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Introduction

In 2007, a new project to assess survival and movement patterns of juvenile salmonids, using a high-spatial resolution acoustic design, was funded by CALFED. This 3-year project is run by researchers from the University of California, Davis, & the Fisheries Ecology Division of the Southwest Fisheries Science Center of NOAA's Fisheries Service.

Objectives

- Estimate reach-specific survival
- Determine reach-specific rates of movement
- Influences of environmental variables (hydrologic, land use, riparian corridor) on survival & movement patterns

Collaborators

Several agencies were immediately interested in collaborating with the CALFED funded project

They have provided additional acoustic tags & receivers, as well as expertise and manpower, to address their needs.

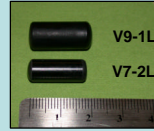
Collaborators

Purpose

	U.S. Army Corps of Engineers, San Francisco, CA	Dredging & Disposal, San Francisco Estuary
	Bay Planning Coalition, San Francisco, CA	
	ECORP Consulting, Inc., Rocklin, CA	Water Exports & Pumping, Delta
	U.S. Fish & Wildlife Service, Stockton, CA	
	CA Dept. Water Resources, Sacramento, CA	
	East Bay Municipal Utility District, Lodi, CA	Ecosystem studies & hatchery Mokelumne River
	Hanson Environmental, Inc., Walnut Creek, CA	Sand mining, Rivers confluence

Technology

Ultrasonic transmitters
 Very small (7-9mm dia x 18.5-24mm, ~2.4g in air)
 Uniquely coded signal
 Battery life of 95-150 days
 69kHz works in fresh and salt water
 Surgically implanted
 Vemco® tags (~\$300 each)



Automated receivers
 Records tag number and time
 Range of up to 300m
 Easy to deploy and recover
 12-15 mo battery life
 Vemco VR2 (~\$1,000 each)
 Temperature logger @ each site

Fish



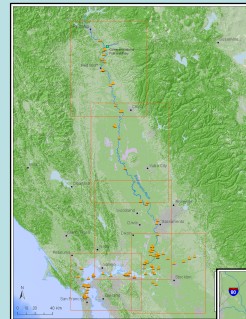
FL: 165 mm (141-198)	FL: 217 mm (158-264)
Wt: 46.5 g (22-82)	Wt: 112 g (43-220)
N: 200	N: 200
Tag: V7-2L	Tag: V9-1L
% fish wt (air): 3.4	% fish wt (air): 3.4

Fish were tagged at Coleman National Fish Hatchery & released:
 • in Sacramento River near Battle Creek (steelhead)
 • in Battle Creek (late-fall Chinook salmon)
 • in lower Sacramento River (additional 200 late-fall Chinook & 50 steelhead for Delta & Estuary studies)

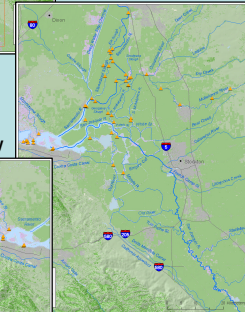
Study Area

Sacramento River - Golden Gate

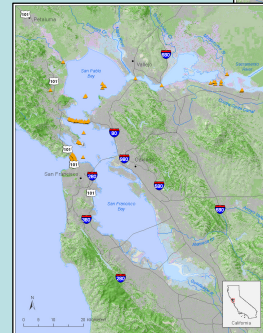
Upper Sacramento River



The Delta



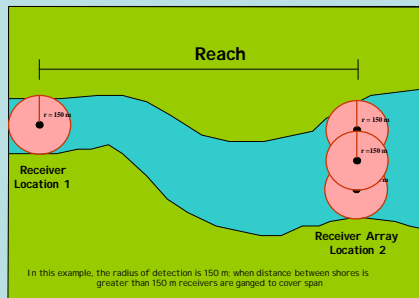
San Francisco Estuary



Golden Gate

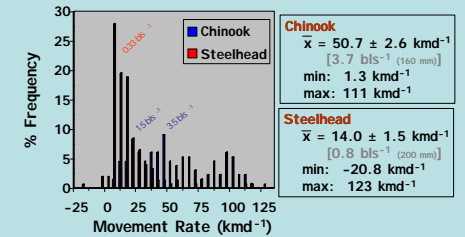


Concept: Acoustic receivers are placed along outmigration corridor to define reaches; spaced to increase detection probability of acoustically-tagged fish passage



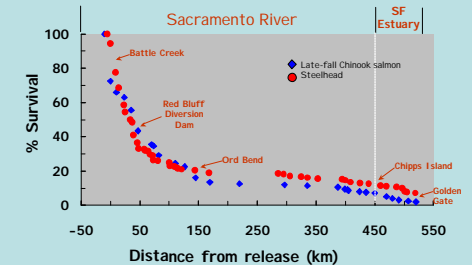
Early Results

Movement Rate 2007 Battle Creek - Golden Gate



- Late-fall Chinook salmon smolts moved rapidly through the river and estuary, averaging 50 km d⁻¹ (3.7 body lengths per sec)
- Steelhead smolts were significantly slower, at 14 km d⁻¹; some may have residentialized, at least temporarily, based on net movement upstream

Late-fall Chinook & Steelhead Survival 2007



- High mortality was experienced in the upper reaches of the Sacramento River, particularly in Battle Creek for Chinook salmon. Steelhead released in river.
- By Ord Bend, only ~20% survived
- Survival to Chipps Island was 7% for Chinook & 12% for steelhead
- Survival to the Golden Gate was 2% for Chinook & 7% for steelhead

Website

For more information & updates go to:

<http://californiafishtracking.ucdavis.edu/index.html>