rock dissipater -4 @ \$950/ dip (\$3,800)
- Construct rocked critical dip to accommodate overtopping and protect the road fills-4 @ \$2,700 each (\$10,800)

37N68

- Riprap outlet dissipater -3 @ \$700/ea (\$2,100)
- Brush Channel to prevent culvert plugging 200'- 2 locations (\$1,100)
- Clean out culvert inlets and catch basin -4 @ \$200/ea (\$800)
- Armor culvert inlet-2 @ \$700/ea (\$1,400)
- Armored Crossing Overflow-2 @ \$30,000/ea (\$60,000)
- Construct rocked critical dip to accommodate overtopping and protect the road fills- 3@ \$2,700 each (\$8,100)
- Install end section on inlet- 3 @ \$2,000 (\$6,000)

37N33A

- Clean out culvert inlets and catch basin -6 @ \$200/ea (\$1,200)
- Clean out and repair smashed culvert inlets and catch basin-1 @ \$300/ea (\$300)
- Clean Ditch whole length of road-0.68 miles (\$820)
- Install rolling dip and construct rock disapator-12 @ \$950/ dip (\$11,400)
- Install rolling dip with leadoff ditch ~20' and construct rock dissipater - (\$1,050)
- Armor culvert outlet-5 @ \$700/ea (\$3,500)
- Install road closure barrier- (\$1,500)
- Repair drainage at concrete ditch-(\$1,000)
- Armored Crossing Overflow-1 @ \$30,000/ea (\$30,000)

37N33C

- Clean out culvert inlets and catch basin -2 @ \$200/ea (\$400)
- Clean out and repair smashed culvert inlets and catch basin-1 @ \$300/ea (\$300)
- Clean Ditch whole length of road-0.70 miles (\$850)
- Install rolling dip and construct rock dissipater -2 @ \$950/ dip (\$1,900)

Fire area overall costs

- Storm patrol-\$13,000 (3 weeks two people)
- Monitoring-\$13,000 (3 weeks two people)

- Signs-\$2,000

B). Monitoring: Monitoring or storm patrol of roads the first 1-3 years after fire.

C). National Fire plan proposals, long term project proposals: Closure of roads in proposed areas for resource protection to reduce damage to road surfaces during wet weather periods. Decommissioning segments of roadways to trails, that are no longer needed for administrative access or that have a high probability to contribute large amounts of sediment deposits into tributaries. Further evaluation and replacement of undersized culverts.

Consultations: Members of the BAER Assessment Team and regional engineering personal.

References: Best Management Practices booklet by the USDA Forest Service. (Author unknown at this time).

**Burned Area Emergency Response Plan
Vegetation Resource Assessment
Bagley Fire**

19 September 2012

Martin Lenz, Shasta Lake District Botanist
Lusetta Nelson, Westside Botanist
Shasta Trinity National Forest

I. OBJECTIVES

- Identify known locations and extent of/impacts to rare plant populations and special habitats.
- Identify noxious weed populations and pre- and post-fire suitable habitat for weeds.
- Provide management recommendations for reducing impacts from noxious weed introductions as a result of the fire.
- Provide management recommendations, where warranted, for repair of impacts to rare plants or special habitats.

II. GENERAL ISSUES

- Impacts of damage to special habitats and rare plants from wildfire and fire suppression activities on ecosystem stability.
- Impacts of noxious weeds on ecosystem stability and soil productivity.

III. OBSERVATIONS

A. Background Information

The Bagley Fire started on Saturday August 18th, 2012 at approximately 10:07am from a series of lightning fires in northern California. Approximately 46,010 acres burned in the fire with soil burn severities of 22% very low, 48% low, 19% moderate, and 11% high. The fire was contained on September 15, 2012.

Land Management Designations

A large proportion (approximately 13000 acres) of the burned area is under private ownership, primarily by Sierra Pacific Industries, which is managed for timber production. A small amount of that private ownership is by The Nature Conservancy. The remainder is under National Forest management, within the Shasta Trinity National Forest. Designations within the National Forest land include Inventoried Roadless Area (IRA) and Late Seral Reserve (LSR).

