

Fisheries Specialist Report
King Fire Burned Area Emergency Response (BAER) Assessment
Eldorado National Forest
Final Specialist Report

Resource Specialty: Aquatic Species and Habitat

Fire Name: King Fire

Month/Year: October, 2014

Author Name and Home Unit: Dan Teater - Fisheries biologist, Tahoe National Forest

I. Resource Condition Assessment

A. Resource Setting

This rapid aquatic analysis is based on site-specific and aerial review between October 6th thru 11th, 2014. Due to time constraints, every effort was made to visit high priority fisheries and aquatic habitat sites in the field. Areas with high to moderate burn severity were the focused area for this assessment on National Forest Lands to effectively evaluate impacts within the fire perimeter.

The King fire started on September 13, 2014. The fire was driven by steep terrain, low relative humidity, and wind. The fire spread quickly up the Rubicon River and surrounding drainages eventually reaching approximately 97,717 acres. The King Fire burned several tributaries to the South Fork American River and the Rubicon River (a tributary to the Middle Fork American River) subwatersheds. The area is characterized by steep, rocky, mountainous canyons, and gentle lahar ridges. A significant percentage of this area burned intensely, consuming all organic duff on the soil surface along with leaves and needles on standing live vegetation. Approximately 46% of the burn area burned at a high and moderate soil burn severity. The rest of the fire was either low or very low soil burn severity with unburned areas within the fire perimeter.

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

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

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

flows. Debris flows may trigger well before the peak rainfall amount falls during a long duration winter storm.

The Eldorado National Forest GIS data shows 101.5 miles of perennial channels, 60 miles of regulated perennial channels, 133.2 miles of intermittent channels, and 5.4 miles of canals within the King Fire area. A total of 305.1 miles of streams and waterbodies were affected by the incident and within the fire perimeter.

Elevation ranges from 1,900-7,200 feet. Methods used to determine burn severity are described in the BAER soils report. Areas of moderate to high burn severity have the greatest potential to move sediment into stream systems and impact fisheries or other aquatic resources. Aquatic habitat and biota would be affected by such movement due to turbidity affects on water quality, and from loss of habitat due to sediment accumulation in pools and riffles. Sedimentation may also reduce the productivity of the stream system through effects on macroinvertebrates and reduce availability of spawning habitat.

Process/Methodology

Information for this assessment was based on a review of relevant research publications and literature including sightings and habitat records from Eldorado N.F, California Department of Fish and Game (CDFG) and personal communication with local experts from each of these agencies.

Consultation

Dan Teater (TNF) initiated consultation with John Hanson, CDFW, Environmental Scientist, Region 2 Heritage and Wild Trout Program Manager on October 7th 2014. In addition, personal communication with Jann Williams, Eldorado National Forest Fisheries Biologist occurred throughout the assignment.

B. Critical Values at Risk Prior existing conditions and Findings of the On-the-Ground Surveys

- Rubicon River fish populations and the Fish and Game Commission Designated Wild Trout Water.
- Two Federally listed Amphibian species, California Red-legged frog and Sierra Nevada yellow legged frog populations.

Table 1 below summarizes the acres of burn severity over the entire King Fire area. Included in the table are acres with private land as well as both the Eldorado and Tahoe National Forest's.

Table 1. Acres of burn severity over the entire King Fire area.

Soil Burn Severity	Acres				% within the Fire Perimeter
	Private	Eldorado National Forest	Tahoe National Forest	Grand Total	
High	7,219	14,857	11	22,087	23%
Moderate	8,117	14,542	40	22,699	23%
Low	10,108	20,327	92	30,527	31%
Unburned/Very Low	8,461	13,810	133	22,404	23%
Grand Total	33,893	63,536	276	97,717	100%

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Much of the following synopsis has been excerpted from Rubicon River Wild Trout Management Plan (CDFG, 1979), Placer County Water Agency (PCWA) Middle Fork American River Project (FERC No. 2079) and Inland Fishes Of California (Moyle 2002).

Federally Listed Species

No T&E species are present within the King Fire perimeter

II. Risk Assessment

Status and distribution

Much of the following synopsis has been excerpted from Rubicon River Wild Trout Management Plan (CDFG, 1979), Placer County Water Agency Middle Fork American River Project (FERC No. 2079) and Inland Fishes Of California (Moyle 2002).

