Monitoring Movement Patterns of Coastal Rainbow Trout (*Oncorhyncus mykiss*) in the Lower Yuba River Using Acoustic Telemetry

L. Alber, J. Nelson, R. Bloom, and B. Hennes

Introduction

The lower Yuba River (Figure 1) is an ~ 24 mile reach from Englebright Dam to the Feather River confluence. It is unique to the Central Valley because it is one of the last rivers to have wild, native steelhead (*Oncorhynchus mykiss*) runs. While steelhead run size on the Yuba River was estimated to be ~ 2,000 adults in 1984 (McEwan & Jackson 1996), current status of the anadromous & resident population components are unknown.

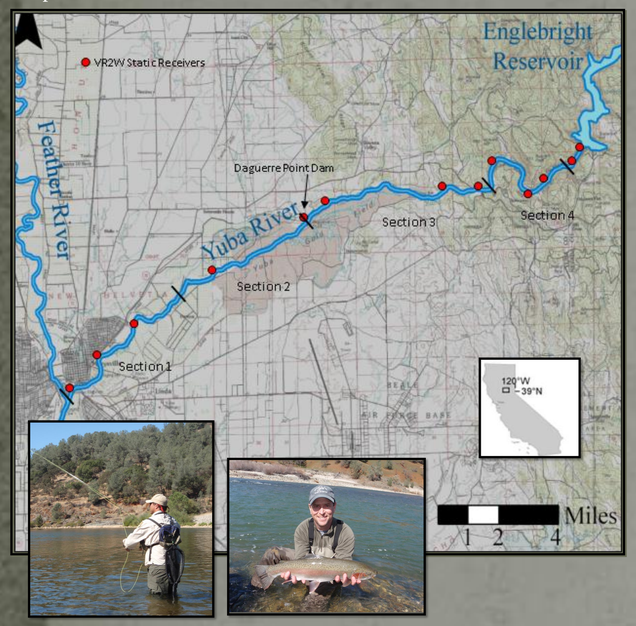


Figure 1 – Lower Yuba River with VR2W static receiver Locations

VAKI Riverwatcher data (Figure 2), collected since 2003, provides a snapshot of *O. mykiss* movements at one location (DPD - RM 11) illustrating passing of ~ 100 to 700 *O. mykiss* 16 inches or greater per year. Anadromous & resident life history patterns cannot be distinguish by these data; therefore, acoustic telemetry is needed to assess movement patterns above & below DPD to determine how/if DPD influences passage & if *O. mykiss* are moving into other systems.

Figure 2 – Infra Red scan \ video from VAKI Riverwatcher

Out of river & anadromous movements have the potential to be captured by complimentary acoustic receiver arrays (Figure 3) in the Feather River, established by DWR, & in the Sacramento River, Delta, and San Francisco Bay systems, established by NOAA and UC Davis.

Database created to facilitate data sharing used by the California Fish Tracking Consortium

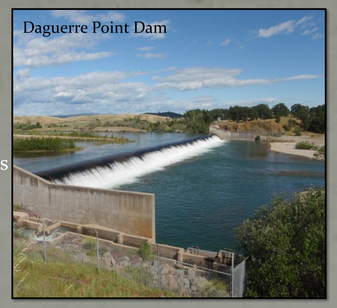
Figure 3 – Central Valley Acoustic receiver arrays

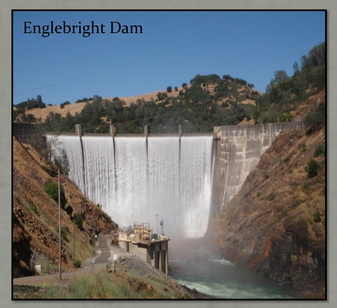
Objectives

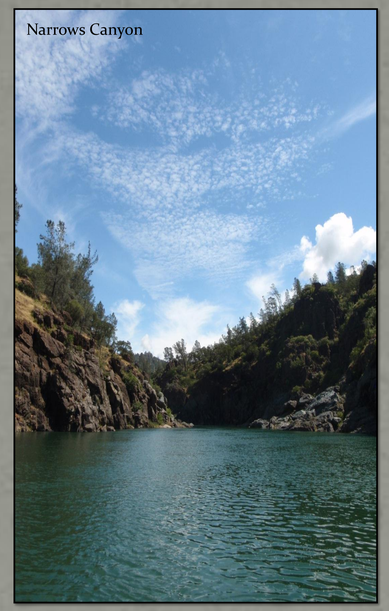
1) The primary objective is to test the difference, or lack there of, in migration of *O. mykiss* between the following variables:
   - Seasons
   - Size/age class
   - Chinook salmon presence
   - Varying flow regimes
   - Origin

