Telemetry Study Summary Framework

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Point of Contact:

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Study objective:

Survival and movement rates of hatchery-origin (progeny of captive broodstock) winter-run Chinook Salmon released in North Fork Battle Creek annually in March-April for the Battle Creek Jumpstart Project. Secondary objective is to determine residency within Battle Creek.

Study Timing:

- Study Duration (years): 2019 – pilot; 2020-2023 – Study
- Release Dates (range): March-April

Study site(s):

- Collection site(s): Coleman NFH
- Tagging site(s): Coleman NFH
- Release location(s): North Fork Battle Creek

Fish

- Species-race: winter-run CS
- Life stage: pre-smolt
- Source: LSNFH / CNFH
- Size distribution (median & range): 80-105 mm

Size to tag (median & range):

- Weight: 6.5 g
- Length: >85 mm
- Fish Grading (hi/lo/no): potentially high

Tags and Tag Studies

Transmitter Information

- Type/model: ATS SS400 single battery
- Weight (gm): 0.30 g
- PRI/approx. life of tag: 5 sec PRI / 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: Established methods with CNFH
- 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): Non-COVID 3/3/3; COVID 2/2/2
- Tagger(s) experience level(s): 2 years of surgery experience
- Most recent tag training or evaluation: March 2019

Release Plans/Metadata

- Post tagging retention time (holding): 24 h +
- Release location (onsite/offsite): Offsite
- Transport details: CNFH distribution truck
- Release method: Tagged fish are returned to raceways and incorporated with all hatchery fish released

Telemetry Receivers:

- Receivers maintained: 7 sites located in Battle Creek, each site with a Lotek and ATS receiver

- Receiver Deployment (e.g., year-round, study-based/seasonal – specific dates): Study-based deployment, Installed March 10 and removed Sept 15 (coupled with adult telemetry study using same receivers)
- Coordination with other studies/receivers needed? (Y/N, geographical extent): Y, coordinated acoustic telemetry receivers in Sacramento River, Delta, and Bay.
- Frequency of data download required: 90 d after release (download in June or July) and again at retrieval

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: Dependent on the number of hatchery lots in the release group – 200 / 3, 300 / 2
- # replicates: see above
- 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: N/A
- H_a: N/A
- Conclusion: N/A

Characteristics of estimate:

Survival estimates were made using a Bayesian CJS model including reach level estimates for 20 reaches between release in Battle Creek and Chipps Island. Scaled estimates of survival (per 10 river kilometers), accounting for differences in reach lengths, showed little variation in survival among reaches with overlapping credible intervals. Tag battery life and tagging related shedding or mortality were assessed and deemed not to significantly influence survival estimates. Additionally, these data will allow assessment of movement rates and residency in Battle Creek and the Sacramento River.

Environmental/operating conditions (if applicable)

- Relevant discharge indices: Battle Creek and Sacramento River through emigration corridor
- Temperature: Battle Creek and Sacramento River
- TDG: N/A
- Treatment(s): Discharge, turbidity, water temperature, release group (see additional study template)

Unique study characteristics:

The 2019 study was an exploratory effort to determine feasibility, work on coordination and timing, and provide initial results to be used in determining an appropriate sample size for future efforts. Working with USGS Cook, WA office, to provide analytical expertise and study analysis. This study is unique because it provides insight on survival, travel time, and distribution of reintroduced fish. Additionally, these fish are released (early spring) into the Battle Creek later than the LSNFH release groups and are present at a time when there are no other AT fish migrating through the system.