



CALTRANS DIVISION OF RESEARCH,
INNOVATION AND SYSTEM INFORMATION

Research



Notes



Environmental

MAY 2024

Project Title:
Standardizing Environmental DNA
Methodologies for Coho Salmon

Task Number: 3697

Start Date: January 2, 2020

Completion Date: December 31,
2023

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Standardizing Environmental DNA Methodologies for Coho Salmon

Develop standardized survey protocol for Coho salmon which is a state and federal listed species.

WHAT IS THE NEED?

California Department of Transportation (Caltrans) is required to initiate Federal Endangered Species Act Section 7 consultation and California Endangered Species Act (CESA) consultations for projects that may affect federal and state listed aquatic species.

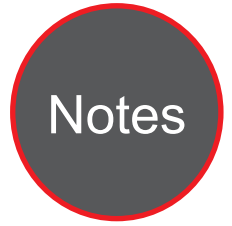
Species listed under CESA must be fully mitigated. Coho salmon (*Oncorhynchus kisutch*), a federally and state listed species with several Evolutionarily Significant Units throughout the state, is one such species. To effectively mitigate for this species, knowing their presence/absence, distribution, and abundance is important.

Using environmental DNA (eDNA) in water samples is an innovative approach that is less expensive, less invasive, and offers higher detection probabilities than traditional monitoring approaches used to detect aquatic species. However, the approach is not generally recognized in standardized survey protocols developed by federal and state regulatory agencies.

By developing distribution and monitoring methodologies, Caltrans practitioners can efficiently establish environmental baseline conditions at culvert and bridge project sites, propose appropriate mitigation for project impacts, and demonstrate the efficacy of mitigation projects in aquatic habitats and at fish passage remediation project locations.



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WHAT ARE WE DOING?

This research is designed to provide guidance for the application of eDNA approaches for monitoring Coho salmon. The initial steps will involve conducting a series of laboratory and field experiment to study the ecological dynamics of eDNA, such as production, decay, and transit rates.

Using the information from these initial experiments, a predictive statistical model will be developed, applied for estimating local- and broad-scale species distribution and abundance in river networks using eDNA.

WHAT IS OUR GOAL?

The goal of this research is to develop standardized eDNA survey protocols for Coho salmon that will be adopted by federal and state agencies, so that Caltrans practitioners can efficiently establish environmental baseline conditions at culvert and bridge project sites.

WHAT IS THE BENEFIT?

Since Caltrans is required to consult with federal and state agencies to mitigate project impacts on Coho salmon, precise knowledge of their presence/absence, distribution, and abundance is critical.

Traditional survey techniques are time and cost intensive resulting in lengthy consultation process with regulatory agencies. Well developed and standardized survey protocols using eDNA can potentially help Caltrans' practitioners establish baseline conditions when evaluating project impacts and developing mitigation plans efficiently and in a timely manner.

WHAT IS THE PROGRESS TO DATE?

A contract for the research was developed and a Humboldt State University research group led by Dr. Andrew Kinziger was selected. The research project is progressing well with the first phase of literature review and some laboratory experiments being conducted right now. The field work has been halted because of the lingering COVID_19 restrictions and as a result a no-cost time only extension has been granted. The new end date for this project was December 31, 2023. All the project deliverables and the final report is received and approved by Caltrans. This project is now completed and closed.