2) Data collected from this study will contribute to improved management of the species by evaluating current and future;
   - Flow releases for improved fish habitat
   - Passage issues/improvement projects
   - Feather River Hatchery influence
   - Sport Fishing Regulation bag limits

3) In addition this data will provide valuable information regarding;
   - Movement patterns
   - Emigration
   - River system utilization
   - *O. mykiss* distribution







Methods

Fig. 4 – Surgery incision \ V13 acoustic transmitter \ recovery net

Tagging

- Fish are captured via angling & implanted with a VEMCO acoustic transmitter (V13, V9, or V7) – (Figure 4).
- Specific age classes are targeted in varying habitats, seasons, and sections.
- Post surgery fish are recovered & released upon strong equilibrium & swimming ability.

Monitoring/Tracking

- VR2W static receivers (Figure 5) monitor 24 hours/day and are retrieved, downloaded, and returned ~every 3 months.
- Mobile tracking surveys (Figure 6) from the Narrows Canyon to the Feather River confluence allow movement to be tracked between static receiver locations.
  - Year round / bi-weekly
  - Dual Pontoon Boat Tracks –
    - VR100 mobile receiver
    - VH110 directional hydrophone
    - Garmin GPS unit

Range Testing

Efficiency of this technique is being evaluated with a series of studies to compare detection rates of acoustic tags across different habitats, flows, and depths.

Figure 5 - VR2W static receiver

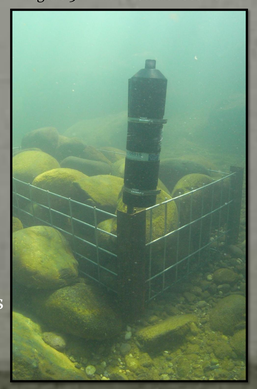


Figure 6 - Mobile Tracking Survey

Figure 7 – VR 100

Figure 8 - VH110

Progress

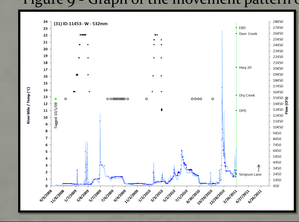
A total of 496 acoustic tags have been implanted since July 2008.

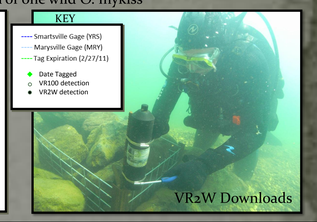
Acoustic Tag Summary as of 08/22/2013

	2008	2009	2010	2011	2012	2013	Totals
Wild							
V13-1L	10	37	87	66	3	0	203
V9-2L	44	38	50	51	6	4	193
V7-4L	0	3	15	21	21	2	62
							458
Hatchery							
V13-1L	4	3	9	16	1	0	33
V9-2L	0	1	4	0	0	0	5
V7-4L	0	0	0	0	0	0	0
	58	82	165	154	31	6	38
Total # of tags implanted							496
Expired Tags							403
Active Tags							93

Preliminary stages of analysis are being conducted on fish whose acoustic tags have expired (Figure 9). Both static receiver range tests and mobile tracking efficiency tests are being, or have been conducted. Monitoring will continue through 2013. A final report will be published after the conclusion of the study.

Figure 9 - Graph of the movement pattern of one wild O. mykiss





Additional Information

- www.vemco.com
- www.vaki.com
- Hydra3.sound-data.com

VR2W Downloads

Acknowledgments

- PSMFC Yuba River Field Crew
- Lower Yuba River Accord RMT
- UC Davis Extension
- Cordura Irrigation District
- Yuba Recreation Inc.