



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

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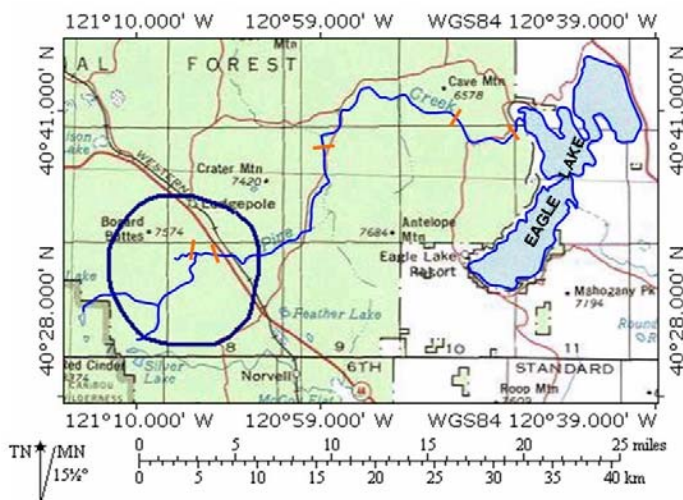
This is the first year of a study to test whether the numerous watershed restoration activities conducted during a 20-year effort in the Pine Creek watershed (Lassen County) have provided conditions under which Eagle Lake rainbow trout can complete their natural life cycle.

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. Results from this project will help us to answer the question, for this and other rangeland watersheds, "How much restoration is enough?" 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.

The approach we are taking is a comparative field survey including habitat, and fish migration and rearing, followed by a stakeholder workshop to share the new information. We are working at a watershed scale to determine the management actions necessary for the restoration of spawning and rearing of ELRT. Our main objectives are 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 2007 we conducted a habitat survey to determine conditions during ELRT spawning migration, spawning, and rearing. We sampled 9 monitoring stations monthly from spring to fall for in-stream physical habitat, flow, temperature, dissolved oxygen, overhead cover, spawning substrate size, and water transparency and quality. In spring 2008 we will use passive integrated transponder (PIT) antennas to track the upstream movement of ELRT spawners, and relate this to environmental factors (flows in 2007 were very low and precluded this part of the study). We will capture a sample of ELRT at the barrier near the mouth of Pine



Map of Eagle Lake and Pine Creek watershed showing PIT antenna locations (orange bars). The upper watershed, where Eagle Lake rainbow trout may spawn, is indicated by a blue circle.

Creek during the spring spawning migration period. A sample of 100 fish, spread out over the time span of the spawning run, will be anesthetized and surgically implanted with PIT tags. After a recovery period, fish will be released upstream of the passage barrier. Upstream migration of ELRT will be monitored in the lower, middle and upper sections of Pine Creek with channel-spanning stationary PIT antennas. Water and air temperature will be monitored with loggers near the passage barrier on lower Pine Creek, in spawning habitat in upper Pine Creek, and at antenna sites along the length of Pine Creek. Flow will be measured weekly during the spring migration period at a fixed location in lower Pine Creek.



Tagged Eagle Lake rainbow trout spawner.

We are also studying the rearing of ELRT juveniles with and without non-native brook trout in the spawning and rearing habitat of the upper Pine Creek watershed, and testing methods to decrease the competition and predation that juvenile ELRT face from brook trout. In spring 2007 we conducted a pilot test in which we transported a small sample of PIT tagged ELRT spawners to the upper Pine Creek watershed to allow them to spawn. In 2008 we will transport 100 PIT tagged ELRT spawners to the upper watershed to allow them to spawn in Bogard Spring Creek and a comparison area, the mainstem reach of Pine Creek near Stephen's Meadows. In August 2007 we electrofished all of Bogard Spring Creek to decrease the density of brook trout. We will conduct summer snorkel surveys of Bogard Spring Creek and the non-electrofished mainstem reach of Pine Creek to determine the spawning and rearing success of ELRT in relation to the electrofishing treatment.

The results of this study will assist resource agencies to determine the management



PIT antenna installed in the upper watershed.

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 Presentations

Thompson, Lisa, Gerard Carmona Catot, Teresa Pustejovsky, David Lile, Peter Moyle, & Kenneth Tate. Restoring Pine Creek Watershed & Eagle Lake Rainbow Trout. American Fisheries Society Conference, San Francisco, CA. Sept. 4, 2007.

Collaborative Efforts

This project involves and expands on existing relationships with collaborators including the Pine Creek Coordinated Resources Management Planning Group (CRMP), 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 assisted in determining locations for PIT antennas, and supplied, installed, and monitored water temperature loggers along the length of Pine Creek. Mr. Kerry Mauro (Mauro Engineering, Mount Shasta, CA) constructed PIT antennas on a pro bono basis, for a substantial cost savings.

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