For aquatic species, post-fire impacts will include compromised water quality and changes in water chemistry due to ash delivery, changes in water temperature from loss of canopy shading, scouring of riparian/aquatic vegetation, changes in pool habitat due to geomorphic bed movement, sediment delivery and flushing of species during flood events downstream. These combined impacts may lead to a temporary loss or reduction of suitable stream habitat to salmonid populations in particular in the Rubicon River and all fish bearing streams within the fire perimeter. For all species, there is a concern that until enough vegetative recovery has occurred habitat degradation will continue.

Rubicon River

The Rubicon River is a Fish and Game Commission designated Wild Trout River. The designated wild trout section of the river is 30 miles long extending from Hell Hole Reservoir downstream to the Middle Fork American River at the confluence of Oxbow Reservoir. Rainbow trout are the only resident game fish native to the Rubicon River drainage. Anadromous spring-run Chinook salmon and steelhead utilized the lower reaches of the Rubicon River (below Pilot Creek) for spawning before construction of dams on the lower American River. Six species of native nongame fish occur in the wild trout section of the Rubicon River: Sacramento sucker, speckled dace, river sculpin, California roach, Sacramento pike minnow and Forest Service listed sensitive hardhead. Brown, golden, and brook trout have all been introduced to the Rubicon River system. Brown trout occur throughout the Rubicon River and in large tributaries and lakes upstream from Hell Hole Reservoir. Golden and brook trout have been planted in several headwater lakes; however, neither has been observed with the wild trout area.

Trout Habitat

Elevation within the King Fire ranged from 1,900-7,200 feet. Maximum summer water temperatures range from 48°F at the upper end of the wild trout area to 84°F near the lower end. Water temperatures during the summer are generally less than 65°F upstream of Ellicott Bridge and less than 75°F within the gorge. The temperature regime in the Rubicon River creates a

transition fishery with a most of the native warm water species holding on the lower end of the system and salmonids dominating the upper reaches (see figure 2).

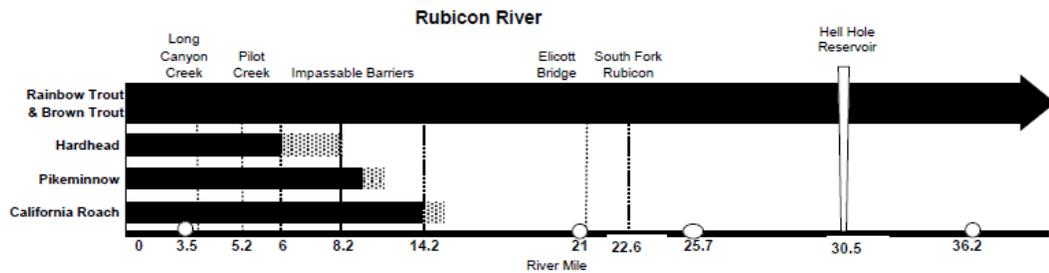


Figure 1. Fish Species Distribution on the Rubicon River (PCWA 210).

Cover consists primarily of deep pools, shelving rocks, and surface turbulence which become scarce during low flow period. Much of the canopy cover has been lost as a result of the King Fire; however a thin strip of riparian vegetation has remained intact (see Figure 1). Spawning gravel in the Rubicon River is reduced by the influence of Hell Hole Reservoir, however young of the year (YOY) trout observed in 2007 (PCWA) indicate that spawning gravel availability is not limiting trout production (see figure 2). Within the King Fire perimeter 23.1 miles of the Rubicon River burned, although 20 miles burned at a low to very low burn severity along the riparian corridor (See table 2). However the highest and longest area of high burn severity occurred largely in the Rubicon River Watershed. More recent work has been conducted by Placer County Water Agency during the Middle Fork American River Project (FERC No. 2079).

Table 2. Miles of Rubicon River burned and associated soil burn severity

Rubicon River	Total 23.1
High	1.1
Low	11.4
Moderate	3.8
Unburned/Very Low	6.6
(blank)	0.1

The Rubicon River was visited on October 6th, 7th, and 9th 2014. A helicopter flight was requested on October 7th to evaluate the post fire condition of the riparian vegetation and overall fire effects to habitat along the entire reach of the Rubicon River. The riparian corridor has remained intact overall, with isolated sections of burned stream banks along the mainstem. White alder observed along the Rubicon River was not completely denuded but experienced long exposure to fire. The remaining standing riparian vegetation will provide short term canopy cover and help reduce stream temperatures (See Figure 3). Mortality to white alder is expected to occur in the short term however long term recovery is anticipated. The King Fire did not crown into the riparian vegetation for the majority of the corridor so needle cast will provide some ground cover later in the year. There is concern for trout in this drainage given the amount of moderate and high severity in the headwaters providing easy delivery of sediment into the channel (See Soils and Hydrology reports).

