**Telemetry Study Summary Framework**

**March 21, 2021**

<table>
<tr><td colspan="2">Point of Contact:<br>Name: Jeremy Notch E-mail: jeremy.notch@noaa.gov Phone: (831) 420-3990</td></tr>
<tr><td colspan="2">Study objective:<br>Survival and routing of steelhead smolts through the lower San Joaquin River and south Delta (continuation of the “6 year study”)</td></tr>
<tr><td>Study Timing:<br>• Study Duration: 5 years<br>• Release Dates (range): 3/23-3/26, 4/13-4/16, 5/4-5/7</td><td>Study site(s):<br>Collection site(s): Mokelumne River Hatchery<br>Release location(s): Durham Ferry, Head of Old River, Stockton</td></tr>
<tr><td colspan="2">Fish</td></tr>
<tr><td>• Species-race: spring and fall-run Chinook salmon<br>• Life stage: smolt<br>• Source: wild</td><td>Size (median & range):<br>• Weight: 95 grams (79-155g)<br>• Length: 210mm (150-300mm)</td></tr>
<tr><td>Transmitter Information<br>• Type/model: ATS SS300 double battery<br>• Weight (gm): .97<br>• PRI/life of tag: 3 sec PRI</td><td>Implant procedure<br>• Surgical placement of acoustic tag in peritoneal cavity of juvenile steelhead. Incision closed using two sutures.</td></tr>
<tr><td colspan="2">Telemetry Receivers:<br>• Receivers Maintained: UC Davis deploying and maintaining a large proportion of the south Delta array (see CAT hydrophone spreadsheet). UC Santa Cruz deploying/maintaining dual array upstream of Durham Ferry, dual array at Turner Cut, dual array at Three Mile Slough. USGS deploying/maintaining receiver array in Grant Line Canal (contracted by ESA/DWR).<br>• Receiver Deployment: receivers deployed late February by UC Davis, early March by UC Santa Cruz/USGS. Coverage will extend until late June<br>• Coordination with other studies/receivers needed? (Y): Increase in sample size of tagged steelhead is being coordinated with ESA to inform survival around the temporary barrier project (funded by DWR).</td></tr>
<tr><td colspan="2">Survival estimate (per species or objective)<br>• Type (project, etc.): NOAA-UCSC IA<br>• Value & SE: .30 (+/-10%)<br>• Sample size/replicate: 1500<br># replicates: 12<br>• Analytical model: Mark-recapture model. The analysis will be completed by UCSC/USFWS at the end of the year and UCSC (web model) in real time.</td></tr>
<tr><td colspan="2">Hypothesis test and results (if applicable)<br>• $H_o$: NA<br>• $H_a$: NA<br>• Conclusion: Observational. Potentially useful in near term synthesis project.</td></tr>
<tr><td colspan="2">Characteristics of estimate</td></tr>
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- Effects reflected (direct, total, etc): Evaluate steelhead smolt survival in the lower San Joaquin River and south Delta. Associate movement and survival rates with import/export flows, water temperature and release time of year. Also estimate entrainment into the SWP/CVP water intake structures with the use of PIT tags implanted into steelhead smolts. Survival estimates will be generated per reach, and regional, from release locations to Chipps Island

**Environmental/operating conditions** (if applicable)

- Relevant discharge indices: WIIN Storm Event
- Temperature: <20
- TDG: N/A
- Treatment(s): Flow, temperature, water exports, OMR flows

**Unique study characteristics:**

This study will be a continuation of the 6 year study, with modifications made to the fish release strategy and holding time in river. Fish will be transported by coolers in trucks after holding for 24hrs at the hatchery post-tagging. Upon arrival to the river, water temperature in the cooler will be tempered with river water until holding temperature is within 2 degrees of river temperature. Fish will then be released at each location, during slack tide, and if possible during a high slack tide to promote downstream migration during ebb tide.

Fish will be released at Durham Ferry, Head of Old River and Stockton, with the downstream releases (Head of Old River, Stockton) intended to bolster the sample size for reach specific survival and routing in the downstream portions of the study area. Releases will occur before SWP/CVP exports, and during exports, as well as during environmental flow releases from the Stanislaus River, allowing to infer survival rates as a function of various environmental and anthropogenic factors.