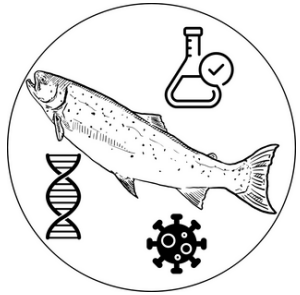
Improved understanding of cumulative impacts on salmon survival across freshwater life-stages; tools and approaches for mechanistic assessments



Conservation and Stewardship

Fraser

Biosampling

Habitat Monitoring

Modelling

Back to Top

The Chilcotin River.

Landscape level assessments of stressors on aquatic habitats, climate change projections, and population dynamics models can be limited in their ability to accurately describe the cumulative impact that multiple stressors can have on individuals and specific populations because they lack a mechanistic approach that can verify the complex interacting pathways of effects on fish.

This project links in situ ecophysiology information with other biophysical habitat monitoring data to develop mechanistic relationships that address management issues around habitat-population modeling, assessment of restoration function, and fish responses to climate change.

The specific management questions are:
1) What multi-factor stressors limit stage specific freshwater habitat distribution?
2) What are the key drivers of stage-specific survival and growth for life-cycle modelling?
3) What is the role of temperature in combination with other key factors in predicting climate change impacts on salmon growth and survival in a given habitat (e.g. lake, river, wetlands)?
4) What are major habitat factors that affect salmon growth and survival to consider in planning and assessment of habitat mitigation, restoration, and offsetting effectiveness?

Life-stage specific mechanistic relationships will be examined using samples in-hand from three large scale field programs (Lakes, E-Watch, North Thompson Salmon Ecosystem Program) within the Freshwater Ecosystems Section. Models examining the effects of multiple biophysical factors on condition will be used to understand how interacting biophysical drivers (including stressors) shape fish condition, while models examining relationships between condition metrics and growth and/or survival will examine the use of condition metrics as tools to indicate future salmon presence, growth and survival.

Take-aways

- Models of landscape-scope watershed assessments often can't capture accurate salmon health and life-cycle dynamics because they lack the mechanistic tools to show cumulative impacts and multiple stressors in the environment.
- This salmon health and habitat (ecophysiology) monitoring project biosamples North Thompson juvenile coho and Fraser juvenile sockeye, along with water quality measurements to develop finer tools to model fish condition in relation to habitat change and climate conditions.

Timeline

- ✓ Dec 2023: project presentation
- ↻ March 2024: journal article publications
- ↻ Sept 2024: resource manager presentations
- ↻ Dec 2024: project progress meeting
- ↻ March 2025: CSAS research document

DFO Science Division
Ecosystem Sciences

DFO Science Section
Freshwater Ecosystems

Project Leads
David Patterson
Douglas Braun

Locations
Fraser
Thompson

Species
Sockeye
Coho

Climate Vulnerability

Project ID
2493