



Using Large Fyke Traps in the Mainstem Sacramento River to Monitor Abundance and Run Timing of Central Valley Steelhead

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Introduction

Since July 2015, CDFW with PSMFC have been implementing the Central Valley Steelhead Monitoring Program (CVSMP) to monitor Central Valley (CV) steelhead (*Oncorhynchus mykiss*) in the Sacramento River watershed.

Goals:

- Provide data to assess population status and evaluate recovery actions

Objectives include:

- Estimate CV steelhead population abundance
- Examine trends in abundance
- Identify the spatial distribution, current range, and changes over time

The CVSMP includes (Figure 1):

- Mainstem Sacramento River Mark-Recapture
- Upper Sacramento River Tributary Escapement
- Sacramento River Tributary Mark-Recapture
- Hatchery Broodstock and Angler Harvest Sampling

Information presented in this poster will cover the operations and results of the Mainstem Sacramento River Mark-Recapture Program and PIT detection in select Sacramento River tributaries

Methods

Location:

- Sacramento River from American River confluence downstream to Clarksburg, CA (2015-ongoing, Figure 1)
- Sacramento River at Knights Landing (above Feather River confluence; 2018-ongoing, Figure 1)

Methods:

- Operate large wire fyke traps
 - Cylindrical traps (23 ft. long, 10 ft. diameter), wrapped with 2" mesh-size chain link fencing, 2 internal conical 'fykes'
- Mark wild and hatchery steelhead with Passive Integrated Transponder (PIT) tags—hatchery steelhead are also Floy tagged
- Collect scale and genetic samples
- Release all marked fish downstream of fyke traps
- Install and operate PIT tag detection equipment in CV hatchery ladders and in the Yuba River
 - Biomark FDX/HDX readers and HDPE antennae

Sample Period:

- Lower Sacramento River: July through May, 7 days/week (water temperature dependent)
 - Channel width 500-600ft
- Sacramento R. at Knights Landing: July through October, 3 days/week (water temperature dependent)
 - Channel width 275-300ft

