

**September 29, 2023****HAPPY CAMP COMPLEX BURNED-AREA REPORT****PART I - TYPE OF REQUEST****A. Type of Report**

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

**B. Type of Action**

- 1. Initial Request (Best estimate of funds needed to complete eligible stabilization measures)
- 2. Interim Request #\_\_\_\_
  - Updating the initial funding request based on more accurate site data or design analysis

**PART II - BURNED-AREA DESCRIPTION****A. Fire Name:** Happy Camp Complex**B. Fire Number:** CA-KNF-007917**C. State:** CA**D. County:** Siskiyou County**E. Region:** 05 – Pacific Southwest**F. Forest:** Klamath National Forest**G. District:** Happy Camp/Oak Knoll and Scott River  
Ranger Districts**H. Fire Incident Job Code:** P5QJ7D (0505)**I. Date Fire Started:** Mid-August, 2023**J. Date Fire Contained:** 73% (as of 09/24/2023)**K. Suppression Cost:** 93.1 million (as of 9/19/2023)**L. Fire Suppression Damages Repaired with Suppression Funds (estimates):**

Item	Unit	Amount Identified	Amount Repaired	No Repair Needed	Remaining
Mapped Dozer Line	Miles	104.6	63.7	4.7	36.2
Road as Control Line	Miles	54.4	4.5	5.7	44.2
Mapped Hand Line	Miles	48.9	13.3	22.9	12.7
Mixed Construction	Miles	4.8	2.9	0	1.9
Fuel Break	Miles	1.5	0.4	1.1	0
Access Or Improved	Miles	60.3	15.2	19.1	26
Repair Line	Miles	11.9	3.4	0.6	7.9
Road Repair	Miles	46.7	3.0	4.1	39.6
Spike Camps	Count	1	0	0	1
Drop Points	Count	33	0	1	32
Culverts	Count	57	47	0	10
Dozer Push	Count	33	33	0	0
Staging	Count	11	0	0	11
Road Repair Point	Count	8	3	0	5
Repair Point	Count	193	103	8	82
Helispots	Count	17	5	1	11

**M. Watershed Numbers:**

HUC #12	Watershed Name	Total Acres	Acres Burned	% of Watershed Burned
180102061004	Horse Creek	38,974	<1	<1%
180102061005	Kohl Creek-Klamath River	17,789	1,463	8.2%
180102061103	Bittenbender Creek-Klamath River	35,413	1,387	3.9%
180102080601	Canyon Creek	15,834	200	1.3%
180102080602	Boulder Creek-Scott River	12,839	49	0.4%
180102080604	Tompkins Creek-Scott River	17,635	1,205	6.8%
180102080605	Mill Creek	14,294	55	0.4%
180102080606	Town of Scott Bar-Scott River	25,691	5,041	19.6%
180102090303	Lower Elk Creek	30,019	1,277	4.3%
180102090403	Lower Clear Creek	21,847	6	<1%

180102090501	North Fork Dillon Creek	21,192	958	4.5%
180102090502	Copper Creek-Dillon Creek	25,632	1,716	6.7%
180102090601	Oak Flat Creek-Klamath River	20,944	1,528	7.3%
180102090604	Titus Creek-Klamath River	19,375	5,854	30.2%
180102090605	Swillup Creek-Klamath River	15,168	7,395	48.8%
180102100303	Hancock Creek	10,516	1,166	11.1%
180102100304	Middle Wooley Creek	23,542	573	2.4%

**N. Total Acres Burned:** Based on September 24, 2023 BARC Perimeter

Total acres burned across the Den, Elliot, Hancock, Head, Lake, Scott, Townsend, and U-Fish was 29,872.

**O. Vegetation Types:**

Vegetative communities within the fire areas vary by distance from the ocean and elevation. Lower elevation communities are characterized as mixed conifer hardwood forests. Common overstory species include Douglas fir (*Pseudotsuga menziesii*), incense cedar (*Calocedrus decurrens*), sugar pine (*Pinus lambertiana*), madrone (*Arbutus menziesii*), black oak (*Quercus kelloggii*), and canyon live oak (*Quercus chrysolepis*). Common understory species include chinquapin (*Chrysolepis chrysophylla*), deer brush (*Ceanothus integerrimus*), Sadler's oak (*Quercus sadleriana*), and white leaf manzanita (*Arctostaphylos viscida*). As elevation increases, vegetative communities shift towards true fir forests of white fir (*Abies concolor*), with understories of snowbrush ceanothus (*Ceanothus velutinus*), mountain maple (*Acer glabrum*), and green leaf manzanita (*Arctostaphylos patula*). Riparian areas generally consist of white alder (*Alnus rhombifolia*) and big leaf maple (*Acer macrophyllum*) with understories of nine bark (*Physocarpus capitatus*), mock orange (*Philadelphus lewisii*), snowberry (*Symphoricarpos mollis*) and spiraea (*Spiraea* spp.).

**P. Dominant Soils:**

Soil Map Unit	Soil Series, Associations, Complexes <sup>1</sup>	K-Factor <sup>2</sup>	Approximate Acres	% of Fire Area
112	Clallam-Deadwood Association	0.1	7,300	23%
118	Deadwood-Clallam Association	0.1	4,800	15%
114	Clallam-Goldridge Gravelly Association	0.1	4,200	13%
109	Clallam Family	0.1	2,200	7%
183	Skalan-Clallam-Decry Association	0.24	2,220	7%
128	Gilligan-Chawanakee Association	0.28	2,100	7%
129	Gilligan-Goldridge Association	0.30	1,900	6%
143	Holland-Skalan Association	0.37	1,700	6%

Notes: <sup>1</sup>Soil Series and Associations less than 5% area are excluded from the table.

<sup>2</sup>K-factor relates the erodibility of the soil, the higher number being more erosive.

**Q. Geologic Types:**

The Happy Camp Complex lies within the Klamath Mountains Physiographic Province and is underlain predominantly by Paleozoic and Mesozoic metavolcanic and metasedimentary rock, along with minor amounts of Quaternary sediments in the valleys. Tectonic processes accreted numerous terranes to the western margin of North America. Four of these occur within the fire area: Condrey Mountain, Rattlesnake, Hayfork, and Jurassic-age quartz-diorite plutons (primarily Pony Mountain Pluton within the fire area).

**R. Miles of Stream Channels by Order or Class:**

Stream Type	Miles of Stream
Perennial	51.1
Intermittent	82.5
Canal/Ditch	0.1
Artificial Path	5.1

**Miles of Stream Channels by Order or Class broken out per fire.**

Fire Name	Canal/Ditch	Intermittent	Perennial	Artificial Path	Grand Total
Den	0.1	0.2	0.5	0.0	0.8
Elliot	0	38.4	27.1	0.0	65.5
Hancock	0	4.9	2.6	0.0	7.5
Head	0	15.9	8.7	4.1	28.6
Lake	0	0.2	0.0	0.0	0.2
Scott	0	7.4	1.1	0.8	9.3
Townsend	0	0.4	0.0	0.0	0.4
U-Fish	0	15.0	11.1	0.2	26.4
<b>Grand Total</b>	<b>0.1</b>	<b>82.5</b>	<b>51.1</b>	<b>5.1</b>	<b>138.6</b>

