Date of Report: *October 10, 2014*
Interim #1

BURNED-AREA REPORT
(Reference FSH 2509.13)

PART I - TYPE OF REQUEST

A. Type of Report

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

B. Type of Action

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

[x] 2. Interim Report # *1* *Interim report #1 Items are in Italicized and in Blue Font*
[*x*] Updating the initial funding request based on more accurate site data or design analysis
[ ] Status of accomplishments to date

[ ] 3. Final Report (Following completion of work)

PART II - BURNED-AREA DESCRIPTION

A. Fire Name: King

B. Fire Number: CA –ENF-023461

C. State:CA

D. County: El Dorado, Placer

E. Region: 05

F. Forest: Eldorado and Tahoe

G. District: Placerville, Pacific & Georgetown (Eldorado N.F.), & ~~Forest Hill~~ *American River* (Tahoe N.F.) H. Fire Incident Job Code: P5JEE9

I. Date Fire Started: September 13, 2014 J. Date Fire Contained: October ~~8~~ 9,2014

K. Suppression Cost: *118.5 million as of October 10, 2014*

L. Fire Suppression Damages Repaired with Suppression Funds
1. Fireline waterbarred (miles):158 miles
2. Fireline seeded (miles):
3. Other (identify): 56 miles handline rehabed.

M. Watershed Number:

HUC12 (6th Field) Name	HUC12 #	*% of Watershed Burned*
Brush Creek-South Fork American River	180201290502	*27%*
Deer Creek-Rubicon River	180201280206	*69%*
Dolly Creek-Middle Fork American River	180201280302	*<1%*
Gerle Creek	180201280204	*<1%*
Hell Hole Reservoir-Rubicon River	180201280203	*2%*
Little Grizzly Canyon-Rubicon River	180201280209	*49%*
Little Silver Creek-Silver Creek	180201290205	*47%*
Long Canyon	180201280208	*30%*
One Eye Creek-Rock Creek	180201290403	*<1%*
Pilot Creek	180201280207	*21%*
Plum Creek-South Fork American River	180201290304	*21%*
Slab Creek	180201290501	*47%*
South Fork Rubicon River	180201280205	*7%*
South Fork Silver Creek	180201290204	*<1%*
Whaler Creek	180201290401	*<1%*

**Subwatersheds having less than 5% burned area are listed but not analyzed in detail.*

N. Total Acres Burned: 97,717
NFS Acres(63,812) Other Federal (na) State (na) Private (33,893)

O. Vegetation Types: *Primarily sierran mixed conifer, ponderosa and jeffrey pine forests, with smaller components of montane hardwood, montane chaparral, grasslands, and riparian areas.*

P. Dominant Soils: McCarthy, Holland, Cohasset, Mariposa, Jocal

Q. Geologic Types: Bedrock within the boundaries of the King Fire includes three primary rocks types, (1) Granitic batholithic rocks, (2) metasediments rocks, and (3) Tertiary volcanics that cap ridges.

R. Miles of Stream Channels by Order or Class:

~~Stream Type~~	~~Miles~~
~~Artificial~~	~~2~~
~~Intermittent Streams~~	~~20~~

~~Perennial Streams~~	~~29~~
~~Regulated Perennial Streams~~	~~12~~

Stream Channels by order or class were miscalculated. Updated miles are listed below.

Stream Type	Miles
Canal/Artificial	5.3
Intermittent Stream	132.8
Perennial Stream	101.2
Regulated Perennial	59.7
Grand Total	299

S. Transportation System

Trails: 56 miles Roads: 343 miles (Forest Service Roads all Maintenance Levels)

PART III - WATERSHED CONDITION

A. Burn Severity (acres):

Soil Burn Severity	Private	Eldorado National Forest	Tahoe National Forest	Grand Total	% within the Fire Perimeter
High	7,219	14,857	11	22,087	**23%**
Moderate	8,117	14,542	40	22,699	**23%**
Low	10,108	20,327	92	30,527	**31%**
Unburned/Very Low	8,461	13,810	133	22,404	**23%**
Grand Total	33,893	63,536	276	97,717	

B. Water-Repellent Soil (acres): 39,087 (40% of the total acres).

C. Soil Erosion Hazard Rating (acres):

EHR	ACRES	%
Very High	3,935	4%
High	31,498	32%
Moderate	42,324	43%
Low	19,960	20%

D. Erosion Potential: 27 tons/acre

E. Sediment Potential: 22 tons per acre or 9,310 cubic yards / square mile

PART IV - HYDROLOGIC DESIGN FACTORS

A. Estimated Vegetative Recovery Period, (years): *3 to 6*

B. Design Chance of Success, (percent): 65%

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

D. Design Storm Duration, (hours): 12

E. Design Storm Magnitude, (inches): ~~3.75~~ *3.34*

F. Design Flow, (cubic feet / second/ square mile): *76*

G. Estimated Reduction in Infiltration, (percent): *45%*

H. Adjusted Design Flow, (cfs per square mile): *116*

PART V - SUMMARY OF ANALYSIS

Overview

The King fire started on September 13, 2014. The fire was driven by steep terrain, low relative humidity, and wind. The fire spread quickly up the Rubicon River and surrounding drainages eventually reaching approximately 97,717 acres. The King Fire burned several tributaries to the South Fork American River and the Rubicon River (a tributary to the Middle Fork American River) subwatersheds. The area is characterized by steep, rocky, mountainous canyons, and gentle lahar ridges. A significant percentage of this area burned intensely, consuming all organic duff on the soil surface along with leaves and needles on standing live vegetation.

Approximately 46% of the burn area burned at a high and moderate soil burn severity. The rest of the fire was either low or very low soil burn severity with unburned areas within the fire perimeter.

The Rubicon River, Wallace Creek drainage, Pilot Creek and a small portion of Long Canyon drainage are tributaries to the Middle Fork American River. The Rubicon River drainage burned completely rim to rim for approximately 12 miles below Hell Hole Reservoir. The headwaters of Wallace Creek subbasin (tributary to Long) burned with a high percentage of high intensity. These slopes range from gentle to moderate steepness. The burned areas within these drainages are expected to produce a lot of erosion and sedimentation easily transported through the drainages to the Ralston Afterbay. The upper headwaters of Pilot Creek burned mostly at a high intensity. The burned portion of Pilot Creek (all private timber land) empties into Stumpy Reservoir, the water supply for Georgetown, CA.

Slab Creek, Brush Creek, Plum Creek, and Silver Creek all have significant amount of burn area and are tributaries to the South Fork American River. A small portion of the South Fork American River drainage also burned. Most of burned area tributary to the South Fork American River burned in a more mosaic pattern. While these drainages have medium to large patches of high severity burn they are more isolated and interspersed with moderate, low, and unburned intensities.

Based on historical precipitation patterns, it can be expected that winter storms have a high probability of occurring in the weeks following the King Fire. The risk of flooding and erosional events will increase as the result of the fire, creating hazardous conditions within and downstream of the burn area. These hazardous conditions maybe worsened in the case of a rain-on-snow event, where long-duration rainstorms falling on a shallow snowpack can produce very high peak flows. Debris flows may trigger well before the peak rainfall amount falls during a long duration winter storm.

Watershed Response

Hydrologic Response: Watershed conditions in the burned watersheds have changed significantly as a result of the fire. Vegetation and underlying organic matter slows runoff and protect soils from direct raindrop impact, assists with water infiltration to soil and releases runoff at slower rates. Consumption of organic material and high soil heating can promote the formation of water repellent layers, at or near the soil surface, which can result in significant amounts of soil loss.

Due to the steepness of some of these drainages, the amount of moderate and high burn severity (46%), and the large areas now devoid of vegetation and groundcover after the fire, large runoff producing storms will likely create increased surface flow volumes and velocities that can transport available sediment from the slopes and along the channel bottoms. These responses are expected to be greatest in initial storm events, and will become less evident as vegetation is reestablished, providing ground cover, increasing surface roughness, and stabilizing and improving the infiltration capacity of the soils. As a result, values at risk are expected to be at an increased risk from post fire flooding and sedimentation.

The fire burned with high soil burn severity in large portions of the Rubicon River drainage. Long Canyon and Brush Creek drainages were also affected by large areas of high and moderate burn severity, but to a lesser extent. Potential post-fire peak flow increases were estimated using a modeling technique utilizing regional regression equations to evaluate watershed response in nine of the fifteen 6th field watersheds (HUC12) within the fire area. Modeling estimates of post-fire peak flow showed water runoff increases from 17% in the South Fork Rubicon River HUC12 to 79% in the Deer Creek-Rubicon River and Little Grizzly Canyon-Rubicon River HUC12 watersheds.

A pour point is the outlet of a catchment through which all runoff in the catchment pass through. Several pour points (catchments smaller than the HUC12) were established across the burned area to capture the estimated increase in hydrologic response the fire might produce. Response across the burn area varies based on terrain, pattern of burn, and amount of moderate and high Soil Burn Severity (SBS) acres, with the increase of estimated post-fire runoff in a 5 year storm ranging from 15 to 100% increase. Flows are expected to be even greater when considering bulking. Localized areas expected to have the highest increase in runoff from burn areas include Rubicon Creek (67% increase from the burned area alone), Wallace Creek (101% increase), Brush Creek (84% increase), and Pilot Creek (91% increase from the burned area alone). Rubicon River is a transport system, steep and lacking natural depositional areas such as wide floodplains or meadows to trap sediment. There may be a temporary filling in of pools as sediment is transported through the system and will remain there until a flushing flow occurs. Regulation of flow by upstream dams may allow sediment to persist in pools indefinitely, creating shallower pools for a longer period of time. It is expected that most of the fire-related fine sediment that makes it to the Rubicon River will be eventually be transported to Oxbow Reservoir. Wallace Creek, Long Canyon and Pilot Creek have flatter terrain, reservoirs, or meadows that will attenuate some of the fire-related flooding risks.

Field evaluations were conducted to identify potential values at risk. The effects to the water quality of the Rubicon River include potential increases in pH from ash, water turbidity and sediment. The Rubicon River is located above the Oxbow Reservoir and Ralston Afterbay (Placer County Water Agency). Small tributary drainages above selected culverts across the burn area were delineated for modeling (ex. Eleven Pines Road). The expected increase in flow in these drainages was greatly increased due to high percentage of high and moderate SBS acres (ranging from 40-100%). Flow in the tributaries crossing Eleven Pines Road is estimated to increase 50 to 180%. The steep, rocky nature of these slopes and high SBS are expected to contribute to this elevated hydrologic response. The Brush Creek watershed is located above a SMUD reservoir that is used for power generation. Sedimentation to these reservoirs could affect power generation. Hillslope treatments of aerial mulching on the slopes are recommended to decrease runoff and soil movement to the streams and roads in these drainages.

Erosion Response: Primary effects of fire on soils are removal of soil cover and soil heating effects, as affected by peak temperatures during the fire front and subsequent smoldering consumption of duff and woody debris. Soil heating effects are below ground, which may compromise soil structure stability and infiltration characteristics, which changes the ability of soils to accept rain events and/or produce runoff. Soil cover is crucial in physically protecting soil from

erosion by absorbing raindrop impact, and dissipating energy of surface runoff at the duff/soil interface; in unburned condition this normally limits erosion to small-scale effects, and fines re-deposited on hillslopes prior to reaching a channel. With cover removal by this fire, large contiguous areas are vulnerable to rain and runoff impacts and mobilized sediments will frequently be delivered to streams. Soil Burn Severity mapped for this fire reflects the relative degrees of soil heating effects and cover reduction as a result of this fire. This mapping may be further used to quantify erosion risk and sediment production through various WEPP models.

Three hundred and forty-one representative hillslopes were modeled in ERMiT for this fire and results extrapolated in Excel for sub-watershed level analysis. Soil erosion estimates are based upon watershed areas within the fire area only. Unburned watershed areas outside the fire area were not modeled. As an interpretive visual, tons/ac is roughly equivalent to that many sheets of paper stacked being removed from the soil surface, and 1000 tons of sediment would fill about 120 standard 10-yard dump trucks. A 5-Year storm was modeled in ERMiT to determine if the estimated soil erosion for the fire area would affect soil productivity. For the 5-year event (20% probability); an estimated average 1,889,185 tons of sediment could be produced (27.09 tons/acre), equivalent to 9,310 cubic yards per square mile (using a conversion factor of 1.35 tons per cubic yard). Increased hillslope erosion is expected to occur throughout the fire area especially within those areas in the high burn severity. Unburned, pre-fire conditions estimated an average 4,933 tons of sediment could be produced (0.47 tons/acre) for a 5-year event (20% probability).