Plant Communities

Plant Communities	mixed conifer/hardwood with ponderosa pine, Douglas fir and/or white fir
	montane chaparral
	seasonally wet meadows
	alder/willow shrubland in riparian areas
Special Habitats	shaded riparian above 2900 feet elevation
	mixed conifer or conifer/oak forest, especially on ridgetops & old road cuts. 2000-5200 feet elevation
	rock outcrops. 1300-6000 feet elevation
	hardwood trees primarily white oak

Forest Sensitive Botanical Species

No federally listed Threatened or Endangered plant species or their habitats are known to occur in the Bagley fire. Six Forest Service Sensitive plant species are documented within the Bagley fire. They are shown in the following table.

Scientific Name	Common Name	Symbol	No. of Locations
<i>Ageratina shastensis</i>	Shasta ageratina	AGSH2	8
<i>Arnica venosa</i>	Shasta County arnica, Veiny arnica	ARVE	1
<i>Clarkia borealis ssp. borealis</i>	northern clarkia	CLBOB	2
<i>Collema nigrescens</i>	jelly lichen	CONI8	1
<i>Lewisia cotyledon var. howellii</i>	Howell's lewisia	LECOH2	1
<i>Smilax jamesii</i>	English Peak greenbriar	SMJA	3

Ageratina shastensis (Shasta ageratina) is a plant of limestone or metavolcanic cliffs, in chaparral or coniferous forest at elevations of 1300 to 5900 feet. Two of the sites within the fire were visited on September 14, 2012 during the BAER reconnaissance. Both were in an area of low to moderate burn intensity and showed no adverse effects from the fire. The CNPS Global and State ranking is G2/S2. This species is known only from a small area within the Cascade Range in Shasta County, California. Almost all occurrences are within the Shasta-Trinity National Forest, where it is considered a Sensitive Species.

Arnica venosa (Shasta County arnica) is found in open, often disturbed sites in oak/pine woodland, at elevations of 1300 to 4600 feet. This is a species of disturbed areas that has, for the most part, gone to seed by the time this fire occurred. Given those conditions and the fact that the single known occurrence within the burn area was in an area of low to moderate severity, it seems unlikely that the population would suffer any long term adverse effects from the fire. This species is ranked as G3/S3.2. There are 20 known populations on the Shasta-Trinity National Forest.

Clarkia borealis ssp. borealis (northern clarkia) is an annual plant found in disturbed forest margins (including road edges) in foothill woodland habitats. Like the Arnica, this is a species of disturbed areas that has normally gone to seed by the time this fire occurred. Again, it is unlikely that the populations would suffer any long term adverse effects from the fire. It is ranked G3T2/S2.

Collema nigrescens (jelly lichen) is a lichen that grows on the bark of hardwood trees and shrubs, including Garry oak, canyon live oak, big-leaf maple, cottonwood, and vine maple. The primary threat to this species is forest management activities or other occurrences that remove host trees or degrade habitat. The one occurrence of this species known in the burn area was not relocated in the field visits, but the locality was in an area of low to very low soil burn intensity, so it is very likely that at least some of the population survived the fire and will recover. It is ranked G5/NR.

Lewisia cotyledon var. howellii (Howell's lewisia) grows in rock outcrops that usually don't burn in wildfire. There is one known occurrence within the burn that is in an area of low to very low soil burn intensity. It is unlikely that this population will suffer any long term adverse effects from the fire. It is ranked G4T4Q/S3.

Smilax jamesii (English Peak greenbriar) is an herbaceous perennial riparian vine that occupies moist riparian areas and dies back to a rhizome each fall and re-grows new tops each spring. All areas of suitable habitat that were checked were either low intensity burn or not burned at all. It is unlikely that the populations would suffer any long term adverse effects from the fire. It is ranked G2/S2.3 and is known only from California and Oregon.

Survey and Manage

The 2001 ROD requires management of known sites of any Category A, B, or E species and high-priority sites of Category C or D species. High-priority sites are those that are needed to provide for reasonable assurance of species persistence. There are no known occurrences of survey and manage species within the Bagley Fire. The Bagley fire is in compliance with the 2001 Survey and Manage ROD.

