



Restoring Rangeland Watersheds and Fisheries: Pine Creek Watershed and Eagle Lake Rainbow Trout

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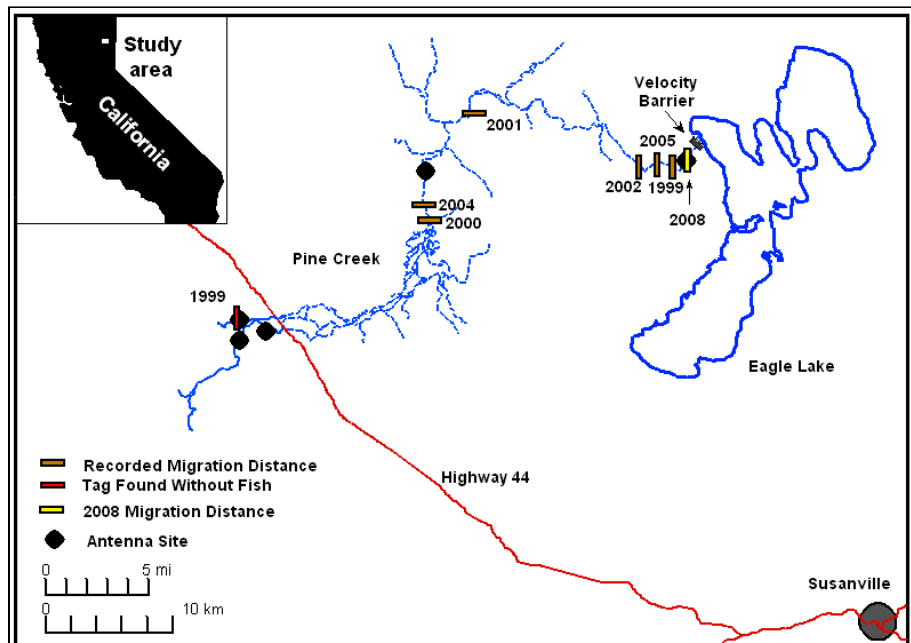
This is the final year of a study to test whether the numerous watershed restoration activities conducted during a 20-year effort in the Pine Creek watershed (Lassen County) have provided conditions under which Eagle Lake rainbow trout can complete their natural life cycle.

The purpose of this project is to test whether the numerous watershed restoration activities conducted during a 20-year effort in the Pine Creek watershed have provided conditions under which a proportion of Eagle Lake rainbow trout (ELRT, *Oncorhynchus mykiss aquilarum*), a Species of Special Concern, can complete their natural life cycle. Pine Creek watershed has historically provided critical spawning and rearing habitat for the ELRT. Over the past 100+ years, modification of Pine Creek and its watershed has resulted in the decoupling of the ELRT from its native stream habitat, and barriers have prevented ELRT from attempting their natural spawning migration of over 20 miles. The fishery is now supported entirely by hatchery production.

We worked at a watershed scale to determine the management actions necessary for the restoration of spawning and rearing of ELRT. Our main objectives were to: (1) Track the upstream migration of ELRT spawners from the mouth of Pine Creek, and relate movement to environmental factors such as water temperature and flow, and (2) Test the ability of ELRT

to spawn and rear in Bogard Spring Creek, a tributary of Pine Creek, following temporary removal of brook trout, non-native fish that prey upon juvenile ELRT.

In spring 2008 we used passive integrated transponder (PIT) antennas to track the upstream movement of ELRT spawners. We captured a sample of ELRT at the barrier near the mouth of Pine Creek during the spring spawning migration period. The fish were surgically implanted with PIT tags and released upstream of the passage barrier. Upstream migration was monitored with five channel-spanning stationary PIT antennas.



Map of Eagle Lake and Pine Creek watershed showing antenna locations and migration distances.



Lisa Thompson tags an Eagle Lake rainbow trout spawner.

Pine Creek naturally flows all the way from its headwaters to Eagle Lake only during the spring snowmelt period. In summer only the upper 6 miles of the creek has water, so spawners must reach this area in order for their offspring to rear successfully. Stream flow was low and erratic in 2008, and ELRT migrated less than 2 miles upstream, far short of the 22 miles necessary to reach areas with perennial summer flows.

In order to relate ELRT migration to environmental factors and potential impacts of climate change, we assembled historical data for stream flow, snowpack, air temperature, and fish migration distances (the furthest distance an ELRT swam up Pine Creek in a given year). Migration distance was positively related to seasonal average stream flow, total days of flow, and April snowpack.

We studied the rearing of ELRT juveniles with and without non-native brook trout, in the spawning and rearing habitat of the upper watershed. In August 2007, we electrofished all of Bogard Spring Creek, a small tributary of Pine Creek, to assess fish abundance, and removed all the brook trout that we cap-

tured. We also sampled parts of Pine Creek, but left the brook trout in the creek as a control area. In September 2008 we repeated the electrofishing sampling in both creeks to assess the effect of removing brook trout on the abundance and growth of ELRT. Numbers of brook trout were 69% lower in Bogard Spring Creek in 2008, while brook trout numbers in Pine Creek were similar to the previous year, suggesting that the removal did in fact suppress brook trout. However, numbers of rainbow trout, Tahoe sucker, and speckled dace were also lower in Bogard Spring Creek in 2008. This suggests that factors other than the brook trout removal, such as a dry year in 2008, have affected fish.

The results of this study will assist resource agencies to determine the management actions necessary to restore natural spawning and rearing of ELRT, and to sustain the trophy ELRT fishery and the economic benefits it provides to Lassen County.

Professional Presentation

Thompson, Lisa, Craig Fergus. Restoring a rangeland watershed & its endemic rainbow trout in the face of climate change: Eagle Lake Rainbow Trout and Pine Creek. Salmonid Restoration Federation conference. Santa Cruz, CA. March 6, 2009.

Collaborative Efforts

This project involves and expands on existing relationships with collaborators including the Pine Creek Coordinated Resources Management Planning Group, California Department of Fish and Game, US Forest Service, Natural Resource Conservation Service, Susanville Indian Rancheria, and numerous volunteers. These groups made extensive in-kind contributions of time volunteered on field work. US Forest Service staff supplied, installed, and monitored water temperature loggers along the length of Pine Creek.

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