\*Data is derived from the National Hydrography Dataset

**S. Transportation System:**

**Trails: National Forest (miles):**

Trail Number	Trail Name	Fire	Total Burned Mileage of Trail within the fires	Burned Mileage of Trail within moderate/high
5832	Wooley Creek	Hancock	0.1	0
5540	Little Elk Lake	Lake	0.1	0
5240	Dillon Creek (Six Rivers)	Elliot	3.3	0.1
5528	Lake Mountain	Head	1.4	1.0
<b>Grand Total:</b>			<b>4.8</b>	<b>1.1</b>

**Roads: National Forest (miles):**

Operational Maintenance Level	Klamath NF
1 – Basic Custodial Care	19.2
2 - High Clearance Vehicles	21.6
3 – Suitable for Passenger Vehicles	5.8
4 - Moderate Degree of User Comfort	1.7
<b>NON-FS Public Roads</b>	<b>6.8</b>
<b>Grand Total</b>	<b>55.1</b>

**PART III - WATERSHED CONDITION**

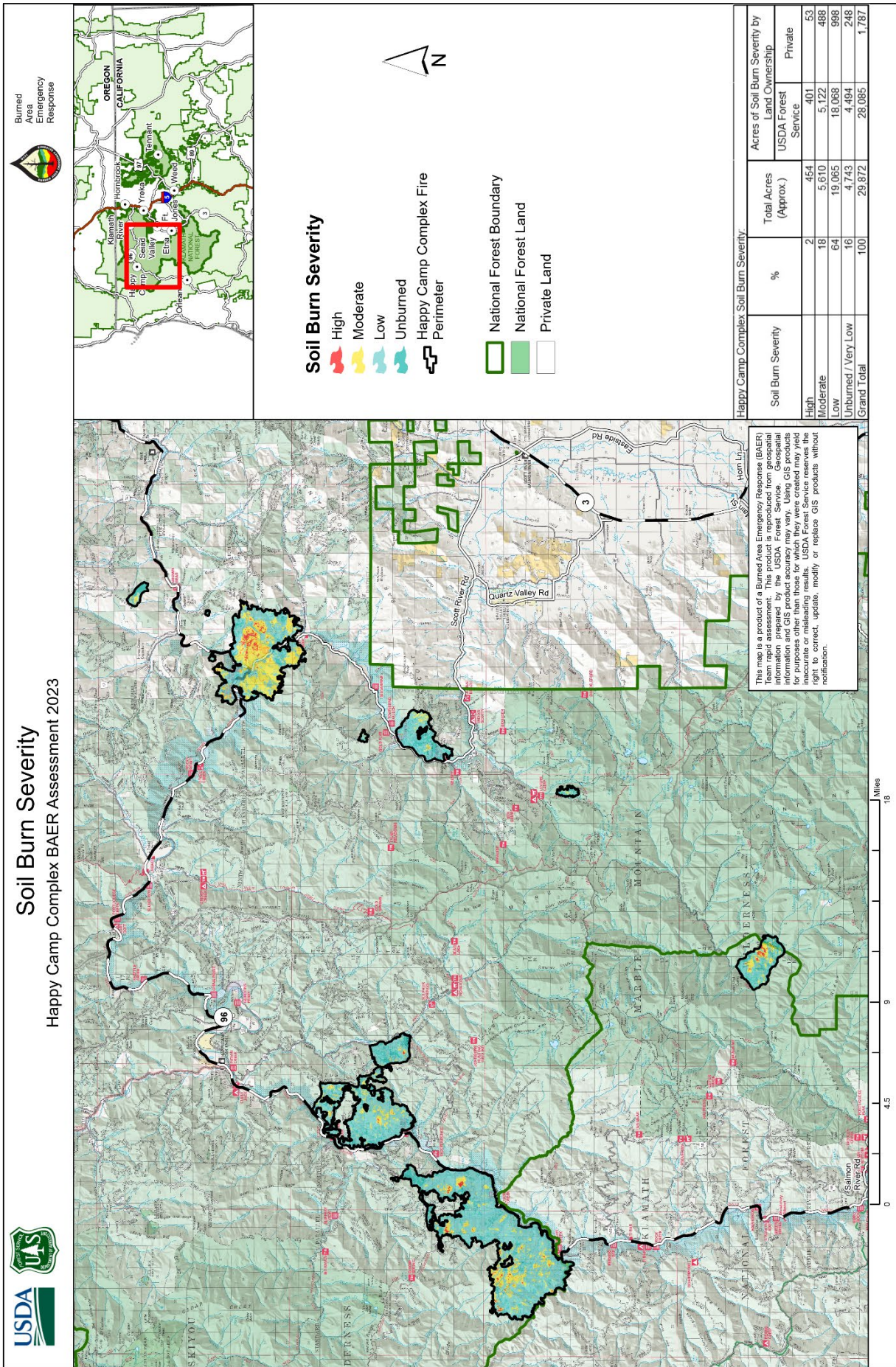
**A. Burn Severity (acres):**

Soil Burn Severity: Based on September 24, 2023 BARC Perimeter.

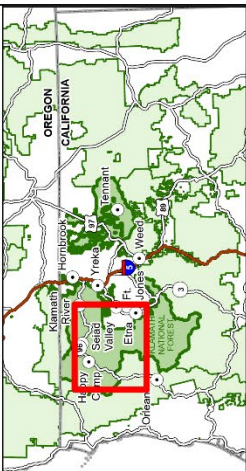
<b>Overall Soil Burn Severity for all fires</b>		
<b>Soil Burn Severity</b>	<b>Acres</b>	<b>Percentage</b>
Unburned / Very Low	4,743	16%
Low	19,065	64%
Moderate	5,610	18%
High	454	2%
<b>GRAND TOTAL</b>	<b>29,872</b>	<b>100.0%</b>

<b>Soil Burn Severity Percentages</b>					
<b>Fire Name</b>	<b>Unburned</b>	<b>Low</b>	<b>Moderate</b>	<b>High</b>	<b>Grand Total</b>
Den	53%	33%	14%	0%	100%
Elliot	14%	72%	13%	1%	100%
Hancock	23%	53%	20%	4%	100%
Head	8%	46%	43%	3%	100%
Lake	54%	39%	6%	0%	100%
Scott	25%	68%	7%	0%	100%
Townsend	16%	77%	8%	0%	100%
U Fish	19%	71%	9%	0%	100%





Soil Burn Severity  
Happy Camp Complex BAER Assessment 2023



The burn boundary used in the BAER analysis (29,872 ac.) is approximately 2,700 acres less than that mapped by the incident management team (32,588 ac.). The burn boundary BAER uses were created during the process of developing the Burn Area Reflectance Classification (BARC), which uses satellite imagery to identify burned areas. The satellite imagery was obtained on September 14<sup>th</sup>, 2023. As of the date of this report, the fire is not 100% contained, as such the boundaries are not a 100% match. The additional acres burned have not been at a severity that would influence BAER results. Likewise, the intention of the BAER analysis boundary is for watershed analysis, not for public acreage reporting.

**B. Water-Repellent Soil (acres):** Water repellent soil was common across the Happy Complex Fires, but its distribution across the landscape was highly variable. The water repellent soil layer was found across soil burn severities including unburned. It was typically wettable to slight hydrophobic and present within the first 2 inches of the soil profile. It is estimated that water repellent soils are present across one third of the landscape, or approximately 10,000 acres. It is estimated that one half of the water repellent soils are due to soil drying through the summer season (5,000 acres) and one half are fire generated (5,000 acres). The existing water repellent soils should cause marginal increases to water and sediment run-off. Water repellent soils should return to pre-fire levels within three years.