Noxious Weeds

Since most of the Bagley fire area is in Inventoried Roadless Areas checker-boarded with Sierra Pacific Industries lands and difficult to access, records of known noxious weed occurrences are quite limited. Weeds in these areas are mostly restricted to roadsides, campgrounds, lakeshore and other developed sites, but some are found within openings that have been disturbed. Observations during field investigations showed that the patterns seen in the known populations can be extended in a general sense throughout the fire area.

Invasive plants known to occur within the Bagley fire are shown in the following table.

Scientific Name	Common Name	Symbol	CDFA Weed List
<i>Centaurea solstitialis</i>	yellow starthistle	CESO3	C
<i>Cirsium vulgare</i>	bull thistle	CIVU	-
<i>Hypericum perforatum</i>	Klamath weed, St. Johnswort	HYPE	C
<i>Centaurea stoebe</i>	spotted knapweed	CESTM	A
<i>Torilis arvensis</i>	spreading hedgeparsley	TOAR	-
<i>Rubus armeniacus</i>	Himalayan blackberry	RUAR9	-

<i>Bromus tectorum</i>	cheatgrass	BRTE	-
<i>Rubus laciniatus</i>	cutleaf blackberry	RULA	-
<i>Carduus nutans</i>	musk thistle	CANU4	A
<i>Cirsium arvense</i>	Canada thistle	CIAR4	B
<i>Verbascum thapsus</i>	common mullein	VETH	-

B. Reconnaissance Methods

Information on noxious weeds, rare plant habitat and populations was derived from Shasta-Trinity National Forest file records, the California Natural Diversity Database, the California Native Plant Society Inventory of Rare and Endangered Plants, the California Department of Food and Agriculture "Encycloweedia", and from visits to the fire area between September 11, 2012 and September 14, 2012.

C. Findings/Description of Emergency

Critical Value at Risk: Native or naturalized communities on NFS lands where invasive species or noxious weeds are absent or present in only minor amounts.

Priority Threats: Dozer line construction and noxious weed introduction and spread probability is likely with a moderate magnitude of consequences which ranks the risk to this critical value as HIGH.

Weed infestations will displace valuable native plant species, reducing wildlife habitat, and can result in increased soil erosion because these species are less capable of stabilizing soil than their native plant counterparts. Many roadsides in the Bagley fire are occupied to varying degrees by noxious weeds that were observed during BAER field work, in particular yellow star thistle, bull thistle, Himalayan blackberry, common mullein, musk thistle, spotted knapweed and Klamath weed.

The two species of most concern with the highest likelihood of spread into newly created habitat are spotted knapweed and musk thistle. Spotted knapweed is a biennial to short-lived perennial. It can be found in disturbed open sites, grasslands, overgrazed rangelands, roadsides and logged areas. It crowds out native species and forage for livestock, and can invade undisturbed native bunchgrass stands. An individual plant may produce as many as 40,000 seeds. Musk thistle is a biennial or winter annual found in disturbed open sites, roadsides, pastures, annual grasslands, and waste areas, but is mostly limited to the Klamath and Cascade Ranges, northern Sierra Nevada, and Modoc Plateau in California.

Equipment washing was instituted at the beginning of the fire and has undoubtedly helped reduce the spread of weeds from that source. However, private timber company vehicles have had considerable access outside that system and their movements represent another potential source of weed introduction. With the many miles of dozer line constructed for suppression of this fire, it is likely that weeds were spread internally to other portions of the fire, and are poised to move into parts of the fire that burned hot enough to kill existing vegetation and damage the native seed bank. Some portion of the dozer lines will likely be used for OHV recreation, at least temporarily increasing chances of weed importation and spread.

Approximately 13,000 acres of private timberland is scattered throughout the burn area in a checkerboard pattern and includes numerous clear cut areas and other disturbed areas associated with

timber harvest. There will be an increase in these areas due to timber salvage operations. Those newly disturbed areas have a high probability for weed infestations, especially for the two A rated noxious weed species, spotted knapweed and musk thistle.

Due to the steep rugged terrain and other geologic and hydrologic characteristics of the fire area, it appears that there is considerable potential for erosion, debris flows and other soil transfer events. Soil transfer equates to seed bank transfer and movement of invasive plant populations to new sites. It also results in new habitat formation at both the point of origin and at the point of deposition. Soil movement issues are being addressed by geology, soils and/or hydrology reports.

