

Carr Fire
2018
BURNED AREA
EMERGENCY RESPONSE PLAN

Redding Field Office BLM

Whiskeytown NRA NPS

...

Shasta-Trinity National Forest



Burned Area Emergency Response Plan

2018 CARR BAER

Table of Contents

Table of Contents	0
Administrative information.....	1
Executive Summary.....	3
Assessments.....	10
Summary of Treatments.....	95
Specifications.....	100
Appendix I – Delegation of Authority.....	308
Appendix II – Environmental Compliance.....	317
Appendix III – Photos	328
Appendix IV – Maps.....	360

BURNED AREA EMERGENCY RESPONSE PLAN

2018 CARR BAER

FIRE LOCATION AND BACKGROUND INFORMATION

Fire Name	Carr BAER
Fire Number	CA-WNP-001228
Agency Unit	Redding Field Office, Whiskeytown NRA, Shasta Trinity NF.
Region	BLM, California NPS, Pacific West USFS, #5
State	California
County	Shasta and Trinity
Ignition Date/Manner	7/23/18
Acres NPS	130,000
Date Contained	Unknown
Date Controlled	Unknown

NATURE OF PLAN

I. Type of Plan (check one box below)

<input checked="" type="checkbox"/>	Short-term Emergency Stabilization Plan
<input type="checkbox"/>	Long-term Rehabilitation
<input type="checkbox"/>	Both Long and Short-term Rehabilitation

II. Type of Action (Check One box below)

<input checked="" type="checkbox"/>	Initial Submission
<input type="checkbox"/>	Updating Or Revising The Initial Submission
<input type="checkbox"/>	Supplying Information For Accomplishment To Date On Work Underway
<input type="checkbox"/>	Final Report (To Comply With The Closure Of The EFR Account)

EMERGENCY STABILIZATION OBJECTIVES

- **Determine need for and to prescribe and implement emergency treatments**
- **Minimize Threats to Human Life, Safety, and Property**
- **Identify Threats to Critical Cultural & Natural Resources**
- **Promptly Stabilize and Prevent Unacceptable Degradation to Resources**

TEAM ORGANIZATION

BAER TEAM MEMBERS

POSITION	TEAM MEMBER / AFFILIATION
Team Leader	Chris Holbeck, NPS
Team Advisor, NIFC	Rich Schwab NPS, Doug Havlina BLM
Vegetation	Kerry Johnston BLM, Mike Dolan AD,
Hydrologist	Rich Pyzik USFS, Allison Reddington USFS, Sydney Post BLM,
Geologist	Sam Flanagan, BLM
Soil Science	Bill Sims AD
Cultural Resources	Carla Burnside USFWS, Devin Snyder BLM, Joe Svinerich NPS, Ashley Phillips NPS, Mike Peterson NPS
GIS	Richard Easterbrook, FWS Lorri Peltz-Lewis USFS
Forestry	Eric Rhodenbaugh BIA, Zak Stewart BLM
Recreation	Jack Oelfke, NPS
AML	Jeremy Stolfus, NPS

**CARR FIRE
BURNED AREA EMERGENCY RESPONSE PLAN
EXECUTIVE SUMMARY**

**Bureau of Land Management, Redding Field Office
National Park Service, Whiskeytown National Recreation Area
USDA Forest Service, Shasta-Trinity National Forest
August 2018**

Purpose and Policy

This Burned Area Emergency Response (BAER) Plan is for lands in the Bureau of Land Management (BLM) Redding Field Office, National Park Service (NPS) Whiskeytown National Recreation Area (NRA), and United States Forest Service (USFS) Shasta-Trinity National Forest affected by the Carr Fire. Following completion of this plan, the BLM will create an implementation plan and request funding through an Emergency Stabilization and Rehabilitation (ESR) Plan. The US Forest Service will request funding through a 2500-8 form. The National Park Service will request funding through this BAER assessment. This plan complies with federal requirements and policies which include the Department of Interior Departmental Manual (620 DM 7), the USFS Forest Service Manual (FSM 2500), and agency specific handbooks and orders.

Fire History and Behavior

The Carr Fire began July 23, 2018 at approximately 1:15 pm from a suspected vehicle mechanical failure. The fire origin was within Whiskeytown NRA, and spread to lands administered by the BLM and USFS in subsequent days. Extreme fire behavior occurred on July 28 and 29, when the fire burned to the east into Redding, California, driven by strong winds and plume dominated fire behavior. The Carr Fire destroyed 1,079 residences, 22 commercial structures, and 503 outbuildings, and damaged an additional 277 structures. The fire was managed under Unified Command between CAL FIRE, the Shasta-Trinity National Forest, and Whiskeytown NRA. At the time of plan development, the fire had covered 229,651 acres (63,000 acres BLM, 39,000 acres NPS, 30,000 acres USFS, 400 acres State, and 93,726 acres private). Containment is estimated to occur on or about 9/1/18.

The Carr Fire burned across wide ecological gradients, and through previous fire scars from the 2004 French Fire, 2008 Motion Fire, and 2008 Whiskeytown Complex. These previously burned footprints were dominated by shrub communities which largely experienced stand replacement in the Carr Fire. Plant communities affected by the fire include chaparral fields (e.g., manzanita, ceanothus, chamise); gray pine/knobcone pine/oak forests; mixed conifer forests; and upper montane forests at the highest elevations. The fire area was dominated by low and moderate soil burn severity and vegetation mortality. Fire behavior moderated when previous fuels treatments were intersected, particularly in mixed conifer forest communities. Specialist reports in this assessment describe observed and expected fire effects.

NPS/BLM Burned Area Emergency Response Team Call Out

Discussions for a BAER team deployment began on July 28, 2018, as Interior BAER coordinators began dialogue with leadership from Whiskeytown NRA and the Redding Field Office. Chris Holbeck of the NPS was selected as team leader, and deployed his team August 12. The Secretaries of Interior and Agriculture toured the fire area on Monday, August 12 and met with DOI employees affected by the Carr Fire. BAER in-briefings with BLM, NPS, and USFS leadership occurred on August 13 and 14. Following the in-briefings, values at risk and issues of concern were identified with staff from these agencies. Preliminary BAER values at risk related to watershed integrity, abandoned mines, historic structures, cultural resource sites, roads, trails, culverts, bridges, campgrounds, hazard trees, and exotic plants. Throughout the assignment, the BAER Team also interfaced with parallel efforts such as CalFire's Watershed Emergency Response Team (WERT) assessment and an NPS All Hazard Incident Management Team.

Mid-assignment briefings were held with BLM and NPS staff on August 24, 2018. The close-out was conducted on August 28, 2018.

Values at Risk

Specific critical values at risk initially identified by **BLM staff** included:

- Off Highway Vehicle Trails (signs, bridges, hazard trees)
- Foot Trails (signs, bridges, hazard trees)
- Vegetation, Exotic Plants
- Abandoned Mine Lands (damage, safety)
- Washington Mine
- OHV Access (unwanted)
- Archaeological Sites
- Roads/Culverts/Bridges
- Cultural Resource Site Looting
- Historic Structures
- Pioneer Baby Grave
- Grass Valley Sediment Basin
- Swasey Sediment Basin
- Shooting Range
- Amphitheater
- Deadwood Creek
- Wilderness
- Rock Creek Culvert Railroad
- French Fry Trails
- Iron Mountain Sedimentation Basins, Shooting Basins

Specific critical values at risk initially identified by **NPS staff** included:

- Brandy Creek
- Boulder Creek
- Tower House District
- Oak Bottom Campground
- Foot Trails
- Campsites
- NEED Camp
- Potable Water
- Vegetation, Exotic Plants
- Whiskey Creek Culvert
- Hazard Trees
- Cultural Resource Site Looting
- Abandoned Mine Lands
- Historic Structures
- Archaeological Sites
- Roads, culverts, bridges
- Mineral Springs and Sediment
- Landslides

Specific critical values at risk initially identified by **USFS staff** included:

- Vegetation, Exotic Plants
- Roads
- Camp Sites
- Trails
- Archaeological Sites

These values, and others, are discussed in the assessment sections of this plan. Values at Risk are further identified and refined as the BAER team works its way through the assessment process and business model.

BAER Business Model

BAER teams conduct rapid assessments in order to first identify values at risk and then prescribe emergency stabilization measures. BAER teams follow a four step business model, consisting of:

- Issues
- Observations
- Findings (Assessments)
- Recommendations (Specifications)

Primary Recommendations

Full descriptions of treatment recommendations and specifications are found in this plan. Following are specification topics identified by agencies during issue identification.

BUREAU OF LAND MANAGEMENT, Redding Field Office

Emergency Stabilization Funding Subactivity

- Archaeological Site Protection Patrols
- Archaeological Site Condition Assessments
- Historic Property Stabilization Assessments
- Previously Assessed Historic Property Stabilizations
- Cultural Resource Compliance
- Kett Ethnographic Site Stabilization
- Charley Brownstein Grave Stabilization
- Abandoned Mine Lands Mine Safety Mitigation
- Trail, Bridges, Culverts Opening
- Proactive Hazard Tree Mitigation
- Trail Sign Installation and Replacement
- Repair Minor Facilities – Shooting Range
- Invasive Species – Early Detection, Rapid Response
- Catchment Basin Cleanout
- Conduct Storm Patrol
- Culvert Cleanout – Pre-storm
- Hazard/Warning Signs

Burn Area Rehabilitation Funding Subactivity

- Out-year Increased Trail Maintenance

- Continued Hazard Tree Abatement
- Repair Minor Facilities - Amphitheater
- Invasive Species – Early Detection, Rapid Response
- Abandoned Mine Lands Mine Safety Mitigation

NATIONAL PARK SERVICE, Whiskeytown NRA

Emergency Stabilization Funding Subactivity

- Historic Blacksmith Shop Stabilization
- Historic El Dorado Mine Stabilization
- Historic Redwood Tank Dismantle and Storage
- Historic Stonehouse Stabilization
- Archaeological Site Protection Patrols
- Archaeological Site Condition Assessments
- Historic Crystal Creek Ditch Stabilization
- Previously Assessed Historic Property Stabilizations
- Cultural Resource Compliance
- Abandoned Mine Lands Mine Safety Mitigation
- Trail bridges, beaches, sinkholes, opening, culverts
- Hazard Tree – Proactive Mitigation
- Hazard Tree - Surveillance
- Sign Replacement, Repair
- Repair, replace minor facilities (kiosks, toilets)
- Culvert cleanout (pre-storm)
- Conduct storm patrol
- Hazard/Warning Signs
- Structure Protection
- Potable Water Source Protection
- Engineering Evaluation – Boulder Creek
- Invasive Species Early Detection, Rapid Response

Burned Area Rehabilitation Funding Subactivity

- Repair, replace minor facilities (picnic tables, interpretive panels)
- Invasive Species Early Detection, Rapid Response
- Out-year Increased Trail Maintenance
- Continued Hazard Tree Abatement
- Abandoned Mine Lands Mine Safety Mitigation

US FOREST SERVICE, Shasta-Trinity National Forest

Emergency Stabilization and Rehabilitation Subactivity

- Invasive Species – Early Detection, Rapid Response
- Conduct Storm Patrols
- Culvert Cleanout – Pre-storm
- Hazard/Warning Signs

Recommendations for Heritage Site stabilizations will be recommended to the USFS after site assessments have been completed by DOI BAER Team members.

Burned Area Rehabilitation Subactivity

- Invasive Species – Early Detection, Rapid Response

BURNED AREA EMERGENCY STABILIZATION PLAN

CARR FIRE

WATERSHED RESOURCE ASSESSMENT

OBJECTIVES

- Assess overall soil and watershed changes caused by the fire on federal lands managed by the National Park Service, Bureau of Land Management, and U.S. Forest Service, particularly those that pose substantial threats to human life and property, and critical natural and cultural resources. This includes evaluating changes to soil conditions, hydrologic function, and watershed response to precipitation events
- Identify potential flood and erosion source areas and sediment deposition areas
- Identify potential threats to life, property, and critical natural and cultural resources in relation to flooding, debris flows, erosion, and sediment deposition
- Develop treatment recommendations, if necessary
- Identify future monitoring needs, if necessary

ISSUES

- Risks to human life and property from floods and debris flows within and downstream of the Carr Fire
- Risks to domestic and hydropower water supply due to post-fire watershed conditions
- Risks to critical natural and cultural resources including historic and prehistoric cultural resources

OBSERVATIONS

Background

The purpose of a burned area assessment is to determine potential values at risk resulting from post-fire emergency watershed conditions. Identification of values at risk occurs through consultation with individuals, state and federal agencies, and through field investigation. Not all values initially identified are determined to be at risk. If emergency watershed conditions are found, and values at risk are identified and confirmed, then the magnitude and scope of the emergency is mapped and described, values at risk and resources to be protected are analyzed, and treatment prescriptions are developed to protect values at risk. The most significant factor leading to emergency watershed conditions is loss of ground cover, which leads to erosion and

changes in hillslope hydrologic function in the form of decreased infiltration and increased runoff. Such conditions lead to increased flooding, sedimentation and deterioration of soil condition. Values at risk are human life, property, and critical natural and cultural resources located within or downstream of the fire that may be subject to damage from flooding, ash, mud and debris deposition, and hillslope erosion. The CalFire Watershed Emergency Response Team (WERT) report discusses issues on state, county and private lands. The WERT report should be referred to for hazards to state, county and local infrastructure and facilities as well as private lands within the burned area.

Physiography/Geology/Climate

Climate

Rainfall in the watershed is seasonal and varies considerably with elevation. Summers are hot and dry and winters are cool with moderate to heavy rainfall, depending on elevation. Average annual precipitation ranges from 39 inches near Redding, approximately 63 inches at Whiskeytown Lake and over 85 inches in the highest elevations of the burned area. Roughly 80% of the total precipitation falls in the six month period between November and April. To emphasize the variation in rainfall precipitation depths for the area, a good example is provided by the January, 1997 storm. In Redding, 9-day precipitation was 5.3 inches. Approximately 10 miles to the north at Shasta Dam, the 9-day total was 20 inches. Furthermore, several personnel contacted during the assessment process indicated the presence of an atmospheric “convergence zone” which manifests as a relatively stationary band of heavy showers that can occur over the southern portion of the burned area.

Storms of several days in duration and moderate to high intensity come in from the Gulf of Alaska. Summer thunderstorms come from the south and occur 1 or 2 days per month in the summertime. Snowfalls at Whiskeytown Lake have been measured during the months of November through March; annual average total snowfall at Whiskeytown Lake is 4.1 inches. Although no specific data exist on snowfalls in the higher elevations of the upper watershed, snowfalls are routine during the winter months and snow often remains on the uppermost peaks well into June.

A typical winter storm event in the area of French Gulch consists of a 2 to 3 day storm event quickly followed by a 1 to 2 day storm event. Under such conditions soils become saturated during the first event and during the second event infiltration quickly exceeds runoff resulting in flooding of the area.

Geology and Physiography

The underlying rock types and resulting landforms are a key factor in the watershed response following fire. Extensively weathered bedrock units and weak rock types can experience increased erosion rates due to removal of vegetative cover and changes in soil properties in higher burn severity areas (i.e., hydrophobic soils). Additionally, the presence of faults and other structural features can have significant influences on landform processes in specific areas.

The principal geologic bedrock units that underlie the Carr Fire range in age from 400 million years (Devonian) to 138 million years (Cretaceous). Smaller bodies of extrusive igneous, metamorphosed sedimentary rock, and younger (Neogene) sedimentary rocks occur within the

burn perimeter. The dominant bedrock units are summarized from Fraticelli *et al.*, (2012) and Lapierre *et al.* (1995). To simplify the display of the principal geologic units described below, several of the smaller units within the burned area are combined on the accompanying geologic map in order. Similarly, we also simplify some of the lithologic and geochemical descriptions for these rock units.

Mule Mountain Stock (Devonian) is a highly altered granitic intrusion. Within the burned area, Mule Mountain Stock underlies portions of the southeast burned area near Whiskeytown Dam. In outcrop, it appears as relatively competent rock forming relatively stable landforms. Enhanced weathering is present along dikes cross cutting the area and may result in localized elevated erosion potential.

The Shasta Bally (Lower Cretaceous) is a highly weathered quartz diorite and granodiorite surrounding Shasta Bally peak and extends west into the watershed encompassing much of the Deadwood Creek watershed and the headwaters of Grass Valley Creek. The highly weathered rock results into extremely erodible soils subject to elevated surface erosion rates. In steep, confined drainages, eroding debris may continue down channels forming debris flows. The steep drainages originating off the Shasta Bally south of Whiskeytown Lake show abundant evidence of debris flow activity. Major drainages such as Paige Boulder Creek, Brandy Creek, and Boulder Creek contain large debris flow deposits near tributary confluences and along lower gradient reaches nearer the lake.

Copley Greenstone (Devonian) is a volcanic sequence of a basalt–andesite series. All the rocks are metamorphosed to the greenschist facies. The Copley Greenstone consists of massive flows and pyroclastic deposits in the lower part that are overlain by pillow lavas. No sediments are interlayered in the volcanic pile except in the easternmost outcrop area, where sandstones with granitic debris and shaly tuffs are interbedded in the uppermost flows (Lapierre *et al.* 1985). In outcrop, Copley Greenstone appears relatively resistant with localized weathering and fracturing resulting in areas of enhanced erosion. In steeper drainages, smaller debris flow deposits are evident at the mouths of drainages.

The Bragdon formation (Mississippian) is a dark-gray to black shale, mudstone, and siltstone in the lower part; siliceous sandstone, grits, and chert conglomerate prominently interlayered with dark pelitic rocks in middle and upper parts; some tuffaceous beds near top of formation seem to be conformable with and gradational into the overlying Baird Formation. The abundant chert in the conglomerate is of unknown source. In outcrop, the Bragdon is highly bedded, readily fracturing and prone to enhanced rockfall onto road surfaces. Evidence of debris flow activity across the Bragdon is present on steeper drainages. An abundance of fractured, platy material is of concern where it delivers to small channels above roads and culverts. Larger debris deposits are present on private lands along upper Clear Creek where small, steep channels enter the valley. The WERT report discusses these areas in more detail as they relate to state, county, local and private landowner issues.

Soil

The majority of the soils within the burn area are highly erosive due to the coarse and sandy surface textures associated with steep slopes. The soils found in the South Folk Mountain area,

especially around the Shasta Bally peak are very prone to extreme erosion due to the Cretaceous Shasta Bally Batholith parent material, (decomposed granite). Soils formed from this geological parent material are prone to form debris flows under extreme rain events. Other soils found in the Mad Mule and Trinity Mountains have more soil development, but still have a high erosion potential. These soils produce more mud flow events than debris flows during above normal high intensity rain events.

Hydrology/Water Quality

Flows on unregulated streams in the burned area are characteristic of the Mediterranean climate of Northern California, with highest discharge during the wet, winter months and lower discharge during the summer and fall months. Flows on Clear Creek were measured downstream of French Gulch between 1950 and 1993. Mean monthly discharge in upper Clear Creek during a normal year was less than 600 CFS. The highest peak discharge measured over the forty three year record was 14,600 CFS in January 1974. Other large flow events occurred in the winters of 1954 and 1997. Both the 1954 and 1997 flow events blew out bridges at NEED Camp. The 1997 event also blew out the bridge over Boulder Creek on South Shore Drive and the bridge over Brandy Creek at Sheep Camp.

All of the large rivers in and around the burned area are regulated by the Central Valley Project. Altered hydrologic regimes and sediment supply in the Trinity and Sacramento rivers have been documented to be an area of concern regarding impacts to fisheries. No attempt to model fire effects to regulated watersheds was made. However, it should be noted that prior to the fire Deadwood Creek and Grass Valley Creek were delivering sediment loads to the Trinity River that exceeded the assimilation capacity of the regulated flows.

The Whiskeytown Dam regulates stream flows on Clear Creek. The reservoir formed by the Whiskeytown Dam, commonly referred to as Whiskeytown Lake, is the single largest hydrological feature in the watershed. Built by the Bureau of Reclamation (BOR) in 1962 as part of the Central Valley Project, Whiskeytown Lake stores approximately 240,000 acre-feet of water and has a surface area of approximately 3,220 acres. While the dam prevents the upstream migration of anadromous fish to historic spawning grounds located in the upper watershed, water quality and suspended sediments in releases from the dam can affect salmon and other aquatic resources downstream of the dam. Geologic, biologic and hydrologic characteristics upstream of the dam can also affect the storage potential in Whiskeytown Lake and hence the timing and magnitude of downstream flow releases, which have the potential to affect physical and biological conditions downstream of the dam.

The California Division of Water Resources monitors water quality in the area. Water quality concerns include coliform bacterial levels in waters downstream of septic systems used by private residences. Acid mine drainage is also of concern as there are several active and abandoned mines in the burned area.

Soil Burn Severity

Soil burn severity mapping is intended to reflect the degree of effects caused by the fire to soil characteristics that affect soil health and hydrologic function, and hence erosion rate, and runoff potential. It is not a map of vegetation consumption. In mapping soil burn severity, the team

evaluated field-observable parameters such as the amount and condition of surface litter and duff remaining, soil aggregate stability, amount and condition of fine and very fine roots remaining, and surface infiltration rate (water repellency). Water repellency was evaluated by observing the length of time a water drop remained beaded on the soil. If water repellency was present, the depth and thickness of this water repellent layer was also measured. Ash and soil color may also indicate how intense the heat was and how long it remained at a given place (residence time). These parameters are compared to similar soils under unburned conditions to estimate the degree of change caused by the fire.

While soil burn severity is not based primarily on fire effects to vegetation, the team used post-fire vegetative condition as one of the visual indicators in assessing soil burn severity. In some cases there may be complete consumption of vegetation by fire, with little effect on soil properties, such as in a shrub ecosystem. Dense vegetation, with a deeper litter and duff layer, results in longer heat residence time, hence more severe effects on soil properties. For example, deep ash after a fire usually indicates a deeper litter and duff layer prior to the fire, which generally supports longer residence times. This promotes loss of soil organic cover and organic matter which are important for erosion resistance, and the formation or exacerbation of water repellent layers at or near the soil surface. The results are increased potential for runoff and soil particle detachment and transport by water, wind, and gravity. This would be mapped as high soil burn severity.

Conversely, sparse or light pre-fire vegetation such as grasses or sparse shrubs usually have negligible litter layer and surface fuels and experience extremely rapid consumption and spread rates, with very little heat residence time at the soil surface. The result is very little alteration of soil organic matter and little or no change in soil structural stability. Water repellency, usually present under shrubs before the fire, may or may not be exacerbated by the fire. Areas between shrubs or grass crowns usually had very little fuel to burn, thus only experienced brief radiant heat as the flashy grasses and sparse shrubs burned. In these cases, soil burn severity would be low.

In between these extremes, the moderate class of soil burn severity is far more diverse in observed soil conditions and can include various vegetation types, ranging from forests to shrub communities. In the case of a forest, the litter layer may be largely consumed, but scorched needles and leaves remain in the canopy and will rapidly become mulch. This is important in re-establishing protective ground cover and soil organic matter. This factor can result in the classification of the area as moderate, rather than high. Generally, however, there will also be less destruction of soil organic matter, roots, and structure in an area mapped as moderate. In a shrub ecosystem, even where pre-fire canopy density was high, litter layer is generally thin, and while the shrub canopy may have been completely consumed by the fire, the soil structure, roots, and litter layer may remain intact beneath a thin ash layer. Above ground indicators such as size of unconsumed twigs remaining to help the team determine how long the heat may have persisted on the site. If only root stubs and large diameter twigs remain, it was likely a more intense fire with longer heat residence time, and combined with other observations of soil conditions may result in a call of high soil burn severity. More common in chaparral is a condition of remaining small diameter twigs, indicating a flashy fire with short residence time. Combined with other observations of soil conditions this usually resulted in a classification of

moderate soil burn severity even though the canopy was partially consumed.

Soil Erosion/Debris Flows

Soil erosion potential following a fire is generally increased over pre-fire potential. This is largely due to loss of soil cover (forbs, grass, leaf, and needle litter), surface horizon soil organic matter responsible for structural stability, and in some cases, increased water repellency at or near the soil surface. The amount of increase over pre-fire condition is related to the degree of soil changes. The degree of soil alteration influences the potential of post-fire soil erosion and debris flow process.

The factors most affected by fire are: 1) the amount of effective soil cover, 2) the inherent susceptibility to soil particle detachment by wind, water, or gravity (a function of soil texture and structural stability), and 3) the surface infiltration rate. Areas of high soil burn severity can be expected to show a larger increase in sediment production than an area of low soil burn severity due the concomitant decrease in soil cover, increase in susceptibility of soil particle detachment, and decrease in the infiltration capacity of the soil. It is important to understand pre-fire erosion behavior when assessing post-fire erosion, since some areas have water repellent surfaces and inherently high erosion potential even before the fire.

In more extreme cases, the combination of eroded materials, steep slopes and high rainfall rates can trigger destructive debris flows. Debris flows are water-laden masses of soil, vegetation and rock that rush down mountainsides, funnel into stream channels, entrain additional material in their paths, and form thick, fan-shaped deposits on valley floors. They generally have bulk densities comparable to those of rock avalanches and other types of landslides but due to widespread sediment liquefaction caused by high pore-fluid pressures, they can flow almost as fluidly as water. Debris flows can travel rapidly down steep channels, attaining speeds greater than 10 m/s (more than 20 mph), although some large flows can reach speeds that are much greater (Iverson 1997).

Watershed Response

Overland flow occurs as a result of rainfall that exceeds soil infiltration capacity and the storage capacity of depressions. On the unburned forest floor, overland flow is often absent, though when it does occur flow is forced to follow a myriad of interlinking paths that constantly change as organic material (litter and duff layers) and inorganic material (rock) are encountered. Consumption of the forest floor by fire alters the path of overland flow by reducing the overall length of the flow path, resulting in the concentration of flow into a shorter flow path. This concentration of overland flow increases the hydraulic energy of the flow and can result in rill erosion. At the watershed scale, the reduction of hillslope flow path lengths and the formation of rills that have a high water conveyance capacity reduce the times of concentration or the amount of time for overland flow to reach a defined point within the watershed.

Overland flow is also increased if there is an increase in water repellency (hydrophobicity) of the soils because of the fire. This can reduce infiltration and increase overland flow (runoff). Infiltration curves for water repellent soils reflect increasing wettability over time once the soil is placed in contact with water. Water repellency decreases (hence infiltration increases) with time as the substances responsible for hydrophobicity begin to break down, thereby increasing

wettability. In general, fire-induced hydrophobicity is broken up or is sufficiently washed away within one to two years after a fire. The thicker and deeper the water repellent layer, the longer it will take to dissipate. However, once soil cover and vegetative canopy begin to recover, this persistent water repellency becomes less significant to the runoff response because the litter and canopy quickly restore protection of soil and obstruction of overland flow, thus enhancing infiltration and reducing energy for runoff and erosion.

Raindrops striking exposed mineral soil with sufficient force can dislodge soil particles. This is known as splash erosion. These dislodged particles can fill in and seal pores in the soil thereby reducing infiltration. Further, once soil particles are detached by splash erosion they are more easily transported in overland flow. Surface erosion is defined as the movement of individual soil particles by a force (wind, water, or gravity), and is initiated by the planar removal of material from the soil surface (sheet erosion) or by concentrated removal of material in a downslope direction (rill erosion). Surface erosion is a function of four factors: 1) susceptibility of the soil to detachment, 2) magnitude of external forces (raindrop impact or overland flow), 3) the amount of protection available by material that reduces the magnitude of the external force (soil cover), and 4) management practices that can reduce erosion.

On-the-ground field observations within and downstream of the burned area were conducted to determine potential watershed response. Channel morphology related to transport and deposition processes were noted, along with channel crossings and stream outlets. Observations included condition of riparian vegetation and the volume of sediment and wood stored in channels and on slopes that could be mobilized.

FINDINGS

In order to assess the degree of threat to values at risk from post-fire watershed conditions, several environmental aspects need to be evaluated including: soil burn severity, erosion and debris flow potential, and watershed response.

Soil Burn Severity

The Carr Fire burned 229,462 acres within Shasta and Trinity Counties in northern California. In cooperation with the US Forest Service and CalFire Watershed Emergency Response Team, the Burned Area Reflectance Classification (BARC) map (e.g. Hudak et al, 2004) was adjusted by field verification to create a Soil Burn Severity Map (Parsons et al, 2010). The fire was still burning on the northeast portion of the fire when the BARC map was acquired. A second image of this area was acquired and adjustments made to derive the final soil burn severity map. The Soil Burn Severity Map shows that 11,062 acres (4.8%) have high soil burn severity, 89,949 acres (39.2%) have moderate soil burn severity, 114,447 acres (49.9%) have low soil burn severity, and 14,003 acres (6.1%) have unburned soil burn severity (Table 1). High and moderate soil burn severity have the greatest impact to watershed response and low and unburned have minimum impact to watershed response, therefore high and moderate will only be considered in this watershed assessment.

Table 1. Acres of Soil Burn Severity for the Carr Fire.

Soil Burn Severity Class	Acres	Percent
Unburned	14,003	6.1
Low	114,447	49.9
Moderate	89,949	39.2
High	11,062	4.8
Total	229,462	100

The following table exhibits a more refined scale of soil burn severity as it relates to the watersheds within the fire that had identified values at risk. In addition, these watersheds were used for hydrologic modeling to help identify the magnitude of risk to identified values. Although other watersheds are present in the burned area, only watersheds with identified values at risk were modeled. Watersheds without identified values at risk are not discussed any further in this assessment.

Table 2. Acres of Soil Burn Severity Class by Modeled Watershed in the Carr Fire.

Watershed	Acres within Fire Perimeter	Soil Burn Severity Class	Acres Soil Burn Severity	Percent Soil Burn Severity
Paige Boulder	3,070	Unburned	0	0
		Low	899	29%
		Moderate	1,725	56%
		High	446	15%
Brandy	6,257	Unburned	165	2%
		Low	3,565	57%
		Moderate	1,612	26%
		High	916	15%
Boulder	3,266	Unburned	0	0
		Low	248	7%
		Moderate	2,128	65%
		High	899	28%
Whiskey	5,785	Unburned	23	
		Low	1,300	22%
		Moderate	3,912	68%
		High	550	10%
Upper Clear	75,849	Unburned	13,803	18%
		Low	34,954	46%
		Moderate	24,535	32%
		High	2,556	4%
Deadwood	5,856	Unburned	1,168	20%
		Low	2,102	36%
		Moderate	1,697	29%

		High	889	15%
Grass Valley	29,337	Unburned	17,348	59%
		Low	6,805	23%
		Moderate	4,286	15%
		High	898	3%
Crystal	7,820	Unburned	358	4%
		Low	3,910	50%
		Moderate	3,174	41%
		High	378	5%
Middle	2,760	Unburned	39	1%
		Low	929	34%
		Moderate	1,743	63%
		High	48	2%
Rock	3,781	Unburned	149	4%
		Low	1,644	43%
		Moderate	1,975	52%
		High	14	1%
Salt	2,340	Unburned	91	4%
		Low	1,106	47%
		Moderate	1,125	48%
		High	19	1%
Papoose	6,157	Unburned	92	1%
		Low	2,933	48%
		Moderate	2,297	37%
		High	837	14%
Cline	4,030	Unburned	40	1%
		Low	926	23%
		Moderate	2,639	65%
		High	425	11%
Mill	1,818	Unburned	0	0
		Low	63	4%
		Moderate	1,329	73%
		High	426	23%

Erosion Potential (ERMiT results)

ERMiT is a web-based tool developed to predict surface erosion from pre- and post-fire hillslopes, and to evaluate the potential effectiveness of various erosion mitigation practices (Robichaud et al., 2011). ERMiT requires input for climate parameters based on location, vegetation type (forest, range, chaparral), soil type, (clay loam, silt loam, sandy loam, loam and rock content), topography (slope length and gradient), and soil burn severity class (low, moderate, high). This model provides probabilistic estimates of single-storm post-fire hillslope erosion by incorporating variability in rainfall characteristics, soil burn severity, and soil

characteristics into each prediction (Robichaud et al., 2011). The following table shows the predicted sediment production for modeled watersheds with Values at Risk in the Carr Fire burn area.

Table 3. ERMiT Results for 10-yr Storm Event on the Carr Fire.

Modeled Watershed	10-yr Pre ton/acre	10-yr Post ton/acre	Percent Change
Boulder Creek	4	44	1100%
Brandy Creek	5	39	780
Paige Boulder Creek	5	54	1080
Upper Clear Creek	2	29	1450
Crystal Creek	6	34	570
Deadwood Creek	2	31	1550
Grass Valley Creek	2	27	1350
Middle Creek	7	38	540
Rock Creek	7	34	480
Salt Creek	4	32	800
Papoose Creek	1	28	2800
Whiskey Creek	4	44	1100
Mill Creek	2	40	2000
Cline Creek	5	48	960

Debris Flow Potential

Debris flow potential was assessed using a combination of modeling outputs and field observations in the vicinity of identified Values at Risk. Modeled debris flow hazard was provided by the U.S. Geological Survey’s post-fire debris flow hazard model (Staley *et al.* 2016). In simplest terms, the model incorporates information on burn severity, soil erodibility, slope and elevation. The model was run using a 15-minute rainfall intensity of 28 mm/hr (1.12 in/hr). It should be emphasized that this empirical model does not incorporate data from Northern California. However, by integrating burn characteristics, soil properties and landscape parameters, the model is a valuable tool for guiding reconnaissance and assessment efforts.

Field reconnaissance included identification of historic debris flow deposits supported by discussions with local specialists. Debris flow deposits are often readily recognizable, particularly in the post –fire environment where concealing vegetation is removed. Debris flows typically deposit steep fans at tributary junctions and where smaller drainages enter a larger valley. The fans are characterized by numerous lobes of rocky debris with traces of remnant channels across the features. Along channels, debris flows can leave prominent natural levees and berms as the traveling debris front sheds and deposits debris along its flanks.

Watershed Response

The effect of wildfires on storm runoff is well documented. Wildfires typically cause an increase in watershed responsiveness to precipitation events. Burned watersheds can quickly yield runoff due to the removal of protective tree and shrub canopies and litter and duff layers, thus producing flash floods. Burned areas often respond to typical storm events in a much flashier way. The amount of water yield increase is variable and it is often orders of magnitude larger

than pre-fire events. These impacts are predominantly true in watersheds that experienced significant consumption of the vegetation community and moderate to high soil burn severity effects. Fires may increase the number of runoff events as well because it generally takes a smaller storm to trigger runoff until vegetation begins to recover. Peak flow increases from the fire may also be augmented by floatable and transportable material within the active channels.

Throughout the fire area, vegetation recovery is largely dependent on climatic cycles. If wet winters occur, vegetation recovery could be rapid, with forbs and grasses providing ground cover similar to that observed in unburned areas throughout the fires. By the second winter season, forbs, grasses, and re-established shrubs should provide sufficient cover to reduce any increase in watershed response to near pre-fire levels. Once sprouting vegetation begins to produce brushy crowns and a duff/litter layer, watershed response will be reduced further. However, if winters are dry, vegetation recovery will be slow, and thus the establishment of ground cover and shrub communities will be slow, and watershed response will remain slightly elevated over pre-fire conditions.

A consequence of increased runoff, erosion, sediment and debris delivery is a short-term degradation of water quality as ash, sediment, and burned organic debris are delivered to streams and reservoirs within and downstream of burned areas. The impacts of this effect depend largely on the vegetative recovery times in combination with storm characteristics in the same time period.

The primary watershed response of the Carr Fire is largely dependent on the amount of area classified as moderate to high soil burn severity. As exhibited in Table 1, the largest percentage of moderate and high soil burn severity within the burn perimeter is in the following watersheds: Mill (96%), Boulder (93%), Cline (76%), Whiskey (73%), Paige Boulder (71%), Middle (65%) and Rock (53%). Modifying this response is the patchiness of soil burn severity, steep watershed slopes, and the geology of those watersheds within the Shasta Bally Batholith. The increase in peak stream flow and the associated hillslope erosion is expected to decrease to natural levels after 3-5 years as vegetative recover occurs in the fire effected watersheds.

The DOI Watershed Team used the StreamStats program developed by the U.S. Geological Survey to determine relative 10-year peak flow estimates for pre-fire ($Q_{pre-fire}$). StreamStats version 4 is a Web application that provides access to an assortment of Geographic Information Systems (GIS) analytical tools. StreamStats incorporates (1) a map-based user interface for the site selection; (2) a relational data base that contains information for data-collection stations and regression equations used to estimate flow statistics for unaged sites; (3) a GIS program that allows locating sites of interest in the user interface, delineates drainage basins and measures basin characteristics; and (4) a database of geospatial datasets needed for the GIS program to work. Geospatial datasets include digital representations of the land surface (digital elevation models and derivative products), water features, historic climate data, soils information, and land-use information.

In consultation with the CalFire Watershed Emergency Response Team assigned to the Carr Fire, The DOI BAER Team selected an empirical method to model post-fire peak flow percent increases for watersheds with Values at Risk (Kinoshita *et al.* 2014). Methodology for

application of a sediment bulking factor to post-fire peak flows was modified from the Interagency BAER Team methodology described in Gusman *et al.* (2011).

The bulked discharge, Q_B , is defined as:

$$Q_B = Q_{\text{pre-fire}} \times Q_{\text{pre-fire}} (\% \text{HighBurn} * 0.7 + \% \text{ModerateBurn} * 0.5 + \% \text{LowBurn} * 0.2)$$

Watershed modeling results are presented in Table 4 and discussed in the context of their implications to values at risk in the following subsections.

Table 4. Watershed Modeling Results for Post-Fire Peak Flows.

Modeled Watershed	Bulking Factor	Post-Fire % Peak Flow Increase
Boulder Creek	1.5	50
Brandy Creek	1.4	40
Clear Creek	1.3	30
Cline Gulch	1.4	40
Crystal Creek	1.3	30
Deadwood Creek	1.3	30
Grass Valley Creek	1.1	10
Middle Creek	1.4	40
Mill Creek	1.5	50
Paige Boulder Creek	1.4	40
Papoose Creek	1.4	40
Rock Creek	1.4	40
Salt Creek	1.3	30
Whiskey Creek	1.4	40

Paige Boulder Creek

The Paige Boulder Creek watershed had 3,070 acres burned within the Carr Fire which represents the entire watershed. Approximately 29% of the watershed exhibited low soil burn severity, 56% of the burned acres exhibited moderate soil burn severity and 15% high soil burn severity. Modeled flows for return period's ≤ 10 years were estimated to increase 44% over pre-fire flows to the confluence with Lower Clear Creek while post-fire mean sediment yields using ERMiT show erosion of 54 tons/acre, a 1080% increase, with a 10-year storm using local climate conditions. The change in peak flow is associated with the high percentage (71%) of moderate and high soil burn severity throughout the majority of the watershed. In addition, the upper portion of the watershed has the highest concentration of high soil burn severity which is on the higher elevations of Shasta Bally.

It should be noted that bridges over Paige Boulder Creek at NEED Camp were destroyed in high flow events in both 1997 and 1954.

Brandy Creek

The Brandy Creek watershed had 6,257 acres burned within the Carr Fire which represents almost the entire watershed. Approximately 2% of the watershed was unburned, 57% of the

watershed exhibited low soil burn severity, 26% of the burned acres exhibited moderate soil burn severity and 15% high soil burn severity. Modeled flows for return period's ≤ 10 years were estimated to increase 44% over pre-fire flows to the confluence with Whiskeytown Lake while post-fire mean sediment yields using ERMiT show erosion of 39 tons/acre, a 780% increase, with a 10-year storm using local climate conditions. The change in peak flow is associated with the moderate percentage (41%) of moderate and high soil burn severity throughout the majority of the watershed. In addition, the majority of the stream corridor exhibited low soil burn severity however, the upper slopes in the watershed have the highest concentration of moderate and high soil burn severity. These slopes are on the higher elevations of Shasta Bally.

Boulder Creek

The Boulder Creek watershed had 3,266 acres burned within the Carr Fire which represents the entire watershed. Approximately 7% of the watershed exhibited low soil burn severity, 65% of the burned acres exhibited moderate soil burn severity and 28% high soil burn severity. Modeled flows for return period's ≤ 10 years were estimated to increase 53% over pre-fire flows to the confluence with Whiskeytown Lake while post-fire mean sediment yields using ERMiT show erosion of 44 tons/acre, an 1100% increase, with a 10-year storm using local climate conditions. The change in peak flow is associated with the high percentage (93%) of moderate and high soil burn severity throughout the majority of the watershed. In addition, the upper portion of the watershed has the highest concentration of high soil burn severity which is on the higher elevations of Shasta Bally.

It should be noted that the previous crossing structure at this location was destroyed by a high flow event in 1997.

Whiskey Creek

The Whiskey Creek watershed had 5,785 acres burned within the Carr Fire which represents the entire watershed. Approximately 22% of the watershed exhibited low soil burn severity, 68% of the burned acres exhibited moderate soil burn severity and 10% high soil burn severity. Modeled flows for return period's ≤ 10 years were estimated to increase 45% over pre-fire flows to the confluence with Whiskeytown Lake while post-fire mean sediment yields using ERMiT show erosion of 44 tons/acre, a 1100% increase, with a 10-year storm using local conditions. The change in peak flow is associated with the high percentage (73%) of moderate and high soil burn severity located primarily in the lower portion of the watershed. The upper portion of the watershed consists primarily of low and moderate soil burn severity.

Upper Clear Creek

The Upper Clear Creek watershed had 75,849 acres burned within the Carr Fire which represents 82% of the watershed. Approximately 46% of the watershed exhibited low soil burn severity, 32% of the burned acres exhibited moderate soil burn severity and 4% high soil burn severity. Modeled flows for return period's ≤ 10 years were estimated to increase 28% over pre-fire flows to the confluence with Willow Creek while post-fire mean sediment yields using ERMiT show erosion of 29 tons/acre, a 1450% increase, with a 10-year storm using local climate conditions. The change in peak flow is associated with the size and topography of the watershed along with several subwatersheds lower in the system that experienced high levels of moderate and high soil burn severity.

Deadwood Creek

The Deadwood Creek watershed had 5,856 acres burned within the Carr Fire which represents 80% of the watershed. Approximately 36% of the watershed exhibited low soil burn severity, 29% of the burned acres exhibited moderate soil burn severity and 14% high soil burn severity. Modeled flows for return period's ≤ 10 years were estimated to increase 32% over pre-fire flows to the confluence with the Trinity River while post-fire mean sediment yields using ERMiT show erosion of 31 tons/acre, a 1550% increase, with a 10-year storm using local climate conditions. The relatively low change in peak flow is associated with the high percentage (44%) of low and moderate soil burn severity throughout the majority of the watershed. The upper headwater portion of the watershed is where the highest concentration of high soil burn severity occurs.

Grass Valley Creek

The Grass Valley Creek watershed had 11,989 acres burned within the Carr Fire which represents 41% of the watershed. Approximately 23% of the watershed exhibited low soil burn severity, 15% of the burned acres exhibited moderate soil burn severity and 3% high soil burn severity. Modeled flows for return period's ≤ 10 years were estimated to increase 14% over pre-fire flows to the confluence with the Trinity River while post-fire mean sediment yields using ERMiT show erosion of 27 tons/acre, a 1350% increase, with a 10-year storm using local climate conditions. The relatively low change in peak flow is associated with the high percentage (59%) of the watershed in an unburned condition along with the portion that did burn was primarily low soil burn severity. One small headwater subwatershed did experience high and moderate soil burn severity however, this drains into Grass Valley Reservoir.

Crystal Creek

The Crystal Creek watershed had 7,820 acres burned within the Carr Fire which represents the entire watershed. Approximately 50% of the watershed exhibited low soil burn severity, 41% of the burned acres exhibited moderate soil burn severity and 5% high soil burn severity. Modeled flows for return period's ≤ 10 years were estimated to increase 34% over pre-fire flows to the confluence with Willow Creek while post-fire mean sediment yields using ERMiT show erosion of 34 tons/acre, a 570% increase, with a 10-year storm using local climate conditions. The relatively low change in peak flow is associated with the high percentage (91%) of low and moderate soil burn severity throughout the majority of the watershed. An upper headwater portion of the watershed near Shasta Bally Peak is where the highest concentration of high soil burn severity occurs.

Middle Creek

The Middle Creek watershed had 2,760 acres burned within the Carr Fire which represents the entire watershed. Approximately 34% of the watershed exhibited low soil burn severity, 63% of the burned acres exhibited moderate soil burn severity and 2% high soil burn severity. Modeled flows for return period's ≤ 10 years were estimated to increase 40% over pre-fire flows to the confluence with the Sacramento River while post-fire mean sediment yields using ERMiT show erosion of 38 tons/acre, a 540% increase, with a 10-year storm using local climate conditions. The change in peak flow is associated with the high percentage (65%) of moderate and high soil burn severity throughout the upper portion of the watershed.

Rock Creek

The Rock Creek watershed had 3,781 acres burned within the Carr Fire which represents the entire watershed. Approximately 43% of the watershed exhibited low soil burn severity, 52% of the burned acres exhibited moderate soil burn severity and 1% high soil burn severity. Modeled flows for return period's ≤ 10 years were estimated to increase 35% over pre-fire flows to the confluence with the Sacramento River while post-fire mean sediment yields using ERMiT show erosion of 34 tons/acre, a 480% increase, with a 10-year storm using local climate conditions. The relatively low change in peak flow is associated with the high percentage (43%) of low soil burn severity throughout the majority of the watershed. In addition, the upper portion of the watershed has the highest concentration of moderate soil burn severity.

Salt Creek

The Salt Creek watershed had 2,340 acres burned within the Carr Fire which represents the entire watershed. Approximately 47% of the watershed exhibited low soil burn severity, 48% of the burned acres exhibited moderate soil burn severity and 1% high soil burn severity. Modeled flows for return period's ≤ 10 years were estimated to increase 34% over pre-fire flows to the confluence with the Sacramento River while post-fire mean sediment yields using ERMiT show erosion of 32 tons/acre, a 850% increase, with a 10-year storm using local climate conditions. The relatively low change in peak flow is associated with the high percentage (51%) of unburned and low soil burn severity throughout the majority of the watershed. In addition, the upper headwall portions of the watershed has the highest concentration of moderate soil burn severity.

Papoose Creek

The Papoose Creek watershed had 6,157 acres burned within the Carr Fire which represents the entire watershed. Approximately 48% of the watershed exhibited low soil burn severity, 37% of the burned acres exhibited moderate soil burn severity and 14% high soil burn severity. Modeled flows for return period's ≤ 10 years were estimated to increase 38% over pre-fire flows to the confluence with Trinity Lake while post-fire mean sediment yields using ERMiT show erosion of 28 tons/acre, a 2800% increase, with a 10-year storm using local climate conditions. The relatively low change in peak flow is associated with the high percentage (49%) of unburned and low soil burn severity throughout the majority of the watershed. In addition, the two subwatersheds in the northern portion of the watershed have the highest concentration of moderate and high soil burn severity.

Mill Creek

The Mill Creek watershed had 1,818 acres burned within the Carr Fire which represents the entire watershed. Approximately 4% of the watershed exhibited low soil burn severity, 73% of the burned acres exhibited moderate soil burn severity and 23% high soil burn severity. Modeled flows for return period's ≤ 10 years were estimated to increase 54% over pre-fire flows to the confluence with Clear Creek while post-fire mean sediment yields using ERMiT show erosion of 40 tons/acre, a 2000% increase, with a 10-year storm using local climate conditions. The change in peak flow is associated with the high percentage (96%) of moderate and high soil burn severity throughout the majority of the watershed. In addition, the upper portion of the watershed has the highest concentration of high soil burn severity which is on the higher elevations of Shasta Bally.

Cline Gulch

The Cline Gulch watershed had 4,030 acres burned within the Carr Fire which represents the

entire watershed. Approximately 23% of the watershed exhibited low soil burn severity, 65% of the burned acres exhibited moderate soil burn severity and 11% high soil burn severity. Modeled flows for return period's ≤ 10 years were estimated to increase 45% over pre-fire flows to the confluence with Clear Creek while post-fire mean sediment yields using ERMiT show erosion of 48 tons/acre, a 960% increase, with a 10-year storm using local climate conditions. The change in peak flow is associated with the high percentage (76%) of moderate and high soil burn severity throughout the majority of the watershed. In addition, the upper two-thirds of the watershed has moderate soil burn severity.

Debris Flows

Debris flows are a relevant hazard in the burned area. Modeled outputs show many high hazard areas throughout. It should be emphasized that a “high” hazard modeled segment does not necessarily equate to an imminent hazard. Additional field verification is required to identify the presence of past deposits that may be indicative of future instances of debris flows.

Field reconnaissance revealed debris flows deposits in several drainages. Many of the larger drainages along the south side of Whiskeytown Lake, including Boulder Creek, Dry Creek, Brandy Creek and Paige Boulder Creek contain notable debris fans in their lower gradient reaches near the lake. Other units within the burned area such as the Mule Mountain Stock, Bragdon Formation and Copley Greenstone also show evidence of debris flows, but are generally smaller features. However, smaller debris fans at tributary mouths suggest debris flows can occur on steeper drainages elsewhere in the burned area. The CalFire Watershed Emergency Response Team report discusses debris flow hazards on non-federal lands, particularly in the upper Clear Creek watershed where steep drainages empty into the Clear Creek valley.

In regards to the Shasta Bally Batholith, field evidence and interviews with NPS staff document debris flows occurring during the January 1997 storm, when a rain on snow event triggered at least two debris flows within the park, one in Brandy Creek watershed and one in Paige-Boulder watershed. The 1997 event resulted in the failure of at least three crossings (Brandy Creek at Sheep Camp, Paige Boulder Creek at NEED Camp and Boulder Creek at South Shore Drive). Review of nearby stream gauges suggest that while 1997 was a significant runoff event, it was not unprecedented in the record.

Given the unstable nature of the weathered granodiorite as well as recent and past events, the likelihood of debris flows during post-fire conditions greatly increases. In particular, areas of high soil burn severity and high vegetation mortality on the Shasta Bally present high debris flow hazards. Debris flow hazard in Shasta Bally drainages appears to be further enhanced by the abundance of large granitic boulders present throughout the weathered rock body. These large boulders incorporated in debris flows add additional bulk, may help entrain additional debris, and dramatically increase the potential for damage to downstream values.

Assigning a probability to debris flow occurrence similar to the approach used for flood flows is impractical and can be mis-leading. Considerable uncertainty in the triggering rainfall conditions, physical watershed setting and resulting volumes precludes reliable estimates of probability (e.g., Kean *et al.* 2016, Gusman 2011 for discussions on bulking factors). Debris flow discharge can be orders of magnitude greater than floods in the same area, unlike the

bulking value of 1.7 used previously in the runoff modeling to account for more routine entrainment of post-fire debris. For example, drainages originating from the Shasta Bally contain abundant large debris flow deposits relative to the channel size, suggesting immense volumes of material can be entrained during large storm events. Debris flow hazards are discussed for each value at risk below.

VAULES AT RISK

All areas within the burned area and downstream of the burned area were evaluated for Values at Risk due to post-fire watershed conditions. This assessment covers National Park Service, Bureau of Land Management, and US Forest Service lands burned in the Carr Fire and discusses Values at Risk on these lands. Values at risk on all other lands are covered in the CalFire WERT Report.

In regards to flooding from post-fire watershed conditions, Standard Operating Procedures (SOPs) for BAER evaluations are to consider and prescribe treatment for storm events up to the 25-year recurrence interval. The ability for BAER to prescribe temporary treatments that withstand storm events greater than a 25-year magnitude becomes problematic. The nature of BAER activities allows for rapid assessment and rapid implementation of treatments to protect human lives, property, and critical natural and cultural resources. Design of treatments and implementation of treatments beyond 25-year storm events usually requires complex engineering and implementation that exceeds the rapid implementation of such treatment.

National Park Service

Brandy Creek Campground:

The Brandy Creek Campground, bridge and associated facilities are at risk of flooding and debris flow impacts. Most of the facilities are constructed on historic debris flow deposits. Photographs from 1997 document inundation of the lower lying areas. Significant erosion of the beach also occurred, requiring extensive repairs and armoring. Extensive areas of high soil and moderate burn severity and debris flow hazard segments sourcing from occur in the headwater stream reaches where the erosive Shasta Bally material is present. These headwater reaches also function as the source areas for debris flows that are capable of traveling downstream into the Brandy Creek facilities. Field observations, watershed modeling results, geology of the watershed, and recent events within the past 50 years indicate this VAR is at risk.

Boulder Creek Campground:

Boulder Creek experienced some of the highest proportions of high soil burn severity, occurring on Shasta Bally material. The campground sits on a historic debris flow terrace and is at risk from potential post-fire events. These drainages also serve as the source areas for debris flows. Post-fire watershed modeling results for Boulder Creek indicate that post-fire discharges up to 327% capable of pre-fire flows may occur. The trail fords Boulder Creek multiple times and were the water to rise quickly, would leave campers stranded with no reasonable egress route traveling downstream and impacting these facilities.

As stated previously, Boulder Creek experienced some of the highest proportions of high soil burn severity, occurring on Shasta Bally material. The bottomless arch culvert where South Shore Drive crosses Boulder Creek sits on historic debris flow deposits and is at risk from potential post-fire debris flows. Post-fire watershed modeling results for Boulder Creek indicate

that post-fire discharges up to 150% of pre-fire flows may occur. The previous road-stream crossing structure where South Shore Drive crosses Boulder Creek blew out in the 1997 flood. The increase in runoff, and the erosive power of post-fire sediment laden water will likely exacerbate the existing issue of the left culvert footer being undermined and accelerate the eventual failure of the structure. The structure has a span of 31 feet and a rise of 12 feet (plus 2 feet for the concrete stem walls). Its failure would potentially have consequences for public safety.

Whiskeytown Environmental School NEED Camp:

The main facilities for the NEED Camp is located on the south bank of Paige Boulder Creek, which includes a road bridge over the creek. Debris flow hazard is significant at NEED camp. The central facilities of the NEED camp are constructed on an historic debris flow fan. Anecdotes from 1997 suggest a debris flow was responsible for destroying the bridge and sending floodwaters to the main kitchen building. Indeed, a string of bridge failures has occurred at this site extending back to at least the storm of 1954.

Post-fire watershed modeling results for Paige Boulder Creek indicate that post-fire discharges up to 150% of pre-fire flows may occur. The previous road-stream crossing structure where South Shore Drive crosses Boulder Creek blew out in the 1997 flood. Flood waters have threatened the dining hall multiple times in the recent past. Field observations, watershed modeling results, geology of the watershed, and recent events within the past 50 years indicate this VAR is at risk.

Transportation System Infrastructure:

With regards to debris flow hazards, many small drainages across the burned area have high modeled hazards. To further assess risks to roads and culverts, the debris flow hazard model results are overlaid with streams and roads to highlight areas of heightened risk. Road networks extending into the Shasta Bally may be especially vulnerable to debris flow hazards.

Potable Water Systems:

Four potable water systems are at risk from post-fire hillslope erosion. Field observations determined that these sites are likely to experience hill slope sheet flows off the burn area during major rain events due to moderate and high soil burn severity.

Bureau of Land Management

Transportation Infrastructure:

With regards to debris flow hazards, many small drainages across the burned area have high modeled hazards. To further assess risks to roads and culverts, the debris flow hazard model results are overlaid with streams and roads to highlight areas of heightened risk. Road networks extending into the Shasta Bally materials (i.e., Grass Valley and Deadwood Creek watersheds) may be especially vulnerable to debris flow hazards given the erosion potential of the parent material.

Swasey Sediment Basin:

The Swasey Sediment Basin is located in the upper portion of Middle Creek. It is an important structure to help minimize sediment inputs to downstream critical habitats for threatened and

endangered Chinook salmon and steelhead species. Currently the sediment basin is filled to capacity and is not function as intended. Approximately 63% of the Middle Creek watershed has moderate soil burn severity and modeled post-fire peak flows showing a 40% increase. This sediment basin is at vulnerable to failure under post-fire conditions.

Grass Valley Sediment Basin:

The Grass Valley Sediment Basin/Reservoir is located in the upper portion of Grass Valley Creek. The reservoir provides sediment retention for downstream movement of material to the Trinity River, where threatened coho and critical habitat occur. Only 17% of the watershed experienced high and moderate soil burn severity and modeled post-fire peak flows showing a 14% increase. The reservoir/sediment basin is not considered to be at risk from post-fire peak flows or sediment yields.

US Forest Service

Transportation Infrastructure:

With regards to debris flow hazards, many small drainages across the burned area have high modeled hazards. To further assess risks to roads and culverts, the debris flow hazard model results are overlaid with streams and roads to highlight areas of heightened risk. Small, steep drainages sourcing from high severity burn areas are especially vulnerable to increased debris flow impacts.

Critical Natural Resources

There are several species/populations of fish listed under the Endangered Species Act with designated critical habitat within or downstream of the Carr Fire. These species and population are:

- Sacramento River Winter-run Chinook (*Oncorhynchus tshawytscha*) is a federally listed Endangered species.
- California Central Valley Spring-run Chinook (*Oncorhynchus tshawytscha*) is a federally listed Threatened species.
- California Central Valley DPS Steelhead (*Oncorhynchus mykiss*) is a federally listed Threatened species.
- Northern California Coast Coho (*Oncorhynchus kisutch*) is a federally listed Threatened species.

General Fire Effects to Fish/Water Quality/Aquatic Systems

Fish populations have been found to respond in a variety of ways to the effects of large wildfires (Reiman and Clayton 1997). Refugia are known to be a key component in the recovery of salmonid populations. When salmonids are severely depressed by the effects of fires, a migratory life history may aid in the recovery and persistence of a population (Reiman and Clayton 1997). Gresswell (1999) presents an overview of direct and indirect effect of fire on aquatic ecosystem processes and biological communities.

The effects of wildfire on fish and aquatic resources may depend on multiple factors that include:

the scale and severity of fire; existing watershed and riparian condition; the connectedness of habitats that provide for potential refugia and re-colonization; and the potential for the full range of life history expression (Reiman et al. 1997, Gresswell, 1999). Fire can alter the quantity, quality, and use of habitat via the alteration of water temperatures, increased sedimentation rates, loss of riparian vegetation, nutrient availability, food sources, and woody debris (McMahon and deCalesta 1990).

Water Quality and Nutrient Cycle-Aquatic Systems

Wildfires can also have an effect on the nutrient cycle in aquatic systems. Usually there is an initial nutrient pulse after a wildfire. This is followed by a gradual decrease in nutrient loss from the watershed because of the high recovery of net photosynthetic rates of terrestrial vegetation. Low nutrient concentrations in the stream 5-10 years after the fire are expected to contribute to the decline in autochthonous production (Minshall, Brock, and Varley 1989). Enhanced light levels will increase primary production for 10-20 years. Additionally, the changing light levels will cause a shift in the benthic flora from diatoms and moss to green algae with occasional formations of filamentous algal mats. There are two major factors affecting the pattern of dissolved nutrient concentrations in streams: 1) water borne transport, and 2) biotic uptake and release. Nutrient increases are usually small or of a short duration after a fire and their effects on fish populations and food resources are negligible in most cases. Robichaud et al (1993) observed relatively little sediment transport and minimal nutrient losses following a low intensity burn in northern Idaho, however, nutrient spikes following fire are most common during storm events in the autumn and after the summer period of maximum algal production and fish growth.

Chemical water quality measurements after wildfire are generally for nitrogen and phosphorous. Nitrogen can occur in several forms in a stream; however the nitrate-nitrogen ion (most common form used by vascular plants) is typically studied as a result of its mobility through the soil-water system. In general, nitrate concentrations are low in undisturbed watersheds and have relatively small increases following wildfire. Nitrogen export from watersheds is dependent on the amount present and streamflow. The severity and intensity of wildfires affects nitrogen export and concentrations in watersheds. Phosphorous in watersheds is present primarily in two forms 1) orthophosphate (the inorganic form) and 2) organic phosphate with the losses of phosphates after wildfire are generally negligible (Beschta, 1990).

Similar to streams, the nutrient cycle of lakes and reservoirs can be affected with pulses of nutrients following a wildfire event. Nutrients such as ammonium, phosphorous, potassium, and alkalinity typically increase in aquatic systems following ash input. Concentrations of these nutrients can return to pre-fire levels within 4 months following input to water bodies (Earl and Blinn, 2003). Concentrations of major ions, turbidity levels, and pH can increase immediately in aquatic systems downstream or at the point of entry to a water body following ash inputs, however these changes in water chemistry are typically short lived, less than 24 hours (Earl and Blinn, 2003).

Larger lakes and/or reservoirs typically see lower impacts to water quality and nutrient cycle from wildfire events. For example, an analysis of water quality records for Yellowstone and Lewis Lakes collected over a fifteen year period between 1976 and 1991 have shown only a minimal shift in lake water quality following the large wildfires in 1988. Approximately 25

percent of these respective watersheds were heavily burned, however these lakes were large enough to dilute increased inputs and have experienced few lasting effects from the 1988 fires (Lathrop, 1994).

Carr Fire Watershed Response on Listed Fish Species

Trinity River

Tributaries to the Trinity River that occur in the Carr Fire include Deadwood Creek, Hoadley Gulch, Grass Valley Creek, and Little Grass Valley Creek. These streams are important for the recovery of Northern California Coast coho. Altered hydrologic regimes and sediment supply have been documented to be an area of concern regarding the recovery of the species (NOAA 2014a). As discussed above in this assessment, watershed response models were run for Deadwood Creek and Grass Valley Creek to determine relative increases in post-fire peak runoff and sediment yield.

Deadwood Creek could see an increase in post-fire peak runoff of 32% over pre-fire peak flows while sediment yields are estimated to be 31 tons/acre or a 1550% increase over pre-fire sediment yields. Forty-four percent of the watershed was either unburned or had low soil burn severity. The headwaters did experience high soil burn severity however, and additional surface erosion and delivery to the channel network is anticipated. No hillslope treatments (e.g. straw mulch) to minimize soil erosion were prescribed for Deadwood Creek. Slope steepness, the small percentage of high soil burn severity within the watershed, effectiveness of the treatment, and cost vs benefit were taken into consideration. For sediment issues, specifications are provided for treatments focused on road drainage features, namely culverts, with pre-storm road and event cleaning to facilitate the movement of water and minimize plugging. This pre-storm effort followed by a series of post-storm road patrols to address runoff issues, culvert plugging and other road-related drainage and erosion issues.

Grass Valley Creek could see an increase in post-fire peak runoff of 14% over pre-fire peak flows while sediment yields are estimated to be 27 tons/acre or a 1350% increase over pre-fire sediment yield. Eighty-two percent of the Grass Valley Creek watershed was unburned or had low soil burn severity. A small headwater watershed contains the majority the moderate and high soil burn severity however, this area occurs upstream of Grass Valley Reservoir. It is anticipated that sediment generated from this area would fall out in the reservoir and not be transported to the Trinity River.

Sacramento River

Tributaries to the Sacramento River that occur in the Carr Fire include Middle Creek, Rock Creek, Salt Creek, and Lower Clear Creek. These streams are important for the recovery of Sacramento River Winter-run Chinook, Central Valley Spring-run Chinook, and Central Valley DPS steelhead. Loss of juvenile rearing habitat in the form of lost natural river morphology and function, and lost riparian habitat and instream cover are documented concerns for recovery of Winter-run chinook and Spring-run chinook along with limited spawning habitat availability for steelhead (NOAA 2014b)

Middle Creek, Rock Creek, and Salt Creek could see an increase in post-fire peak runoff of 40%, 35%, and 34% over pre-fire peak flows while sediment yields are estimated to be 38, 34, and 32

tons/acre, or 540%, 480%, and 850% respectively, over pre-fire sediment yield. These three watersheds had a minimal amount of high soil burn severity ranging between 1-2% of the watersheds. Since there was very little acres of high soil burn severity, no hillslope treatments were prescribed to minimize soil erosion and transport to stream channels. Specifications are provided to address road and culvert issues within these watersheds, and sediment removal in the Swasey sediment basin on Middle Creek.

Lower Clear Creek was not modeled. The Whiskeytown Dam and Lake prevented StreamStats from delineating the watershed. However, approximately 56% of this watershed burned during the Carr Fire. The majority of the soil burn severity, 49% was low and 44% moderate soil burn severity. No treatments were identified for this watershed as it is anticipated the post-fire watershed response of peak flows and sediment yield will be low.

Critical Cultural Resources

See Cultural Resource Assessment of a description of VAR's.

RECOMMENDATIONS

Emergency Stabilization

Culvert Cleanout (NPS-20, BLM-17, USFS-3)

There are many places at risk of inundation, debris deposition, flood damage and other post-fire related impacts from elevated flows carrying sediment and debris. Culverts will be at elevated risk from post-fire flood and debris flow deposits and must be cleared to ensure maximum flow capacity and accessibility. Prior to the fall and winter wet season, use appropriate heavy equipment to remove sediment and debris from culvert inlets and outlets. Heavy equipment will be required due to the volume and weight of material that needs to be removed.

Storm Patrol/Road Debris Removal (NPS-21, BLM-16, USFS-2)

There are many BLM, NPS, and USFS maintained roads and road-stream crossings within the fire perimeter at risk of inundation, debris deposition, culvert plugging, flood damage and other post-fire related impacts from elevated flows carrying sediment and debris. After rainfall events these areas will be assessed for any potential damage to the roads and infrastructure such as culvert plugging and stream diversions onto the road surface. If the culverts are plugged or damaged then the areas could be cleaned out immediately to avoid further damage during the next rainfall event. Additionally, other values at risk (buildings, water supply facilities, diversion structures, etc.) adjacent to channels will be assessed during storm patrol.

The patrols are used to identify those road problems such as plugged culverts and washed out roads and to clear, clean, and/or block those roads that are or have received damage. The storm patrollers shall have access to equipment that can be used when a drainage culvert is plugged or soon to be plugged and to repair any road receiving severe surface erosion.

Structure Protection (NPS-23)

Two park facilities sites within Whiskeytown National Recreational Area will be impacted by post fire flood and debris flows from the Carr fire burn scar. These facilities are used by the public and need to be protected. At the Brandy Creek recreational area the upper restroom, lower restroom, store and lift station will be protected by placement of k-rails and sandbags. The NEED's camp will require protection using Hesco baskets, sandbags, removal of floatable

debris, and berm repair.

Potable Water Source Protection (NPS-24)

Several potable water sites within Whiskeytown National Recreational Area have been impacted by post fire effects from the Carr fire burn scar. Potable water is used throughout the Whiskeytown National Recreational Area for Park facilities, which included recreation sites

Engineering Evaluation (NPS-25)

An engineering assessment of the Boulder Creek Culvert on South Shore Drive is needed to develop a comprehensive design solution to the compromised footer on the left bank which is at risk as a result of the Carr Fire.

Swasey Basin Cleanout (BLM-19)

Remove sediment and debris from the Swasey Sediment Basin on Middle Creek prior to fall rainfall events to maximize storage capacity. Following major storm events, remove debris and sediment fill to maintain storage capacity of the sediment basin. The work is expected to occur in fall of 2018 for initial clean out and for eight storms during the first winter (2019/2020), four storms during the second winter (2020/2021), and two storms during the third winter season (2021/2022).

NON-SPECIFICATION MANAGEMENT RECOMMENDATIONS

National Park Service

Whiskeytown NEED's Camp:

Due to the increased risk of debris flows and flooding associated with post-fire watershed condition, NEED camp should be closed for a minimum of three years (through the winter of 2020-2021). In order to reduce risks to site infrastructure, the trailer, propane tanks, and electric box in the figure below should be moved out of the path of flood waters.



South Shore Road:

South Shore Road should be closed seasonally from November to May for at least three years (through the winter of 2020-2021). South Shore Road crosses multiple small drainages and several major drainages draining out of watersheds with substantial amounts of moderate and high soil burn severity. These drainages all have the potential to produce flooding and debris flows which would pose direct safety threats to motorists, and also indirect threats in that such events could leave motorist stranded.

Boulder Creek Primitive Campground:

Due to the potential for egress from the campground to be cut off by high-water conditions at the multiple fords on all access trails, camping at the Boulder Creek Primitive Campground should not be allowed for at least three years (through the winter of 2020-2021). Use of this trail should be limited to day use only.

Brandy Creek Campground: seasonal closure

Due to the increased risk of flooding and debris flows, Brandy Creek Campground should be closed seasonally from November to May for at least three years (through the winter of 2020-2021).

Mineral Springs:

A complex of mineral springs adjacent to state highway 299 at milepost 7.84 provides unique

habitat for endemic plant species. A culvert under the highway conveys runoff from a 61-acre intermittent channel across the one of the spring sites. Concerns over sedimentation and burial of the site have resulted in the construction of a small sediment retention basin upstream of the highway. Based on discussions with NPS staff, CalTrans regularly excavates the retention basin. Furthermore, an incipient landslide scarp cuts across the western portion of the drainage near the headwaters. The scarp appears as part of a larger complex of scarps occupying adjacent small drainages to the west. These scarps range in length from 60 to 150 meters. Much older landslide topography to the west suggests that these scarps reflect to deep-seated movement, most likely associated with a fault that is mapped in the vicinity. Field observations suggest the fire is unlikely to appreciably influence the dynamics of the incipient landslide. This is based on the combination of a lack of larger vegetation providing root cohesion and the deep-seated nature of the slide mass where the slide plane extends below the rooting zone.

More relevant to sedimentation, is the amount of drainage area experiencing at least moderate soil burn severity. Upstream of the retention basin, 56% of the watershed experienced a moderate soil burn severity. Reconnaissance of the channel revealed many areas of actively raveling slopes and smaller bank landslides delivering increased debris to the channel. Given the burn severity and abundance of loose hillside materials, increased sediment delivery and transport is expected through the reach with increased filling rates in the sediment basin. Surface erosion modeling results suggest a ten-fold increase in annual surface erosion values post-fire, eventually returning to a pre-fire level as vegetation recovery occurs.

Based on modeled increased runoff and sediment delivery, coupled with post-fire field observations, construction of additional storage capacity at the site is recommended. Additional small basin(s) should be installed in conformance with applicable rights-of-way and permitting. The additional capacity should reflect the anticipated sediment volumes and frequency of cleaning. Regular clean-outs should occur immediately following storms, particularly during the first runoff producing storms of the season.

Flooding/Evacuation Plan:

It is recommended that the Whiskeytown NRA consider developing an emergency flood response plan. An example of a plan that the park can use for guidance is the "Lake McDonald Complex Flood Evacuation Plan". This plan can be found in Appendix V-Supporting Documentation and will provide key information to include in the plan such as:

Stage 1: Pre-Evacuation Planning Notice

Explanation: Conditions are conducive to a flood or debris flow occurring usually within the next 48 hours.

Trigger: NWS issues Flash Flood Watch - or - the park determines local conditions (creek stage, snowpack, temp increasing, precipitation forecasts, etc.) dictate the need to go to Stage 1.

Stage 2: Evacuation Warning

Explanation: A flood or debris flow is occurring or has a high likelihood of occurring.

Trigger: NWS issues Flash Flood Warning - or - local conditions (creek stage, snowpack, temp increasing, precipitation forecasts, etc.) dictate the need to go to Stage 2.

Stage 3: Immediate Evacuation

Explanation: A major flood or debris flow is occurring or is imminent. Anyone left in the evacuation area needs to leave the area immediately.

Trigger: NWS issues Flood Warning - or - local conditions (creek stage, snowpack, temp increasing, precipitation forecasts, etc.) dictate the need to go to Stage 3.

It should be stated that all 3 conditions **do not** need to be met to get to Stage 3, one bad condition may warrant going to this alert level.

BLM, USFS, NPS

Emergency Notifications – Weather

It is recommended that the agencies establish Interactive National Weather Service (iNWS) alerts. The iNWS push notifications are now the standard way to go for emergency responder notifications. It will send notifications to your device either by email or text about predicted damaging storm events. The National Weather Service will soon have the fire perimeter from GeoMac and will setup the watch box. Any cell phone within the watchbox will get a reverse 911 notification during a warning event. To set up the alert use the following link:

<https://inws.ncep.noaa.gov/>

The NWS 24-hour phone number is 916-979-3049. The NWS will need the Whiskeytown dispatch 24-hour number for redundancy. You may contact Cindy Matthews at the NWS directly with questions.

Cindy Matthews
Senior Service Hydrologist
National Weather Service
3310 El Camino Ave, Suite 228
Sacramento, CA 95821
(916) 979-3041 Ext 228

CONSULTATIONS

Brian Rasmussen, Whiskeytown NRA Geologist
Morgan Rau, Whiskeytown NRA Wastewater Operator
Jennifer Gibson, Whiskeytown NRA Ecologist
Dominique Brough, BLM Geologist
Cindy Matthews, NWS Senior Hydrologist
Brad Rust, Shasta-Trinity National Forest Soil Scientist

REFERENCES

Beschta, Robert L. 1990. Effects of Fire on Water Quantity and Quality. Pages 219-232 *in*: J.D. Walstad, S.R. Radosvich, and D.V. Sandberg, eds. Natural and prescribed fire in Pacific Northwest forests. Oregon State University Press, Corvallis, OR.

Earl, Stevan R., and Blinn Dean W. 2003. Effects of Wildfire Ash on Water Chemistry and Biota in Southwestern USA Streams. *Freshwater Biology*, Vol. 48, pages 1015-1030.

- Fratlicelli, L. A., Albers, J. P., Irwin, W. P., Blake, Jr, M. C. and C. M. Wentworth. 2012. Digital Geologic Map of the Redding 1° x 2° Quadrangle, Shasta, Tehama, Humboldt, and Trinity Counties, California. Open-File Report 2012-1228. Department of the Interior. U.S. Geological Survey. 19pp + map sheet.
- Gresswell, Robert E. 1999. Fire and Aquatic Ecosystems in Forested Biomes of North America. Transactions of the American Fisheries Society, Vol. 128, No. 2: 193-221. American Fisheries Society, Bethesda, MD.
- Gusman, A.J., Teal, M.J., Todesco, D. and M. Bandurraga. 2011. Sediment/Debris Bulking Factors and Post-Fire Hydrology for Ventura County. Final Report, WEST Consultants Inc., San Diego, California.
- Hudak, A.T., P.R. Robichaud, J.S. Evans, J. Clark, K. Lannom, P. Morgan, and C. Stone, 2004. Field Validation of Burned Area Reflectance Classification (BARC) Products for Post Fire Assessment. In: Greer, Jerry Dean, ed. Remote sensing for field users; proceedings of the tenth Forest Service remote sensing applications conference; 2004 April 5–9; Salt Lake City, UT. Bethesda, MD: American Society of Photogrammetry and Remote Sensing. CD-ROM
- Iverson, R.M. 1997. The Physics of Debris Flows. Reviews of Geophysics 35(3):245-296.
- Kean, J.W., McGuire, L.A., Rengers, F.K., Smith, J.B., and D.M. Staley. 2016. Amplification of postwildfire peak flow by debris. Geophysical Research Letters, 43: 8545-8553.
- Kinoshita, A.M.; Hogue, T.S.; Napper, C. 2014. Evaluating pre- and post-fire peak discharge predictions across western U.S. watersheds. Journal of the American Water Resources Association 50: 1540-1557.
- Lapierre, H., Albarede, F., Albers, J., Cabanis, B., and C. Coulon. 1985. Early Devonian volcanism in the eastern Klamath Mountains, California: evidence for an immature island arc. Canadian Journal of Earth Sciences, Vol. 22: 214-227.
- Lathrop, Richard G. 1994. Impacts of the 1988 Wildfires on the Water Quality of Yellowstone and Lewis Lakes, Wyoming. International Journal of Wildland Fire, Vol. 4, No. 3, pages 169-175.
- McMahon, Thomas E. and D.S. deCalesta. 1990. Effects of Fire on Fish and Wildlife. Pages 233-250 in: J.D. Walstad, S.R. Radosvich, and D.V. Sandberg, eds. Natural and Prescribed Fire in Pacific Northwest Forests. Oregon State University Press, Corvallis, OR.
- Minshall, Wayne G., James T. Brock, and John D. Varley. 1989. Wildfires and the Yellowstone's Stream Ecosystems. Bioscience Vol. 39: 707-715.
- National Marine Fisheries Service. 2014a. Final Recovery Plan for the Southern Oregon/Northern California Coast Evolutionarily Significant Unit of Coho Salmon (*Oncorhynchus kisutch*). National Marine Fisheries Service. Arcata, CA.

National Marine Fisheries Service. 2014b. Recovery Plan for the Evolutionarily Significant Units of Sacramento River Winter-run Chinook Salmon and Central Valley Spring-run Chinook Salmon and the Distinct Population Segment of California Central Valley Steelhead. California Central Valley Area Office. July 2014.

Parson, A., Robichaud, P.R., Lewis, S.A., Napper, C., and Clark, J.T., 2010. Field guide for mapping post-fire soil burn severity. Gen. Tech. Rep. RMRS-GTR-243. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 49 p.

Reiman, Bruce and Jim Clayton. 1997. Wildfire and Native Fish: Issues of Forest Health and Conservation of Sensitive Species. Fisheries Vol. 22, No. 11: 6-15. American Fisheries Society, Bethesda, MD.

Reiman, Bruce, Danny Lee, Gwynne Chandler, and Deborah Myers. 1997. Does Wildfire Threaten Extinction for Salmonids? Responses of Redband Trout and Bull Trout Following Recent Large Fires on the Boise National Forest. Pages 47-57 *in*: Proceedings – Fire Effects on Rare and Endangered Species and Habitats Conference, Coeur d' Alene, ID. International Association of Wildland Fire, Fairfield, WA.

Robichaud, Peter R., Russell T. Graham, and Roger D. Hungerford. 1993. Onsite sediment production and nutrient losses from a low severity burn in the interior Northwest. Pages 227-232 *in*: Baumgartner, D.M., J.E. Lotan, J.R. Tonn (compilers). Interior cedar-hemlock-whitepine forests: ecology and management: Proceedings; 1993 March; Spokane, WA.

Robichaud, P. R.; Elliot, W. J.; Wagenbrenner, J. W. 2011. Probabilistic soil erosion modeling using the Erosion Risk Management Tool (ERMIT) after wildfires. ISELE Paper Number 11039. Paper presented at the international symposium on erosion and landscape evolution; September 18-21, 2011; Anchorage, AK. ASABE Publication Number 711P0311cd. 8 p.

Staley, D.M., Negri, J.A., Kean, J.W., Tillery, A.C., and A.M. Youberg. 2016. Updated logistic regression equations for the calculation of post-fire debris-flow likelihood in the western United States: U.S. Geological Survey Open-File Report 2016-1106, 13p., available at: <http://pubs.usgs.gov/of/2016/1106/>

DOI National Interagency Watershed Team

Sam Flanagan, Geologist, BLM Arcata Field Office, CA
Sidney Post, Hydrologist, BLM South River Resource Area, OR
Allison Reddington, Hydrologist, Cherokee National Forest, TN
Bill Sims, Soil Scientist, Bureau of Indian Affairs-Retired, NM
Rich Pyzik, Fish Biologist/Hydrology, Fremont-Winema National Forest, OR

**BURNED AREA EMERGENCY STABILIZATION PLAN
CARR FIRE
CULTURAL RESOURCE ASSESSMENT**

I. OBJECTIVES

- Determine if known or incidentally encountered cultural resources within, adjacent to or downstream of the Carr Fire were damaged by the fire or are threatened by post-fire conditions. If applicable, prescribe emergency stabilization treatments to minimize, negate, or mitigate those impacts.
- Determine if any proposed emergency stabilization treatments for the 2018 Carr Fire have the potential to adversely impact cultural resources and, if so, prescribe actions to minimize, negate, or mitigate identified adverse effects to cultural resources to meet Section 106 of the National Historic Preservation Act requirements (NHPA).
- Meet all Federal cultural resources legal mandates and agency policies, including consultation with affiliated American Indian Tribes for the Carr Fire BAER assessments and emergency stabilization treatments.

II. ISSUES

- Numerous archaeological sites or historic structures on NPS, BLM and USFS lands are known to occur within or immediately adjacent to the Carr Fire. Many of these resources have National Register of Historic Places (NRHP) qualifying attributes that are subject to direct fire effects and/or are vulnerable to impacts caused by the post-fire environment. Cultural resource assessments need to be completed for these resources.
- Historic vegetation including the Camden House Historic District apple orchard and other ethnobotanical resources need to be assessed for condition and accessibility.
- Many trees were burned or scorched during the 2018 Carr Fire within the fire area. These fire-killed trees can fall and directly impact cultural features, such as historical structures including the Crystal Creek Ditch and the Clear Creek Ditch, or uproot and expose cultural materials that were previously buried and potentially impacting the NRHP qualifying attributes of known significant cultural resources.
- NPS and BLM lands affected by the 2018 Carr Fire are adjacent to public roads and established trail systems. The potential for unauthorized artifact collection, looting, and vandalism that can impact the NRHP qualifying attributes of known cultural resources is significantly increased with the loss of vegetative cover.
- Other proposed emergency stabilization treatments may be implemented for public safety, preservation of agency infrastructure, or protection of natural resource values. These treatments may have the potential to impact known sensitive cultural resources especially if ground disturbing activities are required.

III. OBSERVATIONS

A. Background

This cultural resource assessment was completed to determine if post-fire conditions pose a risk to cultural resource values. The identification of cultural resource values at risk includes completing a cultural resources data records search for the fire area, consulting with agency cultural resources personnel, and conducting field assessments. Not all values initially identified during the records search were determined to be at risk. Where emergency conditions have the potential to affect known cultural resources, treatment prescriptions are developed to protect the values at risk. This includes evaluation of direct fire impacts on known resources and evaluating potential post-fire impacts within burned areas. The most significant factor leading to post-fire risk is loss of ground cover, which exposes artifacts to looters and leads to increased erosion and deposition as a result of decreased infiltration, increased runoff, and increased exposure to wind.

Cultural resources within the fire area span the range of known human occupation in the northern Sacramento Valley and adjoining Klamath Mountains extending back eight to ten thousand years. Prehistoric sites extend from these early periods to Euro-American contact shortly before the beginning of the California Gold Rush. Much of the history in the fire area is directly related to mining including the placer, hydraulic, and hard-rock mining phases. The timber industry, travel and commerce, and ranching also played a role in the development of the area.

Prehistoric sites found in the fire area include artifact scatters representing early nomadic campsites, developed resource extraction/collection locations, and large permanent habitation sites. Features can include bedrock grinding features, house pit depressions and midden deposits, stacked rock features or alignments, or rock art. Historic sites can include mine shafts/adits and prospecting features, buildings/ruins, foundations, roads, fence lines, and trash/debris scatters. Both the NPS and BLM have several overview or survey reports on file that summarize historical and archaeological information for the fire area.