**C. Soil Erosion Hazard Rating:**

Rating	Acres
Very High	4,497
High	23,809
Medium	3,114
Low	163

**D. Erosion Potential:** ERMiT Hillslope Erosion Potential, Averaged Across Fires

	2-YEAR RUNOFF EVENT (TONS/ACRE)	5-YEAR RUNOFF EVENT (TONS/ACRE)	10-YEAR RUNOFF EVENT (TONS/ACRE)
<b>BURNED (POST-FIRE)</b>	10	22	50
<b>UNBURNED (PRE-FIRE)</b>	1	6	18

**E. Sediment Potential:** Modelling for this fire does not accurately measure sediment potential however a conservative estimate is that there is at least a 50% delivery ratio compared to the erosion rates.

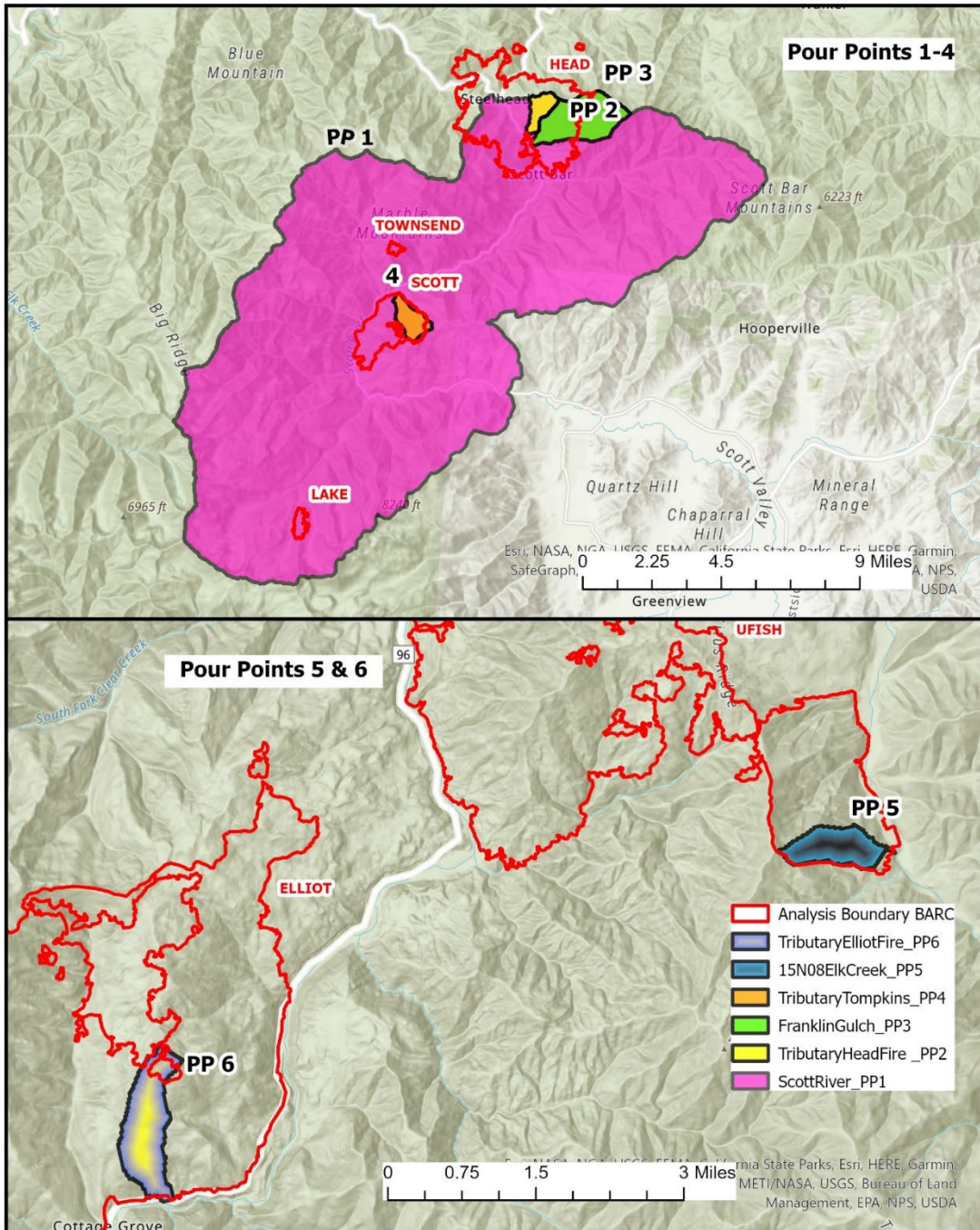
**F. Estimated Vegetative Recovery Period (years):** 1-3 years for grass and forb components, 5-10 years for shrub components, much longer for tree species.

**G. Estimated Hydrologic Response (brief description):**

The primary watershed responses of the Happy Camp Complex are expected to include: 1) an initial flush of ash and debris, 2) rill and gully erosion on steep slopes within the burned area, and 3) potential flash floods and debris flows in tributary drainages to the main stem rivers during short duration high intensity summer monsoonal precipitation events and during long duration winter atmospheric river precipitation events. These responses are expected to be most pronounced during the first 1- 3 years after the fire and will become less evident as vegetation and soil-hydrologic function recover.

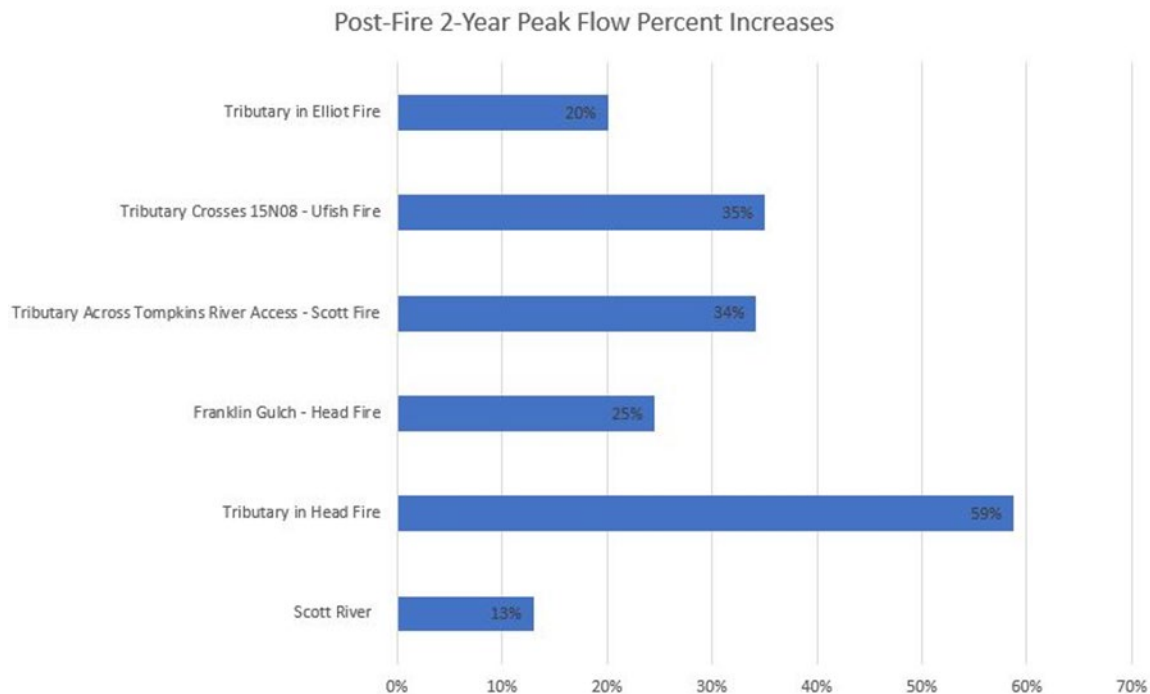


For hydrologic response modeling, the burned area was separated into 6 analysis watersheds. Pour points were established at the mouth of each basin to facilitate a more detailed analysis of stream discharge. The watershed above each pour point was delineated, and pre-fire and post-fire flows were modeled and compared. The risk of threats such as flooding can be determined by using modeling results in combination with field review of floodplain elevation, channel morphology, and flood history.