The Rubicon River is a transport reach, steep and lacking natural depositional area to trap sediment. As a result of the King Fire sediment may temporarily fill pools and transform available habitat. In the modeled 5 year event, runoff from the burn area in the Rubicon River is expected to increase 67% (see hydrology report). It is expected that most of the fire-related fine sediment that makes it to the Rubicon River will be transported to Oxbow Reservoir.

Trout Populations

Trout population data for the Rubicon River in 1979 is limited to methodologies obtained from underwater observations and electrofishing made upstream of Ellicott Bridge. Population estimates for trout greater than 6 inches long from that data ranged from 50 trout per mile (Hell Hole to Parsley Bar) to 900 fish per mile (Ellicott Bridge area to Pilot Creek). More recent work has been conducted by Placer County Water Agency during the Middle Fork American River Project (FERC No. 2079). Four sampling sites were selected as part of the relicensing process. The lower Rubicon River site (R3.5) had the fastest growth rates of trout in the project and typically the largest fish of each age class. Quantitative densities of fish species ranged from 4 brown trout per mile (at River Mile 3.5) to 1,688 rainbow trout per mile (River Mile 25.7 just upstream of Ellicott Bridge). A total of 60% of the rainbow trout collected in 2007 (RM 25.7) were young of the year. Adult and juvenile fish were observed actively feeding above Ellicott Bridge on October 9th.

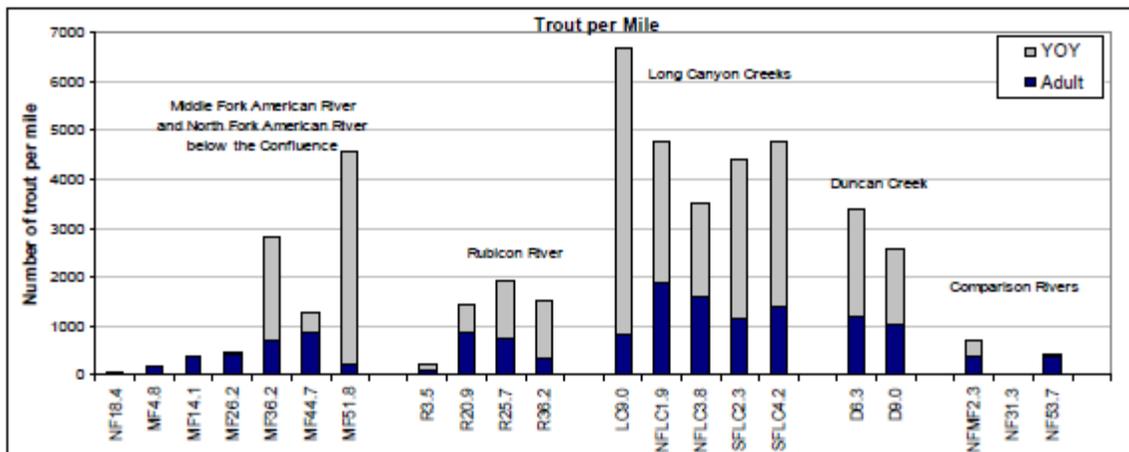


Figure 2. The 2007 Density and Biomass of Trout in the Rubicon River (PCWA 2010).