EMERGENCY TREATMENT RECOMMENDATIONS

FSM 2523.3 gives direction to monitor burned areas for up to 3 years from containment to ensure emergency stabilization measures are functioning as planned and effective.

Noxious Weed Detection Surveys

All dozer lines on or within fire perimeter should be surveyed in 2013, with new infestations hand treated and mapped.

Dozer lines are generally mapped with varying levels of quality in different parts of the fire area, so number and length of lines in the GIS database can only be considered to be estimates. Line location and number should be validated in the field as treatments proceed. Using the GIS database, there are 32.7 miles of dozer lines on or within the fire perimeter.

Seeding and Mulching Treatments

Roadways are the primary conduit of noxious weed introduction as weed seeds and plant parts are carried on the tires and underbellies 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 lines and the interior of fires, intersections of dozer lines and travelable roads should be seeded with native seed and mulched with weed-free straw. Seeding and mulching the first 50 feet of dozer lines where they meet travelable roads should discourage noxious weed introduction, which should discourage spread further down individual dozer lines. There are 64 intersections of dozer lines with roads and it is assumed that they will average 25 feet in width and occur on both sides of the road. These figures yield 3.7 acres of dozer line treatment.

Sites would be seeded with a mix of native species. Native grasses would probably include blue wildrye (*Elymus glaucus*), California brome (*Bromus carinatus*), and Sandberg's bluegrass (*Poa secunda*), with the legume Spanish lotus (*Lotus purshianus*) (not to exceed 5% of the mixture) at a rate of 5-15 pounds per acre.

TREATMENT COSTS

Cost Summary				
	Units	Unit Cost	# of Units	BAER \$
Land Treatments				
Seeding & Mulching Dozer Line - Road Intersections	acres	1385.00	3.7	5087.24
Monitoring				
Noxious Weed Detection Surveys	miles	1200.00	32.7	39240.00
TOTAL ALL LINE ITEMS				44327.24

References

- Baldwin, B.G., ed. 2012. The Jepson Manual: Vascular Plants of California, Second Edition, University of California Press.
- Nevares, Steve and Nicole Jurjavcic. PG&E Technical Memorandum (TM-13). Invasive Plant Species in the Study Area. July 2009.
- USDA Forest Service. 1995a. Forest Service Handbook 2509.18 – Soil Management Handbook.
- USDA Forest Service. 1995b. Shasta-Trinity National Forests Land and Resources Management Plan.
- USDA Forest Service. 2001. Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage Protection Buffer, and other Mitigation Measures, Standards and Guidelines.
- USDA Forest Service. 2004. FSM 2523. Emergency Stabilization – Burned Area Emergency Response (BAER).
- Sawyer, J.O. and Thornburgh, D.A. (1977). Montane and subalpine vegetation of the Klamath Mountains. In Barbour, M.G. and Major, J. (eds), *Terrestrial vegetation of California*. John Wiley and Sons, New York. Pp. 699-732.

Burned Area Emergency Response (BAER)

OHV Recreation Report

OHV Recreation Report

Bagley Fire

September 2012

Paul Hart. Shasta-Trinity National Forest, OHV Coordinator

OHV Recreation Report

I. Potential Values at Risk (identified prior to the on-the-ground survey)

The values at risk identified for Off-Highway Vehicle (OHV) Recreation are located on Four Maintenance Level 2(ML2) Roads and three are also identified as Legacy Trails. These travel routes are historic Jeep, All-Terrain Vehicle (ATV) and Motorcycle (MCs) trails that are used for OHV Recreation, hunting, sightseeing and for fire suppression. The fire affected 35N07A, 35N46 (01W11), 36N40 (02W32) and 35N15Y (02W11). Due to high and moderate fire activities on these travel routes public safety, road and trail prisms are at risk.

The follow values are what were considered during the Burned-Area Emergency Response:

- Human life and safety on or in close proximity to burned NFS lands.
- Building, water systems, utility systems, road and trail prisms, dams, wells or other significant investments on or in close proximity to the burned NFS lands.