A 2-year return interval peak flow (Q2) can be used as a conservative estimate of a peak flow magnitude that could be potentially damaging and has a high likelihood of occurrence within the next 1-4 years, when the watersheds are most susceptible to elevated peak flows and erosion. A 2-year peak flow event has a 50% probability of occurrence in any given year and a 94% probability of occurring at least once over the next 4 consecutive years. Modeling pre- and post-fire peak flow involves uncertainty; modeled flows should be considered estimates of the relative expected change in post-fire hydrologic response which are used to help identify areas of concern and prioritize treatment. Design flow estimates for the Happy Camp Complex have been based on the U.S. Geological Survey regression equations developed for the North Coast region (Gotvald, et al., 2012) for Scott River pour point. The remaining 5 pour points were modeled using WildCat 5 due the size of the basins.

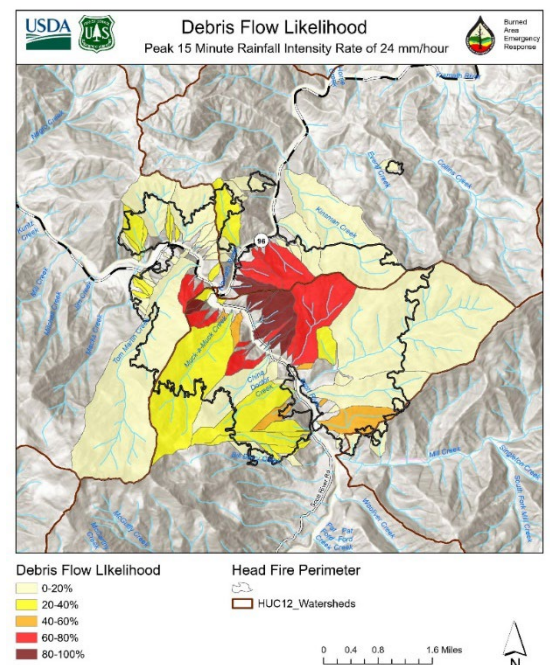


These elevated post-fire flows and bulking could lead to plugged culverts, damage to road infrastructure, damage to utility infrastructure, impacts to water quality, decreased soil productivity and hydrologic function.

**Geologic Response:**

Based on USGS debris flow modeling it appears that under conditions of a peak 15-minute rainfall intensity storm of 24 millimeters per hour (0.95 inches/hour) corresponding to a 1-2 year storm, most of the basins in the burn area have very low (0-20%) or low (20-40%) likelihoods of producing debris flows. Most of the assessed burn area requires storms with rainfall rates more than 36 millimeters per hour (1.4 inches/hour) to exceed a 50% likelihood of debris-flow occurrence.

There are some subbasins with high (60-80%) and very high (80-100%) likelihood of debris flows. These subbasins are mostly unnamed tributary drainages above the confluence of the Scott and Klamath rivers (impacting FS road 46N51, and non-FS roads Highway 96, and county roads 7F01 and 7F002). Under this same magnitude of storm in these high likelihood



subbasins, modeled sediment volumes stored in channels are 1,000-10,000 cubic meters. Based on field observations of most of the fire area, stored sediment is limited, or unavailable and channel geometry is not conducive to debris flow production. Therefore, the model overestimates debris flow likelihood, but does highlight subbasins with increased post-fire risk of producing sediment, hyper-concentrated flows, and experiencing localized mass wasting and loss of slope stability during storms.

In general, there are limited rockfall hazards that have increased as a result of the fire. Baseline rockfall hazards exist throughout the fire area, but those areas had either low soil burn severity or were unburned, therefore relative risk has not increased. We identified key areas (Values at Risk), within or below steep slopes with a moderate to high soil burn severity, that will benefit by installing post-fire hazard signs (Human Life and Safety along Highway 96 on the south side of Elliot fire; Highway 96 within Head fire; county roads 7F01 and 7F02 in Head fire). Warning signs are recommended for Forest Service Roads and Trails in order to mitigate hazards to human life and safety where the potential for debris flows, rockfall, and/or landslides constitute a BAER Risk Assessment of Intermediate to Very High. Coordination between the Forest Service, Watershed Emergency Response Team (WERT), and County officials is recommended to effectively manage cumulative post-fire geologic hazards along Highway 96 and the county roads within the Head fire.

These increase risks of geological hazards described above will stay in effect until vegetation recovers, which could take 2-5 years after the fire.

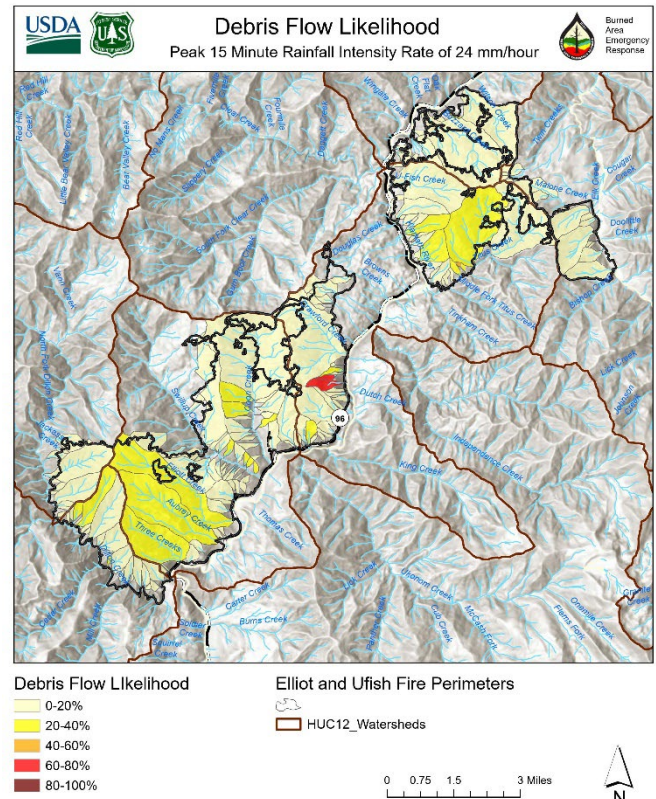
## PART IV - SUMMARY OF ANALYSIS

### Introduction/Background

The Happy Camp Complex started mid-August, 2023 after a series of thunderstorms moved across the Klamath National Forest bringing abundant lightning and igniting more than 20 fires over the western side of the forest. Only scattered precipitation was received with these storms but strong winds caused the fire to spread. As of September 20, 2023, the fire is 70% contained at 32,588 acres and has destroyed 9 structures, damaging 2, and 1 fatality.

A BAER assessment team began field reconnaissance of the burned area on September 13 to begin burn severity mapping, hydrologic response, and to identify geologic hazards. The remainder of the BAER team arrived on September 18.