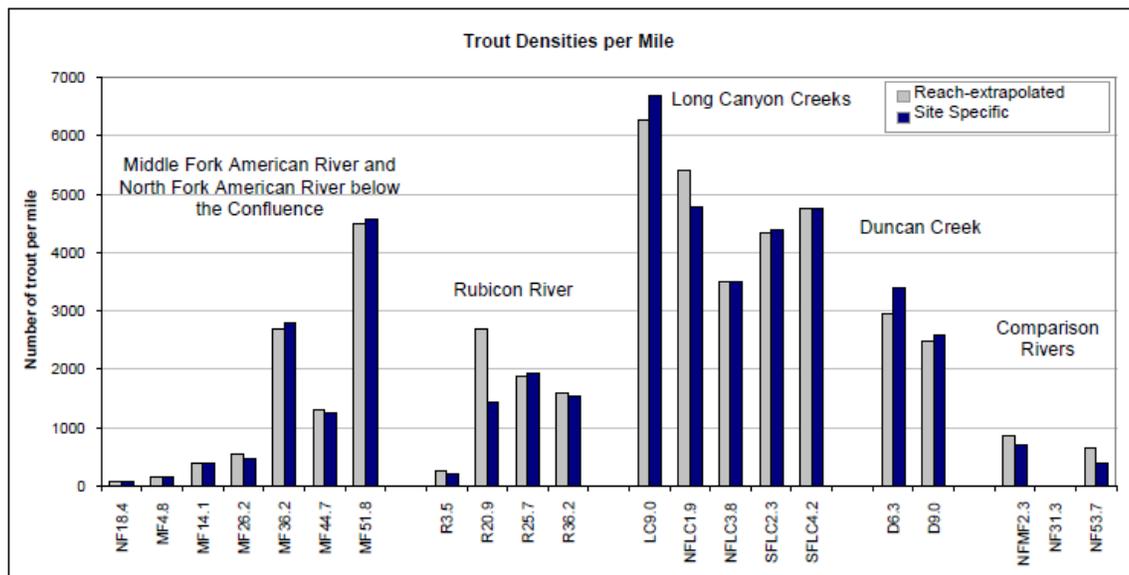


Figure 3. 2007 Trout Densities Using Reach-Extrapolated and Site-Specific Population Estimates (PCWA 2010).



Figure 4. Representative Photograph of the Rubicon River showing a narrow band of intact riparian vegetation. Standing trees will provide post fire bank stability and canopy cover. Photo taken on October 7th 2014.

Threatened and Endangered Amphibian Habitat

Intermediate risk to native threatened and endangered (T&E) amphibian habitat and populations exists within the King Fire perimeter. The area affected by the King Fire supports important potentially suitable habitats of two federally listed amphibians. The following two species of amphibians were of particular concern during the incident. The California red-legged frog (CRLF) which is listed as threatened under the Endangered Species Act of 1973. Within the King Fire there are 8,942 acres of potentially suitable habitat for CRLF (see figure 4). In addition the Sierra Nevada yellow-legged frog (SNYLF) was recently listed as endangered by the United States Fish and Wildlife Service and 2,124 acres of potentially suitable habitat exist within the burn perimeter. Proposed designated critical habitat for Sierra Nevada yellow-legged frogs occurs 1.48 miles east of the burn perimeter. There are no known occurrences of threatened or endangered species within or downstream of the King Fire.

Table 3. CRLF and SNYLF Potentially Suitable Habitat and Associated Burn Severities by Acres.

Habitat	SBS	Acres
CRLF Suitable Habitat	High	751.0
CRLF Suitable Habitat	Low	3864.7
CRLF Suitable Habitat	Moderate	1051.7
CRLF Suitable Habitat	Unburned/Very Low	3266.6
Habitat	SBS	Acres
SNYLF Suitable	High	609.9
SNYLF Suitable	Low	525.7
SNYLF Suitable	Moderate	430.3
SNYLF Suitable	Unburned/Very Low	546.7

Figure 5. California Red-legged Frog Potential Suitable Habitat.

Potentially suitable habitat for Californian Red-legged frogs were calculated using <4,000 feet in elevation and within 300 feet of perennial and intermittent water bodies.

Figure 6. California Red-legged Frog Potential Reproductive Habitat.

Productive reproductive habitat included perennial water bodies < or equal to 4,000 feet and less than or equal to 2% gradient.

Figure 7. Sierra Nevada Yellow-legged Frog Potential Suitable Habitat.

Sierra Nevada Yellow-legged frog potentially suitable habitat was calculated using acres > 4,500 feet elevation and within 30 meters of perennial and intermittent water bodies.

Figure 8. United States Fish and Wildlife Service Proposed Sierra Nevada Yellow-legged Frog Critical Habitat.

Fisheries Summary

Fire may result in a large array of direct and indirect effects to salmonid populations in the Rubicon River and surrounding fish bearing streams. Direct effects to these populations will generally occur when high severity burns occur in riparian areas. In the King Fire riparian areas generally burned at low or moderate severity, but some isolated areas within headwater tributaries where it burned more severely were completely denuded of vegetation.

Since some of the drainages burned very hot, fish may have died as a result of water heating, gas exchange or ash loading to streams. It is often difficult to locate fish that have died from a fire since they rot quickly or get eaten by scavengers.