Geologic Response: Within the King Fire burned area, some watersheds, especially the Rubicon, show a great deal of past debris slide/debris flows/rockfall activity that will be increased during future storms. Other areas have little evidence of recent past slope instability. But conditions have changed due to the King Fire.

As a result of the removal of vegetation by the fire, excessive sediment and available transported material in channels and potential high runoff as a result of moderate to high rainstorms, debris-flow probabilities are high along some of the steep to moderate canyons. Soils are exposed and have become weakened, and rocks on slopes have lost their supporting vegetation. Roads are at risk from rolling rock, plugged culverts, debris slides and debris flows. Stream channels and mountainside ephemeral channels will be flushed of the sediment that in some places is loose and deep, in other places shallow. That sediment will deposit in some channels, choking flow, raising flood levels, then covering roads or eroding road prisms. Risks to human life, roads, trails and natural resources are high to very high. There is a high potential for small to large debris flows within the steep inner gorge areas, particularly within the Rubicon drainage.

Field and aerial observations in the Rubicon drainage showed numerous debris flow channels, some plugged with large deposits of rock and soil from the 9/27-9/28 rain event, and many slopes burned at moderate and high soil burn severity at risk for contributing large quantities of soil, rock and organic debris to steep channels. When debris flows occur, catchment basins above the Eleven Pines Road will fill and plug due to undersized culverts and excessive debris. In some locations, berms and insloped road design will keep flow on the road for long distances, before exiting on the fillslope in random locations and potentially undercutting road fills and washing sideslopes where flow is not intended. USGS debris flow modeling estimates that out of 18 larger basins in the Rubicon mapped as moderate hazard for debris flows, 7 basins intercept the Eleven Pines Road. Of those 7 basins, 4 are predicted to produce debris flows of 10-100K cubic meters, and 3 at 1-10K cubic meters of debris. Brush Creek and Silver Creek watersheds also each have 5 basins with moderate probability for debris flows, and Slab Creek has one. No major roads are impacted by those potential debris flows.

A.Describe Critical Values/Resources and Threats:

A comprehensive list of potential values at risk within or directly downstream of the King burned area was compiled through consultation with local management and resource specialists and through BAER Team on the ground assessment ~~(Attachment ___~~ *can be requested from the Project Record*~~).~~ Following guidance in Interim Directive 2520-2013-1, the BAER assessment team evaluated this list of values through field assessment and subsequent analysis to identify the critical values (FSM 2523.1 – Exhibit 01) that may be treated under the BAER program (Appendix A) The critical values were then assigned a level of risk defined by the probability of damage or loss coupled with the magnitude of consequences using the risk assessment matrix (FSM 2523.1 – Exhibit 02). The critical values with unacceptable risks signify a burned-area emergency exists. The characterization of the probability of damage or loss is based on the

watershed response analysis completed by the BAER Assessment. Critical values having a "Very High" or "High" risk rating include recommended emergency stabilization actions known to mitigate potential threats or minimize expected damage, which are described below. No treatments were identified for values when the analysis resulted in an "Intermediate" or lower risk rating. *These intermediate risk areas were identified and discussed with the recommended treatment consisting of coordination with local, state, and other federal cooperators. Additionally critical warning signs are recommended in some areas with an intermediate risk.*

1. Human Life and Safety (HLS)
   a. **Very High** ***to High*** risk to travelers along routes (roads and trails) within and downslope from hillslopes burned at a moderate to high severity due to an increased threat of falling trees/snags, rocks, excessive erosion, flooding, and other debris. The highest identified risk is the Eleven Pines Road. There is a significant risk of debris flows all throughout the Rubicon drainage where several Forest system trails are located. *Additional Level 2, 3, 4, and 5 Forest System Roads were evaluated and site specific areas have been identified and can be found in the Roads/Engineering Specialist Report. Treatment recommendations are temporary closure, install warning signage, and monitoring to ensure treatments are functioning as intended.*
   b. ***Very High, High, to Intermediate*** *risk to the life and safety of the public, cooperator, and FS workers and contracted personnel implementing BAER treatments due to the presence of excess sedimentation, flooding, debris flow, rockfall in the burn area have been identified. Treatment recommendations are temporary closure, install warning signage, and storm patrol monitoring to ensure treatments are functioning as intended.*
   c. ***Very High, High, to Intermediate*** *risk to the life and safety of the public, cooperator, and FS workers and contracted personnel implementing BAER treatments due to the presence of hazard trees throughout the entire burn area. In areas of high or very high risk closure is the most certain way of reducing public safety risks, but in those unusual situations where public closure cannot be implemented, the appropriate treatment may involve removal of the hazard trees. Hazard tree removal would be limited to managing the hazard (dropping the tree) and must be focused on the trees posing the greatest risk. Mitigation of hazard trees that pose a significant risk to FS or contract workers working on implementing BAER treatments will occur as needed. Cooperators and employees at the Pacific Ranger District Office will need to monitor their facilities and infrastructure. It will be up to the cooperators coordinating with the Eldorado National Forest and employees of the Pacific Ranger District to manage hazard trees near and around their facilities.*
   d. ***Very High*** *risk to public and administrative personnel at the Big Meadows Campground due to the presence of hazard trees in areas of likely concentrated use. Treatment recommendation is to temporarily close the site to public and administrative use, remove hazard trees identified in the Recreation Specialist report, and install hazard tree warning signage at the site to warn of potential for additional threats.*
   e. ***Very High*** *risk to travelers along trails within and downslope from hillslopes burned at a moderate to high severity due to an increased threat of falling trees/snags, rocks, and other debris. Trail routes having the greatest concern are: 13E24, 14E04, 14E10, 14E11, and 14E14, which represent 19.26 miles of trail. Treatment recommendations are temporary closure, installation of hazard warning signage and monitoring.*
   f. ***Very High*** *risk to public and administrative personnel at the Bridal Veil Day Use site and Slab Creek Reservoir dispersed recreation area due to the presence of hazard trees and location within and below from hillslopes burned at a moderate to high severity due to an increased threat of falling trees/snags, rocks, and other debris. Treatment recommendations are mitigation of hazard trees, temporary closure, installation of warning signs and monitoring.*
   g. ***High*** *risk to public and administrative personnel at Black Oak Campground, Stumpy Meadows Campground, and Big Meadows Campground due to the presence of exposed stump holes and holes resulting from burned bollards and barrier posts, and exposed/unstable lumber and hardware from informational signage burned in the fire. Both Black Oak and Stumpy Meadows Campgrounds have exposed hazardous waste material present. Treatment recommendations are stabilization of hazardous waste, temporary site closure, installation of warning signage, mitigation of exposed holes, and removal of damaged informational signage.*
   h. ***High*** *risk to human life and safety because of anticipated flooding, debris flows, and rockfall exists for the following trails: 13E24, 13E13, 13E17, 13E18, 14E09, 14E04, 14E10, 14E11, and 14E14. Treatment recommendations are temporary closure, install warning signage, and monitoring to ensure treatments are functioning as intended.*

i. ***Low*** *risk to visitors and campground employees at Middle Meadows Campground due to potential flooding of the low water crossing on the access road. This road is routinely closed for the winter. No treatments are recommended.*

j. ***Low*** *risk to visitors of the Ralston Picnic area. This site is well outside the burn area and was not affected by recent large flows. No treatments are recommended.*

2. **Property (P)**

a. **Very High** ***to High*** **risk to road and associated infrastructure with substantial damage expected because flooding, debris flows, and erosion is imminent. The highest risk is associated with 9 of the 12 miles of the Eleven Pines Road.** *Post fire conditions and predicted watershed response indicate increased runoff, excessive sedimentation, debris flows, and rockfall will occur into roadway drainage features, such as such as roadside ditches, culvert inlets, over side drains, roadway dips and run outs. Once these drainage features become impacted and overwhelmed, their function fails, allowing uncontrolled water to divert, resulting in major damage to the road and invested road improvements, loss of road function, and the denial of access along some road segments. Additional Level 2, 3, 4, and 5 Forest System Roads were evaluated and site specific areas have been identified and can be found in the Roads/Engineering Specialist Report. Treatment recommendations are improve road drainage features, temporary closure, install warning signage, and storm patrol monitoring to ensure treatments are functioning as intended.*

b. ***Very High*** *risk to recreation infrastructure at the Big Meadows Campground from fire weakened trees leaning directly over/toward infrastructure. Treatment recommendation is to temporarily close the site to public and administrative use, remove hazard trees identified in the Recreation Specialist report, and install hazard tree warning signage at the site to warn of potential additional threats.*

c. ***Very High*** *risk to trail infrastructure with substantial damage expected because flooding, debris flows, and erosion are imminent in areas of moderate to high burn severity. Trail routes of greatest concern are: 13E24, 14E04, 14E10, 14E11, and 14E14, which represent 19.26 miles of trail. Treatment recommendations are temporary closure, install warning signage, implement storm proofing as prescribed in the Recreation Specialist report, and perform storm patrol and monitoring to ensure treatments are functioning as intended.*

d. ***Very High*** *risk to* ***non-Forest Service*** *reservoir storage capacity and hydroelectric operations due to sedimentation of material eroded from areas of high burn severity. Values at risk included at the Ralston Afterbay, Oxbow Reservoir and Ralston Powerhouse, owned by Placer County Water Agency (PCWA) and Camino, Brushy Creek and Slab Creek Reservoirs, and Jaybird and Camino Powerhouses owned by Sacramento Municipal Utility District (SMUD). Treatment recommendations to our cooperators are to aerially apply mulch to reduce hillslope erosion. This treatment is feasible in Rubicon River and Brushy Creek. Not enough treatable ground exists in the Camino and Slab Creek reservoir drainages to effectively reduce predicted erosion, making treatment ineffective.*

e. ***High*** *risk to trail infrastructure due to an increased threat of damage expected because flooding, debris flows, and erosion is imminent in areas of low to moderate burn severity. Trail routes having the greatest concern are: 12E16, 12E17, 12E18, 13E13, 13E17, 13E18, and 14E09, which represent 17.32 miles of trail. Treatment recommendations are to install warning signage, implement storm proofing as prescribed in the Recreation Specialist report, and perform storm patrol and monitoring to ensure treatments are functioning as intended.*

f. ***High*** *risk to two private properties in the Whites Meadows area along Spring Valley Road due to flooding and sedimentation likely to originate from up-slope source areas that burned at high and moderate severity. Treatment recommendations will be coordinated with NRCS for point source protection.*

g. ***Intermediate, low, and very low*** *risks exist for a number of trail routes where there is no increase or only minimal increase in the susceptibility of erosion or damage from flooding. These routes are either not directly impacted from significant upslope soil burn severity or are in upland locations not likely threatened from flooding. Treatment recommendations are to perform maintenance on existing drainage features, and perform storm patrol and monitoring.*

h. ***Intermediate*** *risk to the PCWA South Fork Long Canyon Diversion dam due to increased flows, sedimentation, and floatable debris from the burned area upstream. There is a low percentage of moderate and high severity burn upstream. Upstream riparian zones are all unburned or low severity. Potential for increased sedimentation and woody debris input is low. Runoff modelling shows a 20-40% increase in peak design flows. This increase is*

not considered a threat to the facility. Treatment recommendations include increase monitoring of sediment and woody debris loading, and natural recovery of the burned area.

i. ***Low** risk to the PCWA North Fork Long Canyon diversion dam and the road crossing and Forest Service facilities downstream of the spot fire near French Meadow reservoir from increased flows, sedimentation and woody debris input. The burned area upstream of these sites is low, leading to low increased in flow, sedimentation and woody debris. Treatment recommendation is natural recovery.*

j. ***Low** risk to SMUD owned flow gauge stations due to increased flows, hazard trees and unstable ground upslope of the stations. Treatment recommendation is natural recovery.*