As a note, any treatment stabilization recommendation from the Happy Camp Complex that impacted the Six Rivers National Forest (roads, trails, and suppression repair) will be identified by the Six Rivers BAER Assessment Team.



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

*Critical Value Matrix*

**Probability of Damage or Loss:**

*The following descriptions provide a framework to estimate the relative probability that damage or loss would occur within 1 to 3 years (depending on the resource):*

**Very likely.** Nearly certain occurrences (90% - 100%)

**Likely,** Likely occurrence (50% - 89%)

**Possible.** Possible occurrence (10% - 49%)

**Unlikely.** Unlikely occurrence (0% - 9%)

Probability of Damage or Loss	Magnitude of Consequences		
	Major	Moderate	Minor
	<b>RISK</b>		
Very Likely	<b>Very High</b>	<b>Very High</b>	<b>Low</b>
Likely	<b>Very High</b>	<b>High</b>	<b>Low</b>
Possible	<b>High</b>	<b>Intermediate</b>	<b>Low</b>
Unlikely	<b>Intermediate</b>	<b>Low</b>	<b>Very Low</b>

**Magnitude of Consequences:**

**Major.** Loss of life or injury to humans; substantial property damage; damage to critical natural or cultural resources

**Moderate.** Injury or illness to humans; moderate property damage; damage to critical natural or cultural resources resulting in considerable or long-term effects.

**Minor.** Property damage is limited in economic value and/or too few investments; damage to critical natural or cultural resources resulting in minimal, recoverable or localized effects.

**1. Human Life and Safety:**

- *Forest Visitors Safety:*

The BAER team identified potential threats to Forest visitors/recreating public, and agency personnel (visiting or post-fire treatments) that are within or downstream/downslope of burned slopes, especially those with a moderate-high burn severity, from flooding and debris flows, hazard trees, loss of ingress and egress along/at roads, trails, and permitted sites. The probability of damage or loss is **possible or likely**, resulting from hazard trees along travel routes within the burn area have not been mitigated. Likewise, road-stream crossings within the burn area or directly below moderate/high burn severity are at risk from flooding, debris flows, and rockfall. The magnitude of consequences is **major**, as a tree strike or entrapment could lead to serious injury or loss of life. As such, the risk is considered **high/very high**.

- BAER funds are requested to treat these risks (*Treatments LS-1*).

BAER recommends that human health and safety concerns on adjacent lands within or below the footprint of the fire also be evaluated for risk from flooding and debris flows, hazard trees.

**2. Property:**

- *NFS Roads*

There is a threat to the 4.15 miles NFS road prisms from increased runoff, erosion, and debris flows. Undersized and inadequate drainage structures are not expected to convey the expected increase in post-fire runoff and erosion and may damage Forest Service Road infrastructure. The probability of damage or loss is **possible**, because the identified NFS road prisms are expected to receive increased overland flow and accelerated erosion concentrating on route segments downslope from areas burned at moderate and high severity. The magnitude of consequences is **major** due to the relatively steep burned slopes. Increased runoff could lead to failure of these road segments, which could constitute



a loss of Forest Service infrastructure and increased sediment delivery to streams downslope. The resulting risk is **high**.

- BAER funds are requested to treat these risks (*Treatment RD-1*).

BAER recommends that roads on adjacent lands managed by private and counties also be evaluated for risk from flooding and debris flows, and hazard trees.

- *NFS Trails*

Of the 4.8 miles of trails burned in the burn areas, approximately 1.1 miles of trails are affected by high and moderate severity and projected runoff. The probability of damage or loss is **likely**, as post-fire increases in run off from these slopes onto the trail may influence trail integrity from erosion and sedimentation, and loss of drainage function. The magnitude of consequences is **moderate**. The trail systems host a substantial Forest Service investment that could be altered or lost by erosion of the trail prism. Due to the relatively high angle of the burned slopes, the magnitude is expected to be considerable. The resulting risk is **high**.

- BAER funds are requested to treat these risks (*Treatment TR-1*).

### 3. Natural Resources:

- *Recovery of Native Vegetation - Fire Suppression Activities*

During fire suppression, 88.5 miles of dozer line were constructed on National Forest System lands alone (totals for the entire incident are higher); 80.4 miles were located on the Klamath NF and 8.1 on the Six Rivers NF. These constructed areas serve as invasive plant seed dispersal corridors for spread. The spread and introduction of invasive and noxious plants into areas disturbed by suppression impacts (dozer lines, hand lines, drop points, helispots, etc.) pose a threat to native and naturalized plant communities. The probability of damage or loss is **likely** because areas of exposed soil due to fire suppression activities are susceptible to plant invasion and spread. The introduction and dispersal via heavy equipment of invasive plants into areas disturbed by fire suppression and suppression repair activities will result in the establishment of large and persistent non-native populations. Where firelines were constructed through existing invasive plant infestations there is little doubt that infestations were spread beyond their pre-fire footprint. Because invasive plants are opportunistic, without treatment they will rapidly increase in the burn area due to mechanical soil disturbance and their release from competition with native plant species along freshly cleared firelines. The magnitude of consequences is **moderate**. Introduction and expansion of weeds can suppress native vegetation recovery and lead to a loss of native and naturalized plant communities. The resulting risk is **high**.

- BAER funds are requested to treat these risks (*Treatments LD-1*).

- *Recovery of Native Vegetation - Non-Suppression Activities (BAER-Specific)*

There is a threat of spread of invasive plants due to fire especially in high and moderate soil burn severity areas near known infestations and adjacent to transportation system within the burned area. There are approximately 78.0 mapped acres of existing invasive plant populations. The spread of existing populations is a direct threat to the recovery of native vegetation at risk of recovery. The probability of damage or loss is considered **likely**, as there was known presence of invasive populations in the moderate or high soil burn severity, which is extremely vulnerable to colonization of invasives. The magnitude of consequences is **moderate**, because spread and establishment of invasive weeds could have long-term

- negative effects on re-establishment of native vegetation that protects the extremely steep slopes of the Happy Camp Complex. Forest Service direction seeks to minimize the establishment of non-native invasive species to prevent unacceptable habitat degradation of burned areas, while allowing for the recovery of the native plant community. The resulting risk is **high**.
- BAER funds are requested to treat these risks (*Treatments LD-2*).
- *Natural Resources Soil Productivity*  
Soil productivity in the post fire environment are threatened by the loss of organic soil cover, elevated inherent erosion hazard, and potential for debris flows from steep slopes having high and moderate SBS. The probability of damage or loss is considered **unlikely soil productivity** based on moderate soil burn severity patches have high potential for leaf and needle drop producing soil cover. Erosion and sedimentation will occur with smaller storm events (such as the 2 year), but widespread damage to soil from erosion is mostly possible in larger storms (~20% chance). The magnitude of consequences is **moderate**. Topsoil loss and loss of soil productivity affects ecosystem function. Areas that burned at high and moderate soil burn severity, are relatively small portion of the fires and are in smaller patch sizes. The resulting risk is **low**.
    - BAER funds are NOT requested to treat these risks. Natural Recovery is recommended.
  - *Natural Resources Water Quality*  
Water Quality in the post fire environment are threatened by the loss of organic soil cover, elevated inherent erosion hazard, and potential for debris flows from steep slopes having high and moderate SBS. The probability of damage or loss is **likely** because the area receives moderate to high precipitation and the burned area contains steep slopes that received moderate SBS. Water repellent soil was common across, but its distribution across the landscape was highly variable. The water repellent soil layer was found across soil burn severities including unburned. The magnitude of consequences is **minor**. There are limited water diversions or intake structures known for municipal and ag supply within NFS lands. Altered water quality should be short-term, and prevalent primarily during storm events. The resulting risk is **low**.
    - BAER funds are NOT requested to treat these risks. Natural Recovery is recommended.
  - *Threatened and Endangered Species, (Coho salmon and Designated Critical Habitat)*  
The values at risk assessed were coho salmon, designated critical habitat and the post fire effects on fish populations in Klamath River, Scott River (Head Fire), Swillup and Dillon Creek (Elliot Fire) and Elk Creek (UFISH Fire). All these systems provide important spawning and rearing habitat for coho salmon.