B. Resource Identification and Assessment Methods

Field assessments of known cultural resources located on NPS and BLM lands within the Carr Fire area affected by the fire and subject to post-fire threats were performed by the DOI BAER Team archaeologists and historical architect from August 13-22, 2018. The assessments were completed by National DOI BAER team Archeologists Carla Burnside, Joseph Svinarich, Devin Snyder, NPS Archaeologist Michael Peterson, BLM Archaeologist Eric Ritter, BLM Archaeologist Alden Neel, and NPS Historical Architect Ashley Phillips. Cultural resource assessments for the fire included examination of fire

and cultural resource data to identify resources most likely to be threatened by the fire, and completion of field assessments for significant sites that were easily accessible and in non-hazardous areas of the fire. However, given the large quantity of cultural resources under NPS and BLM jurisdiction within the fire area, and limited time allowed for developing the BAER plan, only a limited number of cultural features and archaeological sites were assessed.

Field assessments of known cultural resources located on USFS lands within the Carr Fire area affected by the fire and subject to post-fire threats are being assessed at the time of this plan by DOI BAER Team archaeologists for 12 archaeological sites. Recommendations for stabilization treatments will be transmitted to the USFS for use in USFS Form 2508.

Record searches of archaeological records and historical information were conducted, and cultural resources located within the area affected by the fire were ranked based on site significance and potential for fire related impacts. Examination of known cultural resources in relation to the fire areas and in burned watersheds were completed to determine if sites were likely to have burned over or if there was a threat of erosion due to burned areas on steep slopes above identified cultural resources. However, given the large quantity of cultural resources within the fire area, and limited time allowed for developing the BAER plan, only a limited number of cultural features and archaeological sites were assessed in the field. These were chosen based on the results of a geo-spatial risk assessment and consideration of site significance. Documentation methods for completed field assessments included field notes and completion of BAER cultural resources assessment forms, digital photo documentation, and collection of GPS location data.

The risk assessment used to develop the priority ranking for field site assessments consisted of geospatial analysis using ArcGIS to intersect archaeological site locations with three classes (low, moderate, high) of burn severity data derived from the Burned Area Reflectance Classification (BARC) for the fire area. Predicted watershed response following storms at the 10 year return interval was also developed by the BAER Team using the best available data within the time constraints allowed for developing this plan. This data was also used to intersect locations of known archaeological sites and historical structures within the fire area. All cultural resources were also visually examined with regard to topographic setting and proximity to major stream channels. The results of these geospatial analyses were combined into a matrix to develop a risk assessment chart for known cultural resources located within the fire area (Table 1). Documentation for cultural resources determined to be at highest risk was used to priority rank these resource values at risk for field assessment completion.

The risk for direct fire impacts to cultural resources is significant within the fire area as defined by the burn severity model and the high proportion of cultural resources located within moderate or high burn severity burn areas. Review of analysis results show many cultural resource sites on NPS and BLM lands were subject to direct fire effects and will most likely be impacted by the post-burn watershed response. Sites that are most likely directly affected by the fire include 99 NPS sites (54%) and 230 BLM sites (55%) located within areas that burned at higher intensities. Of these, 48 NPS sites (or 26%) and 77 BLM sites (18%) may be subject to an above normal watershed response and associated potential for erosion or sedimentation impacts.

Table 1. Summary of site by Burn Severity and Watershed Response for NPS sites

Watershed Response for a 10-yr event	Unburned	Low Burn Severity	Moderate Burn Severity	High Burn Severity	TOTAL
Normal	17	12	28	0	57
Low	0	30	23	0	53
Moderate	0	20	32	1	53
High	0	4	14	1	19
TOTAL	17	66	97	2	182

Table 2. Summary of site by Burn Severity and Watershed Response for BLM sites

Watershed Response for a 10-yr event	Unburned	Low Burn Severity	Moderate Burn Severity	High Burn Severity	TOTAL
Normal	1	42	40	0	83
Low	3	114	102	1	220
Moderate	0	32	51	1	84
High	0	9	21	4	34
TOTAL	4	197	214	6	421

The nature of the resource and accessibility was also considered in conjunction with the geospatial cultural resource site risk assessment and included consultation with local agency office cultural resource staff to identify specific resources of concern. Flammable historical structures are often found within historic period mining or habitation sites. Some archaeological sites and historic period features are inherently more susceptible to fire damage, or include components that make them NRHP eligible and can be affected

additional 61 BLM managed archaeological sites require post-fire condition assessments because of their location in high risk areas associated with the fire.

Impacts resulting from the fire and post-fire environmental threats were noted for all of the cultural sites and features during the initial assessments, and treatments were defined for the same. Impacts to cultural resources as a result of fire, fire management actions, and post-fire conditions can be conveniently divided into three categories: direct, operational, and indirect. Direct impacts are those caused by the wildland fire itself or its byproducts (e.g., smoke); operational impacts are caused by fire management actions made in response to wildland fires (e.g., fire line construction, retardant drops); and indirect impacts occur as a result of fire-induced changes to the context in which cultural resources are found (e.g., erosion due to loss of vegetation cover, toppling of fire-killed trees, and looting). Operational impacts to cultural resources are identified, assessed and mitigated as part of fire suppression activity damage repair and funded from the fire emergency suppression account.

Indirect impacts of the greatest concern within the Carr Fire include erosion, fire-killed hazard trees, and looting or vandalism resulting from the post-fire exposure of artifacts. This includes incremental sediment loss and deposition, as well as catastrophic events such as debris flows. Onsite and upslope post-fire vegetation conditions influence erosion potential affecting resources at the bottom of burned watersheds. Fire-killed trees that fall can affect cultural resources if they impact cultural features or cause ground disturbance through impact and uprooting. Loss of vegetative cover due to fire can expose cultural features and surface artifacts that may be collected by uneducated visitors or vandalized by unscrupulous looters in these burned areas.

Slope and Erosion Potential

Many archaeological sites are located in areas that warrant field assessments to determine actual on-site erosion threats. Soil destabilization resulting in erosion of cultural features, deposition on site features or artifact concentrations due to vegetation loss and steep slopes presents a very real concern for NRHP listed or eligible sites within the NPS, BLM and USFS jurisdictions. As determined by the geospatial risk assessment the more significant resources located within the fire affected area are at greatest risk from erosion, flooding, or debris flows. Results of the hydrologic assessment of watersheds indicate erosion from fluvial and colluvial flows is a significant concern for preserving the integrity of archaeological sites and cultural landscape features within the fire area. Some factors affecting the amount of erosion at sites include burn severity, slope, geology, amount of vegetation loss, and the geographic position of particular sites across the landscape.

Cultural resources located on or below steep slopes are subject to increased precipitation runoff and/or surficial erosion from direct rain during heavy rainfall events that can erode archaeological sites or historic features. Sites located in the southwestern portion of the burn where biotite and hornblende biotite granodiorite of the Shasta Bally Batholith (Lower Cretaceous) is prominent (Thornberry 2007) are at the highest risk of eroding because of the hydrophobic soils which increase water repellency, surface runoff and erosion. These above factors combined with a total loss of vegetation and the geographic location of some sites (e.g. at confluences, on ridges, or at the edges of drainages) will exponentially increase the chance of major fluvial and colluvial erosion at post-burn sites.

Of particular concern is the historic Crystal Creek Ditch, a popular trail and operational water conveyance system that contributes to the Camden House Historic District Cultural Landscape. The multi-component system includes an earthen ditch and berm, metal flumes, an inverted siphon, concrete intake and weir, wooden water storage tank, clean-out shed, and a hiking trail that follows the top of the berm and then transitions to a narrow boardwalk along the metal flume portion of the trail. The ditch and trail runs along a moderately steep slope that saw a high burn severity resulting in dozens of stump holes and denuded slopes. A likely cause of erosion is from water collecting in stump holes and causing blowouts above, atop, and below the ditch; resulting in the collapse of the ditch and berm. These same impacts can be expected at other historic ditches in the fire area.

Other significant concerns include dry laid stone walls at multiple archeological sites and at the El Dorado Mine Historic District Cultural Landscape. Some walls at El Dorado had previously shown signs of deterioration as encroaching vegetation and erosion threatened stability. Post-fire, upslopes denuded of vegetation and woody debris have increased the risk of stone wall instability and collapse. Loose soils have already begun to migrate over the stone walls, and additional sheet or rill erosion will lead to increased destabilization.

Emergency stabilization includes adding sandbags to reinforce threatened retaining walls and redirecting debris flows through directional tree falling. Resources along waterways, such as historic bridge piers and the Crystal Creek Ditch intake structure should be monitored after heavy or prolonged rain events to assess potential debris collection or undercutting.

Fire-Damaged, Fire-Killed Trees and Woody Debris

Archaeological sites with fire-killed trees located on or near site features such as the Crystal Creek Ditch, hand-stacked retaining walls, historical structures, prehistoric sites, or within recorded artifact concentration areas need to be assessed. These trees will eventually fall, further disrupting site features and may pull up root balls that will impact and expose subsurface archaeological deposits. Completed field site assessments have

demonstrated that most of the fire area has fire-damaged trees. Tree mortality is significant for the Carr Fire and fire-killed hazard trees abound within the fire area. Numerous fire-killed hazard trees were identified at cultural resource sites during the initial BAER assessment that will need to be removed to protect site features and archaeological deposits from tree fall and uprooting trees. In addition, these hazard trees pose a significant threat to workers conducting other emergency stabilization activities.

Dozens of fire-killed trees are noted along the historic Crystal Creek Ditch, which can potentially damage the resource, and place visitors at risk. During the assessment, it was observed that many fire-killed trees upslope from the ditch have a high potential of falling into the ditch or berm, damaging the integrity of the ditch system. Trees have already fallen onto the metal flume and boardwalk portion of the ditch, and woody debris has begun to migrate downslope and collect in the ditch causing further damage to integrity and operability.

The Stone House on NPS lands, is managed as an archaeological resource and associated with early mining in the area, was also damaged by a fire-killed tree. The impact dislodged stones from the top stone coursing and caused a retaining wall to separate from the structure. Additionally, the tree landed on the foundations of another structure, causing unknown damage. Hazard trees located behind and uphill of the stone house pose further risks to the structure if not removed.

Fire-killed trees will tend to topple at archeological sites located along watercourses where secondary gravels are abundant and limited. Archeological sites within channeled topographic corridors creating higher wind speeds, coupled with locations next to watercourses, further increases the chance that fire-killed trees will uproot and disturb intact archeological deposits these particular sites. One site located [REDACTED] on NPS managed lands was assessed by the BAER Team and a toppled fire-killed tree was noted with exposed archeological deposits and covering a portion of a historic architectural feature. This illustrates the need to reduce future adverse effects of fire-killed trees at other archaeological sites and historic properties within the burn area.

Potential Looting of Archaeological Sites

Field examination of archaeological sites and cultural features during the initial post-fire assessment revealed the potential for unauthorized artifact collecting and/or looting. Much of these areas were characterized by dense stands of shrub vegetation and pine or oak trees, or grasses before the fire. Easy access resulting from [REDACTED] with the loss of vegetative ground cover has elevated the post-burn probability of illegal artifact collecting or looting. Loss of vegetation providing ground surface cover has clearly revealed cultural material in these readily accessible areas.

Integrity of the archaeological deposits represents the most significant attribute for NRHP eligibility for site data potential.

Increased patrols and archaeological site monitoring are recommended to address these potential illegal artifact collecting and looting concerns. Proposed exclusionary fencing and signing will provide some degree of protection, but there is no guarantee that artifact hunters will honor the area closure and may in fact see it as an opportunity to collect artifacts without worry of being seen. Using Tribal Cultural Resource Monitors to periodically monitor archaeological sites is a proposed method to deter and or report Archeological Resource Protection Act violations.

Direct Fire Impacts to Cultural Features

Fire can directly affect cultural resources by damaging or altering elements or attributes of cultural materials that make them significant (Buenger 2003; Klemic 2005). Fire intensity and burn severity vary with fuel type and fuel loading, with greater burn severity occurring in areas with heavier fuel loading (Hanes 2001; Winthrop 2004). While fire intensity and burn severity generally increase with heavier fuel loads, fuel arrangement plays a significant role in fire behavior as the presence or absence of ladder and intermediary fuels will allow or prevent fire from entering the tree crowns or igniting large heavy fuels (Deal 2002). In some instances, sites can be protected during wildfires by removing the ladder and intermediary fuels.

Although many prehistoric sites consist primarily of flaked or ground-stone artifacts, some include features that can be directly affected by fire including midden soils or rock art. In addition, some sites are valued as significant ethnographic locations by contemporary tribes.

Four National Register listed structures were destroyed by fire. Other destroyed or damaged structures, including three remote cabins, several NPS administrative buildings, and multiple historic mining-related structures, are managed as archaeological resources or did not have a determination of eligibility. Due to the rapid spread and extreme behavior of the fire, firefighters were unable to provide protective measures to remote or not-easily accessed structures, and many park and BLM structures suffered complete timber incineration. Other historic structures easily accessible from major roadways, like the Camden House, were saved by firefighter efforts.

NPS Fire Destroyed Structures	Designation Number
El Dorado Mine Stamp Mill	[REDACTED]
El Dorado Mine Equipment Shed	[REDACTED]
Crystal Creek Ditch Clean-Out Shed	[REDACTED]
[REDACTED] Cabin	[REDACTED]

Ground-Disturbing Emergency Stabilization Treatments

Proposed treatments for emergency stabilization were discussed with the BAER Team during daily team meetings. Treatments with the potential to impact known cultural resources are subject to federal regulatory evaluation (36CFR800) to ensure identified impacts will have minimal effect on historic properties. This includes cleaning culverts, removal of campground infrastructure from within archaeological sites or near cultural features, and removal/replacement of bridges and culverts or other roadwork. For all these treatments archaeological monitoring may ensure appropriate preventative measures are observed to avoid impacts to known cultural sites and features when initiating ground disturbing activities. However, for all proposed activities with the potential to impact historic properties, including those proposed to stabilize historical resources or prehistoric sites, the agency must meet the regulatory requirements under NHPA, Section 106.

IV. RECOMMENDATIONS

A. Emergency Stabilization

Emergency stabilization (BAER) funds are used to assess and, if necessary, mitigate the direct effect of fire and related indirect impacts such as erosion and hazard trees, as well as identify and mitigate resources that could be affected by emergency stabilization treatments (e.g., ground-disturbing activities). Treatment recommendations include both emergency stabilization specifications that are eligible for funding under BAER and non-specification management recommendations intended to meet general agency cultural resource management standards. The following emergency treatment specifications were developed following completion of fifty-seven (57) in-field site assessments and the results of a geospatial risk assessment which considered the fire area burn severity and modeled watershed response predictions for 10-year storm events.

NPS Emergency Stabilizations

NPS-6-ES (*Historic Blacksmith Shop Stabilization*): Wooden shoring installed on the Blacksmith Shop walls after the Motion Fire in 2014 have partially burned, resulting in insufficient bracing of the historic mud-mortared rock walls. This treatment will replace burned bracing members and cribbing, repair any damages to a French drain located behind the site, replace sand bags and wattles. This treatment will stabilize the walls until the park can develop and implement a permanent solution.

NPS-7-ES (*Historic El Dorado Mine Stabilization*): The El Dorado Mine Historic District Cultural Landscape () suffered a high burn severity, resulting in the destruction of two wooden buildings, a wooden retaining wall, and mine entrance framing. Fire-killed trees and denuded slopes pose a threat to historic retaining walls, and remaining mining equipment. This treatment will clear debris from burned structures, provide temporary shed-roof covers for historic mining equipment and artifacts, and buttress erosion-threatened retaining walls with sandbags.

NPS-8-ES (*Historic Redwood Tank Dismantle and Storage*): The Crystal Creek Ditch Water Storage Tank, an integral component of the Crystal Creek Ditch water conveyance system was burned during the fire. The extant staves and floorboard do not retain enough structural integrity to be reused, and it is recommended the remnants be removed and disposed of, and that original metal hardware is placed in storage for a future reconstruction project. A temporary water tank will be placed at the site to provide water for the historic apple orchard.

NPS-9-ES (*Historic Stone House Stabilization*): A fire-killed tree damaged a small stone and concrete building that is associated with local mining history. The impact dislodged multiple stones from the top course of the front wall and caused an adjoining retaining wall to disconnect from the structure. Stabilization treatment will include removing the tree from the site and assessing additional damage to features beneath it, and constructing a wooden brace support for the retaining wall.

NPS-10-ES (*Archaeological Site Protection Patrols*): Loss of vegetative cover due to the Carr Fire has left a large number of potentially vulnerable cultural resources that may be subject to unauthorized artifact collecting or looting of recently exposed artifacts and cultural features. This treatment is intended to preserve the data potential of at risk archaeological sites and provide protection from unauthorized artifact collecting and looting. Cultural resource site protection is to preserve NHPA qualifying site characteristics of data potential inherent in artifacts and artifact location (36CFR60). This treatment will include site monitoring and documentation of cultural artifacts and features exposed following the fire per NPS standards/policy. Archaeological sites and individual artifacts under federal jurisdiction are protected under the Archaeological Resources Protection Act (ARPA) and for sites with human burials under Native American Graves Protection and Repatriation Act (NAGPRA). Increased site surveillance in the fire area is intended to deter looting and illegal artifact collection.

The site protection patrols will be completed by NPS employees and cooperating partners, including Certified Tribal Monitors, who will report any illegal activity or evidence thereof to the Cultural Resource staff who notify park Law Enforcement personnel. GPS data, digital photographs, and field inspection notes will be collected as

needed to prepare legal cases against perpetrators and compile a final report documenting activities and accomplishments completed for this treatment specification.

NPS-11-ES (*Archaeological Site Condition Assessments*): A total of [REDACTED] potentially vulnerable cultural resources were identified within the Carr Fire area on NPS lands. These need to be assessed for susceptibility to looting, erosional effects, and other fire related impacts to determine any needed emergency stabilization treatment. The large number of potentially vulnerable cultural resources dictated that not all assessments could be completed prior to completion of the BAER plan. [REDACTED]

[REDACTED] The assessment will follow the protocol established for the BAER planning and assessment phase, including documenting post-burn observations and photographic recordation of resource condition and threats.

Completing the assessment process will consist of compiling, processing, and archiving field data to include GPS data, digital photographs, and field inspection notes to prepare an accomplishments report including an analysis of field methods and results and summarize the treatment specification success. These activities will be performed by NPS archeologists.

NPS-12-ES (*Historic Crystal Creek Ditch Stabilization*): A cultural resource investigation of the Crystal Creek Ditch (a contributing element of the Camden House Historic District) was conducted during the initial BAER planning and assessment process for the 2018 Carr Fire. Findings indicate that components of this historic property were severely impacted by the fire and are at risk of failing and will be adversely affected by erosion and other weathering processes.

To return the ditch to a functional state, this specification includes four components: 1) Clear fire-killed trees and fallen trees within 15 feet either side of the ditch; 2) Clear woody debris and minor amounts of sediment within the ditch deposited as a result of the fire; 3) Fill burned out stump holes and burned out root holes within the inboard and outboard edges of the earthen ditch structure; and 4) Repair steel cat-walk infrastructure damaged by fallen trees, replace burned cat-walk boards associated with the ditch's flumes, reconstruct burned cross-culvert frames and support structures, and replace fire damaged bearings and other mechanical parts at the burned out clean-out shed for visitor safety and to prevent further degradation of the mechanical infrastructure.

NPS-13-ES (*Previously Assessed Historic Property Stabilization*): The removal of hazard trees and repair of existing exclusionary fence will help to mitigate further damage to significant sites managed by Whiskeytown NRA. Fire-killed hazard trees pose a significant threat to project staff and cultural resources values in the post-fire environment. Falling trees can strike vulnerable structures or uproot exposing buried

artifacts affecting integrity of features contributing to site significance or impacting artifact values providing data potential. These hazard trees also represent a risk to project staff conducting emergency stabilization work. These trees need to be identified by trained staff who can fall them under controlled conditions to remove the hazard. In some instances, the trees can be strategically dropped to reduce site access and surface visibility to reduce the threat of looting. Proactively cutting the trees also eliminates the potential for uprooting trees that may expose subsurface archaeological deposits. This work will need to be done in consultation with archaeological staff who can identify cultural resource values that require protection. In some cases, existing exclusionary fencing damaged by the fire will need to be replaced or repaired to maintain the pre-fire site protection.

This treatment will consist of three components: (1) Clear fire-killed trees and fallen trees from resources; (2) Lop and scatter, chip, and/or directionally fell fire killed hazard trees to reduce site surface visibility, erosion, and fuel loading potential; (3) Repair existing exclusionary fencing surrounding sites to discourage access. On-site monitoring conducted during treatment will ensure that work is conducted to NPS standards. Monitoring efforts will additionally include photo documentation, field notes, and a report that will be prepared following the completion of stabilization efforts.

NPS-14-ES (*Cultural Resource Compliance*): Fund a GS-7 Archaeologist to complete Archaeological Site Condition Assessments (NPS-11-ES), Assessed Historic Property Stabilizations (NPS-13-ES), and Archaeological Site Protection Patrols (NPS-10-ES) and fulfill Cultural Resource Section 106 Compliance activities associated with other specifications developed for treatments as a result of the Carr Fire.

NPS-26-ES (*Post Condition Assessment Site Stabilizations*): [REDACTED] archaeological sites will have post-fire condition assessments conducted by NPS archaeologists as part of the Archaeological Site Condition Assessment Specification. Based on findings from assessments conducted during BAER field visits all sites will require at a minimum hazard tree removal or other site stabilization treatments.

This specification consists of three components: (1) Clear fire-killed trees and fallen trees from resources; (2) Lop and scatter, chip, and/or directionally fell fire killed hazard trees to reduce site surface visibility, erosion, and fuel loading potential; and (3) Repair existing exclusionary fencing surrounding sites to discourage access. The GS-7 Archaeologist (Specification NPS-14-ES) will coordinate with and monitor the work of the Fuels Crew at archaeological sites where these treatments are recommended.

BLM Emergency Stabilizations

BLM-1-ES (*Archaeological Site Protection Patrols*): Loss of vegetative cover due to the Carr Fire has left a large number of potentially vulnerable cultural resources that may be subject to unauthorized artifact collecting or looting of recently exposed artifacts and cultural features and ORV damage. This treatment is intended to preserve the data potential of at risk archaeological sites and provide protection from unauthorized artifact collecting and looting. Cultural resource site protection is to preserve NHPA qualifying site characteristics of data potential inherent in artifacts and artifact location (36CFR60). This treatment will include site monitoring and documentation of cultural artifacts and features exposed following the fire per BLM standards/policy. Archaeological sites and individual artifacts under federal jurisdiction are protected under the Archaeological Resources Protection Act (ARPA) and for sites with human burials under Native American Graves Protection and Repatriation Act (NAGPRA). Increased site surveillance in the fire area is intended to deter looting and illegal artifact collection.

The site protection patrols will be completed by BLM employees and cooperating partners, including Certified Tribal Monitors, who will report any illegal activity or evidence thereof to BLM cultural resources staff who notify BLM law enforcement. GPS data, digital photographs, and field inspection notes will be collected as needed to prepare legal cases against perpetrators and compile a final report documenting activities and accomplishments completed for this treatment specification.

BLM-2-ES (*Archaeological Site Condition Assessments*): A total of 82 potentially vulnerable cultural resources were identified within the Carr Fire area on BLM lands. These need to be assessed for susceptibility to looting, erosional effects, and other fire related impacts to determine any needed emergency stabilization treatment. The large number of potentially vulnerable cultural resources dictated that not all assessments could be completed prior to completion of the BAER plan. Currently only 21 assessments have been completed and continuation of the cultural resources assessment process for the Carr Fire is needed for the remaining 61 sites. The assessment will follow the protocol established for the BAER planning and assessment phase, including documenting post-burn observations and photographic recordation of resource condition and threats.

Completing the assessment process will consist of compiling, processing, and archiving field data to include GPS data, digital photographs, and field inspection notes to prepare an accomplishments report including an analysis of field methods and results and summarize the treatment specification success. These activities will be performed by BLM archaeologists.

BLM-3-ES (*Previously Assessed Historic Property Stabilization*): The removal of hazard trees and repair of existing exclusionary fence will help to mitigate further damage to

significant sites managed by the Bureau of Land Management (BLM) Redding Field Office. Fire-killed hazard trees pose a significant threat to project staff and cultural resources values in the post-fire environment. Falling trees can strike vulnerable structures or uproot exposing buried artifacts affecting integrity of features contributing to site significance or impacting artifact values providing data potential. These hazard trees also represent a risk to project staff conducting emergency stabilization work. These trees need to be identified by trained staff who can fall them under controlled conditions to remove the hazard. In some instances, the trees can be strategically dropped to reduce site access and surface visibility to reduce the threat of looting. Proactively cutting the trees also eliminates the potential for uprooting trees that may expose subsurface archaeological deposits. This work will need to be done in consultation with archaeological staff who can identify cultural resource values that require protection. In some cases, existing exclusionary fencing damaged by the fire will need to be replaced or repaired to maintain the pre-fire site protection.

This treatment will consist of three components: (1) Clear fire-killed trees and fallen trees from resources; (2) Lop and scatter, chip, and/or directionally fell fire killed hazard trees to reduce site surface visibility, erosion, and fuel loading potential; (3) Repair existing exclusionary fencing surrounding and signage at sites to discourage access. On-site monitoring conducted during treatment will ensure that work is conducted to the standards of BLM Redding Field Office archaeology staff. Monitoring efforts will additionally include photo documentation, field notes, and a report that will be prepared following the completion of stabilization efforts.

BLM-4-ES (*Kett Ethnographic Site Stabilization*): Stabilize post-fire effects at the Kett Site (CA-SHA-491, CA-030-008) also known as the ethnographic Wintu “resting place (*Phu-rus-topi*)” or *No-Sai*. The site contains extensive midden deposits, and at least eight housepit features. Hazard trees, destroyed split rail exclusionary fencing, increased access potential, and increased site surface visibility put the site at further risk of damage and disturbance should treatment measures not be undertaken. All proposed on-site treatments should be undertaken after consultation with the Wintu Tribe has been completed, particularly the replacement of existing on-site signage.

This treatment will consist of four components: (1) Fire killed hazard trees within or adjacent to site boundaries, particularly near housepit features at the center of the site, the designated burial area to the southeast, and along access routes to the north of the site where unauthorized OHV access is most likely to occur. (2) Reconstruct existing exclusionary split rail fencing surrounding the burial area within the footprint of the previous fence line. Fence line measures 42 feet (east-west) by 45 feet (north-south) and encompasses the known extent of the burial area. (3) Chip, lop and scatter, or directionally fall hazard trees as appropriate. Lop and scatter and/or chipping should occur within the site boundary on exposed surface soils. Directional falling should take

place along the northwestern extent of the site along the two-track access road so that trees may be placed perpendicular to the road. (4) Replace signage at previous location using original posts; this is dependent on the outcome of consultation efforts with the Wintu Tribe.

BLM-5-ES (Charlie Brownstein Grave Stabilization): Stabilize post-fire effects at the Charley Brownstein Gravesite (CA-030-367). The gravesite is a highly visible, historic (1864) period infant burial, located on BLM land, that represents the last evident gravesite of the Shasta Hebrew Congregation Jewish Cemetery established in 1857. Fire killed hazard trees threaten to impact the site and pose a risk to the individuals who visit the gravesite. Footpath erosion also poses a risk to the gravesite and the pedestrians who utilize it. The removal of hazard trees, reconstruction of footpath handrail, steps, and railroad tie border, and construction of a French drain at the base of the stairs and slope will help to mitigate further damage to a significant site managed by the Bureau of Land Management (BLM) Redding Field Office.

BLM-6-ES (Cultural Resource Compliance): Fund a GS-7 Archaeologist to complete Archaeological Site Condition Assessments (BLM-2-ES), Assessed Historic Property Stabilizations (BLM-3-ES), and Archaeological Site Protection Patrols (BLM-1-ES) and will fulfill Cultural Resource Section 106 Compliance activities associated with other specifications developed for treatments as a result of the Carr Fire.

BLM-20-ES (Post Condition Assessment Site Stabilizations): Sixty-one archaeological sites will have post-fire condition assessments conducted by BLM archaeologists as part of the Archaeological Site Condition Assessment Specification. Based on findings from assessments conducted during BAER field visits all sites will require at a minimum hazard tree removal or other site stabilization treatments.

This specification consists of three components: (1) Clear fire-killed trees and fallen trees from resources; (2) Lop and scatter, chip, and/or directionally fell fire killed hazard trees to reduce site surface visibility, erosion, and fuel loading potential; and (3) Repair existing exclusionary fencing surrounding sites to discourage access and signage as needed. The GS-7 Archaeologist (Specification BLM-6-ES) will coordinate with and monitor the work of the Fuels Crew at archaeological sites where these treatments are recommended.

USFS Emergency Stabilizations

Recommendations for post-fire stabilization at sites assessed by DOI BAER team archaeologists will be provided to the USFS for inclusion in USFS Form-2508 after completion of site assessments.

B. Management Recommendations - (Non-Specification Related)

Visual Impacts to Cultural Landscapes

Fire impacts to the Camden House Historic District Cultural Landscape have damaged contributing features and altered the viewshed of the site. When feasible, the park should replace burned or damaged segments of picket and field fencing, and remove melted irrigation lines and abandoned and melted fire hose.

Blacksmith Shop Wall

Emergency specifications for stabilization are a temporary measure. The park should consult with a historical architect, or other preservation professional, to develop a permanent stabilization plan for the ruin.

Newly Exposed Site Features on Previously Recorded Sites

Following vegetation loss due to the Carr Fire many historic features and areas of artifact scatter were noted during the initial BAER assessment. In some cases, such as in [REDACTED] the extent of new features is extraordinary and appears to link two previously recorded sites and includes a significantly larger site area with numerous new features, connecting road and trail system. These areas should be recorded to NPS/BLM standards to meet NPS responsibilities for management of cultural resources.

Newly Exposed Archaeological Resources

Extensive removal of vegetation provides an opportunity to conduct Section 110 surveys on agency lands within the fire perimeter. These surveys should be conducted within the first year post-fire before shrubs regrow and obscure artifacts and features.

V. CONSULTATIONS

A. Agencies

- Glendee Ane Osborne, Cultural Resources Program Manager, Whiskeytown National Recreation Area
- Eric Ritter, Cultural Resources Program Manager, BLM Redding Field Office
- Alden Neel, Archaeologist, BLM Redding Field Office
- Jason Judd, Maintenance Staff, Whiskeytown National Recreation Area
- Matt Padilla, Heritage Resources Manager, Shasta-Trinity National Forest

B. SHPO

The National Park Service, the Bureau of Land Management and the US Forest Service will continue to conduct consultations with the California SHPO for proposed treatments identified in this plan.

C. TRIBES

The National Park Service, the Bureau of Land Management and the US Forest Service will conduct consultations with the affected Tribes for proposed treatments identified in this plan

REFERENCES

Buenger, Brent A. 2003. *The Impact of Wildland and Prescribed Fire on Archaeological Resources*. Phd Dissertation, University of Kansas, Lawrence, Kansas.

Deal, Krista. 2002. Fire Effects Studies on the Eldorado National Forest. *Society for California Archaeology Newsletter* 36 (2).

Hanes, Richard C. 2001. Chapter VIII - Cultural Resources. In the *Fire Effects Guide (NFES 2394)* by the National Wildlife Coordinating Group, National Interagency Fire Center, Boise ID.

Klemic, Katherine G. 2005. *Cultural Resource Management and the Effects of Fire: Protecting Archaeological Sites on the Los Padres National Forest*. Master's Thesis, University of California, Santa Barbara.

Thornberry- Ehrlich, T. 2007. *Whiskeytown National Recreation Area Geologic Resource Evaluation Report*. Natural Resource Report NPS/NRPC/GRD/NRR—2007/008. National Park Service, Denver, Colorado.

Winthrop, Kate. 2004. *Bare Bones Guide to Fire Effects on Cultural Resources for Cultural Resource Specialists*. Bureau of Land Management. Washington, D.C.

Carla Burnside, Zone Archaeologist, USFWS, Spokane, Washington. 509-893-8007
Michael R. Peterson, Archaeologist, NPS, Redwood National and State Park. 707-465-7717
Ashley Phillips, Historical Architect, NPS, Lassen Volcanic National Park. 530-595-6181
Devin Snyder, Archaeologist, BLM, Susanville Field Office, Alturus, CA. 530-233-7932
Joseph Svinarich, NPS, Fire Program Archaeologist, Klamath Network. 530-638-6744

ABANDONED MINE LANDS (AML) ASSESSMENT

OBJECTIVES:

- Identify changes in condition of abandoned mine sites directly related to the Carr Fire
- Locate newly exposed mine hazard features that had previously been hidden by vegetation
- Identify sites that may see increased visitation due to the new access routes (dozer trails or previously hidden/overgrown roads)

METHODOLOGY:

Due to the size of the Carr Fire and time constraints, not all AML sites in the burned area were able to be visited. Some sites were inaccessible due to road damage or fire suppression/repair activities. Sites visited were chosen based on their accessibility, public popularity, and recommendations from agency staff.

NPS SITES VISITED & SPECIFIC RECOMMENDATIONS:

El Dorado Mine & Mill*: The El Dorado is a popular visitor attraction at Whiskeytown. The site is [REDACTED]. The stamp mill and equipment shed were burned during the fire and are covered in the cultural section of this report. The hill behind the El Dorado Mill was surveyed for mine features. [REDACTED]
[REDACTED]

Recommendations: Whiskeytown has already submitted a project to address [REDACTED]. Although the two collapsed shafts have closed up, they could still pose a hazard and should be partially backfilled and/or fenced and signed indefinitely.

N.E.E.D Camp: This site consists of two adits behind N.E.E.D. Camp. The first adit is secured with a locked metal door. The second adit has a bat gate that's surrounded by a breached chain link fence. Neither feature was affected by the fire.

Recommendations: None

[REDACTED] This site consists of a single gated adit, [REDACTED]. The site was unaffected by the fire and no new features were observed.

Recommendations: None

[REDACTED]: A number of small sites were surveyed along [REDACTED]. No changes in condition were observed and no new hazard features were found.

Recommendations: None

[REDACTED]: [REDACTED] This site consists of several collapsed adits, a cement water tank, and a mill site ruin. The previously recorded features were unaffected by the fire and no new hazard features were observed.

Recommendations: None

[REDACTED] [REDACTED]. The site consists of one collapsed adit and a number of prospect pits. The mine features were not impacted by the fire and no new hazards were observed.

Recommendations: None

[REDACTED]. It consists of four short, gated adits. All gates remain intact and no new features were observed.

Recommendations: None

[REDACTED] [REDACTED] [REDACTED]. The site consists of multiple features, including several underground openings (open and collapsed) and a mill ruin. During the site visit a previous hidden adit was discovered [REDACTED].

Recommendations: The newly discovered adit [REDACTED]. There appears to be a significant waste rock pile. The portal should be dug out and fitted with a bat gate or culvert gate.

[REDACTED] Bats were observed flying in and out of the upper adit and guano is visible inside the portal.

Recommendations: Both adits are dug into solid rock and have significant waste rock piles. They should be fitted with bat gates.

[REDACTED] This site consists of a single open adit. It was reported, but not visited.

Recommendations: NPS biologists should evaluate the site to see if it's appropriate for a bat gate or culvert gate.

BLM SITES VISITED & SPECIFIC RECOMMENDATIONS:

French Gulch Road*: This site consists of four adits along the French Gulch road. One of the adits is at road level. The other three are along a ditch that runs directly above the lower adit. All four features are now much more visible from the road. The lower adit has evidence of visitation in the form of beer and soda cans. The three upper adits are all short and can be seen in their entirety from the portal. The largest of the three has approximately 25' of workings.

Recommendations: People are entering the lower adit. The portal should be dug out and gated. The three upper adits are all relatively small. The two smallest can be ignored. The larger one could be closed with a PUF (polyurethane foam) plug.

Tom Green Mine: This site is located in Scorpion Gulch, off the Tom Green Mine road. At one time it was one of the more prominent mines in the area. Four of the five known adits are collapsed. The one gated adit was not visited. No changes in condition or new features were observed.

Recommendations: None

Summit Mine and Mill: The Summit Mine is located off the Tom Green Mine road and is semi-active. The site has a long history and there are remnants of structures and milling equipment from multiple eras. At one time there were several buildings and structures on site, but between the French and Carr fires, the only ones still standing are a modern cabin and a

crude shade structure. The underground openings are all gated and unchanged by the fire. No new hazard features were observed.

Recommendations: The recently burned buildings should be evaluated for hazardous materials.

Brunswick Mine: The Brunswick Mine is located at the end of the Summit Mine road. The mine cabin was destroyed in the Carr Fire. All known adits are collapsed and no new hazard features were observed.

Recommendations: The recently burned cabin should be evaluated for hazardous materials.

Kline Gulch*: There were three isolated features identified along the Kline Gulch Road. There are two open adits and an open vertical feature that is next to an old cabin foundation. It's probably not a mining excavation, but is still hazardous and needs to be addressed.

Recommendations: The portal of adit #1 should be dug out and gated. Adit #2 sits just below the edge of the road and appears to be dug into largely unconsolidated material that may be difficult to gate. A PUF plug or backfill may be more appropriate. The small vertical feature can easily be backfilled.

Clear Creek Road*: There were two isolated, open adits discovered along Clear Creek road, north of the town of French Gulch. One adit is large, has standing water, and had three Townsends big-eared bats roosting near the portal. The other adit was difficult to access due to recently downed trees. The portal is open, but filling with eroding material

Recommendations: Adit #1 has solid rock and bats were observed roosting inside. It should be gated. It was difficult to get much of a look inside adit #2, but if the downed trees can be removed and the portal dug out, it may be a good candidate for a bat gate or culvert gate.

Boswell Mine*: This site consists of mill ruins and a recently discovered adit. The adit is open and appears to have significant depth.

Recommendations: The adit has competent rock and should be fitted with a bat gate.

West Side Trails*: This is a lone vertical shaft discovered less than 30' from the West Side Trail. The shaft bottom isn't visible and a fall would likely be fatal. Strands of barbed wire on the ground suggest the shaft had been fenced at one time.

Recommendations: Due to its depth and proximity to a heavily used trail, this shaft should be backfilled as soon as possible.

Keswick -- South of Keswick Dam*: This site consists of two isolated features; one vertical shaft and one inclined shaft/adit.

Recommendations: The shaft is close to a heavily used trail and should be backfilled as soon as possible. The inclined opening goes into solid rock and should be easy to gate.

Chappie Shasta OHV Trail*: This site consists of two adits with sizable waste rock piles. One shaft is open and the other is collapsed. Due to snags and numerous hazard trees, we weren't able to safely approach these features. There may be additional mines at this site.

Recommendations: The open adit should be dug out and gated. Hazard tree removal may be required in order to make the site safe for work. The surrounding area should also be surveyed for additional features.

Judy Mine & Mill: The Judy is located high above Mad Ox Gulch. The site burned in both the French and Carr fires. No standing buildings or structures were observed. There is one gated adit with water flowing out of it. No new features were found.

Recommendations: None

Middle Creek Trail*: A single open adit was found near a section of the Middle Creek Trail. The adit has a trickle of water flowing out of it.

Recommendations: The adit opening is narrow and it appears to be dug into relatively soft material. It could be closed with a backfill or PUF plug.

Mad Ox Mine*: The Mad Ox consists of several collapsed mine openings, and a stamp mill ruin. The site was burned in both the French and Carr fires. The metal stamps and some mill equipment are still present. A small, collapsing adit opening was found on the far side of the creek.

Recommendations: This adit opening has been largely plugged by rocks and eroding material from above. It's located in an area that probably doesn't get much visitation and the easiest solution may be to backfill the rest of the opening by hand.

Mad Ox Gulch: This is a single adit located at the end of the road up Mad Ox Gulch. It may be part of the Mad Ox Mine or a separate site. The adit is open, has standing water, and ore car rails. However, since the site was previous known and unimpacted by the fire, it does not qualify for BAER funding.

Recommendations: None

Trail 58: The first half mile of the trail was surveyed. There were numerous prospect pits identified, but no hazardous mine features were found.

Recommendations: None

Brown Bear Mine: The Brown Bear Mine is located in and around Deadwood. The site is a mix of private and BLM ownership. There were a number of open adits observed, including several with standing water. These openings are hazardous, but there was no change in condition related to the Carr Fire, so they don't meet the criteria for BAER funding.

Recommendations: None

Scorpion Mine: The adit at the end of the road is collapsed, but still has water flowing from it. There are two other adits in the area that are also both collapsed. There were no changes in condition or new hazard features observed.

Recommendations: None

Gic Gulch*: This site has a single open adit.

Recommendations: If the adit is in competent rock and has sizable underground workings, it should be fitted with a bat gate or culvert gate.

Washington Mine: The Washington Mine is an active site with a number of complicated issues, including mixed land ownership (private and BLM), and a history of changes in ownership. The site was visited in conjunction with the BAER hydrology team and the BLM geologist. Of specific concern was the O’Neal adit, which is discharging water that’s high in zinc, arsenic, and cadmium. The water is normally piped to a treatment tank at the mill site, but the pipeline was burned and water is now being discharged down the drainage. The mine operator should repair the pipeline as soon as possible.

Recommendations: None

* - Indicates site with newly discovered hazard features

GENERAL RECOMMENDATIONS:

- Newly discovered mine openings should be formally surveyed for bat use and cultural resources.
- Continue surveying AML sites in the burned area and record new features. Volunteers may be able to assist agency staff with this task. The California Department of Conservation’s AML unit may also be interested in helping to survey.
- Start Section 106 compliance for temporary fencing and permanent closures
- Begin signing and fencing new features. Start with vertical shafts, which present the biggest safety hazard, and then work through the rest of the features, starting with the one closest to roads and trails
- Install permanent closures (bat gates, culvert gates, PUF plugs, backfills), working through features in the same order as the fencing

BURNED AREA EMERGENCY STABILIZATION PLAN

CARR FIRE

RECREATIONAL TRAILS ASSESSMENT

OBJECTIVES

Recreational trails-related issues include:

- Identifying and mitigating threats to life and property along visitor use trails
- Burned bridges and culverts, loss of trail tread due to collapse, tree hazards, loss of signs, loss of other visitor use infrastructure along trails such as picnic tables and benches

OBSERVATIONS

A. Background

BLM

An extensive network of trails exist on BLM managed lands in the Redding field office. There are roughly 75 miles of non-motorized and 75 miles of off highway vehicle (OHV) trails that have been affected by the fire. The fire affected numerous trees, creating fire weakened hazard trees near the trail and trailhead parking. The trail system primarily had high density polyethylene (HDPE) plastic pipe which in many instances melted or fully burned. The damaged or destroyed pipes create holes in the trail tread and could adversely affect drainage. Most of the signs have been destroyed; either the posts have burned or the entire sign has been burned and is no longer readable.

NPS

Whiskeytown NRA has 69 miles of maintained trails. The trails include a mixture of abandoned logging and mining roads along with asphalt walkways and engineered dirt trails. The park recently completed a year-long trail monitoring program that documented roughly 93,000 trail users, 85% of which are hikers, 8% bicyclists, 4% runners, 1% equestrian, and 1% other (Whiskeytown NRA, 2018). The trail system is quite popular for the urban Redding area and surrounding communities. Many special events are held in the springtime for the variety of trail users, highlighting the need for the trails to be in useable condition by April or May of each year.

B. Reconnaissance Methodology and Results

Trails were surveyed on BLM and NPS lands for fire-caused damage to infrastructure on trails, particularly to bridges, culverts, benches, toilets, signs, etc. Reconnaissance methodologies and survey results follow for each agency.

BLM

BAER personnel met with Redding Field Office staff (Laura Broadhead – Ecologist, Bill Kuntz – Recreation Supervisor) on August 13, 2018 to identify trails with possible infrastructure damage, 2018. We also met with additional BLM staff (Shawn Stapleton – foot/bike/horse trails, Sky Zaffarano – off highway vehicle trails) to clarify infrastructure locations. BAER personnel conducted site visits August 15 -20 to collect infrastructure damage point data. Approximately 30% of the trails were surveyed, but this included all of the infrastructure locations. The table shown below in the “Findings” section indicates the trails that were visited. BAER personnel visited these listed locations and most commonly (but not always) only a part of each trail, based on where potentially vulnerable infrastructure lies on each trail.

NPS

BAER personnel met with Whiskeytown NRA staff (Jason Judd, Trails Leader) on Aug. 21, 2018 to identify those trails within the park that burned and had possible infrastructure damage. Of the total trail mileage of approximately 70 miles, NRA staff narrowed the mileage that needed to be viewed/assessed by roughly 80% to enable a focus on where vulnerable infrastructure existed (several trails have little or no vulnerable infrastructure, particularly farther away from a trailhead). The table shown below in the “Findings” section indicates the trails and campgrounds within the park that were visited on Aug. 21 and 22 by BAER personnel to assess the damage to infrastructure by the fire. Although other trails exist within the park, only those listed in the table were considered priorities by the park to assess. BAER personnel visited these listed locations and most commonly (but not always) only a part of each trail, based on where potentially vulnerable infrastructure lies on each trail.

C. Findings

BLM

Many structures were burned along the trails, including plastic culverts and wooden bridges – see Maps in Appendix for “BLM Damaged Recreational Infrastructure”. Some specific locations of tread collapse were found, but it is again important to note that not all of the total trail miles were actually assessed given the short time frame available to the BAER Team. It is assumed that additional sections of tread collapse will be found on unsurveyed sections. BAER personnel noted only the imminent danger hazard trees in those sections of trails visited; it is assumed that additional imminent danger hazard trees exist on unsurveyed sections of trail.

The table below summarizes those structures found that had incurred damage. Trail infrastructure damage will be repaired through an ES specification.

Trail Name	Mileage (total miles)	Damaged Infrastructure
Off Highway Vehicle (OHV)	75.0	1 culvert
Cloverdale	7	7 culverts
Mule Ridge	19.0	2 culverts, 5 Bridges
Swasey	18.5	7 culverts

Salt Creek	1.5	none
Westside	3.5	1 culvert
58	2.0	1 culvert
Middle Creek	1.5	2 culverts (on connector)
French Fry	8	4 culverts, 1 bridge
Sacramento River Rail	4	31 culverts
FB	10	21 culverts, 1 bridge

NPS

Several structures were burned along the trails and in campgrounds, primarily bridges, benches, and picnic tables - see Map in Appendix for “NPS Damaged Recreational Infrastructure”. Some specific locations of tread collapse were found, but it is again important to note that only a fraction of the total trail miles were actually assessed given the short time frame available to the BAER Team. It is assumed that additional sections of tread collapse will be found on unsurveyed sections. BAER personnel noted only the imminent danger hazard trees in those sections of trails visited; it is assumed that additional imminent danger hazard trees exist on unsurveyed sections of trail.

The table below summarizes those structures found that had incurred damage. Not all trail locations listed in the table have unique numbers on the map (Appendix – “NPS Damaged Recreational Infrastructure” – they may have had no infrastructure damage (but may have had a tread collapse or particular hazard tree noted) but are left in the table because NPS staff specifically asked the BAER team to assess them.

Trail infrastructure damage will be repaired through an ES spec and a BAR spec, according to whether the infrastructure is critical to public safety (bridges, trail tread) or not (benches, picnic tables, stairs).

Trail/Campground Name	Total trail miles)	Map icon #; damage found
James Carr (Whiskeytown Falls)	1.7	34: Bridge burned 33: tread collapse
Camden Water Ditch	0.8	30, 31: Steps burned (2 locations) 29: Mill Crk bridge burned
Tower House parking	--	28: Bridge planks burned (to Tower House parking 27: picnic table burned
Crystal Creek Falls	Approx. 0.5 (road)	No damage along road/trail
Crystal Creek Campground	--	Dead top in oak tree at toilet
Tower Grave	0.2	Fence (cultural structure) burned
Mill Creek Road	4.8	223: Bridge burned; tread collapse nearby
Boulder Creek Falls	0.1	35: Bridge burned 36: bench at falls burned; tread damage at falls

Boulder Creek campground	3.6	37: Picnic table burned; some directional signs burned at Papoose trail junction
Oak Bottom Water Ditch	2.7	Hazard trees; dozer line damaged the trail tread
Dry Creek Campground	--	Hazard trees
Papoose Creek	5.0	43: Bridge burned
Brandy Creek Trail Campground	--	42: Picnic table burned
Brandy Creek picnic area	--	41: Bridge burned
Shasta Divide Nature Trail	0.4	No infrastructure damaged
Mount Shasta Mine Loop	3.1	Trailhead sign burned
Martha's Ditch	--	44: Burned stairs Bridge #2 handrails material burned
Guardian Rock	1.0	45: Bench burned
Princess Ditch	2.5	46: Bridge burned 0: Bridge burned
Red Gulch Picnic Area	--	47: 2 picnic tables burned
Kanaka Peak	4.1	Bench assumed burned (site was not assessed due to lack of time)

*Note: the Crystal Creek Water Ditch trail was evaluated by the Cultural Resource group and is assessed and a funding specification written to address mitigation issues in that section of this plan.

RECOMMENDATIONS

BLM

Several specifications are recommended to address public safety associated with using the trails, as well as to address the longer-term increased maintenance needs that inevitably follow a significant fire in steep, forested terrain.

BLM-09-ES, Replace burned trail infrastructure and tread

Many culverts and several bridges have burned, creating a human safety hazard. Similarly, sections of trail tread have collapsed in places where roots and stumps have burned out. All need to be mitigated to provide for public safety on these heavily used trails

BLM-18-ES Install hazard warning signs along all trails (and roads)

Warning signs serve to inform the visiting public of increased safety risks when entering a burned area, such as threats of flash floods, debris flows, tree hazards, rockfall, etc. Warning signs will be placed at key locations – trailheads, road junctions, visitor gathering locations, etc. This specification covers both trails and roads.

BLM-11-BAR, Out-year increased trail maintenance needs

Ongoing post-fire affects will continue to cause an increased level of damage to trails for several years following the fire – expected increases in normal windfall, drainage concerns, rockfall and tread issues, increased brushing needs, etc. This specification addresses the increased staffing needs to mitigate the increased trail maintenance workload.

NPS

Several specifications are recommended to address public safety associated with using the trails, as well as to address the longer-term increased maintenance needs that inevitably follow a significant fire in steep, forested terrain such as found in the park.

NPS-16-ES, Replace burned trail infrastructure and tread

Several bridges have burned in the park, creating a human safety hazard for parts of the year. Similarly, sections of trail tread have collapsed in places where roots and stumps have burned out. All need to be mitigated to provide for public safety on these heavily used trails

NPS-22-ES Install hazard warning signs along all trails (and roads)

Warning signs serve to inform the visiting public of increased safety risks when entering a burned area, such as threats of flash floods, debris flows, tree hazards, rockfall, etc. Warning signs will be placed at key locations – trailheads, road junctions, visitor gathering locations, etc. This specification covers both trails and roads.

NPS-18-BAR, Out-year increased trail maintenance needs

Ongoing post-fire affects will continue to cause an increased level of damage to trails for several years following the fire – expected increases in normal windfall, drainage concerns, rockfall and tread issues, increased brushing needs, etc. This specification addresses the increased staffing needs to mitigate the increased trail maintenance workload.

CONSULTATIONS

Laura Brodhead, Ecologist, Redding Field Office

Bill Kuntz, Supervisory Recreation Planner for Operations, Maintenance and Recreation Programs, Redding Field Office

Sky Zaffarano, OHV-Trails, Redding Field Office

Shawn Stapleton, Trails, Redding Field Office

Jason Judd, Whiskeytown NRA

Joe Pettegrew, Roads, Trails, and Lake Supervisor, Whiskeytown NRA

ATTACHMENTS

Maps in Appendix

REFERENCES

National Park Service. 2018. Whiskeytown Trail Use Survey Results. Whiskeytown National Recreation Area, Redding, CA. 46 p.

=====

Jack Oelfke, Chief, Natural/Cultural Resources, North Cascades National Park Service Complex, WA
Eric Rhodenbaugh, Forest Manager, Wind River Agency, BIA, Fort Washakie, WY
Zack Stewart, Forester, Cottonwood Field Office, Cottonwood, ID

BURNED AREA EMERGENCY STABILIZATION PLAN

CARR FIRE

MINOR FACILITIES ASSESSMENT

OBJECTIVES

- Identify and assess minor facilities (excluding life and safety concerns associated with trails, covered in a separate assessment) that have burned within the fire perimeter on BLM and NPS lands
- Identify the number of burned structures that pose risks from debris and hazardous materials

ISSUES and BACKGROUND

The Carr Fire burned minor facilities on BLM and NPS lands. Extensive damage occurred to trail infrastructure (typically bridges and culverts), but that issue regarding life and safety concerns on trails is covered in the “Recreational Trails” assessment. Covered in this assessment are other minor facilities within the burn area, as described below for each agency.

BLM

Two minor facilities were identified that were damaged by the Carr Fire. The **Iron Mountain shooting range** is located on the Iron Mountain Road in Shasta County, approximately 5 miles north of Redding and ½ miles west of the Sacramento River/Keswick Reservoir. The site is an unofficial and unmanaged shooting range covering roughly 60 acres. Four separate shooting lanes exist as separate pullouts along the road. NorthWind, Inc, produced a report (2017) for the BLM California State Office to address lead contamination at the range. Sampling of soil and adjacent wetlands and waterways detected lead contamination that exceeded EPA’s soil screening background, which ultimately led to the recommendation by the California Central Valley Regional Water Quality Control Board to BLM to develop an Erosion Control Plan to prevent discharge of lead and other waste leaving the site. Contaminated soils were subsequently consolidated into swales in two of the shooting range lanes; straw wattles were installed to capture any sediment off the swales prior to discharge off site through precipitation runoff.

The **Shasta Guild amphitheatres** are located near the Shasta Historical Park just off Highway 299, northwest of the Middle Creek Trail. The two locations, within a couple hundred yards of each other, were part of a visitor use area that featured historical structures and activities and were managed by a non-profit group. Minor structures associated with the larger amphitheatre and stage was a tree log to separate the stage from public seating, straw bales as seating benches in several rows facing the stage, and a small bridge on the adjacent trail. The smaller amphitheatre had a stage and straw bales for seating in rows facing the stage.

NPS

The NPS has a number of kiosks that provide important park information, particularly regarding safety issues and general park rules, and wayside interpretive panels that serve to inform the public of important natural, cultural, and recreational features in the recreation area. These structures are found in various frontcountry locations throughout the park. Similarly, toilets and picnic tables for visitor use are also found at several frontcountry locations. Key entry points to the park have large wooden signs identifying the park.

Several trails have wooden benches for visitors to stop and rest, either on steep sections of trail or at special features along the trails, such as waterfalls. A few trails have wooden steps embedded in short steep sections of trail.

Many larger structures exist in the park, serving a number of purposes including employee housing and garages, concession operations, facility maintenance operations, and offices.

RECONNAISSANCE METHODS

BLM

BAER personnel paired with the BLM Redding office Supervisory Realty Specialist (Charley Wright) and the Supervisory Recreation Planner for Operations, Maintenance and Recreation Programs (Bill Kuntz) to assess the Iron Mountain shooting range and the Shasta Guild amphitheatres on Aug. 20, 2018. All minor facilities on each site were assessed for burn damage, information was gathered in Collector, and loaded into the Carr Fire database in the BAER den. BLM staff made the determination on Aug. 22 that only one amphitheatre site was a priority to keep, and that the small footbridge adjacent to the large amphitheatre was also important to retain as part of the trail system. Therefore, only the large amphitheatre infrastructure is considered below.

NPS

BAER personnel assessed trail damage and other minor facilities (some campgrounds or picnic sites) on Aug. 21 and 22 and anecdotally noted one fire-impacted interpretive panel. Contact was made with the WHIS Chief of Resource Mgmt/Interpretation to note this and request an inventory of parkwide interpretive panels. Park staff subsequently completed an assessment of the kiosks and interpretive panels on Aug 23 and Aug. 27 and provided that information to the BAER team.

The toilet on the Whiskeytown Dam and picnic areas/beaches/marinas were assessed on Aug. 22.

A National Park Service all-risk Incident Management Team completed an initial survey of burned structures within the park.

FINDINGS

BLM

Iron Mountain Shooting Range: Two of the four shooting lanes had swales created to contain the lead contamination, and the straw wattles on both of those sites were burned. Shooting lane site #1 (northern site) had 75' of wattles burned. No other facilities were damaged. Shooting range site #3 had wattles of 120' in length burned. No other facilities were damaged on Site #3, and no facilities were damaged at shooting lane sites #2 or #4.

Shasta Guild large amphitheatre: The stage (roughly 12' x 35') was completely burned, and metal supports compromised. The log barrier that separated the seating area from the stage was partially burned and will need replacement (50' long). The small wooden bridge (6' x 15') adjacent to the amphitheatre completely burned. Seven rows in an arc, amphitheatre style, face the stage and the straw bales that were in place in each row for general audience seating were burned. Each row is approximately 60' long.

NPS

No kiosks were substantively damaged by the fire; the Tower House kiosk has very minor paint blistering. One interpretive panel at the JFK memorial adjacent to the Whiskeytown dam and two panels at Whiskey Creek was burned; all others were undamaged.

Only one toilet suffered fire-related damage (along the JFK road on the Whiskeytown dam), but park staff will repair the damage from other park project funds. The toilet at the Crystal Creek campground has a hazard tree adjacent to it.

Picnic tables in several front and backcountry locations were burned, including Tower House parking, Boulder Creek primitive campsite, Whiskey Creek group picnic site, and Brandy Creek campsites. Resting benches along park trails were also burned, including at Boulder Creek Falls, Horse Camp, and at Kanaka Peak.

The entrance sign off Mule Town Road suffered partial damage.

Many larger structures burned in the park, reducing them to rubble and debris and potentially exposing hazardous materials. Serious concern exists that soil contamination and downslope contamination into water sources will occur once fall rains begin.

RECOMMENDATIONS

BLM

BLM-12-ES Minor Facilities Repair – shooting range

The burned straw wattles on Sites #1 (75' long) and #3 (120' long) will be replaced before fall rains set in. These wattles were a part of the Erosion Control Plan developed by a contractor for managing the lead contamination at the site. BLM staff will complete the work.

BLM-13-BAR Minor Facilities Repair - Shasta Guild amphitheatre

The burned wooden stage, log barrier, wooden bridge, and straw bales will be rebuilt/replaced. This facility is an important element of the public recreational use of this near-urban area of Redding. BLM or contractor staff will complete the work.

NPS

NPS-19-BAR Replace minor facilities along trails, roads, and frontcountry locations

This specification will fund the repair burned structures that support visitor-use related activities in the park, including picnic tables, trailside benches, an entrance sign, three wayside panels, and burned steps in one location. Facilities will be replaced in-kind, using park staff.

NPS-31-ES Remove debris and hazardous materials from burned structures

This specification will fund the removal of debris and hazardous materials from 29 priority structure/sites that have burned in 8 general locations within the park.

CONSULTATIONS

Bill Kuntz, Supervisory Recreation Planner for Operations, Maintenance and Recreation Programs,
Redding Field Office

Charley Wright, Supervisory Realty Specialist, Redding Field Office

Jason Judd, Trails Leader, Whiskeytown NRA

Joe Pettegrew, Roads, Trails, and Lake Supervisor, Whiskeytown NRA

Matt Switzer, Interpretive Ranger, Whiskeytown NRA

Ellen Petrick, Supervisor for Interpretation, Whiskeytown NRA

REFERENCES

North Wind, Inc. 2017. Erosion Control Plan Iron Mountain Shooting Area CERCLA Response Action, Redding, California. Prepared for USDI BLM California State Office, Sacramento, CA

=====

Jack Oelfke, Chief, Natural/Cultural Resources, North Cascades National Park Service Complex, WA
Eric Rhodenbaugh, Forest Manager, Wind River Agency, BIA, Fort Washakie, WY
Zack Stewart, Forester, Cottonwood Field Office, Cottonwood, ID

BURNED AREA EMERGENCY STABILIZATION PLAN

Carr Fire

VEGETATION RESOURCE ASSESSMENT

I. OBJECTIVES

- Identify potential impacts and threats to native vegetation recovery based on field assessments, Burned Area Reflectance Classification (BARC) and Soil Burn Severity (SBS).
- Provide management recommendations for reducing impacts to native vegetation from invasive plants within and adjacent to the burned area.
- Develop cost effective emergency stabilization and rehabilitation treatments and specifications in addition to treatment effectiveness monitoring.
- Assess fire effects monitoring on plant succession of the high SBS areas in order to provide additional direction for fire management of these areas.

II. ISSUES

- Impacts to the ecological integrity of watersheds including native vegetation and wildlife communities within and adjacent to the fire perimeter including access roads and fire suppression related activities.
- Potential for the introduction of new invasive weeds and the expansion of existing invasive weed infestations within and adjacent to the fire perimeter.
- Vegetation recovery and seedling recruitment and establishment of native vegetation in high SBS areas and in locations impacted by fire suppression related activities.
- Impacts to unique Sensitive Species plant populations, native seed banks, and soil productivity.

III. OBSERVATIONS

A. Background

The Carr Fire burned approximately 229,462 acres within Shasta County and Trinity County California--63,127 acres were within Bureau of Land Management (BLM), 38,565 acres National Park Service (NPS), 30,149 acres United States Forest Service (USFS), 3,266 acres Bureau of Reclamation and 94,354 acres were within private or other administrative jurisdictions. Four dominant vegetation communities were impacted by the fire including mixed chaparral which intergrades with oak woodland, mixed conifer forest and mixed evergreen forest/riparian woodland (refer to table 1 and vegetation community map). Refer to individual treatment specification forms by agency for details on the number of acres and miles of disturbance and priority treatment areas.

B. Vegetation Resources

The Carr fire is within the Klamath Mountain physiographic province and is considered an area of high species richness due to the proximity to the Southern Cascade Range, Northern California Coast Range and Sacramento Valley. The vegetation communities within the Carr Fire

do not have distinct boundaries but instead intergrade based on topography, elevation, soil type and level of past disturbance. Four dominant vegetation communities were identified using the USDA’s remote Sensing Lab CALVEG project, NLCD (National Land Cover Database), CNPS (California Native Plant Society) Manual of CA Vegetation and local knowledge. The four communities (shown below in Table 1-Dominant Land Cover within the Carr Fire Perimeter) are mixed chaparral, mixed evergreen/riparian woodland, oak woodland, and mixed conifer forest. See pre-fire vegetation map.

Table 1. Dominant Land Cover types within the Carr Fire Perimeter.

Cover Type	Acres within the Carr Fire perimeter
Barren/Agriculture/Developed	1,801
Water	477
Herbaceous	1,056
Mixed Chaparral	32,500
Mixed Evergreen Forest/Riparian Woodland	57,063
Oak Woodland	38,167
Mixed Conifer Forest:	98,410
Gray Pine/Knobcone Pine	NA
Ponderosa Pine	NA
White Fir	NA
Douglas-fir/Sugar Pine	NA

Postfire regeneration information was obtained using Fire effects information System (FEIS 2018) and A Manual of California Vegetation (CNPS 2018). Following field assessments it was determined that the vegetation mortality was comparable to the SBS in the majority of the fire

1. Mixed Chaparral

Chaparral is dominated by fire adapted shrub species that have a historic fire return interval between 35-150 years. Species in this community are dominated by manzanita, Ceanothus, chamise, redbud and toyon within the Carr Fire. Many species have adaptations that allow them to survive postfire including obligate resprouters (i.e. toyon (*Heteromeles arbutifolia*)) and obligate seeders (i.e. *Arctostaphylos viscida* and *Ceanothus* spp.) which only survive postfire from seed (seeds often remain dormant in the soil until fire cues--heat and/or smoke--release the seed from dormancy). Some species are facultative seeders such as chamise (*Adenostoma fasciculatum*), Canyon live oak (*Quercus chrysolepis*), Greenleaf manzanita (*Arctostaphylos patula*), and California redbud (*Cercis orbiculata*) which survive by resprouting and by seed postfire. California redbud and canyon live oak were observed resprouting during field assessments in this community in the Whiskey Creek watershed, Grizzly Gulch and South Fork Road.

Vegetation recovery in this community postfire varies by soil burn severity. Chaparral typically recovers within 5 to 10 years postfire in low soil burn severity areas and recovers more slowly in moderate to high soil burn severity areas within the Carr fire. Chaparral communities within the Carr fire are adapted to fire return intervals ranging from 35-100 years however frequent fires outside the historic range can cause obligate seeding shrubs that require years for maturation to produce seed to be lost in this community. This loss of obligate seeding species and mortality of resprouting shrubs in high soil burn severity areas can lead to type conversion of invasive weed dominant vegetation over time.

2. Oak Woodland

Oak Woodland consists of various species that are adapted to fires that occur within historic fire return intervals (typically less than 35 years). Species in this community are dominated by canyon live oak, black oak (*Quercus kelloggii*), and interior live oak (*Quercus wislizeni*). Many species have adaptations that allow them to survive postfire including thick bark and the ability to resprout from roots or regenerate from seed. Some species are facultative seeders--Canyon live oak and black oak survive by resprouting and by reproducing from seed postfire.

Vegetation recovery in this community postfire varies by soil burn severity. Trees within oak woodland communities are expected to survive and regenerate postfire in low soil burn severity areas. This community typically recovers to pre-fire conditions in 25-40 years. Tree species with thick bark (black oak) tend to survive moderate soil burn severity as opposed to tree species with thin bark (i.e. canyon live oak) however, canyon live oak has a deep extensive root system and was observed resprouting during field assessments within moderate soil burn severity areas within the fire perimeter. High SBS areas had tree mortality due to entire root crowns and acorns that were killed. These areas are expected to take longer to recover since recruitment will be from unburned adjacent trees or resprouting adjacent individuals within moderate and low SBS areas.

3. Mixed Conifer Forest

Mixed conifer forest consists of various species that are adapted to low to moderate intensity that occur within historic fire return intervals (typically 50 years). Species in this community are dominated by gray pine (*Pinus sabiniana*) and knobcone pine (*Pinus attenuata*) at lower elevations that intergrade with Douglas-fir (*Pseudotsuga menzeisii*), ponderosa pine (*Pinus ponderosa*), incense cedar (*Calocedrus decurrens*), sugar pine (*Pinus lambertiana*), and white fir (*Abies concolor*) at higher elevations.

Vegetation recovery in this community postfire varies by soil burn severity. Trees within mixed conifer forest are expected to survive and regenerate postfire in low to moderate SBS areas. In the absence of type conversion this community typically recovers or seedlings become established within 25-40 years postfire. Tree species with thick bark and deep extensive root systems tend to survive low to moderate soil burn severity as opposed to tree species with thin bark. This community is expected to survive by seed production from mature trees that

survived, wind dispersed seed from unburned pockets within the fire and adjacent unburned trees.

4. Mixed Evergreen Forest/Riparian Woodland

Mixed evergreen Forest consists of various conifer, oak, and riparian species. Riparian woodland is a vegetation community found along intermittent and perennial streams within watersheds. Within the Carr Fire this community is dominated by white alder (*Alnus rhombifolia*), bigleaf maple (*Acer macrophyllum*), and various willow species (*Salix* spp.). The riparian woodland communities burned at low to moderate intensity and SBS with areas of unburned vegetation. The primary threat to riparian areas within the fire perimeter is the introduction and establishment of noxious and invasive weeds and erosion/sedimentation from steep slopes with high SBS. There is a potential for upstream sediment to be delivered into the riparian areas during rain events or snowmelt runoff.

There were some areas of high vegetation mortality observed (i.e. Whiskeytown Lake-Clear Creek, Deadwood Creek-Trinity River and E. Fork of Clear Creek HUC 12 watersheds); however, perennial grasses, Indian rhubarb (*Darmera peltata*), California blackberry (*Rubus ursinus*), foothill ash (*Fraxinus dipetala*), and willow (*Salix* spp.) were observed resprouting within the low to moderate SBS areas. Regeneration is expected in the absence of further disturbance. Vegetation recovery in this community postfire varies by SBS. This community is expected to recover in low to moderate SBS areas. Many riparian species are expected to survive by resprouting from root crowns and regenerating from undamaged seed within the seed bank, and wind dispersed seeds from adjacent unburned pockets. Some species are less tolerant of fire due to thin bark and may take decades to recover especially in high SBS areas (i.e. white alder). No resprouting was observed in the high SBS areas and species in this community were likely killed due to root crown and seed damage. Vigorous resprouting was observed during field assessments in moderate SBS areas within the Clear Creek and Whiskey Creek tributaries.

Type Conversion

Many communities within the Carr Fire are adapted to historic fire return intervals. When frequent fires occur outside their historic ranges some portions within vegetation communities may be more susceptible to type conversion over time. For instance, some conifer stands within the Moon Fire (2008), did not recover to their pre-fire condition. Tree seedlings intolerant of shade were out-competed by vigorous shrub regeneration. Many factors contributed to this change including more variable rain patterns, and increased drought which hindered tree seedling survival. Similarly, variable conditions can reasonably be expected to result in vegetation type conversion in certain communities within the Carr Fire. Fire adapted communities may regenerate and recover postfire however, they may not reflect pre-fire species composition and cover due to these variations in climatic conditions, fire return intervals, and site resiliency.

Unique Vegetation Communities

Camden House Orchard

The Camden House fruit trees are contributing features to the Camden House Cultural Landscape. The trees were visited during the field assessment and the majority are expected to survive and approximately three were killed. The majority had resprouts from the base and some still had green apical shoots. A few trees still had flowers that were unburned. The orchard burned at low SBS and is expected to survive unless further disturbance is experienced.

McNabb Cypress Stand

The McNabb cypress (*Hesperocyparis macnabiana*) stand has local historic significance and was killed during the Carr Fire. This stand is located near the historic Whiskeytown within the Whiskeytown National Recreation Area. This area experienced moderate SBS however, mature trees in addition to approximately 10 year old trees were killed. The stand is expected to survive unless additional disturbance occurs in this area. This species is typically adapted to high mortality and seeds are known to vigorously germinate from serotinous cones during the fire and vigorously germinates in bare mineral soil exposed.

Rare Plant Habitat

There were 11 documented Special Status Species (rare plants limited in abundance and distribution within their range) exist within the Carr Fire perimeter. California Natural Diversity Database CNDDDB 2018. During rapid assessments a few populations were observed with low vegetation mortality including canyon creek stonecrop (*Sedum obtusatum* ssp. *paradisum*), Sulphur Creek Brodiaea (*Brodiaea matsonii*), Howell's alkali grass (*Puccinellia howellii*) and Mallory's manzanita (*Arctostaphylos malloryi*). A few populations of Mallory's manzanita were impacted by suppression repair efforts and the fire within upper Whiskey Creek watershed (BLM) however, it is expected to resprout from intact underground roots within the low/unburned area. In addition, Howell's alkali grass was observed within low/unburned habitat and is expected to survive unless further disturbance occurs in this area. See Table 2. Special Status Species Plants documented within the Carr Fire perimeter.

Populations of Sulphur Creek Brodiaea were observed in the field post-fire by local experts. Part of the known extent was burned at a low burn severity and no impacts are expected to the plants in this area due to fire effects. A suppression dozer line disturbed part of the known extent but the shallow nature of the dozer line and repair work done by hand is expected to protect the individuals in this area. Part of the known extent was unburned. Changes to localized hydrology due the fire upstream in the watershed might influence the species' distribution over the coming years, as the plant is known to only occur within the river channel and adjacent flooded areas of Sulphur Creek.

Table 2. Special Status Species Plants documented within the Carr Fire perimeter (CNDDDB 2018)

Scientific Name	High	Low	Moderate	Unburned/ Very Low	Grand Total
<i>Brodiaea matsonii</i>	-	0.70	-	0.74	1.44
<i>Clarkia borealis</i> ssp. <i>borealis</i>	20.01	75.32	56.44	16.06	167.82
<i>Eriogonum ursinum</i> var. <i>erubescens</i>	1.29	64.13	19.46	2.33	87.21
<i>Erythranthe taylorii</i>	-	0.29	-	0.41	0.70
<i>Potamogeton epihydrus</i>	5.32	5.15	61.99	1.35	73.82
<i>Puccinellia howellii</i>	-	3.01	-		3.01
<i>Sagittaria sanfordii</i>	-	0.89	1.22	0.02	2.13
<i>Sedum obtusatum</i> ssp. <i>paradisum</i>	7.56	70.78	19.63	12.35	110.33
<i>Silene salmonacea</i>	0.01	1.04	1.89	-	2.94
<i>Smilax jamesii</i>		12.96	5.12	1.76	19.84
<i>Vaccinium shastense</i> ssp. <i>shastense</i>		89.97	22.75	13.98	126.70
Grand Total	34.19	324.23	188.50	49.01	595.94

Most of the Special Status Species plants that burned within the Carr Fire are adapted to historic fire regimes and fire return intervals within their corresponding vegetation community. The majority of Special Status plant habitat burned at 54% low SBS followed by 32% moderate SBS, 8% was unburned and 6% was high SBS. Populations that burned at low intensity are expected to survive either by seed banked in the soil or from surrounding intact plants, in the absence of further disturbance. Populations that burned at moderate intensity may have adaptations that allow them to survive postfire including deep roots insulation by rocky outcroppings, the ability to resprout, or seeds buried below the top few inches of the soil surface that are more likely to survive. Annuals were killed in moderate and high intensity areas and perennials are expected to survive in low to moderate intensity areas and were likely insulated by rocks and deeper root structures.

C. Reconnaissance, Methodology and Results

Information used in this assessment was generated from field reconnaissance, recovery and management plans, GIS databases, and natural resource managers from the NPS, BLM, and FS along with support from other BAER team members. A custom soil survey was created for a few select locations within the Carr Fire from the USDA Natural Resources Conservation Service (NRCS) Web Soil Survey web site in order to obtain Ecological Site Descriptions.

Unburned vegetation areas

Approximately 14,003 acres of unburned/very low vegetation exist within portions of the Carr Fire perimeter and the unburned vegetation within and adjacent to the fire is expected to serve as native and non-native seed sources within burned areas.

Burned vegetation

Vegetation mortality was classified into the following four categories (unburned, low, moderate, and high) based on immediate postfire mortality of aboveground plant parts. Following field assessments it was determined that the vegetation mortality was comparable to the SBS in the majority of the fire which burned at 89,949 ac. moderate SBS, 11,062 ac. high SBS and 114,447 ac. were low/unburned. See Table 3, Vegetation Mortality.

Table 3. Vegetation Mortality

Vegetation Mortality by cover type							
Rating	Other	Herbaceous	Mixed Chaparral	Mixed Evergreen Forest	Mixed Conifer Forest	Oak Woodland	Grand Total
High	9	10	937	3,426	5,713	967	11,062
Moderate	1,289	269	17,113	18,719	40,939	12,543	89,949
Low	367	674	12,795	30,721	46,298	22,670	114,447
Unburned/ Very Low	611	103	1,657	4,193	5,430	2,010	14,003
	2,276	1,056	32,501	57,059	98,380	38,189	229,462

Fire suppression related activities are likely to have been a vector for the introduction and spread of invasive weeds within and adjacent to the fire perimeter. High probability areas of introduction and spread of invasives include high SBS areas, riparian corridors, roads and recently disturbed areas due to fire suppression related activities (including dozerlines, drop points and staging areas. These serve as corridors and vehicles as vectors that transport weed seeds and propagules to recently burned areas that are suitable for colonization due to the lack of competition from native species postfire. Postfire recreational use of roads, trails, and designated camping areas creates a greater potential for the spread of invasive weeds.

D. Findings

The burned area, now lacking desired vegetation that can normally outcompete invasive species, is vulnerable to the introduction and spread of invasives by unburned seed sources outside and adjacent to burned areas especially if native seed banks and soil productivity are compromised. In the low SBS areas, it will take at least one growing season (Summer 2019) until native vegetation can reestablish and compete with invasive species. In moderate to high SBS areas, vegetation recovery is expected to take longer and will vary based on pre-fire vegetation community and location within the fire perimeter. Invasive species are likely to establish at a much faster rate in certain areas, further impacting native vegetation communities. The introduction and establishment of invasive weeds is very likely to prevent native vegetation recovery and establishment and can increase future fire hazards especially with the establishment of flashy invasive annual grasses including cheatgrass (*Bromus tectorum*) and medusahead rye (*Taeniatherum caput-medusae*). Invasive weeds known to occur within and adjacent to the fire include yellow star thistle (*Centaurea solstitialis*), knapweeds-diffuse

(*Centurea diffusa*), and spotted (*Centaurea maculosa*), stinkweed (*Dittrichia graveolens*), puncture vine (*Tribulis terrestris*), various broom species (French (*Genista monspessulana*), Spanish (*Spartium junceum*), Scotch (*Cystisus scoparius*) and St. John's wort (*Hypericum perforatum*), Arundo (*Arundo donax*) and tree of heaven (*Ailanthus altissimum*).

The establishment of a weed washing station was not implemented until late in the incident, and is expected to increase the threat of the introduction and spread of weed seed and propagules within and adjacent to the Carr Fire. Vehicles were required to wash as part of the demob process after the incident.

The acres and miles of suppression damage on federal lands is as follows: Drop points/safety zones: BLM - 18 acres, NPS – 4 ac., USFS – 15 ac.; dozerlines: BLM – 15 miles, 15 ac, NPS – 12 miles, 15 ac., USFS – 12 miles, 12 ac.; handlines: BLM – 12 miles, 14 ac., NPS – 2 miles, 2 ac., USFS – 9 miles, 11 ac.; roads: BLM – 85 miles, 5,737 ac., NPS – 78 miles, 5,491 ac., USFS – 95 miles, 6,347 ac. Riparian areas with moderate to high soil burn severity (SBS): BLM – 88 ac., NPS – 8 ac., USFS – 106 ac.; vegetation with high SBS: BLM – 2,726 ac., NPS – 3,855 ac., USFS – 1,224 ac. Out of total acres burned on the three federal agencies addressed in this Assessment, the BLM had 4% of the vegetation in high SBS, NPS had 10% in high SBS, and USFS had 4% in high SBS.

IV. RECOMMENDATIONS

Early Detection Rapid Response (EDRR) treatments of invasive species in native vegetation communities are proposed to mitigate the threat to native vegetation recovery. Specifications were developed which outline the application of manual and chemical treatments to reduce the competitive pressure of invasive weeds. Invasive weed treatments will greatly improve new recruitment of desirable species from surrounding unburned native vegetation and allow seed germination from existing seeds stored within the seed bank.

A high probability for the introduction and spread of invasive weeds exists especially in high priority treatment areas (refer to invasive weed priority inventory and treatment map) including high SBS areas, riparian corridors, roads and recently disturbed areas due to fire suppression related activities (dozerlines, handlines, drop points, safety zones, and staging areas). Some areas are excluded from inventory and treatment due to the native vegetation community's ability to recover postfire in areas of unburned/low SBS since these areas are expected to resprout and/or regenerate from seed unless further disturbance occurs. Inventory will occur in areas having high SBS as these areas have a high likelihood for invasive weed invasion. Various treatment methods will be utilized including hand pulling, backpack spraying and/or truck/UTV boom mounted spray units.

A. Emergency Stabilization (ES)

NPS, BLM, FS

Specification # BLM-14, NPS-4, USFS-1 Invasive Species, Early Detection Rapid Response

The purpose is to identify the establishment and monitor the spread of noxious weeds. The most effective noxious weed strategy after a disturbance is Early Detection and Rapid Response. Inventory and treatment by trained botanists/environmental specialists should begin in spring 2019 as soon as plant identification is possible. Priority should be given to areas impacted by fire suppression related activities and high SBS areas (refer to Treatment Specification forms in plan. The data collected from invasive weed surveys and treatments should include species, location, area infested and density. Treatments should be prescribed to control introduction and spread of invasive weeds in order to minimize the threat to native vegetation recovery.

Control of invasive weed infestations will include existing documented sites as well as new sites that may have been introduced during fire suppression operations. Integrated pest management techniques (herbicides, mechanical, and/or biological) will be utilized as appropriate to prevent the spread and establishment of weeds within the fire area. Herbicides are excluded for use within Trinity County. This specification addresses populations that can be treated through appropriate spot treatments mechanically, backpack sprayers, and vehicle-mounted broadcast sprayers. High priority species will be decided at the discretion of the lead agency and will include California Invasive Plant Council (Cal-IPC) A and B rated weeds. For a list of A and B rated weeds visit: <https://www.cal-ipc.org/plants/inventory/> .For example, high priority species for treatment include: yellow starthistle, tocalote, puncture vine, knapweeds (diffuse, spotted and squarrose), Arundo, tree of heaven, and broom (Spanish, French and Scotch).

B. Burned Area Rehabilitation (BAR)

Invasive Species, Early Detection Rapid Response, Specification # NPS-5

In fiscal years 2020-2022 follow up treatments will be required on a subset of treatment sites and all new infestations of high priority species. Manual removal will occur where herbicide is not appropriate. All herbicide treatments will adhere to the National Park Service list of approved chemicals. Herbicide use would follow application procedures described in the chemical manufacturer's label. In order to ensure watershed health, control or elimination of noxious weeds on both upland and riparian areas will be in cooperation with local, state, and other federal agencies, as well private groups or other interested parties. Executive Order 13112, Feb. 3, 1999, Invasive Species established the format for federal agencies to develop programs dealing with invasive species. Invasive weed inventory of the disturbed sites within the Carr Fire boundary will be conducted and reported under the current standards using Pesticide Use Reports and a local geospatial database. Other Regulations and Policies include: Whiskeytown NRA General Management Plan (1999), NPS Management Directive No. 038, NPS Management Policies 2001, 4.4.4, Whiskeytown NRA Fire Management Plan (2004).

Monitoring Treatment Effectiveness NPS-27

Noxious weed treatments will be conducted and reported under the current standards using Pesticide Use Reports and a local geospatial database. All treated invasive weed infestations will be monitored to evaluate the effectiveness of different chemical applications, plant resistance to herbicide(s) and recovery of the native plant communities. Control effectiveness will be evaluated the year following treatment to determine effectiveness of treatment (hand pulling or chemical applications), plant resistance to herbicides, and if follow-up treatments are necessary. Monitoring methods will involve repeated visits to infestation sites to give ocular estimates of the infestation. Photo-points during flowering periods can also be utilized. Monitoring will occur in years 1 through 3.

Invasive Species, Early Detection Rapid Response, Specification BLM-15

In fiscal years 2020-2024 follow up treatments will be required on a subset of treatment sites and all new infestations of high priority species. Manual removal will occur in areas where herbicide is not appropriate.

