Telemetry Study Summary Framework

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Study objective:

Evaluation of paired releases of fall Chinook Salmon from Coleman National Fish Hatchery at downstream acclimation net pens and on-site in Battle Creek

Study Timing:

- Study Duration (years): 3 years- 2019, 2021-2022
- Release Dates (range): Late-March through mid-April, annually

Study site(s):

- Collection site(s): Coleman National Fish Hatchery
- Release location(s): Battle Creek (Coleman NFH) and Sacramento River at Scotty's Landing (RM 196)

Fish

- Species-race: fall Chinook Salmon
- Life stage: pre-smolt and smolt
- Source: Coleman NFH
- Size distribution (median & range): (80 mm, 58-94 mm)

Size to tag (median & range, data from 2019 tagging):

- Weight: 6.5 g (5.0-81)
- Length: 84 mm (78-91)
- Fish Grading (hi/lo/no): high or none

Tags and Tag Studies

Transmitter Information

- Type/model: ATS SS400, BR306 battery
- Weight (gm): 0.21 g
- PRI/approx. life of tag: 5s/ 71 days
- Implant orientation (battery anterior/posterior): Anterior
- Battery life (y/n & count): Y, 30
- Tag retention (y/n and count): Y, 30

Tagging Plans/Metadata

- Tagging environment (field or hatchery): Hatchery
- Biosecurity/disinfection methods: Coleman NFH established protocols
- Tagging protocol(s): NMFS/UCSC protocol and USGS Cook lab
- Deviations from protocols: None
- Implant procedure: Surgical placement of acoustic tag in peritoneal cavity. Two sutures.
- Staffing levels (taggers/data/assistants): 2 tagging stations (1 each surgeon, data, assistant)
- Tagger(s) experience level(s): 2 years of surgery experience
- Most recent tag training or evaluation: Spring 2019

Release Plans/Metadata

- Post tagging retention time (holding): > 24 hours
- Release location (onsite/offsite): On-site and off-site
- Transport details: Aerated fish hauling trucks for off-site
- Release method: On-site: direct release Off-site: Release into net pens for approx. 2 hr acclimation

Telemetry Receivers:

- Receivers Maintained (type/model, number, & geographical extent): EATSM receivers only

- Receiver Deployment (e.g., year-round, study-based/seasonal – specific dates): Seasonal: Mid-March through late May (approximately 70+ days after the final fish is tagged)
- Coordination with other studies/receivers needed? (Y/N, geographical extent): Sacramento River and Bay-Delta Region
- Frequency of data download required: No additional requirements outside of normal download schedule

Survival estimate (per species or objective)

- Type (project, etc.): System survival estimated from release to Chipps Island
- Value & SE: Mean = 0.174; 95% BCI = 0.211 – 0.140
- Sample size/replicate: 300/release group/year
- # replicates: 0
- Analytical model: Cormack Jolly Seber (CJS) model fit within a Bayesian framework using R and Stan modelling software.

Hypothesis test and results (if applicable)

- H_o: There is no difference in fishery contribution, returns to Battle Creek, stray rates or juvenile in-stream survival between release sites/methods
- $H_{a:}$ There are differences in fishery contribution, returns to Battle Creek, stray rates or juvenile in-stream survival between release sites/methods
- Conclusion: Pending. Data may be used to inform future hatchery release practices.

Characteristics of estimate:

- Effects reflected (direct, total, etc): Evaluate instream survival of juvenile FCS throughout the freshwater emigration corridor using real-time data from acoustic tags
- Absolute or relative: Relative survival between release sites/methods

Environmental/operating conditions (if applicable)

- Relevant discharge indices: Battle Creek and Sacramento River through emigration corridor
- Temperature: Battle Creek and Sacramento River through emigration corridor
- TDG: N/A
- Treatment(s): Flow, turbidity, temperature in Battle Creek and Sacramento River through emigration corridor

Unique study characteristics: The primary goal of this study is to evaluate the fishery contribution, escapement to Battle Creek and stray rates of paired releases of juvenile FCS from Coleman NFH released into acclimation pens in the Sacramento River and released directly from the hatchery into Battle Creek. The study will assess if the proposed off-site release strategy is aligned with the Service's goals for Coleman NFH, which are to promote increased survival of salmon to support ocean and freshwater fisheries while encouraging a high rate of fidelity to Coleman NFH to ensure a source of hatchery broodstock and reduce the potential for negative impacts that can result when hatchery fish stray to natural spawning areas. A secondary study goal is to evaluate instream survival of juvenile FCS throughout the freshwater emigration corridor using data from acoustic tags. This study was developed in partnership with Golden Gate Salmon Association (GGSA), NorCal Guides & Sportsmen's Association, Pacific Coast Federation of Fishermen's Association, UC Davis, U.S. Geological Survey, and U.S. Bureau of Reclamation.