



Effects of Controlled Flow Releases on Survival, Migration, and Habitat Use of Radio-Tagged Juvenile Coho Salmon in the Mainstem Klamath River Below Iron Gate Dam

The Issue: In their 2002 Biological Opinion, NOAA Fisheries determined that Bureau of Reclamation's Klamath Project operations were likely to jeopardize the continued existence of coho salmon (*Oncorhynchus kisutch*) and result in the adverse modification of designated critical habitat in the Klamath River. To address this concern, the Bureau requested assistance from the Arcata Fish and Wildlife Office to design and implement a study to investigate the effect of controlled flow releases from Iron Gate Dam on annual survivability of coho salmon smolts beginning in spring 2005.

Objectives

1. Estimate survival of radio-tagged coho salmon smolts. Determine differences in survival between wild and hatchery fish and determine the effect of river discharge volume on survival below Iron Gate Dam (IGD).
2. Determine how environmental conditions such as flow, temperature, photoperiod, and indices of smoltification influence the emigration behavior of wild and hatchery coho salmon smolts in the mainstem Klamath River.
3. Identify instream habitat use by tributary and IGH coho salmon smolts.



Study Design

- Surgically implant radio tags in up to 400 coho smolts from IGH, and Shasta River during the spring emigration period.
- Monitor downstream movement through reaches of increasing discharge between IGD and the estuary using a network of remote radio receivers.
- Paired-Release Mark-Recapture design used to estimate apparent survival and elucidate detrimental tag effects on individuals.
- Conduct mobile tracking surveys to collect habitat use data on relocated individuals.

Results

- Based on 2005 capture probabilities, sample sizes of 200 fish are needed to formally estimate survival (± 0.1).
- Variable patterns in migration observed for both wild and hatchery fish.
- Median migration rates increased as fish traveled downstream.
- Tagged smolts occupied discrete locations for up to 4 weeks.
- Tagged smolts associated with cattails, boulders, undercut banks, submerged willows, and shear zones.
- Edge habitats used by tagged coho salmon smolts overlapped with habitats used by Chinook salmon fry.