Post-fire threats to coho salmon habitat includes compromised water quality, increased solar radiation and water temperature due to reduced riparian cover. Additional concerns include increased sedimentation, loss of large woody material and changes in streambed/pool habitat due to geomorphic movement (e.g., debris flows). The probability of damage or loss to fish habitat is **possible**, for Elk Creek (UFISH Fire), Dillon Creek, and Swillup Creek (Elliot Fire) and **likely** in the Scott River and Klamath River, given the amount of moderate and

high soil burn severity observed inside the perimeter of the Head Fire. These combined impacts may lead to high turbidity events and short-term alteration of suitable stream habitat in the Scott River and Klamath River. The magnitude of consequences is **minor** (recoverable and localized) for Elk Creek, Dillon Creek, and Swillup Creek. The magnitude of consequences is **moderate** (considerable or long term) for Scott River and Klamath River.

The intact and functioning riparian vegetation observed across the Happy Camp Complex will help alleviate some of the sedimentation, ash run-off and debris flow coming from the headwaters and hill slopes. Recovery of the stream channels will not take place until fine sediment loads move through these systems, and pool-riffle-run sequences are recreated through the return of complex substrates, and sufficient riparian cover to reduce water temperatures and provide sufficient allochthonous input for fish prey (e.g., shredders and detritivores) including the return of a diverse food web. The degree of sediment loading to streams affected by the Happy Camp Complex largely depends on the frequency, duration, and timing of ensuing rain events. Considering the complexity of potential responses of stream communities post-fire, coupled with the likelihood of a future rain event and some level of sediment delivery to the drainages analyzed, it is difficult to provide precise management guidance and must rely on probabilities.

The headwaters in high and moderate burn severity in the Head Fire are expected to take longer for recovery, but it is not irreversible and is expected to comeback. These local impacts include reduced habitat quality for coho salmon from increased sediment flow directly into these mainstem channels as well as from tributaries affected by the Happy Camp Complex. The resulting risk is **low** for Elk Creek, Dillon Creek, and Swillup Creek and **high** for the Scott River and Klamath River inside the Head Fire perimeter.

- BAER funds are NOT requested to treat these risks. However, road treatments (*Treatment RD-1*) will reduce sedimentation into designated critical habitat for coho salmon. Natural Recovery is recommended.

#### 4. Cultural and Heritage Resources:

- *Damage to sites from Hazardous Trees, Erosion, Sedimentation and Looting.* Eligible or unevaluated archaeological sites for listing on the National Register of Historic Places (NRHP) were located within the Happy Camp Fire perimeter. There is a threat of damage, loss of historic context and contents due to hazardous trees falling on cultural resources, potential erosion, sedimentation, or looting. However, the probability of damage or loss is **unlikely**. Four out of five sites assessed generally low to moderate burning through the site. One site had moderate to high burning through the sites and is susceptible to potential looting due to its location adjacent to a county road and private property, however the potential of looting may not be related to the fire. In consultation with BAER geologist and soil scientists, the likelihood of erosion or sedimentation of all sites assessed is minimal due to their location within the burned area and the nature of soil profile which is generally rocky. Likewise, the potential hazardous tree displacement was not observed.

The magnitude of consequences is **major**. In most cases, damage to cultural resource sites represents an irretrievable loss of traces of the past. Cultural resources are non-renewable. Damaged infrastructure degrades the meaning of historic sites and features and their potential to provide important information about the past to this and future generations. The resulting risk is **intermediate**.



- BAER funds are NOT requested to treat these risks. Natural Recovery is recommended.

**B. Emergency Treatment Objectives:**

- Mitigate and protect, to the extent possible, threats to personal injury or human life of forest visitors and Forest Service employees by raising awareness through posting hazard warning signs on roads and trails, reinforcing road and trail tread, improving road and trail drainage and stream crossings, and communicate hazard of landslides, flooding, and debris flows. Communicate to cooperating agencies and community groups.
- Protect Forest Service employees and the public from exposure to hazardous material contamination created or exposed by the fire and minimize environmental impacts to downstream surface water which may require emergency stabilization treatment measures.
- Protect or minimize potential post-fire impacts to the Coho Salmon and designated critical habitat.
- Protect or minimize damage to NFS investments in roads and trail infrastructure by installing drainage features capable of withstanding potential increased stream flows and/or debris flows. Minimize damage to key NFS travel routes.
- Protect or mitigate potential post-fire impacts to critical cultural resources within the burned area.
- Treat invasive plants that are a threat to native and 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 the fire and fire suppression activities.
- Assist cooperators, other local, State, and Federal agencies with the interpretation of the assessment findings to identify potential post-fire impacts to communities and residences, domestic water supplies, public utilities and other infrastructure.

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

\*Land 100 % Channel na % Roads/Trails 90 % Protection/Safety 100 %

\*EDRR treatments would be conducted in the spring/summer 2024.

**D. Probability of Treatment Success**

*Probability of Treatment Success*

	1 year after treatment	3 years after treatment	5 years after treatment
Land	80	50	35
Channel	N/A	N/A	N/A
Roads/Trails	80	85	95
Protection/Safety	85	95	100

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

**Human Health and Safety:** Human Life and Safety do not have a market value, but an injury provides a substantial benefit/cost ratio.

**Property:** The cost to rebuild sections of the road after they are washed out, eroded, or buried includes estimates to bring in material to build up the damaged roads. The cost of not completing 1.96 miles of drainage restoration and 4.15 miles of Storm Patrol provides at least a 1.91 benefit/cost ratio, assuming a 20% probability of loss. This does not include the lost value to project management, fire suppression, recreation, and habitat stability of Coho Salmon and designated critical habitat.

The cost to rebuild sections of the trail after they are washed out, eroded, or buried includes estimates to bring in material to build up the damaged trails. The cost of not completing 1 mile of drainage restoration provides at least a 11.6 benefit/cost ratio, assuming a 20% probability of loss. This does not include the lost value to project management, fire suppression, and recreation.

**Land Treatments - Native and Naturalized Plant Communities:** Treating invasive plants once they become established would be high in ecological and economic damage. As such, the benefit/cost ratio exceeds 17%, (considering loss).

