



# Global Re-introduction Perspectives: 2013

Further case-studies from around the globe  
Edited by Pritpal S. Soorae



IUCN/SSC Re-introduction Specialist Group (RSG)





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## Re-establishment of the natural life histories of Eagle Lake rainbow trout, USA

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### Introduction

Eagle Lake rainbow trout (*Oncorhynchus mykiss aquilarum*), is endemic to Eagle Lake and its main tributary Pine Creek of northeastern California, USA. Eagle Lake rainbow trout (ELRT) spend most of their life in Eagle Lake, a large highly alkaline lake. The lake consists of two basins averaging 5 - 6 m deep and the third averaging 10 - 20 m, although lake levels may drop further during drought periods. The shallow basins are uniform in their limnology and water temperatures can exceed 20°C in the summer. The deep basin stratifies, so in late summer most of the trout are in the deeper, cooler water of this basin. Pine Creek is the major tributary to Eagle Lake, is approximately 60 km long, of which about 10 km are perennial. During the summer, upper Pine Creek is a cold spring-fed trout stream, flowing through meadows and open forest, with modest gradients.

ELRT is currently listed as a Species of Special Concern by California Department of Fish and Wildlife (CDFW). The American Fisheries Society considers ELRT to be a threatened species and NatureServe has listed it as “critically imperiled”. The ELRT fits the definition of a threatened species under U.S. Endangered Species Act because it is in danger of extinction throughout its native range as a wild, self-sustaining species.

### Goals

Goal 1: Restoration of a wild, naturally-spawning population.

Goal 2:

Modification of the weir/dam at the bottom of the main tributary stream to allow free passage.

Goal 3:

Improvements to the watershed habitat.



Eagle Lake rainbow trout



**Electro-fishing for Eagle Lake rainbow trout**

**Goal 4:** Removal of alien fish in spawning streams.

**Goal 5:** Reach an agreement with all the agencies and stakeholder groups on the restoration actions.

### Success Indicators

- **Indicator 1:** Re-introduced fish spawn naturally in native streams.
- **Indicator 2:** Part of the fish run pass through the weir and reach the historically spawning grounds.
- **Indicator 3:** Water diversions are stopped and habitat restoration actions continue.
- **Indicator 4:** Alien trout are eradicated from Pine Creek watershed.
- **Indicator 5:** Agencies and stakeholders group are involved in the project and actively work on the restoration project.

## Project Summary

**Feasibility:** The focus of this project is the restoration of the natural spawning run of ELRT to its historic spawning tributary Pine Creek. ELRT are important to the regional economy where this species lives; the trophy fishery in Eagle Lake attracts anglers, providing significant income to local businesses. The trout are also an important cultural resource for the native Paiute people. However, ELRT have not been able to sustain their populations for more than 60 years because of inaccessible spawning areas, competition from alien trout in perennial spawning and rearing areas, and decreased habitat quality of Pine Creek. The major spawning reaches in Pine Creek have been inaccessible due to habitat degradation and barriers, but restoration actions have considerably improved both upstream habitat and access to spawning areas. However, alien brook trout dominate the headwater spawning and rearing streams and it is unlikely ELRT can persist as natural spawners without eradication of the brook trout. The restoration of the natural life history should bring back wild spawning populations of ERLT, and also a run of considerable cultural importance and greatly benefiting the fishery in Eagle Lake. Likelihood of restoration has been greatly increased in recent years by cooperative efforts of CDFW, US Forest Service, Susanville Indian Rancheria, University of California, Davis, and various stakeholders.

**Implementation:** For the past 25 years, a Cooperative Resource Management Program has resulted in major improvements to the Pine Creek watershed, greatly reducing the impacts of livestock grazing, eliminating passage

barriers, and reducing diversion of water. In 2012, CDFW modified the weir at the mouth of Pine Creek to allow volitional passage of ELRT under high winter/spring flows, while also allowing continued take of spawning fish to support the hatchery program. Movement of fish along 50 km of stream is being monitoring through the use of passive integrated transponder (PIT) tags. Experimental transport of adult fish to spawning areas has demonstrated that successful spawning is possible, especially in Bogard Spring Creek, a tributary to Pine Creek, where the brook trout population has been largely eliminated through annual electrofishing. Successful rearing of juvenile ELRT has been observed in the creek although successful return to the lake has not yet been demonstrated. Some ELRT allowed passage over the weir spawned in the intermittent reaches of Pine Creek and small young of year were observed moving over the weir towards the lake as flows dropped.

**Post-release monitoring:** The project has shown that fish transported to the upper watershed have spawned and reared successfully. The study has also demonstrated that despite 60 years in captivity, ELRT are still capable of migrating upstream to spawn and of rearing in Pine Creek. These results also indicate that trapping and trucking is a viable option for helping to recreate a naturally reproducing population in dry years when stream flows reaching the lake are not sufficient for migration from the mouth of the stream. The biggest single factor that limits potential for full recovery of a self-sustaining population is the presence of abundant brook trout in the headwaters. The brook trout will have to be eradicated for complete recovery of ELRT.

### Major difficulties faced

- The coordination and dialog among agencies and stakeholder groups to reach agreement about restoration goals, including modifying the Pine Creek weir to allow passage.
- Changing the perception that fish used for restoration purposes will negatively affect the fishery in Eagle Lake and elsewhere.
- Implementing a research program to show successful migration and spawning of ELRT can take place.
- Demonstrating the importance of brook trout eradication and finding a way to implement an eradication program.



PIT tag antennae

# Fish



**Overview of Eagle Lake rainbow trout habitat**

### Major lessons learned

- Although ELRT have more than 60 years of total dependence on hatcheries, the ELRT still can complete its natural life cycle. However, the fishery will likely to continue to depend on hatchery production indefinitely.
- Success depends on close cooperation among diverse agencies and stakeholders, who agree on common goals. Such cooperation develops slowly and depends on a

few individuals from each agency or group to make sure it works.

- Research is essential to demonstrate that proposed management actions can work.
- Involvement of the local Paiute people (Susanville Indian Rancheria) greatly increased the interest in and likelihood of restoration of natural population.
- Complete restoration of a naturally spawning population is likely many years away because of the difficulties of dealing with alien species and long-term drought.

### Success of project

Highly Successful	Successful	Partially Successful	Failure
		√	

### Reason(s) for success/failure:

- There is now widespread agreement among agencies and stakeholders that restoration of a natural population is possible, if difficult to implement.
- ELRT spawned successfully at historical spawning grounds, followed by rearing of young.
- Modifications to the weir at the mouth of Pine Creek has allowed for natural passage of fish.
- Successful spawning has been recorded only in a tributary from which alien trout have been eliminated.
- Upstream habitat in the perennial reaches of Pine Creek as been greatly improved.
- Complete success will depend on brook trout eradication from Pine Creek using piscicides, which is difficult, expensive, and unpopular.
- Persistence of ELRT still depends on hatchery production.

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