Upper Clackamas eDNA Species of Concern Project

Technical Project Summary

Prepared by:
Clackamas River Basin Council (CRBC)

In Partnership with:
USDA Forest Service · Oregon Department of Fish and Wildlife · U.S. Fish and Wildlife Service

Field Sampling: August–October 2024
Report Date: December 2025

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This technical summary is intended to support watershed management, restoration planning, and interagency coordination. It is not a peer-reviewed publication.

Background and Objectives

The Upper Clackamas River Basin, defined here as areas upstream of the North Fork Reservoir to the headwaters, is primarily forestland managed by the U.S. Forest Service and Bureau of Land Management, with additional private and tribal ownership. The basin contains designated critical habitat for multiple Endangered Species Act (ESA)–listed salmonids, including Upper Willamette Spring Chinook salmon (*Oncorhynchus tshawytscha*), Lower Columbia River Coho salmon (*O. kisutch*), and Lower Columbia River Winter steelhead (*O. mykiss*). In addition to anadromous salmonids, the Upper Clackamas supports several resident and state-listed sensitive species that play important ecological roles in watershed function and salmon recovery.

Despite extensive monitoring efforts focused on salmon and steelhead, distribution data for other species of conservation concern, particularly Pacific lamprey (*Entosphenus tridentatus*), Bull trout (*Salvelinus confluentus*), and freshwater mussels, remain limited in the upper basin. These taxa contribute to aquatic ecosystem health through nutrient cycling, water filtration, habitat provisioning, and food web support. Several freshwater mussel species are among the most imperiled faunal groups globally, and Pacific lamprey and Bull trout are listed as sensitive species by the State of Oregon. Both Pacific lamprey and freshwater mussels are also of cultural significance to Native American Tribes in the Pacific Northwest.

Spring Chinook Salmon and her Redd

The Upper Clackamas eDNA Species of Concern Project was designed to address key information gaps related to the spatial distribution of four focal species: Bull trout, Pacific lamprey, Western pearlshell mussel (*Margaritifera falcata*), and Western ridged mussel (*Gonidea angulata*). Specifically, the project objectives were to:

1. Evaluate the current distribution of reintroduced Bull trout within the upper basin,
2. Determine whether Pacific lamprey are migrating upstream of the Collawash River confluence,
3. Assess whether Western pearlshell mussels are present in the upper basin, and
4. Evaluate evidence for continued presence or absence of Western ridged mussels.

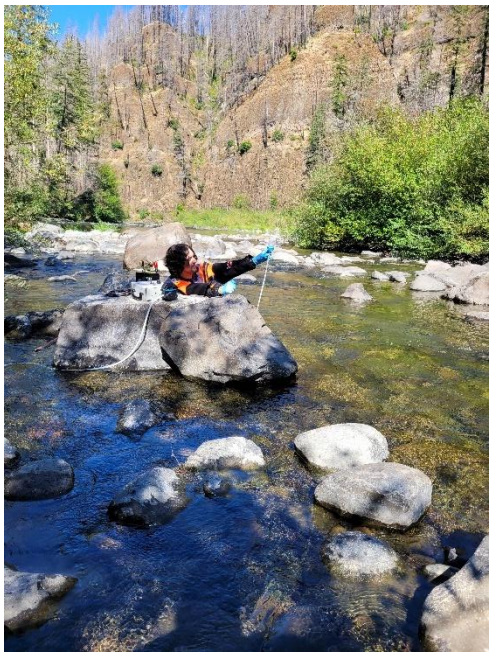
Results from this project are intended to inform future monitoring efforts, restoration planning, and management decisions related to ESA-listed salmonids and associated species of concern.

Methods

U.S. Forest Service personnel conducted field sampling between August and October 2024 across the mainstem of the Upper Clackamas River and several tributaries. A total of 25 environmental DNA (eDNA) samples were collected at approximately 1-kilometer intervals where feasible, with site selection based on accessibility, habitat suitability, designated critical habitat, and prior monitoring locations.

At each site, a minimum of five liters of stream water was filtered using standardized eDNA sampling kits and peristaltic pumps following protocols developed by the National Genomics Center for Wildlife and Fish Conservation. Sampling procedures emphasized contamination prevention using clean gloves, sterile equipment, and individual filter storage with desiccant. Filters were shipped to the Rocky Mountain Research Station laboratory for genetic analysis using established species-specific assays for all four focal taxa.

Visual snorkel surveys were conducted at eight of the eDNA sampling locations to complement molecular detections. Surveyors assessed a 30-meter reach downstream of each sampling site using modified protocols to identify and enumerate focal species when observed. Environmental covariates, including water depth, velocity, temperature, substrate composition, gradient, and visibility, were recorded to provide additional context for species detections. Handling of freshwater mussels was permitted under a U.S. Fish and Wildlife Service scientific collection permit; no handling of Pacific lamprey or Bull trout occurred during surveys.