**F. Skills Represented on Burned-Area Survey Team:**

- Soils                                       Hydrology                       Engineering                       GIS                       Archaeology
- Weeds     Recreation/Trails               Fisheries                       Wildlife
- Mines & Hazmat

**Team Leader(s):** Kendal Young & Brian Hansen

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**Forest BAER Coordinator(s):** William Wall

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**Team Members:** *BAER Team Members by Skill*

<b>Skill</b>	<b>Team Member Name</b>
<i>Team Lead(s)</i>	Kendal Young Brian Hansen
<i>Soils</i>	Jason Jimenez
<i>Hydrology</i>	Luke Rutton Oswaldo Angulo Hilda Kwan
<i>Geology</i>	Victoria Stempniewicz
<i>Engineering</i>	Samual Marano Madison Foster
<i>GIS</i>	Mariah Blackhorse Allison Bruner
<i>Archaeology</i>	Doreen Hrivnak
<i>Botany/Weeds</i>	John Mcrae Erin Lonergan
<i>Recreation</i>	Jennifer Womack
<i>Aquatics</i>	Dan Teater
<i>Logistics/Admin/PIO</i>	Meagan Carter Cathleen Thompson

Skill	Team Member Name
<i>Agency Administrator Rep.</i>	Jason Roesner

## Treatment Narrative:

### Human Health and Safety:

#### Entering Burn Area Warning Signs

“Entering Burned Area” signs are needed to alert the public of possible threats to their life and safety that exist within or downstream of a burned area. The signs contain language specifying items to be aware of when entering a burn area such as falling trees and limbs, rolling rocks, and flash floods. Signs are placed in entry points that are expected to receive high use, either around residential areas or popular roads used for recreation. Signs will be removed once hazards are mitigated. Costs include installation.

### Property:

#### Roads Treatments:

Treatments considered for the transportation system include natural recovery, cleaning of existing road drainage structures, reshaping the crown of the road, and preparing ditches for increased runoff. Implementation of road packages (see engineering report) will be completed by on-forest engineers, CORs, and road crew (as capacity exists). Request includes overtime to support these resources and additional funding for any contracted work.

#### Trail Treatments:

Storm proof trail system in high and moderate burn severity classes where slopes can concentrate runoff onto the trail prism. Storm proofing includes creating run off ditches, water bars and removing side bars where needed (see Recreation report for implementation strategies).

### Land Treatments:

Native and Naturalized Plant Communities: Invasive plant surveys will begin in 2024 during the flowering periods of weed species. Because of differences in flowering times for all potential species, two visits during the growing season are normally required, although the funding requested does not support this. Early Detection/Rapid Response (EDRR) surveys along suppression lines, suppression disturbance sites.

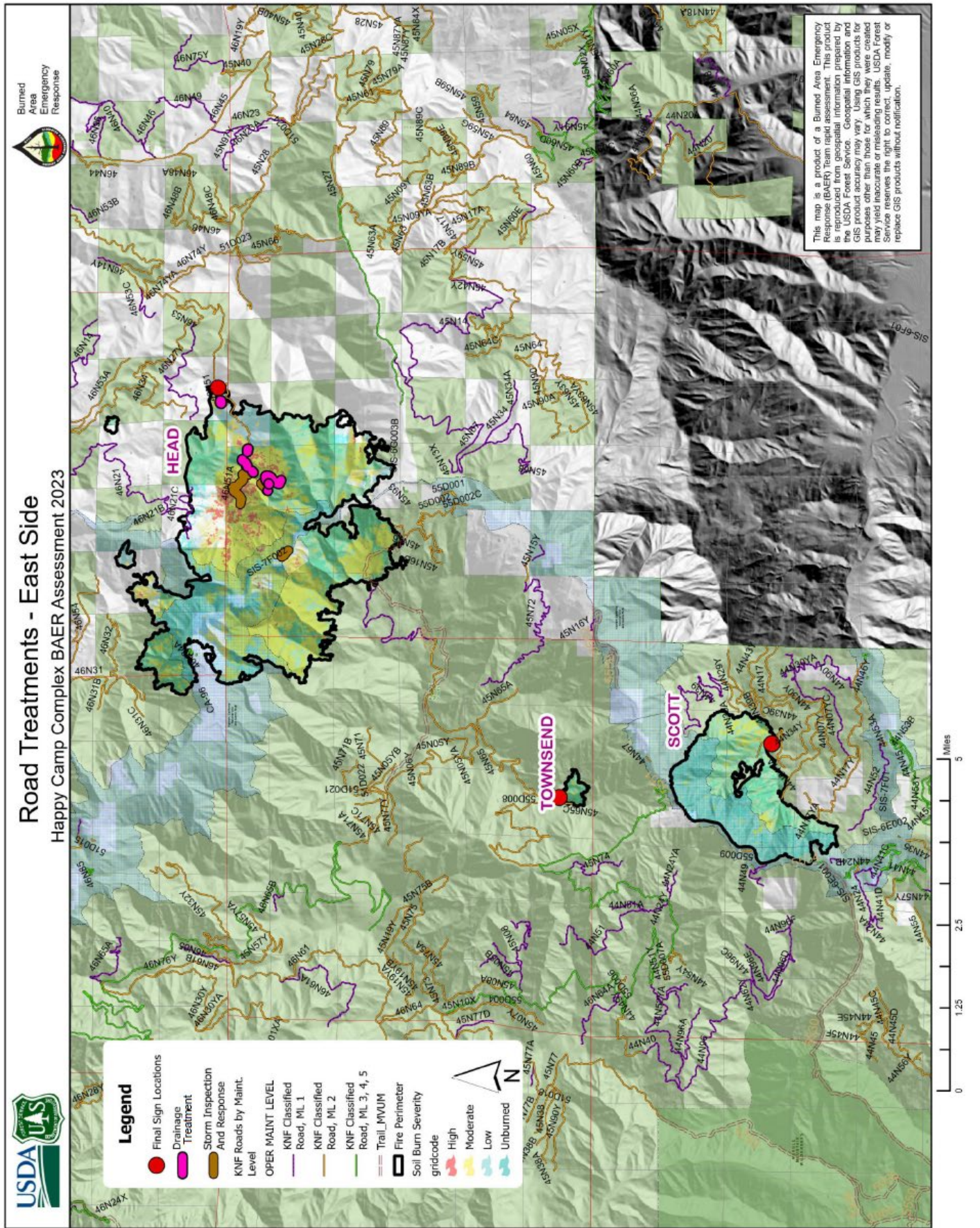
EDRR surveys would occur within moderate and high soil burn severity in close proximity to known invasive plant populations, as described in the critical value. The goal is to restrict known populations from expanding. The weed risk to native plant community recovery can be mitigated at low cost by implementing EDRR within the first year after the fire. New, small weed infestations located during EDRR surveys would be manually treated upon discovery. Existing infestations found to be expanding due to the fire or fire suppression activities would be re-mapped and evaluated for treatment.