3. Natural Resources (NR)

a. ***Very High, High, and Intermediate** risk to hydrologic function from loss of ground cover and coarse woody debris, mass erosion, flooding and debris flows that scour channels below the root structure of the surviving plant communities. Approximately 46% of the fire burned at moderate to high severity, the threat to hydrologic function exists to varying degrees in all subwatersheds with significant moderate to high severity. The highest threat is within the Rubicon River drainage. Impacts to hydrologic functions will benefit from the proposed roads, trails and land treatments.*

b. ***Very High** risk to downstream water quality from hazardous materials on private land in the White Meadows area where homes burned and from the burned bridge in the Brushy Creek channel. Treatment recommendations include removal of bridge material out of the channel and coordination with NRCS and Placer County to remove or stabilize material from the White Meadows area.*

c. ***Very High** risk to domestic water supply from Stumpy Meadow reservoir from increased input of ash and fine suspended sediments. Treatment recommendation is coordination with NRCS and GDPUD (Georgetown Divide Public Utilities District).*

d. ***Very High** risk to water quality in the Rubicon River State Designated Wild Trout River from ash and sediment input. Treatment recommendations are natural recovery along with associated benefits derived from treatments to protect life, safety and property, including road and land (mulch) treatments.*

e. ***Very High** risk to trout habitat and populations exist in the Rubicon River as a result of the King Fire. The Rubicon River is a Fish and Game Commission designated Wild Trout River. The designated wild trout section of the river is 30 miles long extending from Hell Hole Reservoir downstream to the Middle Fork American River at the confluence of Oxbow Reservoir. For aquatic species, post-fire impacts will include compromised water quality and changes in water chemistry due to ash delivery and hazardous materials, changes in water temperature from loss of canopy shading, scouring of riparian/aquatic vegetation and changes in streambed/pool habitat due to debris flows and sediment delivery and flushing of individual fish during flood events downstream. These combined impacts may lead to a temporary loss or reduction of suitable stream habitat. Rainbow trout are the only resident game fish native to the Rubicon River drainage. Five species of native nongame fish occur in the wild trout section of the Rubicon River: Sacramento sucker, speckled dace, river sculpin, Sacramento pike minnow and Forest Service listed sensitive hardhead. For all fish species, there is a concern that until enough vegetative recovery has occurred habitat degradation will continue. Excess sedimentation may temporarily fill pool and the flushing flows needed to clean these pools could be impacted due to regulated flows upstream. The vast scale of the Rubicon River watershed prohibits effective treatment options to adequately reduce potential impacts, however the fisheries resource will benefit from the proposed roads, trails and land treatments.*

f. ***High** risk of increased erosion and gullying from the Pilot Ditch due to increased runoff. Treatment recommendation is to provide additional drainage by breaching the ditch in two locations.*

g. ***High** risk to natural recovery of burned native plant communities due to grazing and off-road/trail vehicle travel. Both cattle and vehicles/OHVs can cause trampling, erosion, compaction, and altered hydrologic function which precludes or reduces vegetation re-establishment post-fire. Vegetation recovery in the fire is at risk from vehicle impacts where natural barriers (downed woody debris, screening vegetation, etc.) have been burned. Cattle and vehicles can serve as a vector for invasive species introduction when seeds attach to fur, hooves, or tires and are deposited on bare ground. Grazing in the first year after fire can also increase the potential for conversion to non-native species composition due to native species higher nutritional content and lack of highly unpalatable features. Treatment recommendations include resting burned areas of grazing allotments for one to three years, and closing the fire area to the public through the first growing season to allow for native plant recovery.*

h. ***High*** *risk to native plant communities, rare plant habitats, and special-designation botanical areas due to the risk of invasive species spread and introduction to uninfested areas within and adjacent to the King Fire. Known infestations of spotted knapweed, perennial pepperweed, Scotch broom, yellow starthistle, tree-of-heaven, medusahead, and goatgrass occur within and adjacent to the burned area. These infestations have been treated repeatedly by the ENF invasive plants crew and have been controlled or nearly eradicated. However, these infestations may expand following fire due to seed bank stimulation and lack of competition. In addition, the introduction of propagules during fire suppression has the potential to establish new weed infestations. Treatment recommendations include treating infestations to limit fire-induced population growth and geographic expansion, as well as surveying for and treating newly introduced infestations before they become a serious threat to the integrity of native plant communities.*

i. ***High*** *risk to native plant communities and unique habitat types due to the risk of vehicle or recreational use where natural barriers (screening vegetation) have been burned. In particular, rare habitats types such as lava caps and hard slate outcrops are unique features on the landscape. These areas are highly susceptible to damage from vehicle and recreation use because of their low-growing vegetation, ridge-top position, shallow soils, and long recovery times. Treatment recommendations include installation of informational signs and barrier rock in strategic locations where previous incursions have been documented and/or there has been previous investment in education/prevention measures. Recreation patrols will also be conducted to assess the effectiveness of signs and barriers.*

j. ***High and Intermediate*** *risk to soil productivity from increased soil erosion within areas that burned at moderate to high severity. There is a high probability for mass erosion, hillslope erosion, and mud flows. The fire is expected to impact soil quality by eroding exposed soil and nutrient-rich ash off-site, as well as by increasing the potential for spread of noxious weeds and invasive plant species. Site specific locations of greatest concern have been identified in the soil specialist report. Treatment recommendations are site specific varying from natural recovery to land treatments along Eleven Pines Road.*

k. ***Intermediate*** *risk to the degradation of the Long Term Soil Productivity (LTSP) PSW research sit. Treatment recommendations are to monitor the site.*

l. ***Intermediate*** *risk to water quality for irrigation and hydropower in the El Dorado Irrigation District (EID) ditch due to inputs of ash and sediment. Treatment recommendation is coordination with EID and NRCS to control erosion in site specific locations.*

m. ***Intermediate*** *risk to native threatened and endangered (T&E) amphibian habitat and populations. The area affected by the King Fire supports important potentially suitable habitats of two federally listed amphibians. The following two species of amphibians were of particular concern during the incident. The California red-legged frog (CRLF) which is listed as threatened under the Endangered Species Act of 1973. Within the King Fire there are 8,942 acres of potentially suitable habitat for CRLF. In addition the Sierra Nevada yellow-legged frog (SNYLF) was recently listed as endangered by the United States Fish and Wildlife Service and 2,124 acres of potentially suitable habitat exist within the burn perimeter. Proposed designated critical habitat for Sierra Nevada yellow-legged frogs occurs 1.48 miles east of the burn perimeter. There are no known occurrences of threatened or endangered species within or downstream of the King Fire. Because there are no identified occurrences of T&E amphibian species within the fire perimeter mitigation measures to reduce impacts to habitat will rely on the roads, trails and land treatments.*

n. ***Intermediate*** *risk to native threatened and endangered (T&E) terrestrial habitat. The area affected by the King Fire is within the range for California spotted owl (Strix occidentalis) and Northern goshawk (Accipiter gentilis). There are no known occurrences of threatened or endangered species within or in close proximity of the King Fire. Because there are no identified occurrences of T&E amphibian species within the fire perimeter mitigation measures to reduce impacts to habitat will rely on the roads, trails and land treatments.*

4. Cultural and Heritage Resources (CHR)

a. ***High*** *risk to eligible cultural and historic sites from looting, due to the burned area exposing previously obscured features and artifacts. Approximately 57% of the federal lands burned have been surveyed within the fire perimeter. Continued monitoring will occur for this concern. No treatments are recommended.*

b. ***High*** *risk to eligible cultural and historic sites due to an increased threat from increased runoff, erosion, flooding, or debris flow causing irreversible damage. There are 193 cultural sites within the burned area, of which, only 23 were assessed as part of the BAER assessment. 4 sites within the Rubicon River drainage are at the greatest risk;*

however, due to the location on the landscape and other important factors, treatment opportunities are limited to monitoring and site recordation for 2 sites. Cultural resources will benefit from the proposed roads, trails and land treatments.

c. ***High** risk to eligible cultural and historic sites due to hazard trees. One site is located within standing fire killed trees and poses an emergency due to natural tree fall occurring on cultural resources features and deposits on site. Continued monitoring will occur for this site. No treatments are recommended.*

B. Emergency Treatment Objectives:

As noted above, threats to life, property, and natural and cultural resources from loss of water control, increased sediment delivery, increased debris flow potential, establishment of invasive weeds, and habitat degradation for Federally Threatened species exist as a result of the King Fire. For these reasons the primary treatment objectives are:

- Mitigate, to the extent possible, threats to personal injury or human life of forest visitors and Forest Service employees at recreation facilities or while traveling select roads and trails on NFS lands within or downstream of the burned area.
- Reduce loss of soil productivity.
- Protect or minimize damage to high-value NFS investments within the burned area. Minimize damage to key NFS travel routes within and downstream the fire boundary.
- Treat invasive plants that are a threat to naturalized ecosystems by minimizing the expansion of existing populations in the burned area and control of expected invasion of noxious weeds within and adjacent to the area where soils/vegetation was disturbed as a result of fire suppression activities.
- Assist cooperators with the interpretation of the assessment findings to identify potential post-fire impacts to communities and residences, domestic water supplies, public utilities (including power transmission facilities, cellular towers, roads, and other infrastructure).
- Reduce impacts to water quality and downstream values.
- Mitigate effects of changed post-fire watershed response on natural resources such as federally listed species and historic properties and cultural resources.

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

Land 75 % Channel __ % Roads/Trails 60 % Protection/Safety 75 %

D. Probability of Treatment Success

	Years after Treatment		
	1	3	5
Land	*75*	*85*	*95*
Channel	--	--	--
Roads/Trails	*75*	*85*	*95*
Protection/Safety	*80*	*70**	*60**

**Initially, visitors will heed the warning signs. Complacency is expected after the initial year unless there are continued damaging events.*

E. Cost of No-Action (Including Loss):

Refer Values at Risk Analysis for the Cost of No-Action and Cost of Selected Alternative (Including Loss). Worksheets can be found in the King Fire project record.

While the benefit:cost is 2.5 in the north zone or Rubicon drainge there are several other factors to consider. The VAR analysis focuses on the very high and high risks to NFS values within the northern zone of the fire. The Rubicon drainage has an extremely high monetary investment with one major road (Eleven Pines), several arterial roads, trails, natural, and cultural/historic value. Some of the treatment costs will be distributed across the entire northern zone, but the estimated cost of treatments within Rubicon drainage is a large portion of the overall cost for recommended treatments. Conversely, total loss of all of the facilities within the Rubicon drainage would only occur with an epic climatic event that no treatment would effectively mitigate. It is to be noted that a localized storm events could result in loss of life and property.

The accumulated benefits of multiple treatments in the Rubicon drainage are not considered in the cost analysis. Several of the natural and cultural resources are reliant on land, roads, and trails treatments to reduce impacts of the fire. The hillslope treatment will also increase the likelihood of success for the road and trail treatments recommended in the Rubicon drainage; which will ultimately benefit downstream values on and off NFS lands.

F. Cost of Selected Alternative (Including Loss): *See above*

G. Skills Represented on Burned-Area Survey Team:

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

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Core Team Members:

USFS Core Team Members:

Kellen Takenaka – Soil Science
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Dave Young – Soil Science
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Dave McComb – Hydrology
Luke Rutten – Hydrology
Vince Pacific – Hydrology(t)
Allen King – Geology
Yonni Schwartz - Geology
Dan Teater – Aquatic/Fisheries Biology
Jacob Quinn – Recreation
Adrianne Gass – Recreation (t)
Josh Sjostrom – Recreation (t)
Blake Engelhardt – Botany
Fletcher Linton - Botany
Antonio Cabrera – Road Engineer
Rusty Leblanc – Road Engineer
Craig Kusener – Road Engineer
Cathleen Thompson - Information
Kristi Schroeder – Information (t)
Dorit Buckley – Archeology
Katy Parr – Archeology
Jordan Serin – Archeology (t)
Deb Tatman – GIS
Virginia Emly – GIS
Brent Moore – Hazard Tree Specialist (t)

Cooperator Core Team Members:
Shane Edmunds – Central Valley Regional Water Quality Control Board
David Krietemeyers – NRCS: Damage Survey Report Team
Jason Rambach - NRCS: Damage Survey Report Team

H. **Treatment Narrative:**

(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. For seeding treatments, include species, application rates and species selection rationale.)

Land Treatments:

Aerial Mulching:

The primary treatment recommended for implementation is aerial mulching of slopes above the Eleven Pines Road. *Straw mulch provides immediate ground cover and protects the soil from erosion and loss of nutrients. Mulch can reduce downstream peak flows by absorbing rainfall and allows pre-wetting of water repellent soil. Straw helps to secure seeds that are stored in the soil, or applied as an emergency treatment. Straw mulch on burned areas helps maintain a favorable moisture and temperature regime for seed germination and growth. The BAER Team considered this treatment to be the minimum necessary to achieve a reduction in risk to the accumulated critical values of: human life and safety to forest visitors and employees along Eleven Pines Road, other NFS roads and trails in the Rubicon drainage, NFS cultural sites, soil productivity, hydrologic function, water quality, and native plant recovery. 999 hillslope acres on NFS lands have been identified to be treated with aerial mulching above the Eleven Pines Road.* This cost includes the contract cost, the administration of the contract, and treatment effectiveness monitoring.