II. Resource Condition Assessment

A. Resource Setting

OHV Recreation

The Bagley Fire area is located in the area where the Forest Service has been working with a partner under a Challenge Cost Share agreement. Over the last year the Forest OHV Coordinator has been working with the Recreation Outdoors Coalition (ROC) on the Bagley OHV Demonstration Project. The project is a feasibility study that is intended to provide information and recommendations to the Forest for OHV Recreation opportunities. The Bagley Fire area encompassed the majority of the Bagley OHV Demonstration Project area.

ROC prepared a (Public Law 106-393, Secure Rural Schools and Community Self-determination Act of 2000) grant application through the Shasta County Resource Advisory Committee (RAC) to develop an OHV feasibility study for the Bagley Mountain area.

The Bagley OHV Demonstration Project application was approved for RAC funding on July 22, 2011. This project has five major tasks.

- Complete a field inventory of routes; validate easement and rights-of-way status.
- Identify natural and cultural resource constraints.
- Develop objectives and experience criteria for OHV activities with affected stakeholders.
- Assess the quality of riding opportunities with road and trail management and experience criteria.
- Complete the OHV feasibility study and provide maps.

Field Surveys (Pre-Fire)

36N40(02W32--Garden Ridge Legacy Trail) The road crosses squaw creek at a very deep and misleading spot. The North end of the creek crossing is very deep (3 ½ feet) in October. There is also a very large boulder (15ft by 7ft) in the path that vehicles try to cross. The boulder forms a deep eddy on the back side of the rock which causes ATVs and MCs to drown out their machines. If an individual can cross the creek (experts only) the road continues onto garden ridge. The ascent to the ridge top is roughly a mile hill climb. The road is 40% in spots. Not recommended for high -clearance vehicles. The private portions of garden ridge are not marked and riders continue on the trail. The trail narrows to single track in numerous spots and is very technical.

35N46(01W11--Bagley Mt. Legacy Trail) Half of the road is currently an open and well maintained ML2 Road. The other half of the road is narrow and two track in most spots. The road is in poor shape (potential to slide) near the junction of 35N46 and 37N43. From 37N95 to 37N48 the road is grown over and very difficult to navigate.

35N07A The road is very narrow and is impassible by most high clearance vehicles. The road is best for ATV, MCs and high clearance jeep or truck traffic.

37N15Y(02W11--Curl Ridge Legacy Trail) The road is drivable near North Fork Mt. for roughly a half mile. The road crosses private land in Section 29 and quickly turns into a single track/two track trail in Section28. The route continues North as it crosses 37N95 near Happy Hunting Ground. The road is drivable for about a mile, then turns into two track/single track for the majority of the route. The last mile of the road was almost completely brushed over.

B. Findings of the On-The-Ground Field Surveys (Post-Fire)

36N40 (02W32--Garden Ridge Legacy Trail) Crews installed a temporary crossing for passage through Squaw Creek. The road prism is now more open and drivable to ATVs and MCs. Some modified Jeeps

will be able to travel the route. Suppression efforts included brushings and some Dozer work directly on the ridge. The brushing occurred in sections 27 and 22 near Wheeler Ranch. There are dozer lines in Sections 21 and 16. Road rehab is recommended. Section 4 received moderate burns with pockets of high burned areas. The potential for hazard trees and erosion problems are likely. Sections 33 and 32 received high fire activities. The potential for erosion, landslides and hazards trees risk the value of the Garden Ridge Legacy Trail. **The risk is High** (likely and moderate consequences).

35N46 (01W11--Bagley Mt Legacy Trail) The intersection from 37N48 & 35N46 down to 37N51Y (sections 6, 7 and 18) on the Bagley Mt Legacy Trail received some suppression repair. There are numerous trees down and will continue to fall. The majority of this section is moderately burned. The intersection of 37N51Y to 37N50 (sections 18 and 19) has numerous pockets of very low and unburned areas. The intersection of 37N50 & 35N46 to 37N95 (sections 19, 24, and 25) is mostly low and moderately burned with some trees starting to fall. The intersection of 37N95 & 35N46 (Private Section25) to 37N43 is mostly moderately burned with pockets of highly burned areas with erosion potentials and hazard trees risking the value of the trail. Sections 36, 1 and 12 on the Bagley Mt. Legacy trail received mostly moderately burned areas with pockets of high in section 1. Erosion is possible and hazard trees are likely to risk the trail. Section13 mostly received low to very low burned areas. **The risk is High** (likely and moderate consequences).