**Channel Treatments:** None

## I. Monitoring Narrative: N/A



# Happy Camp Complex BAER Treatment Maps

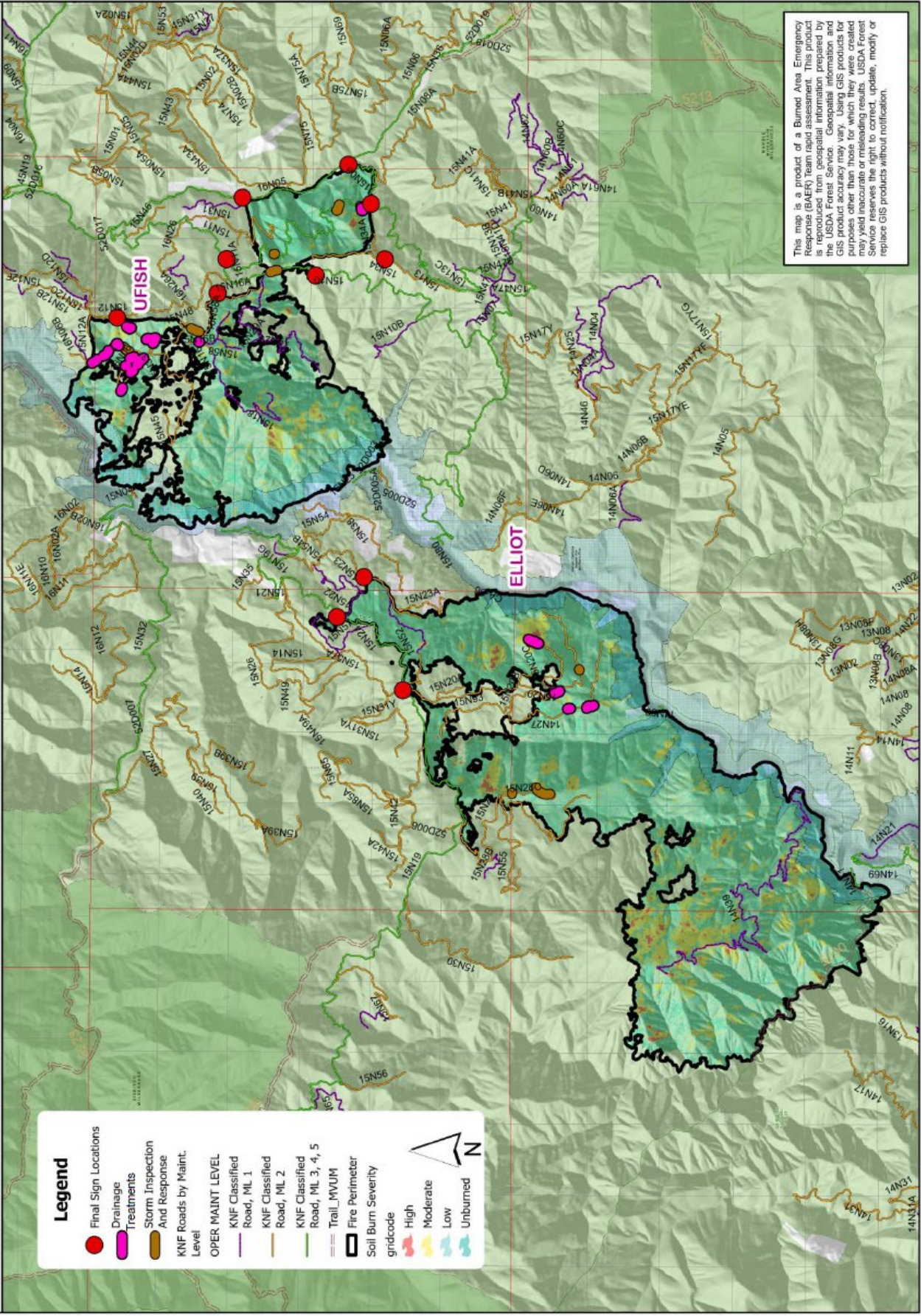




# Happy Camp Complex BAER Treatment Maps



## Road Treatments - West Side Happy Camp Complex BAER Assessment 2023



**Legend**

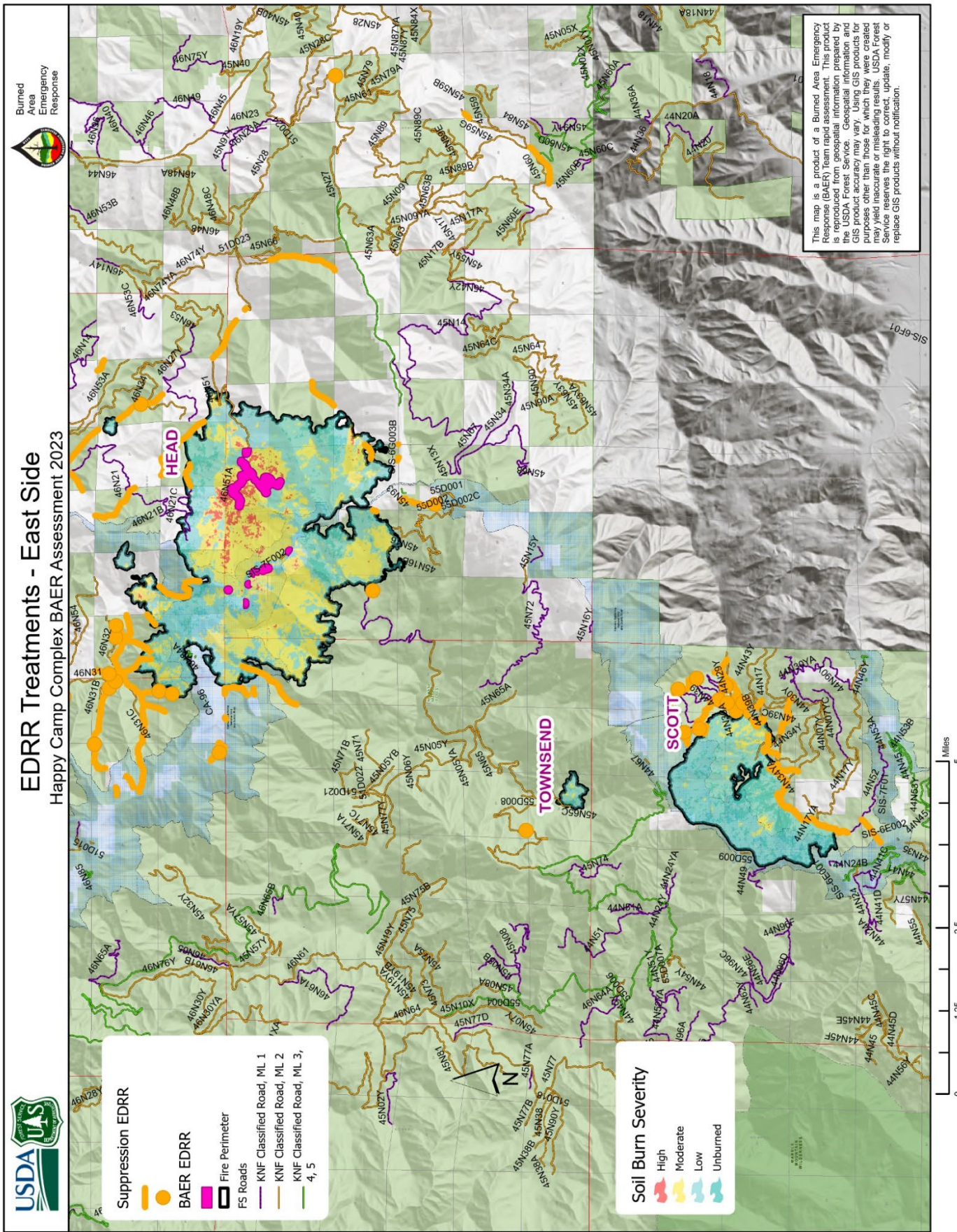
- Final Sign Locations
- Drainage
- Treatments
- Storm Inspection And Response
- KNF Roads by Maint. Level
- OPER MAINT LEVEL
- KNF Classified Road, ML 1
- KNF Classified Road, ML 2
- KNF Classified Road, ML 3, 4, 5
- Trail\_MVUM
- Fire Perimeter
- Soil Burn Severity gridcode
- High
- Moderate
- Low
- Unburned

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# Happy Camp Complex BAER Treatment Maps





# Happy Camp Complex BAER Treatment Maps

