Monitoring Sacramento River winter-run Chinook salmon life history diversity, growth, and habitat use among varying hydroclimatic regimes

**WHY THIS RESEARCH MATTERS**
Sacramento River winter-run Chinook salmon have been listed as endangered since 1994. Historically, the fish spawned during summer in cool tributaries upstream of the Sacramento, but dams have limited spawning habitat to a small reach of the river. Today, climate change poses additional challenges to winter-run salmon, because of an increase of drought frequency and water temperature in the current spawning grounds. Knowing which habitats may be available in drought and non-drought years and identifying the migratory pathways used by successful individuals during contrasting conditions is a key management goal.

**PROJECT**
This project tackled two outstanding questions about winter-run salmon ecology. The first was how winter-run Chinook use different rearing habitats during drought and non-drought periods, and the second was to explore which habitats provide enhanced growth during drought and non-drought periods.

To answer these questions, UC Berkeley post-doc Pedro Morais used isotopic analysis of otoliths, or fish ear bones, which grow continuously throughout their lives and therefore carry a record of their environment and growth. Using otoliths, researchers can reconstruct details of fishes’ lives, including water temperature and migration patterns.
As climate change progresses, droughts are expected to increase in California’s Central Valley, making it even more difficult for water managers to balance the many needs for water. The results of this project will provide state and federal agencies and the Delta Conservancy with valuable information for securing a healthy ecosystem that supports both winter-run Chinook salmon as well as a reliable water supply.

RESULTS

This project was the first to estimate differences in winter-run growth during periods of drought and non-drought, and assign each individual into their brood year since 2 and 4-year-old fish might be present in each escapement year.

MANAGEMENT APPLICATIONS

As climate change progresses, droughts are expected to increase in California’s Central Valley, making it even more difficult for water managers to balance the many needs for water. The results of this project will provide state and federal agencies and the Delta Conservancy with valuable information for securing a healthy ecosystem that supports both winter-run Chinook salmon as well as a reliable water supply.

SELECT PUBLICATIONS AND PRESENTATIONS


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