35N07A The road prism is significantly improved which now allows 4WD, Jeeps, ATVs and MCs to travel from wheeler ranch over to the Bagley Mt. Legacy Trail. Additional suppression repair work is needed to ensure sediment does not enter into East Fork of Squaw Creek. Due to the number of vehicles and dry conditions on the road, deep dust is currently present. **The risk is Intermediate** (possible and moderate consequences).

37N15Y (02W11--Curl Ridge Legacy Trail) The road is drivable near North Fork Mt. for roughly a half mile. The road crosses private land in Section 29 and quickly turns into a single track/two track trail in Section28. Sections 32, 29 and 28 all received high burned areas and pockets of moderate burns from the fire. The road continues onto section 21 for a short segment, where equipment work has been completed. The potential for erosion problems, rock fall and hazard trees are very likely in sections 32, 29 and 28. The route continues North as it crossed 37N95 near Happy Hunting Ground. The road is drivable for about a mile, then turns into two track/single track for the majority of the route. Sections 22, 15, 10, 11 and 2 received highly burned areas with pockets of moderate burned severity near Shoeinhorse and Little Shoeinhorse Mt. The potential for erosion problems, rock fall and hazard trees are very likely in sections 22, 15, 10, 11 and 2. **The risk is High** (very likely and moderate consequences).

Table 1: Qualitative terminology for use in assessing risk to property (modified by Koler from Fell et al., 2005)

Qualitative measures of likelihood of occurrence

Level	Descriptor	Description
A	Almost certain	The event is expected to occur
B	Likely	The event will probably occur under adverse conditions
C	Possible	The event could occur under adverse conditions
D	Unlikely	The event could occur under very adverse circumstances
E	Rare	The event is conceivable but only under exceptional circumstances
F	Not credible	The event is inconceivable or fanciful

Qualitative measures of consequences to the resource and human life and safety

1	Catastrophic	Resource is completely destroyed or large scale damage occurs requiring major engineering works for stabilization
2	Major	Extensive damage to most of the resource, or extending beyond site boundaries requiring significant stabilization
3	Medium	Moderate damage to some of the resource, or significant part of the site requires large stabilization works
4	Minor	Limited damage to part of the resource, or part of the site requires some reinstatement/stabilization works
5	Insignificant	Little damage

Qualitative risk analysis matrix – classes of risk to resource

		Consequences to the resource				
Likelihood	Catastrophic	Major	Medium	Minor	Insignificant	
Almost certain	VH	VH	H	H	H	
Likely	VH	H	H	M	L-M	
Possible	H	H	M	L-M	VL-L	

Unlikely	M-H	M	L-M	VL-L	VL
Rare	M-L	L-M	VL-L	VL	VL
Not credible	VL	VL	VL	VL	VL

Legend – VH: very high risk; H: high risk; M: moderate risk; L: low risk; VL: very low risk

Field Data Log for Rolling dips/outsloping locations according to Slope and Grade

Road Assessment

While studying the road conditions I took photographs, helmet camera videos and numerous notes. The notes included current conditions, trail maintenance recommendations, slope and grade measurements with an inclinometer and signage inventory/recommendations.

Road Assessment Table

**note-- max grade for high clearance and four-wheel drive vehicles: 18% or as required by State safety regulations. (FSH 7709.56-Road Construction Handbook CH. 40-Design)

Road	Mileage	Slope	Grade	Recommendation
36N40(Garden Ridge)	7.02 Miles	Max 51% Eight Spots>35%	Max 27% Eight Spots > 18%	Convert to trail- Provides loop opportunities and is part of the Bagley Mt. OHV Study area. Sign as Black Diamond open to MCs and ATVs. Construct multiple rolling dips on locations that exceed 18% grade as identified. Clear Hazard trees to ensure safety of crews.
35N46(Bagley MT Legacy Trail)	9.5 Miles	Max 38% Six Spots > 35%	Max 22% Six Spots > 18%	Convert to trail Part of the Bagley Mt. OHV Study area. Sign as Blue Diamond open to Jeeps, MCs and ATVs accordingly. Construct multiple rolling dips on locations that exceed 18% grade as identified. Clear Hazard trees to ensure safety of crews.