Aerial Mulching with a Straw Application				
Item	**unit cost**	**unit**	**total units**	**Total item cost**
Contract	$850	/acre	999	$849,150
Contract Administration, Travel, Per Diem, and Mileage	$128,000	/unit	1	$128,000
Treatment Effectiveness Monitoring	$60,000	/unit	1	$60,000
Total Cost of Treatment				$1,037,150

Log Erosion Barriers/Contour Log Felling at Eleven Pines Road

Log erosion barriers (LEBs) are a way to reduce the amount of soil and rolling rock that migrates down a slope, especially following a fire. Trees are cut to fall perpendicular to the slope, i.e., on-contour. Avoid rocky slopes that would prevent ground contact by log sections, slopes within and across steep drainages, and areas treated by other means, such as aerial mulching. Above the Eleven Pines Road, LEBs are proposed in order to catch rolling rock and eroding sediment before it drops on this important road. Logs are to be felled roughly in rows or levels, from 1 to 3, the number to be defined by slope conditions. The LEB Treatment is further discussed and defined in the USFS BAER Response Treatment Catalogue, 2006.

Selecting appropriate sites of 30-60% slope, relatively smooth sections of slope. Drop logs along the contour, perpendicular to the slope, where they can be anchored behind other trees or stumps. SAFETY IS FIRST PRIORITY! Falling branches and trees, rolling rocks, and steep slippery slopes create hazardous situations which must be identified, managed, and monitored. Felled trees will need to be processed in a manner so that 90% of the log is in firm contact with soil. A shallow (6-8"deep) trench should be dug behind each log to fill space under the log and create additional catchment, add soil end berms to improve sediment trapping. Length of log can be as long as practical and manageable to achieve ground contact, but not shorter than 15'. Diameter of logs should be between 10" and 24" DBH.

A watershed specialist will need to be on-site to direct felling locations and details, and ensure operations are conducted in a safe manner. Logs should be roughly placed end to end across the slope for each course. Where impractical, logs may be staggered to fit slope conditions. The degree of slope and length of slope will help determine spacing and number of courses of logs to be felled on contour. Begin first row of log felling approximately 50' above top of cutslope. On gentler (30-50%) and shorter (<400' to ridgetop or gentle ground) slopes, one to two rows, spaced approximately 50' vertically apart should be sufficient. On steeper (>50%) and longer (>400' to ridgetop) slopes, two to three rows are recommended. Estimated production rate of 4 "C" Fallers and a CDF crew is 1,000 linear feet a day for 30 days. Patrols will need to be conducted to assess the effectiveness of log erosion barriers.

Log Erosion Barriers/Contour Log Felling at Eleven Pines Road				
Item	**unit cost**	**unit**	**total units**	**Total item cost**
4 - "C" Fallers	$1,200	/day	30	$36,000
Travel and Per Diem, Vehicle, and Equipment for "C" Fallers	$1,000	/day	30	$30,000

2 Forest Watershed Specialist	$800	/day	30	$24,000
Local California Department of Forestry (CDF - Inmate Crew)	$1,000	/day	30	$30,000
Total Cost of Treatment				$120,000

Pilot Creek Ditch above Eleven Pines Road

Pilot Creek Ditch is an abandoned irrigation ditch above Eleven Pines Road. If untreated this ditch may drain water onto unstable hillslopes causing uncontrolled flooding impacts to Eleven Pines Road. A hand crew would be utilized to breach the ditch at two strategic locations to provide drainage relief onto stable hillslope.

Pilot Creek Ditch above Eleven Pines Road				
Item	unit cost	unit	total units	Total item cost
Forest Watershed Specialist	$350	/day	1	$350
California Conservation Crew (CCC)	$2,500	/day	1	$2,500
Total Cost of Treatment				$2,850

EDRR (Early Detection Rapid Response) Surveys and Treatment

Conduct Early Detection Rapid Response (EDRR) surveys and treatments for Eldorado and Tahoe NF target invasive plant species. Approximately 474 acres of susceptible area within the fire area will be surveyed and treated. An additional 80 known point locations (spike camps, safety zones, drop points, staging areas, weed washes, etc.), 152 miles of fireline, and 216 miles of heavily used road corridors will be surveyed and treated. EDRR is a strategy developed to increase efficiency of weed work by combining surveying, mapping, and immediate treatment of new weed infestations as they are discovered. Areas adjacent to existing infestations and areas disturbed during fire suppression (fire lines, staging areas, spike camps, transport routes, etc.) will be surveyed for new infestations and treated to prevent establishment. Existing infestations which had previously been controlled or near eradication will be treated in order to limit fire-induced expansion.

Survey priority areas in spring or early summer of 2015 when plants are detectable but early enough to treat effectively (prior to maturation and dispersal of seed). Where feasible, new or isolated infestations will be treated by hand or mechanically (e.g. string-trimmer) during the same visit as the surveys. If the infestation is too large to treat during the survey, then plan and implement a follow-up treatment visit. Select manual, mechanical, or chemical treatment dependent upon weed species and location. For chemical treatments, determine the appropriate herbicide, application rate, and application timing, and treat in accordance with the design criteria of the Eldorado NF Invasive Plants Treatment EA.

This treatment is to protect native plant communities and rare plant habitats from impacts of invasive plant species. Prevent fire-induced expansion of known infestations within the fire area. Prevent establishment of new infestations in locations where propagules were introduced or spread by fire suppression efforts. Follow-up surveys and treatment in subsequent years if new or expanded weed populations are discovered during the first year post-fire. See Appendix D for specific project costs.

Total Cost of Treatment: $ 164,980

Protective Barriers for Naturally Recovering Areas

Install barrier rock where natural barriers (screening vegetation, trees, downed woody debris) have been burned adjacent to recovering native plant communities and unique habitat types and there is a threat of incursion by vehicle traffic. Treatment will be targeted in strategic locations where previous incursions have been documented and/or there has been previous investment in education/prevention measures. The initial site identified for treatment is near Slate

Mountain, at a hard slate outcrop which is a unique habitat type. Large swaths of whiteleaf manzanita burned which had previously prevented access to the site off a closed road. Additional sites may be identified for barrier rock placement during recreation patrols.

Survey area to determine precise locations of barrier rock. Purchase or acquire needed rock material. Coordinate with roads crew to assign equipment and personnel to work at the site. Install rock and conduct periodic patrols to assess the effectiveness of the barriers.

This treatment is to promote the recovery of native plant communities and unique habitat types by preventing new incursions of vehicle or recreational use after the fire. Recreation patrols will be conducted to assess the effectiveness of barriers. See Botany Specialist Report for specific project costs.

Protective Barriers for Naturally Recovering Areas					
Item	**unit cost**		**unit**	**total units**	**Total item cost**
Dump Truck and Trailer	$	600	/day	3	$1,800
Backhoe	$	500	/day	3	$1,500
Operator	$	375	/day	3	$1,125
Rock	$	100	/yard	7	$700
Botanist Time and Monitoring	$	350	/day	5	$1,750
Total Cost of Treatment					$6,875

Channel Treatments: *None recommended.*

Roads and Trail Treatments:

Road Treatments:

The prescribed treatments for roads are designed to help preserve infrastructure while protecting the integrity of the National Forest system roads. Road treatments are designed to minimize damage caused by hazard trees, rockfalls, minor debris flows, increased runoff and sediment transport across steep slopes, blowouts/roadway failures and erosion from drainage channels. Road treatments include: clean out culverts, ditches, lead outs, re-grade roadway, removing berms, and out-sloping where possible to handle increased flood flows and sediment transport caused by burn area. K-rails will be placed in key locations along the side of the road to capture rolling debris and rocks. Installation of the prescribed road treatment will help to mitigate potential risk and further road damage. Storm response will include: keeping culvert and drainage structures functional by cleaning sediment and debris from the inlet between or during storm events. These costs are for contract labor and have overhead built in.

On October 8, 2014 an initial request was submitted asking for Regional approval to begin using up to $500,000 in BAER implementation funds to begin work on immediate threats having unacceptable consequences to high-value resource: Eleven Pines Road. A rapid assessment was completed for all additional Level 2, 3, 4, and 5 Forest System Roads in moderate and high severity. It did not provide a full evaluation of each condition, but provided critical information about potential threats and degrees of severity. Standard Specifications for Roads were utilized consistent with the language provided in the BAER Treatments Catalog.

This treatment is designed to protect road infrastructure by minimizing erosion of the road surface, provide water control, and reducing excessive flooding and sediment delivery into the watersheds for 197.66 miles. The probability of damage or loss to the road system if no treatments are done is estimated to be 90%, which results in a very probable, likely determination with a high risk. The cost of the loss to the Eleven Pine Road only is estimated at $2 million per mile. If land, road, and trail treatments are done the probability of success of not losing major sections of this road is

estimated to be 75% which results in a very probable, likely. This evaluation is for one of the many roads proposed for treatment. Monitor roads and culverts after storm events for possible obstructions and damage and initiate maintenance. See Appendix E for specific project costs to include Eleven Pines Road.

Total Cost of Treatment: $ 1,830,351 (of which $500,000 has already been approved of in the Initial request). Additional cost needed to address Road Treatments for the remaining Level 2, 3, 4, and 5 roads within the Fire perimeter is $1,330,351.

Trail Treatments:

Many of the trails in the burned area are at high risk due to the burning of stabilizing brush, roots and logs. Treatments include installing rolling dips, waterbars, and performing berm removal and outsloping. Treatments are needed to provide sustainability of the trail and to prevent off-site impacts should the trails erode or fail for 44.65 miles. A rapid assessment was completed that did not provide a full evaluation of trail conditions, but provided critical information about potential threats and degrees of severity.

The following trails have been affected:

Trail Number	Miles
12E15	0.84
12E16	0.5
12E17	1.01
12E18	0.07
12E19	3.65
12E20	2.75
13E13	3.26
13E16	1.5
13E17	0.83
13E18	2.88
13E24	6.6
14E04	3.75
14E09	9.6
14E10	3
14E11	0.95
14E14	3.46

Utilizing USFS Trails Handbook 2309.18., installation should be designed to last no more than 3 years. Permanent structures are not part of this treatment. If safety risks (e.g. hazard trees) cannot be mitigated for work crews, work will be delayed until threat is reduced or stabilized. Install drainage feature depending on steepness of trail (see Recreation Specialist Report, Appendix C) in areas of moderate or high severity. Focus on sections of trail that have continuous gradient for a length of greater than 50 feet and are either insloped (cupped) or show evidence of routing water (rills, gullies). Hazards within or along the trail route that restrict efficient and safe access to work sites will be mitigated (rocks, trees). Clean existing drainage features to ensure proper function and protect existing investments to infrastructure.

This treatment is designed to stabilize trails for anticipated increases in runoff. The stabilization methods may vary by site but are designed to reduce trail erosion or damage. The BAER Team considers this treatment to be the minimum necessary to achieve a reduction in risk to the accumulated critical values: trail infrastructure, soil productivity, hydrologic function, and public and administrative use. The sections of trail improved during this treatment will be inspected after implementation, during storm patrols and in 2015 to ensure that drainage features are functioning. See Appendix F for specific project costs.

Total Cost of Treatment: $97,656

Storm Proofing Non-System Roads

Using existing remotely sensed data, 40 miles of skid trails, temporary roads and landings were identified on erosion prone slopes in the Rubicon drainage. Cross-drains or other water control features were not observed and many segments appear insloped and benched. Although these roads appeared stable under pre-fire conditions of closed canopy and 100% soil cover, they are at very high risk of altering hillslope flow, concentrating water, and initiating gullies that would negatively and cumulatively to the fire affect water quality of the Rubicon drainage and increase the threat to the Eleven Pines Road. Gullies are notoriously difficult to repair and the erosional processes initiated by a gully can persist for years as their headwalls migrate up the slope.

The treatment consists of using a small dozer (D5) to provide drainage to roads that are at risk of gullying both in the road tread and at drainage outlets. Specific treatments could include outloping road beds, constructing cross drains, removing small culverts if they exist, and subsoiling treads that are overly compacted. Specific road treatments would be prescribed by an Enterprise Team Soil Scientist.

Suitable sites are those skid trails, temporary roads, and landings not recognized as system roads. Candidate roads were identified using LiDAR. Priority would be given to those roads that are at risk of entraining water with little side relief. This treatment would only be considered in moderate and high burn severity. Roads on flat tabular ridges generally would not be considered unless there is a risk of water flow from a road draining onto steep slopes. This treatment may extend to the south part of the fire depending on acquisition of LiDAR for this portion of the fire and timing weather that may limit operations. The purpose of the treatment is to prevent long-term damaging erosional features resulting from past disturbance that may become hydrologically active during a post-fire, runoff producing storm. Forest watershed specialists will monitor the effectiveness of implementation to ensure that erosion is not exacerbated by treatment.

