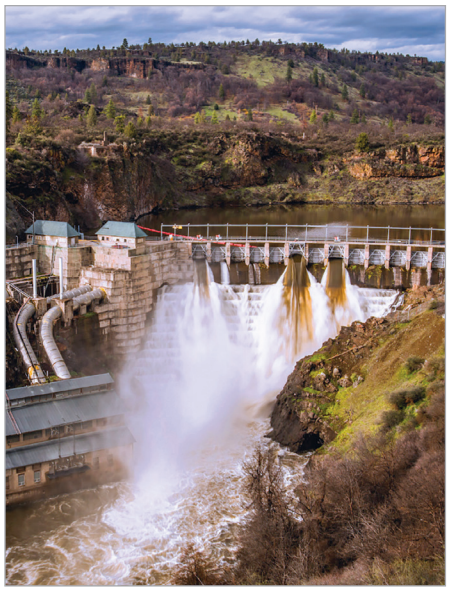
CASE STUDY

info@eqo.life www.eqo.life

The Relationship Between Salmon and the Yurok Tribe on the Klamath River – Native Species Detection, Diagnosis, and Monitoring *(December 2020 – Present)*

Abstract – Hydroelectric power has always created a challenge for migrating species such as salmon, and the effectiveness of mitigation actions has been hard to quantify. However, using eDNA and eRNA technology it has been possible to cost-effectively and accurately monitor the population density and health of salmon, and take timely corrective action, as required.



To Learn More or Schedule a Meeting, Email: Kevin@Eqo.Life

Historical Context

The Klamath River basin is home to the Karuk, Yurok, Hoopa, and other tribes. It is a special place, rich in history and culture. Salmon is both a food source and a focal point for their cultural identity. The Klamath was once a highly productive salmon river, with one million fish returning to the river each year.

Sadly, due to the presence of four dams, there are no longer enough fish for the tribes to have Klamath salmon as a primary food source. The loss of this important cultural tradition has been deeply felt by all those who call the Klamath River basin home.

Over the last 100+ years, excessive water diversions, nutrient loading, modified sediment budgets, and dams have created the ideal ecological conditions for fish pathogens to populate the river at elevated rates. In the past two decades, the Klamath River's juvenile and adult salmon populations have experienced numerous disease-driven die-offs, including the largest pre-spawn mortality event in American history.

It's heart breaking to witness how our actions have impacted the natural balance of this ecosystem and caused such devastation to its inhabitants.

CASE STUDY

info@eqo.life www.eqo.life

Why is the Salmon Population So Important

On the Yurok Reservation, where the median income is $11,000, many tribal families rely on the fishery to pay basic bills and make ends meet. The health of the salmon is an integral part of the Yurok community's livelihood and is also extremely important from an ecological perspective. They bring nutrients from the ocean into the boreal forest environment, which supports biodiversity all along the river. So, when a juvenile fish kill happens, it's not just a disaster for the salmon people, but for the entire community and the environment as a whole.

2022 - 2024 Dam Removal: California and Oregon continue prioritizing river restoration and are embarking on the largest dam removal project in history. Over the next three years, three dams are going to be removed, which will hopefully re-populate these areas with salmon.

How Will We Know if the Restoration Projects are Working?

EQO technology will help monitor the DNA and RNA of juvenile fish across geographic and temporal perspectives in the Klamath. Constant monitoring of the salmon DNA and RNA will help determine if there are the proper conditions for salmon life and understand if the salmon are coming back post-dam removal. This testing will help understand the effectiveness of the ecological restoration and refine strategies for ongoing mitigation efforts. At the end of the day, it's all about giving the salmon community a better life while saving the health of the river ecosystem.

Why Was EQO Brought In?

It is very difficult to detect and monitor juvenile salmon. Traditional tracking methods such as tagging and capturing put additional stress on the salmon and are destructive. This is where EQO technology comes in, which is a low-cost, non-destructive, and high-resolution testing solution.

With increasing human demands on water for both drinking and agriculture, the series of pump stations in northern California must be turned on and off to provide water for the built infrastructure. Currently, these systems operate off historical data that is not correct based on current realities.

Because of climate change and other human-induced factors, the salmon spawning season is rapidly changing. To better understand the migration patterns of salmon, it's important to know how active they are in different parts of the river. This helps understand the migration patterns and protect those areas. Additionally, juvenile salmon produce different genes than adults, and it is possible to track the difference between youth and adult salmon via transcriptomics.

The real goal is to determine when and where the salmon spawns are happening in close to real-time, which can allow the built infrastructure to be operated as efficiently and responsibly as possible. The salmon population is part of the conversation, and we want to ensure that it stays a healthy and thriving ecosystem for all stakeholders in the area. These new insights into the population will help find harmony between humans and the ecosystem.

Short Summary of this case study from ChatGPT

The Yurok Tribe on the Klamath River relies on salmon for food and cultural identity, but the river's ecological conditions have led to disease-driven die-offs, threatening the tribe's livelihood and biodiversity. The largest dam removal project in history is underway to restore the river, but monitoring the success of the project has been challenging. Traditional tracking methods stress salmon and are destructive, but EQO technology offers a low-cost, non-destructive solution to monitor salmon DNA and RNA. This monitoring can help determine if the restoration efforts are working and refine ongoing mitigation strategies. Additionally, the technology can track the differences between juvenile and adult salmon and help operate the built infrastructure more efficiently and responsibly. Ultimately, the goal is to find harmony between humans and the ecosystem to ensure a healthy and thriving environments for all stakeholders in the area.

Learn more Resources:

Five Key Lessons as World's Biggest Dam Removal Project Will Soon Begin on the Klamath River

In Klamath River Drought, a Massive Juvenile Salmon Die-Off

Who is EQO?

We are an Austin-based biotechnology company tackling challenges in aquatic ecosystems including: lakes, reservoirs, rivers, wetlands, estuaries, and intercoastal waterways.

Our Tech

Field and lab innovations in eRNA and eDNA to diagnose, detect, and monitor invasive species, native and endangered species, and biosecurity risks.

Our Vision

Forge partnerships with synergistic technologies, engineering firms, and conservation groups.