All herbicide treatments will adhere to the BLM list of approved chemicals. Herbicide use would follow application procedures described in the chemical manufacturer's label (most recent list updated September, 2011) and would be in conformance with the Vegetation Treatments Using Herbicides on BLM Lands in 17 Western States Programmatic Environmental Impact Statement (PEIS). In order to ensure watershed health, control or elimination of noxious weeds on both upland and riparian areas will be in cooperation with local, state, and other federal agencies, as well private groups or other interested parties. Executive Order 13112, Feb. 3, 1999, Invasive Species established the format for federal agencies to develop programs dealing with invasive species. Invasive weed inventory of the disturbed sites within the Carr Fire boundary will be conducted and reported under the current standards using Pesticide Use Reports and a local geospatial database. Other Regulations and Policies include: All proposed treatments are in conformance with these additional existing BLM policies and plans including: *Redding Field Office Environmental Assessment, Integrated Vegetation Management (2016), Redding Resource Management Plan and Record of Decision (1993), Final Programmatic Environmental Impact Statement Vegetation Treatments Using Herbicides on Bureau of Land Management Lands in 17 Western States (2007), Vegetation Treatments on BLM Lands in 17 Western States Programmatic Environmental Report (2007), Vegetation Treatments Using Aminopyralid, Flourozpyr, and Rimsulfuron on Bureau of Land Management Lands in the 17 Western States Programmatic Environmental Impact Statement (2016).*

Monitoring Treatment Effectiveness BLM-21

Chemically treated noxious weed infestations will be monitored to evaluate the effectiveness of different chemical applications, plant resistance to herbicide(s) and recovery of the native plant communities. Control effectiveness will be evaluated the year following treatment to determine effectiveness of treatment (hand pulling or chemical applications), plant resistance to

herbicides, and if follow-up treatments are necessary. Monitoring protocol methods will be at the discretion of the local Field Office or District and will involve at a minimum repeated visits to infestation sites to give ocular estimates of the infestation. Photo-points during flowering periods can also be utilized. Long term monitoring of the area using methods such as line point intercept will also add more quantitative data for analysis to post-fire rehabilitation Monitoring will occur in years 1 through 3.

V. NON-SPECIFICATION RECOMMENDATIONS

Monitor for Special Status Species

Since the fire burned through suitable habitat for Special Status Species plants, surveys and postfire effects monitoring are recommended. If Special Status Species plants are detected, each occurrence should be documented and a voucher specimen collected as needed.

Areas of importance include 1) Macnab Cypress stand near Whiskeytown on NPS lands. Monitor for seedling recruitment; 2) BLM sensitive stonecrop (*Sedum obtusatum* ssp. *paradisum*) location impacted by suppression repair efforts and the fire within the Chappie Shasta OHV Area (BLM), 3) Mallory's manzanita (*Arctostaphylos malloryi*) within upper Whiskey Creek watershed. Monitor for recruitment (BLM); and 4) Howell's alkali grass (*Puccinellia howellii*) on NPS lands. Monitor for offsite impacts.

Assess fire effects in High SBS areas

Additional fire effects monitoring on plant succession of the high SBS areas (including Upper Clear Creek, and Deadwood Creek), and those that have experienced fire within the past 20 years can provide additional direction for fire management of these areas.

Fire History and Past Treatment Effectiveness

Due to aggressive fire suppression tactics over the past hundred years, there has been an increase in downed woody debris and ladder fuels that have led to dense fuel loading in mixed conifer forest especially within the Grass Valley Creek, Deadwood Creek and Whitney Gulch areas observed during field assessments.

These areas historically experienced high frequency, low severity lightning caused fires that were allowed to burn across the landscape following summer thunderstorms. These fires often burned until season rain or snow extinguished them in the late fall.

In mixed conifer forest within the Carr fire perimeter, lack of fire has enabled shade tolerant conifer species to fill in the understory, and eventually overstock canopies that were once quite open and highly resilient to fire.

Mixed conifer forest intergrades with mixed chaparral and there is no distinct boundary delineating vegetation communities (refer to Mixed Chaparral discussion above and vegetation map). Fire regimes and species composition within these different vegetation communities creates varying effects postfire.

Fuel treatment effectiveness was considered when conducting field assessments. Within mixed conifer forest areas of the Carr Fire, past fuels treatments objectives were intended to increase the mosaic composition of vegetation to increase resiliency and break up fuel continuity and to remove dense understory component that could elevate ground fire into the crown; crown fires are often highly resistant to control measures. For instance, the Coggins (NPS) 2017 and Buck (NPS) 2018 fuels treatments burned at low SBS/veg mortality within the Carr Fire. Active management of fuels on a larger landscape scale may help to change fire behavior by rearranging continuous fuels in strategic locations over time.

VI. Consultations/Coordination

Julie Kierstad-Nelson-Forest Botanist, Shasta-Trinity National Forest

Brad Rust-Forest Soil Scientist, Shasta-Trinity National Forest

Thomas Garcia-Chief of Wildland Fire, Whiskeytown NRA

Rolland Hall-Fire GIS Specialist, Whiskeytown NRA

Jason Fallon- Deputy Region FMO, Pacific West Region

Daniel O'Connor-Fire Management Specialist, San Bernardino National Forest

Joe Nicholas-Lead Biological Technician, Whiskeytown NRA

Jennifer Gibson-Chief Division of Interpretation and Resource Management, Whiskeytown NRA

Laura Brodhead-Ecologist (Detail), Redding BLM

Tim Bradley-FMO, Redding BLM

Walter Herzog-Northern California FMO, BLM

VII. REFERENCES

Cal-IPC. 2018. California Invasive Plant Council. <https://www.cal-ipc.org/plants/inventory/>.

CNDDDB. 2018. California Natural Diversity Database. US Fish and Wildlife Service
<https://www.wildlife.ca.gov/Data/CNDDDB>.

CNPS. 2018. A Manual of CA Vegetation. California Native Plant Society

FEIS. 2018. Fire Effects Information System. <https://www.feis-crs.org/feis/>.

NLCD. 2018. National Land Cover Database. <https://catalog.data.gov/dataset/national-land-cover-database-nlcd-land-cover-collection>

NRCS. 2018. Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture. Web Soil Survey. Available online at
<https://websoilsurvey.sc.egov.usda.gov/app/WebSoilSurvey.aspx> Accessed 8/20/2018.

Written by:

Kerry Johnston, DOI BAER Team Vegetation Specialist, Klamath Falls Field Office, Lakeview District BLM kjohnston@BLM.GOV 541-884-4136.

Michael Dolan, DOI BAER Team Vegetation Management Specialist, Dayton, NV
Heremusgramen@gmail.com 530-640-8686.

BURNED AREA EMERGENCY STABILIZATION PLAN

Carr Fire

FORESTRY RESOURCES ASSESSMENT



I. OBJECTIVES

- Identify and mitigate immediate (imminent) and short-term tree hazard threats to life and property and recommend those to be mitigated
- Determine future tree hazard surveillance needs that were not completed during the BAER assignment due to time constraints
- Prescribe treatments to mitigate (tree removal) or abate (target removal) identified tree hazards along roads/rec sites not subject to closure

Tree hazards around trailheads, trails, roads and campgrounds are very prominent within the fire perimeter. The foresters of the BAER team spent 10 days assessing and designating tree hazards around campgrounds, trailheads, roads and trails on the BLM and National Park Service-managed lands. There is still a need to assess more tree hazards within road corridors and developed sites. Shallow-rooted species such as knobcone pine (*Pinus attenuata*) and gray pine (*Pinus sabiniana*) pose a threat to life and property after being burned.

II. ISSUES

- Tree hazards along roads and in recreational sites not subject to closure.
- Responsibility for mitigation/abatement (i.e., jurisdiction, easement, etc.)

- Explore possibility of joint salvage sale with BLM and NPS along County Line Road and Coggins Park area
- Prepare to post signs in closed areas and implement public education program

III. OBSERVATIONS

This report addresses known and potential fire effects to forest resources on U.S. Forest Service (USFS), Bureau of Land Management (BLM), and National Park Service (NPS) lands as a result of the Carr Fire. It specifically addresses issues presented by BLM and NPS resources staffs and provides recommendations for emergency treatment. This plan may be cited as a justification document to seek outside funding from other sources for recommended treatments not covered by Emergency Stabilization (ES) funds. Additional supplemental requests may be made after this document has been reviewed and approved.

Findings and recommendations contained in this assessment are based upon information obtained from literature reviews, field reconnaissance of the fire area, Geographic Information System (GIS) analyses, personal interviews and meetings with various USFS, BLM and NPS natural resource managers and other BAER Team members.

A. Background

The Carr Fire started on July 23, 2018 as the result of a flat tire on a travel trailer on Highway 299 in the western portion of Whiskeytown National Recreation Area. burned approximately 229,651 acres within Shasta County and Trinity County California. 63,127 ac. were within BLM, 38,565 ac. NPS, 30,149 ac. FS, 3,266 ac. Bureau of Reclamation and 94,354 ac. were within private or other. Public lands around Redding are very popular recreation areas. After the Carr fire, numerous hazard trees were created, many occurring around high use trail heads, trails, campgrounds and roads.

A detailed description of fire behavior, spread, and suppression actions is provided in the Executive Summary, incident action plans, and Incident Command Team Narratives. As of August 26, 2018, the fire was still uncontrolled (94% contained) and continued to burn within the control lines already established on the fire. With fire growth having been unchanged in the previous week, the management complexity of the fire was reduced to a Type 3 incident with minimal resources patrolling and supervising the organization currently in place.

B. Forestry Resources

The Carr fire burned a wide variety of vegetation types throughout the fire area. The fire burned primarily in vegetation that consists of a knobcone pine-dominated plant community, with areas of mixed conifer, oak woodland and chaparral brush species, as well as riparian zones along the many creeks that run through the drainages of Whiskeytown NRA. Coniferous tree species found in the area include knobcone, ponderosa, sugar, and gray pine, Douglas fir, and incense cedar. Hardwood tree species include blue oak, black oak, canyon and interior live oak, along with a wide variety of well-established riparian species, with big-leaf maple, red alder, and dogwood being the dominant species. In the fire area, approximately 56% of the Carr Fire is either low/unburned to low soil burn severity, while 39% sustained a moderate soil burn severity and 5% burned at high severity.

C. Reconnaissance, Methodology and Results

Field assessments were conducted from August 14 to August 24, 2018 by four BAER Foresters. Potential areas to be surveyed for tree hazards were identified by staff from the NPS and BLM. These agencies identified developed/recreational sites, roads, trails, cultural sites, and secondary road corridors within the burned area as primary areas of concern for threats to life and property.

The most significant and heavily-used road is Highway 299 that runs from Redding to Weaverville. The fire burned in multiple jurisdictions along the highway, but CalTrans was responsible for the majority of tree hazard removals through the fire. There are several county roads within the boundaries of Whiskeytown that have not historically been maintained for tree hazards, putting the onus on the park to mitigate these trees. That has been the case on the Carr fire as well, significantly increasing the workload on an already monumental effort that will be required to make these roads safe.

1. Tree Hazards

NPS

In Whiskeytown, short-term (likely to fail within one year) tree hazards were identified using the National Park Service (NPS 2015) hazard tree guidelines. These included trees that: had been damaged and weakened structurally; were killed outright in the fire; or, weakened by crown scorch and/or cambial damage, thus increasing susceptibility to subsequent successful bark beetle attack. While not all posed an immediate threat to the

public and administrative users of the road, many that didn't will deteriorate quickly and likely be prone to failure within a year, based on recent observations.

The purpose of tree hazard surveillance is to identify and evaluate potential hazards--i.e. determine if a tree is dead or likely to die and/or has a structural defect and poses a threat to life/property. Trees were assessed for cracks, cat faces, broken limbs, burn damage, pathogens and heavy leans toward targets. Surveyed sites were identified on basis of the likelihood of targets of life or property being present. The sites were then prioritized by using visitor use records and local knowledge. Foresters from the BAER team broke into teams of two and conducted tree hazard surveys on BLM, NPS, and USFS managed lands, identifying/evaluating immediate tree hazards. The trees were identified with "DANGER" orange glow ribbon and painted with blue tree marking paint and tallied based on size class/species.

The 7-Point Rating System utilized by the NPS rates hazard on the basis of a combination of defect (including lean) and target. Both tree and the target are each given a rating from 1-3 (with an extra point for lean) for a possible total rating of 7 for the most severe hazards. Although trees were not individually rated for this assignment, each was evaluated to confirm defect and potential to inflict property damage or physical injury. Those trees with a potential rating of 5 (with a minimum 3 defect) or greater were designated with blue tree-marking paint and documented in field notebooks each day. Data collected included, besides location, species and dbh (diameter at breast height).

Several roads within the burned area were surveyed by vehicle to estimate the extent of the remaining tree hazard surveillance workload, although no trees were marked for removal due to time constraints. In addition, park staff identified several newly-discovered arch sites and trails needing to be surveyed and evaluated for tree hazard potential, prior to opening to the public.

BLM

The BAER team met with the Redding BLM staff on Aug. 14, 2018 to identify their issues and concerns with resource issues related to the Carr Fire. Furthermore, on Aug. 15, 2018, BAER personnel met with the recreation staff (Bill Kuntz, Sky Zaffarano, Sean Stapleton, and Laura Brodhead) to develop the priority areas of the trail system to assess for tree hazards. Swasey Drive was identified as the highest priority; however, field office staff were in the process of snagging and assessing it. August 14, 16, 17 and 18 were spent assessing BLM non-motorized trails. On August 19, the crews assessed the BLM managed OHV trail system. Numerous trees were observed across the #2 trail as well as many standing tree hazards along the trail. Listed in the table under the "findings" section in the recreation assessment are the BLM trail systems that were assessed by the BAER personnel. Parking lots at trail heads were a focus for the BAER team, as these

areas have stationary targets, and therefore pose a greater threat to human life and property.

Longer- term tree hazards will continue to be dealt with by each of the agencies involved as additional trees succumb to the effects of fire.

Values at Risk – The potential values at risk are public safety and infrastructure value associated with roads and developed/recreational sites which could be directly damaged or impacted by tree failures. These values at risk are delineated within two categories: the short-term (1 year post-fire) includes currently identified tree hazards as well as those to be detected by spring 2019 surveillance. Long-term (2-5 years post-fire) hazards include those trees which succumb to effects of fire in subsequent years.

Consequences of the Fire on Values at Risk – Values at risk in this assessment include the possible loss of life and damage to property. This risk exists in all forest environments, but the Carr Fire has exacerbated it as a result of damage to and/or killing of trees. While many of the most obvious imminent tree hazards have been eliminated (felled) during the fire suppression efforts, there are thousands of trees remaining that will need to be removed before areas can be opened to the public. Many of these trees have already been identified and marked, but there are still many unidentified hazards. These hazards pose an unacceptable risk to the public and employees, if not mitigated/abated. They can either be mitigated (felled) alongside roads and within/adjacent developed/ recreational sites in the burn area or abated by temporary exclusion (road/site closure).

2. Tree Injury/Damage and Mortality

Post-fire mortality can continue for several years, influenced by numerous factors, including: season the injury/damage occurred, pre-fire tree vigor, site quality, extent of crown injury, extent of cambium damage, post-fire stand density/competition, post-fire climatic conditions, and insect/disease damage. The following guidelines were derived primarily from research by Wagener (1961), and Smith and Cluck (2011).

Season: Conifers are most susceptible to fire injury/damage early in the growing season, when stem and twig length growth is active, because growing points are more sensitive to heat, and because food reserves (from previous growing season) are at their lowest. Retention of sufficient green foliage is necessary to carry the tree through the remainder of the growing season and provide some food reserves for the following year. Fires that occur after bud set have much less impact on tree survival (Wagener, 1961).

Tree Vigor/Site Quality: Younger, more vigorous trees on good sites have a better chance of survival than over-mature trees on poor sites (Wagener, 1961). Drought-stressed trees have less of a chance for survival (Bulaon, pers.com).

Crown Injury: The amount of live crown remaining, as distinguished from green foliage, is the most important single factor in survival of fire-scorched ponderosa and Jeffrey pine (Wagener, 1961). Large terminal buds, well protected by scales, are able to withstand considerable heat without damage during late season fires. Green needle bases indicate that the surrounding parts of the crown are still alive; conversely, darkened needles and needles "frozen" in position in the direction of fire-run are unmistakable indicators the surrounding crown is dead (Wagener, 1961). Minimum criteria for survival of moderately vigorous ponderosa/Jeffrey pine with no or light cambium injury following a late season (after August 1) fire are 60% live crown and 15% green foliage (Wagener, 1961). In species with slender twigs and small terminal buds, such as sugar pine and true firs, or those without definite terminal buds, such as incense cedar, foliage kill and bud and twig kill are approximately the same as that which will be present in succeeding years (Wagener, 1961). Minimum criteria for survival of moderately vigorous trees of these species with no or light cambium injury following a late season (after August 1) fire are 55% live crown and 45% green foliage (Wagener, 1961).

Cambium Damage: Ryan (1990) reported that, in the absence of significant crown injury, most trees survive up to 25 percent basal girdling, whereas few survive more than 75 percent.

Post-Fire Stand Density: Potter and Foxx (1979) reported decreased recovery as stand density increased.

In the absence of established guidelines or criteria for knobcone and gray pine, the Foresters doing the evaluation used their best judgement for retention of fire-scorched crowns for these two species. Very few crown-scorched oaks were marked for removal as judgement was deferred pending re-evaluation of epicormic sprouting.

D. Findings

There are many tree hazards as a result of the Carr Fire. The BAER Foresters assessed roads, trails and developed areas throughout the fire. On NPS lands, roads, trails and developed areas were evaluated and prioritized. Imminent hazards were marked with blue paint and flagged to indicate the higher priority (Table 1) . Although not every mile of trail on BLM lands could be walked due to time constraints, there are numerous additional hazard trees along trails and roads.

Table 1. NPS Developed Sites Surveyed & Tree Hazards Identified/Marked

Developed Sites	Number of Identified/Marked Tree Hazards by Dbh (Diameter Breast Height) Class			
	≤8"	10-24"	24+''	Totals
Grizzly Gulch Wastewater Treatment Plant	13	82	2	97*
Grizzly Gulch Boat Storage/Residence	8	24	3	35*
Building #318	1	2	1	4*
Building #324/Road	4	21	4	29*
JFK Memorial	6	28	2	36*
Peltier Campground	0	1	0	1
Brandy Creek Beach Picnic Area	0	4	1	5
Brandy Creek RV Campground	2	3	0	5
Dry Creek Campground Parking Lot	0	1	0	1
Dry Creek Campground	9	6	0	15
NEED Camp	1	3	0	4
Whiskey Creek Picnic Area/Boat Launch	20	59	2	81*
Whiskey Creek Group Picnic Area	1	3	4	8
Oak Bottom Marina/Amphitheater	0	7	0	7
Oak Bottom Campground	11	12	0	23
Camden House/Eldorado Mine	7	9	1	17
Crystal Falls Picnic Area	3	2	0	5
Coggins Park Campground	0	5	3	8
Clear Creek Picnic Area	0	3	1	4

Developed Sites	Number of Identified/Marked Tree Hazards by Dbh (Diameter Breast Height) Class			
	≤8"	10-24"	24+"	Totals
Crystal Creek Campground	0	0	1	1
Brandy Creek Campground	0	3	0	3
East Beach	0	1	0	1
"Dropbox" (NPS Trash Consolidation Area)	1	7	0	8
Dry Creek Waterhead	6	9	3	18
Whiskey Creek H ₂ O Tank	29	17	0	46
Headquarters	0	0	0	0
Sheep Camp Campground	0	2	0	2
Whiskeytown Cemetery (County)	7	15	0	22
TOTALS	129	329	28	486

* Includes both immediate (imminent) and short-term tree hazards

Table 2. NPS/County Roads Surveyed & Tree Hazards Identified/Marked

Roads	Total Length (Mi)	Surveyed Length (Mi)	Number of Identified/Marked Tree Hazards by Dbh (Diameter Breast Height) Class			
			≤8"	10-24"	24+"	Totals
JFK Parkway	5.8	3.3	81	102	5	188
Paige Bar Rd.			35	19	1	55
Whiskey Cr. Group Picnic Area Rd.			0	7	0	7
Qtrs.#402 H ₂ O Tank Rd.			1	4	0	5
Crystal Creek Rd.			0	5	0	5
County-Line Rd.			--	--	--	--
Whiskey Creek Rd.	1.4	1.4	31	41	8	80*

Qtrs. #324 H ₂ O Tank Rd.			1	6	1	8
Dry Creek Waterhead/Rd.			7	23	5	35
TOTALS			156	207	20	383

* Includes both immediate (imminent) and short-term tree hazards

Table 3. NPS Trails Surveyed & Tree Hazards Identified/Marked

Trails	Total Length (Mi)	Surveyed Length (Mi)	Number of Identified/Marked Tree Hazards by Dbh (Diameter Breast Height) Class			
			≤8"	10-24"	24+"	Totals
Crystal Cr. Ditch Trail	2.1	2.1	1	10	4	15
Whiskeytown Falls Trail	1.7	1.7	2	2	0	4
TOTALS			3	12	4	19

* Includes both immediate (imminent) and short-term tree hazards

IV. RECOMMENDATIONS

The Carr Fire, encompassing almost 239,000 acres, has created an environment of increased risk for BLM and park users. BLM and park users are, and will continue to be, exposed to increased risk and potential injury due to tree hazards falling in road corridors as well as in developed/recreational sites within fire perimeter for many years. There are thousands of dead trees throughout the park that will continue to rot and fail over time. Specifications were developed to reduce the number of tree hazards in the park and to improve the safety of employees and visitors working and visiting the park.

Trees will continue to die over time which will require constant monitoring, surveillance and mitigation to assure that the park is safe to visit and work in. Roads, trails and developed areas may need to be closed until areas are determined to be safe.

A. General Recommendations

- Abate identified/potential (unidentified) tree hazards by road/site closures pending tree hazard surveillance/mitigation.

- Complete tree hazard surveillance along roads and within developed/ recreational sites.
- Mitigate identified tree hazards prior to re-opening roads/sites within the burn area.
- Post appropriate signage warning the public of the potential risk associated with unidentified tree hazards along the roads and within developed/recreational sites.

B. Specification-Related Recommendations

- **NPS-1-ES Short-Term Tree Hazard Surveillance by NPS** -- Complete surveillance for short-term tree hazards along sections of paved and unpaved NPS and County roads and developed sites in Whiskeytown NRA. Some of the roads and most of developed areas have already been surveyed, but, only for immediate/imminent hazards. There are approximately 90 miles of roads and approximately 95 acres of developed areas that still need to be surveyed/ resurveyed.
- **NPS-2-ES Short-Term Tree Hazard Mitigation by NPS** -- Complete mitigation of identified short-term tree hazards along paved and unpaved NPS and County roads and developed sites in Whiskeytown NRA. Includes approximately 788 unmitigated previously- identified tree hazards, as well as those to be identified by short-term surveillance.
- **NPS-3-BAR Long-Term Tree Hazard Surveillance by NPS (BAR)**--Complete surveillance for long-term tree hazards along paved and unpaved NPS and County roads and developed sites in Whiskeytown NRA.
- **NPS-17-ES, Tree hazard mitigation on trails**
The fire burned over most of the 70 miles of trail, creating a significant tree hazard safety issue for the public. All trails will be surveilled and mitigated.
- **BLM-8-ES, Tree hazard mitigation on roads**
The fire burned over most of the 48 miles of roads, creating a significant tree hazard safety issue for the public. All roads will be surveilled and mitigated.
- **BLM-10-ES, Tree hazard mitigation on trails**
The fire burned over most of the 150 miles of trail, creating a significant tree hazard safety issue for the public. All trails will be surveilled and mitigated.

V. NON-SPECIFICATION RECOMMENDATIONS

- NPS/BLM entertain possibility of joint salvage timber sale along county-Line Road

VI. CONSULTATIONS

Laura Brodhead, Forest Ecologist, BLM Redding Field Office, Redding, CA

Jennifer Gibson, Chief Division of Resources Management and Interpretation,
Whiskeytown NRA

Pete Angwin, Plant Pathologist, USFS Northern CA Forest Health Protection,
Redding, CA

Cynthia Snyder, Entomologist, USFS Northern CA Forest Health Protection,
Redding, CA

Tom Warner, Forester, Sequoia and Kings Canyon National Park, Three Rivers, CA

Steve Femmel, Forester, Whiskeytown National Recreation Area, Whiskeytown, CA

Zack Stewart, Forester, Cottonwood Field Office, Cottonwood, ID

Eric Rhodenbaugh, Forester, Fort Washakie, WY

TREATMENT SPECIFICATION
ES-Emergency Stabilization Funding Activity
BAR - Burned Area Rehab Funding Activity

BUREAU OF LAND MANAGEMENT

BLM-1-ES Archeological Site Protection Patrols

BLM-2-ES Archeological Site Condition Assessments

BLM-3-ES Previously Assessed Historic Property Stabilization

BLM-4-ES Kett Ethnographic Site Stabilization

BLM-5-ES Charley Brownstein Grave Stabilization

BLM-6-ES Cultural Resource Compliance

BLM-7-ES AML Mine Site Mitigation

BLM-8-ES Tree Hazard Mitigation - Trails

BLM-9-ES Trail Infrastructure Repair

BLM-10-ES Tree Hazard Mitigation - Trails

BLM-11-BAR Out Year Trail Increased Trail Maintenance

BLM-12-ES Minor Facilities Repair- Shooting Range

BLM-13-BAR Minor Facilities Repair- Amphitheater

BLM-14-ES Invasive Species-EDRR

BLM-15-BAR Invasive Species- EDRR

BLM-16-ES Storm patrol

BLM-17-ES Culvert Clear-out/Pre-storm

BLM-18-ES Hazard Warning Signs- Roads/Trails

BLM-19-ES Swasey Basin Cleanout

BLM-20-ES Post-Condition Assessment Stabilization

BLM-21-BAR Monitoring Invasive Species

BLM-22-ES Short Term AML Safety Fencing

BLM-23-ES Implementation Leader

BLM-24-BAR Implementation Leader

NATIONAL PARK SERVICE

NPS-1-ES Tree Hazard Surveillance

NPS-2-ES Tree Hazard Mitigation

NPS-3-BAR Tree Hazard Surveillance

NPS-4-ES Invasive Species- EDRR

NPS-5-BAR Invasive Species-EDRR

NPS-6-ES Historic Blacksmith Shop Stabilization

NPS-7-ES Historic El Dorado Mine Stabilization

NPS-8-ES Historic Redwood Tank Dismantle and Storage

NPS-9-ES Historic Stone House Stabilization

NPS-10-ES Archeological Site Protection Patrols

NPS-11-ES Archeological Site Condition Assessments

NPS-12-ES Historic Crystal Creek Ditch Stabilization

NPS-13-ES Previously Assessed Historic Property Stabilization

NPS-14-ES Cultural Resource Compliance

NPS-15-ES AML Mine Safety Mitigation

NPS-16-ES Trail Infrastructure Repair
NPS-17-ES Tree Hazard Mitigation-Roads
NPS-18-BAR Out-year Increased Trail Maintenance
NPS-19-BAR Minor Facilities Repair
NPS-20-ES Culvert Cleanout/Pre-Storm
NPS-21-ES Storm Patrol
NPS-22-ES Hazard Warning Signs-Roads-tails
NPS-23-ES Structure Protection
NPS-24-ES Potable Water Source Protection
NPS-25-ES Engineering Evaluation-Boulder Crk
NPS-26-ES Post-Condition Site Assessment Stabilization
NPS-27-BAR Monitoring Invasive Species
NPS-28-ES Short Term AML Safety Fencing
NPS-29-ES Implementation Leader
NPS-30-BAR Implementation Leader
NPS-31-ES Remove Debris and Hazard Materials from Burned Structures
USDA FOREST SERVICE
USFS-1-ES Invasive Species EDRR
USFS-2-ES Storm Patrol
USFS-3-ES Culvert Cleanout Pre-Storm
USFS-4-ES Hazard Warning Signs

ESRS INDIVIDUAL TREATMENT SPECIFICATION

TREATMENT/ACTIVITY NAME	Archaeological Site Protection Patrols - BLM	Spec-#	BLM-1-ES
NFPORS TREATMENT CATEGORY*	Heritage Resources	FISCAL YEAR(S) (list each year):	2019
NFPORS TREATMENT TYPE *	Protect Heritage Resources	WUI? Y / N	N
IMPACTED COMMUNITIES AT RISK		IMPACTED T&E SPECIES	NA

*See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

ES/BAR ISSUE STATEMENT

ES Issue-4: Critical Heritage Resources

Patrol and protect over 300 known Archaeological sites that are at risk of looting and vandalism because the fire removed vegetation that was camouflaging artifacts and features. This treatment will protect exposed sensitive pre-contact and historic cultural resources and deter looters. This is a temporary measure until vegetation recovers on the sites and conceals artifacts and features or until other protection measures are enacted.

TREATMENT

S9 - Cultural Protection (Stabilization/Patrol)

General Description:

Patrol selected pre-contact and historic sites and localities to monitor for site looting and vandalism. Tribal Monitors or a BLM seasonal archaeologist will report instances of site looting or vandalism to agency archaeologists who will notify Law Enforcement of the infractions. Patrols will occur on BLM lands within the burn area and at select areas affected by suppression impacts which may be outside of the fire perimeter.

Location/(Suitable) Sites:

Burned area and adjacent areas where suppression activities affected cultural resources. Information specific to the location and description of cultural resources is sensitive and exempt from public disclosure under the Archaeological Resources Protection Act of 1979 and the Freedom of Information Act. BLM archaeologists will provide site location information to tribal monitors and a seasonal employee.

Design/Construction Specifications:

1. BLM Archaeologists will coordinate monitoring patrols with Certified Tribal Monitors from the Redding Rancheria and Wintu tribal organizations.
2. Monitors will undertake systematic and discretionary patrols along public trails and roads.
3. A seasonal BLM Archaeologist will monitor sites that are in remote areas with more difficult access.
4. Monitors will document instances of looting, vandalism, erosion, deposition, site deterioration and patrol events and will report this information to BLM Archaeologists.
5. Monitors *will not* make contact with individuals encountered at archaeological sites.
6. BLM Archaeologists will provide looting or vandalism information to law enforcement for action.

How does the treatment relate to damage or changes caused by the fire?

Purpose of Treatment Specifications (relate to damage/change caused by fire):

To protect exposed sensitive historic and prehistoric cultural resources and deter looters. This is a temporary measure until sufficient green-up occurs to conceal some cultural materials, and other protective measures are enacted.

Treatment Reasonableness and Cost Effectiveness:

- a. Agency cultural resource personnel and Tribal monitors will monitor sites for condition and evidence of looting and degradation
- b. A second measure of effectiveness will be the number of law enforcement actions taken upon report of violations.

Treatment consistent with Agency Land Management Plan (identify which plan):

National Historic Preservation Act as codified in 36 CFR 800.

Redding Resource Management Plan and Record of Decision, US Bureau of Land Management, Redding Resource Area, California. 1993

Swasey Drive Area Implementation Plan, Shasta County, California. Decision Record and Finding of No Significant Impact, Environmental Assessment, CA-360-EA-2004-23

MONITORING PLAN

1) Treatment Objectives:

- a. Undertake systematic and discretionary monitoring patrols to prevent looting and vandalism at archaeological sites.
- b. Provide information to law enforcement for action.

2) Describe how implementation will be monitored.

BLM archaeologists will coordinate monitoring activities and will track areas monitored, evidence of looting, vandalism or degradation at sites, number of people observed in the vicinity of sites or suspicious behaviors, and subsequent actions taken by law enforcement of reported violations

3) Describe how effectiveness will be monitored, how it will be monitored, and within what time period.

- 1. Post-Fire site condition assessments will be used as a baseline for tracking evidence of looting or vandalism at sites.
- 2. Tribal monitors in coordination with BLM archaeologists will make multiple visits to areas identified as sensitive and document occurrences of looting, vandalism or degradation on sites or the presence of suspicious individuals in the area.
- 3. BLM archaeologists will provide oversight of monitoring activities and will document patrol events.
- 4. Monitoring will occur within the first year after the fire or until vegetation becomes re-established on sites and obscures artifacts and features, or other protective measures have been effectively enacted.

LABOR, MATERIALS AND OTHER COST:

PERSONNEL SERVICES: (Grade @ Cost/Hours X # Hours X # Fiscal Years = Cost/Item): Do not include contract personnel costs here (see contractor services below).	COST / ITEM
TOTAL PERSONNEL SERVICE COST	

ESRS INDIVIDUAL TREATMENT SPECIFICATION

TREATMENT/ACTIVITY NAME	Archaeological Site Condition Assessments - BLM	Spec-#	BLM-2-ES
NFPORS TREATMENT CATEGORY*	Heritage Resources	FISCAL YEAR(S) (list each year):	2019
NFPORS TREATMENT TYPE *	Site Stabilization	WUI? Y / N	No
IMPACTED COMMUNITIES AT RISK	No	IMPACTED T&E SPECIES	No

*See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

ES/BAR ISSUE STATEMENT

ES Issue-4: Critical Heritage Resources

Conduct Archaeological Site Condition Assessments at archaeological sites within the fire perimeter to assess potential damage to cultural resources from post-fire effects and to prescribe treatments for the emergency stabilization and rehabilitation of sites and structures to prevent adverse effects from post-fire erosion and other fire related effects and impacts.

TREATMENT

S9 - Cultural Protection (Stabilization/Patrol)

General Description:

This specification addresses the need for additional site condition assessments on Bureau of Land Management (BLM) lands within the 2018 Carr Fire boundaries. Twenty-one archeological sites on BLM lands affected by the 2018 Carr Fire were inspected for site condition during the initial BAER planning and assessment process. However, it was not possible to inspect all sites potentially affected by the fire due to limited cultural resource personnel capacity, logistics accessing sites, quantity of sites, and time constraints. As a result, 61 known BLM managed archaeological sites require post-fire condition assessments.

Site visits will allow staff to assess potential damage to cultural resources and prescribe treatments for the emergency stabilization and rehabilitation of the sites and structures to avoid adverse effects from post-fire erosion and other fire related effects and impacts. Assessments will include time for conducting additional record searches, tribal consultation, GIS data development and management, and management of photos and other field collected data. Consultations with the California State Historic Preservation Officer, American Indian tribes and groups will be conducted prior to prescribing treatments to minimize or mitigate post-fire related effects to cultural resources.

Location/(Suitable) Sites:

Sixty-one (61) pre-contact and historic sites within the Carr-Fire perimeters located on BLM lands will be assessed. Cultural resource locations are exempt from public disclosure under the Archaeological Resources Protection Act of 1979 (ARPA), and the Freedom of Information Act (FOIA).

Design/Construction Specifications:

1. Assess 61 sites within the Carr-Fire perimeter located on BLM lands
2. A GS-11 archeologist will supervise the work of a GS-7 archeological technician (BLM-6-ES).
3. Assessment information of each site will be recorded on an Emergency Post-Fire Inspection Form; field notes and photographs will be taken at each site; and GPS data and other information will be collected and used for sketching threatened or disturbed cultural features or associated items at each site

4. A determination will be made if emergency stabilization is needed to preserve significant information from hazard trees, potential precipitation events or winter weather events (BLM-20-ES).
5. Prescribed treatments for each assessed archaeological site will consider consultation results between the State Historic Preservation Officer, American Indian tribes and groups, and the BLM.

Purpose of Treatment Specifications (relate to damage/change caused by fire):

Site assessments are necessary to determine if emergency stabilization is needed to preserve significant archaeological and cultural resources at sites during the first year after the fire. Assessments are necessary to evaluate and document the risk to archaeological and cultural resources from the effects of post-fire flooding, debris flows, severe erosion, looting of exposed artifacts and possible sub-surface materials. Treatment recommendations will be commensurate with disturbances and threats or "risk" at each site.

Treatment Reasonableness and Cost Effectiveness:

Part of the BLM mission is to minimize adverse impacts on cultural resources and values of the public lands they manage (FLPMA 1976). Without baseline data derived from on-site condition assessments, impacts to historic properties from the fire could not be quantified, thus statistically significant information could not be developed for making emergency stabilization recommendations and treatment specifications at individual sites. Without this baseline data, unassessed sites could deteriorate, adverse effects could occur (800.5.A.2.vi), and potential risks such as exposed human remains and other NAGPRA issues or inadvertent discoveries could arise and become problematic. Without these site assessments, it would be unknown if erosion of intact cultural deposits are at risk of eroding or depositional processes. If direct and indirect fire effects or "risk" is not immediately identified and addressed, erosional/depositional issues could exponentially reduce site integrity and potentially increase future data recovery and stabilization costs, and possibly negatively affecting tribal relations.

Treatment consistent with Agency Land Management Plan (identify which plan):

- Federal Land Policy and Management Act of 1976
- Redding Resource Management Plan and Record of Decision, US Bureau of Land Management, Redding Resource Area, California. 1993
- Directors Order #28, Cultural Resource Management Guidelines June 11, 1998
- 36 CFR 800.5.A.2.vi

MONITORING PLAN

1) Treatment Objectives:

- Condition assessments will be conducted on known/documented pre-contact and historic archaeological sites within the Carr fire perimeter and determinations made if emergency stabilization treatments are needed at individual locations
- Baseline data will be collected from which informed decisions can be made that will guide treatment recommendations for protecting and preserving historic properties at risk from post-fire effects
- Sites will be assessed for potential risks from erosion, looting, vandalism or other direct or indirect threats caused by or as a result of the fire
- Site condition assessments will include the identification of safety hazards (open adits and shafts) at historic mining sites and work with AML staff on these sites.
- Visiting individual site locations will help ground truth and improve burn severity model data that could be used for assessing areas that may have a high probability of undocumented sites

2) Describe how implementation will be monitored:

- A BAER site assessment form or a similar form will be completed for each of the 61 historic properties assessed.
- GS-11 archeologist will provide a brief progress report (one page or less) that will summarize bi-weekly progress of the GS-7 archeological technician's after assessing 20 sites, then a second progress report of the same length will be written that will summarize the results of the GS-7 archeological technician's progress after the next 20 site assessments
- A final third report (site assessment summary report) will be written that will summarize the results of the last 21 sites assessed, and will summarize the assessments at all 61 sites
- The third and final report will identify any potential issues with erosion, looting, vandalism or other direct or indirect threats caused by or as a result of the fire, and will identify any safety hazards
- Each report will be provided to the BLM's Cultural Resource Manager within a reasonable time frame in order to monitor the quantity and quality of the GS-7 archeological technician's data collected, and to allow time for planning site visits and or modifications to data collection and condition assessment methods and or treatment recommendations
- Management of photos of assessed sites will be conducted and reviewed.
- GIS data will be collected and reviewed in ArcMap
- Emergency stabilization treatments and related assessment data will be reviewed in GIS metadata developed for point lines or polygons derived from field data collection
- Emergency Post-Fire Inspection Forms containing site assessment data and treatment recommendations will be added to existing site forms and will be reviewed by BLM's Cultural Resource Lead Specialist

3) Describe how effectiveness will be monitored, how it will be monitored, and within what time period.

- At least 61 sites will have emergency stabilization treatment prescriptions
- The GS-7 archeological technician will be on site to monitor stabilization and treatment implementation
- Field notes and georeferenced photos will be taken of stabilization and treatment operations
- GPS data will be collected during stabilization and treatment operations that will assist in documentation and monitoring stabilization and treatment processes
- GS-11 archeologist will spot check stabilization and treatment implementation at chosen or randomly selected sites over the course of one year or during emergency stabilization operations
- Meetings between the GS-7, GS-11 and BLM's Cultural Resource Lead Specialist
- will occur after each progress report is submitted or when necessary
- A final monitoring report will be written that will summarize results of the completed treatment specifications and will be appended to the final site assessment summary report

LABOR, MATERIALS AND OTHER COST:

PERSONNEL SERVICES: (Grade @ Cost/Hours X # Hours X # Fiscal Years = Cost/Item): Do not include contract personnel costs here (see contractor services below).	COST / ITEM
TOTAL PERSONNEL SERVICE COST	
EQUIPMENT PURCHASE, LEASE AND/OR RENT (Item @ Cost/Hour X # of Hours X #Fiscal Years = Cost/Item): Note: Purchases require written justification that demonstrates cost benefits over leasing or renting.	COST / ITEM
TOTAL EQUIPMENT PURCHASE, LEASE OR RENTAL COST	
MATERIALS AND SUPPLIES (Item @ Cost/Each X Quantity X #Fiscal Years = Cost/Item):	COST / ITEM
TOTAL MATERIALS AND SUPPLY COST	

ESRS INDIVIDUAL TREATMENT SPECIFICATION

TREATMENT/ACTIVITY NAME	Previously Assessed Historic Property Stabilizations	Spec-#	BLM-3-ES
NFPORS TREATMENT CATEGORY*	Heritage Resources	FISCAL YEAR(S) (list each year):	2019
NFPORS TREATMENT TYPE *	Site Stabilization	WUI? Y / N	No
IMPACTED COMMUNITIES AT RISK	N/A	IMPACTED T&E SPECIES	None

*See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

ES/BAR ISSUE STATEMENT

ES Issue-4: Critical Heritage Resources

Remove hazard trees within the perimeter and/or immediate vicinity of known, significant cultural features and archaeological sites have the potential to adversely affect cultural resources when they ultimately fall. These trees also pose a risk to archaeological personnel conducting site assessments and monitoring activities. Existing exclusionary fencing damaged by the fire similarly put sites at risk of unwanted pedestrian and vehicular access and increased looting potential. The removal of hazard trees and repair of existing exclusionary fence will help to mitigate further damage to significant sites managed by the Bureau of Land Management (BLM) Redding Field Office.

TREATMENT

S9 - Cultural Protection (Stabilization/Patrol)

General Description: Indirect impacts from the Carr Fire are, or have the potential to further degrade important attributes of cultural features or archaeological sites on lands managed by the BLM Redding Field Office that fall within the fire perimeter. This specification consists of three components: (1) Clear fire-killed trees and fallen trees from resources; (2) Lop and scatter, chip, and/or directionally fell fire killed hazard trees to reduce site surface visibility, erosion, and fuel loading potential; and (3) Repair existing exclusionary fencing surrounding sites to discourage access.

Location/(Suitable) Sites:

(1) Fire killed hazard trees within site boundaries at eleven (11) known archaeological sites or historic structures within the Carr Fire perimeter on BLM Redding Field Office-managed lands, specifically including: the Niagara Mill stacked rock foundation north of French Gulch (CA-SHA-2291, CA-030-579); Charley Brownstein’s gravesite along Highway 299 (no trinomial, CA-030-367); the Kett Site (CA-SHA-491, CA-030-008); site Keswick Dam #4 at Ribbon Bridge (CA-SHA-1448, CA-030-188); the Keswick Hotel (CA-SHA-2431, CA-030-337); China Gulch Foundation (CA-030-1716, no trinomial); a site in the Rock Creek drainage with an arrastra and petroglyph (CA-SHA-2419, CA-030-600); an arrastra in the Swasey area (CA-SHA-1783, CA-030-387); and three sites (CA-SHA-1544 [CA-030-097], CA-SHA-1991 [CA-030-423], CA-SHA-2424 [CA-030-421]) in Swasey ACEC.

(2) Repair/reconstruct existing exclusionary fencing surrounding all or portions of five (5) known archaeological sites or historic structures within the Carr Fire perimeter on BLM Redding Field Office-managed lands: The Kett Site (CA-SHA-491, CA-030-008); site Keswick Dam #4 at Ribbon Bridge (CA-SHA-1448, CA-030-188); and three sites (CA-SHA-1544 [CA-030-097], CA-SHA-1991 [CA-030-423], CA-SHA-2424 [CA-030-421]) in Swasey ACEC. The existing fence at CA-SHA-1448 (CA-030-188) surrounded three sides of the site pre-fire; the remaining boundary will be fenced so as to effectively close off the western extent of the site.

Additional sites will be identified for fire killed hazard tree removal as assessments are completed on 61 remaining sites prioritized for assessment and not previously visited during the incident. These sites will necessitate comparable levels and types of treatments to those specifications previously described above.

Design/Construction Specifications:

(1) Removal of fire killed hazard trees identified as a threat to known archaeological sites or as a hazard to archaeology crew members conducting site assessments, and removal of trees that have fallen onto archaeological features within site boundaries. Tree and log removal, either through chipping, directional felling, or lop and scatter methods, will be completed by BLM fuels crew personnel with on-site guidance from BLM archaeology personnel on hazard tree location and directional falling preference (if any). Chipping will be accomplished utilizing up to two chippers that the BLM Redding Field Office currently own. All required training and certification for such work is to be completed prior to the initiation of fieldwork.

(2) Repair/reconstruction of existing exclusionary fence line surrounding previously identified sites. The BLM Force Account will complete fence repair with on-site guidance from BLM archaeology personnel. The work is designed to exclude pedestrian and vehicular traffic on-site and decrease looting potential. All work will be completed in FY19.

Purpose of Treatment Specifications (relate to damage/change caused by fire):

Hazard trees pose a continued threat to archaeological resources and the personnel responsible for managing those resources on-site until they are successfully felled and removed. Surface features such as dry stacked rock foundations can be toppled by falling trees, and subsurface features such as housepits can be disturbed by uprooted root balls. Chipping and/or lop and scatter methods will effectively disperse downed fuels while also helping to stabilize surface soils and make surface artifacts less visible and susceptible to looting. Directional falling perpendicular to site slopes can also reduce erosion potential where appropriate.

Treatment Reasonableness and Cost Effectiveness:

Proposed treatments will effectively protect some of the most significant archaeological resources within the fire perimeter on BLM Redding Field Office-managed lands. Should proposed treatments not take place, the cost of mitigation efforts after site damage and/or disturbance occurs will greatly exceed treatment costs. All work will be conducted in-house by BLM Redding Field Office permanent and seasonal staff, reducing costs, streamlining treatment timelines, and increasing overall efficiency by having personnel work together in the field at the same time to make determinations that most effectively protect archaeological resources. Work will predominately be accomplished utilizing equipment (chippers, vehicles, saws, trailers) already owned by the BLM as well as, eliminating the need for equipment rental and/or additional equipment purchases save for an additional GSA vehicle for an archaeological technician (GS-07).

*Land Use Plan Conformance:***Treatment consistent with Agency Land Management Plan (identify which plan):**

National Historic Preservation Act as codified in 36 CFR 800.

Redding Resource Management Plan and Record of Decision, US Bureau of Land Management, Redding Resource Area, California. 1993

Swasey Drive Area Implementation Plan, Shasta County, California. Decision Record and Finding of No Significant Impact, Environmental Assessment, CA-360-EA-2004-23

ESRS INDIVIDUAL TREATMENT SPECIFICATION

TREATMENT/ACTIVITY NAME	Kett Ethnographic Site Stabilization	Spec-#	BLM-4-ES
NFPORS TREATMENT CATEGORY*	Heritage Resources	FISCAL YEAR(S) (list each year):	2019
NFPORS TREATMENT TYPE *	Site Stabilization	WUI? Y / N	No
IMPACTED COMMUNITIES AT RISK	N/A	IMPACTED T&E SPECIES	None

*See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

ES/BAR ISSUE STATEMENT

ES Issue-4: Critical Heritage Resources

Stabilize post-fire effects at the Kett Site (CA-SHA-491, CA-030-008) also known as the ethnographic Wintu “resting place (*Phu-rus-topi*)” or *No-Sai*. The site contains extensive midden deposits, and at least eight housepit features. Hazard trees, destroyed split rail exclusionary fencing, increased access potential, and increased site surface visibility put the site at further risk of damage and disturbance should treatment measures not be undertaken. All proposed on-site treatments should be undertaken after consultation with the Wintu Tribe has been completed, particularly the replacement of existing on-site signage.

TREATMENT

S9 - Cultural Protection (Stabilization/Patrol)

General Description:

Impacts from the Carr Fire have the potential to degrade one of the most significant Wintu Ethnographic sites on lands managed by the BLM Redding Field Office within the Carr Fire perimeter. This specification consists of four components: (1) Clear fire killed hazard trees and fallen trees from resources; (2) Lop and scatter, chip, and/or directionally fell fire killed hazard trees in ways that reduce site surface visibility, reduce erosion potential, restrict site access, and decrease fuel loading; (3) Reconstruct exclusionary split rail fencing or similar fencing surrounding the burial area to discourage access; and (4) Replace the burned wooden sign near the exclusionary fencing after consultation with the Wintu Tribe.

Location/(Suitable) Sites:

- (1) Fire killed hazard trees within or adjacent to site boundaries, particularly near housepit features at the center of the site, the designated burial area to the southeast, and along access routes to the north of the site where unauthorized OHV access is most likely to occur.
- (2) Reconstruct existing exclusionary split rail or similar fencing surrounding the burial area within the footprint of the previous fence line. Fence line measures 42 feet (east-west) by 45 feet (north-south) and encompasses the known extent of the burial area.
- (3) Chip, lop and scatter, or directionally fall hazard trees as appropriate. Lop and scatter and/or chipping should occur within the site boundary on exposed surface soils. Directional falling should take place along the northwestern extent of the site along the two-track access road so that trees may be placed perpendicular to the road.
- (4) Replace signage at previous location using original posts; this is dependent on the outcome of consultation efforts with the Wintu Tribe.

Design/Construction Specifications:

- (1) Removal of fire killed hazard trees identified as a threat to the previously identified feature areas and other yet-to-be identified areas of concern on-site, or as a hazard to archaeology crew members conducting site assessments/monitoring, and removal of trees that have fallen onto archaeological features within site boundaries. In addition, tree and log removal, either through chipping, directional felling, or lop and scatter methods, is to be completed by BLM fuels crew personnel with on-site guidance from BLM archaeology personnel on hazard tree location and directional falling preference (if any).

Chipping will be accomplished utilizing up to two chippers that the BLM currently own. All required training and certification for such work is to be completed prior to the initiation of fieldwork.

(2) Reconstruction of existing exclusionary split fence line surrounding previously identified burial area.

(3) Replace existing burned signage on-site with metal signage instead of the original wood, and with Wintu tribal input taken into consideration. The BLM Force Account will complete fence and signage reconstruction with on-site guidance from BLM archaeology personnel. The work is designed to exclude pedestrian traffic on-site and decrease looting potential. All work will be completed in FY19.

How does the treatment relate to damage or changes caused by the fire?

Purpose of Treatment Specifications (relate to damage/change caused by fire):

Hazard trees pose a continued threat to archaeological resources and the personnel responsible for managing those resources on-site until they are successfully felled and removed. Subsurface features such as housepits and burials can be disturbed by uprooted root balls. Chipping and/or lop and scatter methods will effectively disperse downed fuels while also helping to stabilize surface soils and make surface artifacts less visible and susceptible to looting. Directional falling perpendicular to site slopes can also reduce erosion potential where appropriate, and will effectively close existing access routes without drawing additional unwanted attention to the area.

Why is the treatment/activity reasonable, within policy, and cost effective?

Treatment Reasonableness and Cost Effectiveness:

Proposed treatments will effectively protect one of the most significant archaeological and Native American Spiritual resources to the Wintu Tribe within the fire perimeter on BLM managed lands. Should proposed treatments not take place, the cost of mitigation efforts after site damage and/or disturbance occurs will greatly exceed treatment costs, particularly if human remains are exposed or disturbed. All work will be conducted in-house by BLM Redding Field Office permanent and seasonal staff, reducing costs, streamlining treatment timelines, and increasing overall efficiency by allowing personnel to work in the field at the same time to make determinations that most effectively protect archaeological resources. Work will predominately be accomplished utilizing equipment (chippers, vehicles, saws, trailers) already owned by the BLM Redding Field Office as well as, eliminating the need for equipment rental and/or additional equipment purchases save for an additional GSA vehicle for an archaeological technician (GS-07).

Land Use Plan Conformance:

Treatment consistent with Agency Land Management Plan (identify which plan):

National Historic Preservation Act as codified in 36 CFR 800.

Redding Resource Management Plan and Record of Decision, US Bureau of Land Management, Redding Resource Area, California. 1993

MONITORING PLAN

1) **Treatment Objectives:** Stabilization and protection of significant archaeological sites and/or features directly affected by the Carr Fire through fire-killed hazard tree removal, exclusionary fence reconstruction, sign replacement, and a combination of chipping, lop and scatter, and directional falling to disperse downed trees, reduce erosion potential, discourage unauthorized access, and obscure site surfaces to decrease the possibility of looting.

2) **Describe how implementation will be monitored:** Work to stabilize the site and immediate vicinity will be physically monitored by BLM archaeology staff. On-site monitoring conducted during treatment will ensure that work is conducted to the standards of BLM archaeology staff.

Work Agent: C=Coop Agreement, F=Force Account, G=Grantee, P=Permittees, S=Service Contract, T=Timber Sales Purchaser, V=Volunteer

SOURCE OF COST ESTIMATE

1. Estimate obtained from 2-3 independent contractual sources.	
2. Documented cost figures from similar project work obtained from local agency sources.	M, T
3. Estimate supported by cost guides from independent sources or other federal agencies	
4. Estimates based upon government wage rates and material cost.	P
5. No cost estimate required - cost charged to Fire Suppression Account	

P = Personnel Services, E = Equipment M = Materials/Supplies, T = Travel, C = Contract, F = Suppression

RELEVANT DETAILS, MAPS AND DOCUMENTATION INCLUDED IN THIS REPORT:



Sign constructed at Kett Site. Sign originally read: “Phu-rus-topi” “1875 Wintu Resting Place 1927” “Public Law 95-341 and 96-95 and the California Health and Safety Code Sections 7052, 7500, 8101, and 8102 Prohibit Disturbing These Sacred Grounds”. Revisions are recommended to signage language.

ESRS INDIVIDUAL TREATMENT SPECIFICATION

TREATMENT/ACTIVITY NAME	Charley Brownstein Grave Stabilization	Spec-#	BLM-5-ES
NFPORS TREATMENT CATEGORY*	Heritage Resources	FISCAL YEAR(S) (list each year):	2019
NFPORS TREATMENT TYPE *	Site Stabilization	WUI? Y / N	No
IMPACTED COMMUNITIES AT RISK	N/A	IMPACTED T&E SPECIES	None

*See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

ES/BAR ISSUE STATEMENT

ES Issue-4: Critical Heritage Resources

Stabilize post-fire effects at the Charley Brownstein Gravesite (CA-030-367). The gravesite is a highly visible, historic (1864) period infant burial, located on BLM land, that represents the last evident gravesite of the Shasta Hebrew Congregation Jewish Cemetery established in 1857. Fire killed hazard trees threaten to impact the site and pose a risk to the individuals who visit the gravesite. Footpath erosion also poses a risk to the gravesite and the pedestrians who utilize it. The removal of hazard trees, reconstruction of footpath handrail, steps, and railroad tie border, and construction of a French drain at the base of the stairs and slope will help to mitigate further damage to a significant site managed by the Bureau of Land Management (BLM) Redding Field Office.

TREATMENT

S9 - Cultural Protection (Stabilization/Patrol)

General Description: State Park and E Clampus Vitus signage direct motorists from the northern shoulder of Highway 299 (approximately 0.5 miles west of Shasta) down a roughly 120-foot pedestrian path to the gravesite proper. The gravesite is of public significance to the nearby community of Shasta, the local Jewish community, and represents an accessible tourist stop that receives high volume visitation. Impacts from the Carr Fire are, or have the potential to further degrade a highly visible and locally significant historic infant gravesite. This specification consists of four components: (1) clear fire killed hazard trees from the immediate vicinity of the gravesite and footpath; (2) lop and scatter, chip, and/or directionally fell fire killed hazard trees in ways that reduce site surface visibility, reduce erosion potential, restrict site access, and decrease fuel loading; (3) reconstruct footpath steps, adjacent handrail, railroad tie boundary, and sign post (2) access; and (4) construct French drain at base of stairs/slope to divert water and erosion potential away from gravesite as it flows downslope along the footpath.

Location/(Suitable) Sites: The gravesite is located on the north side of Highway 299, approximately 0.5 miles west of the town of Shasta. The gravesite is located just outside of the CalTrans Right-of-Way.

Design/Construction Specifications:

1. Remove fire killed hazard trees from the edge of the CalTrans Right-of-Way and adjacent to the gravesite which pose a threat to the gravesite, other buried features in the vicinity, and to visitors to the historic site.
2. Chipping and/or lop and scatter methods will effectively disperse downed fuels while also helping to stabilize surface soils
3. Reconstruction of burned wooden step treads, the safety handrail on the downslope side of the stairs, and a railroad tie border around the gravesite which stabilized the area around the grave pre-fire..
4. Replace two 4x4 sign posts in the turnout on the highway shoulder.
5. Construct a French drain at the base of the stairs to divert erosion potential.

The BLM Redding Field Office Force Account will complete step, handrail, border, and signage reconstruction with on-site guidance from BLM Redding Field Office archaeology personnel. The work is designed to provide safe pedestrian access to the site, while preventing erosion potential. All work will be completed in FY19.

Purpose of Treatment Specifications (relate to damage/change caused by fire):

Hazard trees pose a continued threat to archaeological resources and the personnel responsible for managing those resources on-site until they are successfully felled and removed. Subsurface features such as burials can be disturbed by uprooted root balls. Chipping and/or lop and scatter methods will effectively disperse downed fuels while also helping to stabilize surface soils. Wooden step treads and the downslope handrail were burned during the fire resulting in an unsafe surface for pedestrian access to the site. The French drain and replacement of the railroad tie border around the grave will provide greater erosion protection for the gravesite.

Treatment Reasonableness and Cost Effectiveness:

Proposed treatments will effectively protect a locally significant historic Site in the community of Shasta within the fire perimeter on BLM Redding Field Office-managed lands. Should proposed treatments not take place, the cost of mitigation efforts after site damage and/or disturbance occurs will greatly exceed treatment costs, particularly if human remains are exposed or disturbed. All work will be conducted in-house by BLM Redding Field Office permanent and seasonal staff, reducing costs, streamlining treatment timelines, and increasing overall efficiency by allowing personnel to work together in the field to make determinations that most effectively protect archaeological resources.

Treatment consistent with Agency Land Management Plan (identify which plan):

National Historic Preservation Act as codified in 36 CFR 800.

Redding Resource Management Plan and Record of Decision, US Bureau of Land Management, Redding Resource Area, California. 1993

MONITORING PLAN

- 1) **Treatment Objectives:** Stabilization and protection of a significant historic site and potential buried features directly affected by the Carr Fire through fire-killed hazard tree removal, footpath step reconstruction, sign post reconstruction, construction of a French drain at the base of the stairs, and a combination of chipping, lop and scatter, and directional falling to disperse downed trees, and reduce erosion potential.
- 2) **Describe how implementation will be monitored:** Work to stabilize the site and immediate vicinity will be physically monitored by BLM Redding Field Office archaeology staff. On-site monitoring conducted during treatment will ensure that work is conducted to the standards of BLM Redding Field Office archaeology staff. Monitoring efforts will additionally include photo documentation, field notes, and a report that will be prepared following the completion of stabilization efforts.
- 3) **Describe how effectiveness will be monitored, how it will be monitored, and within what time period:** BLM Redding Field Office archaeology staff will conduct periodic post-treatment monitoring of the site at regular intervals. Interval schedule and overall duration will be determined by archaeology staff.



Burned stair treads and handrail.



Burned railroad ties around gravesite.

ESRS INDIVIDUAL TREATMENT SPECIFICATION

TREATMENT/ACTIVITY NAME	Cultural Resource Compliance	Spec-#	BLM-6-ES
NFPORS TREATMENT CATEGORY*	Heritage Sites	FISCAL YEAR(S) (list each year):	2019
NFPORS TREATMENT TYPE *	Protect Heritage Sites	WUI? Y / N	N
IMPACTED COMMUNITIES AT RISK		IMPACTED T&E SPECIES	

*See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

ES/BAR ISSUE STATEMENT

ES Issue-4: Critical Heritage Resources

Fund a GS-7 Archaeologist to complete Archaeological Site Condition Assessments (BLM-2-ES), Assessed Historic Property Stabilizations (BLM-3-ES), and Archaeological Site Protection Patrols (BLM-1-ES) and will fulfill Cultural Resource Section 106 Compliance activities associated with other specifications developed for treatments as a result of the Carr Fire.

TREATMENT

S9 - Cultural Protection (Stabilization/Patrol)

General Description:

Complete tasks identified in other specifications - Archaeological Site Condition Assessments (BLM-2-ES), Assessed Historic Property Stabilizations (BLM-3-ES), and Archaeological Site Protection Patrols (BLM-1-ES) and will fulfill Cultural Resource Section 106 Compliance activities associated with other specifications developed for treatments as a result of the Carr Fire.

Location/(Suitable) Sites:

Pre-contact and historic sites on lands managed by the BLM Redding Field Office within and immediately adjacent to the Carr Fire.

Design/Construction Specifications:

1. Conduct Site Condition Assessments on known pre-contact and historic sites on BLM managed lands within the Carr Fire. Assess erosion and stabilization needs for each site, document post-fire condition, and recommend necessary treatments to prevent further degradation to sites.
2. Monitor stabilization treatments, primarily hazard tree removal, on sites that have had condition assessment recommendations.
3. Conduct site protection patrols at a variety of locations, primarily remote locations not readily accessible by tribal monitors, and report instances of site looting or vandalism to agency archaeologists who will notify Law Enforcement of the infractions.
4. Monitor treatments or conduct Section 106 compliance for treatments prescribed for other resources or values at risk on BLM managed lands affected by the Carr Fire.

How does the treatment relate to damage or changes caused by the fire?

Purpose of Treatment Specifications (relate to damage/change caused by fire):

This position fulfills the requirements for cultural resource compliance activities under the National Historic Preservation Act as codified in 36CFR800.

Treatment Reasonableness and Cost Effectiveness:

Agency archaeological staff do not have the capacity to undertake all necessary National Historic Preservation Act compliance activities for cultural resources impacted by the Carr Fire. A one year GS-7 archaeological position will insure that compliance activities are completed in a timely manner and are fully documented.

Treatment consistent with Agency Land Management Plan (identify which plan):

National Historic Preservation Act as codified in 36 CFR 800.

Redding Resource Management Plan and Record of Decision, US Bureau of Land Management, Redding Resource Area, California. 1993

Swasey Drive Area Implementation Plan, Shasta County, California. Decision Record and Finding of No Significant Impact, Environmental Assessment, CA-360-EA-2004-23

MONITORING PLAN

1) Treatment Objectives:

Achieve compliance with the National Historic Preservation Act for activities associated with the protection, stabilization, and avoidance of cultural resources as defined under the Act.

2) Describe how implementation will be monitored.

Tasks listed in the design section above will be tracked with site assessment forms, patrol logs, documentation of stabilization treatments which will include photo documentation, field notes, and a report that will be prepared following the completion of stabilization efforts, and file maintenance pertinent to these objectives. Section 106 compliance activities will use standardized procedures already in place at the agency.

3) Describe how effectiveness will be monitored, how it will be monitored, and within what time period.

A BLM GS-11 archaeologist will provide oversight and supervision for this position. They will assure that documentation, as specified above, has been completed at regular intervals, that site records have been updated and that GIS data has been updated as necessary.

LABOR, MATERIALS AND OTHER COST:

PERSONNEL SERVICES: (Grade @ Cost/Hours X # Hours X # Fiscal Years = Cost/Item): Do not include contract personnel costs here (see contractor services below).	COST / ITEM

ESRS INDIVIDUAL TREATMENT SPECIFICATION

TREATMENT/ACTIVITY NAME	Abandoned Mine Mitigation for BLM	Spec-#	BLM-7-ES
NFPORS TREATMENT CATEGORY*	Protection and Warning	FISCAL YEAR(S) (list each year):	FY19
NFPORS TREATMENT TYPE *	Protective Barriers/Fences	WUI? Y / N	N
IMPACTED COMMUNITIES AT RISK		IMPACTED T&E SPECIES	

*See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

ES/BAR ISSUE STATEMENT

This treatment provides for permanent mitigation for hazardous mine features that were discovered or made more visible by the Carr Fire. These mine openings pose significant safety threats to BLM visitors and agency staff. Section 106 compliance for the closures will be completed during the temporary fencing phase of this project.

TREATMENT

General Description: A two person crew will visit the hazardous mine features identified in the BAER report to remove the temporary t-post fences and replace them with permanent closures. In most cases planning, construction, and installation will require multiple site visits.

Location/(Suitable) Sites: There are 15 hazardous mine openings located at the following sites: French Gulch Road (2), Kline Gulch (3), Clear Creek Road (2), Boswell Mine (1), West Side Trails (1), Keswick -- South of Keswick Dam (2), Chappy Shasta OHV Trail (1), Middle Creek Trail (1), Mad Ox Mine (1), and Gic Gulch (1). Specific locations have been given to BLM staff.

Design/Construction Specifications: Bat gates and culvert gates will be built to size for each mine opening. Closures should be designed to blend in and be as visually unobtrusive as possible.

Purpose of Treatment Specifications (relate to damage/change caused by fire): These mine features were previously unknown or largely obscured by vegetation prior to the Carr fire. Their increased visibility poses a significant safety issue for the visiting public.

Treatment Reasonableness and Cost Effectiveness: When designed and installed correctly, bat gates culvert gates, puf closures, and backfills are very effective at keeping people out of mines. Bat and culvert gates have the additional benefit of keeping the underground habitat available for wildlife. These styles of closures are difficult to compromise and typically require little or no maintenance.

Treatment consistent with Agency Land Management Plan (identify which plan): These mitigation treatments are consistent with the following BLM documents:

- Redding Resource Management Plan and Record of Decision, US Bureau of Land Management, Redding Resource Area, California. 1993
- Swasey Drive Area Implementation Plan, Shasta County, California. Decision Record and Finding of No Significant Impact, Environmental Assessment, CA-360-EA-2004-23

ESRS INDIVIDUAL TREATMENT SPECIFICATION

TREATMENT/ACTIVITY NAME	Tree Hazard Mitigation, Roads-BLM	Spec-#	BLM-8-ES
NFPORS TREATMENT CATEGORY*	Roads	FISCAL YEAR(S) (list each year):	FY18, FY19
NFPORS TREATMENT TYPE *	Hazard Removal	WUI? Y / N	No
IMPACTED COMMUNITIES AT RISK	Redding	IMPACTED T&E SPECIES	No

*See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

ES/BAR ISSUE STATEMENT

ES Issue 1: Human Life and Safety

The Carr fire has created numerous hazard trees along BLM maintained roads. These hazard trees pose a threat to human life and safety due to the fact that they can unpredictably fall onto the roadway and will create an increase in subsequent maintenance.

TREATMENT

S10- Tree Hazard Removal

Treatment/Activity Description:

General Description:
 The BLM Redding Field Office maintains approximately 48 miles of road that was impacted by the Carr fire. Fire weakened trees can unpredictably fail and fall on the roadway, threatening human life and safety. It is essential to mitigate the hazard trees along roadsides to ensure safety and decrease road maintenance. Hazard trees within 1 tree length from the edge of the road will be felled.

Location/(Suitable) Sites:
 48 miles of roads across the Redding field office within the Carr fire footprint, refer to Damaged Recreational Infrastructure in appendices 4.

Design/Construction Specifications:
 Hazard trees will be directionally felled with agency saw crews away from the roadway.

How does the treatment relate to damage or changes caused by the fire?

Purpose of Treatment Specifications (relate to damage/change caused by fire):
 This treatment will address fire-created hazard trees from the Carr fire, ensuring public safety and reducing maintenance costs and fuel loading.

Why is the treatment/activity reasonable, within policy, and cost effective?

Treatment Reasonableness and Cost Effectiveness:
 This treatment is addressing newly created hazard trees within travel corridors that the BLM is responsible to maintain. Mitigating the hazard trees in a timely manner will help alleviate the continual issue with the hazard trees as they begin to decay and fall down sporadically and will greatly reduce the risk of hazard trees threatening human life and property.

Land Use Plan Conformance:

Treatment consistent with Agency Land Management Plan (identify which plan):
 June 1993, Redding Resource Management Plan, as amended.

ESRS INDIVIDUAL TREATMENT SPECIFICATION

TREATMENT/ACTIVITY NAME	Replace Burned Trail Infrastructure and Tread - BLM	Spec-#	BLM-9-ES
NFPORS TREATMENT CATEGORY*	Trails	FISCAL YEAR(S) (list each year):	FY18, FY19
NFPORS TREATMENT TYPE *	Infrastructure	WUI? Y / N	N
IMPACTED COMMUNITIES AT RISK	N	IMPACTED T&E SPECIES	

*See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

ES/BAR ISSUE STATEMENT

ES1: Human Life and Safety

The fire has completely burned critical trail infrastructure (plastic culverts, bridges) that are essential to safe visitor passage during spring flows over numerous water courses, and has caused tread collapse in some areas that are hazards to the variety of trail users in the park. Completing this treatment directly mitigates all of these hazards.

TREATMENT

Treatment/Activity Description: S11 Facilities

General Description: Replace all burned trail infrastructure directly related to protecting human safety on the BLM trails, with a primary focus on replacing burned culverts, bridges and restoring collapsed tread sections. BLM staff will complete all work. The number and location of burned culverts and bridges is complete; based on the number of sections of collapsed trail tread assessed it is estimated there is one section of collapsed trail tread per 2 miles of trail, or 300 locations.

Location/(Suitable) Sites: Burned infrastructure that needs replacement/repair to protect public safety is found throughout the fire affected lands administered by the BLM Redding Field Office. Collapsed trail tread is scattered over the 150 miles of BLM administered trails. Project locations include the following trails: Sacramento River Rail Trail, FB Trail, Middle Creek Trail, 58 Trail, Salt Creek Trail, Westside Trail, Swasey Recreation Area, Mule Ridge Trails, French Fry, and the OHV trails in the interlaces Special Recreation Management Area.

Design/Construction Specifications: All culverts and bridges will be replaced per current BLM standards, using the skilled BLM workforce. Culvert and bridge replacement costs were provided by the Redding Field Office. The sections of collapsed tread will be filled in with on-site material.

How does the treatment relate to damage or changes caused by the fire?

Purpose of Treatment Specifications (relate to damage/change caused by fire): This treatment will address all the lost trail infrastructure that directly affects visitor safety on the trails by replacing the culverts/bridges and repair the collapsed tread sections.

Why is the treatment/activity reasonable, within policy, and cost effective?

Treatment Reasonableness and Cost Effectiveness: This treatment is only addressing the critical human safety-related elements of the burned trail infrastructure, and uses the local BLM staff who are familiar with BLM standards for trail maintenance. BLM staff have installed culverts and built several trail bridges in the past few years and thus are skilled and efficient in such construction.

Land Use Plan Conformance:

Treatment consistent with Agency Land Management Plan (identify which plan): Redding Resource Management Plan 1993, as amended, Interlakes Special Recreation Management Area 1997, Swasey Drive Implementation Plan 2004.

ESRS INDIVIDUAL TREATMENT SPECIFICATION

TREATMENT/ACTIVITY NAME	Tree Hazard Mitigation Trails - BLM	Spec-#	BLM-10-ES
NFPORS TREATMENT CATEGORY*	Trails	FISCAL YEAR(S) (list each year):	FY18, FY19
NFPORS TREATMENT TYPE *	Infrastructure	WUI? Y / N	N
IMPACTED COMMUNITIES AT RISK	N	IMPACTED T&E SPECIES	

*See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

ES/BAR ISSUE STATEMENT

ES1: Human Life and Safety

Tree hazard mitigation will reduce the threat to human life along heavily used recreation trails. Tree mortality averages 70% throughout the fire. Completing this treatment directly mitigates these hazards.

TREATMENT

Treatment/Activity Description: **S10 – Tree Hazard Removal**

General Description: Hand fall all tree hazards along developed trail systems.

Location/(Suitable) Sites: Tree hazards exist along all stretches of the developed trail system administered by the BLM Redding Field Office. There are approximately 150 miles of developed trails within the fire perimeter. Project locations include the following trails: Sacramento River Rail Trail, FB Trail, Middle Creek Trail, 58 Trail, Salt Creek Trail, Westside Trail, Swasey Recreation Area, Mule Ridge Trails, and the OHV trails in the interlakes Special Recreation Management Area.

Design/Construction Specifications: Tree hazards along the developed trail system will be mitigated using skilled BLM tree fallers. Tree hazards will be identified as: any tree killed outright by the fire, trees with significant crown or bowl scorch, trees where fire has compromised cracks, cat faces, and broken limbs, or which has a severe lean towards the trail.

How does the treatment relate to damage or changes caused by the fire?

Purpose of Treatment Specifications (relate to damage/change caused by fire): This treatment will address the tree hazards caused by fire damaged or fire killed trees adjacent to trails.

Why is the treatment/activity reasonable, within policy, and cost effective?

Treatment Reasonableness and Cost Effectiveness: This treatment is only addressing the critical human safety-related elements of the tree hazards along the heavily used developed trails.

Land Use Plan Conformance:

Treatment consistent with Agency Land Management Plan (identify which plan): Redding Resource Management Plan 1993 as amended, Interlakes Special Recreation Management Area 1997, Swasey Drive Implementation Plan 2004.

MONITORING PLAN

- 1) **Treatment Objectives:** This treatment is designed to eliminate the safety concerns of dead and damaged trees along the developed trails system administered by the Redding Field Office in the first year.

ESRS INDIVIDUAL TREATMENT SPECIFICATION

TREATMENT/ACTIVITY NAME	Increased trail maintenance requirements in subsequent years - BLM	Spec-#	BLM – 11 - BAR
NFPORS TREATMENT CATEGORY*	Trails	FISCAL YEAR(S) (list each year):	FY 20, 21, 22
NFPORS TREATMENT TYPE *	Infrastructure	WUI? Y / N	N
IMPACTED COMMUNITIES AT RISK	N/A	IMPACTED T&E SPECIES	none

*See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

ES/BAR ISSUE STATEMENT

BAR Issue 4 – Repair/Replace Fire Damage to Minor Facilities
 The Carr fire burned over roughly 75 miles of non-motorized and 75 miles of OHV trails within the Redding Field Office. This treatment addresses the increased trail maintenance needs that will arise annually for the following three years, such as removal of increased numbers of windfall, increased landslide/debris/rockfall removal following rain, and likely increased brush/vegetative growth that will require additional trail brushing.

TREATMENT

R11 – Facilities

General Description: Respond to increased trail maintenance needs that will arise in subsequent years following the fire. Expected increased needs include an elevated number of trees/logs across the trail, increased landslide/rockfall debris across the trail, and increased vegetative growth that will require increased trail brushing. Some trail tread issues will likely arise as evidence of burned out roots and logs also appear.

Location/(Suitable) Sites: Several locations for the non-motorized trails, including the Sacramento River Rail Trail area, FB trail, Middle Creek trail, 58 Trail, Salt Creek Trail, Westside Trails, Swasey Recreation Area trails, Mule Ridge trails, and the OHV trails in the Interlakes Special Recreation Management Area vicinity.

Design/Construction Specifications: Trail reopening and clearing will occur each spring and after particular storm events or particular issues (such as log or debris fall across trails). Response to individual storm events will likely also be required.

How does the treatment relate to damage or changes caused by the fire?
Purpose of Treatment Specifications (relate to damage/change caused by fire): The treatment will directly enable the BLM to respond to the inevitable increased trail maintenance needs and trail safety issues that will persist for several years following the fire by providing enough staff time to respond to these increased needs.

Why is the treatment/activity reasonable, within policy, and cost effective?
Treatment Reasonableness and Cost Effectiveness: The treatment provides support to address the inevitable increased trail maintenance needs in subsequent years. Adding staff to the existing small Fuels management program, with this staff overseen by the existing leadership, will provide the necessary labor support to address the issue. Using seasonal employees is very cost effective.

Land Use Plan Conformance:
Treatment consistent with Agency Land Management Plan (identify which plan): Interlakes Special Recreation Management Area, Final Plan/EIS, 1997.

MONITORING PLAN

ESRS INDIVIDUAL TREATMENT SPECIFICATION

TREATMENT/ACTIVITY NAME	Minor Facilities Repair- shooting range- BLM	Spec-#	BLM-12-ES
NFPORS TREATMENT CATEGORY*	Facilities	FISCAL YEAR(S) (list each year):	FY19
NFPORS TREATMENT TYPE *	Infrastructure	WUI? Y / N	No
IMPACTED COMMUNITIES AT RISK	Redding	IMPACTED T&E SPECIES	No

*See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

ES/BAR ISSUE STATEMENT

ES Issue 1: Human Life and Safety

The Carr fire burned minor facilities on BLM lands including the Iron Mountain shooting range. The area is a popular recreation facility for the surrounding urban area.

TREATMENT

S8 Road/Trail Water Diversion

Treatment/Activity Description:

General Description:
The Iron Mountain shooting range will need to have approximately 200 feet of straw wattles replaced before fall rains to help contain lead contamination.

Location/(Suitable) Sites:
Iron Mountain shooting range is located approximately 5 miles north of Redding and ½ miles west of the Sacramento River/Keswick reservoir. Approximately 200 feet of straw wattles need to be purchased and installed.

Design/Construction Specifications:
Wattles will be installed to BLM standards and approved by a BLM personnel.

How does the treatment relate to damage or changes caused by the fire?

Purpose of Treatment Specifications (relate to damage/change caused by fire):
This treatment will only address lost infrastructure due to the Carr fire, ensuring public safety and water quality protection.

Why is the treatment/activity reasonable, within policy, and cost effective?

Treatment Reasonableness and Cost Effectiveness:
This treatment is only addressing infrastructure that was lost due to the Carr fire. BLM staff is familiar with agency specs.

Land Use Plan Conformance:

Treatment consistent with Agency Land Management Plan (identify which plan):
June 1993, Redding Resource Management Plan, as amended.

MONITORING PLAN

1) Treatment Objectives:
This treatment is designed to capture overland runoff from the shooting range by reconstructing the water capture system on site in order to protect the water quality in Keswick reservoir.

2) Describe how implementation will be monitored.
The installation of the wattles will be overseen by Redding field office personnel to ensure proper placement.

3) Describe how effectiveness will be monitored, how it will be monitored, and within what time period.
The site will be monitored by BLM personnel directly following storm events for the first year.

ESRS INDIVIDUAL TREATMENT SPECIFICATION

TREATMENT/ACTIVITY NAME	Minor Facilities Repair-amphitheater- BLM	Spec-#	BLM-13-BAR
NFPORS TREATMENT CATEGORY*	Facilities	FISCAL YEAR(S) (list each year):	FY19
NFPORS TREATMENT TYPE *	Infrastructure	WUI? Y / N	No
IMPACTED COMMUNITIES AT RISK	Redding	IMPACTED T&E SPECIES	No

*See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

ES/BAR ISSUE STATEMENT

BAR Issue 4- Repair/Replace Fire Damage to Minor Facilities

The Carr fire burned minor facilities on BLM lands including the Shasta Guild amphitheater. The area is a popular recreation facility for the surrounding urban area.

TREATMENT

S11-Facilities

Treatment/Activity Description:

General Description:
The Shasta Guild amphitheater will need to be reconstructed, the seating replaced, and the 50' log barrier in front of the stage will need to be replaced.

Location/(Suitable) Sites:
Shasta Guild amphitheater is located near the Shasta Historical Park off of hwy 299. The amphitheater stage needs to be reconstructed, seating needs to be purchased and installed, and the small bridge needs to be constructed and replaced.

Design/Construction Specifications:
The bridge needs to be constructed to BLM standards with BLM trail workforce. The amphitheater should be reconstructed to the pre fire standards, BLM staff or non profit group volunteers will help reconstruct the amphitheater. Straw bales for seating should be certified weed free.

How does the treatment relate to damage or changes caused by the fire?

Purpose of Treatment Specifications (relate to damage/change caused by fire):
This treatment will only address lost infrastructure due to the Carr fire, ensuring public safety and restoring recreation opportunities.

Why is the treatment/activity reasonable, within policy, and cost effective?

Treatment Reasonableness and Cost Effectiveness:
This treatment is only addressing infrastructure that was lost due to the Carr fire. BLM staff is familiar with agency specs, having recently built trail bridges thus completing the reconstruction in a timely manner and meeting BLM specifications.

Land Use Plan Conformance:

Treatment consistent with Agency Land Management Plan (identify which plan):
June 1993, Redding Resource Management Plan, as amended.

MONITORING PLAN

1) Treatment Objectives:
This treatment is designed to eliminate the safety concern of crossing the stream during spring flows, and reconstruct the amphitheater and seating area for the enjoyment of the public.

PART E - INDIVIDUAL TREATMENT SPECIFICATION

TREATMENT/ACTIVITY NAME	Invasive Species – Early Detection Rapid Response	PART E Spec-#	BLM-14-ES
NFPORS TREATMENT CATEGORY*	Invasive species	FISCAL YEAR(S) (list each year):	2019
NFPORS TREATMENT TYPE *	Chemical Treatment, Terrestrial Habitat Improvement	WUI? Y / N	Y
IMPACTED COMMUNITIES AT RISK	French Gulch, Shasta	IMPACTED T&E SPECIES	Spotted owl habitat

* See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

BLM ES/BAR ISSUE STATEMENT

How this treatment affects issue ES5 – Invasive Plants and Weeds: On Bureau of Land Management (BLM) lands invasive and noxious weeds were present in scattered locations in low densities throughout the Carr Fire area. The known invasive species are located along roads, open disturbed areas and other sites. Fire suppression vehicles and equipment traveled through known populations of invasive plant species. Suppression activities resulted in 15 miles of dozerlines and 12 miles of hand lines being constructed, 60 miles of roads being bulldozed and 18 acres of staging areas, drop points and safety zones constructed. It was observed by the BAER Assessment team that suppression vehicles and equipment has driven through existing populations of invasive species. In addition, utility companies have constructed 25 miles of dozerlines to install burned and damaged infrastructure. Total acreage of suppression related disturbances, including control lines and roads is 8,598 ac. Current NEPA guidance limits treatment to 600 acres per year. There was no weed wash station for about 26 days from the start of the fire. Without this treatment (chemical and manual removal) there is a high probability (over 90%) that invasive species will spread and infest much of the fire area.