Cost Estimation for Non-System Road Stormproofing Non-System Roads and Trails				
Item	***unit cost***	***unit***	***total units***	***Total item cost***
Contract and Contract Administration	*$3,000*	*/mile*	*40*	*$120,000*
Archeology support	*$250*	*/day*	*7*	*$1,750*
Botany support	*$250*	*/day*	*7*	*$1,750*
Enterprise Soil support	*$800*	*/day*	*10*	*$8,000*
Forest Watershed Specialist	*$350*	*/day*	*15*	*$5,250*
Vehicle mileage	*$0.35*	*/mile*	*3,000*	*$1,050*
Total Cost of Treatment				***$137,800***

<u>Protection/Safety Treatments</u>:

Road Closure, Road Warning Signs, and Hazard Tree Removal

This treatment will design and install burned area warning signs to caution forest visitors recreating within the burned area. It is consistent with the language provided in the BAER Treatments Catalog. The treatment is a component of the overall travel control devices for the burned area (USDA Forest Service-EM7100-15, 2005). The warning signs will identify the types of hazards to watch for roads. This treatment will place hazard warning signs and information signs at access points leading into the fire area.

The travel management strategy identifies the type of signing necessary. Use may be discouraged at certain times of the year when the risk is higher. This treatment must be combined with the closure order to ensure that it is posted consistent with both the identified hazards as well as the language of the order. 10 gates have been identified as

necessary to enforce a closure order. The gate and sign will be integral to the enforcement of a legal order identified in the Temporary Road Closure Treatment and citing the appropriate CFR. Purchase and install signs and gates at each of the identified locations consistent with Forest Engineering Standards at these locations.

This treatment will keep Forest users out of the burn area during major storm events and inform users of the dangers associated with entering/driving within a burned area. The probability of motorist accessing routes or hitting objects not identified within the roadway is about 95% or nearly certain will occur. The loss is difficult to estimate since this a safety issue. One could conclude damages to a vehicle would occur but there is a greater risk of someone getting injured if their vehicle strikes something. If the treatments are implemented the probability of someone damaging their vehicle is greatly reduced if they are made aware of potential obstacles within the roadway. Hazard trees will be mitigated in order to protect human life during implementation and prevent damage to infrastructure. The BAER Assessment Team considered this treatment to be the minimum necessary to achieve a reduction in risk to the human lives and safety of Forest visitors and Forest Service employees. A Forest Service employee will inspect the signs and gates for visibility, damage, or loss and replace as needed. See Appendix E for specific project costs.

Total Cost of Treatment: $ 173,568

Recreation Facility Protection, Trail Warning Signs, and Hazard Tree Removal

This treatment is to design and install burned area warning signs to caution public and administrative users about the potential hazards that exist within the burned area. Consistent with the language provided in the BAER Treatments Catalog (USDA Forest Service-EM7100-15, 2005), the treatment is a component of the overall traffic control devices for the burned area. The warning signs will identify the types of hazards to watch for at the recreation site or trail. This treatment will place hazard warning signs and information signs at 3 developed campgrounds, 1 dispersed campground, 1 day use area, and numerous recreation trailheads. Additionally, this treatment will stabilize exposed hazardous material, and address hazard trees.

***Locations** (Suitable Sites):*

1. *Trail signs will be installed at the following trail locations (see Recreation Specialist Report, Appendix C for specific locations):*

11E49	13E03	13E13	13E18	14E09
12E15	13E05	13E16	13E24	14E11
12E16	13E10	13E17	14E04	14E14

2. *Recreation Site signs will be installed in the following locations: Big Meadows Campground, Stumpy Meadows Campground, Black Oak Campground, Slab Creek Dispersed Area, Bridal Veil Day Use Area, Hell Hole Vista Overlook.*
3. *At several access points along Forest Road 12N56, travel management signs will be installed to notify motorized users of travel restrictions in the area.*
4. *Hazardous waste material will be stabilized and/or removed from Stumpy Meadows and Black Oak Campgrounds.*
5. *Hazard tree will be mitigated at Big Meadows Campground.*

The Forest's travel management strategy identifies the type of signing necessary. Use may be discouraged at certain times of the year when the risk is higher or damage to facilities may result from use. This treatment must be combined with the closure order to ensure that it is posted consistent with both the identified hazards as well as the language of the order. The signs will be integral to the enforcement of a legal order identified in the Temporary Trail Closure Treatment and citing the appropriate CFR. Purchase and install signs at each of the identified locations consistent with Forest Recreation Standards and the Trail Management Handbook at these locations.

Inform users of the dangers associated with entering/recreating within a burned area as well as inform them of closures to help ensure that users are able to access available routes in a safe manner. There is a very high possibility that motorized users could encounter and/or strike objects within or along authorized routes (logs, rocks, debris), resulting in potential for injury, damage to property, or becoming stranded on a route. Route closures are proposed in moderate to

high burn severity areas to mitigate this concern; however, all routes within the burn area are subject to this hazard. Hazard warning signage will greatly reduce the probability of injury and damage, as this treatment will set an appropriate expectation for likely hazards and risks of use. Hazardous waste material will be stabilized and/or removed in order to prevent further exposure and protect human safety. Hazard trees will be mitigated in order to protect human life during implementation and prevent damage to infrastructure. The BAER Assessment Team considered this treatment to be the minimum necessary to achieve a reduction in risk to the human lives and safety of Forest visitors and Forest Service employees. A Forest Service employee will inspect the signs for visibility, damage, or loss and replace as needed. See Appendix F for specific project costs.

Total Cost of Treatment: $35,449

Road Storm Patrol

The patrols are used to identify road problems such as plugged culverts and washed out roads, and to clear, clean, and/or close roads that are or have received damage for 30 days. Those conducting storm patrols shall have rapid access to a backhoe and dump truck that can be used when a drainage culvert is plugged or soon to be plugged, to repair any road having severe surface erosion, or to clean debris from roadside drainage ditches. Due to the multiple crossing structures in the Rubicon River drainage and the potential for debris to cause damage to those structures, the patrols will also monitor the movement of large woody debris and make a determination of whether or not the material should be removed before it contacts the structures. Patrols are based on the areas expected to have or that did have localized precipitation events. Secondly, patrols should then focus on those roads that receive the most traffic and are of more value to the transportation system.

Immediately upon receiving heavy rain and spring snowmelt the FS will send out patrols to identify road hazard conditions. Observations of rocks and sediment causing washouts and plugged culverts are identified and corrected before they worsen or jeopardize motor vehicle users. The road patrol personnel bring heavy equipment necessary to mechanically remove any obstructions from the roads and culvert inlets and catch basins where necessary. All excess material and debris removed from the drainage system shall adhere to the sidecasting recommendations found in the Geologist Specialist Report.

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

Engineering and District personnel will survey the roads within the fire perimeter after high-intensity winter storms in 2014 before they are snowed out of the area and spring 2015 runoff. Survey will inspect road surface condition, ditch erosion, and culverts/inlet basins for capacity to accommodate runoff flows. The purpose of the monitoring is to evaluate the condition of roads and bridges for motorized access and to identify and implement additional work needed to maintain and/or repair damage to road surfaces and flow conveyance structures (culverts, bridges) across roads in order to provide safe access across FS lands. See Appendix E for specific project costs.

Total Cost of Treatment: $134,400

Trail Storm Patrol

The patrols are used to identify hillslope erosion that may be causing damage to the trail and to monitor the effectiveness of the trail drainage and stabilization treatment to ensure sustainability of trail facility and any need for further actions for 30 days. The objective is to determine if excessive erosion events are occurring from concentrated trail runoff. Areas of concern will be prioritized where accumulated values increase the magnitude of consequences of loss from damage. This treatment is intended for those trails within or below areas of moderate and high severity burn that are recommended for drainage and/or stabilization treatments. Conduct monthly monitoring and post-event monitoring immediately following uncommon storm events with a recreation specialist beginning at the time of implementation and lasting through May of 2015 to ensure that trail erosion is prevented in the burned area. A Forest Service employee will monitor trails and treatments identified in the Recreation Specialist report. See Appendix F for specific project costs.

Total Cost of Treatment: $30,659

Hazardous Materials and Water Quality

This treatment is designed to remove the Brush Creek Bridge from the creek to reduce the potential for hazardous material to be introduced into the water. The fire burned the Brush Creek Bridge. The burnt infrastructure has now fallen into and remains in the channel. This system is an intermittent system that flows for a period of the year. Removal and proper dispose of the burned bridge material from creek will be necessary to keep hazardous material from entering into the water. Use contractor or force account. Dump truck and backhoe/excavator with cable to extract burned, treated bridge timbers from creek channel. Load material in truck and haul to disposal facility.

Brush Creek Bridge Hazardous Material Site				
Item	**unit cost**	**unit**	**total units**	**Total item cost**
Contract and Contract Administration	$1,500	/day	1	$1,500
Forest Watershed Specialist	$350	/day	1	$350
Disposal Fee	$250	/unit	1	$250
Vehicle mileage	$0.35	/mile	250	$88
Total Cost of Treatment				$2,188

Heritage Site Recordation

There are 193 cultural resource sites within the burned area (34 unburned or very low burn severity, 61 low burn severity, 38 moderate burn severity, 60 high burn severity), but only 23 sites were assessed by the BAER team archaeologists. Of the cultural resources assessed, four are within areas where increased runoff, erosion, flooding, or debris flow pose a significant threat; however, due to location on the landscape and other important factors, treatment opportunities are limited to monitoring and full site recordation is needed for two of the sites in anticipation of debris flow or landslide. Site recordation is needed to improve and update information about the site given constraints on time and access. This treatment is needed to mitigate the potential loss of access to the site and a potential loss of scientific values; the site will be fully recorded with updated information.

Heritage Site Recordation				
Item	**unit cost**	**unit**	**total units**	**Total item cost**
Forest/District Archeologist (2)	$700	/day	3	$2,100
Vehicle mileage	$0.35	/mile	300	$105
Total Cost of Treatment				$2,205

Extended Emergency Coordination

This involves communication and coordination with other federal, state, and local agencies with jurisdiction over lands where life and property are at risk from post-fire conditions. There was a very high level of public involvement and interagency coordination initiated during King Fire suppression efforts. This interest has continued into the BAER assessment and there will be a need for maintaining a high level of coordination during implementation of emergency stabilization treatment recommendations that are approved for NFS lands. Actions include but are not limited to cooperating with other agencies on hazard notification systems, permitting the siting of rain gauges and soil moisture instruments to monitor conditions within the burn in support of National Weather Service forecasts, and exchanging information and coordinating the BAER implementation plan as needed when subsequent recovery plans are developed by other agencies. This initial request is to fund a primary coordinator assigned to the Eldordao National Forest to facilitate coordination of the Forest Service BAER activities with the cooperating partners implement EMS (Emergency Management Services) for other jurisdictions. Additional coordination needs may ensue costs which will be requested on an interim 2500-8. During the next 3-5 years it is critical that appropriate agencies maintain due diligence and continue to inform the public of the potential hazards resulting from post-fire watershed response.

Extended Emergency Coordination				
Item	**unit cost**	**unit**	**total units**	**Total item cost**
Forest BAER Coordinator	$350	/day	30	$10,500
Vehicle mileage	$0.35	/mile	3,000	$1,050
Total Cost of Treatment				$11,550

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.)

Forest personnel will conduct implementation monitoring of the BAER treatments to check that treatments are present and functioning properly.

This report is an initial funding request based on a rapid assessment. If additonal treatment needs are identified through more site specific on the ground investigation in cooperation with interested agencies, or through further field analysis location or noxious weed detection surveys, interim requests for additional funding will be filed. These funding requests will identify the purpose for each treatment, and specific treatment specifications, locations, and number of each treatment. A detailed implementation and treatment effectiveness monitoring plan will be submitted as a separate document to the Regional BAER coordinator.