				crews.
37N15Y(Curl Ridge Legacy Trail)	9.35 Miles	Max 45% 5 Spots > 35%	Max 24% 5 Spots > 18%	Convert to trail: Part of the Bagley Mt. OHV Study area. Sign as Blue Diamond open to Jeeps, MCs and ATVs accordingly. Construct multiple rolling dips on locations that exceed 18% grade as identified. Clear Hazard trees to ensure safety of crews.

Risk Determination for Forest Service and Private Roads

Resources at Risk High and Moderate Burned Sections	Probability of Damage or loss	Magnitude of Consequences	Risk Rating
35N07A	Possible	Moderate	Intermediate
35N46 (4.58miles)	Likely	Moderate	High
36N40 (3.76miles)	Likely	Moderate	High
37N15Y (9.35miles)	Very Likely	Moderate	High

Risk Determination for Forest Service Roads

Resources at Risk High and Moderate Burned Sections	Probability of Damage or loss	Magnitude of Consequences	Risk Rating
35N07A	Possible	Moderate	Intermediate
35N46 (4.57miles)	Likely	Moderate	High
36N40 (2.52miles)	Likely	Moderate	High
37N15Y (6.45miles)	Very Likely	Moderate	High

II. Emergency Determination

The emergency to values at risk include high potential for geologic hazards (ie., landslides, debris flows, rockfalls and flooding), hazard trees (ie., standing snags, down trees, widow makers) and the loss of Forest Service signs caused by the fire will have adverse effects to human life and safety on or in close proximity to burned NFS lands on road & trail prisms. Of particular concern is the likely risk for injury or illness to humans and moderate property damage in the high burned areas with standing snags and

rock slides. The moderate burned areas also have a likely potential to cause injury or illness to humans and cause moderate property damage.

III. Treatments to Mitigate the Emergency

A. Treatment Types

- **Trail Stabilization/Rolling Dips and Outsloping**—Rolling dip cross drains are designed to pass slow traffic, while also dispersing water. Rolling dips cost less, require less maintenance and are less likely to fail compared to inboard ditches and culvert pipes. Outsloping will be designed where the road allows such construction. These treatment types fit into the Road and Trail Treatments—Trail Stabilization Category, Rolling Dips Category and Outsloping Roads Category.
- **Hazard Tree/Rock Removal**—Treatment of hazard trees and unstable rock is prescribed to protect life along roads. Large boulders destabilized by wildfire and severely burned trees pose a preventable risk to public safety. This treatment type fits into the Protection and Safety Treatments—Hazard Trees and Unstable Rocks Category.
- **Warning Signs and Sign Installation**—The warning signs will be used to alert drivers and recreational users of existing or potentially hazardous conditions created by the wildfire. The road/trail signs must be replaced as they are a critical value for safety and road/trail prisms. This treatment type fits into the Protection and Safety Treatments—Warning Signs.
- **Monitoring**—Monitoring will be used to evaluate the effectiveness of the treatments. Photo monitoring and the Soil Conservation Plan will be tools to capture data and progress. The Soil Conservation Plan is attached in Appendix I.

B. Treatment Objectives

- Assess effects of the fire and untreated suppression actions to Off-Highway Vehicle (OHV) recreation opportunities within the Shasta Lake and McCloud Ranger Districts. On-going monitoring will help determine the effects of the fire using the Soil Conservation Plan attached in Appendix I.
- Mitigate potential threats to public users because of the effects of the fire and related suppression activities.
- Implement the treatments to reduce significant safety threats to users and perform trail work to control erosion issues of the area.

C. Treatment Descriptions

- Several bulldozed fire suppression and control lines intersect and follow the existing forest service system roads. Public use of these lines is unsafe and can accelerate erosion leading to impacts to trails, roads and watersheds. Rolling dips and outsloping will be implemented to such areas.