TREATMENT/WORK TO BE DONE:

General Description:

On BLM lands EDRR (Early Detection Rapid Response) treatments of invasive species in native vegetation communities are proposed to mitigate the threat to native vegetation recovery. The establishment of a weed washing station was not implemented until late in the incident, and is expected to increase the threat of the introduction and/or spread of invasive weed species that exist within and adjacent to the Carr Fire. This specification outlines the application of manual and chemical treatments to reduce the competitive pressure of invasive weeds, including yellow starthistle, diffuse knapweed, St. Johnswort, tree of heaven, and brooms (French, Spanish and Scotch) on the establishment of native plant communities within the Carr Fire. Other invasive species that are less common will also be included in the EDDR. Application of manual and chemical treatments will greatly improve new recruitment of native species from surrounding unburned vegetation and seed germination from existing seeds stored within the seed bank. A high probability for the introduction and spread of invasive weeds exists in priority treatment areas where soil disturbance occurred from suppression-related activities including dozerlines, handlines, staging areas and safety zones. Roads and riparian areas also serve as corridors for transporting invasive weeds to recently burned areas. These areas are necessary for inventory and treatment to allow the re-establishment of vegetation, which is unlikely to recover post-fire without intervention due to competition from invasive weed species. Inventory will occur in areas having high vegetation mortality as these areas have a high probability (>90%) for invasive weed invasion. Some areas are excluded from treatment due to the native vegetation community's ability to recover post-fire (areas of unburned to low vegetation mortality since these are expected to resprout and regenerate from seed). Various treatment methods will be utilized including hand pulling, backpack sprayers and/or truck/UTV boom mounted spray units. There is support for an Interagency Weed Control Crew utilizing both the Shasta-Trinity National Forest and the Redding Bureau of Land Management. *See Appendix for itemized cost sheet for BLM*

Location/(Suitable) Sites:

Areas suitable for treatment are roads and trails used by suppression vehicles, dozerlines, staging areas, drop points, powerline corridors disturbed by utility companies, staging areas utilized by timber operations conducted during and immediately post fire, and riparian areas that experienced moderate to high vegetation mortality/soil burn severity. There are a total of 18 acres of drop points and safety zones, 15 acres and 15 miles of dozerlines, 14 acres and 12 miles of hand lines, and 5,737 acres and 85 miles of roads used by suppression vehicles/equipment and utility companies, or roads that were bulldozed. There are 88 acres of riparian areas with moderate to high soil burn severity that will be inventoried. In addition, 2,726 acres of high vegetation mortality will be inventoried. Within the fire on BLM administered lands 8,598 acres and 112 miles have been identified as appropriate for invasive species inventory and treatment. Current NEPA guidance limits treatment to 600 acres per year. Emphasis will be within and adjacent to invasive weed locations.

Design/Construction Specifications:

- Inventory areas utilized and disturbed by suppression and utility company activities for invasive species/noxious weeds.
- Apply herbicides at the recommended rate listed in the label for the targeted species with a non-ionic surfactant and a blue dye.
- Treatment will be timed to apply herbicide to actively growing invasive species in fall of 2018 (FY2019) after the first rains (so that herbicide does not bind to ash), but prior to green-up to maximize efficacy.
- Applications will be made by truck/UTV boom sprayers or backpack sprayers as specified by the herbicide label.
- Hand pulling will be conducted on small invasive species populations located during inventory. If plant is in fruit or seed these will be bagged and disposed of accordingly.
- If follow-up applications are needed as determined through monitoring, herbicide applications should occur during the appropriate phenology as determined by the herbicide label or local knowledge.
- Herbicide applications will only be made by qualified applicators according to the label and following state and federal regulations. All applications must be documented and reported according to state and federal guidelines.
- Monitor treatment efficacy (see Elzinga et al., 1998 and Herrick et al. 2009 for example monitoring designs).

Purpose of Treatment Specifications (relate to damage/change caused by fire):

In a disturbance situation such as wildfire, noxious species can outcompete existing vegetation and lead to an altered plant community that serves less ecological function and has less resiliency than its pre-wildfire condition. Native vegetation recovery is likely to be impacted by off-road and off-trail travel and invasive species introduction and establishment. Initial concerns include maintaining the ecological health and integrity of watersheds within the fire perimeter. Sensitive plant species populations, unique plant communities, native plant communities, native seed banks, and soil productivity have been impacted in moderate to high Soil Burn Severity (SBS) areas of the fire. The burned area, now lacking desired vegetation that can normally outcompete invasive species, is vulnerable to the establishment and expansion of invasive seed sources outside and adjacent to burned areas especially where native seed banks and soil productivity are compromised (see Carr Fire Vegetation Assessment 2018). In the low SBS areas, it will take at least one growing season--summer 2019--until native vegetation can reestablish and compete with invasive species. In moderate to high SBS areas, vegetation recovery is expected to take longer and will vary based on pre-fire vegetation community and location within the fire perimeter. Invasive species are likely to establish at a much faster rate in certain areas, further impacting Special Status Species plants and their associated habitat. The presence of invasive species may prevent establishment of desirable perennial grasses, shrubs, and tree seedlings and can increase future fire hazards with the establishment of flashy non-native annual species that often become established post-fire.

Treatment Reasonableness and Cost Effectiveness:

Hand treatments (pulling, digging, etc.) can be used on small infestations, on sites where herbicides are

prohibited according to local restrictions, or local agency policy. Herbicides will not be used in Trinity County. Truck or UTV boom mounted spraying is feasible on relatively flat, even terrain and where the hose can reach infestations. Backpack sprayers will be used where UTV's or trucks cannot be used. Herbicide treatment increases the probability of success for native species regeneration. Prompt application of this treatment is the most cost-effective response to the risk of further infestation by invasive plant species. Lack of treatment would put these areas at risk for dominance by invasive species with potential spread into adjacent plant communities and habitats with intact native perennial vegetation. Providing an EDRR program to minimize infestations on this fire will protect and maintain general wildlife habitat, designated black tailed deer winter range and northern spotted owl critical habitat, help stabilize soils and hydrology by allowing for natural regeneration, and provide reliable quality forage for wildlife on an annual basis.

Treatment consistent with Agency Land Management Plan (identify which plan): In order to insure watershed health, control or eradication of noxious weeds on both upland and riparian areas will be in cooperation with local, state, and other federal agencies, as well as private groups or other interested parties. Executive Order 13112, Feb. 3, 1999, Invasive Species established the format to federal agencies to develop programs dealing with invasive species. BLM: This treatment is consistent with the USDI Bureau of Land Management Redding Field Office Environmental Assessment, Integrated Vegetation Management (2016), Redding Resource Management Plan and Record of Decision (1993), Final Programmatic Environmental Impact Statement Vegetation Treatments Using Herbicides on Bureau of Land Management Lands in 17 Western States (2007), Vegetation Treatments on BLM Lands in 17 Western States Programmatic Environmental Report (2007), Vegetation Treatments Using Aminopyralid, Flourozypyr, and Rimsulfuron on Bureau of Land Management Lands in the 17 Western States Programmatic Environmental Impact Statement (2016).

Treatment Effectiveness Monitoring Proposed

- 1) **Treatment Objectives:** Ensure watershed health by control or eradication of invasive weeds on both upland and riparian areas and reduce competition of invasive and promote the establishment of native species. Control invasive plant species on areas used or disturbed by fire suppression and utility company activities.
- 2) **Describe how implementation will be monitored.** BLM reporting: Noxious weed inventory and control will be reported under the current standards using Pesticide Use Reports and documentation in the National Invasive Species Information System (NISIMS).
- 3) **Describe how effectiveness will be monitored, how it will be monitored, and within what time period.** The monitoring protocol will be at the discretion of the BLM Redding Field Office. Monitoring methods could involve repeated visits to infestation sites to give ocular estimates of the infestation. Photo-points during flowering periods can also be utilized. Long term monitoring of the area using methods such as line point intercept will also add more quantitative data for analysis to post-fire rehabilitation (see Elzinga et al., 1998 and Herrick et al. 2009 for example monitoring designs). Monitoring will occur in years 1 through 3.

PART E - INDIVIDUAL TREATMENT SPECIFICATION

TREATMENT/ACTIVITY NAME	Invasive Species – Early Detection Rapid Response	PART E Spec-#	BLM-15-BAR
NFPORS TREATMENT CATEGORY*	Invasive species	FISCAL YEAR(S) (list each year):	2020, 2021, 2022, 2023, 2024
NFPORS TREATMENT TYPE *	Chemical Treatment, Terrestrial Habitat Improvement	WUI? Y / N	Y
IMPACTED COMMUNITIES AT RISK	French Gulch, Shasta	IMPACTED T&E SPECIES	Northern Spotted Owl

* See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

BLM ES/BAR ISSUE STATEMENT

How this treatment affects R5 issue 2 – Invasive Plants and Weeds: On Bureau of Land Management (BLM) lands invasive and noxious weeds were present in scattered locations in low densities throughout the Carr Fire area (see ES issue 5). The known invasive species are located along roads, open disturbed areas and other sites. Fire suppression vehicles and equipment traveled through known populations of invasive plant species. Suppression activities resulted in 15 miles of dozerlines and 12 miles of hand lines being constructed, 85 miles of roads being bulldozed or re-opened and 47 acres of staging areas, drop points and safety zones constructed. Total acreage of suppression related disturbances, including control lines and roads is 8,598 ac; current NEPA guidance limits treatment to 600 acres per year. This specification proposes follow-up inventory and treatments in fiscal years 2020-2024.

TREATMENT/WORK TO BE DONE:

Treatment Activity Description

General Description:

Continue EDRR (Early Detection Rapid Response) and conduct follow-up inventory and treatments of invasive species in priority areas described in Weed Treatment E5S. This specification outlines the application of manual and chemical treatments to reduce the competitive pressure of invasive weeds. Inventory will also continue in areas having high vegetation mortality/soil burn severity as these areas have a high probability (>90%) for invasive weed invasion. Various treatment methods will be utilized including hand pulling, backpack sprayers and/or truck/UTV boom mounted spray units. Approved BLM herbicides will be used. Work will be conducted by BLM crews, possibly crews from the Western Shasta Resource Conservation District, and there is support for a joint Shasta-Trinity National Forest-BLM Redding Field Office Interagency crew. *See Appendix for itemized cost sheet for BLM.*

Location/(Suitable) Sites:

Areas suitable for treatment are roads and trails used by suppression vehicles, dozerlines, staging areas, drop points, powerline corridors disturbed by utility companies, staging areas utilized by timber operations conducted during and immediately post fire, and riparian areas that experienced moderate to high vegetation mortality/soil burn severity. There are a total of 18 acres of drop points and safety zones, 15 acres and 15 miles of dozerlines, 14 acres and 12 miles of hand lines, and 5,737 acres and 85 miles of roads used by suppression vehicles/equipment and utility companies, or roads that were bulldozed. There are 88 acres of riparian areas with moderate to high soil burn severity that will be inventoried. In addition, 2,726 acres of high vegetation mortality will be inventoried. Within the fire on BLM administered lands 8,598 acres and 112 miles have been identified as appropriate for invasive species inventory and treatment. Emphasis will be within and adjacent to invasive weed locations. Current NEPA guidance limits treatment to 600 acres per year

Design/Construction Specifications:

- Inventory areas utilized and disturbed by suppression and utility company activities for invasive species/noxious weeds. Inventory sites treated in FY19.
- Apply herbicides at the recommended rate listed in the label for the targeted species with a non-ionic surfactant and a blue dye.
- Applications will be made by truck/UTV boom sprayers or backpack sprayers as specified by the herbicide label and as required by BLM.

- Hand pulling will be conducted on small invasive species populations and where herbicide spraying is not appropriate or allowed. If plant is in fruit or seed these will be bagged and disposed of accordingly.
- Herbicide applications will only be made by qualified applicators according to the label and following state and federal regulations. All applications must be documented and reported according to state and federal guidelines.

How does the treatment relate to damage or changes caused by the fire?

Purpose of Treatment Specifications (relate to damage/change caused by fire):

In a disturbance situation such as wildfire, noxious species can outcompete existing vegetation and lead to an altered plant community that serves less ecological function and has less resiliency than its pre-wildfire condition. Sensitive plant species populations, unique plant communities, native plant communities, native seed banks, and soil productivity have been impacted in moderate to high Soil Burn Severity (SBS) areas of the fire. The burned area, now lacking desired vegetation that can normally outcompete invasive species, is vulnerable to the establishment and expansion of invasive seed sources outside and adjacent to burned areas especially where native seed banks and soil productivity are compromised (see Carr Fire Vegetation Assessment 2018). In moderate to high SBS areas, vegetation recovery is expected to take longer and will vary based on pre-fire vegetation community and location within the fire perimeter. Invasive species are likely to establish at a much faster rate in certain areas, further impacting Special Status Species plants and their associated habitat. The presence of invasive species may prevent establishment of desirable perennial grasses, shrubs, and tree seedlings and can increase future fire hazards with the establishment of flashy non-native annual species that often become established post-fire.

Why is the treatment/activity reasonable, within policy, and cost effective?

Treatment Reasonableness and Cost Effectiveness:

Follow-up treatments will ensure treatments conducted in FY19 (ES5) were successful and to determine the efficacy of herbicide applications. Size and abundance of noxious weed infestations would be compared between years one through five. Inventory and EDRR increases the probability of success for native species regeneration. Prompt application of this treatment is the most cost-effective response to the risk of further infestation by invasive plant species. Lack of treatment would put these areas at risk for dominance by invasive species with potential spread into adjacent plant communities and habitats with intact native perennial vegetation. The BLM Redding Field Office Integrated Vegetation Management program outlines strategies for the inventory and treatment of invasive species and noxious weeds.

and Use Plan Conformance:

Treatment consistent with Agency Land Management Plan (identify which plan): In order to insure watershed health, control or eradication of noxious weeds on both upland and riparian areas will be in cooperation with local, state, and other federal agencies, as well as private groups or other interested parties. Executive Order 13112, Feb. 3, 1999, Invasive Species established the format to federal agencies to develop programs dealing with invasive species. BLM: This treatment is consistent with the USDI Bureau of Land Management Redding Field Office Environmental Assessment, Integrated Vegetation Management (2016), Redding Resource Management Plan and Record of Decision (1993), Final Programmatic Environmental Impact Statement Vegetation Treatments Using Herbicides on Bureau of Land Management Lands in 17 Western States (2007), Vegetation Treatments on BLM Lands in 17 Western States Programmatic Environmental Report (2007), Vegetation Treatments Using Aminopyralid, Flourozypr, and Rimsulfuron on Bureau of Land Management Lands in the 17 Western States Programmatic Environmental Impact Statement (2016).

ESRS INDIVIDUAL TREATMENT SPECIFICATION

TREATMENT/ACTIVITY NAME	Storm Patrol & Cleaning - BLM	Spec-#	BLM-16-ES
NFPORS TREATMENT CATEGORY*	Roads	FISCAL YEAR(S) (list each year):	2019, 2020, 2021
NFPORS TREATMENT TYPE *	Hazard Removal	WUI? Y / N	Y
IMPACTED COMMUNITIES AT RISK		IMPACTED T&E SPECIES	Southern Oregon/Northern California Coast Coho salmon, Central Valley Chinook salmon, Sacramento Winter Run Chinook salmon, Central Valley steelhead

*See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

ES/BAR ISSUE STATEMENT

Storm patrol and cleaning will address the following issues:

- **ES Issue 1: Human Life and Safety.** BLM-maintained roads within the fire perimeter receive year-round public use. Culvert washouts, debris accumulations and instances of adverse surface erosion threaten to strand motorists in relatively remote locations.
- **ES Issue 2: Soil/Water Stabilization.** Numerous areas within the fire perimeter will experience elevated rates of erosion. Where roads and culverts fail or surface erosion is concentrated, increased loss of soil and impacts to downstream watercourses is expected.
- **ES Issue 3: Habitat for Federal/State Listed, Proposed, or Candidate Species.** Several species of federally listed salmon and steelhead occupy drainages within the fire perimeter. Specific watersheds include lower Clear Creek below Whiskeytown Dam and smaller drainages in the west Redding area draining to the Sacramento River below Keswick. In the Trinity River, watersheds include Grass Valley Creek and Deadwood Creek.

TREATMENT

S14 – Other Treatments

Treatment/Activity Description:

- **General Description:**
After each storm event, storm patrol teams will clean roadside ditches, clear the road surface and ensure functional culverts. Heavy equipment may be needed to accomplish the clean-outs where excessive debris accumulates.

There are many BLM-maintained roads and road-stream crossings within the fire perimeter at risk of inundation, debris deposition, culvert plugging, flood damage and other post-fire related impacts from elevated flows carrying sediment and debris. After rainfall events these areas will be assessed for any potential damage to the roads and infrastructure such as culvert plugging and stream diversions onto the road surface. If the culverts are plugged or damaged then the areas could be cleaned out immediately to avoid further damage during the next rainfall event. Additionally, other values at risk (buildings, water supply facilities, diversion structures, etc.) adjacent to channels will be assessed during storm patrol.

The patrols are used to identify those road problems such as plugged culverts and washed out roads and to clear, clean, and/or block those roads that are or have received damage. The storm patrollers shall have access to equipment that can be used when a drainage culvert is plugged or soon to be plugged and to repair any road receiving severe surface erosion.

Storm patrol work is expected to occur for eight storms during the first winter (2019/2020), four storms during the second winter (2020/2021), and two storm patrols during the third winter season (2021/2022).

Work should be performed in the morning and early afternoon. Personnel should leave drainages when chance of rain is moderate or higher. Store equipment and materials outside of flood-prone areas and debris hazards.

Location/(Suitable) Sites: BLM-maintained roads within the fire perimeter with an emphasis on roads within the Clear Creek, Deadwood Creek and Grass Valley Creek watersheds.

• **Design/Construction Specifications:**

1. Immediately after receiving wetting rain the BLM will send out patrols to the roads and facilities of high importance on BLM lands to identify road and other hazard conditions – obstructions such as rocks, sediment, washouts and plugged culverts so the problems can be corrected before they worsen or jeopardize motor vehicle users.
2. The road patrols shall bring in heavy equipment necessary to mechanically remove any obstructions from the roads and culvert inlets and catch basins where necessary.
3. All excess material and debris removed from the drainage system shall be placed outside of the bank-full channel and floodplain where it cannot re-enter stream channels. Preferably the material will be moved off-site.
4. After each storm event, BLM staff will identify the location(s) along roads where debris material is located and what debris material has been removed.
5. Storm patrol and clearing will occur up to 8 times the first winter, 4 times during the second winter and 2 times during the third winter.

How does the treatment relate to damage or changes caused by the fire?

Purpose of Treatment Specifications (relate to damage/change caused by fire): There is an immediate and future threat to travelers along these roads and increased sedimentation to fish-bearing streams within the burned area due to the increased potential for rolling and falling rock from burned slopes and increased potential for flash floods and debris flows. With the loss of vegetation, normal storm frequencies and magnitudes can more easily initiate rill and gully erosion on the slopes and it is likely that 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.

The storm patrol is intended to identify and mitigate issues immediately after a rainfall event to avoid further damage during subsequent events. The purpose of the monitoring is to evaluate the condition of roads for motorized access and to identify and implement additional work needed to maintain and/or repair damage to road surfaces and flow conveyance structures across roads in order to provide safe access across BLM lands. BLM engineering personnel will survey the roads within the fire perimeter after high-intensity storms. Survey will inspect road surface condition, ditch erosion, and culverts/inlet basins for capacity to accommodate runoff flows.

Why is the treatment/activity reasonable, within policy, and cost effective?

- **Treatment Reasonableness and Cost Effectiveness:** Treatment is reflective of the number of storm events typical for the region and reflects gradual alleviation of issues as recovery occurs within the burned area. Post event cleaning of infrastructure prevents further degradation and or failure of road systems with future storm events.

Land Use Plan Conformance:

Treatment consistent with Agency Land Management Plan (identify which plan):
1993 Redding Resource Management Plan, as amended.

MONITORING PLAN

1) Treatment Objectives:

- Inspect BLM maintained road networks for instances of road blockages, culvert plugging, crossing washouts and adverse surface erosion on the road tread.
- Treat road issues through excavating buried inlets, grading to remove debris, and treatments to improve surface drainage.

ESRS INDIVIDUAL TREATMENT SPECIFICATION

TREATMENT/ACTIVITY NAME	Culvert Cleaning	Spec-#	BLM – 17 - ES
NFPORS TREATMENT CATEGORY*	Culverts Intersecting Road Prism	FISCAL YEAR(S) (list each year):	2018, 2019
NFPORS TREATMENT TYPE *	Culverts: Removal of Debris Hazards	WUI? Y / N	Y
IMPACTED COMMUNITIES AT RISK	Redding Field Office	IMPACTED T&E SPECIES	N

*See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

ES/BAR ISSUE STATEMENT

- **Human Life and Safety.** BLM maintained roads within the fire perimeter receive year-round public use. Culvert failure, debris accumulations and instances of adverse surface erosion threaten to strand motorists in relatively remote locations.
- **Soil/Water Stabilization.** Numerous areas within the fire perimeter are will experience elevated rates of erosion. Where roads and culverts fail or surface erosion is concentrated, increased loss of soil and impacts to downstream watercourses would be anticipated.
- **Habitat for Federal/State Listed, Proposed, or Candidate Species.** Several species of federally listed salmon and steelhead occupy drainages within the fire perimeter. Specific watersheds include lower Clear Creek below Whiskeytown Dam and smaller drainages drain to the Sacramento River below Keswick. In the Trinity River, watersheds include Grass Valley Creek and Deadwood Creek. Upkeep and maintenance of culverts would greatly reduce the potential of sedimentation reaching receiving waters.

TREATMENT

Treatment/Activity Description:

- **General Description:** There are 48 miles of transportation network and associated culverts on BLM at risk of inundation, debris deposition, flood damage and other post-fire related impacts from elevated flows carrying sediment and debris. There is the increased potential of culverts clogging with sediment and debris from burned and damaged woody debris. Established rainfall thresholds will require the need to assess the potential damage to the roads and culvert infrastructure. Due to the fires removal of ground cover there is a higher failure risk of culvert clogging/damage during higher rainfall events. Storm patrols are designed to identify clogged culverts and road prism damages and to take measure of removing clogged debris.

Location/(Suitable) Sites: Forty eight miles of roads were identified has having the potential for culvert clogging based on a gis data search as well as the transportation network is fragmented with multiple ownerships. The BAER team utilized the debris flow map developed by the USGS to aid in identifying culverts locations as well as culvert/roads inventory map (see watershed response and culverts maps, see appendix, 4).

Design/Construction Specifications:

1. Culverts will need to have excess sediment material and debris removed from the culverts inlet drainage system as well as this material needs to be placed outside of the bank-full channel and floodplain where it cannot re-enter stream channels. Preferably the material will be moved to an off-site debris staging site.
2. The culvert cleaning before the first rain events will require that all accumulated soils, gravels, rocks and debris be removed before the October seasonal rains begin. A culverts inspections and cleaning needs to take place before storm patrol team begin their rainfall culverts inspections.

3. Utilization of both the USGS debris flow map illustrating the culvert points and the watershed response map illustrating the locations of known culverts show be used as an inspection guideline.
4. Culverts will need to have excess sediment material and debris removed from the outlet if at all possible. There are many culverts identified in the Carr Fire field investigations where this may not be possible due to depth of culvert and length down slope.
5. The utilization of either a backhoe or excavator will be required to excavate the buildup of sediment, gravel and rocks. Due to the Carr Fire and past fires there is also the buildup of woody debris that will need to be removed.
6. During the culvert cleaning every effort should be made to NOT damage the inlet of the culvert pipe. Restriction of the culvert inlet will greatly reduce the volume of water designed to pass through the culvert pipe.
7. In some cases the retrofitting of the inlet with a debris stand pipe may be necessary to prevent repeated debris acuminations and debris woody debris clogging culvert pipe (see diagram, see appendix, 4).

How does the treatment relate to damage or changes caused by the fire?

Purpose of Treatment Specifications (relate to damage/change caused by fire): There is the immediate and future threat to the public along roads and their culvert conveyance infrastructure. Within the burned area due to the increased potential from excessive rainfall onto exposed soils there is the higher possibility that saturated soils could move down slope at accelerated speeds. This increase of saturated soils on bare soils increases the potential for debris flows, debris torrents and mass movement of rocks and trees. Due to the loss of vegetation normal storm frequencies and magnitudes can more easily initiate a debris event from riling and gully erosion from steep slopes. The potential of runoff to clogged culverts and spill onto the road prism is increased and could cause road prism damage from overwhelmed culverts. These events make for hazardous access along steep slopes and put the safety of the public and storm patrols at risk.

The storm patrol is intended to identify and mitigate issues immediately after an established rainfall threshold is exceeded to aid in preventing culvert damage during subsequent rainfall events.

Why is the treatment/activity reasonable, within policy, and cost effective?

- **Treatment Reasonableness and Cost Effectiveness:** Treatments for culvert cleaning are based on the number of rainfall threshold exceedances each year. Post culvert cleaning of infrastructure prevents further degradation to downstream confluences as well as reducing the potential of failures to road systems.

Land Use Plan Conformance:

Treatment consistent with Agency Land Management Plan (identify which plan):

Redding Resource Management Plan and Record of Decision, US Bureau of Land Management, Redding Resource Area, California. 1993

MONITORING PLAN

- **Treatment Objectives:** To keep culverts passing established flows through entire length of culvert pipe during storm events along the approximately 15 miles of road area on FS lands.

ESRS INDIVIDUAL TREATMENT SPECIFICATION

TREATMENT/ACTIVITY NAME	Hazard Warning signs-roads/trails	Spec-#	BLM-18-ES
NFPORS TREATMENT CATEGORY*	Protection & Warning	FISCAL YEAR(S) (list each year):	FY19
NFPORS TREATMENT TYPE *	Warning Signs	WUI? Y / N	No
IMPACTED COMMUNITIES AT RISK	Redding	IMPACTED T&E SPECIES	No

*See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

ES/BAR ISSUE STATEMENT

ES Issue 1: Human Life and Safety

The Carr fire burned road and trail signs on BLM lands. Trailhead signs need to be replaced and warning signs need to be installed to warn people that they are entering a burned area. Carsonite signs need to be replaced to ensure people stay on the trail infrastructure for safety. Brochures need to be made and distributed to the users highlighting the hazards.

TREATMENT

S11-Facilities
Treatment/Activity Description:
General Description:
 Purchase and install warning signs to inform visitors and employees about the risk from post-fire hazard trees, flash flood risk, blockage of trails by fallen trees, and washed out trails.

Location/(Suitable) Sites:
 All trailheads that are within the Carr fire burn area and BLM administered roads and trails that are within the Carr fire burn area. Signs will be placed at intersections from paved roads to BLM maintained roads and trailheads to ensure public is informed of burned environment and associated hazards.

Non-motorized trails and trail heads include:
 Sacramento River trail, FB trail, Keswick Dam trail head, Keswick tail head, Middle creek trail, Westside trail, Salt creek trail, Swasey, Meiners loop trail head, Wintu trail head, Mule Mt, Mule Ridge, Stoney, Gulch trail head, Oak Knoll trail head. Shasta Dam Trailhead, Rock Creek Trailhead, Keswick Boat Launch, Oak Bottom Campground.

Motorized trails and trail heads include:
 #1 trail, #2 trail, #3 trail, #4 trail, #27 trail, Chappie-Shasta Staging Area, Shasta campground, Matheson Parking, Copley Mountain Staging Area, Bohemotash Camp.

Roads:
 Trinity mountain road, Cline gulch road, East fork road, Iron mountain road, Shasta dam, 151 road.

Design/Construction Specifications:
 Trail Construction and Maintenance Handbook. Signs should be attached to existing posts when possible. Avoid mounting signs to historic or rustic trail signs. Avoid archaeological sites for sign placement. Consult with cultural resource staff prior to sign placement.

BLM will design and print brochures to be distributed to public.

How does the treatment relate to damage or changes caused by the fire?
Purpose of Treatment Specifications (relate to damage/change caused by fire):
 Warning danger to visitors and employees of burned bridges and hazard trees and the potential for flash floods. The signs are designed to reach all users on the roads and trail.

ESRS INDIVIDUAL TREATMENT SPECIFICATION

TREATMENT/ACTIVITY NAME	Swasey Basin Cleanout	Spec-#	BLM-19-ES
NFPORS TREATMENT CATEGORY*	Erosion/Sedimentation	FISCAL YEAR(S) (list each year):	2018,2019,2020
NFPORS TREATMENT TYPE *	Catchment Basin Cleanout	WUI? Y / N	Y
IMPACTED COMMUNITIES AT RISK	Swasey/Middle Creek	IMPACTED T&E SPECIES	Central Valley Chinook salmon, Sacramento Winter Run Chinook salmon, Central Valley steelhead

*See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

ES/BAR ISSUE STATEMENT

Removal of sediment from the Swasey sediment basin will address the following:

ES Issue-2: Soil/Water Stabilization. The Middle Creek watershed will experience elevated rates of erosion. Where surface erosion is concentrated, increased loss of soil and impacts to downstream watercourses is expected.

ES Issue 3-Habitat for Federal/State Listed, Proposed, or Candidate Species. Several species of federally listed salmon and steelhead occupy drainages within and downstream of the fire perimeter.

TREATMENT

Treatment/Activity Description: S14-Other Treatments

General Description:
Remove sediment and debris from the Swasey Sediment Basin on Middle Creek prior to fall rainfall events to maximize storage capacity. Following major storm events, remove debris and sediment fill to maintain storage capacity of the sediment basin. The work is expected to occur in fall of 2018 for initial clean out and for eight storms during the first winter (2019/2020), four storms during the second winter (2020/2021), and two storm patrols during the third winter season (2021/2022).

Location/(Suitable) Sites:
Swasey sediment basin on Middle Creek. See Watershed Treatment Map Appendix IV, Watershed Treatment Table Appendix V.

Design/Construction Specifications:
Use an excavator or backhoe along with a dump truck to remove sediment and debris. Sediment and debris should be loaded into dump truck and deposited outside the floodplain where it cannot re-enter stream channels or transport material to an approved disposal site.

How does the treatment relate to damage or changes caused by the fire?
Purpose of Treatment Specifications (relate to damage/change caused by fire):
To maximize sediment basin capacity for subsequent high runoff events. One basin on Middle Creek near Swasey is relatively small and will require frequent cleaning. Units are in cubic yards.

Why is the treatment/activity reasonable, within policy, and cost effective?
Treatment Reasonableness and Cost Effectiveness:
Treatment is reflective of the number of storm events typical for the region and reflects gradual alleviation of issues as recovery occurs within the burned area. Post event cleaning of infrastructure prevents further degradation and or failure of road systems with future storm events. The treatment addresses impacts to critical habitat and critical downstream spawning habitat for federally listed chinook salmon species. Cost are based on the use of local BLM resources and local equipment rental companies.

Land Use Plan Conformance:
Treatment consistent with Agency Land Management Plan (identify which plan):
1993 Redding Resource Management Plan as amended.

ESRS INDIVIDUAL TREATMENT SPECIFICATION

TREATMENT/ACTIVITY NAME	Post Condition Assessment Site Stabilizations	Spec-#	BLM-20-ES
NFPORS TREATMENT CATEGORY*	Heritage Resources	FISCAL YEAR(S) (list each year):	2019
NFPORS TREATMENT TYPE *	Site Stabilization	WUI? Y / N	No
IMPACTED COMMUNITIES AT RISK	N/A	IMPACTED T&E SPECIES	None

*See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

ES/BAR ISSUE STATEMENT

ES Issue-4: Critical Heritage Resources

Remove fire-killed hazard tree, stabilize erosion threats and replace burned fence within the perimeter and/or within the immediate vicinity of known, significant cultural features and archaeological sites, to mitigate the potential for adverse effects on cultural resources. Sites (61 sites) to be treated under this specification will have post-fire assessments completed (BLM-2-ES) before treatment prescriptions are undertaken.

TREATMENT

S9 - Cultural Protection (Stabilization/Patrol)

General Description: Indirect impacts from the Carr Fire are, or have the potential to further degrade important attributes of cultural features or archaeological sites on lands managed by the BLM Redding Field Office that fall within the fire perimeter. This specification consists of three components: (1) Clear fire-killed trees and fallen trees from resources; (2) Lop and scatter, chip, and/or directionally fell fire killed hazard trees to reduce site surface visibility, erosion, and fuel loading potential; and (3) Repair existing exclusionary fencing surrounding sites to discourage access. The GS-7 Archaeologist (Specification BLM-6-ES) will coordinate with and monitor the work of the Fuels Crew at archaeological sites where these treatments are recommended.

Location/(Suitable) Sites:

Sites where post-fire condition assessments will be conducted by BLM archaeologists as part of the Archaeological Site Condition Assessment Specification (BLM-2-ES). Sixty-one sites have been identified for further assessments and based on findings from assessments conducted during BAER field visits all sites will require at a minimum hazard tree removal or other site stabilization treatments.

Design/Construction Specifications:

1. Removal of fire killed hazard trees identified as a threat to known archaeological sites or as a hazard to archaeology crew members conducting site assessments, and removal of trees that have fallen onto archaeological features within site boundaries. Tree and log removal, either through chipping, directional felling, or lop and scatter methods, will be completed by BLM fuels crew personnel with on-site guidance from BLM archaeology personnel on hazard tree location and directional falling preference (if any). Chipping will be accomplished utilizing up to two chippers that the BLM Redding Field Office currently own. All required training and certification for such work is to be completed prior to the initiation of fieldwork.
2. Repair/reconstruction of existing exclusionary fence line surrounding previously identified sites. The BLM Force Account will complete fence repair with on-site guidance from BLM archaeology personnel. The work is designed to exclude pedestrian traffic on-site and decrease looting potential. All work will be completed in FY19.

Purpose of Treatment Specifications (relate to damage/change caused by fire):

Hazard trees pose a continued threat to archaeological resources and the personnel responsible for managing those resources on-site until they are successfully felled and removed. Surface features such

as dry stacked rock foundations can be toppled by falling trees, and subsurface features such as housepits can be disturbed by uprooted root balls. Chipping and/or lop and scatter methods will effectively disperse downed fuels while also helping to stabilize surface soils and make surface artifacts less visible and susceptible to looting. Directional falling perpendicular to site slopes can also reduce erosion potential where appropriate.

Treatment Reasonableness and Cost Effectiveness:

Proposed treatments will effectively protect some of the most significant archaeological resources within the fire perimeter on BLM Redding Field Office-managed lands. Should proposed treatments not take place, the cost of mitigation efforts after site damage and/or disturbance occurs will greatly exceed treatment costs. All work will be conducted in-house by BLM Redding Field Office permanent and seasonal staff, reducing costs, streamlining treatment timelines, and increasing overall efficiency by having personnel work together in the field at the same time to make determinations that most effectively protect archaeological resources. Work will predominately be accomplished utilizing equipment (chippers, vehicles, saws, trailers) already owned by the BLM as well as, eliminating the need for equipment rental and/or additional equipment purchases save for an additional GSA vehicle for an archaeological technician (GS-07).

Treatment consistent with Agency Land Management Plan (identify which plan):

National Historic Preservation Act as codified in 36 CFR 800.

Redding Resource Management Plan and Record of Decision, US Bureau of Land Management, Redding Resource Area, California. 1993

Swasey Drive Area Implementation Plan, Shasta County, California. Decision Record and Finding of No Significant Impact, Environmental Assessment, CA-360-EA-2004-23

MONITORING PLAN

- 1) **Treatment Objectives:** Stabilization and protection of significant archaeological sites and/or features directly affected by the Carr Fire through fire-killed hazard tree removal, exclusionary fence repair, and a combination of chipping, lop and scatter, and directional falling to disperse downed trees, reduce erosion potential, and obscure site surfaces to decrease the possibility of looting.
- 2) **Describe how implementation will be monitored:** Work to stabilize identified sites, as well as those yet to be identified through assessment that necessitate treatment, will be physically monitored by BLM archaeology staff. On-site monitoring conducted during treatment will ensure that work is conducted to the standards of BLM Redding Field Office archaeology staff. Monitoring efforts will additionally include photo documentation, field notes, and a report that will be prepared following the completion of stabilization efforts.
- 3) **Describe how effectiveness will be monitored, how it will be monitored, and within what time period:** BLM Redding Field Office archaeology staff will conduct periodic post-treatment monitoring of sites identified for treatment at regular intervals. Interval schedule and overall duration will be determined by archaeology staff, and will be site-specific.

LABOR, MATERIALS AND OTHER COST:

PERSONNEL SERVICES: (Grade @ Cost/Hours X # Hours X # Fiscal Years = Cost/Item): Do not include contract personnel costs here (see contractor services below).	COST / ITEM

PART F - INDIVIDUAL TREATMENT SPECIFICATION, BAR

TREATMENT/ACTIVITY NAME	Monitor Invasive Weeds	PART E Spec-#	BLM-21-BAR
NFPORS TREATMENT CATEGORY*	Monitoring	FISCAL YEAR(S) (list each year):	2020, 2021, 2022
NFPORS TREATMENT TYPE *	Treatment effectiveness monitoring	WUI? Y / N	N
IMPACTED COMMUNITIES AT RISK	French Gulch, Shasta	IMPACTED T&E SPECIES	Northern Spotted Owl

* See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

BLM ES/BAR ISSUE STATEMENT

How this treatment, R13 affects issue BAR 2 – Monitoring Invasive Plants and Weeds: On Bureau of Land Management (BLM) lands treatments of invasive species control will be monitored for treatment effectiveness. Monitoring allows managers to make adaptive management decisions to either conduct follow-up treatments, determine if invasive weed populations are increasing decreasing, or to request additional funding for invasive species control. Invasive weed locations will be documented using Arc Collector or other GPS technology and herbicide use reported Pesticide Use reports (PURs). The treatment type, amount of herbicide used, efficacy of herbicides, presence or absence of invasives, and size of weed populations will be documented. Treatments will be entered into the National Invasive Species Management System (NISMs) database.

TREATMENT/WORK TO BE DONE:

Treatment Activity Description

General Description:
 On BLM lands Early Detection Rapid Response (EDRR) treatments of invasive species will be monitored to determine effectiveness of treatment type and recovery of natural vegetation. Treatment sites will be evaluated annually for three years to ensure that treatments are effective and to determine the need for follow-up control. Monitoring will help determine if invasive species are increasing or decreasing within the Carr Fire perimeter. This monitoring specification will aid in determining if ES-5 and R-5 Specifications Invasive Species, EDRR are effective.

Location/(Suitable) Sites:
 Areas suitable for monitoring are roads and trails used by suppression vehicles, dozerlines, drop points, powerline corridors disturbed by utility companies, and riparian and burned areas that experienced high vegetation mortality/soil burn severity There are a total of 18 acres of drop points and safety zones, 15 acres and 15 miles of dozerlines, 14 acres and 12 miles of hand lines, and 5,737 acres and 85 miles of roads used by suppression vehicles/equipment and utility companies, or roads that were bulldozed. There are 88 acres of riparian areas with moderate to high soil burn severity that will be inventoried. In addition, 2,726 acres of high vegetation mortality will be inventoried. Within the fire on BLM administered lands 8,598 acres and 112 miles have been identified as appropriate for invasive species inventory and treatment. Priority areas will be known invasive plant species treatment locations followed by areas within and adjacent to invasive weed locations that were utilized by fire suppression forces.

Design/Construction Specifications:

- Inventory areas utilized and disturbed by suppression and utility company activities for invasive species/noxious weeds.
- Monitor treated invasive plant locations (manual or chemically treated) to determine presence or absence of invasive plants and efficacy of chemical control.
- Collect data with tablets utilizing Collector or GPS units that can be interfaced with Arc GIS.
- If follow-up applications are needed as determined through monitoring, herbicide applications should occur during the appropriate phenology as determined by the herbicide label or local knowledge.
- Monitor treatment efficacy (see Elzinga et al., 1998 and Herrick et al. 2009 for example monitoring designs).

- Recommended minimum monitoring attributes could include the species composition, cover, density and size of treated area.

How does the treatment relate to damage or changes caused by the fire?

Purpose of Treatment Specifications (relate to damage/change caused by fire):

In a disturbance situation such as wildfire, noxious species can outcompete existing vegetation and lead to an altered plant community with less ecological function and has less resiliency than its pre-wildfire condition. Dozerlines were constructed adjacent or through three rare plant populations, Mallory's manzanita, sulphur creek brodiaea, and canyon creek stonecrop.

Purpose is to determine if invasive species treatments are preventing the increase of existing weed populations and to determine the level of needed treatments or if follow-up treatments are necessary. Monitoring will help determine whether vegetation treatments are necessary to meet management goals and objectives to maintain native plant community composition, structure and fire return intervals.

Why is the treatment/activity reasonable, within policy, and cost effective?

Treatment Reasonableness and Cost Effectiveness:

This specification monitors the efficacy of the treatments—manual, and chemical. Prompt application of this treatment is the most cost-effective response to the risk of further infestation by invasive plant species. The monitoring data will allow managers to make adaptive management decisions and determine if more treatments are needed, if additional funding is required and if the treatment areas have changed. Lack of treatment would put these areas at risk for dominance by invasive species with potential spread into adjacent plant communities and habitats with intact native perennial vegetation.

Land Use Plan Conformance:

Treatment consistent with Agency Land Management Plan (identify which plan): This treatment is consistent with the USDI Bureau of Land Management Redding Field Office Environmental Assessment, Integrated Vegetation Management (2016), Redding Resource Management Plan and Record of Decision (1993), Final Programmatic Environmental Impact Statement Vegetation Treatments Using Herbicides on Bureau of Land Management Lands in 17 Western States (2007), Vegetation Treatments on BLM Lands in 17 Western States Programmatic Environmental Report (2007), Vegetation Treatments Using Aminopyralid, Flourozypr, and Rimsulfuron on Bureau of Land Management Lands in the 17 Western States Programmatic Environmental Impact Statement (2016).

Treatment Effectiveness Monitoring Proposed

- 1) **Treatment Objectives:** Over thirty species of invasive or noxious weeds occur within the Carr Fire perimeter. The BAER team vegetation specialists located seven invasive species within the Carr Fire perimeter. These species were associated with fire suppression activities and are expected to expand into non-infested areas especially in areas with high soil burn severity. Invasive plant treatments will be documented using Arc Collector or other GPS technology. Photo points and monitoring methodology will be established per agency protocols. Treatment sites will be monitored for three years.
- 2) **Describe how implementation will be monitored.** Noxious weed inventory and control will be reported under the current standards using Pesticide Use Reports and documentation in the National Invasive Species Information System (NISIMS).
- 3) **Describe how effectiveness will be monitored, how it will be monitored, and within what time period.** The monitoring protocol will be at the discretion of the BLM Redding Field Office. Monitoring methods will involve repeated visits to infestation sites to give ocular estimates of the infestation. Photo-points during flowering periods can also be utilized. Long term monitoring of the area using methods such as line point intercept will also add more quantitative data for analysis to post-fire rehabilitation

ESRS INDIVIDUAL TREATMENT SPECIFICATION

TREATMENT/ACTIVITY NAME	Short Term AML Safety Fencing for BLM	Spec-#	BLM-22-ES
NFPORS TREATMENT CATEGORY*	Protection and Warning	FISCAL YEAR(S) (list each year):	FY19
NFPORS TREATMENT TYPE *	Protective Fences/Barriers	WUI? Y / N	N
IMPACTED COMMUNITIES AT RISK		IMPACTED T&E SPECIES	

*See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

ES/BAR ISSUE STATEMENT

This treatment will provide for temporary t-post fencing and signs to keep people out of newly discovered mine features on BLM land until permanent closures can be put into place. It will also include Section 106 compliance that will pave the way for the permanent closures. These mine openings pose significant safety threats to park visitors and agency staff.

TREATMENT

General Description: A two person crew will visit the hazardous mine features identified in the BAER report to install t-post fencing and mine warning signs. These temporary safety measures will remain in place until more permanent closures can be installed.

Location/(Suitable) Sites: There are 15 hazardous mine openings located at the following sites: French Gulch Road (2), Kline Gulch (3), Clear Creek Road (2), Boswell Mine (1), West Side Trails (1), Keswick -- South of Keswick Dam (2), Chappy Shasta OHV Trail (1), Middle Creek Trail (1), Mad Ox Mine (1), and Gic Gulch (1). Specific locations have been given to BLM staff.

Design/Construction Specifications:

- Adit fencing will consist of two t-posts placed across the front of the portal.
- Shaft fencing will surround the entire feature.
- Each fence should have three strands of smooth wire and a mine hazard warning sign.

Purpose of Treatment Specifications (relate to damage/change caused by fire): These mine features were previously unknown or largely obscured by vegetation prior to the Carr fire. Their increased visibility poses a significant safety hazard for the visiting public.

Treatment Reasonableness and Cost Effectiveness: T-post fencing is inexpensive and easy to install. It can be put up and taken down quickly. When combined with signage, it will help protect BLM visitors until permanent mitigation can be put in place.

Treatment consistent with Agency Land Management Plan (identify which plan): This temporary treatment is consistent with the following BLM documents:

- Redding Resource Management Plan and Record of Decision, US Bureau of Land Management, Redding Resource Area, California. 1993
- Swasey Drive Area Implementation Plan, Shasta County, California. Decision Record and Finding of No Significant Impact, Environmental Assessment, CA-360-EA-2004-23

ESRS INDIVIDUAL TREATMENT SPECIFICATION

TREATMENT/ACTIVITY NAME	Implementation Leader - BLM	Spec-#	BLM – 23 -ES
NFPORS TREATMENT CATEGORY*	Planning	FISCAL YEAR(S) (list each year):	FY19
NFPORS TREATMENT TYPE *	ES/BAER plan	WUI? Y / N	N
IMPACTED COMMUNITIES AT RISK	N	IMPACTED T&E SPECIES	N

*See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

ES/BAR ISSUE STATEMENT

ES1: Human Life and Safety
 The implementation leader will ensure the plan is implemented in a timely and efficient manner.

TREATMENT

R1 – Project Management

Treatment/Activity Description:

General Description: Fund a project leader to coordinate and oversee the implementation of the CARR Fire Burned Area Emergency Response (BAER) Plan for the Redding Field Office. This specification provides for funding for a total of 26 pay periods in FY2019 to implement the BAER Plan.

Location/(Suitable) Sites: Much of the work will center within the CARR Fire burned area, treatment areas are distributed throughout the fire and will need to be administered on a watershed basis

Design/Construction Specifications: The project leader is responsible for the oversight of the BAER Plan implementation. The leader will implement each treatment to achieve efficient use of funds, personnel, equipment, and contracts. The leader will oversee monitoring, program review, proposed plan revisions, supplemental funding requests and will complete annual and final accomplishment reports in accordance to BLM BAER Policy and Guidelines. The leader will monitor work to ensure compliance with all relevant Federal laws and regulations, which include but are not limited to NEPA and NHPA mitigation requirements and all OSHA regulations and safety standards. The leader will manage the BAER Plan budget and track expenditures by specification and coordinate projects to ensure events occur in their proper order.

How does the treatment relate to damage or changes caused by the fire?

Purpose of Treatment Specifications (relate to damage/change caused by fire): The purpose is to provide quality control and accountability over project implementation of treatments designed to respond to damage directly caused by the fire.

Why is the treatment/activity reasonable, within policy, and cost effective?

Treatment Reasonableness and Cost Effectiveness: This treatment addresses project implementation and fiscal oversight of the entire plan. Providing this fiscal oversight will ensure all of the treatments are accomplished efficiently and cost effective.

Land Use Plan Conformance:

Treatment consistent with Agency Land Management Plan (identify which plan): Actions proposed in the DOI CARR FIRE BAER Plan have been reviewed by the Redding Field Office Interdisciplinary Team and comply with policy and oversight.

ESRS INDIVIDUAL TREATMENT SPECIFICATION

TREATMENT/ACTIVITY NAME	Implementation Leader - BLM	Spec-#	BLM – 24 - BAR
NFPORS TREATMENT CATEGORY*	Planning	FISCAL YEAR(S) (list each year):	FY 20, 21, 22
NFPORS TREATMENT TYPE *	ES/BAER plan	WUI? Y / N	N
IMPACTED COMMUNITIES AT RISK	N	IMPACTED T&E SPECIES	N

*See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

ES/BAR ISSUE STATEMENT

ES1: Human Life and Safety
 The implementation leader will ensure the plan is implemented in a timely and efficient manner.

TREATMENT

R1 – Project Management
Treatment/Activity Description:

General Description: Fund a project leader to coordinate and oversee the implementation of the CARR Fire Burned Area Emergency Response (BAER) Plan for the Redding Field Office. This specification provides for funding for a total of 26 pay periods in FY2020, 2021, and 2022 to implement the BAER Plan.

Location/(Suitable) Sites: Much of the work will center within the CARR Fire burned area, treatment areas are distributed throughout the fire and will need to be administered on a watershed basis

Design/Construction Specifications: The project leader is responsible for the oversight of the BAER Plan implementation. The leader will implement each treatment to achieve efficient use of funds, personnel, equipment, and contracts. The leader will oversee monitoring, program review, proposed plan revisions, supplemental funding requests and will complete annual and final accomplishment reports in accordance to BLM BAER Policy and Guidelines. The leader will monitor work to ensure compliance with all relevant Federal laws and regulations, which include but are not limited to NEPA and NHPA mitigation requirements and all OSHA regulations and safety standards. The leader will manage the BAER Plan budget and track expenditures by specification and coordinate projects to ensure events occur in their proper order.

How does the treatment relate to damage or changes caused by the fire?

Purpose of Treatment Specifications (relate to damage/change caused by fire): The purpose is to provide quality control and accountability over project implementation of treatments designed to respond to damage directly caused by the fire.

Why is the treatment/activity reasonable, within policy, and cost effective?

Treatment Reasonableness and Cost Effectiveness: This treatment addresses project implementation and fiscal oversight of the entire plan. Providing this fiscal oversight will ensure all of the treatments are accomplished efficiently and cost effective.

Land Use Plan Conformance:

Treatment consistent with Agency Land Management Plan (identify which plan): Actions proposed in the DOI CARR FIRE BAER Plan have been reviewed by the Redding Field Office Interdisciplinary Team and comply with policy and regulations.

ESRS INDIVIDUAL TREATMENT SPECIFICATION

TREATMENT/ACTIVITY NAME	Tree Hazard Surveillance - NPS	Spec-#	NPS-1-ES
NFPORS TREATMENT CATEGORY*	ES1	FISCAL YEAR(S) (list each year):	FY18, FY19
NFPORS TREATMENT TYPE *	Tree Hazard Removal	WUI? Y / N	N
IMPACTED COMMUNITIES AT RISK	N	IMPACTED T&E SPECIES	

*See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

ES/BAR ISSUE STATEMENT

How does this treatment affect the issue? For example, how does the issue affect ES1: Human Life and Safety?

Tree hazard surveillance will reduce the threat to human life along heavily used recreation roads, trails and developed areas. Tree mortality averages 70% throughout the fire. Completing this treatment begins the process of mitigating these hazards by identifying work to be done to make the roads, trails and developed areas safe for visitors and employees.

TREATMENT

Treatment/Activity Description:

General Description: Survey all roads, trails and developed areas for tree hazards that are threats to life and property.

Location/(Suitable) Sites: Tree hazards exist along all stretches of the paved and unpaved road system, trails and developed areas administered by Whiskeytown National Recreation Area. There are approximately 92 miles of paved and unpaved roads, 70 miles of trails and over 100 acres of developed areas within the fire perimeter. Project locations include the following roads: JFK Memorial Drive, Crystal Creek Road, Whiskey Creek Road, Paige Bar Road, County Line Road and many other unpaved roads. High priority trails include Brandy Creek Falls Trail, James Carr Trail, Princess Ditch Trail and many others. Developed sites include Oak Bottom, Brandy Creek, Whiskey Creek and all of the backcountry campgrounds.

Design/Construction Specifications: Tree hazards along the developed roads and trail system and developed sites will be surveyed using experienced Foresters from NPS tree crews. Tree hazards will be identified as: any tree killed outright by the fire, trees with significant crown or bowl scorch, trees where fire has compromised cracks, cat faces, broken limbs, or severe lean towards the target.

How does the treatment relate to damage or changes caused by the fire?

Purpose of Treatment Specifications (relate to damage/change caused by fire): This treatment will identify the tree hazards produced by the fire-caused mortality and damage.

Why is the treatment/activity reasonable, within policy, and cost effective?

Treatment Reasonableness and Cost Effectiveness: This treatment is only addressing the critical human safety-related elements of the tree hazards along all of the park’s roads, trails and developed sites. With virtually all of the park having burned, there is an enormous amount of work to do to identify the hazards which will need to be mitigated.

Land Use Plan Conformance:

Treatment consistent with Agency Land Management Plan (identify which plan): Whiskeytown General Management Plan 2001, Fire Management Plan 2004

TREATMENT/ACTIVITY NAME	Tree Hazard Mitigation - NPS	Spec-#	NPS-2-ES
NFPORS TREATMENT CATEGORY*	ES1	FISCAL YEAR(S) (list each year):	FY18, FY19
NFPORS TREATMENT TYPE *	Tree Hazard Removal	WUI? Y / N	N
IMPACTED COMMUNITIES AT RISK	N	IMPACTED T&E SPECIES	N

*See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

ES/BAR ISSUE STATEMENT

How does this treatment affect the issue? For example, how does the issue affect ES1: Human Life and Safety?

Tree hazard surveillance has identified almost 900 tree hazards following Carr Fire which pose immediate/short-term threats in developed sites, and along roads. This number will increase significantly, as additional surveillance is performed. This treatment will mitigate identified hazards and reduce threat to human life and property.

TREATMENT

Treatment/Activity Description:

General Description: Mitigate identified tree hazards in developed sites, and along roadsides.

Location/(Suitable) Sites: Tree hazards exist in almost all developed sites and along all stretches of the paved and unpaved road system administered by Whiskeytown National Recreation Area. There are over 100 acres of developed sites and approximately 95 miles of paved and unpaved roads within the fire perimeter. Project locations include the following developed sites: Oak Bottom, Brandy Creek, Whiskey Creek and all of the backcountry campgrounds. Roads include: JFK Memorial Drive, Crystal Creek Road, Whiskey Creek Road, Paige Bar Road, County Line Road, and many other unpaved roads..

Design/Construction Specifications: Tree hazards in developed sites and along the road system will be mitigated by NPS day labor and by contract. Tree hazards are defined as trees killed outright by the fire, trees with significant crown scorch, and/or bole char, and those whose structural integrity has been compromised by the fire, and which pose a threat to life/and/or property. Trees to be removed will be identified by an NPS forester and/or WHIS Hazard Tree Manager and marked with blue tree paint. Trees will be felled, limbed, bucked, and boles chipped, salvage logged, or hauled to biomass facility. Slash will be chipped and chips scattered on-site or stockpiled off-site, or lopped and scattered.

How does the treatment relate to damage or changes caused by the fire?

Purpose of Treatment Specifications (relate to damage/change caused by fire): This treatment will mitigate trees killed, severely injured, and/or structurally damaged by fire.

Why is the treatment/activity reasonable, within policy, and cost effective?

Treatment Reasonableness and Cost Effectiveness: This treatment addresses the critical human safety-related element associated with tree hazards in/adjacent to developed sites, and along all of the park's roads.

Land Use Plan Conformance:

Treatment consistent with Agency Land Management Plan (identify which plan): Whiskeytown General Management Plan (2001), Fire Management Plan (2004).

ESRS INDIVIDUAL TREATMENT SPECIFICATION

TREATMENT/ACTIVITY NAME	Tree Hazard Surveillance-BAR-NPS	Spec-#	NPS-3-BAR
NFPORS TREATMENT CATEGORY*	S13	FISCAL YEAR(S) (list each year):	FY20, FY21
NFPORS TREATMENT TYPE *	Tree Hazard Removal	WUI? Y / N	N
IMPACTED COMMUNITIES AT RISK	N	IMPACTED T&E SPECIES	

*See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

ES/BAR ISSUE STATEMENT

How does this treatment affect the issue? For example, how does the issue affect ES1: Human Life and Safety?

Long-term tree hazard surveillance will reduce the threat to human life along heavily used recreation roads, trails and developed areas in future years. Tree mortality averages 70% throughout the fire but will increase as time passes and trees begin to die due to stress and decay. This treatment will extend the monitoring of all the roads, trails and developed sites in the park in future years in an effort to prevent dying trees from injuring visitors and employees.

TREATMENT

Treatment/Activity Description:

General Description: Survey all roads, trails and developed areas for tree hazards that are threats to life and property.

Location/(Suitable) Sites: Tree hazards exist along all stretches of the paved and unpaved road system, trails and developed areas administered by Whiskeytown National Recreation Area. There are approximately 92 miles of paved and unpaved roads, 70 miles of trails and over 100 acres of developed areas within the fire perimeter. There will be many more trees that die in future years as stressed trees decay and die and become threats on all of the park’s roads, trails and developed areas. This includes all of the most heavily-travelled paved roads. Project locations include the following roads: paved roads such as JFK Memorial Drive, Crystal Creek Road, Whiskey Creek Road, Paige Bar Road, and Trinity Mountain Road. Unpaved roads include County Line Road, Muletown Road, Crystal Creek Road and South Shore Drive. High priority trails include Brandy Creek Falls Trail, James Carr Trail to Whiskeytown Falls, Princess Ditch Trail, Davis Gulch Trail and many others. Developed sites include Oak Bottom, Brandy Creek, Whiskey Creek and all of the backcountry campgrounds.

Design/Construction Specifications: Tree hazards along the developed roads and trail system and developed sites will be surveyed using experienced Foresters from NPS tree crews or in-house staff. Tree hazards will be identified as: any tree that has decayed and has brown needles or leaves that would compromise the integrity of the tree. If trees have developed rot that could cause a failure, they will also be targeted for removal.

How does the treatment relate to damage or changes caused by the fire?

Purpose of Treatment Specifications (relate to damage/change caused by fire): This treatment will identify the tree hazards produced by the fire-caused mortality and damage in the outlying years.

Why is the treatment/activity reasonable, within policy, and cost effective?

Treatment Reasonableness and Cost Effectiveness: This treatment is only addressing the critical human safety-related elements of the tree hazards along all of the park’s roads, trails and developed sites. With virtually all of the park having burned in 2018 and most of the imminent hazards removed at an earlier time, it will be time to monitor and survey for dead trees on an ongoing basis. This will be a year-round effort that is required to prevent significant loss of property or threat to humans.

Land Use Plan Conformance:

Treatment consistent with Agency Land Management Plan (identify which plan): Whiskeytown

PART F - INDIVIDUAL TREATMENT SPECIFICATION, EMERGENCY STABILIZATION

TREATMENT/ACTIVITY NAME	Invasive Species – Early Detection Rapid Response	PART E Spec-#	NPS-4-ES
NFPORS TREATMENT CATEGORY*	Invasive species	FISCAL YEAR(S) (list each year):	2019
NFPORS TREATMENT TYPE *	Chemical Treatment, Terrestrial Habitat Improvement	WUI? Y / N	Y
IMPACTED COMMUNITIES AT RISK		IMPACTED T&E SPECIES	Howell's alkali grass

* See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

TREATMENT/WORK TO BE DONE:

General Description:

On Whiskeytown National Park lands EDRR (Early Detection Rapid Response) treatments of invasive species in native vegetation communities are proposed to mitigate this threat. The establishment of a weed washing station was not implemented until late in the incident, which is expected to increase the threat of the introduction and/or spread of invasive weed species that exist within and adjacent to the Carr Fire. This specification outlines the application of manual and chemical treatments to reduce the competitive pressure of invasive weeds, including yellow starthistle, tocalote, diffuse knapweed, and brooms (French, Spanish and Scotch), St. Johnswort and puncture vine on the establishment of native plant communities within the Carr Fire. Application of manual and chemical treatments will greatly improve new recruitment of native species from surrounding unburned vegetation and seed germination from existing seeds stored within the seed bank. A high probability for the introduction and spread of invasive weeds exists in priority treatment areas where soil disturbance occurred related to suppression-related activities including dozerlines, handlines, staging areas and safety zones. Road and riparian areas also serve as corridors for transporting invasive weeds to recently burned areas. These areas are necessary for treatment to allow the re-establishment of vegetation, which is unlikely to recover post-fire without intervention due to competition from invasive weed species. Inventory will occur in areas having high vegetation mortality as these areas have a high probability (>90%) for invasive weed invasion. Some areas are excluded from treatment due to the native vegetation community's ability to recover post-fire (areas of unburned to low vegetation mortality since these are expected to resprout and regenerate from seed). Various treatment methods will be utilized including hand pulling and backpack sprayers. *See Appendix for itemized cost sheet.*

Location/(Suitable) Sites:

Areas suitable for treatment are roads and trails used by suppression vehicles, dozerlines, staging areas, drop points, powerline corridors disturbed by utility companies, and riparian areas that experienced moderate to high vegetation mortality/soil burn severity. There are a total of 4 acres of drop points, 15 acres and 12 miles of dozerlines, 2 acres and 2 miles of hand lines, and 5,491 acres and 78 miles of roads used by suppression vehicles/equipment and utility companies, or roads that were bulldozed. There are 8 acres of riparian areas with moderate to high soil burn severity that will be inventoried. In addition, 3,855 acres of high vegetation mortality will be inventoried. Within the fire on NPS lands, 9,375 acres and 92 miles have been identified as appropriate for invasive species inventory and treatment on WNRA lands. Emphasis will be within and adjacent to invasive weed locations.

Design/Construction Specifications:

- Inventory areas utilized and disturbed by suppression and utility company activities for invasive species/noxious weeds.
- Apply herbicides at the recommended rate listed in the label for the targeted species with a non-ionic surfactant and a blue dye.
- Treatment will be timed to apply herbicide to actively growing invasive species in fall of 2018 (FY2019) after the first rains (so that herbicide does not bind to ash), but prior to green-up to maximize efficacy.
- Applications will be made by backpack sprayers as specified by the herbicide label.

- Hand pulling will be conducted on small invasive species populations located during inventory. If plant is in fruit or seed these will be bagged and disposed of accordingly.
- If follow-up applications are needed as determined through monitoring, herbicide applications should occur during the appropriate phenology as determined by the herbicide label or local knowledge.
- Herbicide applications will only be made by qualified applicators according to the label and following state and federal regulations. All applications must be documented and reported according to state and federal guidelines.
- Monitor treatment efficacy (see Elzinga et al., 1998 and Herrick et al. 2009 for example monitoring designs).

Purpose of Treatment Specifications (relate to damage/change caused by fire):

In a disturbance situation such as wildfire, noxious species can outcompete existing vegetation and lead to an altered plant community that serves less ecological function and has less resiliency than its pre-wildfire condition. Native vegetation recovery is likely to be impacted by off-road and off-trail travel and invasive species introduction and establishment. Initial concerns include maintaining the ecological health and integrity of watersheds within the fire perimeter. Sensitive plant species populations, unique plant communities, native plant communities, native seed banks, and soil productivity have been impacted in moderate to high Soil Burn Severity (SBS) areas of the fire. The burned area, now lacking desired vegetation that can normally outcompete invasive species, is vulnerable to the establishment and expansion of invasive seed sources outside and adjacent to burned areas especially where native seed banks and soil productivity are compromised (see Carr Fire Vegetation Assessment 2018). In the low SBS areas, it will take at least one growing season--summer 2019--until native vegetation can reestablish and compete with invasive species. In moderate to high SBS areas, vegetation recovery is expected to take longer and will vary based on pre-fire vegetation community and location within the fire perimeter. Invasive species are likely to establish at a much faster rate in certain areas, further impacting Special Status Species plants and their associated habitat. The presence of invasive species may prevent establishment of desirable perennial grasses, shrubs, and tree seedlings and can increase future fire hazards with the establishment of flashy non-native annual species that often become established post-fire.

Treatment Reasonableness and Cost Effectiveness:

Hand treatments (pulling, digging, etc.) can be used on small infestations, on sites where herbicides are prohibited according to local restrictions, or local agency policy. Herbicide treatment increases the probability of success for native species regeneration. Prompt application of this treatment is the most cost-effective response to the risk of further infestation by invasive plant species. Lack of treatment would put these areas at risk for dominance by invasive species with potential spread into adjacent plant communities and habitats with intact native perennial vegetation. Providing an EDRR program to minimize infestations on this fire will protect and maintain general wildlife habitat, help stabilize soils and hydrology by allowing for natural regeneration, and provide reliable quality forage for wildlife on an annual basis.

Treatment consistent with Agency Land Management Plan (identify which plan): In order to insure watershed health, control or eradication of noxious weeds on both upland and riparian areas will be in cooperation with local, state, and other federal agencies, as well as private groups or other interested parties. Executive Order 13112, Feb. 3, 1999, Invasive Species established the format to federal agencies to develop programs dealing with invasive species. Invasive weed inventory of the disturbed sites within the Carr Fire boundary will be conducted and reported under the current standards using Pesticide Use Reports and a local geospatial database. Other Regulations and Policies include: Whiskeytown NRA General Management Plan (1999), NPS Management Directive No. 038, NPS Management Policies 2001, 4.4.4, Whiskeytown NRA Fire Management Plan (2004). This specification will compliment WNRA Natural Resource Cyclic Maintenance for FY18, # PMIS 214586.

Treatment Effectiveness Monitoring Proposed

Noxious weed inventory of the disturbed sites within the Carr Fire boundary will be conducted and reported under the current standards using Pesticide Use Reports and a local geospatial database.

PART E - INDIVIDUAL TREATMENT SPECIFICATION, BURNED AREA REHABILITATION

TREATMENT/ACTIVITY NAME	Invasive Species – Early Detection Rapid Response	PART E Spec-#	NPS-5-BAR
NFPORS TREATMENT CATEGORY*	Invasive species	FISCAL YEAR(S) (list each year):	2020, 2021,2022
NFPORS TREATMENT TYPE *	Chemical Treatment, Terrestrial Habitat Improvement	WUI? Y / N	Y
IMPACTED COMMUNITIES AT RISK		IMPACTED T&E SPECIES	Howell's alkali grass

* See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

TREATMENT/WORK TO BE DONE:

General Description:

On National Park Service (NPS) lands continue Early Detection Rapid Response (EDRR) and conduct follow-up inventory and treatments of invasive species in priority areas described in Weed Treatment E5S. This specification outlines the application of manual and chemical treatments to reduce the competitive pressure of invasive weeds. Inventory will also continue in areas having high vegetation mortality/soil burn severity as these areas have a high probability (>90%) for invasive weed invasion. Various treatment methods will be utilized including hand pulling, backpack sprayers and/or truck/UTV boom mounted spray units. Approved NPS herbicides will be used. Work will be conducted by NPS crews.

Location/(Suitable) Sites:

Areas suitable for treatment are roads and trails used by suppression vehicles, dozerlines, staging areas, drop points, powerline corridors disturbed by utility companies, and riparian areas that experienced moderate to high vegetation mortality/soil burn severity. There are a total of 4 acres of drop points, 15 acres and 12 miles of dozerlines, 2 acres and 2 miles of hand lines, and 5,491 acres and 78 miles of roads used by suppression vehicles/equipment and utility companies, or roads that were bulldozed. There are 8 acres of riparian areas with moderate to high soil burn severity that will be inventoried. In addition, 3,855 acres of high vegetation mortality will be inventoried. Within the fire on WNRA lands, 9,375 acres and 92 miles have been identified as appropriate for invasive species inventory and treatment on NPS lands. Emphasis will be within and adjacent to invasive weed locations.

Design/Construction Specifications:

- Inventory areas utilized and disturbed by suppression and utility company activities for invasive species/noxious weeds. Inventory sites treated in FY19.
- Apply herbicides at the recommended rate listed in the label for the targeted species with a non-ionic surfactant and a blue dye.
- Applications will be made by truck/UTV boom sprayers or backpack sprayers as specified by the herbicide label and as required by NPS.
- Hand pulling will be conducted on small invasive species populations and where herbicide spraying is not appropriate or allowed. If plant is in fruit or seed these will be bagged and disposed of accordingly.
- Herbicide applications will only be made by qualified applicators according to the label and following state and federal regulations. All applications must be documented and reported according to state and federal guidelines.

Purpose of Treatment Specifications (relate to damage/change caused by fire):

In a disturbance situation such as wildfire, invasive species can outcompete existing vegetation and lead to an altered plant community that serves less ecological function and has less resiliency than its pre-wildfire condition. Sensitive plant species populations, unique plant communities, native plant communities, native seed banks, and soil productivity have been impacted in moderate to high Soil Burn Severity (SBS) areas of the fire. The burned area, now lacking desired vegetation that can normally outcompete invasive species, is vulnerable to the establishment and expansion of invasive seed sources outside and adjacent to burned areas especially where native seed banks and soil

productivity are compromised (see Carr Fire Vegetation Assessment 2018). In moderate to high SBS areas, vegetation recovery is expected to take longer and will vary based on pre-fire vegetation community and location within the fire perimeter. Invasive species are likely to establish at a much faster rate in certain areas, further impacting Special Status Species plants and their associated habitat. The presence of invasive species may prevent establishment of desirable perennial grasses, shrubs, and tree seedlings and can increase future fire hazards with the establishment of flashy non-native annual species that often become established post-fire.

Treatment Reasonableness and Cost Effectiveness:

Follow-up treatments will ensure treatments conducted in FY19 were successful and to determine the efficacy of herbicide applications. Size and abundance of invasive plant infestations would be compared between years one through three. Inventory and EDRR increases the probability of success for native species regeneration. Prompt application of this treatment is the most cost-effective response to the risk of further infestation by invasive plant species. Lack of treatment would put these areas at risk for dominance by invasive species with potential spread into adjacent plant communities and habitats with intact native perennial vegetation. The Whiskeytown NRA General Management Plan outlines strategies for the inventory and treatment of invasive species and noxious weeds.

Treatment consistent with Agency Land Management Plan (identify which plan): In order to insure watershed health, control or eradication of noxious weeds on both upland and riparian areas will be in cooperation with local, state, and other federal agencies, as well as private groups or other interested parties. Executive Order 13112, Feb. 3, 1999, Invasive Species established the format to federal agencies to develop programs dealing with invasive species. Other Regulations and Policies include: Whiskeytown NRA General Management Plan (1999), NPS Management Directive No. 038, NPS Management Policies 2001, 4.4.4, Whiskeytown NRA Fire Management Plan (2004). This specification will compliment WNRA Natural Resource Cyclic Maintenance for FY18, # PMIS 214586.

Treatment Effectiveness Monitoring Proposed See R13 – Monitoring, Noxious Weeds

Noxious weed inventory of the disturbed sites within the Carr Fire boundary will be conducted and reported under the current standards using Pesticide Use Reports and a local geospatial database. Over thirty species of invasive or noxious weeds occur within the Carr Fire perimeter. The BAER team vegetation specialists located 6 invasive species within the Carr Fire perimeter on WNRA lands. These species were associated with fire suppression activities and known pre-fire locations and are expected to expand into non-infested areas especially in areas with high soil burn severity. The goal of years 2 through 3 is to ensure watershed health by control or eradication of noxious weeds reduce competition of invasive and promote the establishment of native species.

The monitoring protocol will be at the discretion of the BLM Redding Field Office. Monitoring methods will involve repeated visits to infestation sites to give ocular estimates of the infestation. Photo-points during flowering periods can also be utilized. Long term monitoring of the area using methods such as line point intercept will also add more quantitative data for analysis to post-fire rehabilitation (see Elzinga et al., 1998 and Herrick et al. 2009 for example monitoring designs). Monitoring will occur in years 2 through 3.

LABOR, MATERIALS AND OTHER COST:

PERSONNEL SERVICES: (Grade @ Cost/Hours X # Hours X # Fiscal Years = Cost/Item): Do not include contract personnel costs here (see contractor services below).	COST / ITEM

ESRS INDIVIDUAL TREATMENT SPECIFICATION

TREATMENT/ACTIVITY NAME	Historic Blacksmith Shop Stabilization	Spec-#	NPS-6-ES
NFPORS TREATMENT CATEGORY*	Heritage Resources	FISCAL YEAR(S) (list each year):	2019
NFPORS TREATMENT TYPE *	Site Stabilization	WUI? Y / N	
IMPACTED COMMUNITIES AT RISK		IMPACTED T&E SPECIES	None

*See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

TREATMENT

Treatment/Activity Description:

General Description: The Historic Blacksmith Shop, located on NPS land, burned during the Carr Fire. Stabilization will be required to prevent deterioration of the historic structure. A number of tasks will be required to stabilize the structure, including inspection of the condition of cribbing behind the back wall, replacing burned timbers, repacking cribbing with tamped soil, inspecting the condition of the French drain and geotextile fabric behind the wall, and repair/replace as necessary. Fire-burned logs and debris from the slope behind building need to be removed. Rebuild bracing with new lumber and place straw wattle tubing behind the walls to protect ruins from post-fire debris accumulation.

Location/(Suitable) Sites: The site is located within Camden House Historic District, at the corner of Highway 299 and Trinity Mountain Road in Whiskeytown National Recreation Area, Shasta County, California.

Design/Construction Specifications:

1. Replace wall bracing before initiating other work on the structure.
2. Retain the existing grid wire wall panels and replace existing lumber using new 2x6 timbers, preferably rough-cut dimensional, to provide sufficient strength to resist lateral earth pressure.
3. Existing bracing should be replaced in sections to prevent inadvertent collapse of the wall during construction.
4. Stack and retain sandbags along the bottom of the grid wire wall to help secure the bottom of the grid wire to the rock wall, which is beginning to kick out.
5. Replace wattle tubing along back of both back and side walls to prevent erosion and debris collection on the ruin.

How does the treatment relate to damage or changes caused by the fire?

Purpose of Treatment Specifications (relate to damage/change caused by fire): The bracing members added after the Motion Fire in 2014 have partially burned, leading to insufficient shoring of the historic rock walls. This treatment will replace burned shoring, and will stabilize the site until the park develops and implements a permanent solution.

Why is the treatment/activity reasonable, within policy, and cost effective?

Treatment Reasonableness and Cost Effectiveness:

Shoring of the walls with timber bracing is a bare minimum approach to stabilizing the site. Treatment will prevent further deterioration, using minimal labor and materials. The treatment is cost effective in completing only the work needed to stabilize the structure in its' current condition and reasonable in helping the park meet the NPS mission to preserve cultural resources.

Land Use Plan Conformance:

Treatment consistent with Agency Land Management Plan (identify which plan):

Preservation of historical resources is consistent with NPS policy- Cultural Resource Management Guidelines (NPS-28) and Foundation Document, Whiskeytown NRA (2014).

ESRS INDIVIDUAL TREATMENT SPECIFICATION

TREATMENT/ACTIVITY NAME	Historic El Dorado Mine Stabilization	Spec-#	NPS-7-ES
NFPORS TREATMENT CATEGORY*	Heritage Resources	FISCAL YEAR(S) (list each year):	2019
NFPORS TREATMENT TYPE *	Site Stabilization	WUI? Y / N	
IMPACTED COMMUNITIES AT RISK		IMPACTED T&E SPECIES	N/A

*See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

TREATMENT

Treatment/Activity Description:

General Description: This treatment will remove metal and debris from buildings that burned during the Carr Fire to reduce safety hazards for visitors and allow staff to assess what artifacts are damaged. A temporary sloped roof cover will be placed over the former building site to protect extant artifacts and mining equipment from weather damage.

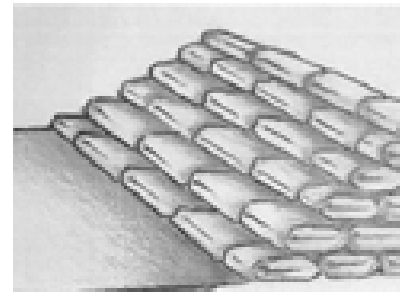
Sandbags will be stacked along the unstable upper terrace dry-stacked stone retaining wall to stabilize the wall in the event of heavy erosion or debris flows.

Open adits are located within the area open to visitors. The AML Assessment and Specifications will address these hazards.

Location/(Suitable) Sites: El Dorado Historic District Cultural Landscape in Whiskeytown National Recreation Area, Shasta County, California, is located south of Highway 229 on the west side of Mill Creek and is accessed via a historic road that leads to the site.

Design/Construction Specifications:

1. Stack sandbags level to the top of the of the stone wall, 4 bags deep and tiered. Stacking should be done with staggered seams, like a brick wall.
2. Build two raised shed roofs in the locations of the burned buildings to cover the stamp mill, ore cars, and extent unmovable artifacts recovered from the collapsed buildings. Use deck blocks, treated 4x4 posts, 2x4 joists, and painted 1/2" or greater CDX plywood or corrugated metal roofing.



How does the treatment relate to damage or changes caused by the fire?

Purpose of Treatment Specifications (relate to damage/change caused by fire):

The slope above the retaining walls had a high severity burn which destroyed vegetation, destabilized trees, and desiccated soils, resulting in an increased risk of debris flows during or following heavy or prolonged rain events. Sloughing soil has already begun to dislodge rocks and cause failure.

Why is the treatment/activity reasonable, within policy, and cost effective?

Treatment Reasonableness and Cost Effectiveness:

Debris removal is necessary to allow visitors access to the site and facilitate assessment of artifacts. Very little material requisition is required to stabilize the remainder of the site and can be accomplished with day-labor using park-service vehicles. Sand bags can be delivered pre-filled and stacked by unskilled day-labor, CCC, or inmate crews to save on labor costs. Work is cost effective in completing only the necessary measures to stabilize the site in its' current condition and reasonable in helping the park meet the NPS mission to preserve cultural resources.

ESRS INDIVIDUAL TREATMENT SPECIFICATION

TREATMENT/ACTIVITY NAME	Historic Redwood Water Tank Dismantle and Storage	Spec-#	NPS-8-ES
NFPORS TREATMENT CATEGORY*	Heritage Resources	FISCAL YEAR(S) (list each year):	2019
NFPORS TREATMENT TYPE *	Site Stabilization	WUI? Y / N	
IMPACTED COMMUNITIES AT RISK		IMPACTED T&E SPECIES	None

*See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

TREATMENT

Treatment/Activity Description:

General Description: The redwood water tank (LCS ID 007420), a contributing structure of the Camden House Historic District Cultural Landscape, was heavily damaged during the Carr Fire. The cone roof burned completely, and the redwood staves and floor are heavily damaged leaving the structure unusable and structurally unstable.

The treatment for this site is to remove the burned lumber, retain any reusable hardware and historic components, and connect a temporary water tank to the system until the redwood tank can be rebuilt.

Location/(Suitable) Sites:

The water tank located is on a hill just north of the intersection of Highway 299 and Trinity Mountain Road, above the Blacksmith Shop Ruins in Whiskeytown National Recreation Area, Shasta County, California.

Design/Construction Specifications:

1. All timber components will be removed and properly disposed of.
2. Intact metal straps and plumbing connections should be retained for use in future reconstruction of the tank.
3. A green 3000-gallon water can be placed on the existing concrete foundation, and plumbed into the current system to provide water to the orchard.
4. The tank will need to be filled periodically by a water truck.

How does the treatment relate to damage or changes caused by the fire?

Purpose of Treatment Specifications (relate to damage/change caused by fire):

This treatment would mitigate safety concerns for a fire-damaged historic water tank, and provide an alternative source of irrigation water for a historic apple orchard.

Why is the treatment/activity reasonable, within policy, and cost effective?

Treatment Reasonableness and Cost Effectiveness:

The historic water tank is a contributing structure to the Camden House Historic District Cultural Landscape and is an integral part of the Crystal Creek Ditch, the historic water conveyance system that provides water to the district's historic apple orchard. The treatment is intended to be temporary until a permanent reconstruction project is undertaken by the park. Procurement of a temporary water tank will allow the park to maintain irrigation to the apple orchard in the interim. The temporary tank will minimize labor costs required to keep the trees watered, and will only require periodic refilling from a water truck.

ESRS INDIVIDUAL TREATMENT SPECIFICATION

TREATMENT/ACTIVITY NAME	Historic Stone House Stabilization	Spec-#	NPS-9-ES
NFPORS TREATMENT CATEGORY*	Heritage Resources	FISCAL YEAR(S) (list each year):	2019
NFPORS TREATMENT TYPE *	Site Stabilization	WUI? Y / N	N
IMPACTED COMMUNITIES AT RISK		IMPACTED T&E SPECIES	N/A

*See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

ES/BAR ISSUE STATEMENT

The mortared stone building was destabilized when a fire-killed tree fell on the structure. Mortared stones were dislodged along the top of the front wall where the tree struck the building and an adjacent stacked rock wall was also struck when the tree fell. If this wall section were to further degrade and collapse the building integrity will be compromised. The heavy timber door frame, which provides structural support, also burned. Loss of the door frame has contributed to destabilization of the mortared stone building.

TREATMENT

Treatment/Activity Description:

General Description: A wood framed structure, located on NPS land, will be constructed to buttress the destabilized mortared stone front wall of the building. The buttress structure location will be prepared by removing the fallen tree and clearing wood and rock debris. The buttress structure will be anchored into the ground with rebar sections. A secondary buttress structure will be constructed on the building interior if needed. The structure should be constructed with rough cut dimensional lumber to maintain historical character and provide a stronger, more robust framework. The structure doorway frame will be replaced with dimensional rough cut timbers of the same dimensions as the burned doorway frame. The work should be completed in consultation with the park archaeologist and include monitoring by an archaeological technician if warranted.

Location/(Suitable) Sites: The stone house (CA-SHA-2715H) is located along the east side of Clear Creek east of Trinity Mountain Road and north of its' junction with state highway 299. The structure is situated along the footslope of Merry Mountain in Section 34 (T33N, R7E). The work site consists of the area inside and immediately in front of the structure.

Design/Construction Specifications:

- Shoring for the front wall of the mortared rock building will be constructed using heavy timbers to support the destabilized front wall.
- The buttress structure will be cross braced and anchored to the ground with rebar. The shoring will extend to cover the affected wall section and is estimated to be approximately 10 feet across and 5 feet tall.
- If necessary similar shoring of appropriate dimensions will be placed against the front wall on the interior of the structure.
- Rough cut timbers matching the historical dimensions of the burned doorframe will be used to replace the doorframe and provide additional support to the front wall of the stone house.
- Work will be monitored by park cultural resource staff.

How does the treatment relate to damage or changes caused by the fire?

Purpose of Treatment Specifications (relate to damage/change caused by fire): This treatment is needed to stabilize a historic mortared rock building that was struck by a large fire-killed oak tree that fell during the 2018 Carr Fire. The impact from the falling tree dislodged mortared stones along the top of the front wall and the force of the impact caused an irregular vertical fracture in the center of the wall south of the doorway. In addition the fire burned the heavy timber doorframe that supports the rock mortared wall above the door. The treatment will stabilize the wall and help preserve the structural integrity of the historic building.

ESRS INDIVIDUAL TREATMENT SPECIFICATION

TREATMENT/ACTIVITY NAME	Archaeological Site Protection Patrols	Spec-#	NPS-10-ES
NFPORS TREATMENT CATEGORY*	Heritage Resources	FISCAL YEAR(S) (list each year):	2019
NFPORS TREATMENT TYPE *	Protect Heritage Resources	WUI? Y / N	N
IMPACTED COMMUNITIES AT RISK		IMPACTED T&E SPECIES	NA

*See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

ES/BAR ISSUE STATEMENT

How does this treatment affect the issue? For example, how does the issue affect ES1: Human Life and Safety?

Over 200 known Archaeological sites are at risk of looting and vandalism because the fire removed vegetation that was camouflaging artifacts and features. This treatment will protect exposed sensitive pre-contact and historic cultural resources and deter looters. This is a temporary measure until vegetation recovers on the sites and conceals artifacts and features.