Part VI – Emergency Stabilization Treatments and Source of Funds

Interim #_1

			NFS Lands				Other Lands				All
Line Items	Units	Unit Cost	# of Units	BAER $	Other $		# of units	Fed $	# of Units	Non Fed $	Total $
A. Land Treatments											
Aerial Mulching	acres	1038.2	999	$1,037,150	$0			$0		$0	$1,037,150
Contour Felling	feet	11.4	10530	$120,042	$0			$0		$0	$120,042
Pilot Ck Ditch	unit	2850	1	$2,850	$0			$0		$0	$2,850
EDRR/Treatments	unit	164980	1	$164,980	$0			$0		$0	$164,980
Protective Barriers	yards	982.14	7	$6,875	$0			$0		$0	$6,875
Insert new items above this line!				$0	$0			$0		$0	$0
Subtotal Land Treatments				$1,331,897	$0			$0		$0	$1,331,897
B. Channel Treatments											
Insert new items above this line!				$0	$0			$0		$0	$0
Subtotal Channel Treat.				$0	$0			$0		$0	$0
C. Road and Trails											
Eleven Pines Rd	miles	41667	12	$500,000	$0			$0		$0	$500,000
Remaining FS Rds	miles	6730.5	197.66	$1,330,351	$0			$0		$0	$1,330,351
Storm Proofing Trails	miles	2187.1	44.65	$97,656	$0			$0		$0	$97,656
Storm Proofing Skid Trails	miles	3445	40	$137,800	$0			$0		$0	$137,800
Insert new items above this line!				$0	$0			$0		$0	$0
Subtotal Road & Trails				$2,065,806	$0			$0		$0	$2,065,806
D. Protection/Safety											
Road Closure, Signs, Htrees	unit	173568	1	$173,568	$0			$0		$0	$173,568
Rec Closure, Signs, Htrees	unit	35449	1	$35,449	$0			$0		$0	$35,449
Road Storm Patrol	days	4480	30	$134,400	$0			$0		$0	$134,400
Trails Storm Patrol	days	1022	30	$30,659	$0			$0		$0	$30,659
Brush Ck Bridge	unit	2188	1	$2,188	$0			$0		$0	$2,188
Heritage	sites	1102.5	2	$2,205	$0			$0		$0	$2,205
Extended Coordinator	days	385	30	$11,550	$0			$0		$0	$11,550
Insert new items above this line!				$0	$0			$0		$0	$0
Subtotal Structures				$390,019	$0			$0		$0	$390,019
E. BAER Evaluation											
Assessment Team	unit	1	340000	—				$0		$0	$0
Insert new items above this line!				—	$0			$0		$0	$0
Subtotal Evaluation				—	$0			$0		$0	$0
F. Monitoring											
				$0	$0			$0		$0	$0
Insert new items above this line!				$0	$0			$0		$0	$0
Subtotal Monitoring				$0	$0			$0		$0	$0
G. Totals				$3,787,722	$0			**$0**		**$0**	**$3,787,722**
Previously approved				$500,000							
Total for this request				***$3,287,722***							

PART VII - APPROVALS

1. /s/ Laurence Crabtree — Forest Supervisor — October 15, 2014 — Date

2. Jayne Handley for — Regional Forester (signature) — 10/17/14 — Date

Forest request is amended to include $50,000 for Level 1 and II Effectiveness Monitoring, increasing the total request for WO approval to $3,337,722

Appendix A

Forest Service Manual (FSM) 2523.1 – Exhibit 01

Critical BAER values to be considered during Burned Area Emergency Response

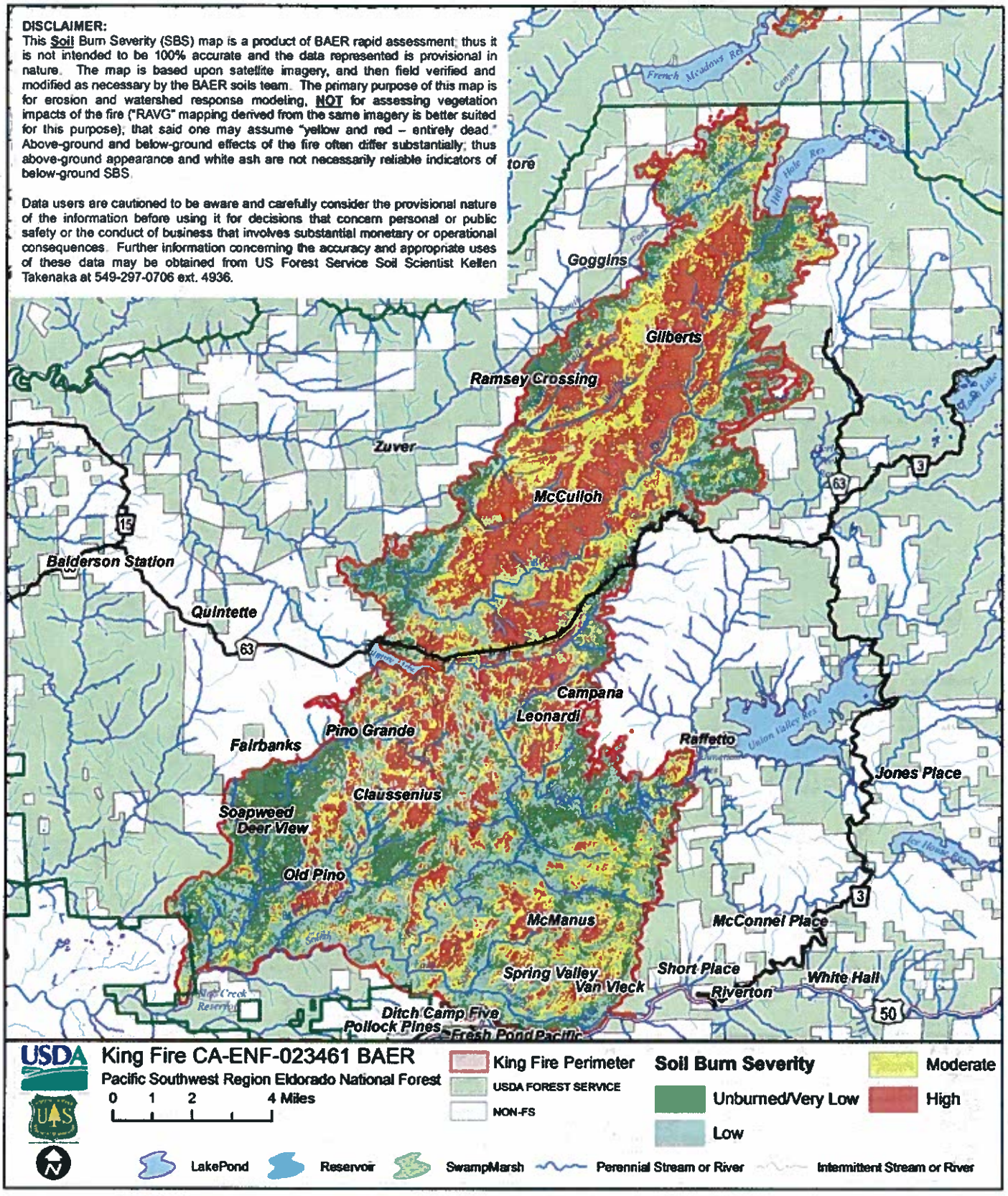
HUMAN LIFE AND SAFETY
Human life and safety on National Forest System (NFS) lands.
PROPERTY
Buildings, water systems, utility systems, roads and trails, dams, wells and other significant improvements on NFS lands.
NATURAL RESOURCES
Water used for municipal, domestic, hydropower, or agricultural supply or waters with special Federal or State designations on NFS lands.
Soil productivity and hydrologic function on NFS lands.
Critical habitat or suitable occupied habitat for federally listed threatened or endangered terrestrial, aquatic animal, or plant species on NFS lands.
Native or naturalized communities on NFS lands where invasive species are absent or present in only minor amounts.
CULTURAL RESOURCES
Cultural resources which are listed or potentially eligible for listing in the National Register of Historic Places, Traditional Cultural Properties and Indian Sacred Sites on NFS lands.

FSM 2523.1 – Exhibit 02

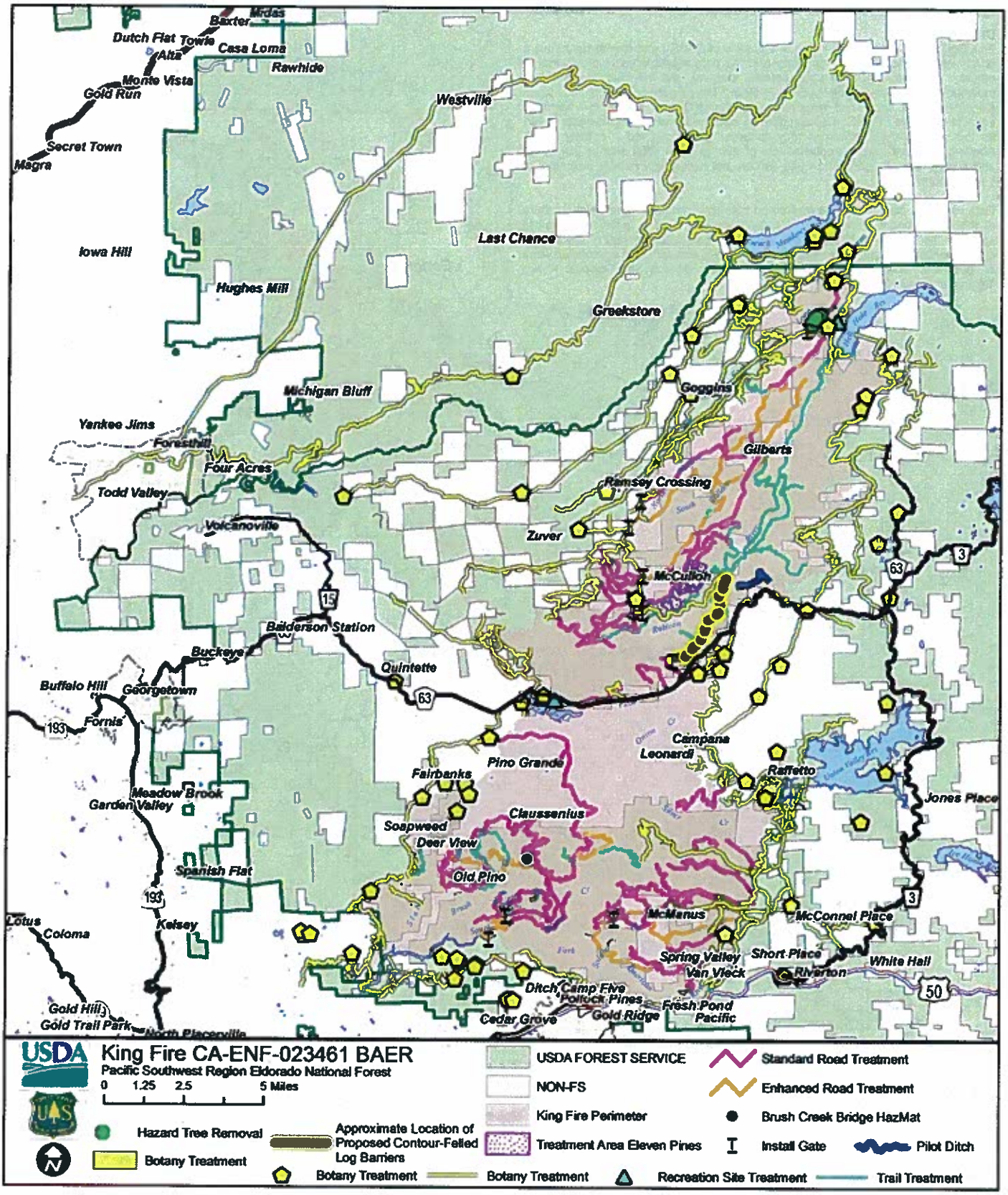
The risk matrix below, Exhibit 2 of Interim Directive No.: **2520-2010-1**, was used to evaluate the Risk Level for each value identified during the Assessment:

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**

Appendix B: King Fire Final Soil Burn Severity Map



Appendix C: King Fire Treatment Map



Appendix D - EDRR (Early Detection Rapid Response) Surveys and Treatment

Personnel	Daily Rate	# Days	Cost
GS-11 Botanist (1 person x 40 days)	$429	40	$17,158
GS-7 Bio Tech Crew Leader (1 person x 80 days)	$210	80	$16,836
GS-5 Bio Tech Crew Member (5 people for ~70 days/14 weeks)	$169	339	$57,308
GS-11 Specialist Review of Planned Treatments (5 people x 2 days)	$429	10	$4,290
GS-5 Bio Tech Overtime (4 people x 10 hours x 12 weeks)	$254	60	$15,249
GS-7 Bio Tech Overtime (1 person x 10 hours x 12 weeks)	$316	15	$4,735
CCC Crew	$8,855	1	$8,855
GS-7 Bio Tech Crew Leader- FACTS/NRIS Reporting (1 person x 20 days)	$210	20	$4,209
Subtotal:			$128,640
Fleet/Materials	**Cost**	**Miles/Units**	
Rental Vehicles (3 vehicles for 3 months each)	$1,150	9	$10,350
Mileage (100 miles/day x 3 vehicles x 70 days)	$0.58	21000	$12,075
String Trimmers (2)	$690	2	$1,380
Backpack Sprayers (2)	$230	2	$460
Herbicide, Adjuvants, Dye	$4,600	1	$4,600
GPS Units (3)	$1,725	3	$5,175
Misc Supplies: Hard hats, safety vests, gloves, batteries, trash bags, flagging, fuel for string trimmers, herbicide misc. equip	$2,300	1	$2,300
Subtotal:			$36,340
Total:			$164,980