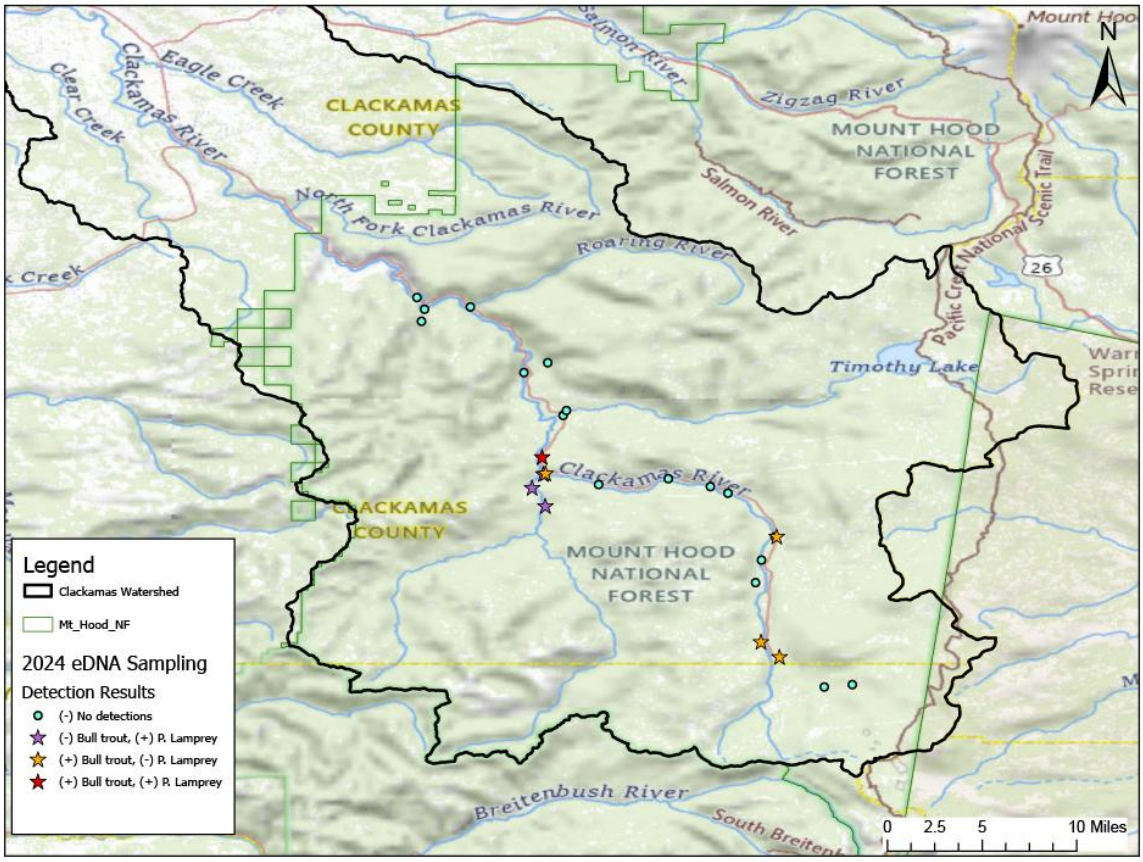
US Forest Service personnel use eDNA sampling equipment along the upper Clackamas in 2024.

Close up of eDNA sampling equipment used along the upper Clackamas by U.S. Forest Service staff

Results and Implications

All 25 eDNA samples were successfully processed and analyzed for Bull trout, Pacific lamprey, Western pearlshell mussel, and Western ridged mussel. Bull trout were detected at five sampling locations within the Upper Clackamas basin, indicating continued use of multiple stream reaches beyond previously documented core monitoring areas. Visual snorkel surveys confirmed the presence of adult Bull trout at one location (Pinhead Creek), while other native fishes—including Rainbow trout, Cutthroat trout, and sculpin—were observed across most surveyed sites.

Pacific lamprey were detected at four sampling locations, including sites upstream of the Collawash River confluence. These detections provide new information on lamprey distribution in the upper basin and suggest that adult lamprey are accessing areas where their current distribution was previously uncertain.



2024 eDNA Sampling Results

No freshwater mussel species were detected via eDNA at any sampling location. While non-detection does not confirm species absence, these results establish an important baseline and

highlight the need for targeted follow-up surveys and refined sampling strategies to better assess mussel distribution and detection probability in the Upper Clackamas.

Collectively, these findings demonstrate the utility of eDNA as a non-invasive tool for monitoring sensitive and elusive aquatic species in forested watersheds. The results will support partner agencies in integrating species-specific biological considerations into restoration design, permitting, and adaptive management. Additionally, the data provide a foundation for future monitoring efforts aimed at evaluating population viability, habitat use, and long-term recovery potential for species of concern in the Upper Clackamas River Basin.

Juvenile coho in the upper Clackamas basin - image taken with underwater camera by US Forest Service personnel

Acknowledgements

This project was implemented through a partnership between the Clackamas River Basin Council (CRBC), the U.S. Forest Service (USFS), the Oregon Department of Fish and Wildlife (ODFW), and the U.S. Fish and Wildlife Service (USFWS). The U.S. Forest Service led field sampling and data analysis, with technical guidance and permitting support provided by ODFW and USFWS. CRBC coordinated project management, outreach, and partner engagement. All partners contributed staff time, expertise, and logistical support.

This project was made possible thanks to funding support from The Nature Conservancy's PGE Salmon Habitat Support Fund and significant in-kind contributions by Mt. Hood National Forest USFS staff.

Selected References

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Data Availability

Environmental DNA data generated through this project will be shared with partner agencies and uploaded to the eDNAtlas database for public access. Use this link to access the Aquatic eDNAtlas where you will find the open-access database and results from other agencies for all these species and more across Oregon: https://research.fs.usda.gov/rmrs/projects/ednatlas

For questions regarding this project or data use, please contact the Clackamas River Basin Council at info@clackamasriver.org or www.clackamasriver.org.