TREATMENT

Treatment/Activity Description:

General Description:
Patrol selected pre-contact and historic sites and localities to monitor for site looting and vandalism. Tribal Monitors or an NPS seasonal archaeologist will report instances of site looting or vandalism to agency archaeologists who will notify Law Enforcement of the infractions. Patrols will occur on NPS lands within the burn area and at select areas affected by suppression impacts which may be outside of the fire perimeter.

Location/(Suitable) Sites:
Burned area and adjacent areas where suppression activities affected cultural resources. Information specific to the location and description of cultural resources is sensitive and exempt from public disclosure under the Archaeological Resources Protection Act of 1979 and the Freedom of Information Act. NPS archaeologists will provide site location information to tribal monitors and a seasonal employee.

Design/Construction Specifications:

1. NPS Archaeologists will coordinate monitoring patrols with Certified Tribal Monitors from the Redding Rancheria and Wintu tribal organizations.
2. Monitors will undertake systematic and discretionary patrols along public trails and roads.
3. A seasonal NPS Archaeologist will monitor sites that are in remote areas with more difficult access.
4. Monitors will document instances of looting, vandalism and patrol events and will report this information to NPS Archaeologists.
5. Monitors *will not* make contact with individuals encountered at archaeological sites.
6. NPS Archaeologists will provide looting or vandalism information to law enforcement for action.

How does the treatment relate to damage or changes caused by the fire?

Purpose of Treatment Specifications (relate to damage/change caused by fire):

To protect exposed sensitive historic and prehistoric cultural resources and deter looters. This is a temporary measure until sufficient green-up occurs to conceal some cultural materials.

Treatment Reasonableness and Cost Effectiveness:

- a. Agency cultural resource personnel and Tribal monitors will monitor sites for condition and evidence of looting and degradation
- b. A second measure of effectiveness will be the number of law enforcement actions taken upon report of violations.

Treatment consistent with Agency Land Management Plan (identify which plan):

National Historic Preservation Act of 1962 as amended through 1992.

General Management Plan and Environmental Impact Statement, Whiskeytown-Shasta-Trinity National Recreation Area, Pacific West Region, 1999.

MONITORING PLAN

1) Treatment Objectives:

- a. Undertake systematic and discretionary monitoring patrols to prevent looting and vandalism at archaeological sites.
- b. Provide information to law enforcement for action.

2) Describe how implementation will be monitored.

NPS archaeologists will coordinate monitoring activities and will track areas monitored, evidence of looting, vandalism or degradation at sites, number of people observed in the vicinity of sites or suspicious behaviors, and subsequent actions taken by law enforcement of reported violations

3) Describe how effectiveness will be monitored, how it will be monitored, and within what time period.

- 1. Post-Fire site condition assessments will be used as a baseline for tracking evidence of looting or vandalism at sites.
- 2. Tribal monitors in coordination with NPS archaeologists will make multiple visits to areas identified as sensitive and document occurrences of looting, vandalism or degradation on sites or the presence of suspicious individuals in the area.
- 3. NPS archaeologists will provide oversight of monitoring activities and will document patrol events.
- 4. Monitoring will occur within the first year after the fire or until vegetation becomes re-established on sites and obscures artifacts and features.

LABOR, MATERIALS AND OTHER COST:

PERSONNEL SERVICES: (Grade @ Cost/Hours X # Hours X # Fiscal Years = Cost/Item): Do not include contract personnel costs here (see contractor services below).	COST / ITEM
TOTAL PERSONNEL SERVICE COST	
EQUIPMENT PURCHASE, LEASE AND/OR RENT (Item @ Cost/Hour X # of Hours X #Fiscal Years = Cost/Item): Note: Purchases require written justification that demonstrates cost benefits over leasing or renting.	COST / ITEM
TOTAL EQUIPMENT PURCHASE, LEASE OR RENTAL COST	

ESRS INDIVIDUAL TREATMENT SPECIFICATION

TREATMENT/ACTIVITY NAME	Archaeological Site Condition Assessments - NPS	Spec-#	NPS-11-ES
NFPORS TREATMENT CATEGORY*	Heritage Resources	FISCAL YEAR(S) (list each year):	2019
NFPORS TREATMENT TYPE *	Site Stabilization	WUI? Y / N	No
IMPACTED COMMUNITIES AT RISK	No	IMPACTED T&E SPECIES	No

*See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

ES/BAR ISSUE STATEMENT

Conduct Archaeological Site Condition Assessments at archaeological sites within the fire perimeter on Whiskeytown NRA to assess potential damage to cultural resources from post-fire effects and to prescribe treatments for the emergency stabilization and rehabilitation of sites and structures to prevent adverse effects from post-fire erosion and other fire related effects and impacts.

TREATMENT

Treatment/Activity Description:

General Description:

This specification addresses the need for additional site condition assessments on National Park Service (NPS) lands within the 2018 Carr Fire boundaries. Thirty-six archeological sites on NPS lands affected by the 2018 Carr Fire were inspected for site condition during the initial BAER planning and assessment process. However, it was not possible to inspect all sites potentially affected by the fire due to limited cultural resource personnel capacity, logistics accessing sites, quantity of sites, and time constraints. As a result, 87 NPS managed archaeological sites still require post-fire condition assessments.

Site visits will allow staff to assess potential damage to cultural resources and prescribe treatments for the emergency stabilization and rehabilitation of the sites and structures to avoid adverse effects from post-fire erosion and other fire related effects and impacts. Assessments will include time for conducting additional record searches, tribal consultation, GIS data development and management, and management of photos and other field collected data. Consultations with the California State Historic Preservation Officer, American Indian tribes and groups, Tribal Historic Preservation Officers will be conducted prior to prescribing treatments to minimize or mitigate post-fire related effects to cultural resources.

Location/(Suitable) Sites:

Eight-seven (87) pre-contact and historic sites within the Carr-Fire perimeters located on NPS lands will be assessed. Cultural resource locations are exempt from public disclosure under the Archaeological Resources Protection Act of 1979 (ARPA), and the Freedom of Information Act (FOIA).

Design/Construction Specifications:

1. Assess 87 sites within the Carr-Fire perimeter located on NPS lands
2. A GS-11 archeologist will supervise the work of a GS-7 archeological technician (NPS-14-ES specification).
3. Assessment information of each site will be recorded on an Emergency Post-Fire Inspection Form; field notes and photographs will be taken at each site; and GPS data and other information will be collected and used for sketching threatened or disturbed cultural features or associated items at each site

4. A determination will be made if emergency stabilization is needed to preserve significant information from potential precipitation events or winter weather events
5. Prescribed treatments for each assessed archaeological site will consider consultation results between the State Historic Preservation Officer, American Indian tribes and groups and Tribal Historic Preservation Officers and the NPS

How does the treatment relate to damage or changes caused by the fire?

Purpose of Treatment Specifications (relate to damage/change caused by fire):

Site assessments are necessary to determine if emergency stabilization is needed to preserve significant archaeological and cultural resources at sites during the first year after the fire. Assessments are necessary to evaluate and document the risk to archaeological and cultural resources from the effects of post-fire flooding, debris flows, severe erosion, looting of exposed artifacts and possible sub-surface materials. Treatment recommendations will be commensurate with disturbances and threats or “risk” at each site.

Why is the treatment/activity reasonable, within policy, and cost effective?

Treatment Reasonableness and Cost Effectiveness:

Managing National Register listed sites are part of the National Park Service’s mission. 36 CFR 800.5.A.2.vi states that neglect of a historic property which causes its deterioration is an adverse effect, and NPS Directors Order #28 provides policy guidelines for managing historic properties. Without baseline data derived from on-site condition assessments, impacts to historic properties from the fire could not be quantified, thus statistically significant information could not be developed for making emergency stabilization recommendations and treatment specifications at individual sites. Without this baseline data, unassessed sites could deteriorate, adverse effects could occur (800.5.A.2.vi) and potential risks such as exposed human remains and other NAGPRA issues or inadvertent discoveries could arise and become problematic. Without these site assessments, it would be unknown if erosion of intact cultural deposits are at risk of eroding. If direct and indirect fire effects or “risk” is not immediately identified and addressed, erosional issues could exponentially reduce site integrity and potentially increase future data recovery and stabilization costs, and possibly negatively affecting tribal relations.

Land Use Plan Conformance:

Treatment consistent with Agency Land Management Plan (identify which plan):

- Directors Order #28, Cultural Resource Management Guidelines June 11, 1998
- 36 CFR 800.5.A.2.vi

MONITORING PLAN

1) Treatment Objectives:

- Condition assessments will be conducted on known/documented pre-contact and historic archaeological sites within the Carr fire perimeter, and determinations made if emergency stabilization treatments are needed at individual locations
- Baseline data will be collected from which informed decisions can be made that will guide treatment recommendations for protecting and preserving historic properties at risk from post-fire effects
- Sites will be assessed for potential risks from erosion, looting, vandalism or other direct or indirect threats caused by or as a result of the fire
- Site condition assessments will include the identification of safety hazards (open adits and shafts) at historic mining sites
- Visiting individual site locations will help ground truth and improve burn severity model data that could be used for assessing areas that may have a high probability of undocumented sites

2) Describe how implementation will be monitored:

- A BAER site assessment form will be completed for each of the 87 historic properties assessed.
- GS-11 archeologist will provide a brief progress report (one page or less) that will summarize weekly progress of the GS-7 archeological technician's after assessing about 33 percent of the total sites, then a second progress report of the same length will be written that will summarize the results of the GS-7 archeological technician's progress after assessing another 33 percent of the total sites
- A final third report (site assessment summary report) will be written that will summarize the results of the remaining 30 percent of total sites assessed, and will summarize the assessments at all 87 sites
- The third and final report will identify any potential issues with erosion, looting, vandalism or other direct or indirect threats caused by or as a result of the fire, and will identify any safety hazards
- Each report will be provided to the NPS's Cultural Resource Manager within a reasonable time frame in order to monitor the quantity and quality of the GS-7 archeological technician's data collected, and to allow time for planning site visits and or modifications to data collection and condition assessment methods and or treatment recommendations
- Management of photos of assessed sites will be conducted and reviewed.
- GIS data will be collected and reviewed in ArcMap
- Emergency stabilization treatments and related assessment data will be reviewed in GIS metadata developed for point lines or polygons derived from field data collection
- Emergency Post-Fire Inspection Forms containing site assessment data and treatment recommendations will be added to existing site forms and will be reviewed by NPS's Cultural Resource Manager

3) Describe how effectiveness will be monitored, how it will be monitored, and within what time period.

- Eighty-seven (87) sites will have emergency stabilization treatment prescriptions
- The GS-7 archeological technician will be on site to monitor stabilization and treatment implementation
- Field notes and georeferenced photos will be taken of stabilization and treatment operations
- GPS data will be collected during stabilization and treatment operations that will assist in documentation and monitoring stabilization and treatment processes
- GS-11 archeologist will spot check stabilization and treatment implementation at chosen or randomly selected sites over the course of one year or during emergency stabilization operations
- Meetings between the GS-7, GS-11 and NPS's Cultural Resource Manager will occur after each progress report is submitted or when necessary
- A final monitoring report will be written that will summarize results of the completed treatment specifications and will be appended to the final site assessment summary report

LABOR, MATERIALS AND OTHER COST:

PERSONNEL SERVICES: (Grade @ Cost/Hours X # Hours X # Fiscal Years = Cost/Item): Do not include contract personnel costs here (see contractor services below).	COST / ITEM
TOTAL PERSONNEL SERVICE COST	
EQUIPMENT PURCHASE, LEASE AND/OR RENT (Item @ Cost/Hour X # of Hours X #Fiscal Years = Cost/Item): Note: Purchases require written justification that demonstrates cost benefits over leasing or renting.	COST / ITEM
TOTAL EQUIPMENT PURCHASE, LEASE OR RENTAL COST	
MATERIALS AND SUPPLIES (Item @ Cost/Each X Quantity X #Fiscal Years = Cost/Item):	COST / ITEM
TOTAL MATERIALS AND SUPPLY COST	
TRAVEL COST (Personnel or Equipment @ Rate X Round Trips X #Fiscal Years = Cost/Item):	COST / ITEM

ESRS INDIVIDUAL TREATMENT SPECIFICATION

TREATMENT/ACTIVITY NAME	Historic Crystal Creek Ditch Stabilization - NPS	Spec-#	NPS-12-ES
NFPORS TREATMENT CATEGORY*	Heritage Resources	FISCAL YEAR(S) (list each year):	2019
NFPORS TREATMENT TYPE *	Site Stabilization	WUI? Y / N	No
IMPACTED COMMUNITIES AT RISK	No	IMPACTED T&E SPECIES	No

*See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

TREATMENT

Treatment/Activity Description:

General Description: A cultural resource investigation of the Crystal Creek Ditch (a contributing element of the Camden House Historic District) was conducted during the initial BAER planning and assessment process for the 2018 Carr Fire. Findings indicate that components of this historic property were severely impacted by the fire and are at risk of failing and will be adversely affected by erosion and other weathering processes.

To return the ditch to a functional state, this specification includes four components: 1) Clear fire-killed trees and fallen trees within 15 feet either side of the ditch; 2) Clear woody debris and minor amounts of sediment within the ditch deposited as a result of the fire; 3) Fill burned out stump holes and burned out root holes within the inboard and outboard edges of the earthen ditch structure; and 4) Repair steel cat-walk infrastructure damaged by fallen trees, replace burned cat-walk boards associated with the ditch's flumes, reconstruct burned cross-culvert frames and support structures, and replace fire damaged bearings and other mechanical parts at the burned out clean-out shed for visitor safety and to prevent further degradation of the mechanical infrastructure.

Location/(Suitable) Sites:

The Crystal Creek Ditch is located approximately 21 miles north of Redding, California, specifically within T33N, R7W, Sec. 33, 34, and 4; and T32N, R7W, Sec. 4 (see attached map). The historic ditch extends for over 7,736 feet within the historic mining district. Fire killed trees and fallen trees to be treated are clustered near the water ditch intake and distributed at several other locations along the ditch. Sediment and woody debris to be removed are distributed along the entire length of the ditch, but increase in quantity within areas of high slope and heavily forested areas adjacent to the ditch. The burned out stump holes and root-hole are located within the previously heavily forested areas along the entire length of the ditch. One steel cat-walk attached to a steel flume to convey water across a steep canyon side has damaged steel components and burned cat-walk boards and is located within 100 feet of the ditch's water-intake. Another fire damaged catwalk also associated with a flume is located about 1,700 feet northeast of the water-intake. The burned cross-culvert frames and support structures are situated at approximately eight locations where major drainages intersect the ditch at right angles. Fire damaged bearings and other mechanical parts associated with the debris clean-out mechanism are located at the burned out clean-out shed situated below the Crystal Creek trailhead approximately 700 feet southwest of the intersection of Highway 299 and Crystal Creek Road.

Design/Construction Specifications:

1. NPS crews guiding California Conservation Camp Program (CCCP) convict crews will clear fire-killed trees using chain saws and other hand tools within about 15 feet either side of the ditch.
2. CCCP crews with guidance by NPS personnel will clear woody debris and minor amounts of sediment within the ditch, and fill at least 160 burned out stump holes and root holes within the inboard and outboard edges of the ditch and or directly at the edge of the earthen ditch structure.
3. NPS will also repair steel cat-walk infrastructure, replace burned cat-walk boards, reconstruct burned cross-culvert frames and support structures, and replace fire damaged bearings and other

fire damaged mechanical parts at the clean-out shed using in house labor and tools or via local sources through small purchase requests or contract.

4. Inspect the Syphon Slip liner using a camera on a gimbal to determine whether the fire impacted the liner which could compromise function of the ditch. The syphon goes under Highway 299 and connects the southern portion of the ditch to the portion of the ditch which parallels the highway.

How does the treatment relate to damage or changes caused by the fire?

Purpose of Treatment Specifications (relate to damage/change caused by fire):

The purpose of the treatment specification is for emergency stabilization of the earthen and rock features and other associated components of the Crystal Creek Ditch to eliminate erosion and emanate failure of the ditch and associated components if not addressed.

Emergency stabilization is needed to restore and preserve the structural integrity of the ditch that was severely compromised by the Carr Fire. Stabilization of the ditch and associated components will eliminate potential future adverse effects to this historic property caused by erosion and other weathering factors.

Stabilizing the ditch and addressing other fire damaged components will also facilitate irrigation of fire affected historic orchards in the Camden and Tower Ditch Historic District, ensuring their preservation and stability. The historic orchards, also a contributing elements of the Camden and Tower Historic Mining District, have historically and currently rely on water conveyed by the ditch. These orchards area at risk of dying unless the integrity of the ditch and its components area restored and the ditch system is returned to a functional state.

Why is the treatment/activity reasonable, within policy, and cost effective?

Treatment Reasonableness and Cost Effectiveness:

Without the treatments, the NRHP ditch will further degrade. Managing National Register listed sites are part of the National Park Service's mission. 36 CFR 800.5.A.2.vi states that neglect of a historic property which causes its deterioration is an adverse effect, and NPS Directors Order #28 provides policy guidelines for managing historic properties.

This is the minimum treatment method to stabilize to minimize or negate deterioration resulting from fire effects or post fire conditions.

Land Use Plan Conformance:

Treatment consistent with Agency Land Management Plan (identify which plan):

Directors Order #28, Cultural Resource Management Guidelines June 11, 1998.
-36 CFR 800.5.A.2.vi

Holland, F. Ross, Jr.
1971 Tower House Historic District, Whiskeytown NRA, CA. National Register of Historic Places Inventory - Nomination Form (added 1973 - District - #73000257).

National Park Service (NPS)
2008 Whiskeytown National Recreation Area, Tower House Historic District, Cultural Landscape Interim Treatment Report. NPS Pacific West Region, Cultural Landscapes Program.

Melinick, Robert
2015 Whiskeytown National Recreation Area – Crystal Creek Water Ditch Assessment and Treatment Repair plan

ESRS INDIVIDUAL TREATMENT SPECIFICATION

TREATMENT/ACTIVITY NAME	Previously Assessed Historic Property Stabilizations - NPS	Spec-#	NPS-13-ES
NFPORS TREATMENT CATEGORY*	Heritage Resources	FISCAL YEAR(S) (list each year):	2019
NFPORS TREATMENT TYPE *	Site Stabilization	WUI? Y / N	No
IMPACTED COMMUNITIES AT RISK	N/A	IMPACTED T&E SPECIES	None

*See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

ES/BAR ISSUE STATEMENT

Hazard trees within the perimeter and/or immediate vicinity of known, significant cultural features and archaeological sites have the potential to adversely affect cultural resources when they ultimately fall. These trees also pose a risk to archaeological personnel conducting site assessments and monitoring activities. The removal of hazard trees will help to mitigate further damage to significant sites managed by the National Park Survey at Whiskeytown RNA.

TREATMENT

General Description: Indirect impacts from the Carr Fire are, or have the potential to further degrade important attributes of cultural features or archaeological sites on lands managed by the NPS within the fire perimeter. This specification consists of three components: (1) Clear fire-killed trees and fallen trees from resources; (2) Lop and scatter, chip, and/or directionally fall fire killed hazard trees to reduce site surface visibility, erosion, and fuel loading potential; and 3) Repair existing exclusionary fencing surrounding sites to discourage access.

Location/(Suitable) Sites:

Archaeological sites identified during post-fire site condition assessments which require stabilization treatments to prevent further degradation from erosion, fire-killed trees or other threats: SHA-192H, SHA-193, SHA-196, SHA-2742H, SHA-3634, SHA-3786H, SHA-4383, SHA-493, Camden House, El Dorado Mine, SHA-2764H, Kate Camden Gravesite, and the Levi Tower Gravesite. The fence between SHA-625, a Wintu Ethnographic Site, and the Highway has been damaged and will be replaced to protect the site.

Design/Construction Specifications:

1. Removal of fire killed hazard trees identified as a threat to thirteen (13) assessed archaeological sites or as a hazard to archaeology crew members conducting site assessments, and removal of trees that have fallen onto archaeological features within site boundaries. Tree and log removal, either through chipping, directional felling, or lop and scatter methods, will be completed by NPS Roads/Trails crew personnel with on-site guidance from NPS archaeology personnel on hazard tree location and directional falling preference (if any).
2. Repair/reconstruction of existing exclusionary fence line surrounding previously identified sites. NPS Force Account will complete any needed fence repair with on-site guidance from NPS archaeology personnel. The work is designed to exclude pedestrian traffic on-site and decrease looting potential. All work will be completed in FY19.

How does the treatment relate to damage or changes caused by the fire?

Purpose of Treatment Specifications (relate to damage/change caused by fire):

Hazard trees pose a continued threat to archaeological resources and the personnel responsible for managing those resources on-site until they are successfully felled and removed. Surface features such as dry stacked rock foundations can be toppled by falling trees, and subsurface features such as housepits can be disturbed by uprooted root balls. Chipping and/or lop and scatter methods will effectively disperse downed fuels while also helping to stabilize surface soils and make surface artifacts less visible and susceptible to looting. Directional falling perpendicular to site slopes can also reduce erosion potential where appropriate.

Why is the treatment/activity reasonable, within policy, and cost effective?

Treatment Reasonableness and Cost Effectiveness:

Proposed treatments will effectively protect some of the most significant archaeological resources within the fire perimeter on NPS managed lands. Should proposed treatments not take place, the cost of mitigation efforts after site damage and/or disturbance occurs will greatly exceed treatment costs. All work will be conducted in-house by NPS permanent and seasonal staff, reducing costs, streamlining treatment timelines, and increasing overall efficiency by having personnel work together in the field at the same time to make determinations that most effectively protect archaeological resources. Work will predominately be accomplished utilizing equipment already owned by the NPS.

Land Use Plan Conformance:

Treatment consistent with Agency Land Management Plan (identify which plan):

National Historic Preservation Act of 1962 as amended through 1992.

General Management Plan and Environmental Impact Statement, Whiskeytown-Shasta-Trinity National Recreation Area, Pacific West Region, 1999.

MONITORING PLAN

- 1) **Treatment Objectives:** Stabilization and protection of significant archaeological sites and/or features directly affected by the Carr Fire through fire-killed hazard tree removal, exclusionary fence repair, and a combination of chipping, lop and scatter, and directional falling to disperse downed trees, reduce erosion potential, and obscure site surfaces to decrease the possibility of looting.
- 2) **Describe how implementation will be monitored:** Work to stabilize identified sites, as well as those yet to be identified through assessment that necessitate treatment, will be physically monitored by NPS archaeology staff. On-site monitoring conducted during treatment will ensure that work is conducted to the standards of NPS archaeology staff. Monitoring efforts will additionally include photo documentation, field notes, and a report that will be prepared following the completion of stabilization efforts.
- 3) **Describe how effectiveness will be monitored, how it will be monitored, and within what time period:** NPS archaeology staff will conduct periodic post-treatment monitoring of sites identified for treatment at regular intervals. Interval schedule and overall duration will be determined by archaeology staff, and will be site-specific.

LABOR, MATERIALS AND OTHER COST:

PERSONNEL SERVICES: (Grade @ Cost/Hours X # Hours X # Fiscal Years = Cost/Item): Do not include contract personnel costs here (see contractor services below).	COST / ITEM
TOTAL PERSONNEL SERVICE COST	
EQUIPMENT PURCHASE, LEASE AND/OR RENT (Item @ Cost/Hour X # of Hours X #Fiscal Years = Cost/Item): Note: Purchases require written justification that demonstrates cost benefits over leasing or renting.	COST / ITEM
TOTAL EQUIPMENT PURCHASE, LEASE OR RENTAL COST	

ESRS INDIVIDUAL TREATMENT SPECIFICATION

TREATMENT/ACTIVITY NAME	Cultural Resource Compliance - NPS	Spec-#	NPS-14-ES
NFPORS TREATMENT CATEGORY*	Heritage Sites	FISCAL YEAR(S) (list each year):	2019
NFPORS TREATMENT TYPE *	Protect Heritage Sites	WUI? Y / N	N
IMPACTED COMMUNITIES AT RISK		IMPACTED T&E SPECIES	None

*See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

ES/BAR ISSUE STATEMENT

Fund a GS-7 Archaeologist to complete Archaeological Site Condition Assessments (NPS-11-ES), Assessed Historic Property Stabilizations (NPS-13-ES), and Archaeological Site Protection Patrols (NPS-10-ES) and will fulfill Cultural Resource Section 106 Compliance activities associated with other specifications developed for treatments as a result of the Carr Fire.

TREATMENT

Treatment/Activity Description:
General Description:

Fund a GS-7 Archaeologist to complete Archaeological Site Condition Assessments (NPS-11-ES), Assessed Historic Property Stabilizations (NPS-13-ES), and Archaeological Site Protection Patrols (NPS-10-ES) and will fulfill Cultural Resource Section 106 Compliance activities associated with other specifications developed for treatments as a result of the Carr Fire.

Location/(Suitable) Sites:

Pre-contact and historic sites on lands managed by the Whiskeytown RNA within and immediately adjacent to the Carr Fire.

Design/Construction Specifications:

1. Conduct Site Condition Assessments on known pre-contact and historic sites on NPS managed lands within the Carr Fire. Assess erosion and stabilization needs for each site, document post-fire condition, and recommend necessary treatments to prevent further degradation to sites.
2. Monitor stabilization treatments, primarily hazard tree removal, on sites that have had condition assessment recommendations.
3. Conduct site protection patrols at a variety of locations, primarily remote locations not readily accessible by tribal monitors, and report instances of site looting or vandalism to agency archaeologists who will notify Law Enforcement of the infractions.
4. Monitor treatments or conduct Section 106 compliance for treatments prescribed for other resources or values at risk on NPS managed lands affected by the Carr Fire.

How does the treatment relate to damage or changes caused by the fire?
Purpose of Treatment Specifications (relate to damage/change caused by fire):

This position fulfills the requirements for cultural resource compliance activities under the National Historic Preservation Act as codified in 36CFR800.

Why is the treatment/activity reasonable, within policy, and cost effective?
Treatment Reasonableness and Cost Effectiveness:

ESRS INDIVIDUAL TREATMENT SPECIFICATION

TREATMENT/ACTIVITY NAME	Abandoned Mine Mitigation for NPS	Spec-#	NPS-15-ES
NFPORS TREATMENT CATEGORY*	Protection and Warning	FISCAL YEAR(S) (list each year):	FY19
NFPORS TREATMENT TYPE *	Protective Barriers/Fences	WUI? Y / N	N
IMPACTED COMMUNITIES AT RISK		IMPACTED T&E SPECIES	

*See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

ES/BAR ISSUE STATEMENT

This treatment provides for permanent mitigation of five hazardous mine features that were discovered or made more visible by the Carr Fire. These mine openings pose significant safety threats to park visitors and staff. Section 106 compliance for the closures will be completed during the temporary fencing phase of this project.

TREATMENT

General Description: A two person crew will visit the hazardous mine features identified in the BAER report to remove the temporary t-post fences and replace them with permanent closures. In most cases planning, construction, and installation will require multiple site visits.

Location/(Suitable) Sites: The five hazardous mine features are located at the following sites: El Dorado Mine (2), Grizzly Gulch (1), and along the western park boundary, north of Highway 299 (2). Specific feature locations have been given to park staff.

Design/Construction Specifications: Bat gates and culvert gates will be built to size for each mine opening. Closures should be designed to blend in and be as visually unobtrusive as possible.

Purpose of Treatment Specifications (relate to damage/change caused by fire): These mine features were previously unknown or largely obscured by vegetation prior to the Carr fire. Their increased visibility poses a significant safety issue for the visiting public.

Treatment Reasonableness and Cost Effectiveness: When designed and installed correctly, bat gates and culvert gates are very effective at keeping people out of mines, while allowing wildlife continued access to underground habitat. These styles of closures are difficult to compromise and typically require little or no maintenance.

Treatment consistent with Agency Land Management Plan (identify which plan): These mine closures are consistent with the General Management Plan and Environmental Impact Statement for Whiskeytown-Shasta-Trinity National Recreation Area (1999).

ESRS INDIVIDUAL TREATMENT SPECIFICATION

TREATMENT/ACTIVITY NAME	Replace Burned Trail Infrastructure and tread - NPS	Spec-#	NPS – 16 - ES
NFPORS TREATMENT CATEGORY*	Trails	FISCAL YEAR(S) (list each year):	FY18, 19
NFPORS TREATMENT TYPE *	Infrastructure	WUI? Y / N	N
IMPACTED COMMUNITIES AT RISK	N	IMPACTED T&E SPECIES	N

*See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

ES/BAR ISSUE STATEMENT

ES1: Human Life and Safety

A safety issue now exists given several bridges have burned that provide safe passage across stream courses, and several sections of trail have collapsed where root/tree/stump burnouts have occurred. Targets exist beneath two hazard trees; landscape hazard tree removal is covered in a separate specification. Completing this treatment directly mitigates all of these public safety hazards.

TREATMENT

S11: Facilities

Treatment/Activity Description:

General Description: Replace all burned trail infrastructure directly related to protecting human safety on the park trails, with a primary focus on replacing burned bridges and restoring collapsed tread sections. Park trails staff will complete all work. Surveys of the number and location of burned bridges is complete. Based on the number of sections of collapsed trail tread assessed it is estimated there are two sections of collapsed trail tread per each mile of trail, or 140 locations in the park. Basic opening of the trails – removal of logs, rockfall and landslide debris – is accounted for in the specification for tree hazard removal and is not included here.

Location/(Suitable) Sites: Burned infrastructure that needs replacement/repair to protect public safety was found at the following locations/trails: Mill Creek trail metal bridge replacement and tread collapse; Crystal Crk campground hazard tree at toilet; Whiskeytown Falls trail (move bench to avoid hazard tree), repair lost tread structure, replace bridge; replace plank on Tower parking bridge; Mill Creek above El Dorado Mine bridge replacement; replace Boulder Creek bridge; replace Brandy Creek bridge; replace Sheep Camp bridge; replace Martha’s Ditch bridge; replace two bridges on Princess Ditch. Collapsed trail tread is scattered over the 70 miles of trail throughout the park.

Design/Construction Specifications: All bridges will be replaced per current NPS standards for trail bridges, using the skilled Whiskeytown trail crew workforce. The old metal surface Mill Creek bridge (formerly used for vehicle passage) will be replaced with a smaller trail bridge similar to the other standard trail bridges (Glu-Lam) in the park. The tread collapse sections will be filled in, hazard trees cut, and the sitting bench beneath a very large hazard tree on the Whiskeytown Falls trail will be moved out of the fall line of the tree. All costs were provided by NPS Facilities staff, based on replacement costs from the FMSS program. Bridge lengths were estimated in the field by BAER personnel.

How does the treatment relate to damage or changes caused by the fire?

Purpose of Treatment Specifications (relate to damage/change caused by fire): This treatment will address all the lost trail infrastructure that directly affects visitor safety on the trails by replacing the bridges over streamcourses, repair the collapsed tread sections, and remove the trees or targets related to hazard trees in two locations.

Why is the treatment/activity reasonable, within policy, and cost effective?

Treatment Reasonableness and Cost Effectiveness: This treatment is only addressing the critical human safety-related elements of the burned trail infrastructure, and uses the local park staff who are familiar with NPS standards for trail maintenance. This staff have built several trail bridges in the park the past few years and thus are skilled and efficient in such construction.

ESRS INDIVIDUAL TREATMENT SPECIFICATION

TREATMENT/ACTIVITY NAME	Tree Hazard Mitigation Trails - NPS	Spec-#	NPS-17-ES
NFPORS TREATMENT CATEGORY*	Trails	FISCAL YEAR(S) (list each year):	FY18, FY19
NFPORS TREATMENT TYPE *	Infrastructure	WUI? Y / N	N
IMPACTED COMMUNITIES AT RISK	N	IMPACTED T&E SPECIES	

*See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

ES/BAR ISSUE STATEMENT

ES1: Human Life and Safety
 Tree hazard mitigation will reduce the threat to human life along heavily used recreation trails. Tree mortality averages 70% throughout the fire. Completing this treatment directly mitigates these hazards.

TREATMENT

Treatment/Activity Description:
General Description: Hand fall all tree hazards along developed trail systems.

Location/(Suitable) Sites: Tree hazards exist along all sections of the developed trail system administered by the NPS Whiskeytown National Recreation Area. There are approximately 69 miles of developed trails within the fire perimeter. Project locations include the following trails: Whiskeytown Falls(James Carr), Brandy Creek Falls, Brandy Creek, Oak Bottom Water Ditch, Davis Gulch, Boulder Creek Falls, Boulder Creek, Crystal Creek Water Ditch, Ridge, Mount Shasta Mine Loop, Mill Creek, Shasta Divide Nature Trail, Logging Camp, Kanaka Peak, Clear Creek Canal, Tower Grave, Camden Water Ditch, Guardian Rock, Papoose, Prospect, Rich Gulch, Mule Mountain Pass, Clear Creek Vista, Hydraulic Mine, Peltier, Princess Ditch, Shasta Divide, Buck Hollow, Mill Creek Road, Monarch Mountain, Salt Gulch, and Shasta Bally.

Design/Construction Specifications: Tree hazards along the developed trail system will be mitigated using skilled NPS tree fallers. Tree hazards will be identified as: any tree killed outright by the fire, trees with significant crown or bowl scorch, trees where fire has compromised cracks, cat faces, and broken limbs, or trees with a severe lean towards the trail.

How does the treatment relate to damage or changes caused by the fire?
Purpose of Treatment Specifications (relate to damage/change caused by fire): This treatment will address the tree hazards caused by damaged or killed trees adjacent to trails.

Why is the treatment/activity reasonable, within policy, and cost effective?
Treatment Reasonableness and Cost Effectiveness: This treatment is only addressing the critical human safety-related elements of the tree hazards along the heavily used developed trails.

Land Use Plan Conformance:
Treatment consistent with Agency Land Management Plan (identify which plan): Whiskeytown National Recreation Area foundation Document, 2014.

ESRS INDIVIDUAL TREATMENT SPECIFICATION

TREATMENT/ACTIVITY NAME	Increased trail maintenance requirements in subsequent years - NPS	Spec-#	NPS – 18 - BAR
NFPORS TREATMENT CATEGORY*	Trails	FISCAL YEAR(S) (list each year):	FY20, 21, 22
NFPORS TREATMENT TYPE *	Infrastructure	WUI? Y / N	N
IMPACTED COMMUNITIES AT RISK	N/A	IMPACTED T&E SPECIES	none

*See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

ES/BAR ISSUE STATEMENT

BAR Issue 4: Repair/Replace Fire Damage to Minor Facilities
 The Carr fire burned over most of the 70 miles of visitor use trails in Whiskeytown NRA. This treatment addresses the increased trail maintenance needs that will arise annually for the following three years, such as removal of increased numbers of windfall, increased landslide/debris/rockfall removal following rain, and likely increased brush/vegetative growth that will require additional trail brushing.

TREATMENT

R11 Facilities

General Description: Respond to increased trail maintenance needs that will arise in subsequent years following the fire. Expected increased needs include an elevated number of trees/logs across the trail, increased landslide/rockfall debris across the trail, and increased vegetative growth that will require increased trail brushing. Some trail tread issues will likely arise as evidence of burned out roots and logs also appear.

Location/(Suitable) Sites: Over all 70 miles of burned trail within Whiskeytown NRA.

Design/Construction Specifications: Trail reopening and clearing will occur each spring and after particular storm events or particular issues (such as log or debris fall across trails). Response to individual storm events will likely also be required.

How does the treatment relate to damage or changes caused by the fire?
Purpose of Treatment Specifications (relate to damage/change caused by fire): The treatment will directly enable the park to respond to the inevitable increased trail maintenance needs and trail safety issues that will persist for several years following the fire by providing enough staff time to respond to these increased needs.

Why is the treatment/activity reasonable, within policy, and cost effective?
Treatment Reasonableness and Cost Effectiveness: The treatment provides support to address the inevitable increased trail maintenance needs in subsequent years. Adding staff to the existing small trail maintenance program, with this staff overseen by the existing leadership, will provide the necessary labor support to address the issue. Using seasonal employees is very cost effective.

Land Use Plan Conformance:
Treatment consistent with Agency Land Management Plan (identify which plan): The Whiskeytown National Recreation Area Foundation Document (2014).

MONITORING PLAN

ESRS INDIVIDUAL TREATMENT SPECIFICATION

TREATMENT/ACTIVITY NAME	Replace Burned Minor Facilities - NPS	Spec-#	NPS – 19 - BAR
NFPORS TREATMENT CATEGORY*	Trails	FISCAL YEAR(S) (list each year):	FY19
NFPORS TREATMENT TYPE *	Infrastructure	WUI? Y / N	N
IMPACTED COMMUNITIES AT RISK	N	IMPACTED T&E SPECIES	N

*See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

ES/BAR ISSUE STATEMENT

BAR issue 4: Repair/Replace Fire Damage to Minor Facilities
 The fire burned several non-public safety related minor structures within Whiskeytown NRA that provide support for the visitor experience (picnic tables or resting benches along trails) or interpretive wayside panels that provide information about park natural and cultural resources and recreational opportunities. Wooden steps in the trail at three locations assist access up one trail. One park entrance sign was fire-damaged. Completing this treatment directly restores these basic visitor experience-related facilities for the public.

TREATMENT

R11 –Facilities

General Description: The fire burned several structures that are not critical life-safety facilities but provide important visitor experience-related support for the public, including trail resting benches, picnic tables, trail steps, three wayside interpretive panels, and one entrance sign.

Location/(Suitable) Sites: Trail resting benches at Boulder Creek Falls, Horse Camp, and Kanaka Peak; picnic tables at Tower House parking lot, Boulder Creek primitive site, Whiskey Creek Group site, and Brandy Creek; stair steps along the Camden Ditch Trail and at; and the NPS entrance sign off Mule Town Road.

Design/Construction Specifications: All structures will be replace in-kind, using existing specifications and standards. All costs were provided by NPS Facilities staff, based on replacement costs from the FMSS program.

How does the treatment relate to damage or changes caused by the fire?
Purpose of Treatment Specifications (relate to damage/change caused by fire): This treatment will address the lost visitor-use related infrastructure that directly enhances the visitor experience while using the park, including picnic tables, resting benches, trail steps, and a park entrance sign. All were directly lost to the fire.

Why is the treatment/activity reasonable, within policy, and cost effective?
Treatment Reasonableness and Cost Effectiveness: This treatment addresses the very basic visitor experience related support facilities that were lost in the fire. It is completely reasonable to replace the few picnic tables, resting benches, steps, interpretive signs, and lone entrance sign that were lost, and it is cost effective to do it with park staff installation of these items purchased from local sources.

Land Use Plan Conformance:
Treatment consistent with Agency Land Management Plan (identify which plan): Whiskeytown National Recreation Area Foundation Document, 2014.

ESRS INDIVIDUAL TREATMENT SPECIFICATION

TREATMENT/ACTIVITY NAME	Culvert Cleaning	Spec-#	NPS – 20 - ES
NFPORS TREATMENT CATEGORY*	Culverts Intersecting Road Prism	FISCAL YEAR(S) (list each year):	2018, 2019
NFPORS TREATMENT TYPE *	Culverts: Removal of Debris Hazards	WUI? Y / N	Y
IMPACTED COMMUNITIES AT RISK	Whiskeytown, NRA	IMPACTED T&E SPECIES	N

*See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

ES/BAR ISSUE STATEMENT

- **ES 1 Human Life and Safety.** NPS maintained roads within the fire perimeter receive year-round public use. Culvert failure, debris accumulations and instances of adverse surface erosion threaten to strand motorists in relatively remote locations.
- **ES 2 Soil/Water Stabilization.** Numerous areas within the fire perimeter are will experience elevated rates of erosion. Where roads and culverts fail or surface erosion is concentrated, increased loss of soil and impacts to downstream watercourses would be anticipated.
- **ES 3 Habitat for Federal/State Listed, Proposed, or Candidate Species.** Several species of federally listed salmon and steelhead occupy drainages within the fire perimeter. Specific watersheds include lower Clear Creek below Whiskeytown Dam and smaller drainages drain to the Sacramento River below Keswick. In the Trinity River, watersheds include Grass Valley Creek and Deadwood Creek. Upkeep and maintenance of culverts would greatly reduce the potential of sedimentation reaching receiving waters.

TREATMENT

Treatment/Activity Description:

- **General Description:** There are 28 miles of transportation network with culverts at risk of inundation, debris deposition, flood damage and other post-fire related impacts from elevated flows carrying sediment and debris. There is the increased potential of culverts clogging with sediment and debris from burned and damaged woody debris. Established rainfall thresholds will require the need to assess the potential damage to the roads and culvert infrastructure. Due to the fires removal of ground cover there is a higher failure risk of culvert clogging/damage during higher rainfall events. Storm patrols are designed to identify clogged culverts and road prism damages and to take measure of removing clogged debris.

Location/(Suitable) Sites: Twenty eight miles of roads were Identified as having the potential for culverts clogging based on a gis data search. The BAER team utilized the debris flow map developed by the USGS to aid in identifying culvert locations as well as culverts/roads inventory map (see watershed response and culverts maps)(see appendix, 4).

Design/Construction Specifications:

1. Culverts will need to have excess sediment material and debris removed from the culverts inlet drainage system as well as this material needs to be placed outside of the bank-full channel and floodplain where it cannot re-enter stream channels. Preferably the material will be moved to an off-site debris staging site.
2. The culvert cleaning before the first rain events will require that all accumulated soils, gravels, rocks and debris be removed before the October seasonal rains begin. A culverts inspections and cleaning needs to take place before storm patrol team begin their rainfall culverts inspections.

3. Utilization of both the USGS debris flow map illustrating the culvert points and the watershed response map illustrating the locations of known culverts show be used as an inspection guideline.
4. Culverts will need to have excess sediment material and debris removed from the outlet if at all possible. There are many culverts identified in the Carr Fire field investigations where this may not be possible due to depth of culvert and length down slope.
5. The utilization of either a backhoe or excavator will be required to excavate the buildup of sediment, gravel and rocks. Due to the Carr Fire and past fires there is also the buildup of woody debris that will need to be removed.
6. During the culvert cleaning every effort should be made to NOT damage the inlet of the culvert pipe. Restriction of the culvert inlet will greatly reduce the volume of water designed to pass through the culvert pipe.
7. In some cases the retrofitting of the inlet with a debris stand pipe may be necessary to prevent repeated debris accumulation's and debris woody debris clogging culvert pipe (see diagram)(appendix 4).

How does the treatment relate to damage or changes caused by the fire?

Purpose of Treatment Specifications (relate to damage/change caused by fire): There is the immediate and future threat to the public along roads and their culvert conveyance infrastructure. Within the burned area due to the increased potential from excessive rainfall onto exposed soils there is the higher possibility that saturated soils could move down slope at accelerated speeds. This increase of saturated soils on bare soils increases the potential for debris flows, debris torrents and mass movement of rocks and trees. Due to the loss of vegetation normal storm frequencies and magnitudes can more easily initiate a debris event from riling and gully erosion from steep slopes. The potential of runoff to clogged culverts and spill onto the road prism is increased and could cause road prism damage from overwhelmed culverts. These events make for hazardous access along steep slopes and put the safety of the public and storm patrols at risk.

Why is the treatment/activity reasonable, within policy, and cost effective?

- **Treatment Reasonableness and Cost Effectiveness:** Treatments for culvert cleaning are likely to continue for years 2019 and 2020 based on soil burn severity and mortality of vegetation. The other factor will be the number of rainfall threshold exceedances each year. Pre-culvert cleaning of infrastructure greatly reduces the threat that a culvert would clog and damage the road systems.

Land Use Plan Conformance:

Treatment consistent with Agency Land Management Plan (identify which plan):
 General Management Plan (1999)
 Foundation Document (2014)

MONITORING PLAN

- **Treatment Objectives:** To keep culverts passing established flows through entire length of culvert pipe during storm events along the approximately 28 miles of road area on NPS lands.
- **Describe how implementation will be monitored.**
 - I. Inspections of culverts identified from USGS debris flow map and watershed response maps will establish the initial needs for culvert cleanings.

ESRS INDIVIDUAL TREATMENT SPECIFICATION

TREATMENT/ACTIVITY NAME	Storm Patrol & Cleaning - NPS	Spec-#	NPS-21-ES
NFPORS TREATMENT CATEGORY*	Roads	FISCAL YEAR(S) (list each year):	2019, 2020, 2021
NFPORS TREATMENT TYPE *	Hazard Removal	WUI? Y / N	Y
IMPACTED COMMUNITIES AT RISK		IMPACTED T&E SPECIES	Central Valley Chinook salmon, Sacramento Winter Run Chinook salmon, Central Valley steelhead

*See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

ES/BAR ISSUE STATEMENT

Storm patrol and cleaning will address the following issues:

- **ES Issue 1: Human Life and Safety.** NPS-maintained roads within the fire perimeter receive year-round public use. Culvert washouts, debris accumulations and instances of adverse surface erosion threaten to strand motorists in relatively remote locations.
- **ES Issue 2: Soil/Water Stabilization.** Numerous areas within the fire perimeter will experience elevated rates of erosion. Where roads and culverts fail or surface erosion is concentrated, increased loss of soil and impacts to downstream watercourses is expected.
- **ES Issue 3: Habitat for Federal/State Listed, Proposed, or Candidate Species.** Federally listed salmon and steelhead occupy lower Clear Creek and its tributaries downstream of Whiskeytown lake.

TREATMENT

Treatment/Activity Description:

- **General Description:**

After each storm event, storm patrol teams will clean roadside ditches, clear the road surface and unplug culverts. Heavy equipment may be needed to accomplish the clean-outs where excessive debris accumulates.

There are many NPS-maintained roads and road-stream crossings within the fire perimeter at risk of inundation, debris deposition, culvert plugging, flood damage and other post-fire related impacts from elevated flows carrying sediment and debris. After rainfall events these areas will be assessed for any potential damage to the roads and infrastructure such as culvert plugging and stream diversions onto the road surface. If the culverts are plugged or damaged then the areas could be cleaned out immediately to avoid further damage during the next rainfall event. Additionally, other values at risk (buildings, water supply facilities, diversion structures, etc.) adjacent to channels will be assessed during storm patrol.

The patrols are used to identify those road problems such as plugged culverts and washed out roads and to clear, clean, and/or block those roads that are or have received damage. The storm patrollers shall have access to equipment that can be used when a drainage culvert is plugged or soon to be plugged and to repair any road receiving severe surface erosion.

Storm patrol work is expected to occur for eight storms during the first winter (2019/2020), four storms during the second winter (2020/2021), and two storm patrols during the third winter season (2021/2022).

Work should be performed in the morning and early afternoon. Personnel should leave drainages when chance of rain is moderate or higher. Store equipment and materials in a stable location away from floodplains and debris hazards.

Location/(Suitable) Sites: NPS roads within the fire perimeter.

- **Design/Construction Specifications:**

1. Immediately after receiving wetting rain the NPS will send out patrols to the roads and facilities of high importance on NPS lands to identify road and other hazard conditions – obstructions such as rocks, sediment, washouts and plugged culverts so the problems can be corrected before they worsen or jeopardize motor vehicle users.
2. The road patrols shall bring in heavy equipment necessary to mechanically remove any obstructions from the roads and culvert inlets and catch basins where necessary.
3. All excess material and debris removed from the drainage system shall be placed outside of the bank-full channel and floodplain where it cannot re-enter stream channels. Preferably the material will be moved off-site.
4. After each storm event, NPS staff will identify the location(s) along roads where debris material is located and what debris material has been removed.
5. Storm patrol and clearing will occur up to 8 times the first winter, 4 times during the second winter and 2 times during the third winter.

How does the treatment relate to damage or changes caused by the fire?

Purpose of Treatment Specifications (relate to damage/change caused by fire): There is an immediate and future threat to travelers along these roads and increased sedimentation to fish-bearing streams within the burned area due to the increased potential for rolling and falling rock from burned slopes and increased potential for flash floods and debris flows. With the loss of vegetation, normal storm frequencies and magnitudes can more easily initiate rill and gully erosion on the slopes and it is likely that 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.

The storm patrol is intended to identify and mitigate issues immediately after a rainfall event to avoid further damage during subsequent events. The purpose of the monitoring is to evaluate the condition of roads for motorized access and to identify and implement additional work needed to maintain and/or repair damage to road surfaces and flow conveyance structures across roads in order to provide safe access across NPS lands. NPS staff will survey the roads within the fire perimeter after high-intensity storms. Surveys will inspect road surface condition, ditch erosion, and culverts/inlet basins for capacity to accommodate runoff flows.

Why is the treatment/activity reasonable, within policy, and cost effective?

- **Treatment Reasonableness and Cost Effectiveness:** Treatment is reflective of the number of storm events typical for the region and reflects gradual alleviation of issues as recovery occurs within the burned area. Post event cleaning of infrastructure prevents further degradation and or failure of road systems with future storm events.

Land Use Plan Conformance:

Treatment consistent with Agency Land Management Plan (identify which plan):
 General Management Plan (1999)
 Foundation Document (2014)

MONITORING PLAN

1) Treatment Objectives:

- Inspect NPS maintained road networks for instances of road blockages, culvert plugging, crossing washouts and adverse surface erosion on the road tread.
- Treat road issues through excavating buried inlets, grading to remove debris, and treatments to improve surface drainage.

2) Describe how implementation will be monitored.

- Storm patrol crews will log the location and type of all road-related issues pertaining to runoff and erosion.
- The locations and types of treatments used to restore drainage, minimize erosion and restore access will be recorded.

ESRS INDIVIDUAL TREATMENT SPECIFICATION

TREATMENT/ACTIVITY NAME	Hazard Warning signs-roads/trails	Spec-#	NPS-22-ES
NFPORS TREATMENT CATEGORY*	Protection & Warning	FISCAL YEAR(S) (list each year):	FY19
NFPORS TREATMENT TYPE *	Warning Signs	WUI? Y / N	No
IMPACTED COMMUNITIES AT RISK	Redding	IMPACTED T&E SPECIES	No

*See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

ES/BAR ISSUE STATEMENT

ES Issue 1: Human Life and Safety

The Carr fire burned road and trail signs on Park Service lands. Trailhead signs need to be replaced and warning signs need to be installed to warn people that they are entering a burned area.

TREATMENT

S11-Facilities

Treatment/Activity Description:

General Description:
Purchase and install warning signs to inform visitors and employees about the risk from post-fire hazard trees, flash flood risk, blockage of trails by fallen trees, and washed out trails.

Location/(Suitable) Sites:
All trailheads that are within the Carr fire burn area and Park Service administered roads that are within the Carr fire burn area. Signs will be placed at intersections from paved roads to Park Service maintained roads and trailheads to ensure public is informed of burned environment and associated hazards.

Design/Construction Specifications:
Trail Construction and Maintenance Handbook. Signs should be attached to existing posts when possible. Avoid mounting signs to historic or rustic trail signs. Avoid archaeological sites for sign placement. Consult with cultural resource staff prior to sign placement.

How does the treatment relate to damage or changes caused by the fire?

Purpose of Treatment Specifications (relate to damage/change caused by fire):
Warning danger to visitors and employees of burned bridges and hazard trees and the potential for flash floods. The signs will reach all users on the roads and trail.

Why is the treatment/activity reasonable, within policy, and cost effective?

Treatment Reasonableness and Cost Effectiveness:
This treatment is addressing public safety while the hazards are being mitigated.

Land Use Plan Conformance:

Treatment consistent with Agency Land Management Plan (identify which plan):
Whiskeytown National Recreation Area Foundation Document, 2014, specifically regarding public safety.

MONITORING PLAN

1) Treatment Objectives:
To replace signs marking trail systems and to place warning signs for burn areas.

2) Describe how implementation will be monitored.
The recreation supervisor will oversee the installation of the signs. Agency personnel will install the signs.

ESRS INDIVIDUAL TREATMENT SPECIFICATION

TREATMENT/ACTIVITY NAME	Structure Protection NPS	Spec-#	NPS-23-ES
NFPORS TREATMENT CATEGORY*	Facility & Structure	FISCAL YEAR(S) (list each year):	2018,2019
NFPORS TREATMENT TYPE *	Stabilize/Secure/Protect Structures	WUI? Y / N	Y
IMPACTED COMMUNITIES AT RISK	Whiskeytown NRA	IMPACTED T&E SPECIES	N/A

*See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

ES/BAR ISSUE STATEMENT

Two park facilities sites within Whiskeytown National Recreational Area will be impacted by post fire flood and debris flows from the Carr fire burn scar. These facilities are used by the public and need to be protected. .

TREATMENT

General Description:

On NPS lands, provide structure protection for two facility sites that are at risk of being impaired by flood and debris flows.

Location/(Suitable) Sites:

1. Brandy Creek campground: Park facilities (upper restroom, lower restroom, store and lift station)
2. NEED Camp: Educational facility that is permitted by Whiskeytown NRA. These structures are along the south bank of Paige Boulder Creek
3. See Watershed Treatment Map, Appendix IV

Design/Construction Specifications: (See attachments)

1. Brandy Creek: Upper restroom; placement of 10 K-rails and 130 sandbags; lower restroom, store and lift station, placement of 300 feet of sandbags (stack sandbags three high in a pyramid configuration – estimate 1,800 sandbags)
2. NEED Camp: Placement of 200 feet of Hesco baskets (hesco.com jackbox units), two rows 39” high by 39” wide and 100 feet of sandbags one foot high (stack sandbags three high in a pyramid configuration – estimate 600 sandbags); Remove floatable debris from hill slope channel and repair damaged embankment (bury stump holes)

Purpose of Treatment Specifications (relate to damage/change caused by fire):

To provide protection to the Park facilities and NEED camp structures from nuisance flooding

Treatment Reasonableness and Cost Effectiveness:

It is more reasonable to provide structure protection than to replace or move the facilities.

Treatment consistent with Agency Land Management Plan (identify which plan):

Park Asset Management Plan (PAMP) July 2014

MONITORING PLAN

SPECIFICATION DIAGRAM FORM

SITE NO. NPS-23

PROPERTY OWNERSHIP:

Whiskeytown NRA

GPS LOCATION:

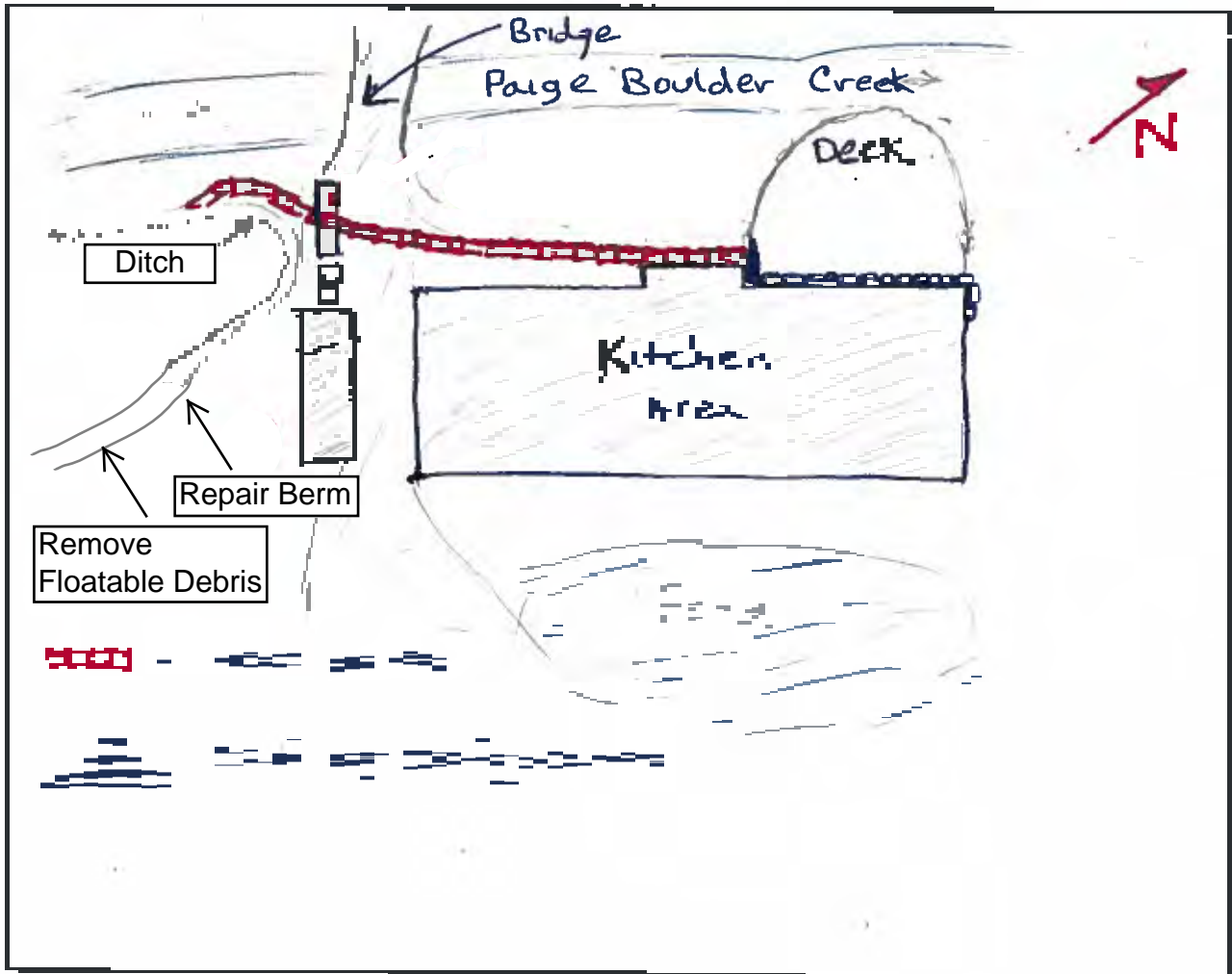
PHYSICAL ADDRESS:

NEED INFO

DESCRIPTION:

Remove floatable debris - sand bags - 100 feet

DIAGRAM:



SPECIFICATION DIAGRAM FORM

SITE NO.

PROPERTY OWNERSHIP:

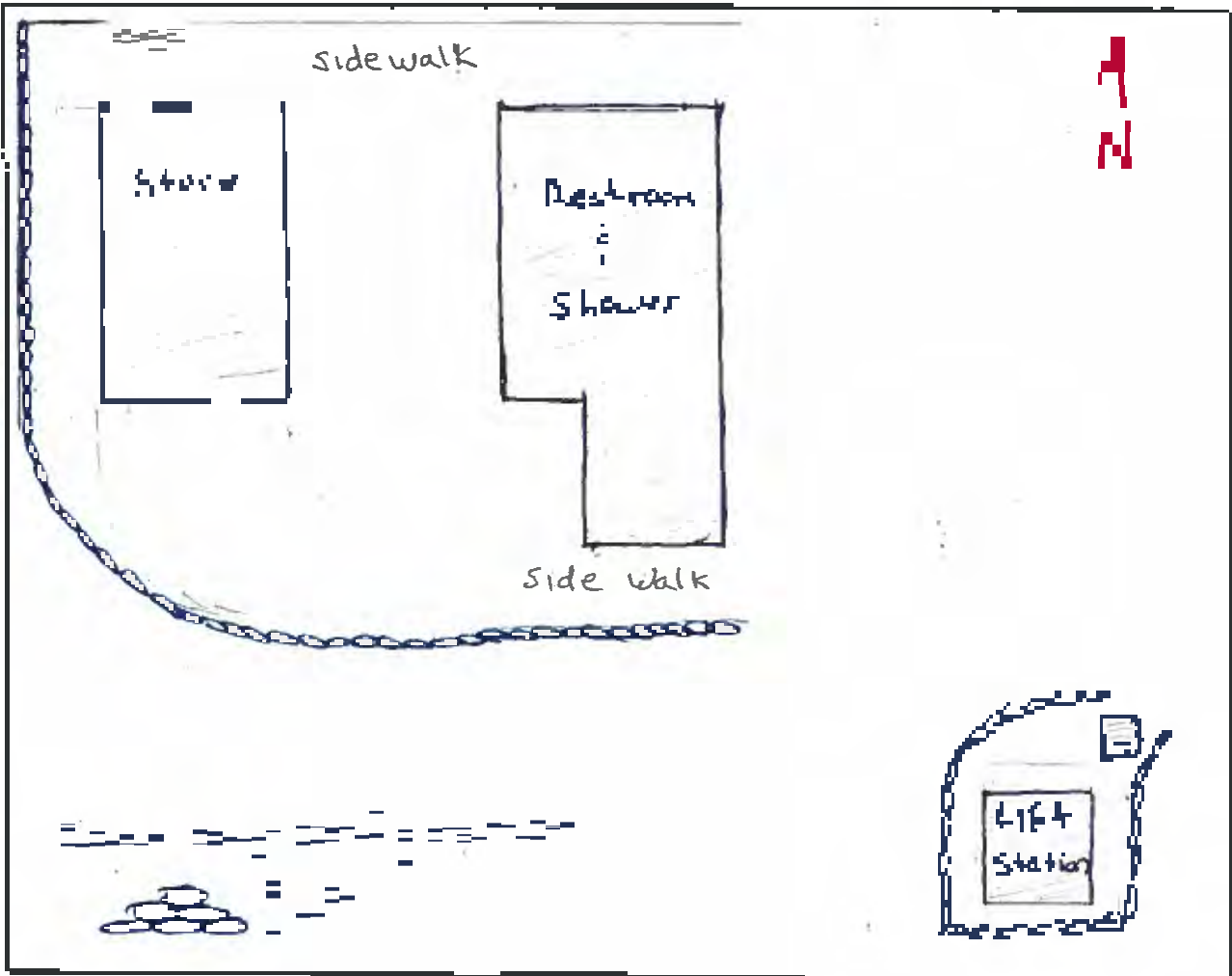
Whiskeytown NRA

GPS LOCATION:

PHYSICAL ADDRESS:

Berry - k - pgr
o - , - , -
g plant - bag - gh

DIAGRAM



SPECIFICATION DIAGRAM FORM

SITE NO. NPS-23

PROPERTY OWNERSHIP:

Whiskeytown NRP

GPS LOCATION:

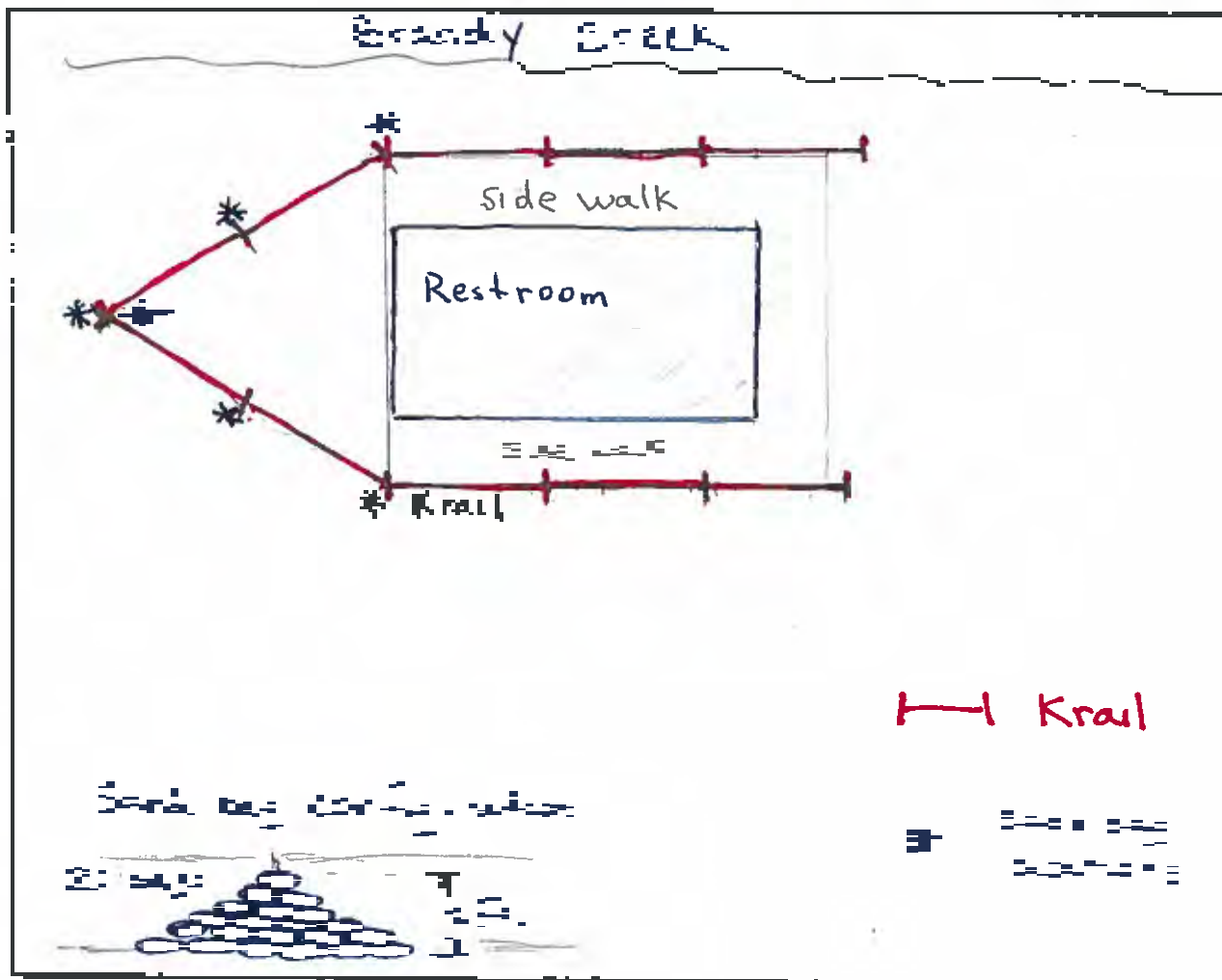
PHYSICAL ADDRESS:

Brandy Creek - Camp ground
Upper rest room

~~DESCRIPTION~~

Structure Protection -
(15) 12' Krauls
Sandbags placed along seams at specific
locations - 6 bags high

~~DIAGRAM~~



NOT To Scale

ESRS INDIVIDUAL TREATMENT SPECIFICATION

TREATMENT/ACTIVITY NAME	Potable Water Source Protection	Spec-#	NPS-24-ES
NFPORS TREATMENT CATEGORY*	Facility & Structure	FISCAL YEAR(S) (list each year):	2018, 2019
NFPORS TREATMENT TYPE *	Stabilize/Secure/Protect Structures	WUI? Y / N	Y
IMPACTED COMMUNITIES AT RISK	Whiskeytown NRA	IMPACTED T&E SPECIES	N/A

*See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

ES/BAR ISSUE STATEMENT

Several potable water sites within Whiskeytown National Recreational Area are impacted by changed watershed conditions within the burned area. Potable water is used throughout the Whiskeytown National Recreational Area for Park facilities, which include recreation sites.

TREATMENT

General Description:

Access to NPS potable water sites could be impaired by flood flows and hazard trees, and two sites require point protection from flood/debris flows.

Location/(Suitable) Sites:

1. Tank 399 above residential facility 324
2. Whiskeytown well and tank
3. Dry Creek spring and tank
4. Brandy Creek well
5. See Watershed Treatment Map, Appendix IV

Design/Construction Specifications:

1. Tank 399: Storm Patrol along access road starting from gate, estimate 6 storm events
2. Whiskeytown well and tank: Storm Patrol along access road starting from gate, estimate 6 storm events and the placement of one k-rail/sandbags along the up slope of the well pad
3. Dry Creek spring and tank: Storm Patrol along access road starting from gate, estimate 6 storm events, and the placement of a concrete barrel with cover for protection of water distribution works from debris flows
4. Brandy Creek well: Rip-rap 25 feet of existing berm in the drainage east of the storage shed. This is done by reshaping berm and placing existing rock along the stream side of the berm. Starting just upstream of the berm, clean 300 feet of drainage channel, which parallels the maintenance yard. Remove floatable debris and other impediments that block normal flow in the channel.
(see attached site drawing)

Purpose of Treatment Specifications (relate to damage/change caused by fire):

To provide access and protection to potable water facilities

Treatment Reasonableness and Cost Effectiveness:

Implementing these treatments is more reasonable in providing potable water to Park facilities than other alternative water sources, such as hauling water.

SPECIFICATION DIAGRAM FORM

SITE NO.

PROPERTY OWNERSHIP:

Wiskey town NRA

GPS LOCATION:

PHYSICAL ADDRESS:

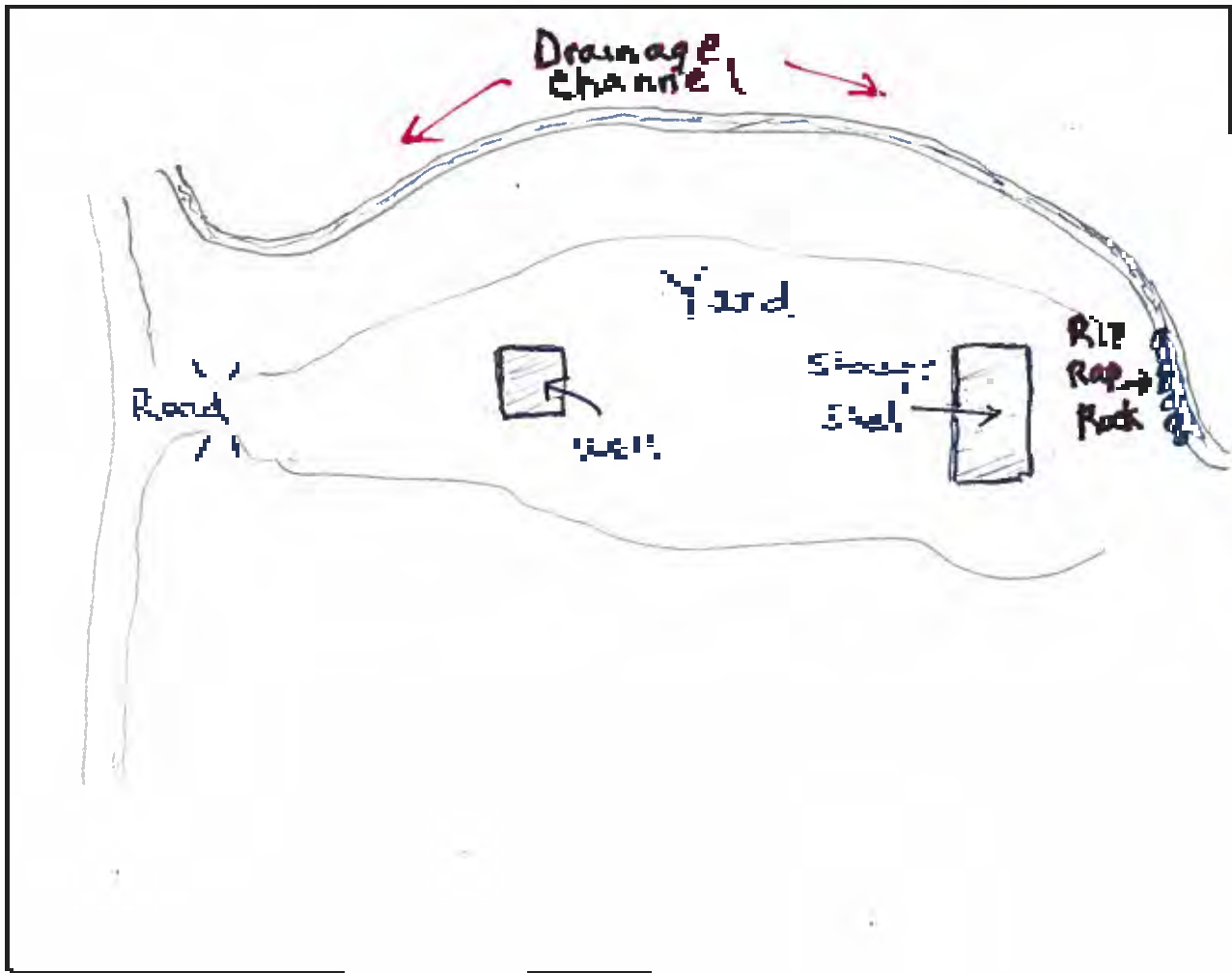
Grady Lake Wai i yard

~~WORK~~

Clean drainage channel of silt & debris &
other impediments

Re-~~place~~ existing berm with rip-rap rock
at outlet

UNIFORM



ESRS INDIVIDUAL TREATMENT SPECIFICATION

TREATMENT/ACTIVITY NAME	Engineering Assessment & Conceptual Design	Spec-#	NPS-25-ES
NFPORS TREATMENT CATEGORY*	Roads	FISCAL YEAR(S) (list each year):	2019
NFPORS TREATMENT TYPE *	Culverts	WUI? Y / N	Y
IMPACTED COMMUNITIES AT RISK	Whiskeytown	IMPACTED T&E SPECIES	None

*See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

TREATMENT

Treatment/Activity Description:

General Description:

An engineering assessment of the Boulder Creek Culvert on South Shore Drive is needed to develop a conceptual design solution to address the compromised footer on the left bank. It should be noted that the watershed team does not support the existing project in PMIS to patch the compromised footer.

Location/(Suitable) Sites:

South Shore Dive at Boulder Creek

Design/Construction Specifications:

- Civil engineering services to evaluate alternatives and provide conceptual design recommendations for repair or replacement of the existing structure. The primary purpose is to reduce the threat to the crossing structure. Survey and design should be coordinated with appropriate agencies. Design requirements include:
 - Safely accommodate post-fire discharges up to 150% of pre-fire flows. Peak flow design requirements should meet NPS & FHWA standard requirements.
 - Crossing evaluation should be conducted in accordance with the methodology described in *Stream Simulation: An Ecological Approach to Providing Passage for Aquatic Organisms at Road-Stream Crossings*, USDA Forest Service, National Technology and Development Program, August 2008. (https://www.fs.fed.us/t-d/pubs/pdf/StreamSimulation/hi_res/%20FullDoc.pdf). This guidance was developed collaboratively by the USDA Forest Service and the Federal Highways administration. The engineer(s) & hydrologist(s) conducting the evaluation must have completed training in this methodology and demonstrate proficiency in it.
 - Alternatives considered should, at minimum, include the following:
 - Repair existing footer and modify channel through crossing to protect culvert footers by more closely mimicking natural channel conditions. This solution may or may not work based on the reduction in culvert capacity caused by the emplacement of natural channel material.
 - Remove structure and replace in same location with an appropriately sized structure. Restore channel dimensions, gradient, and substrate through crossing.
 - Remove structure and relocate road-stream crossing to a more geomorphically appropriate location (i.e. a straight section of channel rather than a bend).

How does the treatment relate to damage or changes caused by the fire?

Purpose of Treatment Specifications (relate to damage/change caused by fire):

The majority of the Boulder Creek watershed above South Shore Drive was burned as part of the Carr Fire. Post-fire watershed modeling results for Boulder Creek indicate that post-fire discharges up to 150% of pre-fire flows may occur. The increase in runoff, and the erosive power of post-fire sediment laden water will likely exacerbate the existing issue of the left culvert footer being undermined and accelerate the eventual failure of the structure. Structure failure presents a threat to major infrastructure and public safety. The purpose of the specification is to develop the design for a long-term treatments that successfully processes post-fire watershed response impacts to the Boulder Creek Culvert and South Shore Drive.

ESRS INDIVIDUAL TREATMENT SPECIFICATION

TREATMENT/ACTIVITY NAME	Post Condition Assessment Site Stabilizations - NPS	Spec-#	NPS-26-ES
NFPORS TREATMENT CATEGORY*	Heritage Resources	FISCAL YEAR(S) (list each year):	2019
NFPORS TREATMENT TYPE *	Site Stabilization	WUI? Y / N	No
IMPACTED COMMUNITIES AT RISK	N/A	IMPACTED T&E SPECIES	None

*See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

ES/BAR ISSUE STATEMENT

Hazard trees on Whiskeytown RNA within the perimeter and/or immediate vicinity of known, significant cultural features and archaeological sites have the potential to adversely affect cultural resources when they ultimately fall. These trees also pose a risk to archaeological personnel conducting site assessments and monitoring activities. Existing exclusionary fencing damaged by the fire similarly put sites at risk of unwanted pedestrian access and increased looting potential. The removal of hazard trees and repair of existing exclusionary fence will help to mitigate further damage to significant sites managed by the NPS.

TREATMENT

General Description: Indirect impacts from the Carr Fire are, or have the potential to further degrade important attributes of cultural features or archaeological sites on lands managed by the NPS at Whiskeytown RNA that fall within the fire perimeter. This specification consists of three components: (1) Clear fire-killed trees and fallen trees from resources; (2) Lop and scatter, chip, and/or directionally fell fire killed hazard trees to reduce site surface visibility, erosion, and fuel loading potential; and (3) Repair existing exclusionary fencing surrounding sites to discourage access.

Location/(Suitable) Sites:
 Sites where post-fire condition assessments will be conducted by NPS archaeologists as part of the Archaeological Site Condition Assessment Specification. Eighty-seven (87) sites have been identified for site condition assessments by NPS archaeologists and based on findings from assessments conducted during BAER field visits all sites will require at a minimum hazard tree removal or other site stabilization treatments.

Design/Construction Specifications:

1. Removal of fire killed hazard trees identified as a threat to known archaeological sites or as a hazard to archaeology crew members conducting site assessments, and removal of trees that have fallen onto archaeological features within site boundaries. Tree and log removal, either through chipping, directional felling, or lop and scatter methods, will be completed by NPS Road/Trails crew personnel with on-site guidance from NPS archaeology personnel on hazard tree location and directional falling preference (if any).
2. Repair/reconstruction of existing exclusionary fence line surrounding previously identified sites. The NPS Force Account will complete fence repair with on-site guidance from NPS archaeology personnel. The work is designed to exclude pedestrian traffic on-site and decrease looting potential. All work will be completed in FY19.

How does the treatment relate to damage or changes caused by the fire?
Purpose of Treatment Specifications (relate to damage/change caused by fire):

Hazard trees pose a continued threat to archaeological resources and the personnel responsible for managing those resources on-site until they are successfully felled and removed. Surface features such as dry stacked rock foundations can be toppled by falling trees, and subsurface features such as housepits can be disturbed by uprooted root balls. Chipping and/or lop and scatter methods will effectively disperse downed fuels while also helping to stabilize surface soils and make surface artifacts less visible

and susceptible to looting. Directional falling perpendicular to site slopes can also reduce erosion potential where appropriate.

Why is the treatment/activity reasonable, within policy, and cost effective?

Treatment Reasonableness and Cost Effectiveness:

Proposed treatments will effectively protect some of the most significant archaeological resources within the fire perimeter on NPS managed lands. Should proposed treatments not take place, the cost of mitigation efforts after site damage and/or disturbance occurs will greatly exceed treatment costs. All work will be conducted in-house by NPS permanent and seasonal staff, reducing costs, streamlining treatment timelines, and increasing overall efficiency by having personnel work together in the field at the same time to make determinations that most effectively protect archaeological resources. Work will predominately be accomplished utilizing equipment (chippers, vehicles, saws, trailers) already owned by the NPS.

Land Use Plan Conformance:

Treatment consistent with Agency Land Management Plan (identify which plan):

National Historic Preservation Act of 1962 as amended through 1992.

General Management Plan and Environmental Impact Statement, Whiskeytown-Shasta-Trinity National Recreation Area, Pacific West Region, 1999.

MONITORING PLAN

- 1) **Treatment Objectives:** Stabilization and protection of significant archaeological sites and/or features directly affected by the Carr Fire through fire-killed hazard tree removal, exclusionary fence repair, and a combination of chipping, lop and scatter, and directional falling to disperse downed trees, reduce erosion potential, and obscure site surfaces to decrease the possibility of looting.
- 2) **Describe how implementation will be monitored:** Work to stabilize identified sites, as well as those yet to be identified through assessment that necessitate treatment, will be physically monitored by NPS archaeology staff. On-site monitoring conducted during treatment will ensure that work is conducted to the standards of NPS archaeology staff. Monitoring efforts will additionally include photo documentation, field notes, and a report that will be prepared following the completion of stabilization efforts.
- 3) **Describe how effectiveness will be monitored, how it will be monitored, and within what time period:** NPS archaeology staff will conduct periodic post-treatment monitoring of sites identified for treatment at regular intervals. Interval schedule and overall duration will be determined by archaeology staff, and will be site-specific.

LABOR, MATERIALS AND OTHER COST:

PERSONNEL SERVICES: (Grade @ Cost/Hours X # Hours X # Fiscal Years = Cost/Item): Do not include contract personnel costs here (see contractor services below).	COST / ITEM
TOTAL PERSONNEL SERVICE COST	
EQUIPMENT PURCHASE, LEASE AND/OR RENT (Item @ Cost/Hour X # of Hours X #Fiscal Years = Cost/Item): Note: Purchases require written justification that demonstrates cost benefits over leasing or renting.	COST / ITEM

PART F - INDIVIDUAL TREATMENT SPECIFICATION, BAR

TREATMENT/ACTIVITY NAME	Monitor Invasive Species	PART E Spec-#	NPS-27-BAR
NFPORS TREATMENT CATEGORY*	Monitoring	FISCAL YEAR(S) (list each year):	2020, 2021, 2022
NFPORS TREATMENT TYPE *	Treatment effectiveness monitoring	WUI? Y / N	N
IMPACTED COMMUNITIES AT RISK	n/a	IMPACTED T&E SPECIES	n/a

* See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

TREATMENT/WORK TO BE DONE:

<p>General Description: On Whiskeytown NRA lands Early Detection Rapid Response (EDRR) treatments of invasive species will be monitored to determine effectiveness of treatment type and recovery of natural vegetation. Treatment sites will be evaluated annually for three years to ensure that treatments are effective and to determine the need for follow-up control. Monitoring will help determine if invasive species are increasing or decreasing within the Carr Fire perimeter. This monitoring specification will aid in determining if ES and BAR Specifications Invasive Species, EDRR are effective.</p> <p>Location/(Suitable) Sites: Areas suitable for monitoring are roads and trails used by suppression vehicles, dozerlines, drop points, powerline corridors disturbed by utility companies, and riparian and burned areas that experienced high vegetation mortality/soil burn severity. There are a total of 4 acres of drop points, 15 acres and 12 miles of dozerlines, 2 acres and 2 miles of hand lines, and 5,491 acres and 78 miles of roads used by suppression vehicles/equipment and utility companies, or roads that were bulldozed. There are 8 acres of riparian areas with moderate to high soil burn severity that will be inventoried. In addition, 3,855 acres of high soil burn severity/vegetation mortality will be inventoried. Within the fire on WNRA lands, 9,375 acres and 92 miles have been identified as appropriate for invasive species inventory and treatment on WNRA lands. Priority areas will be known invasive plant species treatment locations followed by areas within and adjacent to invasive weed locations that were utilized by fire suppression forces.</p> <p>Design/Construction Specifications:</p> <ul style="list-style-type: none"> ● Inventory areas utilized and disturbed by suppression and utility company activities for invasive species/noxious weeds. ● Monitor treated invasive plant locations (manual or chemically treated) to determine presence or absence of invasive plants and efficacy of chemical control. ● Collect data with tablets utilizing Collector or GPS units that can be interfaced with Arc GIS. ● If follow-up applications are needed as determined through monitoring, herbicide applications should occur during the appropriate phenology as determined by the herbicide label or local knowledge. ● Monitor treatment efficacy (see Elzinga et al., 1998 and Herrick et al. 2009 for example monitoring designs). ● Recommended minimum monitoring attributes could include the species composition, cover, density and size of treated area. <p>Purpose of Treatment Specifications (relate to damage/change caused by fire): In a disturbance situation such as wildfire, noxious species can outcompete existing vegetation and lead to an altered plant community that serves less ecological function and has less resiliency than its pre-wildfire condition. The burned area, now lacking desired vegetation that can normally outcompete invasive species, is vulnerable to the establishment and expansion of invasive seed sources outside and adjacent to burned areas especially where native seed banks and soil productivity are compromised (see Carr Fire Vegetation Assessment 2018).</p> <p>Purpose is to determine if invasive species treatments are preventing the increase of existing weed populations and to determine the level of needed treatments or if follow-up treatments are necessary.</p>

ESRS INDIVIDUAL TREATMENT SPECIFICATION

TREATMENT/ACTIVITY NAME	Short Term AML Safety Fencing for NPS	Spec-#	NPS-28-ES
NFPORS TREATMENT CATEGORY*	Protection and Warning	FISCAL YEAR(S) (list each year):	FY19
NFPORS TREATMENT TYPE *	Protective Fences/Barriers	WUI? Y / N	N
IMPACTED COMMUNITIES AT RISK		IMPACTED T&E SPECIES	

*See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

ES/BAR ISSUE STATEMENT

This treatment will provide for temporary t-post fencing and signs in Whiskeytown NRA to keep people out of newly discovered mine features until permanent closures can be put into place. It will also include Section 106 compliance that will pave the way for the permanent closures. These mine openings pose significant safety threats to park visitors and agency staff.