Appendix E – Roads Treatments and Protection/Safety Treatments along Roads

King Fire Roads						
Evaluation and Assessment						
Roads With Proposed Treatment						
Road	**Assessment**	**Risk**	**Treatment**	**Qnty**	**Item cost**	**Total cost**
11N57	Paved primary arterial road through burned area. Sections of high soil burn severity and steep slopes.	Very High	Restore drainage function (4.22 miles)	4.22	$ 5,000.00	$ 21,100.00
11N60	Road primarily in moderate to high soil burn severity and steep slopes.	High	Restore drainage function (3.42 miles)	3.42	$ 5,000.00	$ 17,100.00
14N09	Paved primary arterial road through burned area. Sections of high soil burn severity and steep slopes.	Very High	Restore drainage function (1.71 miles)	1.71	$ 5,000.00	$ 8,550.00
17N02	Paved primary arterial road through burned area. Sections of high soil burn severity and steep slopes.	Very High	Restore drainage function (2.72 miles)	2.72	$ 5,000.00	$ 13,600.00
						$ 60,350.00
11N64	Areas of moderate to high soil burn severity. Likely to impact other areas if sections of road failed.	Very High	Restore drainage function (4.51 miles)	4.51	$ 5,000.00	$ 22,550.00
14N20	Some areas of moderate to high soil burn severity	High	Restore drainage function (4.26 miles)	4.26	$ 5,000.00	$ 21,300.00
						$ 43,850.00

14N08	Paved primary arterial road through burned area. High soil burn severity and steep slopes.	Very High	Restore drainage function (18-80 inch; 110 culvert locations)	11.98	$ 5,000.00	$ 59,900.00
			Remove roadside berm (1.8 miles)	1.8	$ 7,500.00	$ 13,500.00
			Install riprap at culvert/lead-off outlet (32 CY)	32	$ 150.00	$ 4,800.00
			Install metal end section (MP 2.31, 2.42, 2.52, 2.68, 2.95, 3.31, 5.65, 5.79, 5.95, 7.90, 9.12, 9.30)	12	$ 750.00	$ 9,000.00
			Install "Falling Rock" signs	4	$ 450.00	$ 1,800.00
			Install "Warning Debris Flow Signs"	4	$ 450.00	$ 1,800.00
			Road closure gates (double gate)	2	$ 14,000.00	$ 28,000.00
			Enlarge catch basin (MP 0.18, 1.37, 1.46, 1.48, 4.41, 5.17, 7.72, 7.85, 8.01, 9.55, 10.60, 10.73, 10.99, 11.40, 11.54, 11.94)	16	$ 2,250.00	$ 36,000.00
			Replace nonfunctional steel drop inlet lid (MP 0.68, 0.75, 0.95, 1.30, 3.64, 8.39, 8.51)	7	$ 600.00	$ 4,200.00
			Install paved rolling dips (30 CY asphalt) (MP 1.53, 2.80, 3.13, 3.50, 4.14, 4.89, 7.72)	7	$ 30,000.00	$ 210,000.00
			Install 18-24 inch culvert inlet tee and riser with grate (MP 0.95, 1.20, 1.53, 1.66, 3.13, 3.56, 3.86, 4.75, 5.44, 6.50, 6.97, 7.02, 7.72, 9.64, 11,67, 11.75)	16	$ 1,250.00	$ 20,000.00
			Install overside drain 18-24 inches (MP 0.95, 1.20, 1.53, 1.66, 2.18, 2.24, 2.68, 3.13, 3.86, 3.95, 4.02, 4.08, 4.14)	13	$ 1,250.00	$ 16,250.00
			Install drop inlet (MP 1.53, 1.87, 2.24, 2.71, 2.80, 3.05, 3.25, 3.36, 3.78, 4.29, 4.32, 6.86, 7.35, 8.18 , 8.25)	15	$ 750.00	$ 11,250.00
			Install trash racks (MP 2.03, 2.04, 4.08, 5.27, 6.06, 6.26, 6.97, 7.02)	8	$ 25,000.00	$ 200,000.00
			Install piggy back/relief culvert (MP 3.50, 4.08)	2	$ 17,500.00	$ 35,000.00
			Install approach guardrail metal section/posts	1	$ 6,500.00	$ 6,500.00
						$ 658,000.00

11N12	Paved primary arterial road through burned area. Sections of high soil burn severity and steep slopes.	Very High	Restore drainage function (1.39 miles)	1.39	$ 3,250.00	$ 4,518.26
11N12A	Areas of moderate to high soil burn severity. Road drainage negatively impacted during fire suppression.	High	Restore drainage function (0.83 miles)	0.83	$ 3,250.00	$ 2,681.99
11N35	Areas of moderate to high soil burn severity. Road drainage negatively impacted during fire suppression.	Very High	Restore drainage function (1.25 miles)	1.25	$ 3,250.00	$ 4,067.31
11N56	Areas of moderate to high soil burn severity. Road drainage negatively impacted during fire suppression.	Very High	Restore drainage function (3.08 miles)	3.08	$ 3,250.00	$ 9,996.31
11N60B	Areas of moderate to high soil burn severity. Road drainage negatively impacted during fire suppression.	Very High	Restore drainage function (1.44 miles)	1.44	$ 3,250.00	$ 4,694.96
11N63	Areas of moderate to high soil burn severity. Road drainage negatively impacted during fire suppression.	Very High	Restore drainage function (2.49 miles)	2.49	$ 3,250.00	$ 8,085.35
11N63A	Areas of moderate to high soil burn severity. Road drainage negatively impacted during fire suppression.	Very High	Restore drainage function (0.70 miles)	0.70	$ 3,250.00	$ 2,275.28
11N63F	Areas of moderate to high soil burn severity. Road drainage negatively impacted during fire suppression.	Very High	Restore drainage function (0.63 miles)	0.63	$ 3,250.00	$ 2,050.33

11N64C	Areas of moderate to high soil burn severity. Road drainage negatively impacted during fire suppression.	Very High	Restore drainage function (0.84 miles)	0.84	$ 3,250.00	$ 2,742.62
11N69	Areas of moderate to high soil burn severity. Road drainage negatively impacted during fire suppression.	High	Restore drainage function (1.43 miles)	1.43	$ 3,250.00	$ 4,639.56
11N70	Areas of moderate to high soil burn severity. Road drainage negatively impacted during fire suppression.	High	Restore drainage function (2.17 miles)	2.17	$ 3,250.00	$ 7,051.04
11N70C	Areas of moderate to high soil burn severity. Road drainage negatively impacted during fire suppression.	High	Restore drainage function (2.53 miles)	2.53	$ 3,250.00	$ 8,229.43
11N73	Areas of moderate to high soil burn severity. Road drainage negatively impacted during fire suppression.	High	Restore drainage function (2.22 miles)	2.22	$ 3,250.00	$ 7,199.10
11N76	Areas of moderate to high soil burn severity. Road drainage negatively impacted during fire suppression.	High	Restore drainage function (1.33 miles)	1.33	$ 3,250.00	$ 4,321.97
11N80A	Areas of moderate to high soil burn severity. Road drainage negatively impacted during fire suppression.	High	Restore drainage function (0.66 miles)	0.66	$ 3,250.00	$ 2,147.11
11NY05	Areas of moderate to high soil burn severity. Road drainage negatively impacted during fire suppression.	High	Restore drainage function (3.44 miles)	3.44	$ 3,250.00	$ 11,185.43

11NY20	Areas of moderate to high soil burn severity. Road drainage negatively impacted during fire suppression.	High	Restore drainage function (2.00 miles)	2.00	$ 3,250.00	$ 6,510.10
11NY25	Areas of moderate to high soil burn severity. Road drainage negatively impacted during fire suppression.	High	Restore drainage function (2.16 miles)	2.16	$ 3,250.00	$ 7,015.12
11NY25A	Areas of moderate to high soil burn severity. Road drainage negatively impacted during fire suppression.	High	Restore drainage function (1.08 miles)	1.08	$ 3,250.00	$ 3,511.23
12N20	Areas of moderate to high soil burn severity. Road drainage negatively impacted during fire suppression.	High	Restore drainage function (3.65 miles)	3.65	$ 3,250.00	$ 11,861.39
12N34	Areas of moderate to high soil burn severity. Road drainage negatively impacted during fire suppression.	Very High	Restore drainage function (6.81 miles)	6.81	$ 3,250.00	$ 22,120.32
12N34G	Areas of moderate to high soil burn severity. Road drainage negatively impacted during fire suppression.	Very High	Restore drainage function (1.23 miles)	1.23	$ 3,250.00	$ 4,003.02
12N39	Areas of moderate to high soil burn severity. Road drainage negatively impacted during fire suppression.	Very High	Restore drainage function (1.24 miles)	1.24	$ 3,250.00	$ 4,014.91
12N43	Areas of moderate to high soil burn severity. Road drainage negatively impacted during fire suppression.	Very High	Restore drainage function (1.08 miles)	1.08	$ 3,250.00	$ 3,522.24

12N46	Areas of moderate to high soil burn severity. Road drainage negatively impacted during fire suppression.	Very High	Restore drainage function (0.92 miles)	0.92	$ 3,250.00	$ 2,995.07
12N47	Areas of moderate to high soil burn severity. Road drainage negatively impacted during fire suppression.	Very High	Restore drainage function (2.28 miles)	2.28	$ 3,250.00	$ 7,423.33
12N51	Areas of moderate to high soil burn severity. Road drainage negatively impacted during fire suppression.	Very High	Restore drainage function (1.46 miles)	1.46	$ 3,250.00	$ 4,734.17
12N51A	Areas of moderate to high soil burn severity. Road drainage negatively impacted during fire suppression.	Very High	Restore drainage function (1.23 miles)	1.23	$ 3,250.00	$ 3,993.48
12N53	Areas of moderate to high soil burn severity. Road drainage negatively impacted during fire suppression.	Very High	Restore drainage function (7.77 miles)	7.77	$ 3,250.00	$ 25,267.16
12N55	Areas of moderate to high soil burn severity. Road drainage negatively impacted during fire suppression.	Very High	Restore drainage function (0.59 miles)	0.59	$ 3,250.00	$ 1,929.54
12N56	Areas of moderate to high soil burn severity. Road drainage negatively impacted during fire suppression.	Very High	Restore drainage function (3.06 miles)	3.06	$ 3,250.00	$ 9,945.00
12N57	Areas of moderate to high soil burn severity. Road drainage negatively impacted during fire suppression.	Very High	Restore drainage function (6.77 miles)	6.77	$ 3,250.00	$ 21,992.31

12N59	Areas of moderate to high soil burn severity. Road drainage negatively impacted during fire suppression.	Very High	Restore drainage function (2.85 miles)	2.85	$ 3,250.00	$ 9,250.27
12N59D	Areas of moderate to high soil burn severity. Road drainage negatively impacted during fire suppression.	Very High	Restore drainage function (1.68 miles)	1.68	$ 3,250.00	$ 5,465.64
12NY27	Areas of moderate to high soil burn severity. Road drainage negatively impacted during fire suppression.	Very High	Restore drainage function (0.92 miles)	0.92	$ 3,250.00	$ 2,999.70
12NY27A	Areas of moderate to high soil burn severity. Road drainage negatively impacted during fire suppression.	Very High	Restore drainage function (0.52 miles)	0.52	$ 3,250.00	$ 1,677.17
13N10	Areas of moderate to high soil burn severity. Road drainage negatively impacted during fire suppression.	Very High	Restore drainage function (2.16 miles)	2.16	$ 3,250.00	$ 7,026.31
13N39	Some areas of moderate to high soil burn severity	High	Restore drainage function (3.66 miles)	3.66	$ 2,500.00	$ 9,159.39
13N39A	Areas of moderate to high soil burn severity. Road drainage negatively impacted during fire suppression.	Very High	Restore drainage function (1.99 miles)	1.99	$ 3,250.00	$ 6,460.24
13N39B	Areas of moderate to high soil burn severity. Road drainage negatively impacted during fire suppression.	Very High	Restore drainage function (1.65 miles)	1.65	$ 3,250.00	$ 5,375.45
13N40	Areas of moderate to high soil burn severity. Road drainage negatively impacted during fire	Very High	Restore drainage function (0.84 miles)	0.84	$ 3,250.00	$ 2,714.45