There are some risks associated with water quality from ash and sediment post-fire. This is due to the significant amount of high soil burn severity (23%), moderate burn severity (23%), and large amounts of ash. This ash and sediment poses some risk to downstream water systems and fisheries. High soil burn severity and areas with excessive ash is mostly located in the northern half of the burn area and on steeper slopes.

C. Emergency Determinations

Based on the above assessment of the King Fire it is my determination that an emergency **does** exist for resident trout populations and habitat in the Rubicon River. No threatened or endangered aquatic species are known to occur within the King Fire perimeter, so treatments to address these impacts do not fall within the BAER program.

No identified occurrences of T&E amphibian species are present within the fire perimeter. Mitigation measures to reduce potential impacts to habitat will rely on the roads, trails and soils treatment packages. Based on the above assessment it is my determination that the King Fire and fire suppression activities may affect, but are not likely to adversely affected California red-legged frogs or Sierra Nevada yellow-legged frogs.

Threats to Human Life, Property, and Resources

For all fish and amphibian species, there is a concern that until enough vegetative recovery has occurred habitat degradation will continue. It is likely that trout populations in the fire area will be affected by ash, debris, and accelerated discharge following post fire storm events. There is a possibility that stream flows from the first post-fire runoff producing rain events will have a localized effect on these trout populations however the impacts will be recoverable.

The above threats will be the most acute during the first post-fire rain season from December through March and next summer thunder storms in July/August until burn areas experience new vegetative growth and stream banks stabilize. If significant rain on snow events occur this winter spawning gravels could be filled with sediment in interstitial spaces, causing oxygen deprivation to eggs and young of the year. Post-fire watershed threat should be reduced measurably after two to three years with favorable precipitation. Based on monitoring following the 2002 McNally Fire aquatic habitat conditions stabilized after five years.

D. Treatments to Mitigate the Emergency

Effects of BAER Treatments: The vast scale of the Rubicon River watershed prohibits effective treatment options to adequately reduce potential impacts, however the fisheries resource will benefit from the proposed roads, trails and soils treatment packages. BAER treatments that propose soil, road and trail work would benefit trout by reducing overland flow and sediment delivery to stream drainages. Forest area closures and road/gate treatments would prevent unauthorized vehicle (OHV) access to stream drainages and would allow for natural vegetative recovery in riparian and hillslope areas. The following trails are in need of stabilization in order to prevent the loss of trout habitat values.

Trails treatments on the Hunters Trail within the Eldorado National Forest (see trails report). These treatments are grade control structures and waterbars. Treatments to reduce sedimentation effects from trail runoff will help in the recovery of water quality for trout in these watersheds.



Figure 9. Dry ravel coming down along the Hunters Trail that parallels the Rubicon River.

Recommendations:

It is recommended that the following work/monitoring be pursued using non-BAER funding:

1. Trout populations should be monitored in the Rubicon River to evaluate post-fire effects. Monitoring using electroshocking over time, preferably over several years, will help determine the status of these resident trout populations. When there are future impacts, the effects to the population will be more accurately determined.
2. Future surveys by the USFS should include additional Stream Condition Inventory (SCI) survey sites, to add to the information that has been collected during the initial assessment. Local fishing groups could be used as volunteers to assist us with future efforts. To accomplish this it will be important to apply for fire grant money and in some cases using BAER monitoring funds.

SCI Data Gathering

SCI attributes and protocols are designed to measure a suite of characteristics of inventorying stream conditions at a specific time and place. SCI consists of established and proven stream assessment techniques that are organized into a package that can be measured in the field in a complimentary and time-effective manner. Each attribute has a protocol for field measurement and these protocols are the keystones to the success of the SCI since accurate data collection over time is essential. SCI is designated so reliable repeat measurements can be made at desired intervals to detect change. SCI is primarily designed for use on wadable, perennial streams with gradients up to about 10%. When appropriate conditions exist in a project area SCI protocol is used to determine if relevant stream characteristics are within the range of natural variability.

3. Cooperate with CDFW on research and monitoring of post-fire effects to trout and amphibian habitat within the King Fire perimeter. For the first three years after the fire, annual meetings should be conducted to evaluate lessons learned from post fire impacts (what could have been done differently, compile existing data, evaluating new data needs and establish photo points).

4. Additional water quality samples should be taken to help to better understand changes in habitat conditions for aquatic biota following wildfire events.

References

CDFG. July 1979. Rubicon River Wild Trout Management Plan. Inland Fisheries Branch.

Moyle, P. 2002. Inland fishes of California. University of California Press, Berkeley and Los Angeles, CA. 286 pp.

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