TREATMENT

General Description: A two person crew will visit the five hazardous mine features identified in the BAER report to install t-post fencing and mine warning signs. These temporary safety measures will remain in place until more permanent closures can be installed.

Location/(Suitable) Sites: The five hazardous mine features are located at the following sites: El Dorado Mine (2), Grizzly Gulch (1), and along the western park boundary, north of Highway 299 (2). Specific feature locations have been given to park staff.

Design/Construction Specifications:

- Adit fencing will consist of two t-posts placed across the front of the portal.
- Shaft fencing will surround the entire feature.
- Each fence should have three strands of smooth wire and a mine hazard warning sign.

Purpose of Treatment Specifications (relate to damage/change caused by fire): These mine features were previously unknown or largely obscured by vegetation prior to the Carr fire. Their increased visibility poses a significant safety hazard for the visiting public.

Treatment Reasonableness and Cost Effectiveness: T-post fencing is inexpensive and easy to install. It can be put up and taken down quickly. When combined with signage, it will help protect the park visitors until permanent mitigation can be put in place.

Treatment consistent with Agency Land Management Plan (identify which plan): This temporary treatment is consistent with the General Management Plan and Environmental Impact Statement for Whiskeytown-Shasta-Trinity National Recreation Area (1999).

ESRS INDIVIDUAL TREATMENT SPECIFICATION

TREATMENT/ACTIVITY NAME	Implementation Leader - NPS	Spec-#	NPS - 29 - ES
NFPORS TREATMENT CATEGORY*	Planning	FISCAL YEAR(S) (list each year):	FY19
NFPORS TREATMENT TYPE *	ES/BAER plan	WUI? Y / N	N
IMPACTED COMMUNITIES AT RISK	N	IMPACTED T&E SPECIES	N

*See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

ES/BAR ISSUE STATEMENT

ES1: Human Life and Safety
 The implementation leader will ensure the plan is implemented in a timely and efficient manner.

TREATMENT

R1 – Project Management

Treatment/Activity Description:
General Description: Fund a project leader to coordinate and oversee the implementation of the CARR Fire Burned Area Emergency Response (BAER) Plan for the Whiskeytown National Recreation Area. This specification provides for funding for a total of 26 pay periods in FY2019 to implement the BAER Plan.

Location/(Suitable) Sites: Much of the work will center within the Carr Fire burned area. Treatment areas are distributed throughout the fire and will need to be administered on a watershed basis

Design/Construction Specifications: The project leader is responsible for the oversight of the BAER Plan implementation. The leader will implement each treatment to achieve efficient use of funds, personnel, equipment, and contracts. The leader will oversee monitoring, program review, proposed plan revisions, supplemental funding requests and will complete annual and final accomplishment reports in accordance to NPS BAER Policy and Guidelines. The leader will monitor work to ensure compliance with all relevant Federal laws and regulations, which include but are not limited to NEPA and NHPA mitigation requirements and all OSHA regulations and safety standards. The leader will manage the BAER Plan budget and track expenditures by specification and coordinate projects to ensure events occur in their proper order.

How does the treatment relate to damage or changes caused by the fire?
Purpose of Treatment Specifications (relate to damage/change caused by fire): The purpose is to provide quality control and accountability over project implementation of treatments designed to respond to damage directly caused by the fire.

Why is the treatment/activity reasonable, within policy, and cost effective?
Treatment Reasonableness and Cost Effectiveness: This treatment addresses project implementation and fiscal oversight of the entire plan. Providing this fiscal oversight will ensure all of the treatments are accomplished efficiently and cost effective.

Land Use Plan Conformance:
Treatment consistent with Agency Land Management Plan (identify which plan): Actions proposed in the DOI CARR FIRE BAER Plan have been reviewed by the Whiskeytown National Recreation Area Interdisciplinary Team and comply with policy and oversight.

ESRS INDIVIDUAL TREATMENT SPECIFICATION

TREATMENT/ACTIVITY NAME	Implementation Leader - NPS	Spec-#	NPS – 30 - BAR
NFPORS TREATMENT CATEGORY*	Planning	FISCAL YEAR(S) (list each year):	FY 20, 21, 22
NFPORS TREATMENT TYPE *	ES/BAER plan	WUI? Y / N	N
IMPACTED COMMUNITIES AT RISK	N	IMPACTED T&E SPECIES	N

*See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

ES/BAR ISSUE STATEMENT

ES1: Human Life and Safety
 The implementation leader will ensure the plan is implemented in a timely and efficient manner.

TREATMENT

R1 – Project Management
 :

General Description: Fund a project leader to coordinate and oversee the implementation of the CARR Fire Burned Area Emergency Response (BAER) Plan for the Whiskeytown National Recreation Area. This specification provides for funding for a total of 26 pay periods in FY2020, 2021, and 2022 to implement the BAER Plan.

Location/(Suitable) Sites: Much of the work will center within the CARR Fire burned area, treatment areas are distributed throughout the fire and will need to be administered on a watershed basis

Design/Construction Specifications: The project leader is responsible for the oversight of the BAER Plan implementation. The leader will implement each treatment to achieve efficient use of funds, personnel, equipment, and contracts. The leader will oversee monitoring, program review, proposed plan revisions, supplemental funding requests and will complete annual and final accomplishment reports in accordance to NPS BAER Policy and Guidelines. The leader will monitor work to ensure compliance with all relevant Federal laws and regulations, which include but are not limited to NEPA and NHPA mitigation requirements and all OSHA regulations and safety standards. The leader will manage the BAER Plan budget and track expenditures by specification and coordinate projects to ensure events occur in their proper order.

How does the treatment relate to damage or changes caused by the fire?
Purpose of Treatment Specifications (relate to damage/change caused by fire): The purpose is to provide quality control and accountability over project implementation of treatments designed to respond to damage directly caused by the fire.

Why is the treatment/activity reasonable, within policy, and cost effective?
Treatment Reasonableness and Cost Effectiveness: This treatment addresses project implementation and fiscal oversight of the entire plan. Providing this fiscal oversight will ensure all of the treatments are accomplished efficiently and cost effective.

Land Use Plan Conformance:
Treatment consistent with Agency Land Management Plan (identify which plan): Actions proposed in the DOI CARR FIRE BAER Plan have been reviewed by Whiskeytown National Recreation Area Interdisciplinary Team and comply with policy and regulations.

ESRS INDIVIDUAL TREATMENT SPECIFICATION

TREATMENT/ACTIVITY NAME	Remove debris and hazardous materials from burned structures	Spec-#	NPS - 31 - ES
NFPORS TREATMENT CATEGORY*	Protection and Warning	FISCAL YEAR(S) (list each year):	FY19
NFPORS TREATMENT TYPE *	Toxic Substance Mitigation	WUI? Y / N	N
IMPACTED COMMUNITIES AT RISK	none	IMPACTED T&E SPECIES	N

*See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

ES/BAR ISSUE STATEMENT

The Carr fire has burned multiple structures on NPS lands that now pose risk to the watershed and water quality from the debris that remains. Cleanup of the debris is essential before fall rains begin to protect water quality and prevent the spread of toxins to drinking water, wildlife, and surrounding soils.

TREATMENT

Treatment/Activity Description:
General Description: At least 21 structures are known to have burned within Whiskeytown NRA and now posed a risk of soil and water contamination to park lands and waters. Removal of the debris and hazardous materials from these sites is necessary before fall rains set in. Material needs to be removed and hauled to an appropriate facility.

Location/(Suitable) Sites: 29 known structures were burned, at the following locations: 1 at Brandy Creek, 2 at Carr Powerhouse, 4 at Crystal Creek Boys Camp, 3 at Grizzly Gulch, 11 at NEED camp, 2 at Oak Bottom, 1 at Trinity Mtn Road, and 5 at Whiskey Creek.

Design/Construction Specifications: Remove burned debris and hazardous materials from each burned structure site. Haul debris to an approved waste disposal site. Complete work before the Fall 2018 rains set in.

How does the treatment relate to damage or changes caused by the fire?
Purpose of Treatment Specifications (relate to damage/change caused by fire): The Carr fire destroyed many structures that were used for a variety of purposes in the park. Destroyed structures have left significant rubble and debris, and hazardous materials in some locations. Removal of the debris will alleviate concerns of contamination to surrounding soils and downslope/downstream to water sources.

Why is the treatment/activity reasonable, within policy, and cost effective?
Treatment Reasonableness and Cost Effectiveness: Costs are estimated for each structure burned; work will be completed by a contractor.

Land Use Plan Conformance:
Treatment consistent with Agency Land Management Plan (identify which plan): Whiskeytown NRA Foundation Document, 2014.

LABOR, MATERIALS AND OTHER COST:

PERSONNEL SERVICES: (Grade @ Cost/Hours X # Hours X # Fiscal Years = Cost/Item): Do not include contract personnel costs here (see contractor services below).	COST / ITEM
TOTAL PERSONNEL SERVICE COST	
EQUIPMENT PURCHASE, LEASE AND/OR RENT (Item @ Cost/Hour X # of Hours X	COST / ITEM

PART F - INDIVIDUAL TREATMENT SPECIFICATION

TREATMENT/ACTIVITY NAME	Invasive Species – EDRR- ES	PART E Spec-#	USFS-1-ES
NFPORS TREATMENT CATEGORY*	Invasive species	FISCAL YEAR(S) (list each year):	2019
NFPORS TREATMENT TYPE *	Hand Treatment, Terrestrial Habitat Improvement	WUI? Y / N	Y
IMPACTED COMMUNITIES AT RISK		IMPACTED T&E SPECIES	Northern spotted owl

* See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

TREATMENT/WORK TO BE DONE:

General Description:

On Shasta-Trinity National Forest lands Early Detection Rapid Response (EDRR) treatments of invasive species in native vegetation communities are proposed to mitigate this threat. The establishment of a weed washing station was not implemented until late in the incident, which is expected to increase the threat of the introduction and/or spread of invasive weed species that exist within and adjacent to the Carr Fire. This specification outlines the application of manual treatments to reduce the competitive pressure of invasive weeds, including yellow starthistle, spotted knapweed, dyer's woad, St. Johnswort, tree of heaven, and brooms (French, Spanish and Scotch) on the establishment of native plant communities within the Carr Fire. Application of manual treatments will greatly improve new recruitment of native species from surrounding unburned vegetation and seed germination from existing seeds stored within the seed bank. A high probability for the introduction and spread of invasive weeds exists in priority treatment areas where soil disturbance occurred related to suppression-related activities including dozerlines, handlines, staging areas and safety zones. Road and riparian areas also serve as corridors for transporting invasive weeds to recently burned areas. These areas are necessary for treatment to allow the re-establishment of vegetation, which is unlikely to recover post-fire without intervention due to competition from invasive weed species. Inventory will occur in areas having high vegetation mortality as these areas have a high probability (>90%) for invasive species invasion. Some areas are excluded from treatment due to the native vegetation community's ability to recover post-fire (e.g. montane chaparral species in low to moderate vegetation mortality areas are expected to resprout and regenerate from seed). Various treatment methods will be utilized including hand pulling. Herbicide treatments are not proposed here but if the Shasta-Trinity National Forest were to prepare an Integrated Vegetation Management Plan under Emergency Stabilization guidelines, the BLM weed crew that works under a Certified Pesticide Applicator could assist in treating invasive plant species using herbicides. There is support for an Interagency Weed Control Crew utilizing both the Shasta-Trinity National Forest and the Redding Bureau of Land Management. *See Appendix for itemized cost sheet for USFS cost.*

Location/(Suitable) Sites:

Areas suitable for treatment are roads and trails used by suppression vehicles, dozerlines, staging areas, drop points, powerline corridors disturbed by utility companies, staging areas utilized by timber operations conducted during and immediately post fire, and riparian areas that experienced moderate to high vegetation mortality/soil burn severity. There are a total of 15 acres of drop points and safety zones, 12 acres and 12 miles of dozerlines, 11 acres and 9 miles of hand lines, and 6,347 acres and 95 miles of roads used by suppression vehicles/equipment and utility companies, or roads that were bulldozed. There are 106 acres of riparian areas with moderate to high soil burn severity that will be inventoried. In addition, 1,224 acres of high vegetation mortality will be inventoried. Within the fire on USFS administered lands, **7,715 acres** and **116 miles** have been identified as appropriate for invasive species inventory and treatment. Emphasis will be within and adjacent to invasive weed locations.

Design/Construction Specifications:

- Inventory areas utilized and disturbed by suppression and utility company activities for invasive species.
- Hand pulling will be conducted on small invasive species populations located during inventory.
- If follow-up treatments are needed as determined through monitoring, hand pulling and mechanical removal should occur during the appropriate phenology.
- Monitor treatment efficacy (see Elzinga et al., 1998 and Herrick et al. 2009 for example monitoring designs).

Purpose of Treatment Specifications (relate to damage/change caused by fire):

In a disturbance situation such as wildfire, noxious species can outcompete existing vegetation and lead to an altered plant community that serves less ecological function and has less resiliency than its pre-wildfire condition. Native vegetation recovery is likely to be impacted by off-road and off-trail travel and invasive species introduction and establishment. Initial concerns include maintaining the ecological health and integrity of watersheds within the fire perimeter. Sensitive plant species populations, unique plant communities, native plant communities, native seed banks, and soil productivity have been impacted in moderate to high Soil Burn Severity (SBS) areas of the fire. The burned area, now lacking desired vegetation that can normally outcompete invasive species, is vulnerable to the establishment and expansion of invasive seed sources outside and adjacent to burned areas especially where native seed banks and soil productivity are compromised (see Carr Fire Vegetation Assessment 2018). In the low SBS areas, it will take at least one growing season (through the summer of 2019) until native vegetation can reestablish and compete with invasive species. In moderate to high SBS areas, vegetation recovery is expected to take longer and will vary based on pre-fire vegetation community condition and location within the fire perimeter. Invasive species are likely to establish at a much faster rate in these moderate to high SBS areas, further impacting Forest Sensitive Species plants and their associated habitat. The presence of invasive species may prevent establishment of desirable perennial grasses, shrubs, and tree seedlings and can increase future fire hazards with the establishment of flashy non-native annual species that often become established post-fire.

Treatment Reasonableness and Cost Effectiveness:

Hand treatments (pulling, digging, etc.) can be used on small infestations. Herbicide treatment increases the probability of success for native species regeneration, however the Forest at this time is unable to utilize chemical control methods. Prompt application of this treatment is the most cost-effective response to the risk of further infestation by invasive plant species. Lack of treatment would put these areas at risk for dominance by invasive species with potential spread into adjacent plant communities and habitats with intact native perennial vegetation. Providing an EDRR program to minimize infestations on this fire will protect and maintain general wildlife habitat, designated black tailed deer winter range and northern spotted owl critical habitat, help stabilize soils and hydrology by allowing for natural regeneration, and provide for wildlife by providing reliable quality forage on an annual basis.

Treatment consistent with Agency Land Management Plan (identify which plan): In order to insure watershed health, control or eradication of noxious weeds on both upland and riparian areas will be in cooperation with local, state, and other federal agencies, as well private groups or other interested parties. Executive Order 13112, Feb. 3, 1999, Invasive Species established the format to federal agencies to develop programs dealing with invasive species. Noxious weed inventory of the disturbed sites within the Carr Fire boundary will be conducted and reported under the current standards. Other Regulations and Policies include: Noxious weed inventory and control will be reported using Natural Resources Information System (NRIS), 2018; Forest Service Manual 2900, Invasive Species Management.

Treatment Effectiveness Monitoring Proposed

Invasive weed inventory of the disturbed sites within the Carr Fire boundary will be conducted and reported under the current standards utilizing NRIS. The monitoring protocol will be at the discretion of the Shasta-Trinity National Forest. Invasive species treatment sites will be monitored to determine the effectiveness of the treatment and recovery of the native plant communities.

ESRS INDIVIDUAL TREATMENT SPECIFICATION

TREATMENT/ACTIVITY NAME	Storm Patrol & Cleaning - USFS	Spec-#	USFS-2-ES
NFPORS TREATMENT CATEGORY*	Roads	FISCAL YEAR(S) (list each year):	2019, 2020, 2021
NFPORS TREATMENT TYPE *	Hazard Removal	WUI? Y / N	Y
IMPACTED COMMUNITIES AT RISK		IMPACTED T&E SPECIES	

*See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

ES/BAR ISSUE STATEMENT

<p><i>Storm patrol and cleaning will address the following issues:</i></p> <ul style="list-style-type: none"> • ES Issue 1: Human Life and Safety. USFS-maintained roads within the fire perimeter receive year-round use. Culvert washouts, debris accumulations and instances of adverse surface erosion threaten to strand motorists in relatively remote locations. • ES Issue 2: Soil/Water Stabilization. Numerous areas within the fire perimeter will experience elevated rates of erosion. Where roads and culverts fail or surface erosion is concentrated, increased loss of soil and impacts to downstream watercourses is expected.
--

TREATMENT

<p><i>Treatment/Activity Description:</i></p> <ul style="list-style-type: none"> • General Description: After each storm event, storm patrol teams will clean roadside ditches, clear the road surface and ensure functional culverts. Heavy equipment may be needed to accomplish the clean-outs where excessive debris accumulates. <p>There are many USFS-maintained roads and road-stream crossings within the fire perimeter at risk of inundation, debris deposition, culvert plugging, rock fall and other post-fire related impacts from elevated flows carrying sediment and debris. After rainfall events these areas will be assessed for any potential damage to the roads and infrastructure such as culvert plugging and stream diversions onto the road surface. If the culverts are plugged or damaged then the areas could be cleaned out immediately to avoid further damage during the next rainfall event. Additionally, other values at risk (buildings, water supply facilities, diversion structures, etc.) adjacent to channels will be assessed during storm patrol.</p> <p>The patrols are used to identify those road problems such as plugged culverts and washed out roads and to clear, clean, and/or block those roads that are or have received damage. The storm patrollers shall have access to equipment that can be used when a drainage culvert is plugged or soon to be plugged and to repair any road receiving severe surface erosion.</p> <p>Storm patrol work is expected to occur for eight storms during the first winter (2019/2020), four storms during the second winter (2020/2021), and two storm patrols during the third winter season (2021/2022).</p> <p>Work should be performed in the morning and early afternoon. Personnel should leave drainages when chance of rain is moderate or higher. Store equipment and materials outside of flood-prone areas and debris hazards.</p> <p>Location/(Suitable) Sites: USFS-maintained roads within the fire perimeter, specifically roads in the upper Clear Creek watershed and tributaries draining to the west side of Shasta Lake.</p> <ul style="list-style-type: none"> • Design/Construction Specifications: <ol style="list-style-type: none"> 1. Immediately after receiving wetting rain the USFS will send out patrols to the roads and facilities of high importance on USFS lands to identify road and other hazard conditions – obstructions such as

rocks, sediment, washouts and plugged culverts so the problems can be corrected before they worsen or jeopardize motor vehicle users.

2. The road patrols shall bring in heavy equipment necessary to mechanically remove any obstructions from the roads and culvert inlets and catch basins where necessary.
3. All excess material and debris removed from the drainage system shall be placed outside of the bank-full channel and floodplain where it cannot re-enter stream channels. Preferably the material will be moved off-site.
4. After each storm event, USFS staff will identify the location(s) along roads where debris material is located and what debris material has been removed.
5. Storm patrol and clearing will occur up to 8 times the first winter, 4 times during the second winter and 2 times during the third winter.

How does the treatment relate to damage or changes caused by the fire?

Purpose of Treatment Specifications (relate to damage/change caused by fire): There is an immediate and future threat to travelers along these roads and increased sedimentation to fish-bearing streams within the burned area due to the increased potential for rolling and falling rock from burned slopes and increased potential for flash floods and debris flows. With the loss of vegetation, normal storm frequencies and magnitudes can more easily initiate rill and gully erosion on the slopes and it is likely that 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.

The storm patrol is intended to identify and mitigate issues immediately after a rainfall event to avoid further damage during subsequent events. The purpose of the monitoring is to evaluate the condition of roads for motorized access and to identify and implement additional work needed to maintain and/or repair damage to road surfaces and flow conveyance structures across roads in order to provide safe access across USFS lands. USFS engineering personnel will survey the roads within the fire perimeter after high-intensity storms. Survey will inspect road surface condition, ditch erosion, and culverts/inlet basins for capacity to accommodate runoff flows.

Why is the treatment/activity reasonable, within policy, and cost effective?

- **Treatment Reasonableness and Cost Effectiveness:** Treatment is reflective of the number of storm events typical for the region and reflects gradual alleviation of issues as recovery occurs within the burned area. Post event cleaning of infrastructure prevents further degradation and or failure of road systems with future storm events.

Land Use Plan Conformance:

Treatment consistent with Agency Land Management Plan (identify which plan):
Shasta-Trinity National Forests Land and Resource Management Plan, 1995.

MONITORING PLAN

1) Treatment Objectives:

- Inspect USFS maintained road networks for instances of road blockages, culvert plugging, crossing washouts and adverse surface erosion on the road tread.
- Treat road issues through excavating buried inlets, grading to remove debris, and treatments to improve surface drainage.

2) Describe how implementation will be monitored.

- Storm patrol crews will log the location and type of all road-related issues pertaining to runoff and erosion.
- The locations and types of treatments used to restore drainage, minimize erosion and restore access will be recorded.

3) Describe how effectiveness will be monitored, how it will be monitored, and within what time period.

ESRS INDIVIDUAL TREATMENT SPECIFICATION

TREATMENT/ACTIVITY NAME	Culvert Cleaning	Spec-#	USFS – 3 - ES
NFPORS TREATMENT CATEGORY*	Culverts Intersecting Road Prism	FISCAL YEAR(S) (list each year):	2018, 2019
NFPORS TREATMENT TYPE *	Culverts: Removal of Debris Hazards	WUI? Y / N	Y
IMPACTED COMMUNITIES AT RISK	Shasta-Trinity, NF	IMPACTED T&E SPECIES	N

*See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

ES/BAR ISSUE STATEMENT

- **ES Issue 1 Human Life and Safety.** USFS maintained roads within the fire perimeter receive year-round public use. Culvert failure, debris accumulations and instances of adverse surface erosion threaten to strand motorists in relatively remote locations.
- **ES Issue 2 Soil/Water Stabilization.** Numerous areas within the fire perimeter are will experience elevated rates of erosion. Where roads and culverts fail or surface erosion is concentrated, increased loss of soil and impacts to downstream watercourses would be anticipated.
- **ES Issue 3 Habitat for Federal/State Listed, Proposed, or Candidate Species.** Several species of federally listed salmon and steelhead occupy drainages within the fire perimeter. Specific watersheds include lower Clear Creek below Whiskeytown Dam and smaller drainages drain to the Sacramento River below Keswick. In the Trinity River, watersheds include Grass Valley Creek and Deadwood Creek. Upkeep and maintenance of culverts would greatly reduce the potential of sedimentation reaching receiving waters.

TREATMENT

Treatment/Activity Description: S14 – Other Treatments

- **General Description:** There are 15 miles of transportation network and associated culverts on USFS at of inundation, debris deposition, flood damage and other post-fire related impacts from elevated flows carrying sediment and debris. There is the increased potential of culverts clogging with sediment and debris from burned and damaged woody debris. Established rainfall thresholds will require the need to assess the potential damage to the roads and culvert infrastructure. Due to the fires removal of ground cover there is a higher failure risk of culvert clogging/damage during higher rainfall events. Storm patrols are designed to identify clogged culverts and road prism damages and to take measure of removing clogged debris.

Location/(Suitable) Sites: Fifteen miles of roads were identified has having the potential for culvert clogging based on a gis data search as well as the transportation network is fragmented with multiple ownerships. The BAER team utilized the debris flow map developed by the USGS to aid in identifying culverts locations as well as culvert/roads inventory map (see watershed response and culverts maps, appendix, 4).

Design/Construction Specifications:

1. Culverts will need to have excess sediment material and debris removed from the culverts inlet drainage system as well as this material needs to be placed outside of the bank-full channel and floodplain where it cannot re-enter stream channels. Preferably the material will be moved to an off-site debris staging site.
2. The culvert cleaning before the first rain events will require that all accumulated soils, gravels, rocks and debris be removed before the October seasonal rains begin. A culverts inspections and cleaning needs to take place before storm patrol team begin their rainfall culverts inspections.

3. Utilization of both the USGS debris flow map illustrating the culvert points and the watershed response map illustrating the locations of known culverts show be used as an inspection guideline.
4. Culverts will need to have excess sediment material and debris removed from the outlet if at all possible. There are many culverts identified in the Carr Fire field investigations where this may not be possible due to depth of culvert and length down slope.
5. The utilization of either a backhoe or excavator will be required to excavate the buildup of sediment, gravel and rocks. Due to the Carr Fire and past fires there is also the buildup of woody debris that will need to be removed.
6. During the culvert cleaning every effort should be made to NOT damage the inlet of the culvert pipe. Restriction of the culvert inlet will greatly reduce the volume of water designed to pass through the culvert pipe.
7. In some cases, the retrofitting of the inlet with a debris stand pipe may be necessary to prevent repeated debris acumination and debris woody debris clogging culvert pipe (see diagram, appendix,4).

How does the treatment relate to damage or changes caused by the fire?

Purpose of Treatment Specifications (relate to damage/change caused by fire): There is the immediate and future threat to the public along roads and their culvert conveyance infrastructure. Within the burned area due to the increased potential from excessive rainfall onto exposed soils there is the higher possibility that saturated soils could move down slope at accelerated speeds. This increase of saturated soils on bare soils increases the potential for debris flows, debris torrents and mass movement of rocks and trees. Due to the loss of vegetation normal storm frequencies and magnitudes can more easily initiate a debris event from riling and gully erosion from steep slopes. The potential of runoff to clogged culverts and spill onto the road prism is increased and could cause road prism damage from overwhelmed culverts. These events make for hazardous access along steep slopes and put the safety of the public and storm patrols at risk.

The storm patrol is intended to identify and mitigate issues immediately after an established rainfall threshold is exceeded to aid in preventing culvert damage during subsequent rainfall events.

Why is the treatment/activity reasonable, within policy, and cost effective?

- **Treatment Reasonableness and Cost Effectiveness:** Treatments for culvert cleaning are based on the number of rainfall threshold exceedances each year. Post-fire culvert cleaning of infrastructure prevents further degradation to downstream confluences as well as reducing the potential of failures to road systems.

Land Use Plan Conformance:

Treatment consistent with Agency Land Management Plan (identify which plan):

Shasta-Trinity National Forest Land and Resource Management Plan, 1995.

MONITORING PLAN

- **Treatment Objectives:** To keep culverts passing established flows through entire length of culvert pipe during storm events along the approximately 15 miles of road area on FS lands.

ESRS INDIVIDUAL TREATMENT SPECIFICATION

TREATMENT/ACTIVITY NAME	Hazard Warning Signs- FS	Spec-#	USFS-4-ES
NFPORS TREATMENT CATEGORY*	Protection & Warning	FISCAL YEAR(S) (list each year):	FY19
NFPORS TREATMENT TYPE *	Warning Signs	WUI? Y / N	No
IMPACTED COMMUNITIES AT RISK	Redding	IMPACTED T&E SPECIES	No

*See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

ES/BAR ISSUE STATEMENT

ES Issue 1: Human Life and Safety

The Carr fire burned road and trail signs on Forest Service (FS) lands. Trailhead signs need to be replaced and warning signs need to be installed to warn people that they are entering a burned area.

TREATMENT

S11-Facilities

Treatment/Activity Description:

General Description:
Purchase and install warning signs to inform visitors and employees about the risk from post-fire hazard trees, flash flood risk, blockage of trails by fallen trees, and washed out trails.

Location/(Suitable) Sites:
All trailheads that are within the Carr fire burn area and FS administered roads that are within the Carr fire burn area.
Signs will be placed at intersections from paved roads to FS maintained roads and trailheads to ensure public is informed of burned environment and associated hazards.

Design/Construction Specifications:
Trail Construction and Maintenance Handbook. Signs should be attached to existing posts when possible. Avoid mounting signs to historic or rustic trail signs. Avoid archaeological sites for sign placement. Consult with cultural resource staff prior to sign placement.

How does the treatment relate to damage or changes caused by the fire?

Purpose of Treatment Specifications (relate to damage/change caused by fire):
Warning danger to visitors and employees of burned bridges and hazard trees and the potential for flash floods. The signs will reach all users on the roads and trail.

Why is the treatment/activity reasonable, within policy, and cost effective?

Treatment Reasonableness and Cost Effectiveness:
This treatment is addressing public safety while the hazards are being mitigated.

Land Use Plan Conformance:

Treatment consistent with Agency Land Management Plan (identify which plan):
April, 1995 Shasta-Trinity National Forest Land and Resource Management Plan, specifically regarding public safety.

Appendix I – Delegation of Authority



United States Department of the Interior

NATIONAL PARK SERVICE
WHISKEYTOWN NATIONAL RECREATION AREA
WHISKEYTOWN-SHASTA-TRINITY NATIONAL RECREATION AREA
P.O. BOX 188
WHISKEYTOWN, CA 96095-0188



Effective August 14, 2015, Chris Holbeck will hereby be delegated authority and responsibility to administer a Burned Area Emergency Response Team in order to conduct a BAER assessment, and if needed develop a BAER Plan outlining emergency treatment measures and standards necessary to mitigate post-fire impacts resulting from the Carr Fire within Whiskeytown National Recreation Area (NRA)

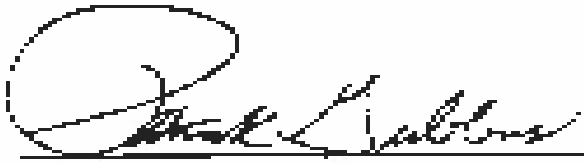
You are to work in cooperation with the Incident Management Team assigned to the Carr Fire and coordinate efforts with the BLM-NPS BAER effort. I expect open communication and cooperation with the CalFire WERT and local recovery efforts. You will coordinate your efforts with me as the Agency Administrator Representative, and with Park's Resource staff. You are accountable to the NPS Agency Representative assigned to the incident by Whiskeytown NRA.

At the end of this assignment you are expected to produce a BAER Plan that meets Service and Department standards. You will present this plan to me or my assigned agency representative upon completion of this assignment. You will maintain span of control over all assigned resources. Safety will be a priority for employees under your direction.

The primary objectives of the BAER program are to assess the need for and prescribe cost effective post-fire stabilization measures necessary to protect human life, property, and critical natural and cultural resources in accordance with approved land management plans and policies, and all other applicable federal, state and local laws and regulations.

- ① Your primary responsibility is to assess potential threats to life and property from post fire conditions
- ② Develop a Plan that identifies specific values at risk. These values at risk include but are not limited to watersheds. If warranted, you are to identify potential treatment recommendations and present those in a plan that presents an assessment of their effectiveness
- ③ Incorporate park Best Management Activities into the Plan.

- 4. Coordinate efforts with the Incident Management Team assigned to recovery efforts in planning for stabilization of critical park infrastructure
- 5. Develop recommendations for future recovery efforts through collaboration with Whiskeytown staff, the Incident Management Team assigned to recovery efforts, park partners, cooperating agencies, and Carr Fire incident management staff.
- 6. Provide accurate and timely incident information to both internal and external audiences.
- 7. Provide daily briefings to me or my designee from the date of signature through the duration of the incident.
- 8. Schedule a closeout meeting with me and conduct a transition to a subsequent incident management team as appropriate.



Patrick Grubbare
Acting Superintendent, Whiskeytown NRA

7/14/17

Date



Christopher Rolbeck
Team Leader, Burned Area Emergency Response Team

8/14/18

Date



United States Department of the Interior
BUREAU OF LAND MANAGEMENT

Redding Field Office
6640 Lockheed Drive
Redding, CA 96002
www.blm.gov/california



11 Reply (11/1/18)
(9710)1703(ELLCAN06000)

Memorandum

To: Chris Holbeck, Burned Area Emergency Response (BAER) Team
From: Jennifer Mace, Redding Field Manager
Subject: BAER Team Delegation of Authority

Effective August 14, 2018, Chris Holbeck will hereby be delegated authority and responsibility to administer a Burned Area Emergency Response Team in order to conduct a BAER assessment, and if needed, develop a BAER Plan outlining emergency treatment measures and standards necessary to mitigate post-fire impacts to BLM administered lands resulting from the Carr Fire, CA-SHU-007808.

Your primary responsibility is to assess potential threats to life and property from post-fire conditions. Your second responsibility is to develop a report that identifies specific values at risk. These values at risk include but are not limited to watersheds, recreational trails, associated infrastructure, and cultural resources. If warranted, you are to identify potential treatment recommendations and present these in a plan that presents an assessment of their effectiveness. Lastly, you are to identify impacts on and necessary compliance or protective measures. BLM leadership is particularly concerned with hazard tree mitigation in areas of high recreation use, and I ask that any BAER report developed provide recommendations on this issue.

You are to work in cooperation with the Incident Management Team assigned to the Carr Fire and coordinate efforts with the USFS BAER effort. You will coordinate your efforts with the Agency Administrator Representative. You are accountable to the Agency Representative I have assigned to the incident, which at this time is Lauren Bradshaw.

My expectation is that you do a complete and efficient job, while providing for safety first. At all times, safety will be a priority for employees under your direction. You will maintain open lines of control over all assigned resources.

I expect open communication during all phases of management under this delegation. Please ensure the immediate notification of any significant concerns, issues or events as they arise.

If your team receives any media inquiries, your staff should forward those inquiries to National Public Affairs Officer Jeff Fontana, 530-200-0187. All press releases will be coordinated.

through BLM Portal and the California State Ethics. It is my expectation that all work will be conducted in an open and transparent manner including communication with the public and partner agencies throughout the assessment process including Findings and recommendations from the report. BLM will work with the team and partner agencies to assign a public affairs officer to the team for the duration of your assignment.



At the end of this assignment, you are expected to produce a BAER report and if warranted a BAER plan that meets Agency and Department standards, and meets the objectives outlined above. You will go over this plan with me and/or my assigned agency representative upon completion of this assignment.

Accept as many trainers as your team can provide quality assignments.

I will meet with you at the end of the incident for a closeout briefing. You will receive a formal evaluation of your performance prior to your departure from the incident. A follow up to this formal evaluation may occur within sixty days after your departure once the Redding Field Office and Northern California District has had the opportunity to review accountability, claims, financial matters, and other items that require time to evaluate.

I have complete confidence in the abilities you and your team bring to this incident, and appreciate the technical expertise that you offer us. Please do not hesitate to contact me at any time should questions or coordination needs arise. Thank you for your assistance.

I may be contacted in the office at (530) 224-2100 or cell (530) 941-1741.

Field Manager		Date	<u>8/14/18</u>
Delegation Accepted:	 BAER Team Lead	Date	<u>8/14/18</u>



United States
Department of Agriculture

Shasta-Trinity National Forest
Headquarters

1444 Asterik Parkway
Redding, CA 96001
(530) 236-1400
(530) 236-2490 TDD
<http://www.fs.usda.gov/nmf>

Forest Service

File Code: 0300

Date: August 14, 2018

Subject: Delegation of Authority, Burned Area Emergency Response (BAER) Team

To: Chris Holtzclaw - BAER Team Lead

This letter establishes the Burned Area Emergency Response Assessment (BAER) Team for the Fair Fire, and designates you as BAER Team Leader. You are hereby assigned responsibility to establish an Emergency Stabilization Plan (Form 2500-3 and associated documents) outlining emergency treatment measures and standards necessary to mitigate fire damage resulting from the Fair Fire on the Shasta-Trinity National Forest. All rehabilitation activities will be conducted within the framework of prescriptions contained within Form 2500-303, 3. US Forest Service BAER Manual, and FSH 2500-33 US Forest Service BAER Handbook. I expect open communication and cooperation between the BAER Team and me as the Agency Administrator or my representative on the Fair Fire. Please ensure notification of any significant concerns, issues or events as they arise.

Your primary responsibility is to organize and direct your assigned resources, to determine values at risk, determine threats to those values and, as needed, determine mitigation measures to minimize threats to those values at risk. Damage was sustained to forest resources as well as forest infrastructure. This will facilitate the recovery process in those affected areas adjacent to the Shasta-Trinity National Forest. I expect the team to fully engage and coordinate with affected stakeholders and cooperating agencies, in addition to completing the assessment. Including water providers, Caltrans, FEMA, California DGS, Shasta County, Trinity County, City of Redding, and the Natural Resource Conservation Service. A coordination meeting is tentatively scheduled to be held at Redding City Hall on August 14, 2018 at 10:00. Please plan to attend this meeting to support cooperation's recovery efforts as possible.

Please ensure the BAER Team completes a Job Hazard Analysis and follows fire suppression safety-related procedures. Field reviews should be conducted efficiently to make productive use of everyone's time as well as reduce employee exposure to hazards. Plan any aerial reconnaissance to be done promptly, only when necessary and follow all aviation safety requirements.

The BAER Team should coordinate with Kenneth Arduini, Jim Stoberich (530-227-9601) to ensure that the suppression related rehabilitation work is being addressed by the fire incident Management Team. I expect the fire incident Management Team will continue to be aggressive in addressing suppression-related repair work while fire suppression resources are available. However, maintain a clear distinction between suppression repair items (charged directly to the fire) and those rehabilitation (requirements associated with the fire itself) (charged to BAER).


There will be interest from the media, our partners and stakeholders in the recovery work. Therefore, it will be important to have a professional and coordinated media effort.

[Redacted text]

[Redacted text] thall@fs.fed.us



[Redacted text]



[Redacted text]

Appendix II – Environmental Compliance

CARR POST-FIRE RESPONSE PLAN
Redding Field Office, Bureau of Land Management
Environmental Compliance Considerations and Documentation

A. Federal Environmental Compliance Responsibilities

All projects proposed in the Carr Post-Fire Response Plan, which includes recommendations for Burned Area Emergency Response (BAER) and Burned Area Rehabilitation (BAR) mitigation actions, that are prescribed, funded, or implemented on BLM lands are subject to compliance with the *National Environmental Policy Act* (NEPA) in accordance with the guidelines provided by the *Council on Environmental Quality (CEQ) Regulations (40 CFR 1500-1508)*. This Appendix documents the BAER Team considerations of NEPA compliance requirements for prescribed emergency stabilization, rehabilitation and monitoring actions described in this plan for BLM lands affected by the Carr Fire, BLM Redding Field Office, Redding, CA.

This plan identifies specific emergency stabilization, rehabilitation, and monitoring actions and recommendations designed to mitigate damages to resources as a result of the Carr Fire and associated fire suppression activities. BLM must complete separate NEPA analyses and compliance for fire response activities not addressed in this plan.

Agency Specific Guidance: This NEPA documentation has been developed in accordance with Bureau of Land Management specific guidelines. Emergency stabilization and rehabilitation actions proposed on Bureau of Land Management lands, involving the agencies permitting, funding, or implementation, must comply with regulations set forth in the *Department of the Interior Manual Part 516 (DM 12)*.

B. Related Plans and Cumulative Impacts Analysis

Redding Resource Management Plan/Record of Decision. 1993. This RMP provides the overall direction for managing and allocating public land resources and uses in the Redding Resource Area. Direction for fire management included modified suppression techniques to address specific resource concerns, and recognized the need for prescribed fire and hazard fuel reduction. An addendum to this plan, the **Standards and Guidelines for Management of Habitat for Late-Successional and Old-Growth Forest Related Species within the Range of the Northern Spotted Owl (1994)**, provides direction for management of these BLM lands for protection of that species, including limited use of prescribed fire and fuels management compatible with habitat protection for the spotted owl.

Integrated Vegetation Management, Redding Field Office. 2016. This Environmental Assessment was prepared to address vegetation management over the approximately 250,000 acres of public lands. The plan was written to address the need to control federally and state listed invasive species populations and take steps to reduce the effects of invasive species and prevent further invasions. Accepted treatment methods include manual, mechanical, and chemical. Herbicide use is limited to a maximum of 600 acres per year, and cannot be used in Trinity County.

Road, Trail, and Facilities Maintenance Categorical Exclusion Documentation, NEPA DOC#: DOI-BLM-CA-N060-2018-0010-CX, Redding Field Office. 2018. This document provides necessary compliance to conduct routine road, trails, and facilities maintenance at developed recreation sites on BLM administered lands within the Redding Field Office management area. A variety of routine infrastructure and minor facility maintenance activities are covered through this Categorical Exclusion.

Interlakes Special Recreation Management Area Record of Decision, Redding Resource Area. 1998. This plan provides multi-agency coordinated management direction for roughly 75,000 acres of public lands in the upper Clear Creek/Shasta Lake area, with a primary focus on improving trail and OHV recreation opportunities and reducing fire hazards.

Swasey Drive Area Implementation Plan, Shasta County California, Redding Field Office. 2004. This plan was developed primarily for the long-term protection of the Swasey Drive cultural resources, and includes direction for other resources of concern including noxious weeds, hazardous fuel loads, and wildlife and fisheries.

Cumulative Impact Analysis: The emergency stabilization and rehabilitation treatments for the Carr Fire, as proposed in this plan, do not result in an intensity of impact (i.e., major ground disturbance, etc) that would cumulatively constitute a significant impact on the quality of the environment. The treatments are consistent with the above BLM management plans and associated environmental compliance documents of the BLM, and categorical exclusions presented below. No direct or indirect unavoidable adverse impacts to the biological or physical environment would result from the implementation of the Carr Fire Post-Fire Response Plan.

Summary of Compliance Documentation Relevant to the Carr Fire Post-Fire Response Plan

The following table summarizes the existing NEPA or NHPA compliance in place for the BAER/BAR treatments proposed for the Carr Fire. Several treatments may involve ground disturbance and directly alter or be in close proximity to known cultural sites and thus would require archeological/NHPA consultation.

Spec #	Treatment or Action*	NEPA Documentation	Assessment	Findings of Significance (NEPA;NHPA)
BLM-1	Archeological Site Protection Patrols - ES	Cat. Ex: DOI Part 46, 46.210 (1)	Cultural	No Significant Impact; NHPA no effect
BLM-2	Archeological Site Condition Assessments - ES	Cat. Ex: DOI Part 46, 46.210 (1)	Cultural	No Significant Impact; May require NHPA consultation
BLM-3	Assessed Historic Property Stabilization - ES	Cat. Ex: DOI Part 46, 46.210 (1)	Cultural	No Significant Impact; May require NHPA consultation

BLM-4	Kett Ethnographic Site Stabilization - ES	Cat. Ex: DOI Part 46, 46.210 (l)	Cultural	No Significant Impact; May require NHPA consultation
BLM-5	Charley Brownstein Grave Stabilization - ES	Cat. Ex: DOI Part 46, 46.210 (l)	Cultural	No Significant Impact; May require NHPA consultation
BLM-6	Cultural Resource Compliance - ES	Cat. Ex: DOI Part 46, 46.210 (l)	Cultural	No Significant Impact; May require NHPA consultation
BLM-7	AML Mine Site Mitigation - ES	Cat. Ex: DOI Part 516 Chp 11: 11.9 J (8)	Abandoned Mine Lands	No Significant Impact; May require NHPA consultation
BLM-8	Tree Hazard Mitigation - Roads - ES	Cat. Ex: DOI Part 46, 46.210 (l)	Tree Hazard	No Significant Impact – limited to 4200 acres – roads and trails; NHPA no effect
BLM-9	Trail Infrastructure Repair- ES	Redding BLM Cat Ex: DOI-BLM-CA-N060-2018-0010-CX	Recreational Trails	No Significant Impact; NHPA no effect
BLM-10	Tree Hazard Mitigation - Trails - ES	Cat. Ex: DOI Part 46, 46.210 (l)	Tree Hazard	No Significant Impact – limited to 4,200 acres – roads and trails; NHPA no effect
BLM-11	Out year trail increased trail maintenance - BAR	Redding BLM Cat Ex: DOI-BLM-CA-N060-2018-0010-CX	Recreational Trails	No Significant Impact; NHPA no effect
BLM-12	Minor facilities repair - shooting range - ES	Cat Ex: Part 516 Chp. 11; 11.9 (I)	Minor Facilities	No Significant Impact; NHPA no effect
BLM-13	Minor facilities repair - amphitheatre - BAR	Cat Ex: Part 516 Chp. 11; 11.9 (I)	Minor Facilities	No Significant Impact; NHPA no effect
BLM-14	Invasive species - EDRR - ES	Redding BLM Integrated Veg Mgmt, DOI-BLM-CA-N060-2016-0021-EA	Vegetation	No Significant Impact – limited to 600 acres/yr of herbicide; NHPA no effect
BLM-15	Invasive species - EDRR - BAR	Redding BLM Integrated Veg Mgmt, DOI-BLM-CA-N060-2016-0021-EA	Vegetation	No Significant Impact – limited to 600 acres/yr of herbicide; NHPA no effect
BLM-16	Storm patrol - ES	Cat. Ex: DOI Part 46, 46.210 (e); Redding BLM Cat Ex: DOI-	Watershed	No Significant Impact; NHPA no effect

		BLM-CA-N060-2018-0010-CX		
BLM-17	Culvert Cleanout/Pre-storm - ES	Redding BLM Cat Ex: DOI-BLM-CA-N060-2018-0010-CX	Watershed	No Significant Impact; NHPA no effect
BLM-18	Hazard Warning signs – Trails/Roads -ES	Cat. Ex: DOI Part 516 Chp 11: 11.9 G (4)	Recreational Trails	No Significant Impact; NHPA no effect
BLM-19	Swasey Basin Cleanout - ES	Cat. Ex: DOI Part 46, 46.210 (l)	Watershed	No Significant Impact; NHPA no effect
BLM-20	Post-Condition Assessment Stabilization - ES	Cat. Ex: DOI Part 46, 46.210 (l)	Cultural	No Significant Impact; May require NHPA consultation
BLM-21	Monitoring Invasive Species - BAR	Redding BLM Integrated Veg Mgmt, DOI-BLM-CA-N060-2016-0021-EA	Vegetation	No Significant Impact – limited to 600 acres/yr of herbicide; NHPA no effect
BLM-22	AML T-post fences - ES	Cat. Ex: DOI Part 516 Chp 11: 11.9 J (8)	Cultural	No Significant Impact; May require NHPA consultation
BLM-23	Implementation Leader - ES	Cat. Ex: DOI Part 516 46.210 (f)		No Significant Impact; NHPA no effect
BLM-24	Implementation Leader - BAR	Cat. Ex: DOI Part 516 46.210 (f)		No Significant Impact; NHPA no effect

*ES = Emergency Stabilization BAR = Burned Area Rehabilitation

C. DOI EXCEPTIONS TO CATEGORICAL EXCLUSIONS

Council on Environmental Quality Regulations at 40 CFR 1508.4 require agencies to consider whether fairly routine actions involve extraordinary circumstances that, per NEPA, trigger an agency to prepare additional assessment and consideration. If it is determined that any of the exceptions listed in the table below apply to a proposed action, that action may not be categorically excluded, and an EA or an EIS must be prepared. The list below is a Department of the Interior list that applies to all DOI agencies (516 DM 2, Appendix 2); agencies often have additional items on their own list of Departmental exceptions, appendix 2). All treatments that are proposed as a Categorical Exclusion for BLM Redding Field Office have been compared against the list of Extraordinary Circumstances listed below and were found not to trigger any exceptions.

Yes	No	Extraordinary Circumstance. Would this action...
	X	2.1 Have significant impacts on public health or safety?
	X	2.2 Have significant impacts on such natural resources and unique geographic characteristics as historic or cultural resources; park, recreation or refuge lands; wilderness areas; wild or scenic rivers; national natural landmarks; sole or principal drinking water aquifers; prime farmlands; wetlands (Executive Order 11990); floodplains (Executive Order 11988); national monuments; migratory birds; and other ecologically significant or critical areas?
	X	2.3 Have highly controversial environmental effects or involve unresolved conflicts concerning alternative uses of available resources [NEPA Section 102(2)(E)]?
	X	2.4 Have highly uncertain and potentially significant environmental effects or involve unique or unknown environmental risks?
	X	2.5 Establish a precedent for future action or represent a decision in principle about future actions with potentially significant environmental effects?
	X	2.6 Have a direct relationship to other actions with individually insignificant but cumulatively significant environmental effects?
	X	2.7 Have significant impacts on properties listed, or eligible for listing, on the National Register of Historic Places as determined by either the bureau or office?
	X	2.8 Have significant impacts on species listed, or proposed to be listed, on the List of Endangered or Threatened Species, or have significant impacts on designated Critical Habitat for these species?
	X	2.9 Violate a Federal law, or a State, local, or tribal law or requirement imposed for the protection of the environment?
	X	2.10 Have a disproportionately high and adverse effect on low income or minority populations (Executive Order 12898)?
	X	2.11 Limit access to and ceremonial use of Indian sacred sites on Federal lands by Indian religious practitioners or significantly adversely affect the physical integrity of such sacred sites (Executive Order 13007)?
	X	2.12 Contribute to the introduction, continued existence, or spread of noxious weeds or non-native invasive species known to occur in the area or actions that may promote the introduction, growth, or expansion of the range of such species (Federal Noxious Weed Control Act and Executive Order 13112)?

D. Consultations

Redding Field Office

- Patricia Moran, Planning and Environmental Specialist, Redding Field Office
- Laura Brodhead, Ecologist, Redding Field Office

All BAER and BAR treatments will be presented to the Redding Field Office Interdisciplinary Team for discussion of the recommended compliance requirements described above prior to initiation of any of the actions.

US Fish and Wildlife Service, National Historic Preservation Act, and tribal consultations:

BLM staff will consult with the US Fish and Wildlife Service regarding listed species present within the Carr Fire perimeter and proposed BAER/BAR mitigation projects.

The California State Historic Preservation Officer has been contacted regarding the several treatments that may directly or indirectly affect cultural resources, as noted in the summary table above. BLM staff will meet with the Rancheria Tribe and have contacted other local tribes offering to meet with them.

CONCLUSION

I have reviewed the treatments in the Carr Fire Post-Fire Response Plan in accordance with the criteria above. Those actions which require additional environmental review will be analyzed and appropriate NEPA and/or NHPA compliance completed before they can be implemented; those actions with approved existing compliance would not involve any significant environmental effect and are approved for initiation. Redding Field Office staff will complete necessary coordination and consultation to insure compliance with the National Historic Preservation Act, Endangered Species Act, Clean Water Act and other Federal, State and local environment review requirements.

Prepared by: Jack Oelfke, Carr Fire BAER Team, August 28, 2018

Approved: _____
Field Manager, Redding Field Office Date

CARR POST-FIRE RESPONSE PLAN
Whiskeytown National Recreation Area
Environmental Compliance Considerations and Documentation

A. Federal Environmental Compliance Responsibilities

All projects proposed in the Carr Post-Fire Response Plan, which includes recommendations for Burned Area Emergency Response (BAER) and Burned Area Rehabilitation (BAR) mitigation actions, that are prescribed, funded, or implemented on park lands are subject to compliance with the *National Environmental Policy Act* (NEPA) in accordance with the guidelines provided by the *Council on Environmental Quality (CEQ) Regulations (40 CFR 1500-1508)*. This Appendix documents the BAER Team considerations of NEPA compliance requirements for prescribed emergency stabilization, rehabilitation and monitoring actions described in this plan for NPS lands affected by the Carr Fire, Whiskeytown National Recreation Area, Redding, CA.

This plan identifies specific emergency stabilization, rehabilitation, and monitoring actions and recommendations designed to mitigate damages to resources as a result of the Carr Fire and associated fire suppression activities. The park must complete separate NEPA analyses and compliance for fire response activities not addressed in this plan.

Agency Specific Guidance: This NEPA documentation has been developed in accordance with National Park Service specific guidelines. Emergency stabilization and rehabilitation actions proposed on National Park Service lands, involving the agencies permitting, funding, or implementation, must comply with regulations set forth in the *Department of the Interior Manual Part 516 (DM 12)*.

B. Related Plans and Cumulative Impacts Analysis

Whiskeytown National Recreation Area General Management Plan (GMP), 1999 and Foundation Document, 2014. The GMP recognized the need for an expanded fire management program that included fuels management and the use of fire to restore a pre-European settlement landscape, while also continuing a wildfire pre-suppression and suppression program that included hazard fuel reduction. The Foundation Document recognized the challenges that decreased funding posed for a proactive fuels reduction program and called for an update to the existing Fire Management Plan and the need for a fuels inventory with existing and proposed fuel treatment areas.

Whiskeytown National Recreation Area Fire Management Plan, 2004. This plan provides parkwide guidance for overall management of the fire program, and included the ability of the park to complete the mechanical treatment of fuels up to 1075 acres/year. The Plan also has a significant appendix that discusses Minimal Impact Suppression Techniques and the requirement for a development of a Burned Area Emergency Rehabilitation plan for fires larger than 100 acres. Special post-fire resource concerns are noted. **Subsequent NEPA analysis (2013) to the 2004 Fire Management Plan** enabled larger diameter trees to be removed and the use of metal-tracked equipment.

Cumulative Impact Analysis: The emergency stabilization and rehabilitation treatments for the Carr Fire, as proposed in this plan, do not result in an intensity of impact (i.e., major ground disturbance, etc) that would cumulatively constitute a significant impact on the quality of the environment. The treatments are consistent with the above park management plans and associated environmental compliance documents of the NPS, and categorical exclusions presented below. No direct or indirect unavoidable adverse impacts to the biological or physical environment would result from the implementation of the Carr Fire Post-Fire Response Plan.

Summary of Compliance Documentation Relevant to the Carr Fire Post-Fire Response Plan

The following table summarizes the existing NEPA or NHPA compliance in place for the BAER/BAR treatments proposed for the Carr Fire. Several treatments may involve ground disturbance and directly alter or be in close proximity to known cultural sites and thus would require archeological/NHPA consultation.

Spec #	Treatment or Action	NEPA Documentation	Assessment	Findings of Significance (NEPA; NHPA)
NPS-1	Tree Hazard surveillance -ES	2013 Compliance Addendum, Fire Mgmt Plan/EIS	Tree Hazards	No Significant Impact; NHPA No Effect
NPS-2	Tree Hazard Mitigation - Roads - ES	2013 Compliance Addendum, Fire Mgmt Plan/EIS	Tree Hazards	No Significant Impact; NHPA No Effect
NPS-3	Tree Hazard Surveillance - BAR	2013 Compliance Addendum, Fire Mgmt Plan/EIS	Tree Hazards	No Significant Impact; NHPA No Effect
NPS-4	Invasive Species - EDRR - ES	Cat. Ex: DO 12: 3.3, E.2	Vegetation	No Significant Impact; NHPA No Effect
NPS-5	Invasive Species - EDRR - BAR	Cat. Ex: DO 12: 3.3, E.2	Vegetation	No Significant Impact; NHPA No Effect
NPS-6	Historic Blacksmith Shop Stabilization - ES	Cat. Ex: DO 12: 3.3, C.4	Cultural	No Significant Impact: Will require NHPA consultation
NPS-7	Historic El Dorado Mine Stabilization - ES	Cat. Ex: DO 12: 3.3, C.4	Cultural	No Significant Impact: Will require NHPA consultation
NPS-8	Historic Redwood Tank Dismantle and Storage - ES	Cat. Ex: DO 12: 3.3, G.1	Cultural	No Significant Impact: Will require NHPA consultation
NPS-9	Historic Stone House Stabilization - ES	Cat. Ex: DO 12: 3.3, C.4	Cultural	No Significant Impact: Will require NHPA consultation
NPS-10	Archeological Site Protection Patrols - ES	Cat. Ex: DO 12: 3.3, G.1	Cultural	No Significant Impact: NHPA no effect

NPS-11	Archeological Site Condition Assessments - ES	Cat. Ex: DO 12: 3.3, G.1	Cultural	No Significant Impact; Will require NHPA consultation
NPS-12	Historic Crystal Creek Ditch Stabilization - ES	Cat. Ex: DO 12: 3.3, C.4	Cultural	No Significant Impact; Will require NHPA consultation
NPS-13	Previously Assessed Historic Property Stabilization - ES	Cat. Ex: DO 12: 3.3, C.4	Cultural	No Significant Impact; Will require NHPA consultation
NPS-14	Cultural Resource Compliance - ES	Cat. Ex: DOI Part 46, 46.210 (f)	Cultural	No Significant Impact; Will Require NHPA consultation
NPS-15	AML Mine Safety Mitigation - ES	Cat. Ex: DO 12: 3.3, C.19	Abandoned Mine Lands	No Significant Impact; Will Require NHPA consultation
NPS-16	Trail Infrastructure Repair - ES	Cat. Ex: DO 12: 3.3, G.1	Trails	No Significant Impact; NHPA No Effect
NPS-17	Tree Hazard Mitigation - Trails - ES	2013 Compliance Addendum, Fire Mgmt Plan/EIS	Trails	No Significant Impact; NHPA No Effect
NPS-18	Out-year increased trail maintenance - BAR	Cat. Ex: DO 12: 3.3, G.1	Trails	No Significant Impact; NHPA No Effect
NPS-19	Minor Facilities repair - BAR	Cat. Ex: DO 12: 3.3, G.1	Minor Facilities	No Significant Impact; NHPA No Effect
NPS-20	Culvert cleanout/pre-storm - ES	Cat. Ex: DO 12: 3.3, C.9	Watershed	No Significant Impact; NHPA No Effect
NPS-21	Storm Patrol - ES	Cat. Ex: DO 12: 3.3, C.9	Watershed	No Significant Impact; NHPA No Effect
NPS-22	Hazard warning signs - Roads-trails - ES	Cat. Ex: DO 12: 3.3, C.5	Watershed	No Significant Impact; NHPA No Effect
NPS-23	Structure Protection - ES	Cat. Ex: DO 12: 3.3, C.19	Watershed	No Significant Impact; May Require NHPA consultation
NPS-24	Potable Water Source Protection - ES	Cat. Ex: DO 12: 3.3, C.19	Watershed	No Significant Impact; May Require NHPA consultation
NPS-25	Engineering Evaluation - Boulder Crk - ES	Cat. Ex: DO 12: 3.2, V	Watershed	No Significant Impact; NHPA No Effect
NPS-26	Post-condition Site Assessment Stabilization - ES	Cat. Ex: DO 12: 3.3, C.4	Cultural	No Significant Impact; Will Require NHPA consultation
NPS-27	Monitoring Invasive Species - BAR	Cat. Ex: DO 12: 3.3, E.5	Vegetation	No Significant Impact; NHPA No Effect
NPS-28	AML T-post fences - ES	Cat. Ex: DO 12: 3.3, C.19	Abandoned Mine Lands	No Significant Impact; Will Require NHPA consultation

NPS-29	Implementation Leader - ES	Cat. Ex: DO 12 3.2 E.		No Significant Impact; NHPA No Effect
NPS-30	Implementation Leader - BAR	Cat. Ex: DO 12 3.2 E		No Significant Impact; NHPA No Effect
NPS-31	Remove debris and hazardous materials from burned structures	Cat. Ex: DO 12 3.3 C.19	Minor Facilities	No Significant Impact; NHPA No Effect

ES = Emergency Stabilization
 BAR = Burned Area Rehabilitation

C. DOI EXCEPTIONS TO CATEGORICAL EXCLUSIONS

Council on Environmental Quality Regulations at 40 CFR 1508.4 require agencies to consider whether fairly routine actions involve extraordinary circumstances that, per NEPA, trigger an agency to prepare additional assessment and consideration. If it is determined that any of the exceptions listed in the table below apply to a proposed action, that action may not be categorically excluded, and an EA or an EIS must be prepared. The list below is a Department of the Interior list that applies to all DOI agencies (516 DM 2, Appendix 2); agencies often have additional items on their own list of Departmental exceptions, appendix 2). All treatments that are proposed as a Categorical Exclusion for Crater Lake National Park have been compared against the list of Extraordinary Circumstances listed below and were found not to trigger any exceptions.

Yes	No	Extraordinary Circumstance. Would this action...
	X	2.1 Have significant impacts on public health or safety?
	X	2.2 Have significant impacts on such natural resources and unique geographic characteristics as historic or cultural resources; park, recreation or refuge lands; wilderness areas; wild or scenic rivers; national natural landmarks; sole or principal drinking water aquifers; prime farmlands; wetlands (Executive Order 11990); floodplains (Executive Order 11988); national monuments; migratory birds; and other ecologically significant or critical areas?
	X	2.3 Have highly controversial environmental effects or involve unresolved conflicts concerning alternative uses of available resources [NEPA Section 102(2)(E)]?
	X	2.4 Have highly uncertain and potentially significant environmental effects or involve unique or unknown environmental risks?
	X	2.5 Establish a precedent for future action or represent a decision in principle about future actions with potentially significant environmental effects?
	X	2.6 Have a direct relationship to other actions with individually insignificant but cumulatively significant environmental effects?
	X	2.7 Have significant impacts on properties listed, or eligible for listing, on the National Register of Historic Places as determined by either the bureau or office?

	X	2.8 Have significant impacts on species listed, or proposed to be listed, on the List of Endangered or Threatened Species, or have significant impacts on designated Critical Habitat for these species?
	X	2.9 Violate a Federal law, or a State, local, or tribal law or requirement imposed for the protection of the environment?
	X	2.10 Have a disproportionately high and adverse effect on low income or minority populations (Executive Order 12898)?
	X	2.11 Limit access to and ceremonial use of Indian sacred sites on Federal lands by Indian religious practitioners or significantly adversely affect the physical integrity of such sacred sites (Executive Order 13007)?
	X	2.12 Contribute to the introduction, continued existence, or spread of noxious weeds or non-native invasive species known to occur in the area or actions that may promote the introduction, growth, or expansion of the range of such species (Federal Noxious Weed Control Act and Executive Order 13112)?

D. Consultations

National Park Service

- Jennifer Gibson, Chief of Resource Management and Interpretation, Whiskeytown NRA
- Glendee Ane Osborne, Cultural Resource Program Manager, Whiskeytown NRA

All BAER and BAR treatments will be presented to the Whiskeytown NRA Interdisciplinary Team for discussion of the recommended compliance requirements described above prior to initiation of any of the actions.

US Fish and Wildlife Service, National Historic Preservation Act, and tribal consultations:

Park staff will consult with the US Fish and Wildlife Service regarding listed species within the fire perimeter of the Carr Fire incident and proposed BAER/BAR mitigation projects.

The California State Historic Preservation Officer will be contacted regarding the several treatments that may directly or indirectly affect cultural resources, as noted in the summary table above. Contacts with local tribes regarding potential treatments will be made prior to implementation.

CONCLUSION

I have reviewed the treatments in the Carr Fire Post-Fire Response Plan in accordance with the criteria above. Those actions which require additional environmental review will be analyzed and appropriate NEPA and/or NHPA compliance completed before they can be implemented; those actions with approved existing compliance would not involve any significant environmental effect and are approved for initiation. Whiskeytown NRA staff will complete necessary coordination and consultation to insure compliance with the National Historic Preservation Act, Endangered Species Act, Clean Water Act and other Federal, State and local environment review requirements.

Appendix III - Photos

Watershed Photos



Fire-related debris clogging culvert inlet and need of cleaning prior to storm events.



Erosion under concrete footer at Boulder Creek road crossing.



Shasta Bally in the background.



Multiple debris flow deposits in Boulder Creek (figure in right center of photo for scale)



View of site with downed tree on historic [REDACTED]



Cultural resources located on or below steep slopes [REDACTED].



Blacksmith Shop, looking east, 8/14/2018.



Blacksmith Shop, looking south, 8/14/2018.



Blacksmith Shop back wall, looking north, 8/14/2018.



Blacksmith Shop back (north) wall. Image shows burned cribbing and fallen sandbags, 8/14/18.



El Dorado, primary mine opening, looking north, 8/14/18.



El Dorado mine entrance and building remnants, looking northwest, 8/14/18.



El Dorado Stamp Mill remnants and equipment. Looking south, 8/14/18.



El Dorado Chilean Mill, looking northeast, 8/14/18.



El Dorado Mine Equipment Shed remnants, looking west, 8/14/18.



El Dorado retaining walls, looking north, 8/14/18.



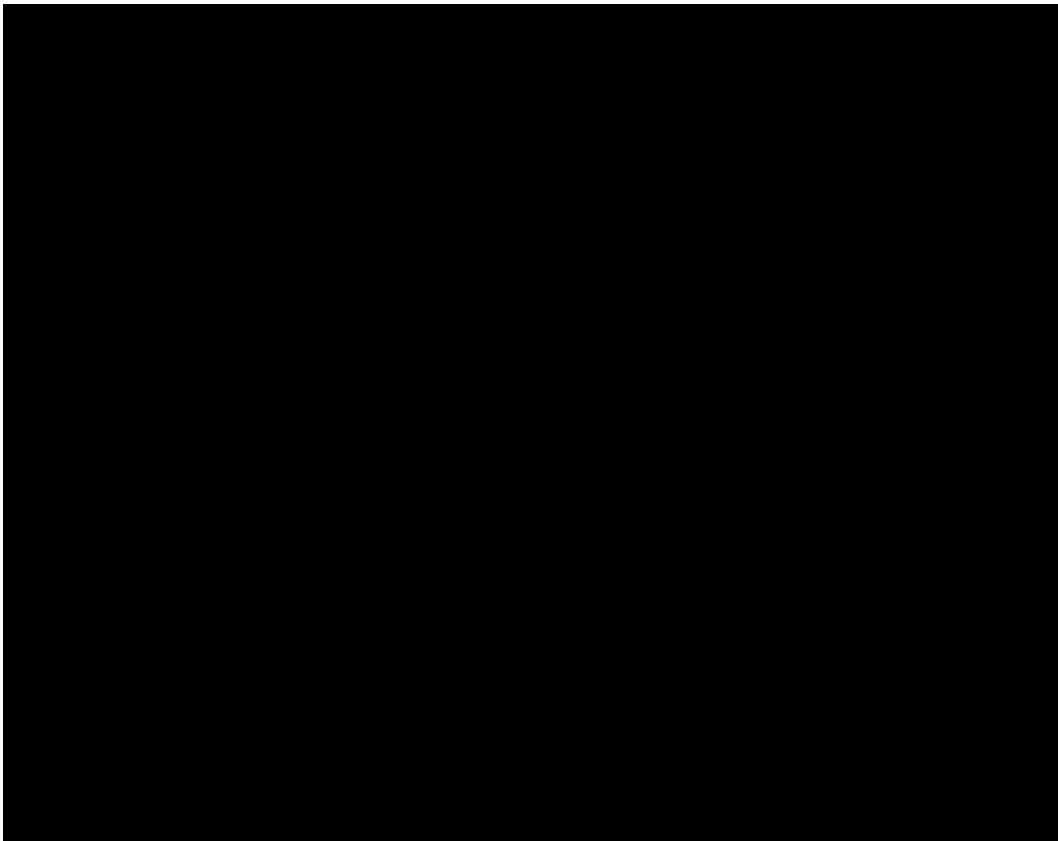
Crystal Creek Water Storage Tank, looking north, 8/15/18.



Crystal Creek Storage Tank, looking south, 8/15/18.



Crystal Creek Storage Tank, burned floorboards, joists, and concrete pad, 8/15/18.





Stone House, Retaining wall, 8/16/18.



Stone House, dislodged stones, 8/16/18.



Crystal Creek Clean-out Shed remnants and mechanical system, looking east, 8/15/18.



Crystal Creek Ditch intake and flume, looking west, 8/21/18



Crystal Creek metal flume and boardwalk, looking west, 8/21/18.



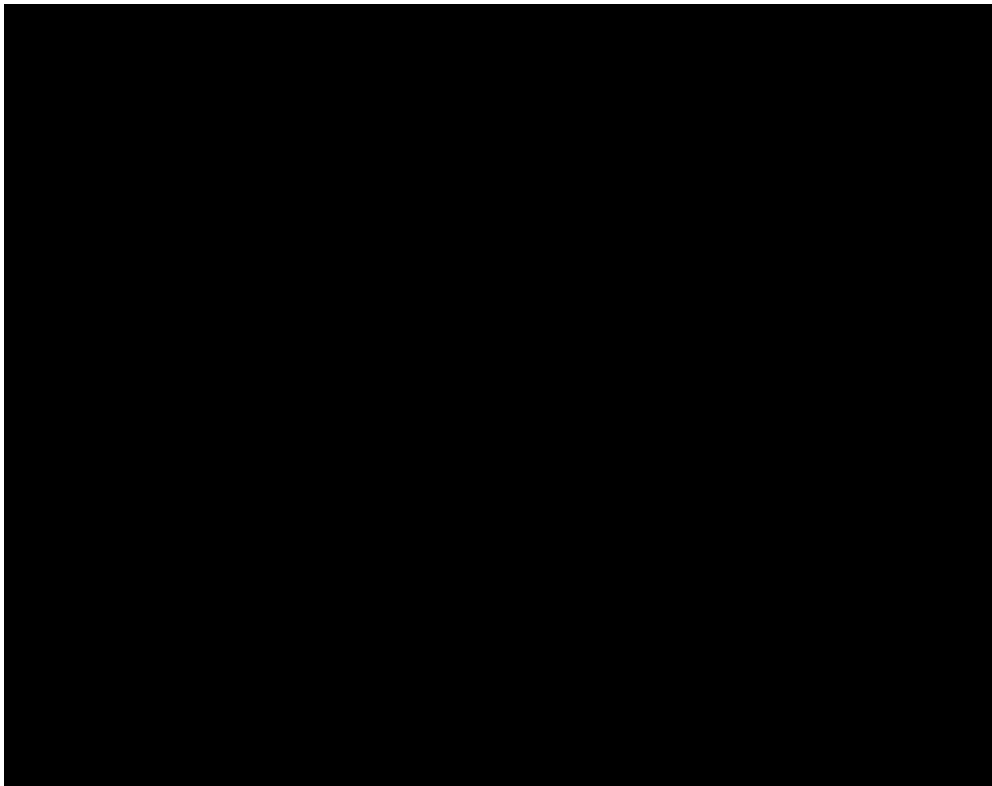
Crystal Creek overflow and sluice, looking west, 8/21/18.

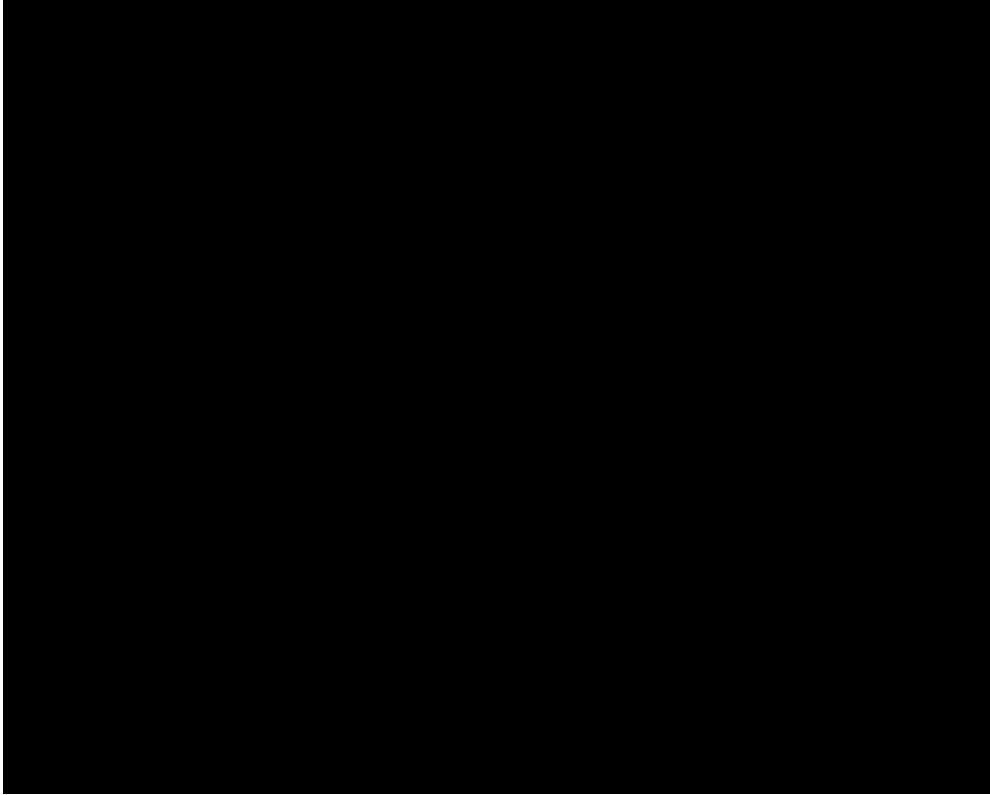


Crystal Creek Ditch culvert, looking northwest, 8/21/18.



Crystal Creek aerial crossing and inverted siphon, 8/15/18





Pioneer Baby Grave, looking west, 8/18/18.



Pioneer Baby Grave Burned Stairs, looking west, 8/18/18.



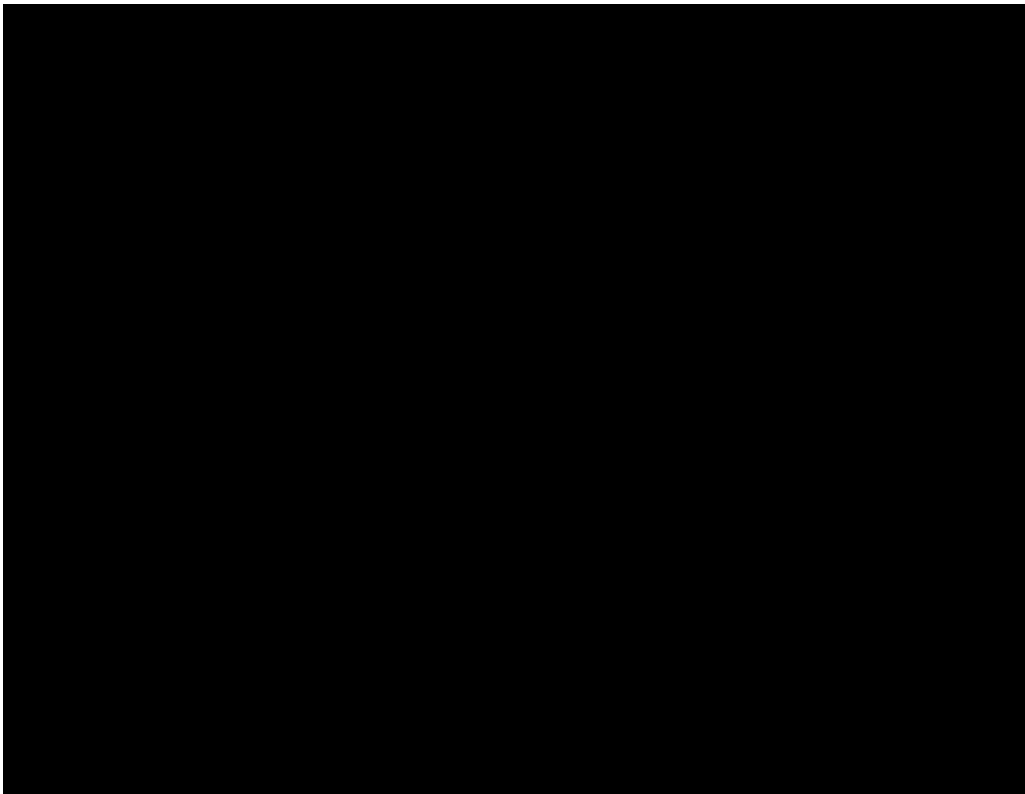
Remains of arrastra at an old mine site.



Artifacts exposed by fire at the Mad Ox Mine.