	suppression.					
13N42	Areas of moderate to high soil burn severity. Road drainage negatively impacted during fire suppression.	Very High	Restore drainage function (5.54 miles)	5.54	$ 3,250.00	$ 18,005.00
13N42D	Areas of moderate to high soil burn severity. Road drainage negatively impacted during fire suppression.	Very High	Restore drainage function (0.83 miles)	0.83	$ 3,250.00	$ 2,713.73
13N42E	Areas of moderate to high soil burn severity. Road drainage negatively impacted during fire suppression.	Very High	Restore drainage function (0.76 miles)	0.76	$ 3,250.00	$ 2,467.33
13N42H	Areas of moderate to high soil burn severity. Road drainage negatively impacted during fire suppression.	Very High	Restore drainage function (0.50 miles)	0.50	$ 3,250.00	$ 1,615.19
13N67	Areas of moderate to high soil burn severity. Road drainage negatively impacted during fire suppression.	Very High	Restore drainage function (1.42 miles)	1.42	$ 3,250.00	$ 4,600.95
13N73	Areas of moderate to high soil burn severity. Road drainage negatively impacted during fire suppression.	Very High	Restore drainage function (2.27 miles)	2.27	$ 3,250.00	$ 7,384.94
13N74	Areas of moderate to high soil burn severity. Road drainage negatively impacted during fire suppression.	Very High	Restore drainage function (2.19 miles)	2.19	$ 3,250.00	$ 7,115.64
14N08C	Areas of moderate to high soil burn severity. Road drainage negatively impacted during fire	Very High	Restore drainage function (1.45 miles)	1.45	$ 3,250.00	$ 4,714.58

	suppression.					
14N08E	Areas of moderate to high soil burn severity. Road drainage negatively impacted during fire suppression.	Very High	Restore drainage function (1.70 miles)	1.70	$ 3,250.00	$ 5,534.55
14N08G	Areas of moderate to high soil burn severity. Road drainage negatively impacted during fire suppression.	Very High	Restore drainage function (0.59 miles)	0.59	$ 3,250.00	$ 1,920.05
14N10AA	Areas of moderate to high soil burn severity. Road drainage negatively impacted during fire suppression.	Very High	Restore drainage function (0.96 miles)	0.96	$ 3,250.00	$ 3,118.59
14N10B	Areas of moderate to high soil burn severity. Road drainage negatively impacted during fire suppression.	Very High	Restore drainage function (0.97 miles)	0.97	$ 3,250.00	$ 3,151.48
14N10C	Areas of moderate to high soil burn severity. Road drainage negatively impacted during fire suppression.	Very High	Restore drainage function (1.01 miles)	1.01	$ 3,250.00	$ 3,266.98
14N10G	Areas of moderate to high soil burn severity. Road drainage negatively impacted during fire suppression.	Very High	Restore drainage function (0.76 miles)	0.76	$ 3,250.00	$ 2,477.83
14N11	Areas of moderate to high soil burn severity. Road drainage negatively impacted during fire suppression.	Very High	Restore drainage function (0.74 miles)	0.74	$ 3,250.00	$ 2,417.27
14N20B	Areas of moderate to high soil burn severity. Road drainage negatively impacted during fire	Very High	Restore drainage function (0.69 miles)	0.69	$ 3,250.00	$ 2,248.22

	suppression.					
14N21	Areas of moderate to high soil burn severity. Road drainage negatively impacted during fire suppression.	Very High	Restore drainage function (3.68 miles)	3.68	$ 3,250.00	$ 11,956.18
						$ 361,561.54

11N55	High soil burn severity. Gradual slopes. Road drainage damaged during fire suppression.	Very High	Restore drainage function (2.52 miles)	2.52	$ 3,500.00	$ 8,820.00
			Install armored dip w/ armored fillslope (MP 0.20, 0.30)	2	$ 2,500.00	$ 5,000.00
						$ 13,820.00

11N59	High soil burn severity. Gradual slopes. Road drainage damaged during fire suppression.	Very High	Restore drainage function (1.13 miles)	1.13	$ 3,500.00	$ 3,955.00
			Armored ditch 50' each direction 5CY (MP 0.50)	1	$ 750.00	$ 750.00
			Outslope road (MP 1.13-2.47)	1.34	$ 3,000.00	$ 4,020.00
						$ 8,725.00

11N63	High soil burn severity. Gradual slopes. Road drainage damaged during fire suppression.	Very High	Restore drainage function (5.4 miles)	5.4	$ 3,500.00	$ 18,900.00
			Install gate (MP 0.00)	1	$ 7,500.00	$ 7,500.00
						$ 26,400.00

11N80	Road primarily in high soil burn severity and steep slopes.	Very High	Restore drainage functions (6.15 miles)	6.15	$ 3,500.00	$ 21,525.00
			Install armored dip w/ armored fillslope (MP 0.01, 0.30)	2	$ 2,500.00	$ 5,000.00
			Install riser (MP 0.70, 1.90)	2	$ 1,250.00	$ 2,500.00

			Install metal end section (MP 1.95, 3.20)	2	$ 750.00	$ 1,500.00
						$ 30,525.00

11N70	High soil burn severity. Gradual slopes. Road drainage damaged during fire suppression.	Very High	Restore drainage function (5.32 miles)	5.32	$ 3,500.00	$ 18,620.00
			Outslope road (MP 0.30-1.80)	1.5	$ 3,000.00	$ 4,500.00
			Install armored LWC 20CY (MP 1.70, 1.80)	2	$ 3,500.00	$ 7,000.00
			Remove existing 36" culvert/Install 60"X51" arch culvert (MP 2.62)	1	$ 20,000.00	$ 20,000.00
						$ 50,120.00

12N34	High soil burn severity. Gradual slopes. Road drainage damaged during fire suppression.	Very High	Restore drainage function (9.83 miles)	9.83	$ 3,500.00	$ 34,405.00
			Install rolling dips w/ armored lead off 25CY	25	$ 1,000.00	$ 25,000.00
			Install water bars	25	$ 275.00	$ 6,875.00
						$ 66,280.00

12N54	High soil burn severity. Gradual slopes. Road drainage damaged during fire suppression.	Very High	Restore drainage function (3.16 miles)	3.16	$ 3,500.00	$ 11,060.00
			Install gate (MP 0.74)	1	$ 7,500.00	$ 7,500.00
			Install rolling dips w/ armored lead off 7CY (MP 0.50-1.00)	7	$ 1,000.00	$ 7,000.00
			Remove existing 36" culvert/Install 48" culvert (MP 1.03)	1	$ 12,500.00	$ 12,500.00
			Install armored LWC 20CY (MP 2.01, 2.09, 2.86)	3	$ 3,500.00	$ 10,500.00
			Install riser (MP 2.37, 2.80)	2	$ 1,250.00	$ 2,500.00
						$ 51,060.00

14N10	High soil burn severity. Gradual slopes. Road	Very High	Restore drainage fuction (12.66 miles)	12.66	$ 3,500.00	$ 44,310.00

	drainage damaged during fire suppression.		Install metal end section (MP 8.78, 9.18)	2	$ 750.00	$ 1,500.00
						$ 45,810.00

14N12	High soil burn severity. Gradual slopes. Road drainage damaged during fire suppression.	Very High	Restore drainage function (5.16 miles)	5.16	$ 3,500.00	$ 18,060.00
			Enlarge catch basin (MP 0.95, 2.26)	2	$ 2,250.00	$ 4,500.00
			Install armored LWC 20CY (MP 1.78)	1	$ 3,500.00	$ 3,500.00
			Install riser (MP 2.62, 4.70)	2	$ 1,250.00	$ 2,500.00
						$ 28,560.00

14N19	High soil burn severity. Gradual slopes. Road drainage damaged during fire suppression.	Very High	Restore drainage function (3.74 miles)	1	$ 3,500.00	$ 3,500.00
			Remove existing culvert/Install LWC 20CY (MP 1.82, 1.94, 2.07, 2.41, 2.50, 2.59, 3.12, 3.78)	8	$ 3,500.00	$ 28,000.00
						$ 31,500.00

Storm inspection and response (30 days)	30	$ 3,500.00	$ 105,000.00
Road closure gates (6 total)	6	$ 7,500.00	$ 45,000.00
Hazard trees removal	1	$ 35,000.00	$ 35,000.00
Warning signs	20	$ 450.00	$ 9,000.00
Road treatment total (includes storm inspection, response & gates)			**$1,670,561.54**

Although the above estimates include burdened labor and equipment costs, it is difficult to include aggregated costs, such as mobilization and P&O to individual items. Funding for public works contract work would be higher. Costs for time, material, contract administration, and engineer design are listed below.

Time and Material Cost Only	Time, Material, Contract Administration, and Engineering Design Cost
$1,670,562	$2,138,319

Appendix F – Trail Treatments and Protection/Safety Treatments along Trails

Treatment / Location	Closure	Signs	Hazard Tree Removal	Hazardous waste containment/removal	Storm-proofing	Barrier Replacement	Monitoring	Treatment Details	Cost
Developed Campgrounds:									
Stumpy Meadows	X	X		X		X	X	2 signs installed,1 day hazmat containment, replace 18 barrier posts and 15 bollards, 4 days monitoring	$7,635
Black Oak	X	X		X		X	X	2 signs installed,1 day hazmat containment, replace 32 barrier posts and 30 bollards, 4 days monitoring	$9,969
Big Meadows	X	X	X			X	X	2 days hazard tree removal, 2 signs installed, coordination with archaeologists (1 day GS-9), replace 10 bollards, 4 days monitoring	$5,440
Day Use Areas:									
Hell Hole Vista		X					X	4 signs installed, 2 days monitoring	$1,863
Bridal Veil Day Use	X	X	X				X	2 signs installed; 1 day saw team, 2 days monitoring	$2,289
Dispersed Camping Areas:									
Long Canyon Dispersed Camping							X	1 day monitoring	$495
Slab Creek Reservoir	X	X	X				X	2 signs installed, 2 days hazard tree mitigation, coordination with utility for closures, 4 days monitoring	$4,635
Non-Motorized Trails:									
12E02 – Edson Burn Interpretive Trail	X	X					X	1 sign installed, 1 day monitoring	$713
12E30 – Brush Creek Reservoir							X	1 day monitoring	$495
13E02 – Middle Meadows		X						4 signs installed, 1 day monitoring	$1,369
13E03 – Frey	X						X	1 day monitoring	$495

13E05 – Gray	X	X					X	*1 sign installed, 1 day monitoring*	*$713*
13E13 – Ellicott	X	X	X		X		X	*3 signs installed, CC crew for 3 days, saw team for 2 days, 2 days monitoring*	*$8,683*
13E16 – Lawyer	X	X	X		X		X	*1 sign installed, CC crew for 1 week, saw team for 1 day, 1 day monitoring*	*$10,431*
13E17 – Slide Point	X	X	X		X		X	*1 sign installed, FS crew for 1 week, saw team for 2 days, 2 days monitoring*	*$15,749*
13E18 – SugarPine Point	X	X	X		X		X	*1 sign installed, CC crew for 2 days, saw team for 1 day, 2 days monitoring*	*$5,612*
13E19 – Pony Express NHT		X					X	*4 signs installed, 1 day monitoring*	*$1,369*
13E24 – Belix	X	X	X		X		X	*3 signs installed, CC crew for 1 week, saw team for 2 days, 4 days monitoring*	*$13,214*
14E10 – Parsley Bar	X		X		X		X	*FS crew for 1 day, saw team for 1 day, 4 days monitoring*	*$5,404*
14E14 – South Fork	X	X	X		X		X	*1 signs installed, FS crew for 1 week, 4 days monitoring*	*$15,013*
Motorized Trails:									
11E49 – Soapweed		X					X	*2 signs installed, 1 day monitoring*	*$932*
12E15 – Poho		X			X		X	*2 signs installed, FS crew for 2 days, 2 days monitoring*	*$6,553*
12E16 – Poho Power		X					X	*2 signs installed, FS crew for 1 day, 1 day monitoring*	*$3,495*
12E17 – Slide Point					X		X	*FS crew for 2 days, 2 days monitoring*	*$6,116*
12E18					X		X	*FS crew for 2 day, 1 day monitoring*	*$5,621*
12E19 – Big X ATV					X		X	*FS crew for 1 day, 1 day monitoring*	*$0*
12E20 – Big Brushy							X	*1 day monitoring*	*$495*
12E21 – Camp Seven							X	*1 day monitoring*	*$495*
14E04 – Hales Crossing	X	X	X		X		X	*1 sign installed, CC crew for 2 days, 2 days monitoring*	*$4,750*
14E09 – Hunter	X	X	X		X		X	*2 signs installed, CC crew for 1 week, saw team for 2 days,6 days monitoring*	*$13,984*

14E11 – Deer Creek	X	X	X		X		X	1 sign installed, FS crew for 2 days, saw team for 1 day, 2 days monitoring	$7,197
								Treatment Cost	$161,216
								Supplies and Materials	$2,548
								Total Cost	$163,764