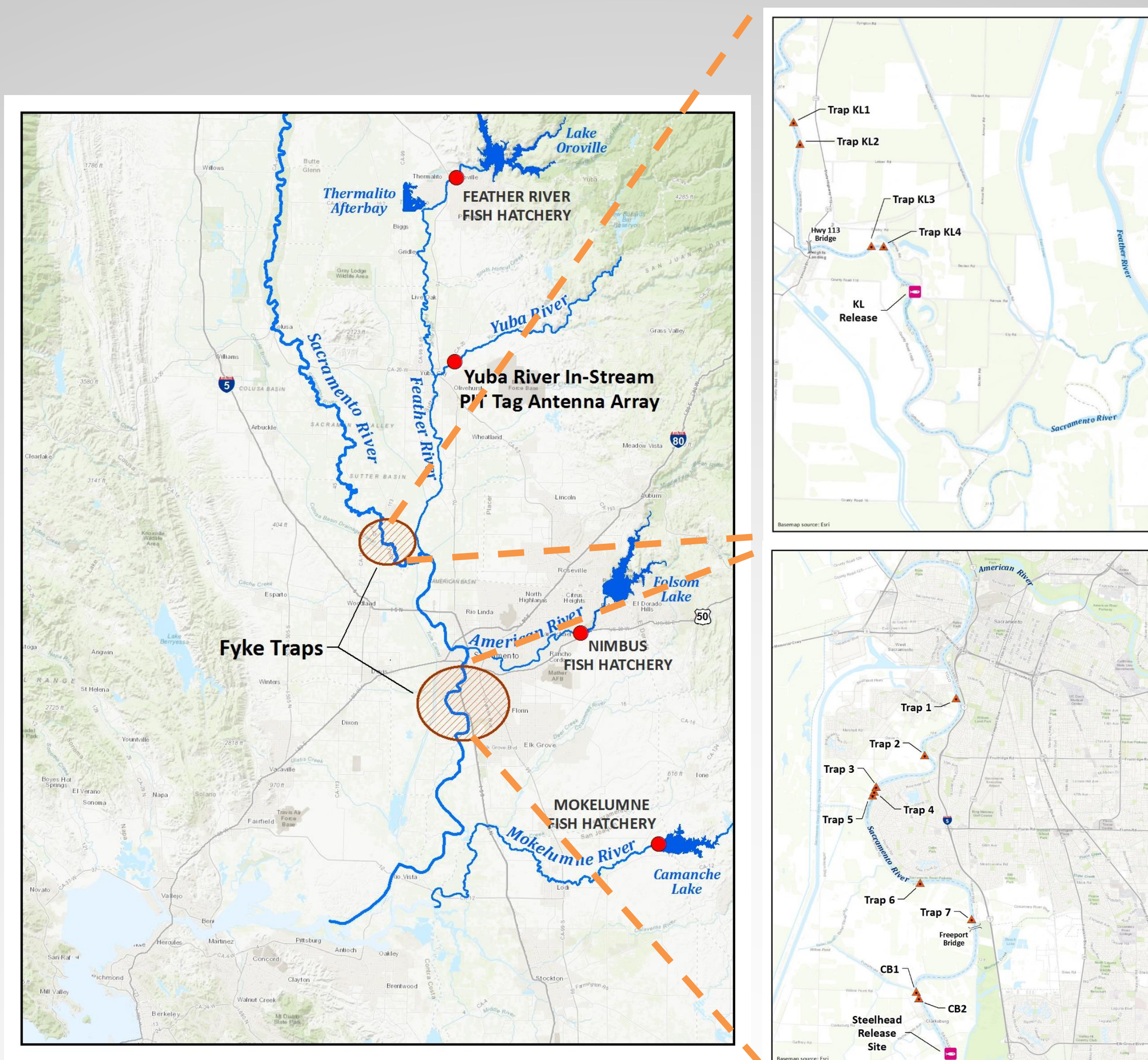


Figure 1. CVSMP monitoring sites in the Sacramento River.

Results

Fyke Trap Mark-Recapture:

2015-16 Trapping Season – Lower Sacramento River (Figure 2A)

- 7 fyke traps operated 14 Oct 2015 – 15 April 2016
- Trap sites 1-7 (Figure 1)
- **49 steelhead captured** (3 wild origin, 46 hatchery origin)
- **0 steelhead recaptured** in fyke traps, no abundance estimate

2016-17 Trapping Season – Lower Sacramento River (Fig. 2B)

- 7 fyke traps operated 23 Aug 2016 – 31 May 2017
 - Trap sites 3-7, CB1 and CB2 (Figure 1)
- **36 steelhead captured** (2 wild origin, 34 hatchery origin)
- **0 steelhead recaptured** in fyke traps, no abundance estimate

2017-18 Trapping Season – Lower Sacramento River (Fig. 2C)

- 7 fyke traps operated June 1 2017 – season ongoing
 - Trap sites 3-7, CB1 and CB2
- **119 steelhead captured** (11 wild origin, 108 hatchery origin)
- **1 steelhead recaptured** in fyke traps on 5 Mar 2018

2017-18 Trapping Season – Sacramento R. at Knights Landing (Fig. 2D)

- 4 fyke traps operated 3 days/wk, 21 Aug 2017 – 26 Oct 2017
 - Trap sites KL1-KL4 (Figure 1)
- **82 steelhead captured** (5 wild origin, 77 hatchery origin)
- **0 steelhead recaptured** in fyke traps, no abundance estimate

Marked Fish Encounters by Anglers, Hatcheries, and PIT Detection:

2015-16

- 4 tagged steelhead reported by anglers in the American River
- 2 tagged steelhead encountered at Nimbus Hatchery (American R.)

2016-17

- 1 tagged steelhead reported by angler in the American R.
- 16 tagged steelhead detected on Nimbus Hatchery Ladder PIT array
- 2 tagged steelhead encountered at Coleman National Fish Hatchery
- 1 tagged steelhead encountered at Feather R. Hatchery

2017-18

- 2 tagged steelhead reported by anglers in Sacramento River
- 2 tagged steelhead detected at Mokelumne Hatchery Ladder PIT array
- 4 tagged steelhead detected at Nimbus Hatchery Ladder PIT array
- 3 tagged steelhead detected at Feather R. Hatchery Ladder PIT array
- 46 tagged steelhead encountered at Coleman National Fish Hatchery

Results (Cont.)