Open vertical shaft along West Side Trails





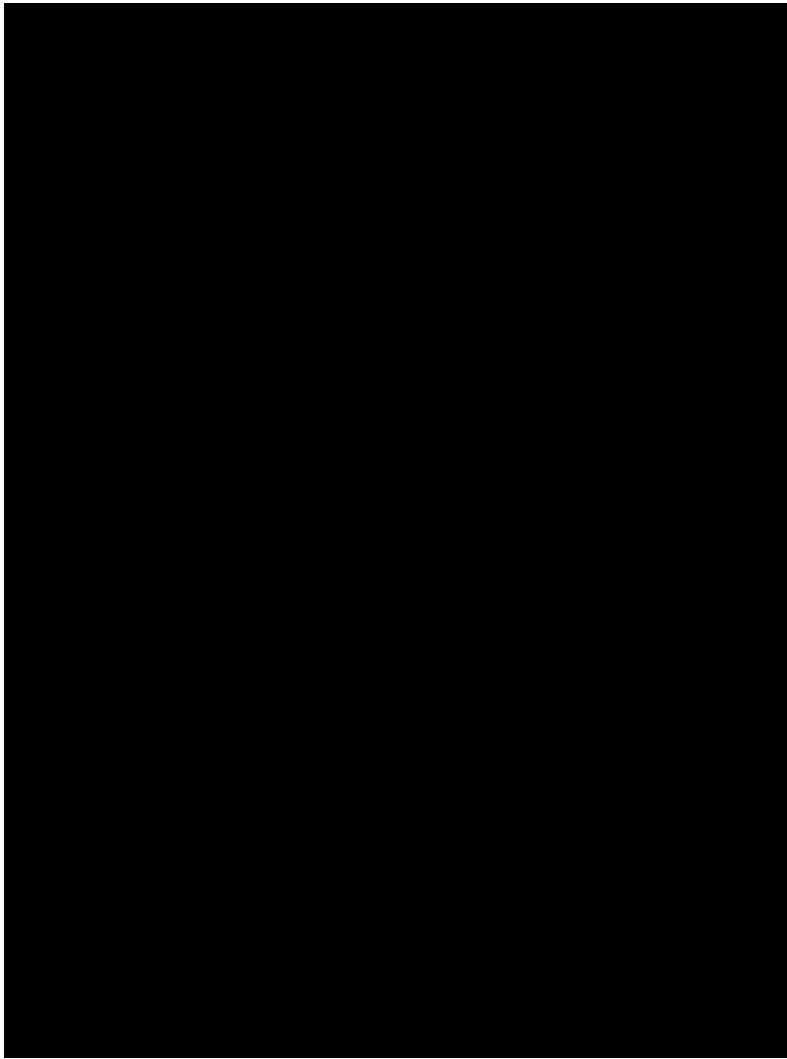
Bat gate at [REDACTED]



Burned structure at Brown Bear Mine



Hazard Tree at Water Treatment Site





Burned Bridge between Mill Creek Trail and Tower House parking



Burned Culvert on Mule Ridge Trail



Collapsed Trail Tread – Whiskeytown Falls Trail



Burned plastic culvert on Sacramento River Rail Trail

Vegetation



Moderate vegetation mortality Middle Creek



Sedum obtusatum ssp. *paradisum*, unaffected by fire



High vegetation mortality, some moderate



High vegetation mortality, Whiskeytown NP

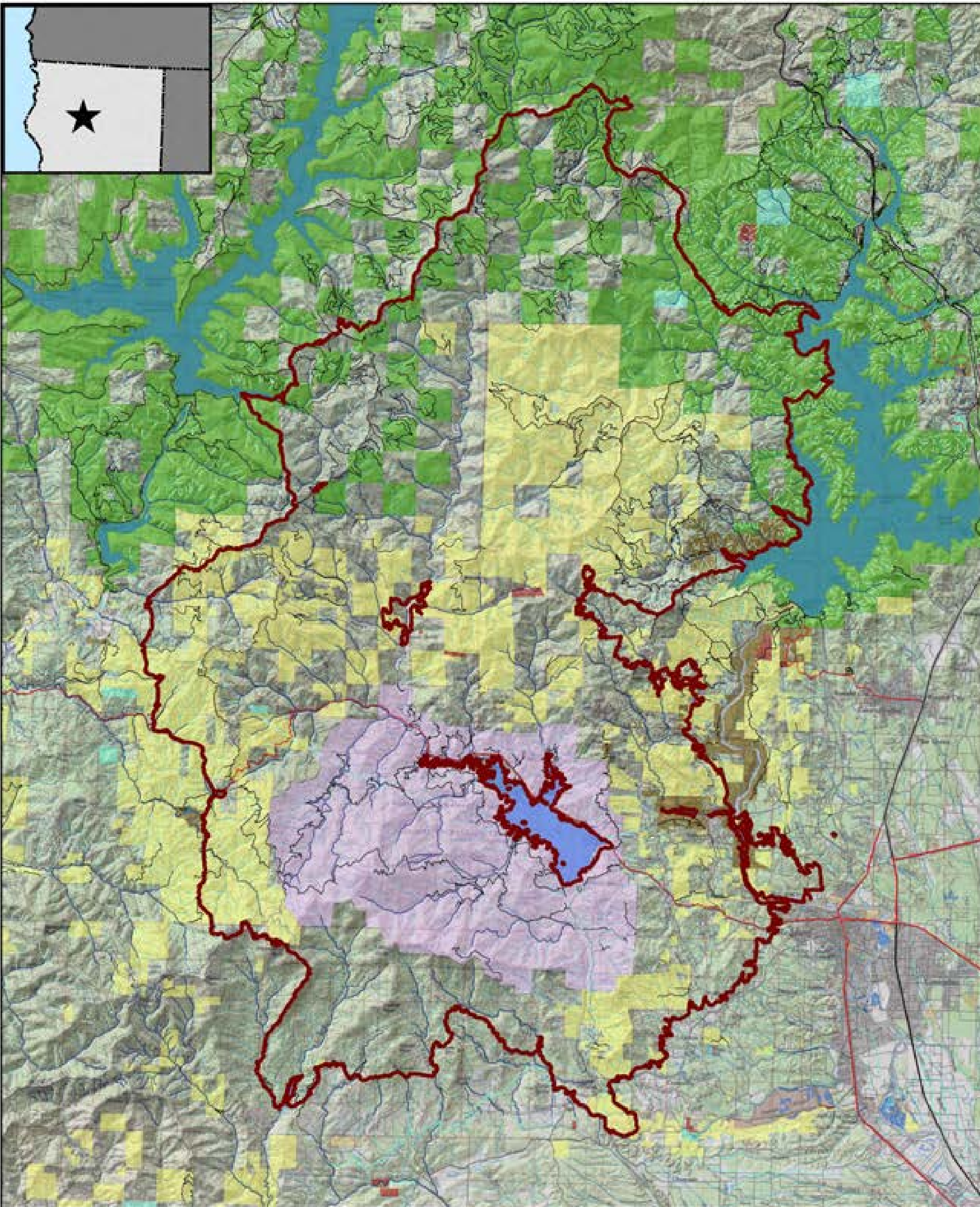


Conducting Vegetation Assessments

Appendix IV - Maps



Carr Fire Ownership



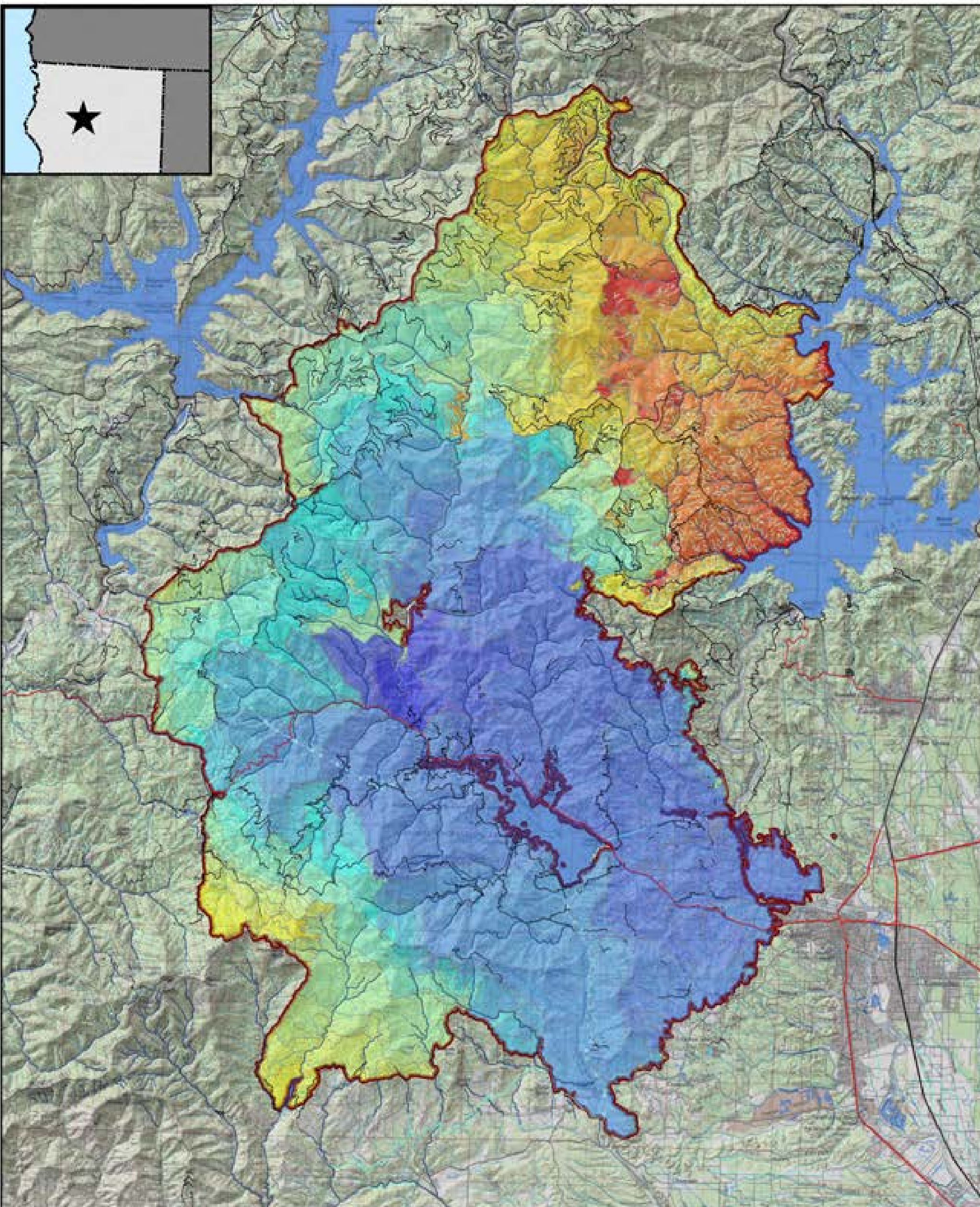
- | | | | |
|---------------------------|-----------------------|-----------------------|------------------------|
| Carr Fire Perimeter | Local Government | Bureau of Reclamation | The Nature Conservancy |
| Bureau of Indian Affairs | National Park Service | State | USDA Forest Service |
| Bureau of Land Management | Unknown Federal | | |

GIS Map Disclaimer: The information used in these applications were derived from digital databases provided to the DOI BAER team. All efforts were made to provide the best aggregated data possible.





Carr Fire Progression



Date	7-26-2018	7-30-2018	8-03-2018	8-07-2018	8-11-2018	8-15-2018
7-23-2018						
7-24-2018						
7-25-2018						

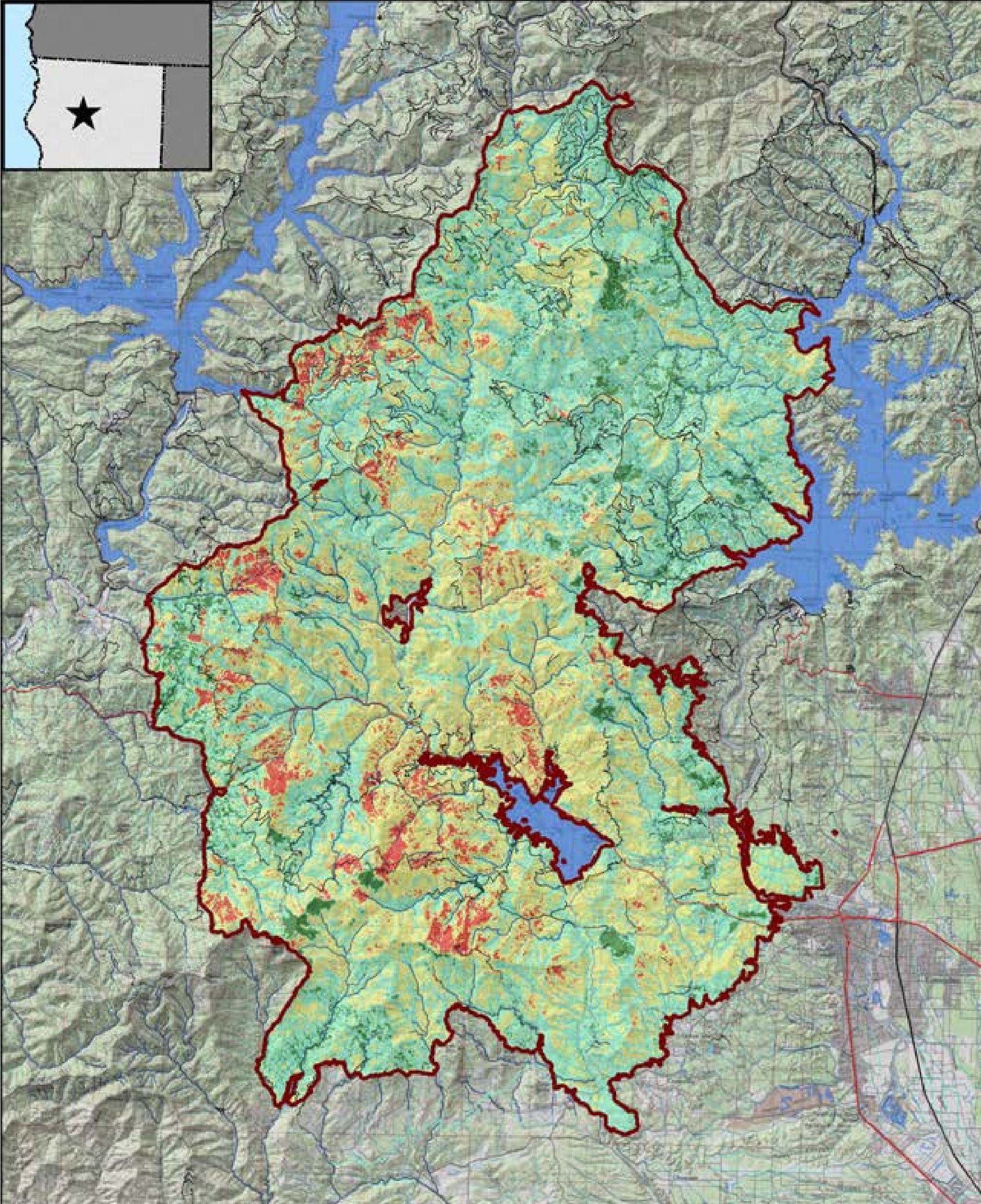
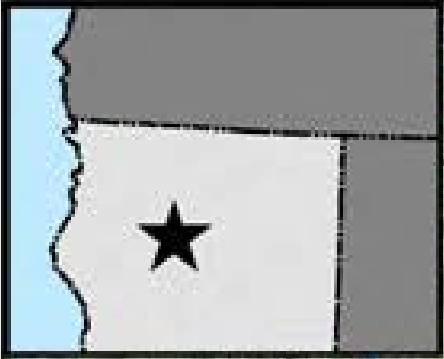
GIS Map Disclaimer: The information used in these applications were derived from digital databases provided to the DOI BAER team. All efforts were made to provide the best aggregated data possible.





Carr Fire

Soil Burn Severity



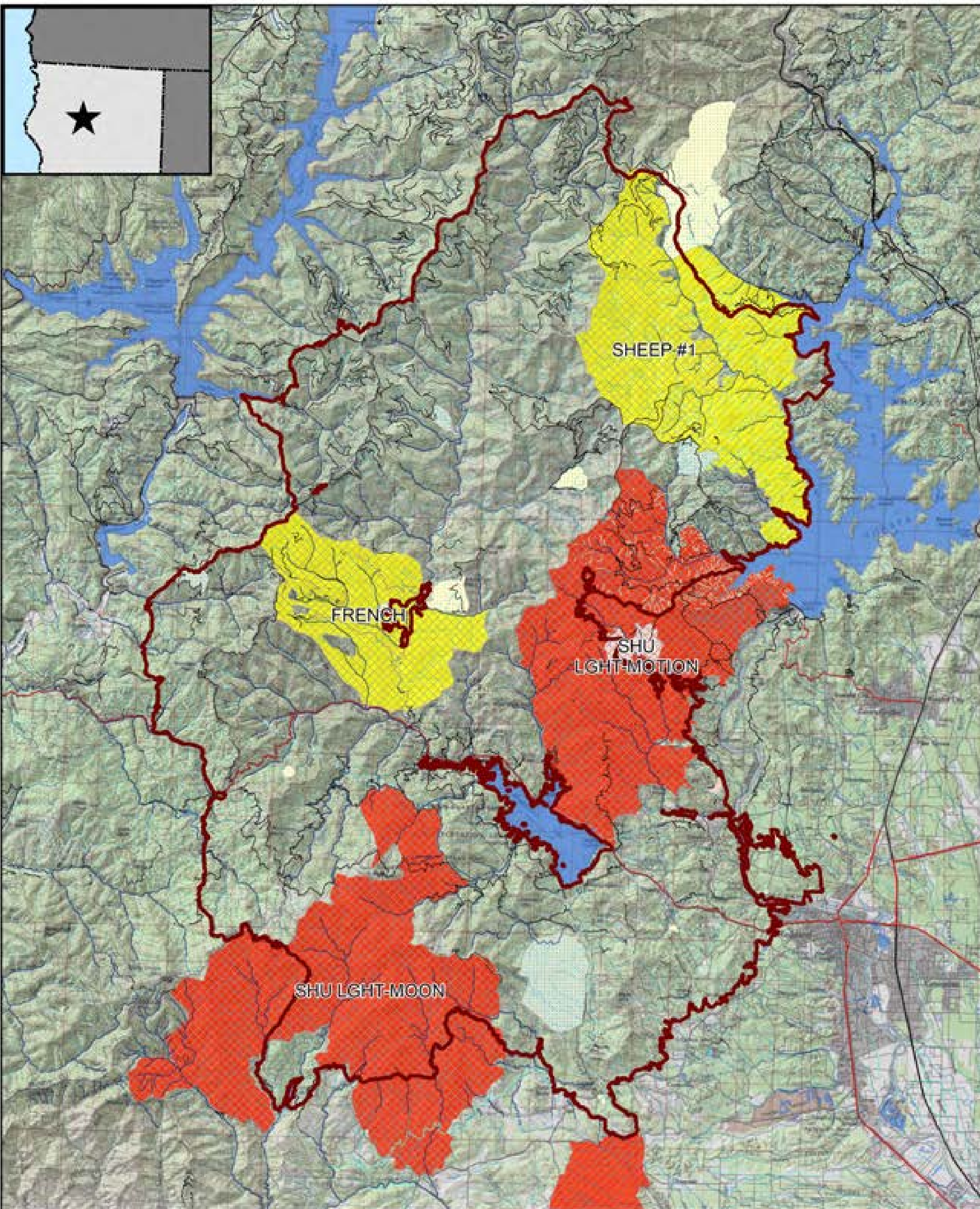
GIS Map Disclaimer: The information used in these applications were derived from digital databases provided to the DOI BAER team. All efforts were made to provide the best aggregated data possible.





Carr Fire

Fire History 30 years

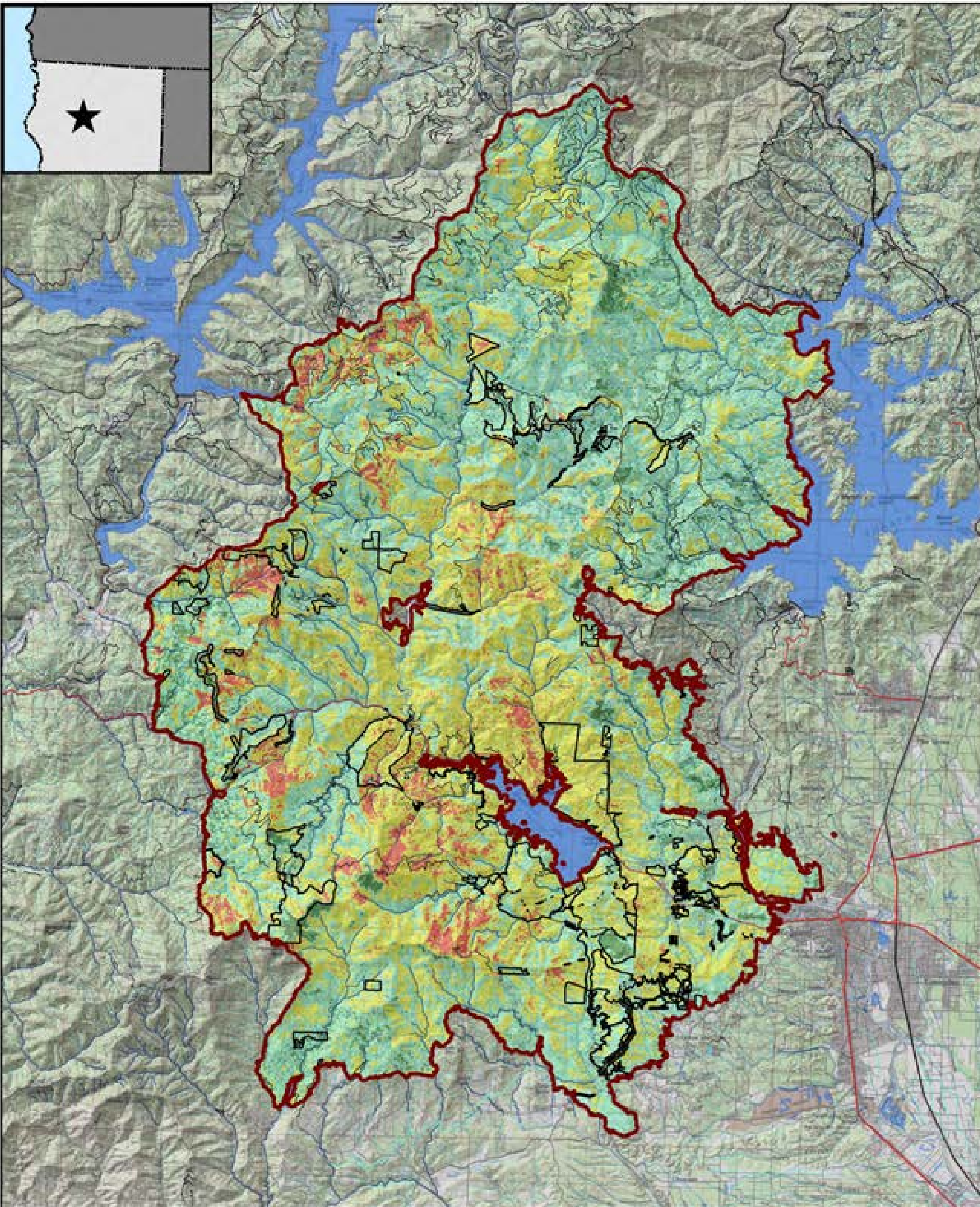


GIS Map Disclaimer: The information used in these applications were derived from digital databases provided to the DOI BAER team. All efforts were made to provide the best aggregated data possible.





Carr Fire Fuel Treatments

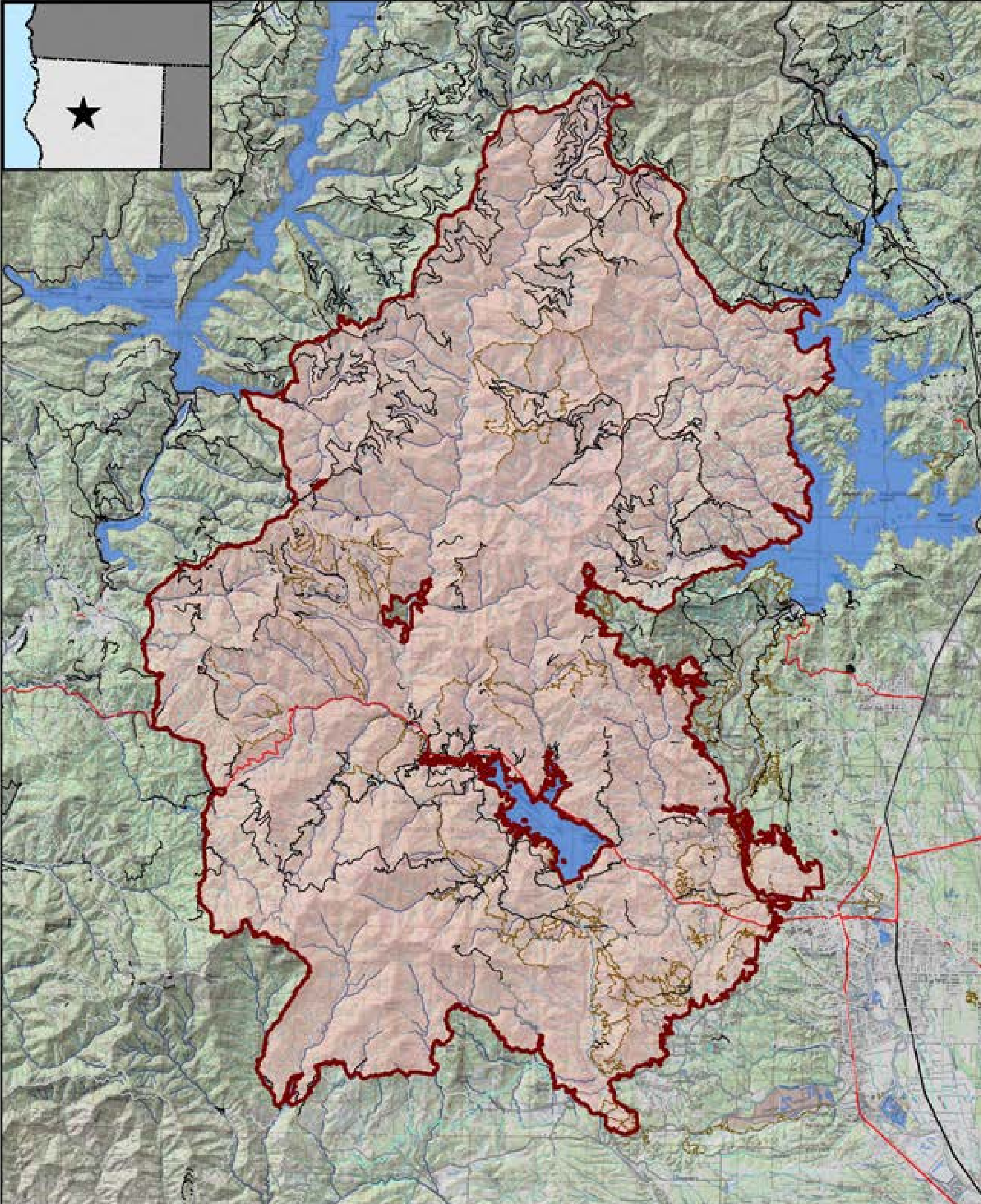
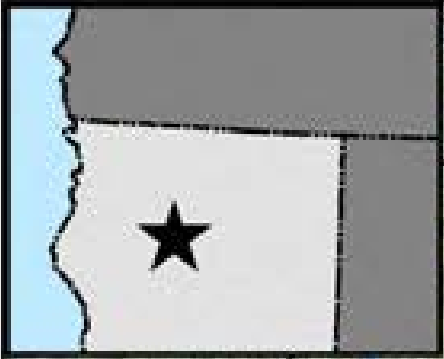





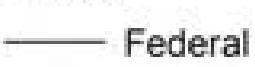


GIS Map Disclaimer: The information used in these applications were derived from digital databases provided to the DOI BAER team. All efforts were made to provide the best aggregated data possible.





Carr Fire Roads and Trails



-  Carr Fire Perimeter
-  Roads
-  Trails
-  County
-  Federal
-  State
-  Other

GIS Map Disclaimer: The information used in these applications were derived from digital databases provided to the DOI BAER team. All efforts were made to provide the best aggregated data possible.

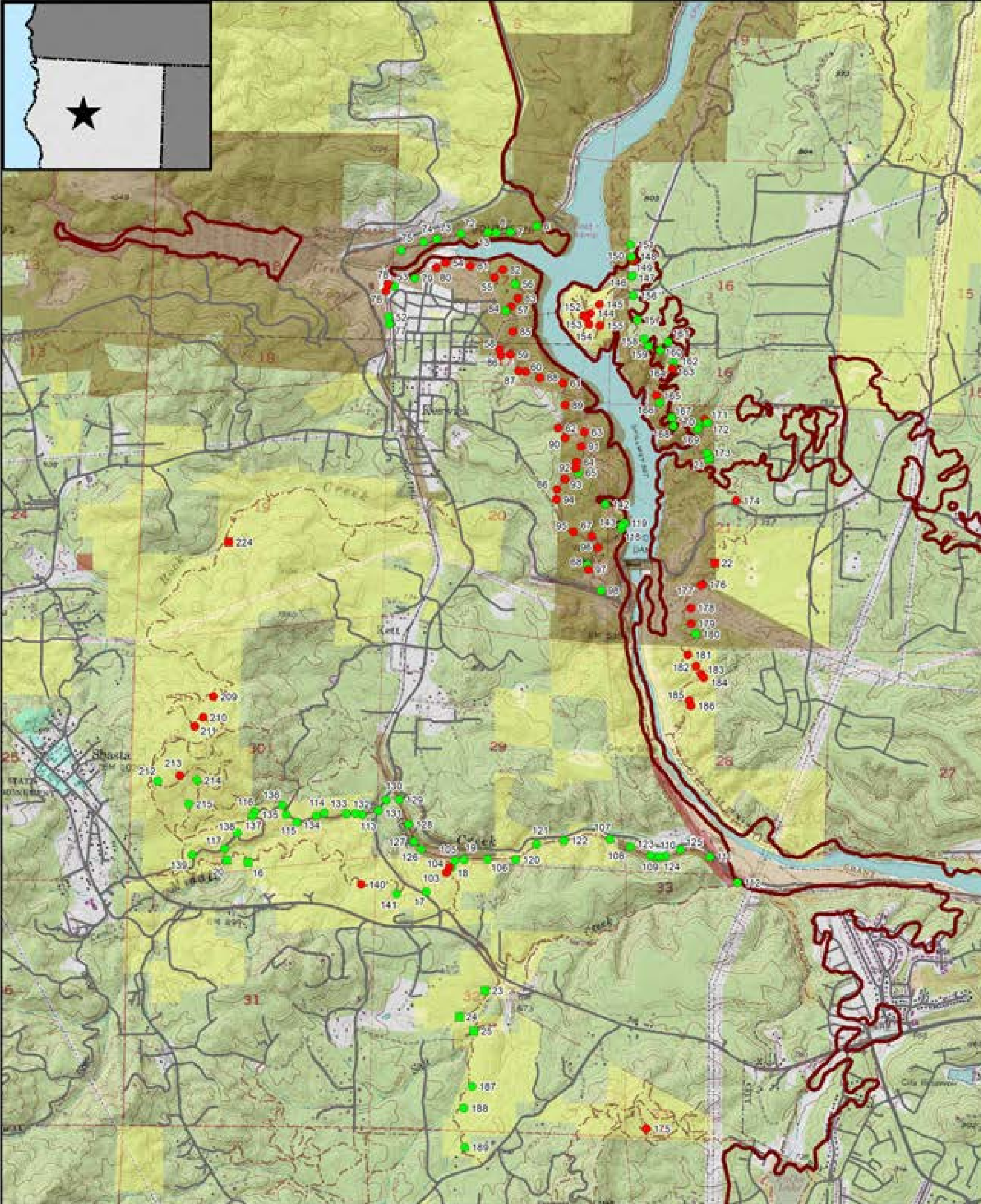
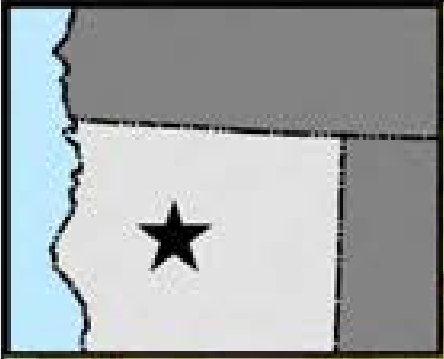




Carr Fire

(Map 1 of 2)

BLM Damaged Recreational Infrastructure



Recreational Infrastructure

- Unburned Bridges
- Burned Bridges
- ▲ Other Burned Infrastructure
- Unburned Culvert
- Burned Culvert
- Burned Culvert
- Carr Fire Perimeter
- Trail
- Road

- Local Government
- Bureau of Indian Affairs
- Bureau of Land Management
- State
- National Park Service
- Bureau of Reclamation
- The Nature Conservancy
- USDA Forest Service
- Unknown Federal

GIS Map Disclaimer: The information used in these applications were derived from digital databases provided to the DOI BAER team. All efforts were made to provide the best aggregated data possible.



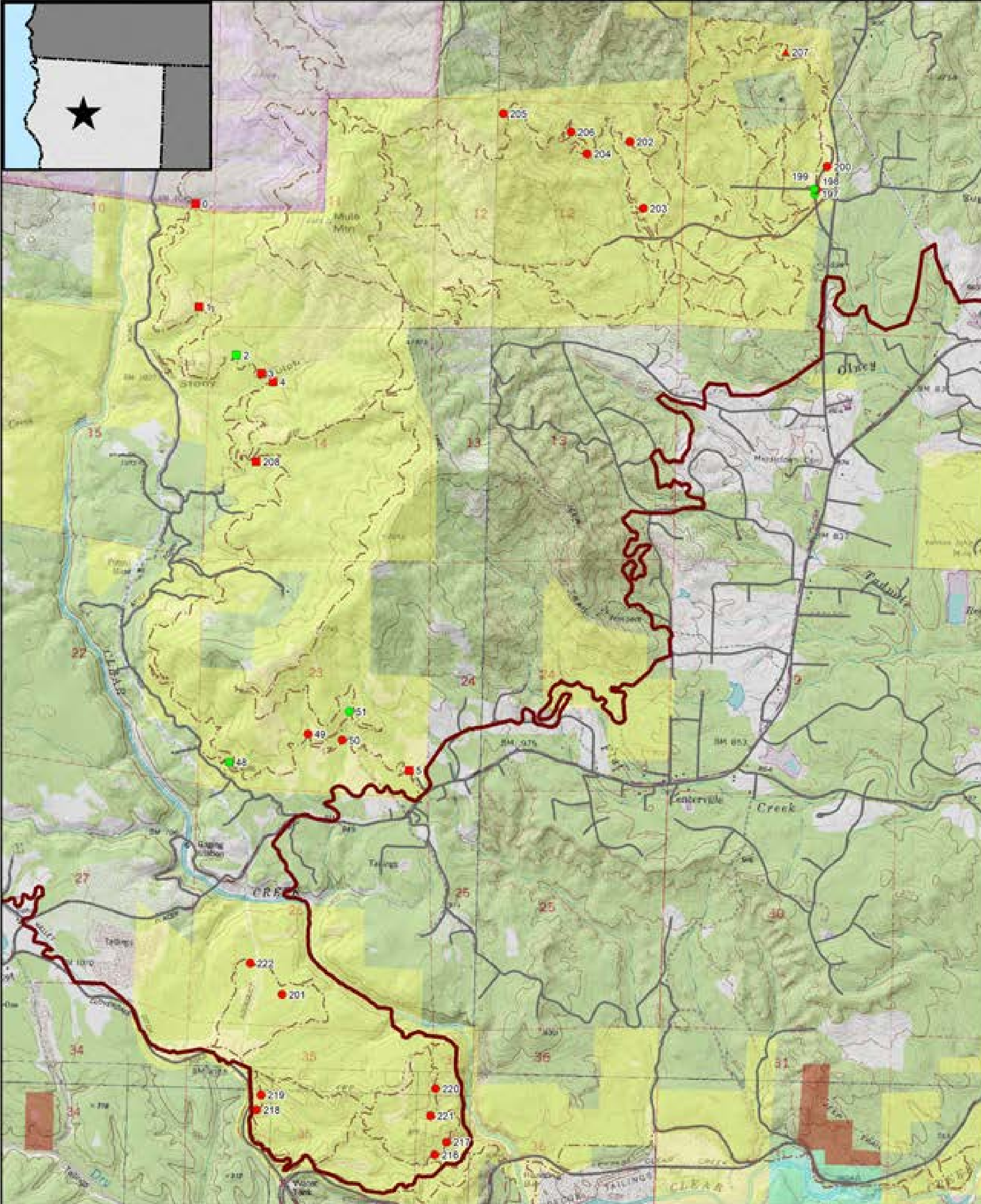


Carr Fire

(Map 2 of 2)



BLM Damaged Recreational Infrastructure



Recreational Infrastructure

- Unburned Bridges
- Burned Bridges
- Burned Culvert
- Unburned Culvert
- ▲ Other Burned Infrastructure
- Carr Fire Perimeter
- Trail
- Road

- Local Government
- Bureau of Indian Affairs
- Bureau of Land Management
- Bureau of Reclamation
- State
- National Park Service
- The Nature Conservancy
- USDA Forest Service
- Unknown Federal

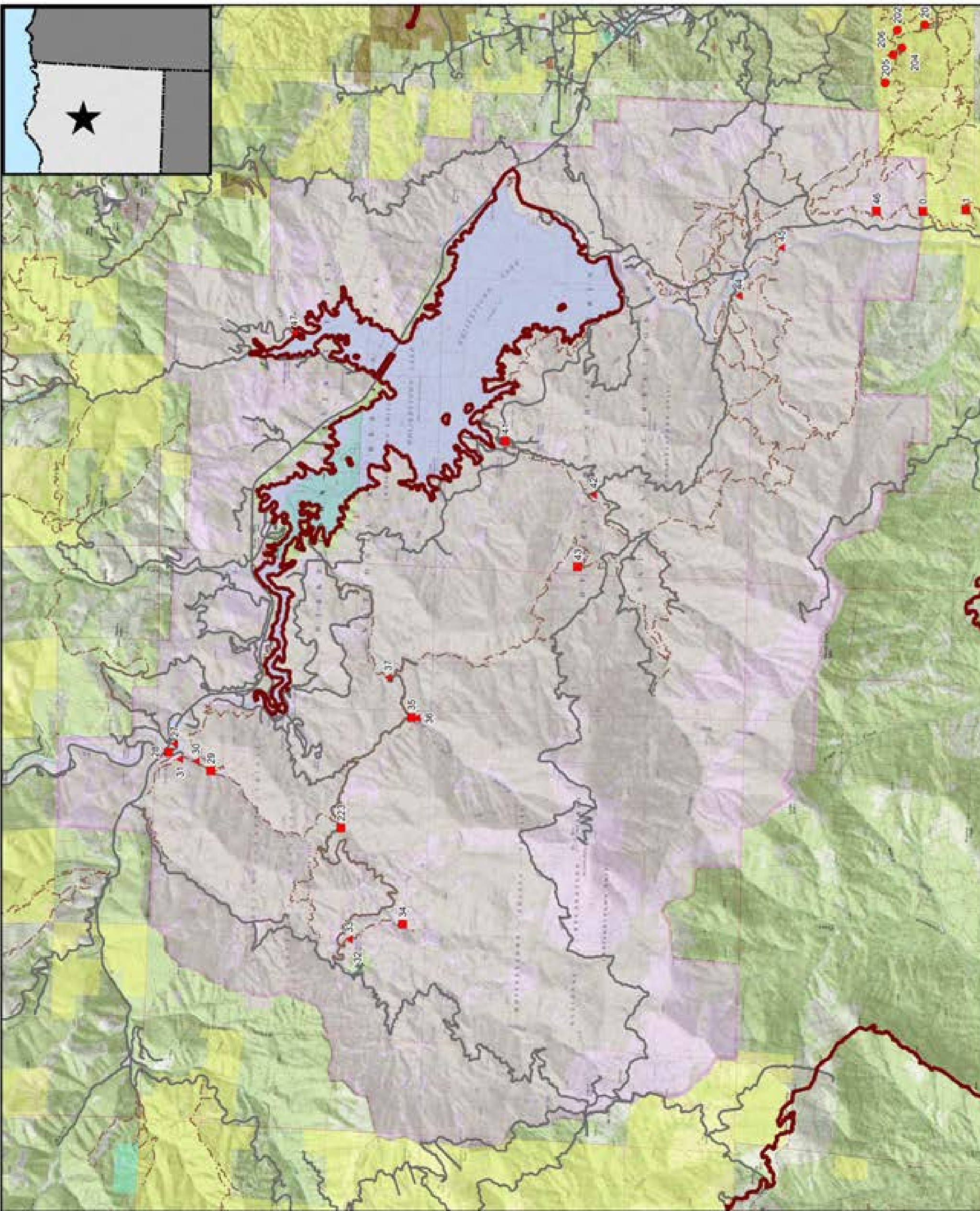
GIS Map Disclaimer: The information used in these applications were derived from digital databases provided to the DOI BAER team. All efforts were made to provide the best aggregated data possible.





Carr Fire

NPS Damaged Recreational Infrastructure



Recreational Infrastructure

- Unburned Culvert
- Burned Culvert

- Unburned Bridges
- Burned Bridges
- Other Burned Infrastructure

- Carr Fire Perimeter
- Trail
- Road

- Local Government
- Bureau of Indian Affairs
- Bureau of Land Management

- Bureau of Reclamation
- State
- National Park Service

- The Nature Conservancy
- USDA Forest Service
- Unknown Federal

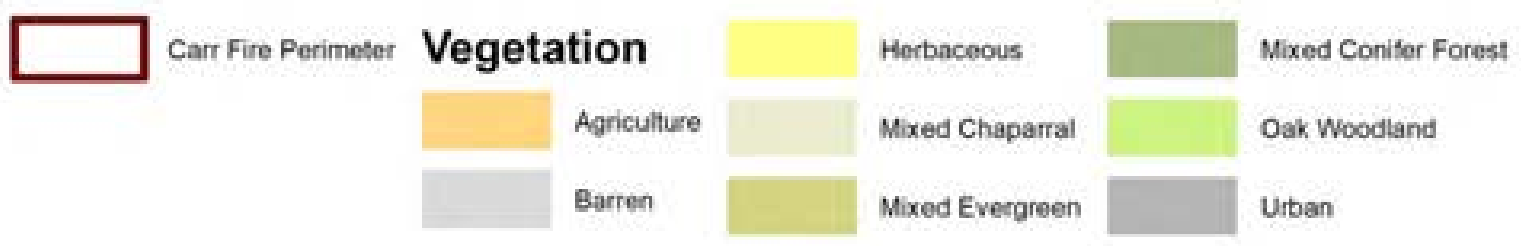
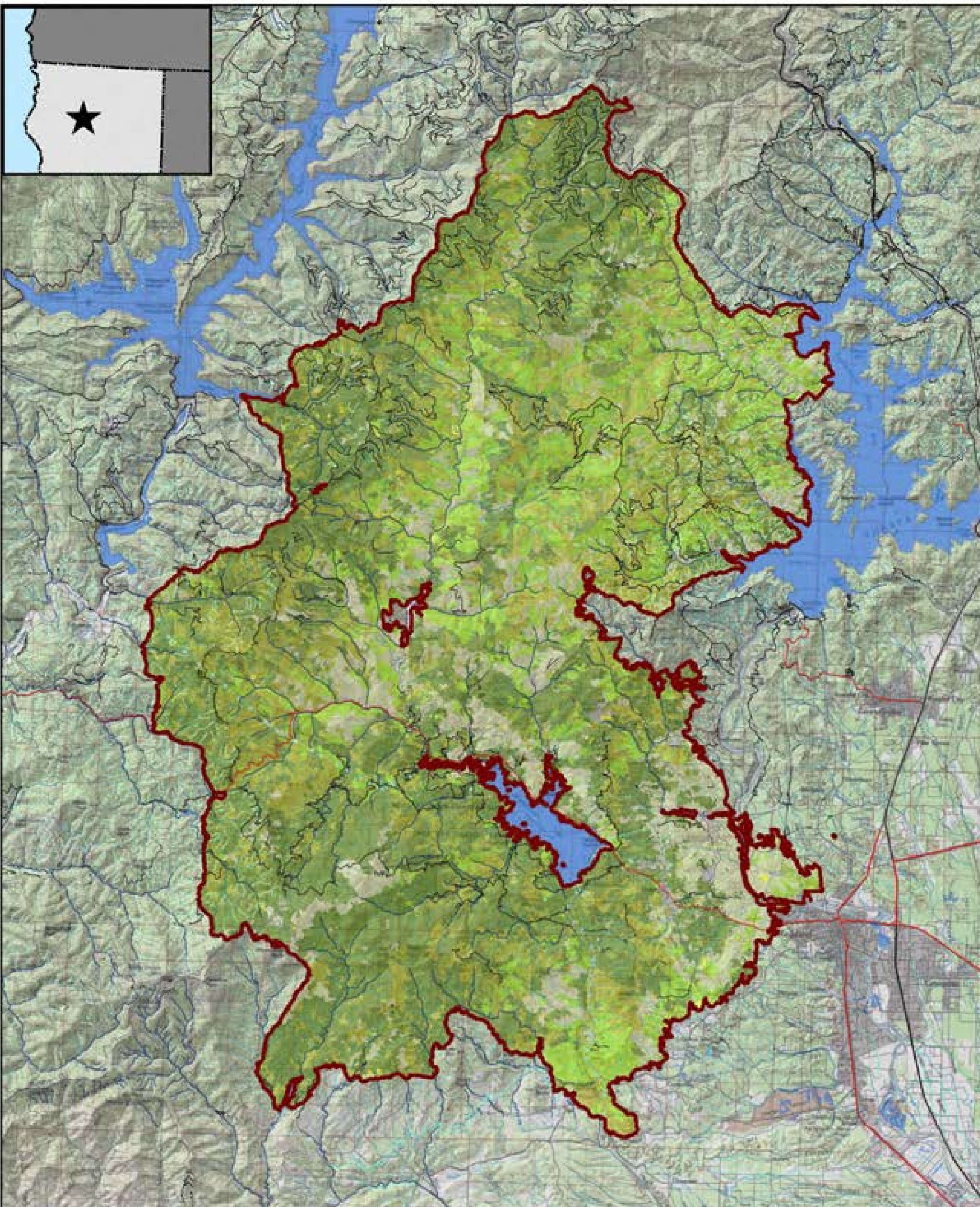
GIS Map Disclaimer: The information used in these applications were derived from digital databases provided to the DOI BAER team. All efforts were made to provide the best aggregated data possible.





Carr Fire

Pre-Fire Vegetation (CalVeg)

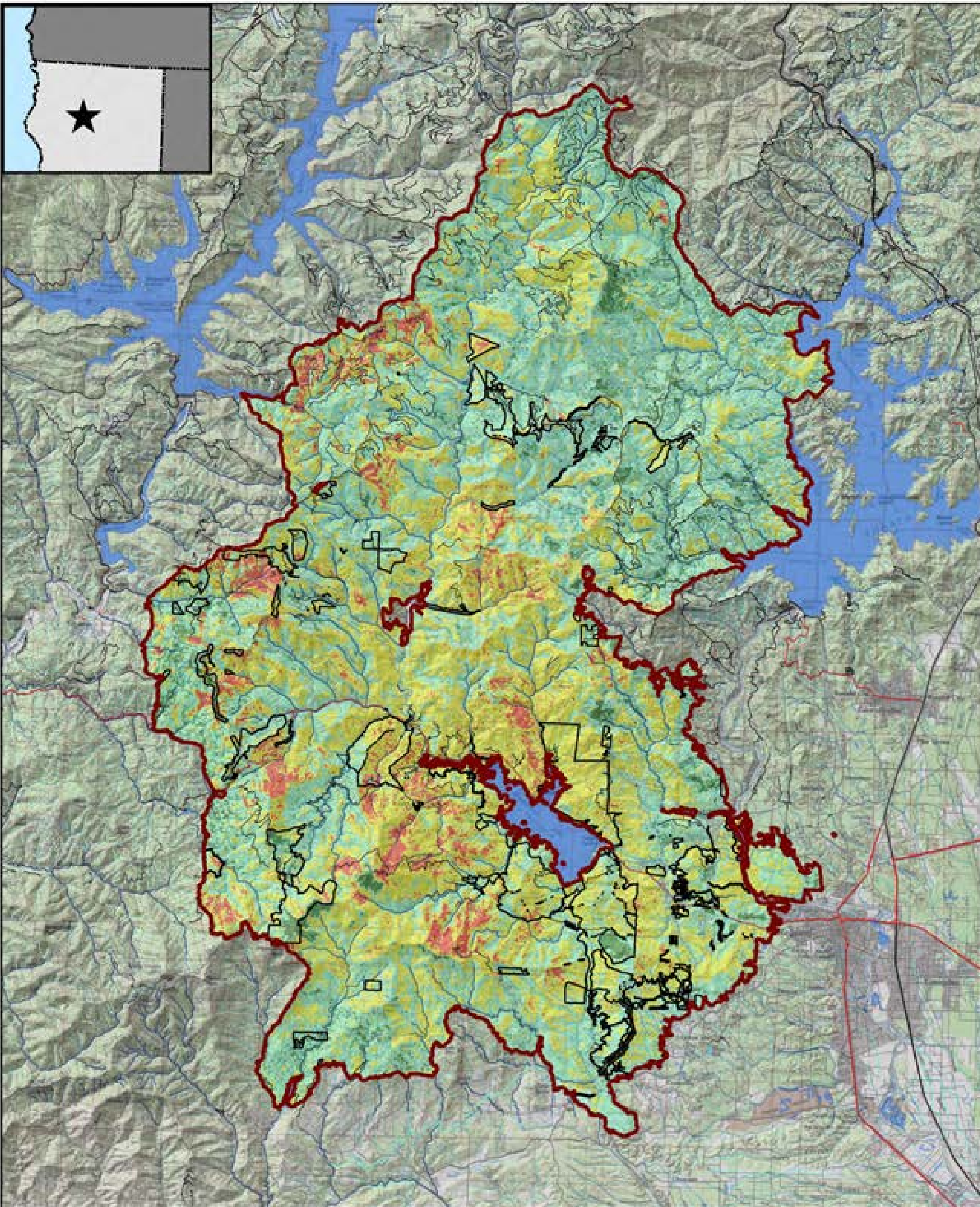


GIS Map Disclaimer: The information used in these applications were derived from digital databases provided to the DOI BAER team. All efforts were made to provide the best aggregated data possible.





Carr Fire Fuel Treatments

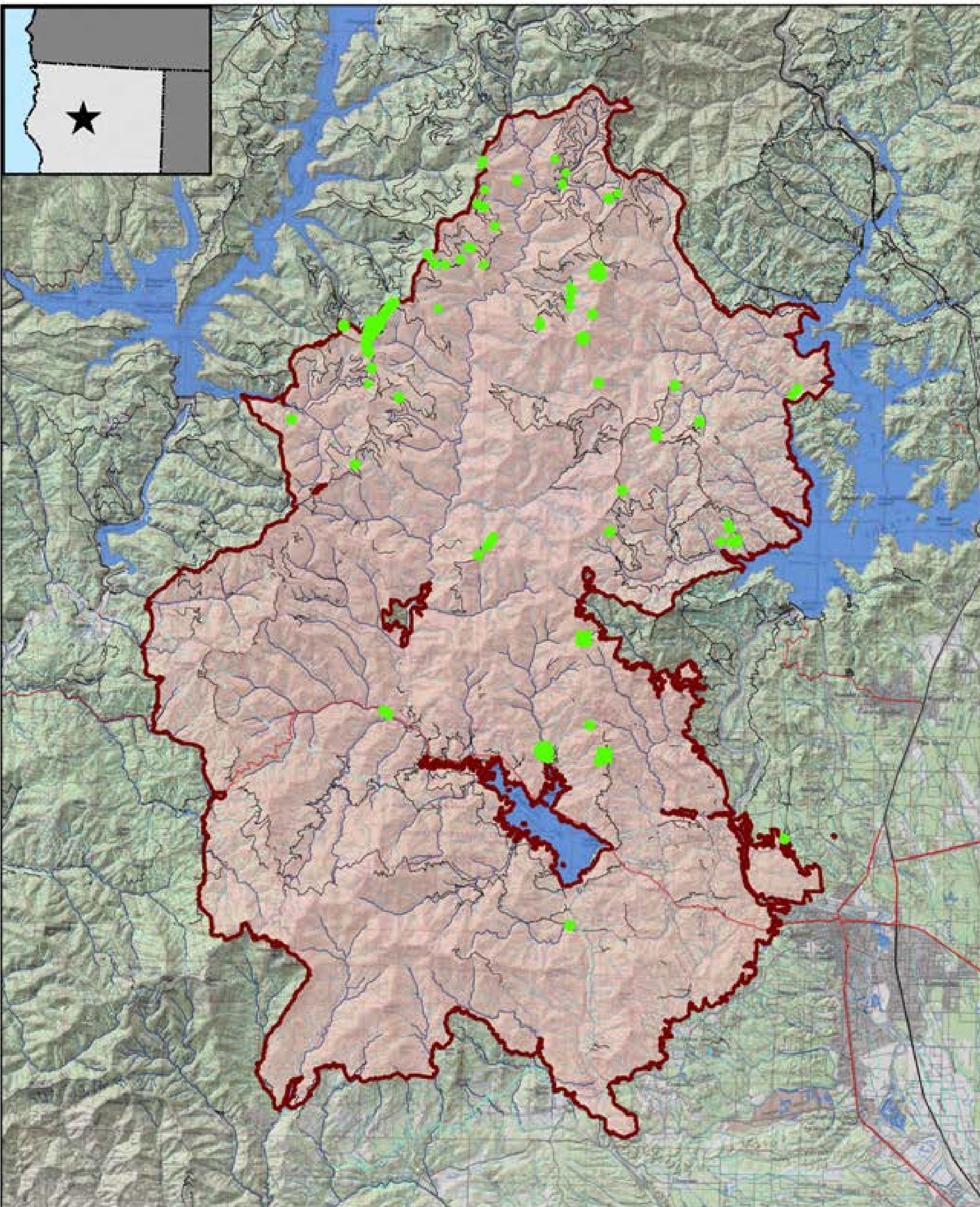


GIS Map Disclaimer: The information used in these applications were derived from digital databases provided to the DOI BAER team. All efforts were made to provide the best aggregated data possible.





Carr Fire Rare Plants



 Rare Plants  Carr Fire Perimeter

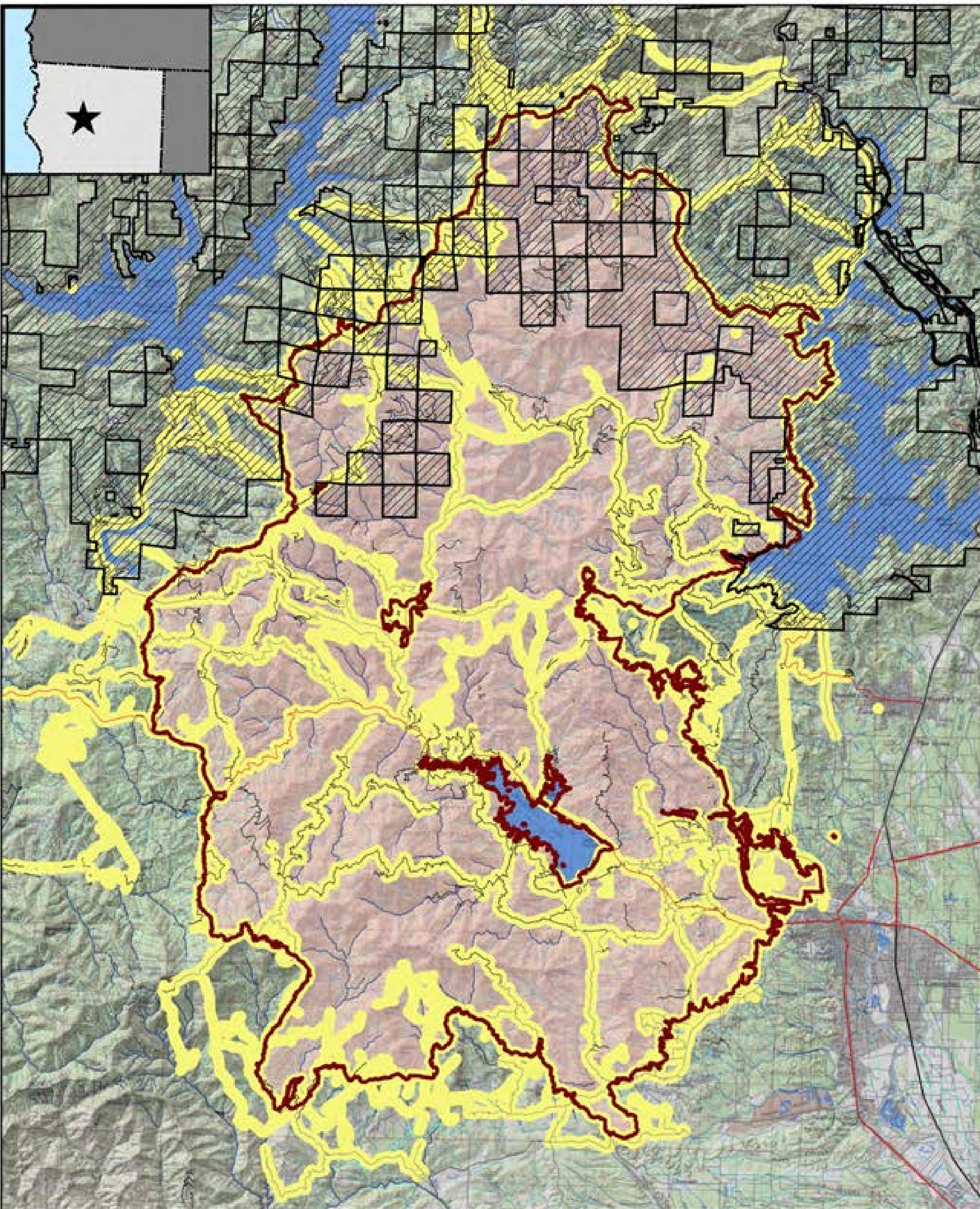
GIS Map Disclaimer: The information used in these applications were derived from digital databases provided to the DOI BAER team. All efforts were made to provide the best aggregated data possible.








Carr Fire

Invasive Treatment Priority Areas



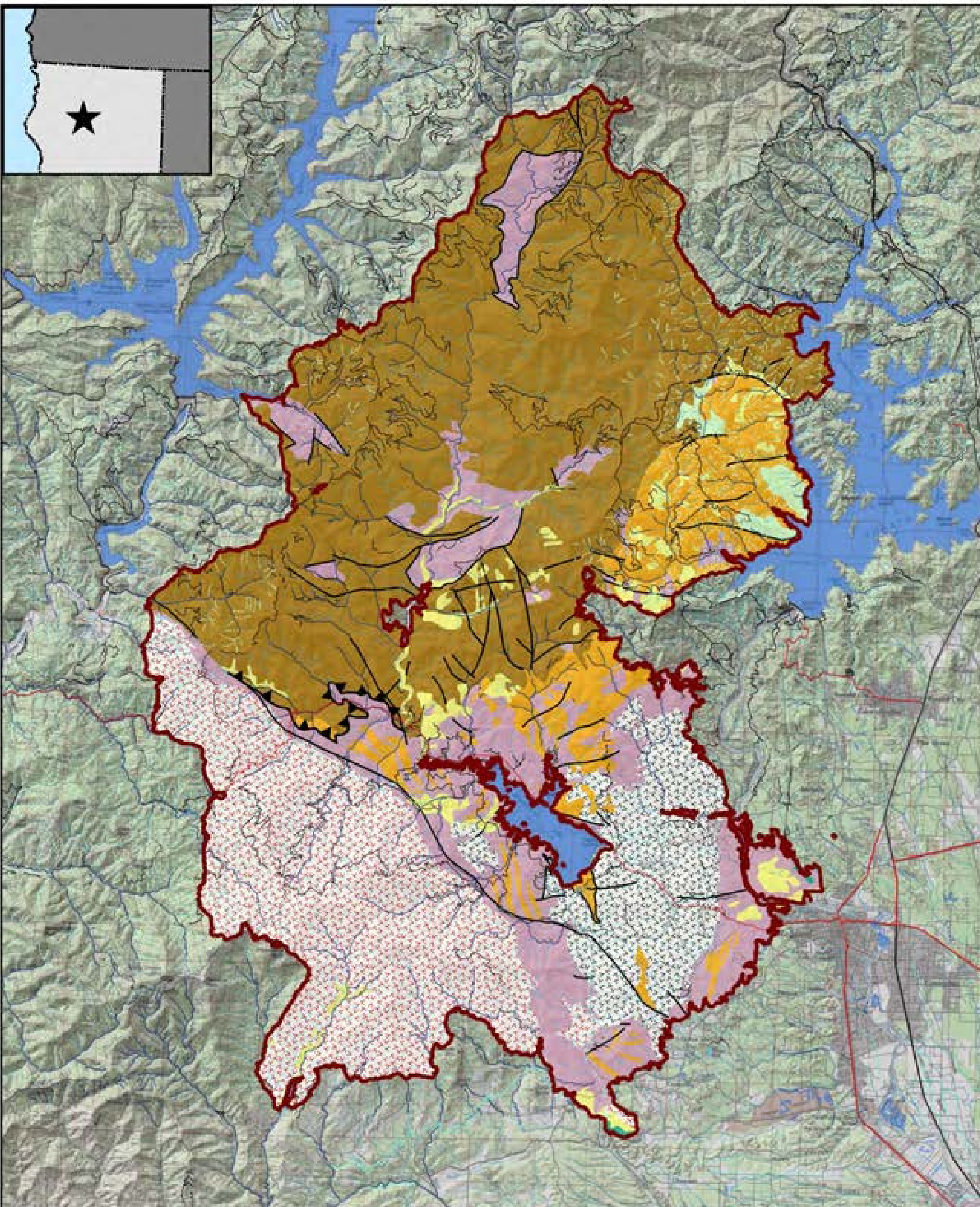
-  Carr Fire Perimeter
-  Invasive Inventory and Treatment Priority Areas
-  USDA Forest Service

GIS Map Disclaimer: The information used in these applications were derived from digital databases provided to the DOI BAER team. All efforts were made to provide the best aggregated data possible.





Carr Fire Geology



- | | | | | |
|---------------------|------------------------|-------------------|-------------------|-----------------------|
| Carr Fire Perimeter | fault | Alluvium | Triassic Units | Kennett Formation |
| fault, concealed | Cretaceous Units | Hornblend Schist | Blakiala Rhyolite | Copley Mtn Greenstone |
| fault, thrust | Shasta Bally Batholith | Baird and Bragdon | Mule Mtn stock | |

Geologic Data adapted from: Digital Geologic Map of the Redding Quadrangle, 2012, Fraticelli, et. al. USGS OF-2012-1228

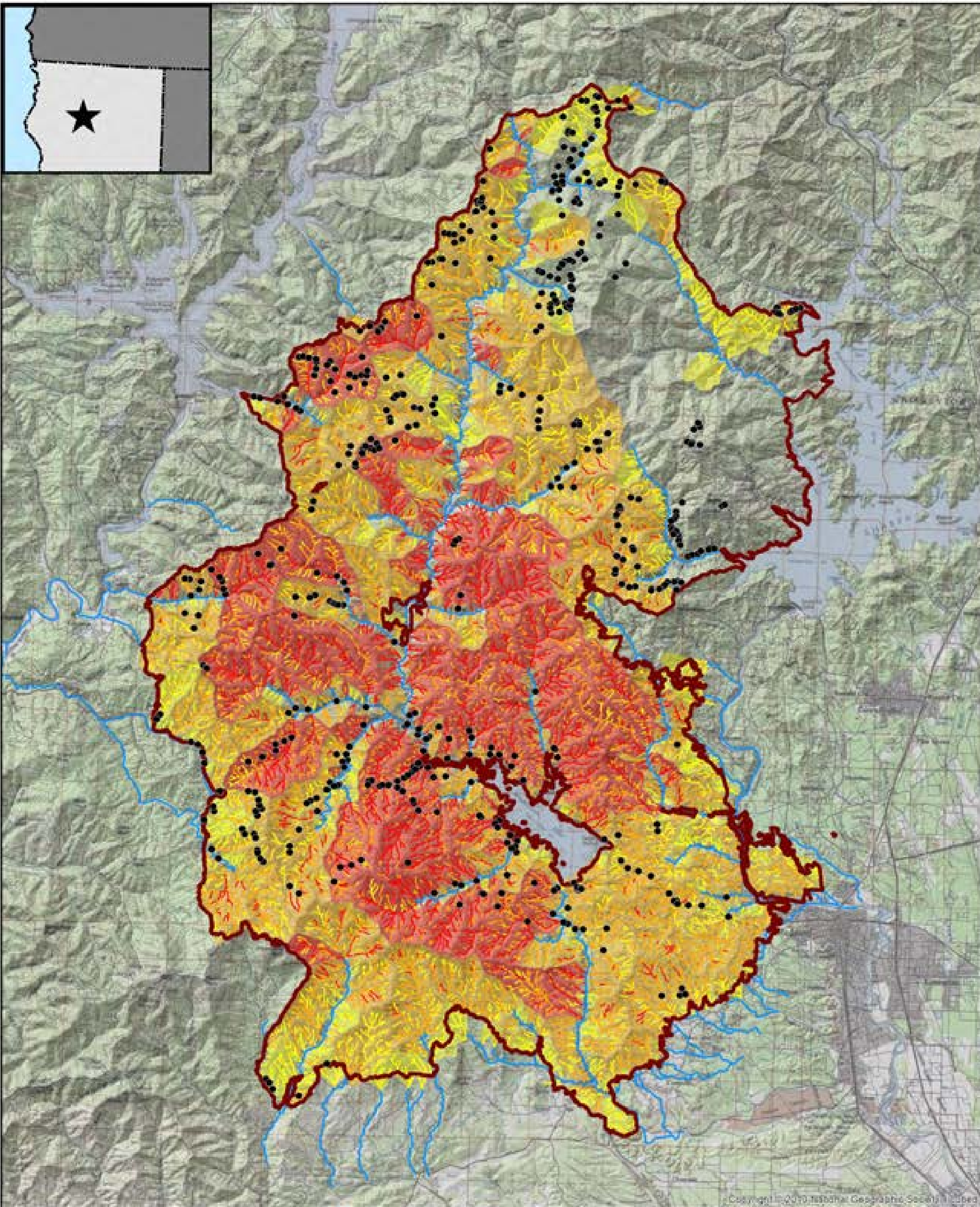
GIS Map Disclaimer: The information used in these applications were derived from digital databases provided to the DOI BAER team. All efforts were made to provide the best aggregated data possible.





Carr Fire

Debris Flow Hazard and Culverts



Segment Combined Hazard Basin Combined Hazard

- Low
- Moderate
- High

- Low
- Moderate
- High

- USGS Watch Stream
- Culvert
- Carr Fire Perimeter

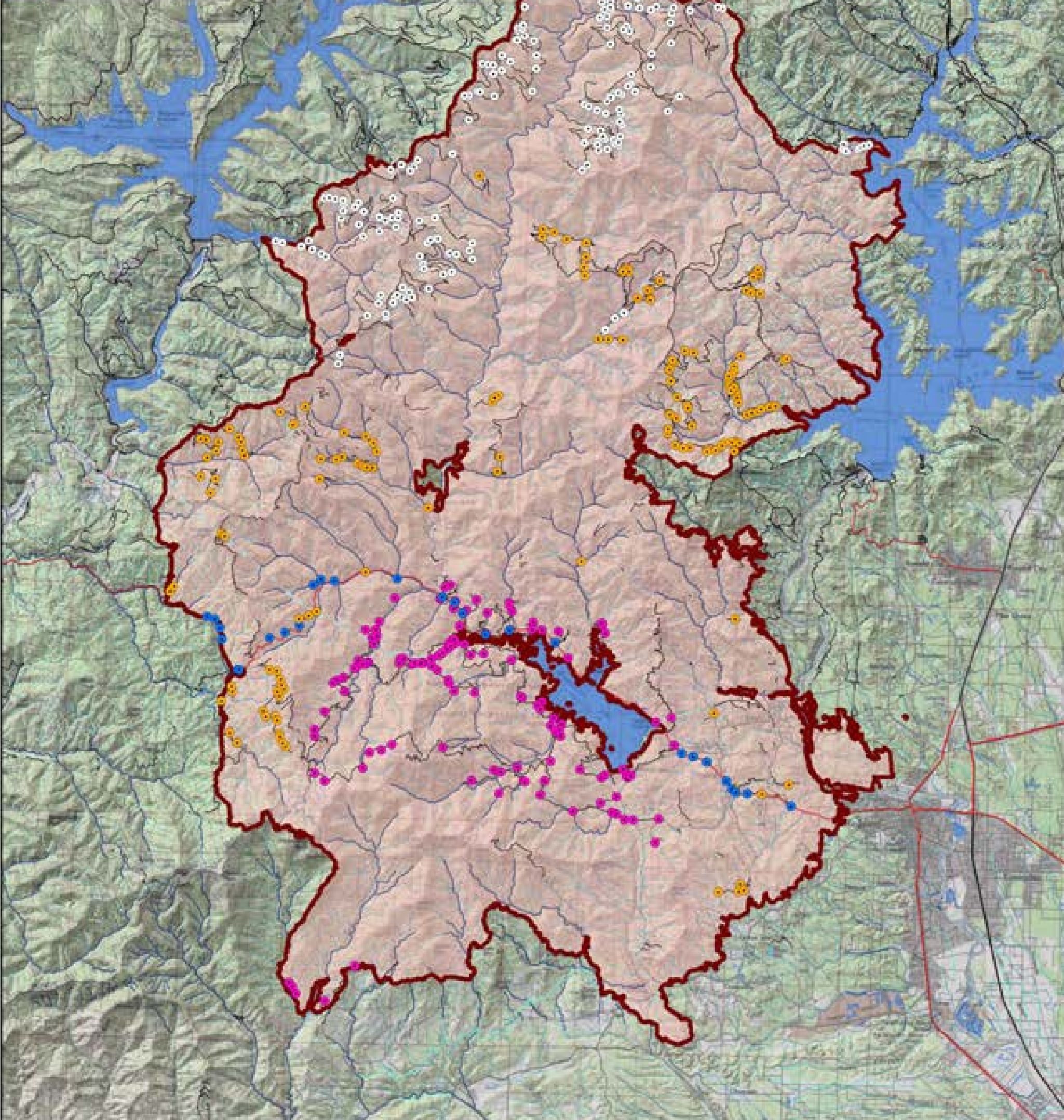
GIS Map Disclaimer: The information used in these applications were derived from digital databases provided to the DOI BAER team. All efforts were made to provide the best aggregated data possible.





Carr Fire

Roads and Culverts



- Carr Fire Perimeter
- BLM Culvert
- State Culvert
- NPS Culvert
- USFS Culvert
- State Roads
- Federal Roads
- County Roads

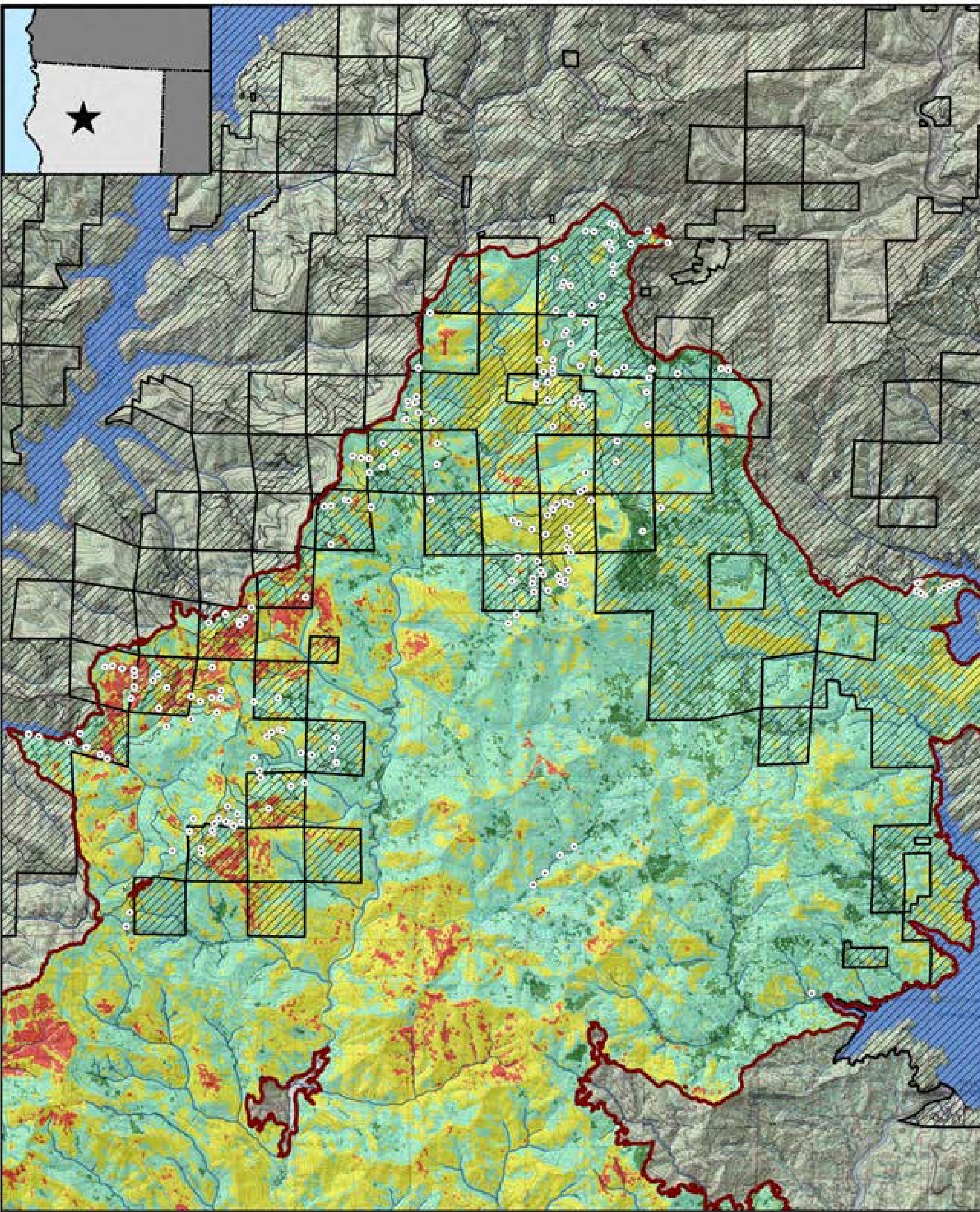
GIS Map Disclaimer: The information used in these applications were derived from digital databases provided to the DOI BAER team. All efforts were made to provide the best aggregated data possible.





Carr Fire

USFS Roads and Culverts



⊙ USFS/Cost Share Culvert	Roads	Soil Burn Severity	Low
Carr Fire Perimeter	Federal	High	Unburned/Very Low
USDA Forest Service	State	Moderate	
	County		

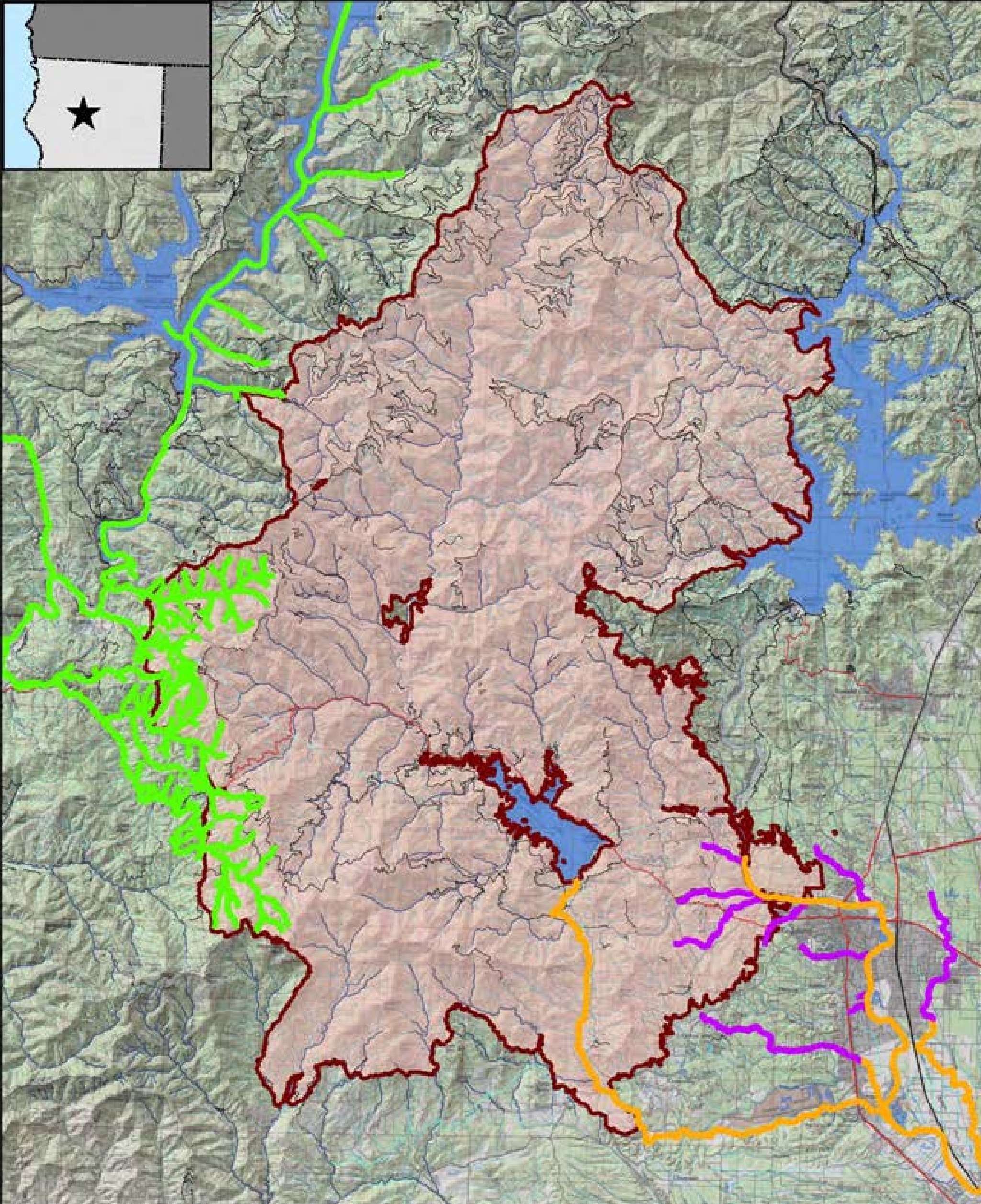
GIS Map Disclaimer: The information used in these applications were derived from digital databases provided to the DOI BAER team. All efforts were made to provide the best aggregated data possible.





Carr Fire

Critical Fish Habitat



-  Coho Critical Habitat
-  Steelhead Critical Habitat
-  Chinook Salmon & Steelhead Critical Habitat
-  Carr Fire Perimeter

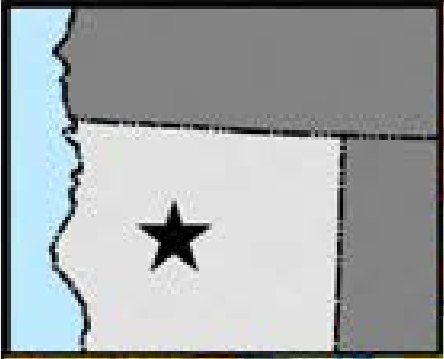
GIS Map Disclaimer: The information used in these applications were derived from digital databases provided to the DOI BAER team. All efforts were made to provide the best aggregated data possible.



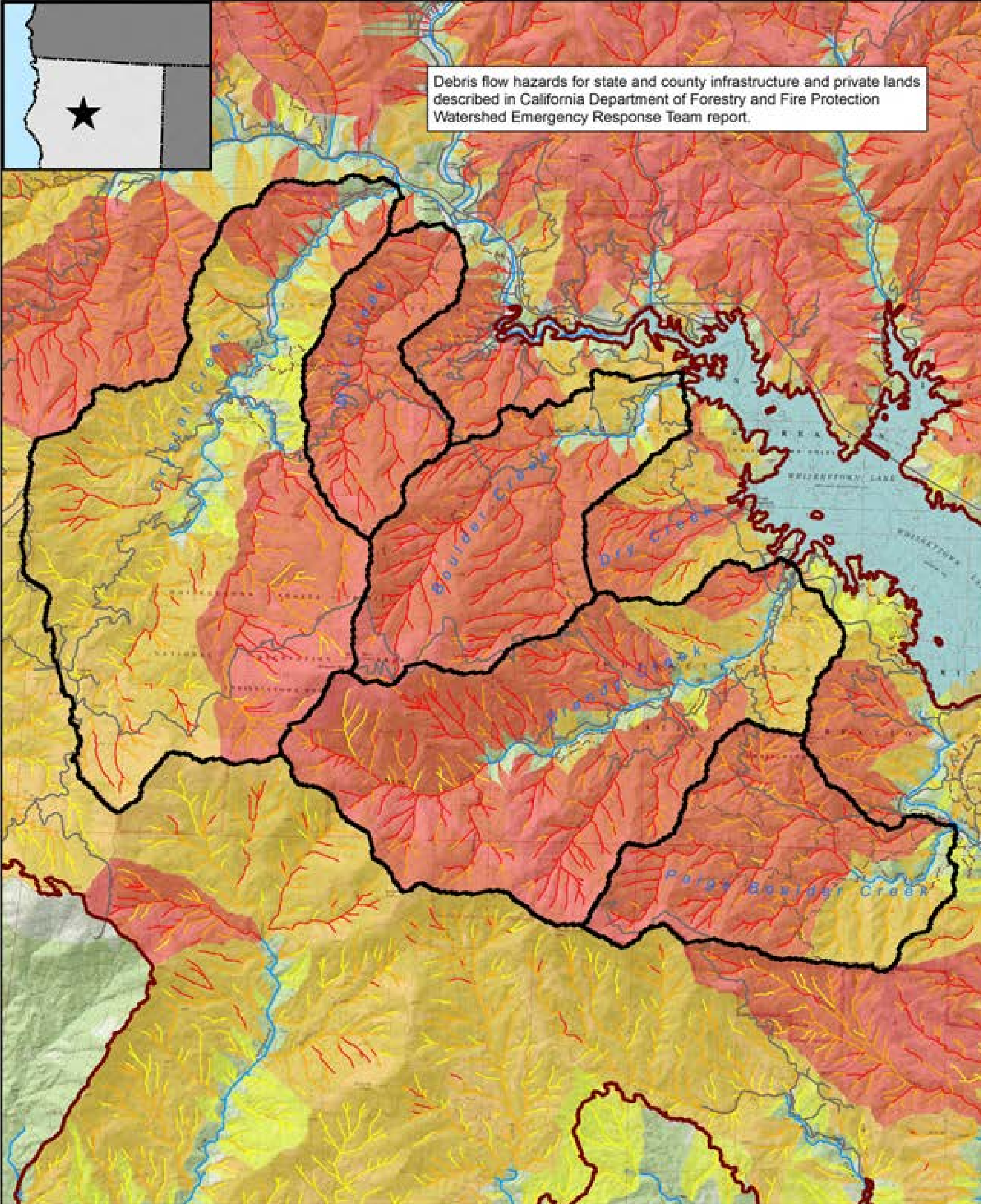


Carr Fire

Modeled Debris Flow Hazard in Watersheds with Federal Values at Risk



Debris flow hazards for state and county infrastructure and private lands described in California Department of Forestry and Fire Protection Watershed Emergency Response Team report.



Segment Combined Hazard Basin Combined Hazard

- Low
- Moderate
- High

- Low
- Moderate
- High

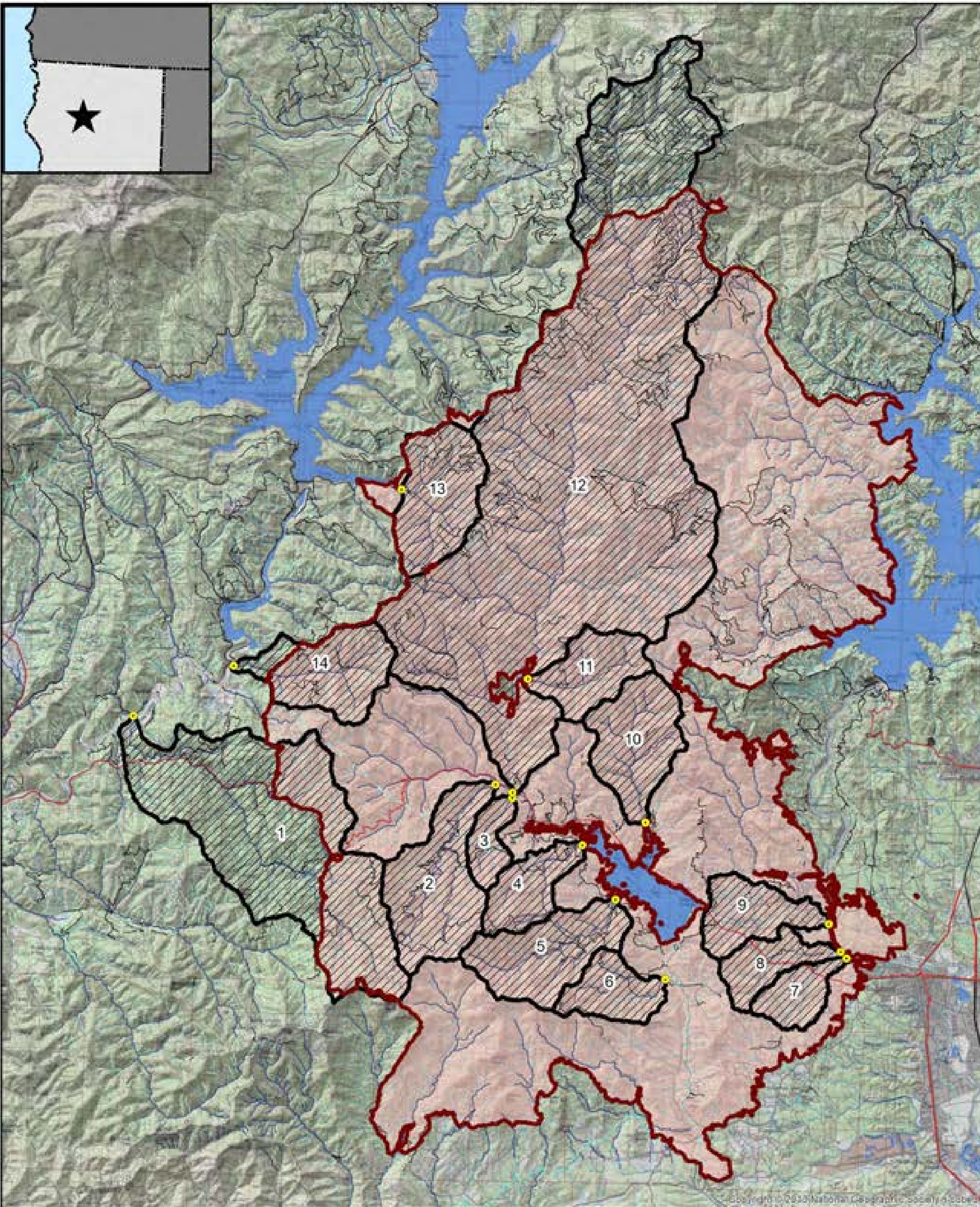
- USGS Watch Stream
- Trail
- Watershed
- Road
- Carr Fire Perimeter

GIS Map Disclaimer: The information used in these applications were derived from digital databases provided to the DOI BAER team. All efforts were made to provide the best aggregated data possible.





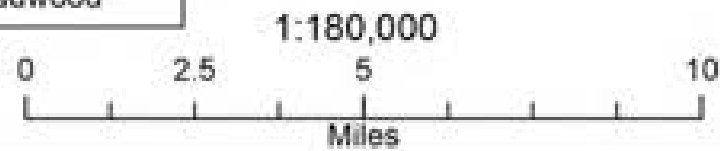
Carr Fire Modeled Watersheds



-  Pour Point
-  Carr Fire Perimeter
-  Watershed

- | | |
|-------------------------|--------------------|
| 1 - Grass Valley Creek | 8 - Middle Creek |
| 2 - Crystal Creek | 9 - Rock Creek |
| 3 - Mill Creek | 10 - Whiskey Creek |
| 4 - Boulder Creek | 11 - Cline Gulch |
| 5 - Brandy Creek | 12 - Clear Creek |
| 6 - Paige Boulder Creek | 13 - Papoose Creek |
| 7 - Salt Creek | 14 - Deadwood |

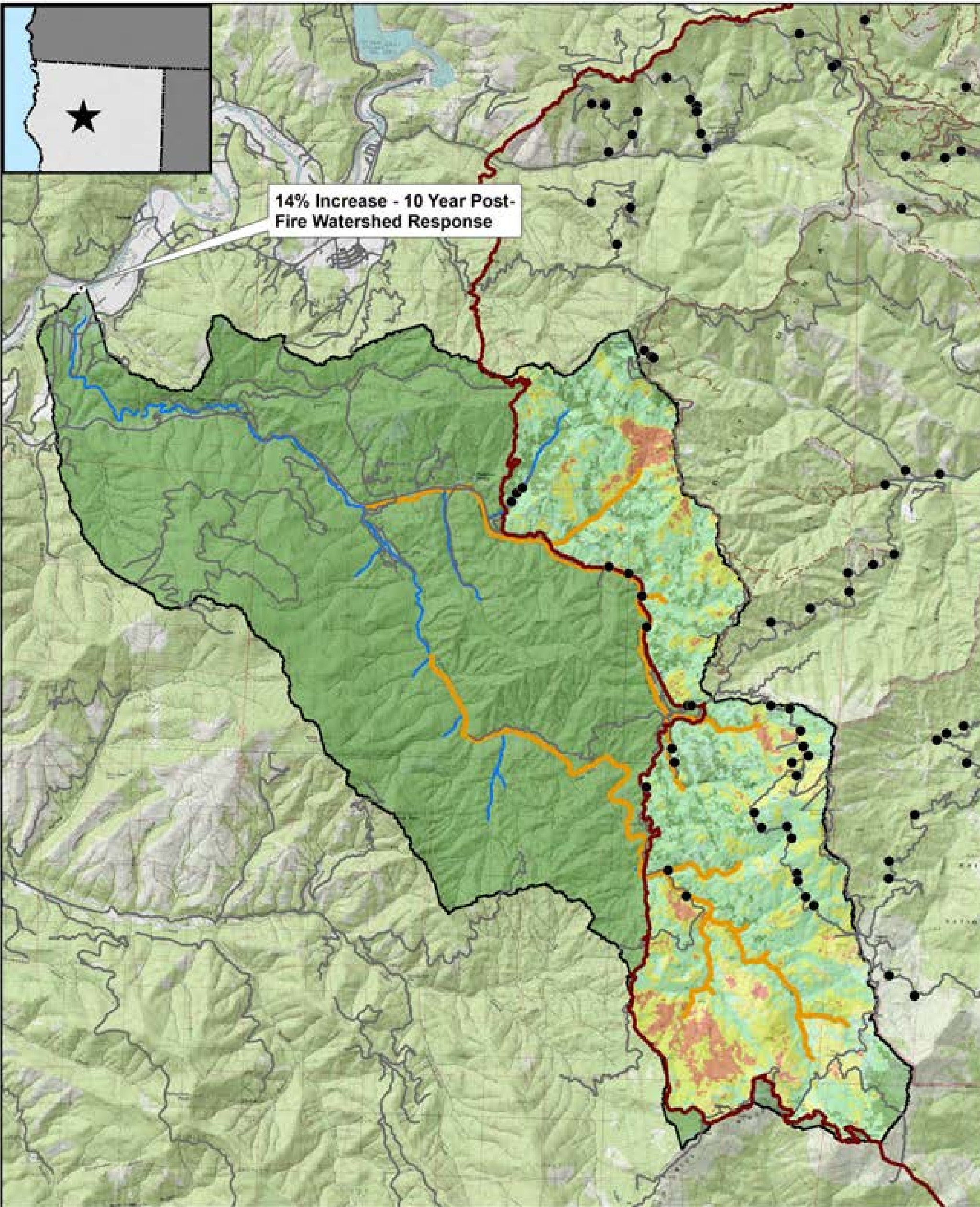
GIS Map Disclaimer: The information used in these applications were derived from digital databases provided to the DOI BAER team. All efforts were made to provide the best aggregated data possible.





Carr Fire

Grass Valley Creek Watershed Response



14% Increase - 10 Year Post-Fire Watershed Response

● Culvert	--- Trail	Watershed Response	Soil Burn Severity	Low
○ Value at Risk	— Road	Low	High	Unburned/Very Low
▭ Carr Fire Perimeter		Moderate	Moderate	
		High		

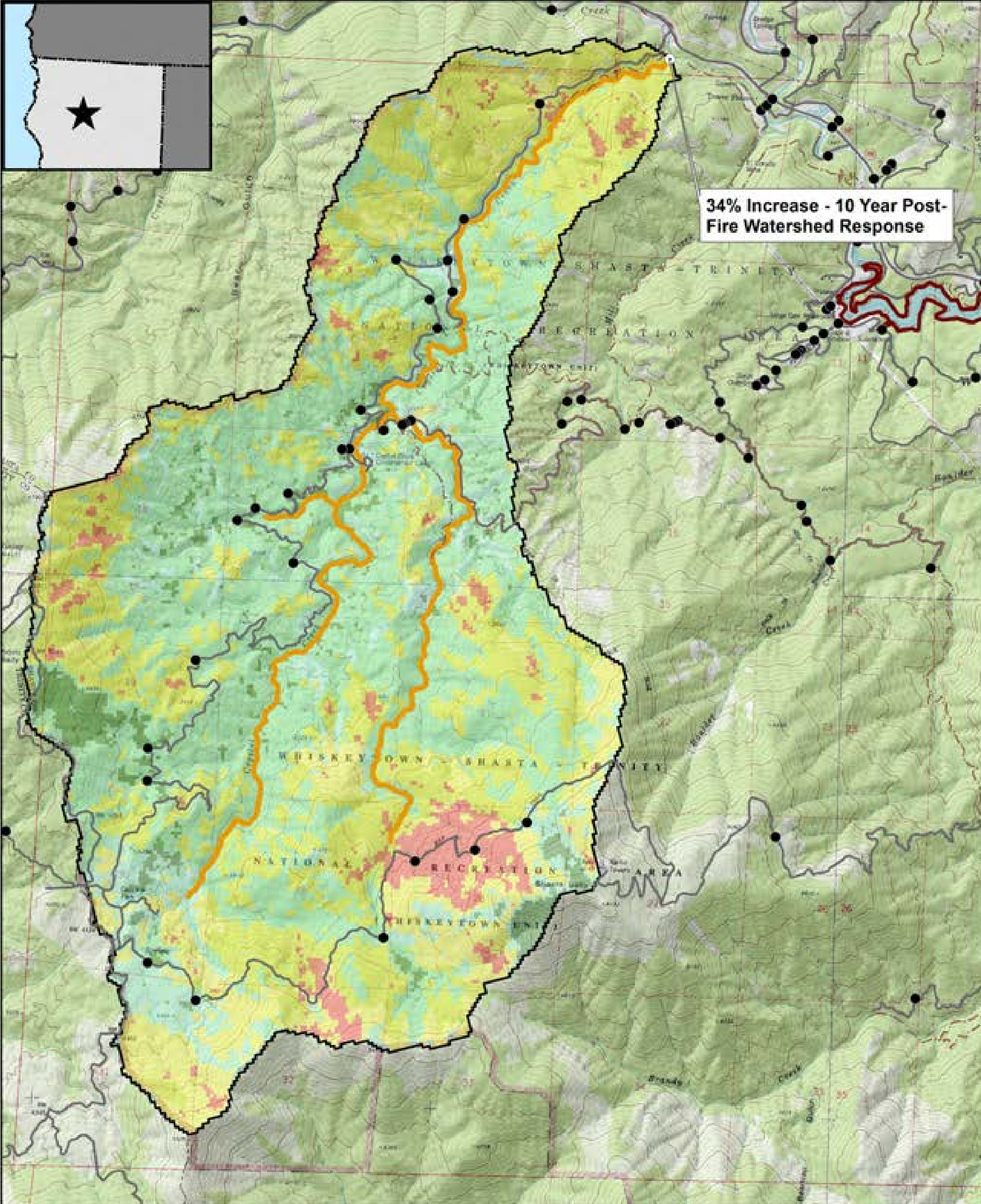
GIS Map Disclaimer: The information used in these applications were derived from digital databases provided to the DOI BAER team. All efforts were made to provide the best aggregated data possible.





Carr Fire

Crystal Creek Watershed Response



● Culvert	--- Trail	Watershed Response	Soil Burn Severity	Low
○ Value at Risk	— Road	Low	High	Unburned/Very Low
Carr Fire Perimeter		Moderate	Moderate	
		High		

GIS Map Disclaimer: The information used in these applications were derived from digital databases provided to the DOI BAER team. All efforts were made to provide the best aggregated data possible.



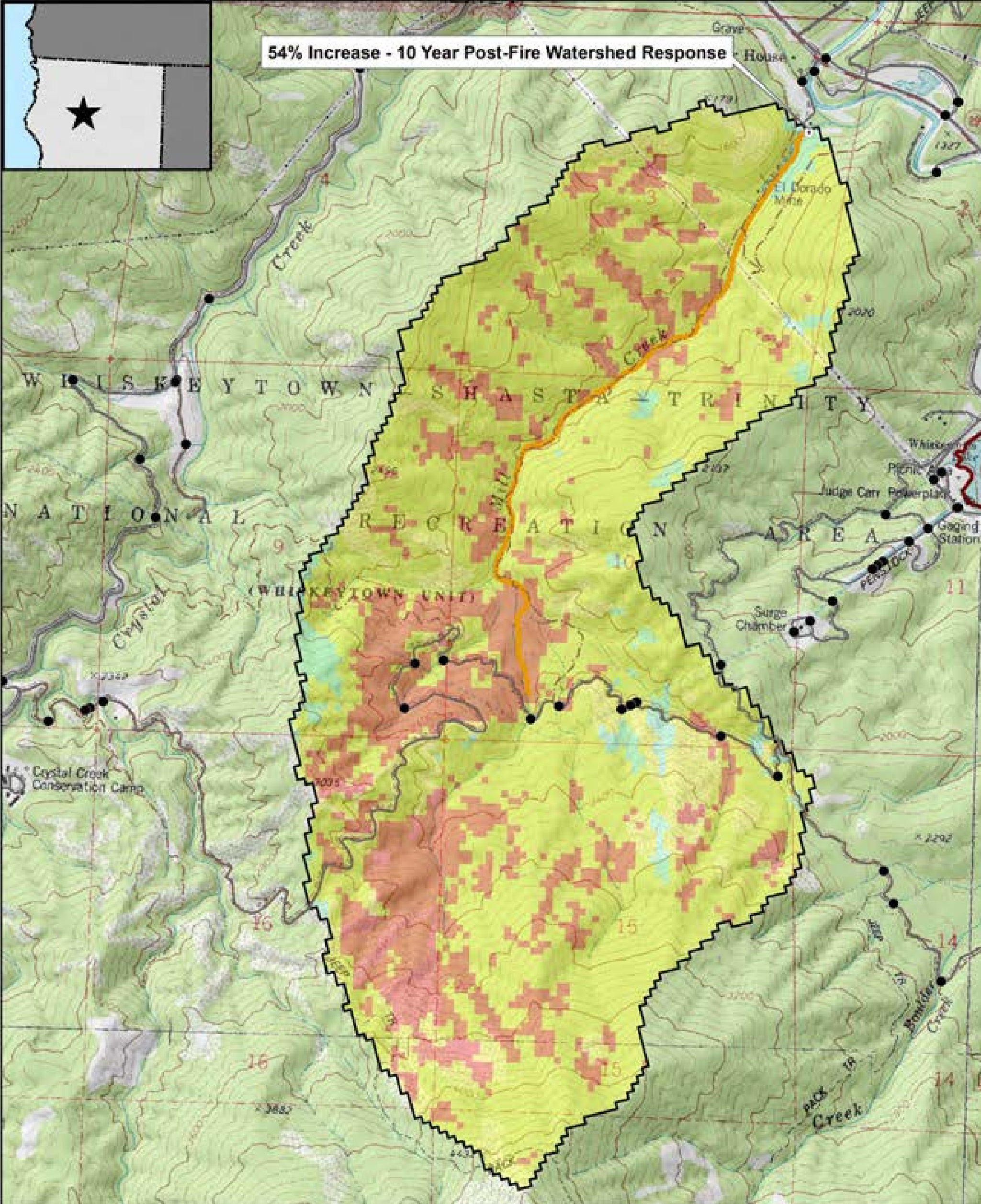


Carr Fire

Mill Creek Watershed Response



54% Increase - 10 Year Post-Fire Watershed Response



● Culvert	--- Trail	Watershed Response	Soil Burn Severity	Low
○ Value at Risk	— Road	Low	High	Unburned/Very Low
▭ Carr Fire Perimeter		Moderate	Moderate	
		High		

GIS Map Disclaimer: The information used in these applications were derived from digital databases provided to the DOI BAER team. All efforts were made to provide the best aggregated data possible.



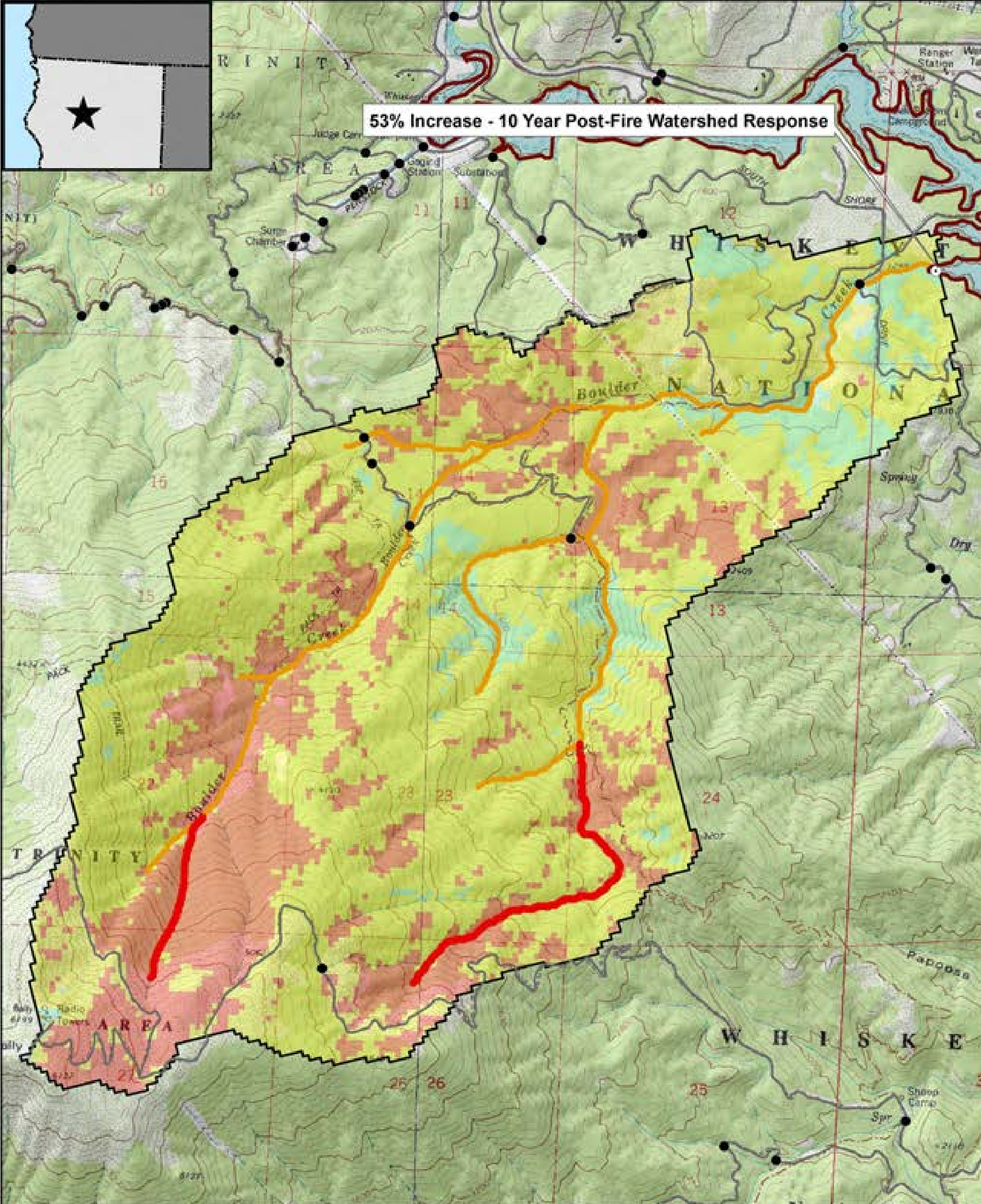


Carr Fire

Boulder Creek Watershed Response



53% Increase - 10 Year Post-Fire Watershed Response



●	Culvert	-----	Trail	Watershed Response	Soil Burn Severity	Low
○	Value at Risk	————	Road	Low	High	Unburned/Very Low
□	Carr Fire Perimeter	————		Moderate	Moderate	
		————		High		

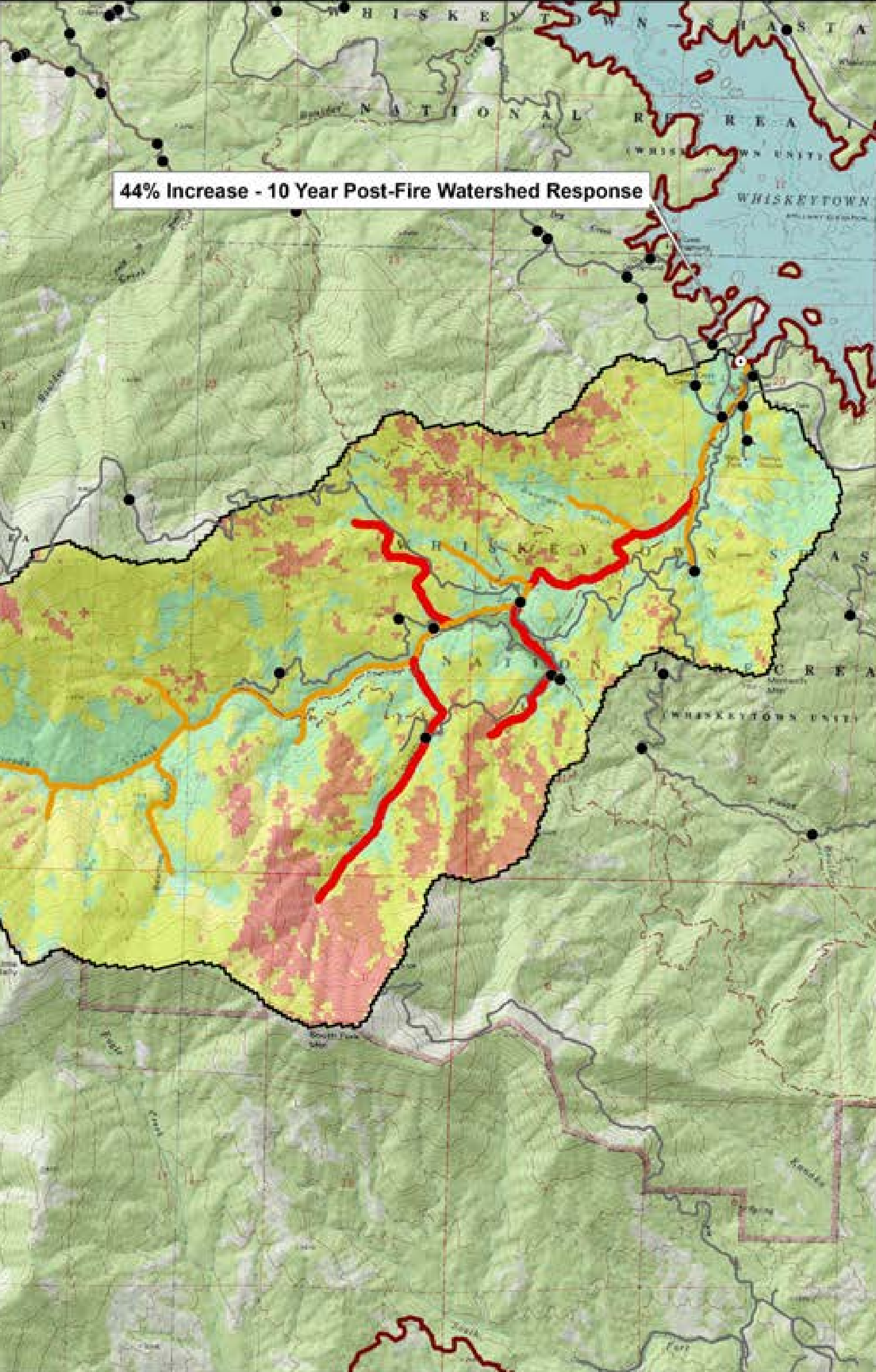
GIS Map Disclaimer: The information used in these applications were derived from digital databases provided to the DOI BAER team. All efforts were made to provide the best aggregated data possible.





Carr Fire

Brandy Creek Watershed Response



44% Increase - 10 Year Post-Fire Watershed Response

● Culvert	--- Trail	Watershed Response	Soil Burn Severity	Low
○ Value at Risk	— Road	Low	High	Unburned/Very Low
▭ Carr Fire Perimeter		Moderate	Moderate	
		High		

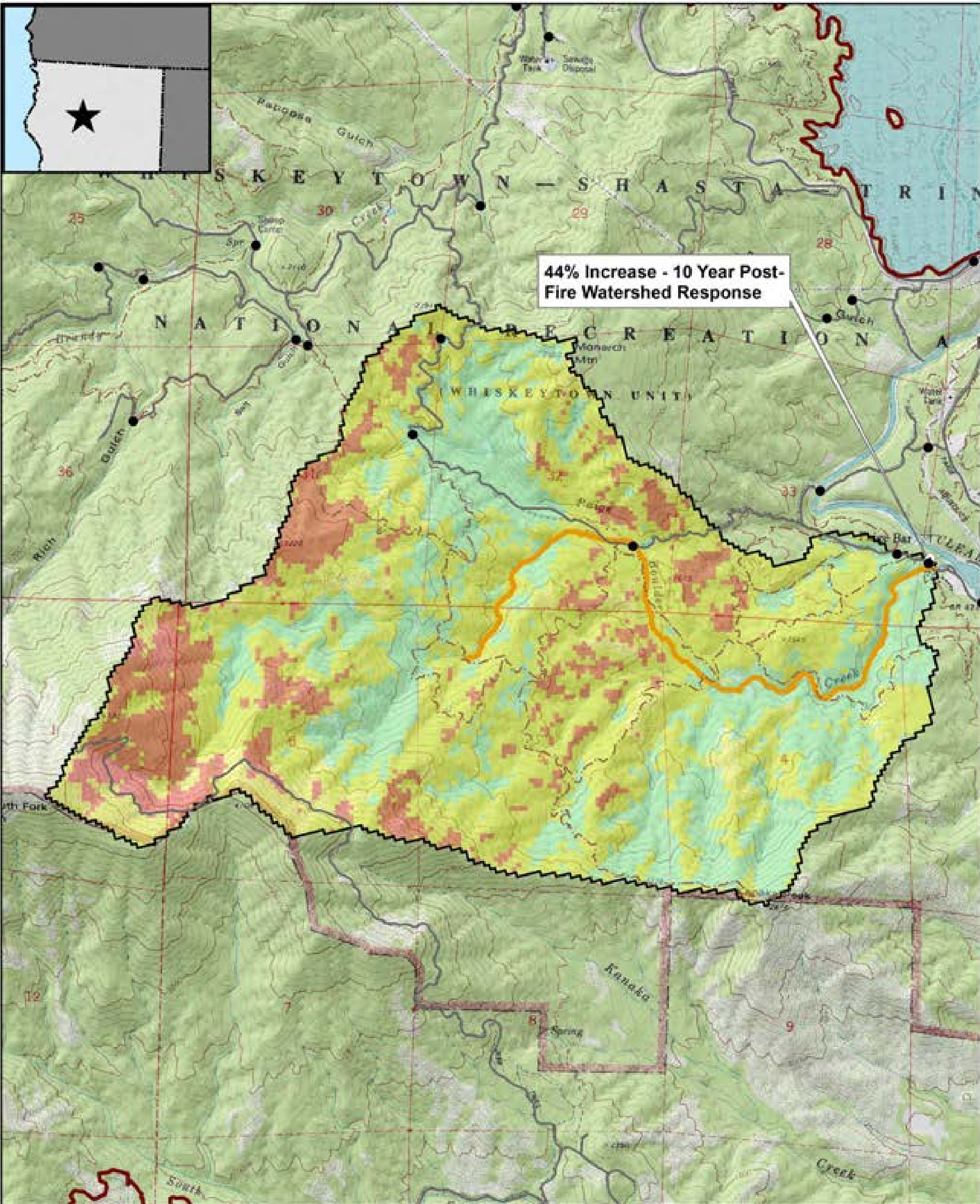
GIS Map Disclaimer: The information used in these applications were derived from digital databases provided to the DOI BAER team. All efforts were made to provide the best aggregated data possible.





Carr Fire

Paige Boulder Creek Watershed Response



44% Increase - 10 Year Post-Fire Watershed Response

● Culvert	--- Trail	Watershed Response	Soil Burn Severity	Low
○ Value at Risk	— Road	Low	High	Unburned/Very Low
▭ Carr Fire Perimeter		Moderate	Moderate	
		High		

GIS Map Disclaimer: The information used in these applications were derived from digital databases provided to the DOI BAER team. All efforts were made to provide the best aggregated data possible.



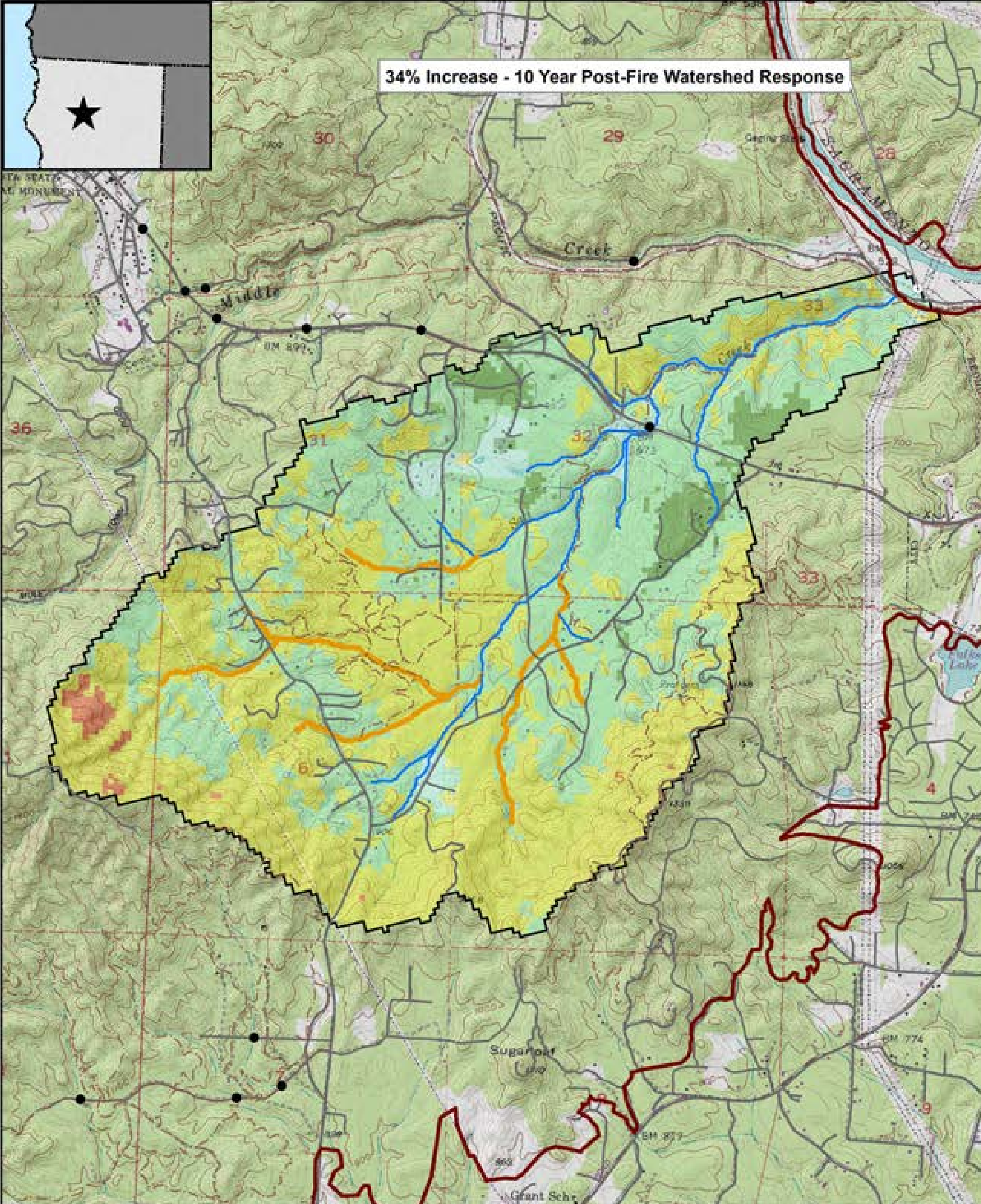


Carr Fire

Salt Creek Watershed Response



34% Increase - 10 Year Post-Fire Watershed Response



● Culvert	--- Trail	Watershed Response	Soil Burn Severity	Low
○ Value at Risk	— Road	Low	High	Unburned/Very Low
▭ Carr Fire Perimeter		Moderate	Moderate	
		High		

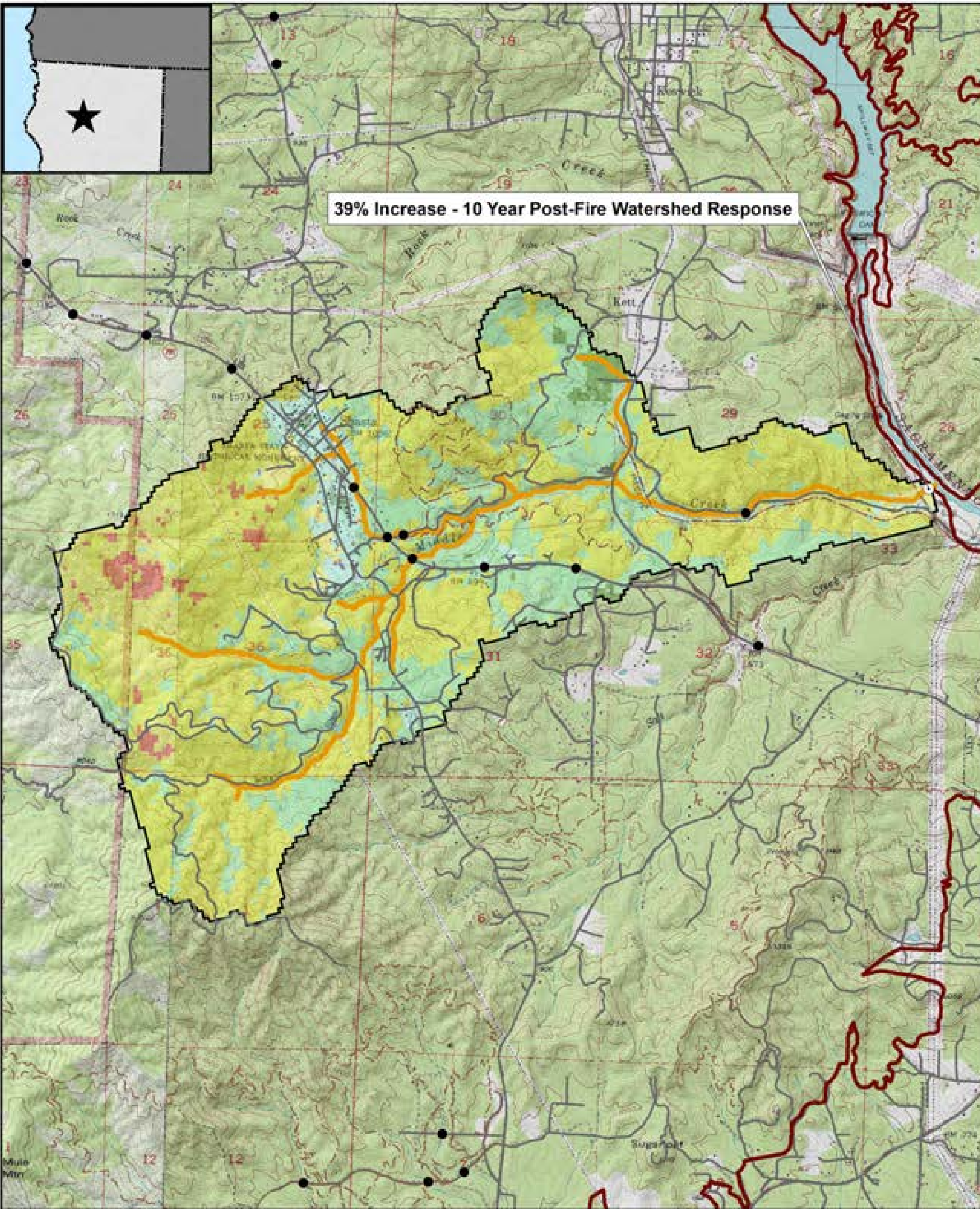
GIS Map Disclaimer: The information used in these applications were derived from digital databases provided to the DOI BAER team. All efforts were made to provide the best aggregated data possible.





Carr Fire

Middle Creek Watershed Response



● Culvert

--- Trail

Watershed Response

Soil Burn Severity

Low

○ Value at Risk

— Road

Low

High

Unburned/Very Low

▭ Carr Fire Perimeter

Moderate

Moderate

High

1:25,000

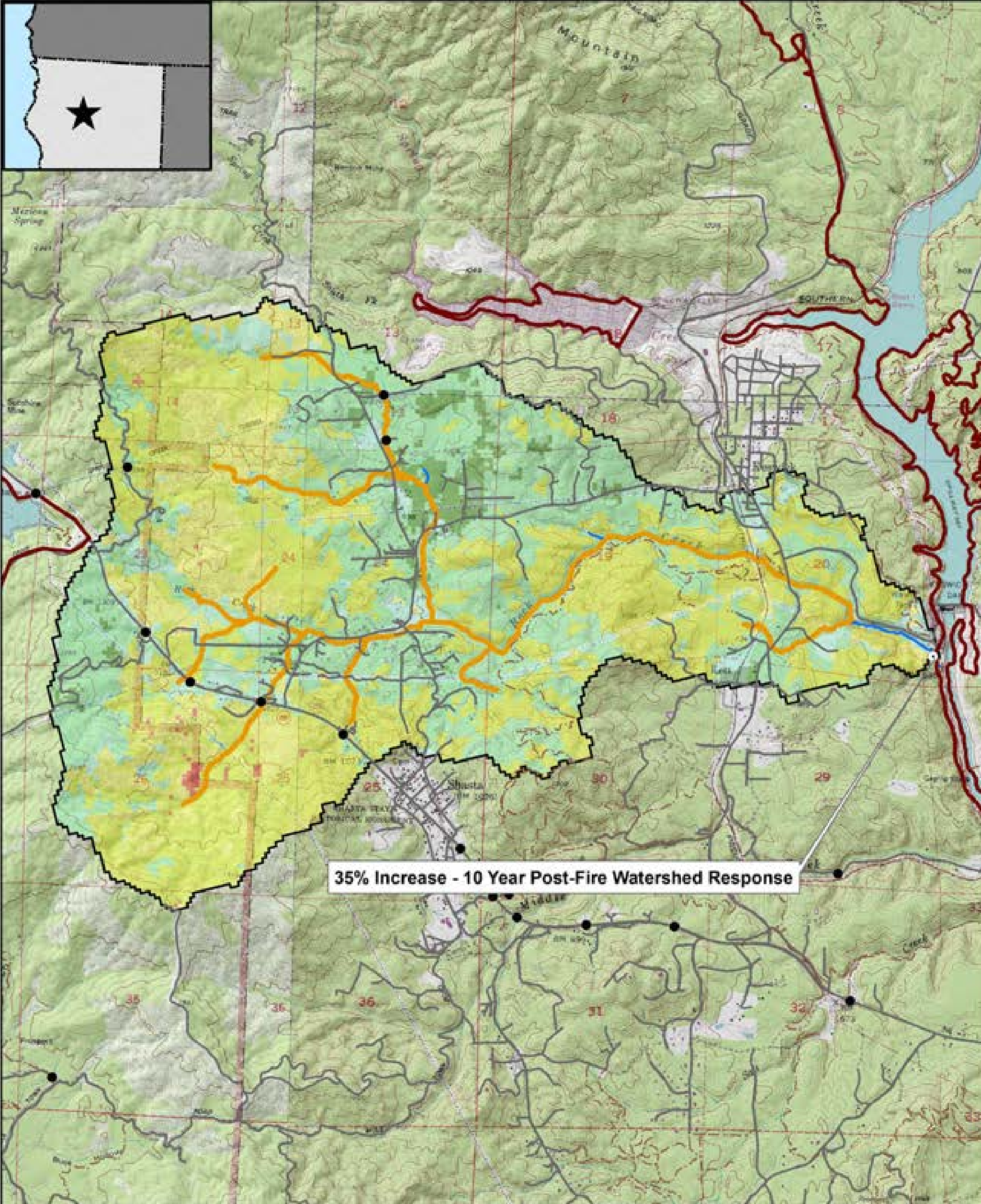
GIS Map Disclaimer: The information used in these applications were derived from digital databases provided to the DOI BAER team. All efforts were made to provide the best aggregated data possible.





Carr Fire

Rock Creek Watershed Response



35% Increase - 10 Year Post-Fire Watershed Response

● Culvert	--- Trail	Watershed Response	Soil Burn Severity	Low
○ Value at Risk	— Road	Low	High	Unburned/Very Low
▭ Carr Fire Perimeter		Moderate	Moderate	
		High		

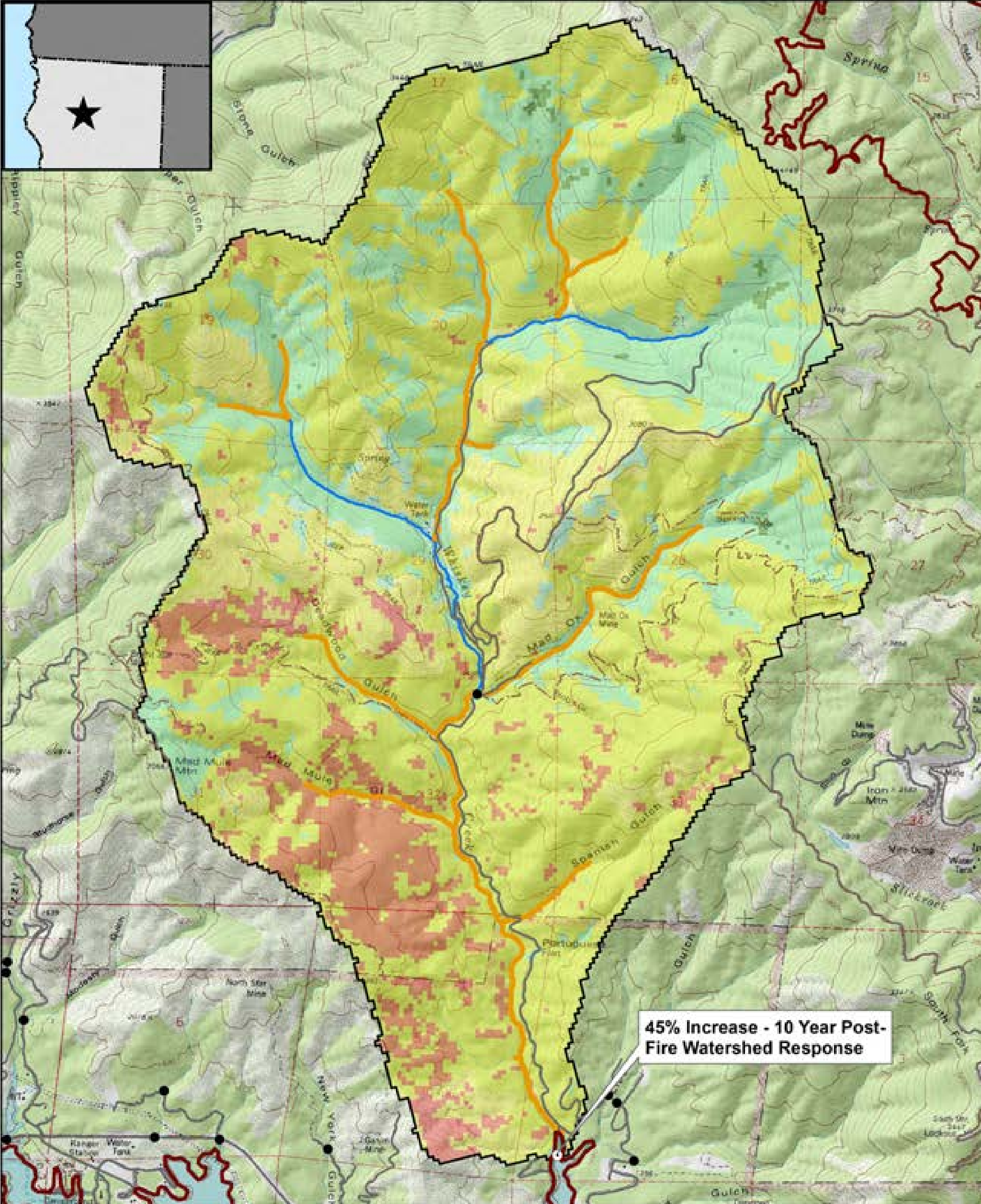
GIS Map Disclaimer: The information used in these applications were derived from digital databases provided to the DOI BAER team. All efforts were made to provide the best aggregated data possible.





Carr Fire

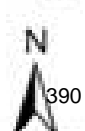
Whiskey Creek Watershed Response



45% Increase - 10 Year Post-Fire Watershed Response

●	Culvert	-----	Trail	Watershed Response	Soil Burn Severity	Low
○	Value at Risk	————	Road	Low	High	Unburned/Very Low
□	Carr Fire Perimeter	————		Moderate	Moderate	
		————		High		

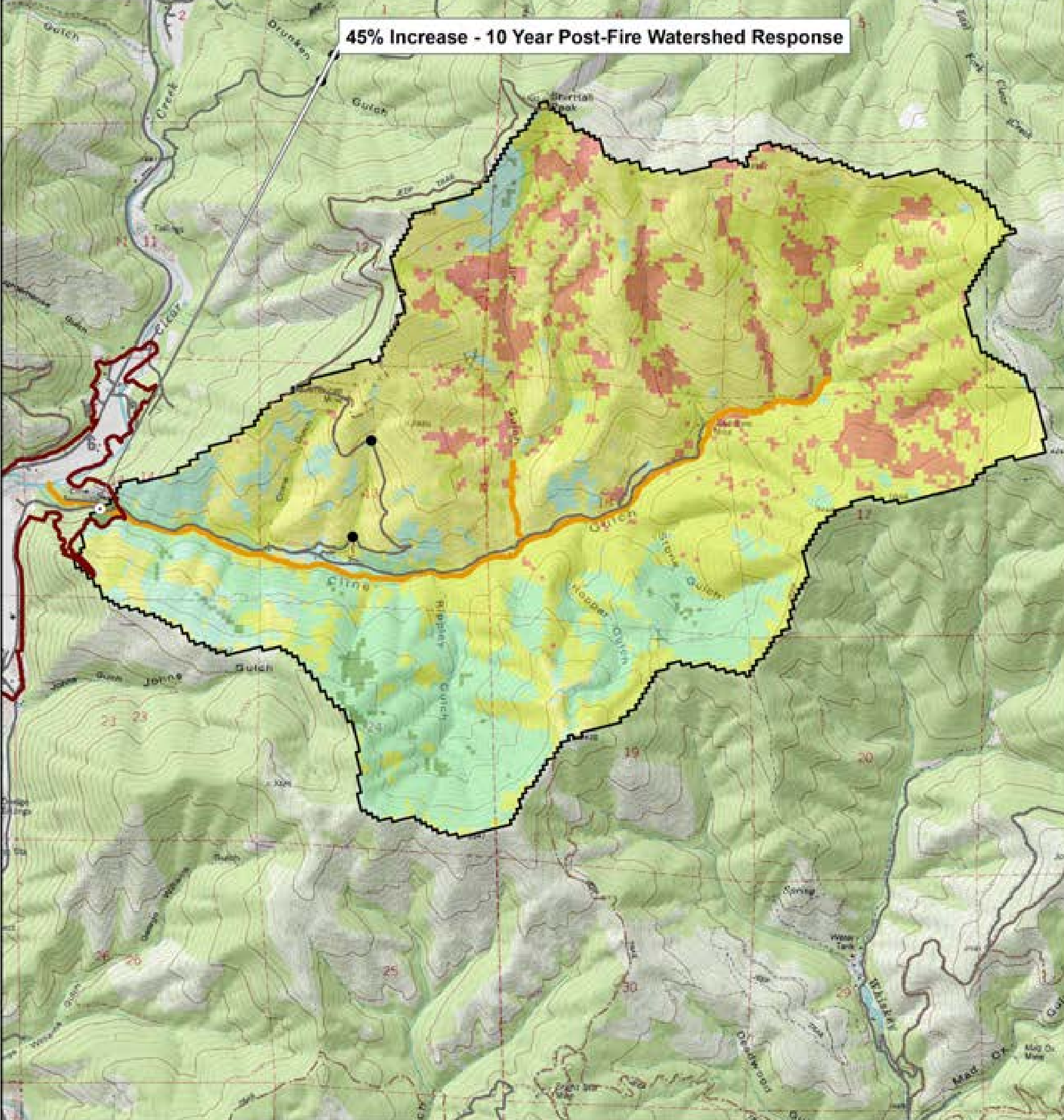
GIS Map Disclaimer: The information used in these applications were derived from digital databases provided to the DOI BAER team. All efforts were made to provide the best aggregated data possible.





Carr Fire

Cline Gulch Watershed Response



● Culvert	--- Trail	Watershed Response	Soil Burn Severity	Low
○ Value at Risk	— Road	Low	High	Unburned/Very Low
▭ Carr Fire Perimeter		Moderate	Moderate	
		High		

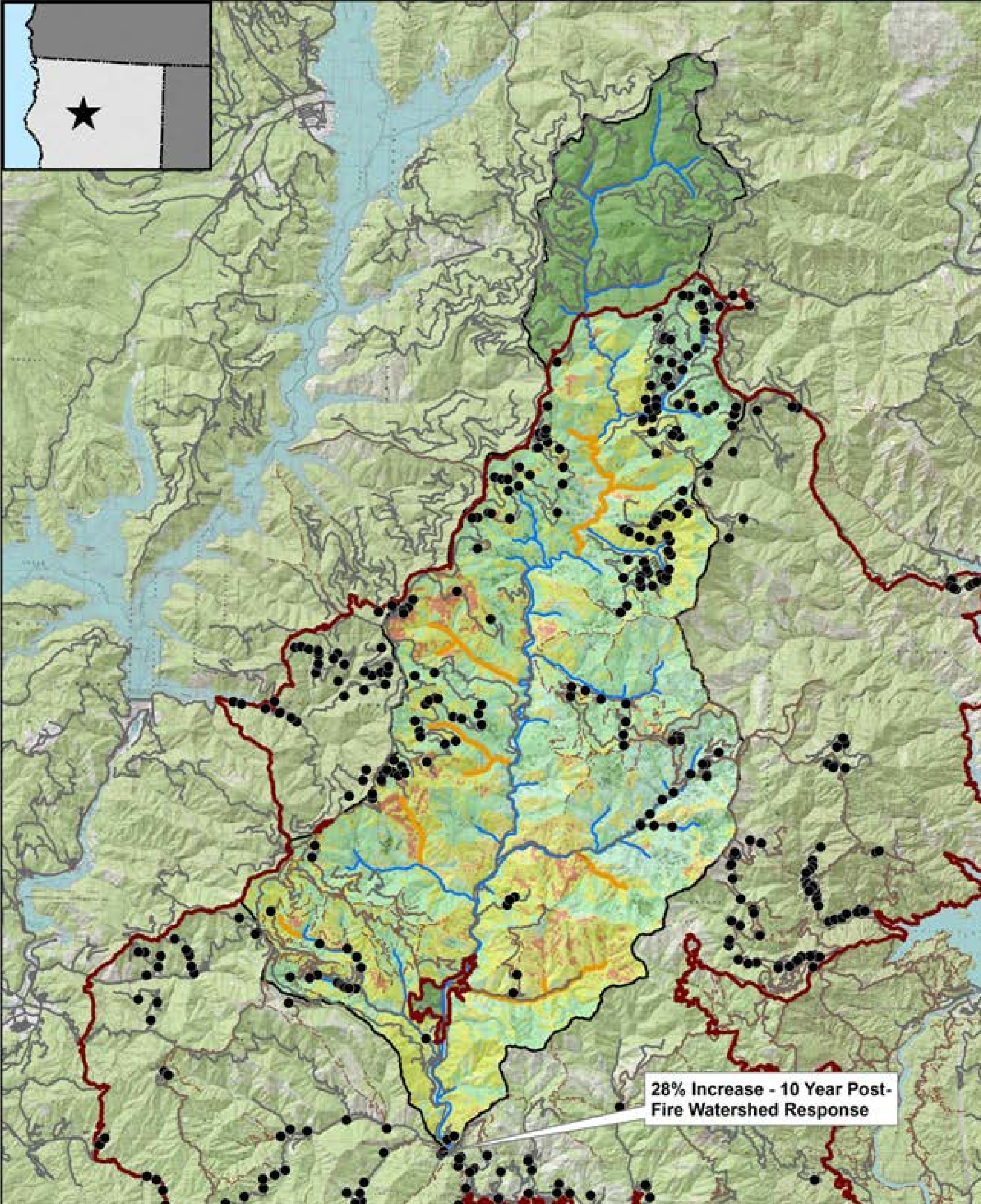
GIS Map Disclaimer: The information used in these applications were derived from digital databases provided to the DOI BAER team. All efforts were made to provide the best aggregated data possible.





Carr Fire

Clear Creek Watershed Response



28% Increase - 10 Year Post-Fire Watershed Response

● Culvert	--- Trail	Watershed Response	Soil Burn Severity	Low
○ Value at Risk	— Road	Low	High	Unburned/Very Low
▭ Carr Fire Perimeter		Moderate	Moderate	
		High		

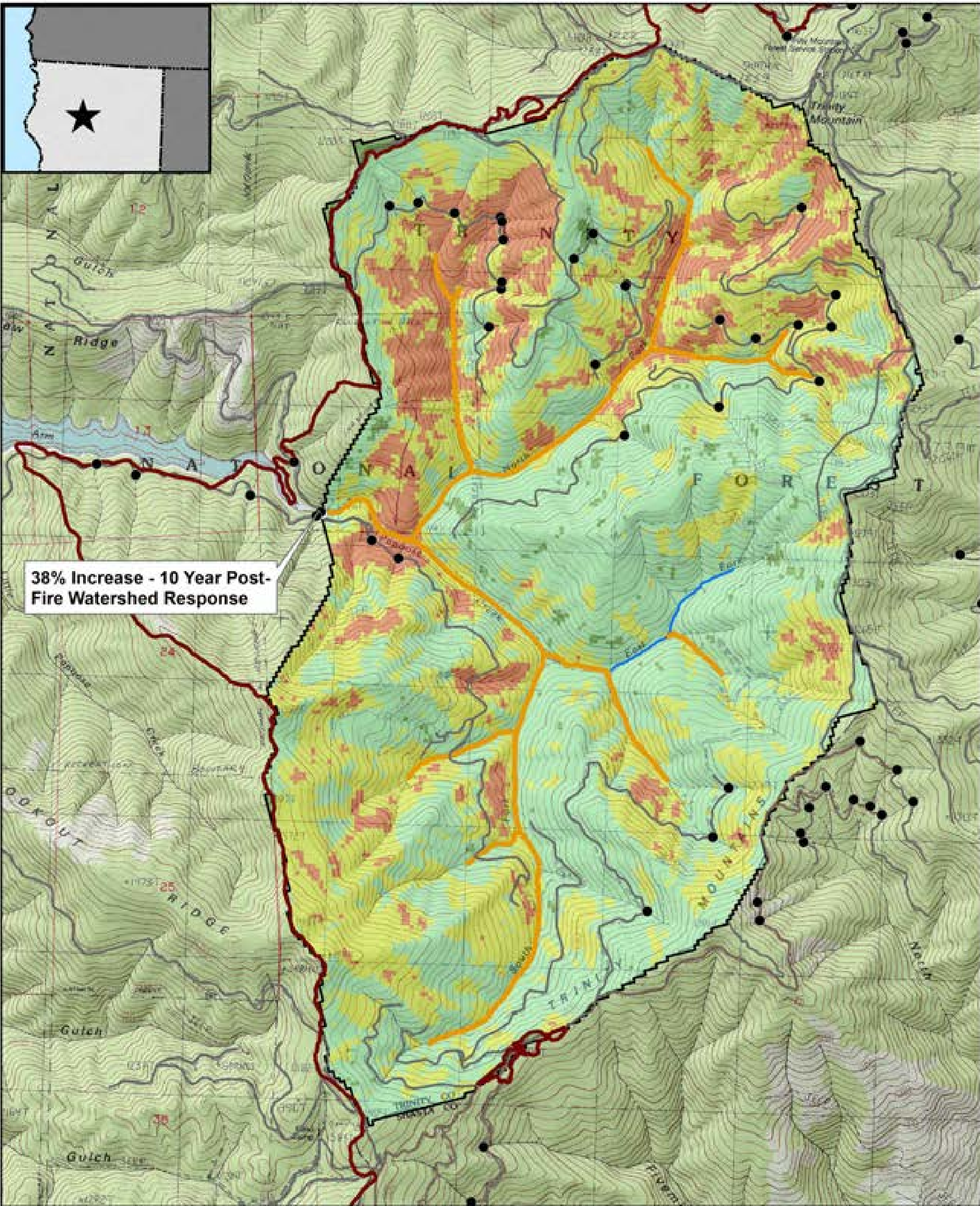
GIS Map Disclaimer: The information used in these applications were derived from digital databases provided to the DOI BAER team. All efforts were made to provide the best aggregated data possible.





Carr Fire

Papoose Creek Watershed Response



38% Increase - 10 Year Post-Fire Watershed Response

● Culvert	--- Trail	Watershed Response	Soil Burn Severity	Low
○ Value at Risk	— Road	Low	High	Unburned/Very Low
▭ Carr Fire Perimeter		Moderate	Moderate	
		High		

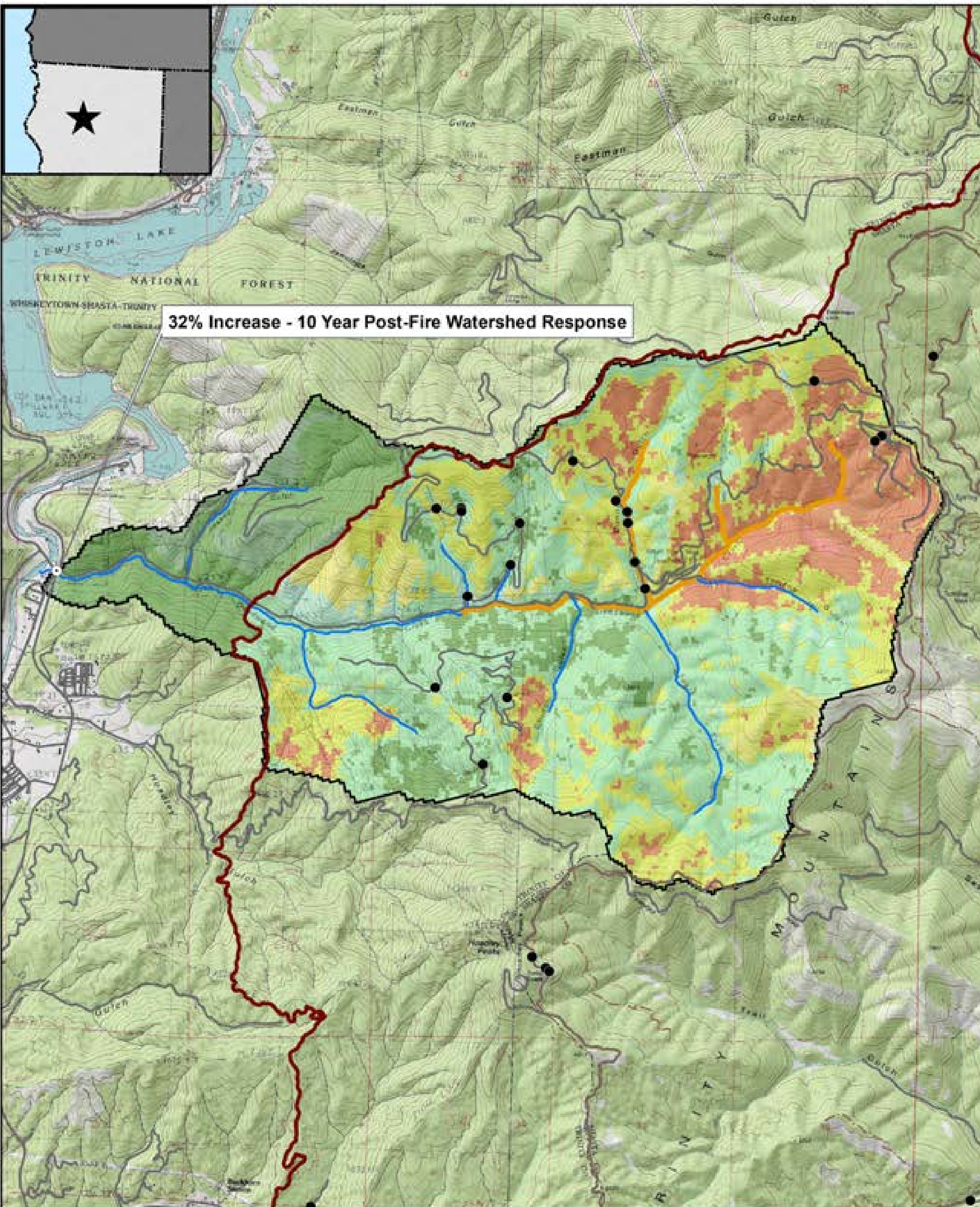
GIS Map Disclaimer: The information used in these applications were derived from digital databases provided to the DOI BAER team. All efforts were made to provide the best aggregated data possible.





Carr Fire

Deadwood Creek Watershed Response



32% Increase - 10 Year Post-Fire Watershed Response

●	Culvert	-----	Trail	Watershed Response	Soil Burn Severity	Low
○	Value at Risk	————	Road	Low	High	Unburned/Very Low
□	Carr Fire Perimeter	————		Moderate	Moderate	
		————		High		

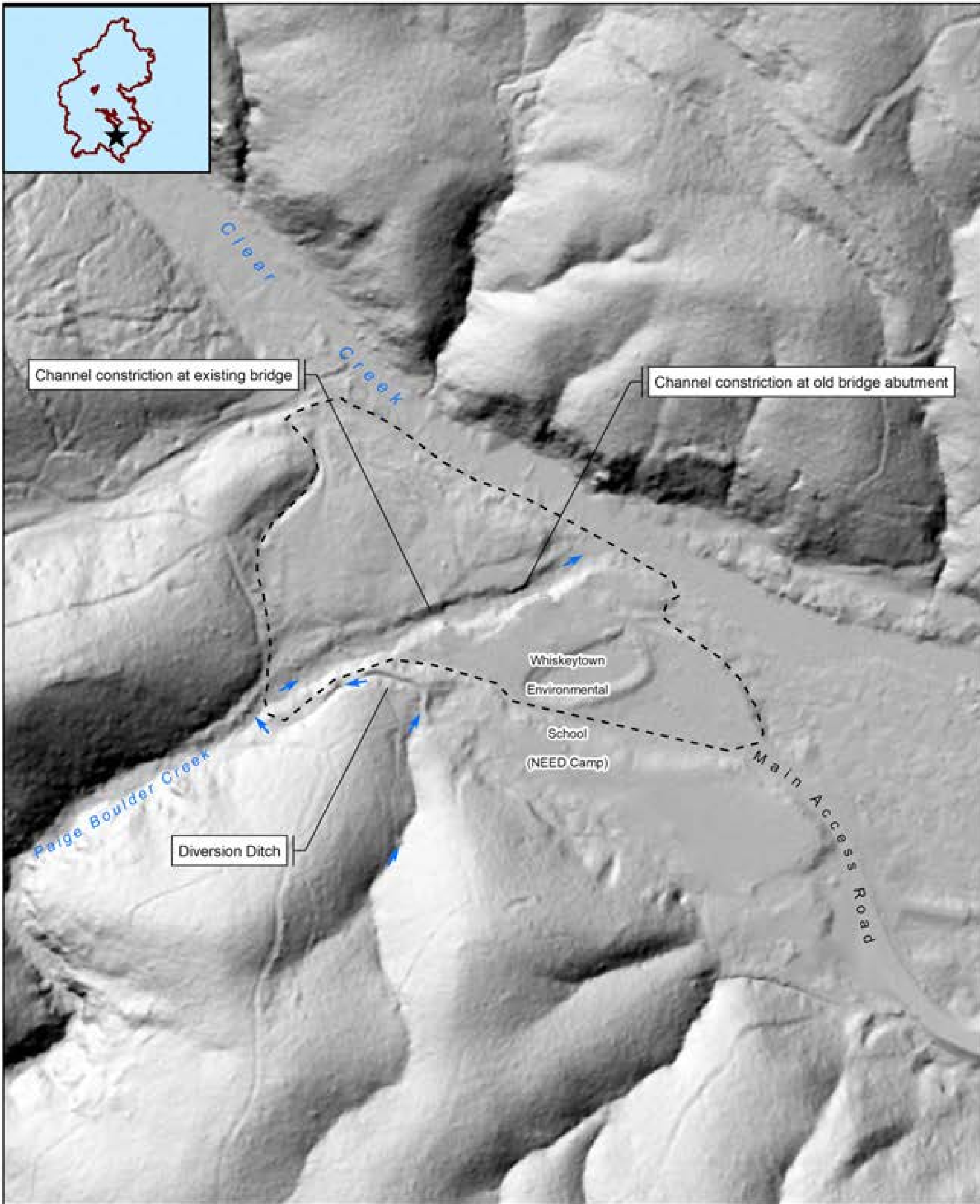
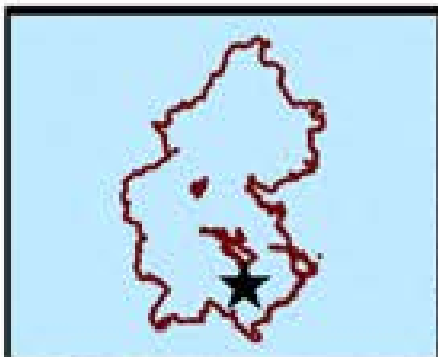
GIS Map Disclaimer: The information used in these applications were derived from digital databases provided to the DOI BAER team. All efforts were made to provide the best aggregated data possible.





Carr Fire

NEED Camp Geologic & Hydrologic Hazards



Stream Flow



Debris Flow Deposits

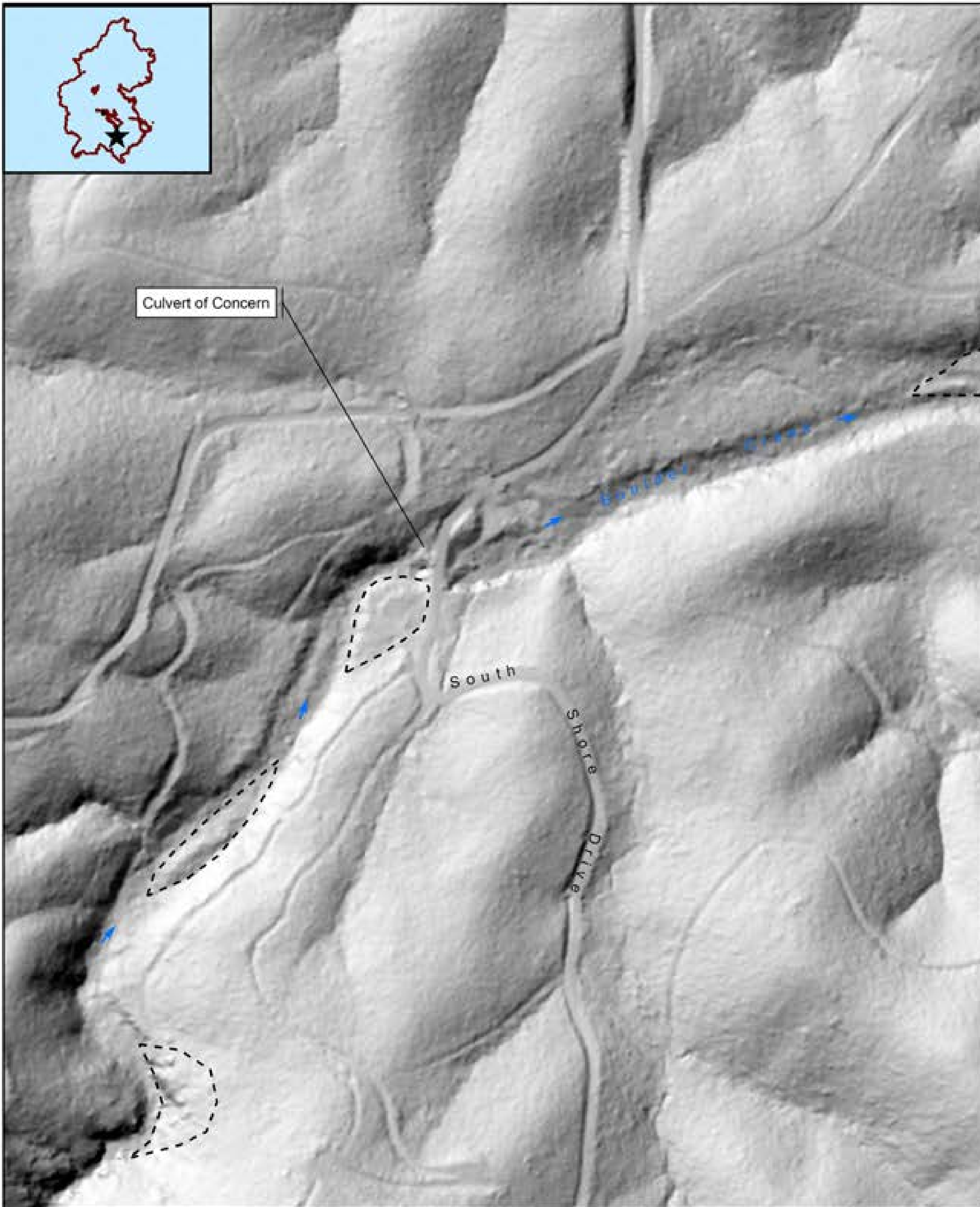
GIS Map Disclaimer: The information used in these applications were derived from digital databases provided to the DOI BAER team. All efforts were made to provide the best aggregated data possible.





Carr Fire

Boulder Creek Geologic & Hydrologic Hazards



Stream Flow



Debris Flow Deposits

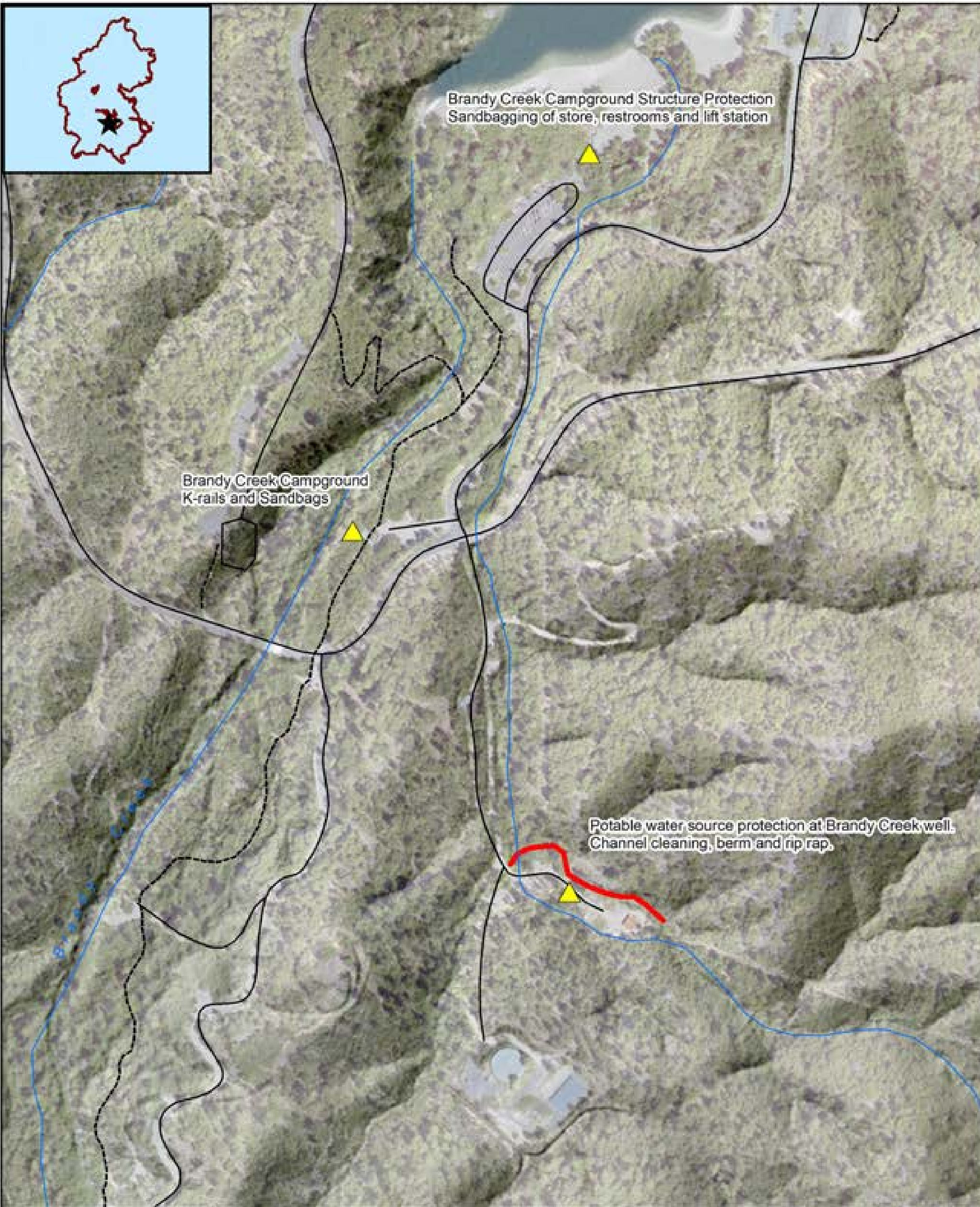
GIS Map Disclaimer: The information used in these applications were derived from digital databases provided to the DOI BAER team. All efforts were made to provide the best aggregated data possible.





Carr Fire

Brandy Creek Watershed Treatments



- Trail
- Road
- Treatment
- ▲ Value at Risk

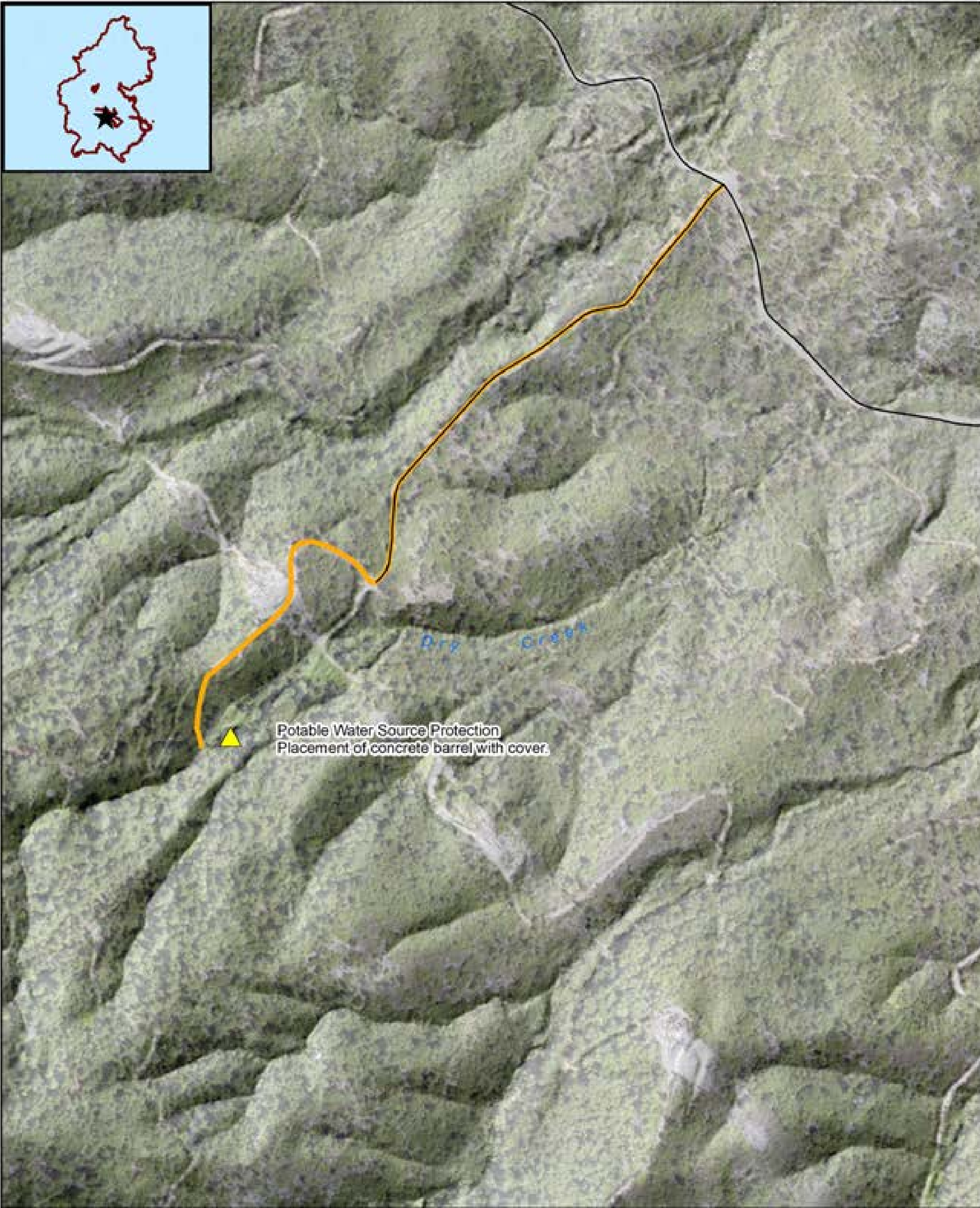
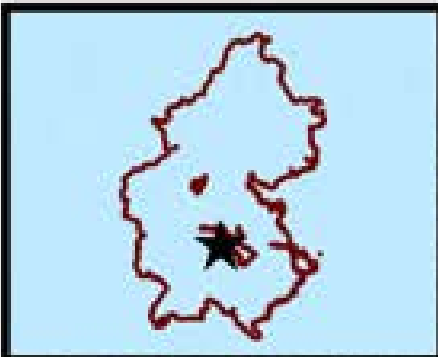
GIS Map Disclaimer: The information used in these applications were derived from digital databases provided to the DOI BAER team. All efforts were made to provide the best aggregated data possible.





Carr Fire

Dry Creek Spring Watershed Treatments



- Trail
- Road
- Storm Patrol
- ▲ Value at Risk

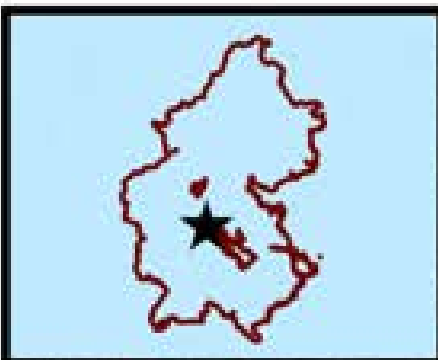
GIS Map Disclaimer: The information used in these applications were derived from digital databases provided to the DOI BAER team. All efforts were made to provide the best aggregated data possible.





Carr Fire

Bull Gulch Watershed Treatments



-  Trail
-  Road
-  Storm Patrol
-  Value at Risk

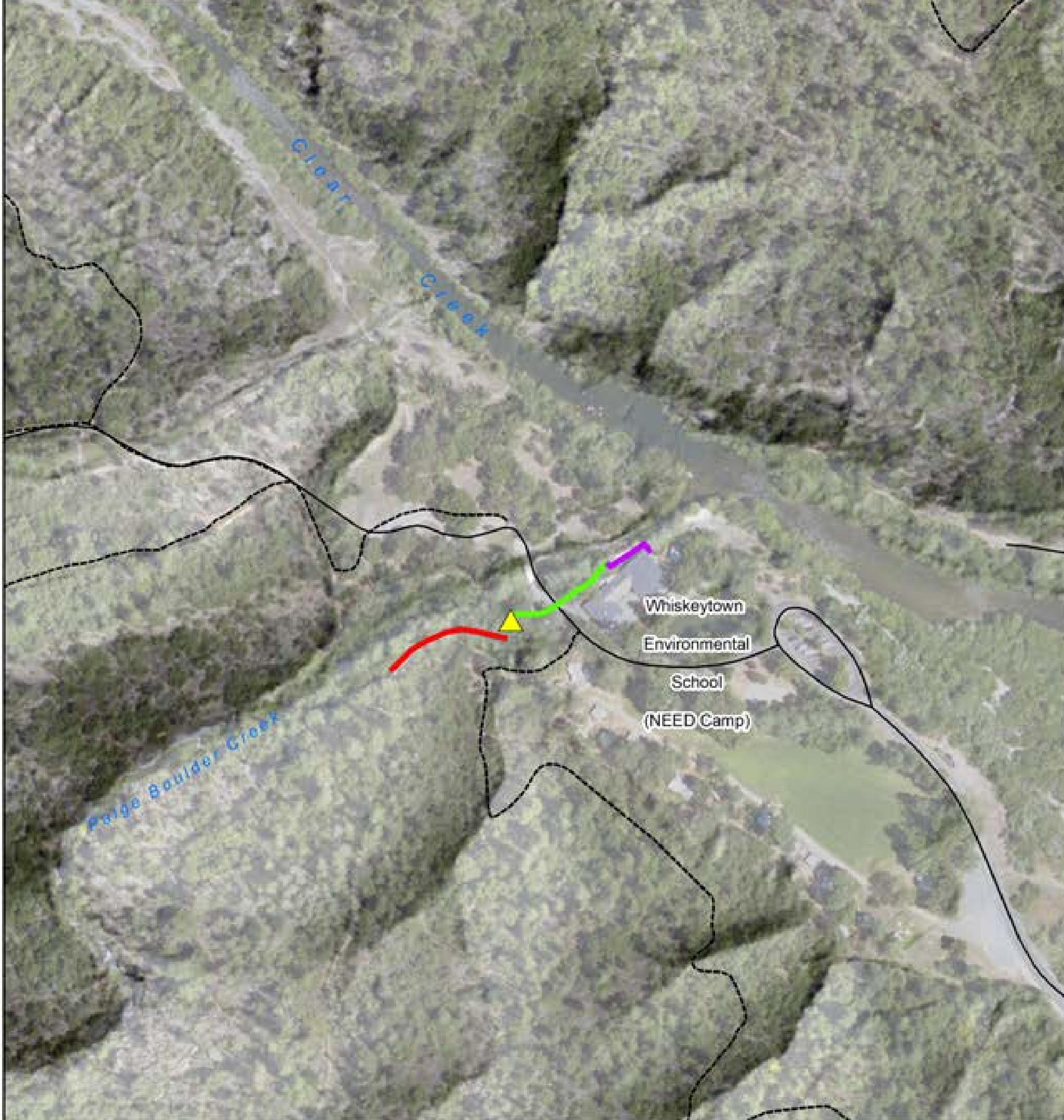
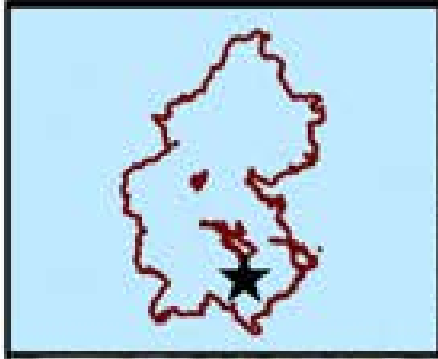
GIS Map Disclaimer: The information used in these applications were derived from digital databases provided to the DOI BAER team. All efforts were made to provide the best aggregated data possible.





Carr Fire

Paige Boulder Creek Watershed Treatments



Treatment

-  Channel Cleaning
-  Sandbags
-  Structure Protection - Hesco Baskets

-  Berm Repair
-  Trail
-  Road

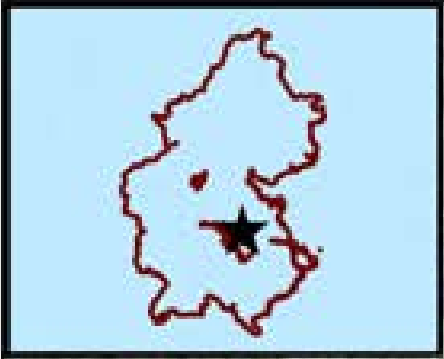
GIS Map Disclaimer: The information used in these applications were derived from digital databases provided to the DOI BAER team. All efforts were made to provide the best aggregated data possible.





Carr Fire

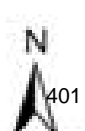
Whiskey Creek Watershed Treatments



Potable Water Source Protection
K-rail well pad

- Trail
- Road
- Storm Patrol
- ▲ Value at Risk

GIS Map Disclaimer: The information used in these applications were derived from digital databases provided to the DOI BAER team. All efforts were made to provide the best aggregated data possible.





August 2018
NPS BAER TEAM