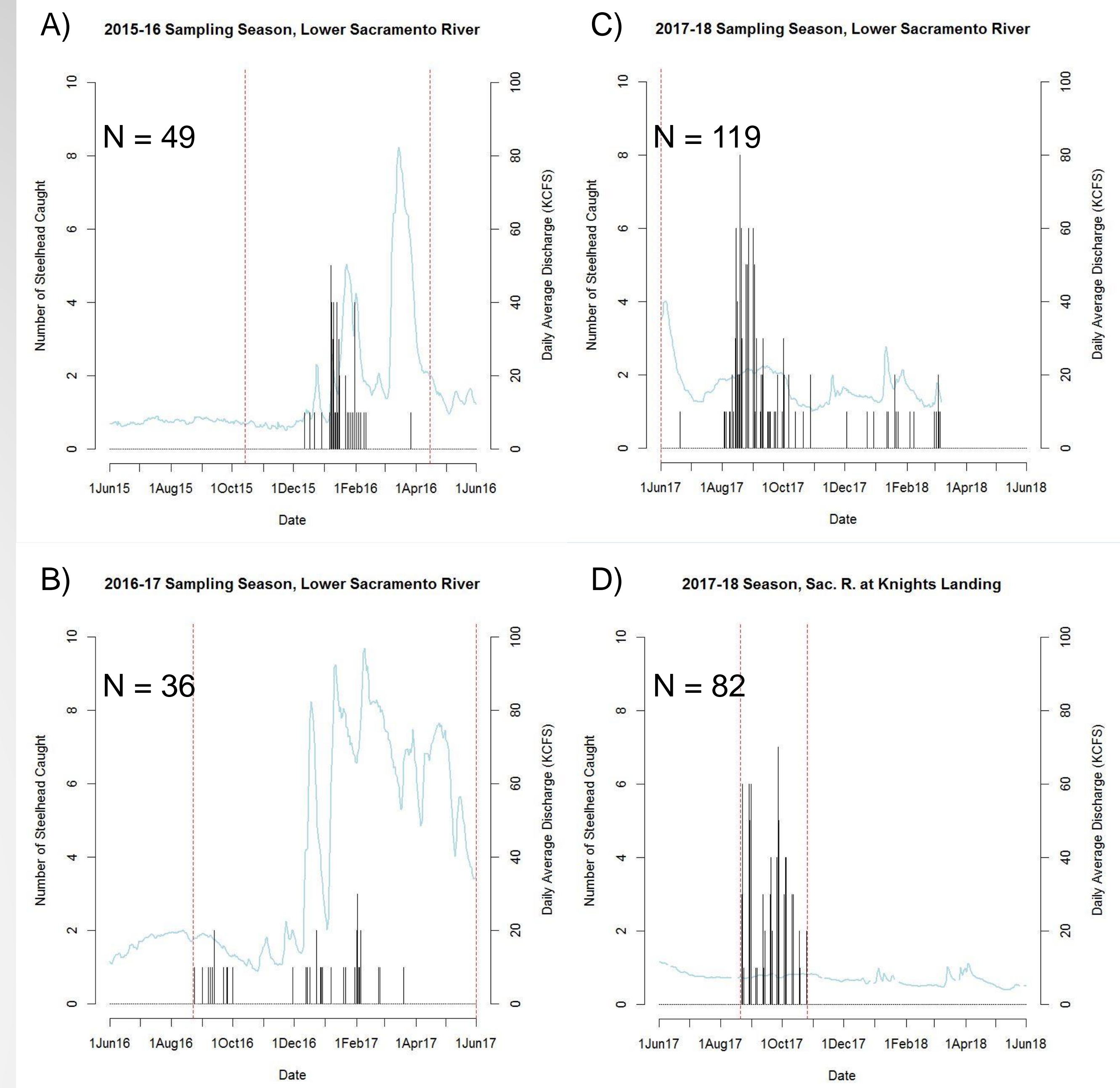


Figure 2. Catch of adult steelhead in the 7 Lower Sacramento River fyke traps as a function of date for the 2015-16 trapping season (panel A), 2016-17 trapping season (panel B), and the 2017-18 trapping season (panel C, currently ongoing). Panel D shows catch of adult steelhead in the 4 Knights Landing fyke traps. Each panel also shows the daily average discharge (blue lines), and the dates the fyke traps began and ended sampling for each season (vertical red dashed lines).

Discussion

Recaptures in Fyke Traps

- 0 in 2015-16, 2016-17, and only 1 in 2017-18. Extremely small capture probability? Or trap avoidance?
 - Planning to investigate with acoustic tagging and Virtual Positioning System (VPS) acoustic array in 2018-19

Run Timing and Sampling Period

- CV steelhead (all populations other than Nimbus Hatchery) return Aug-Oct. Nimbus Hatchery (American River – Eel River winter-run brood stock) return Dec-Mar
 - Sampling period needs to begin in July to ensure sampling of CV steelhead populations

Catch and Flow

- Increases in catch may be related to increases in flow, but catch data too sparse for robust analysis so far

Trap Design

- 2" chain link mesh size insufficiently small to keep smaller adult steelhead from becoming impinged in mesh. Trying 1-1/4" mesh in summer/fall 2018