Improving baseline knowledge of environmental conditions in Vancouver Islands fjords through observations and modelling, with a focus on hypoxia dynamics, climate change, and the potential implications for Pacific salmon

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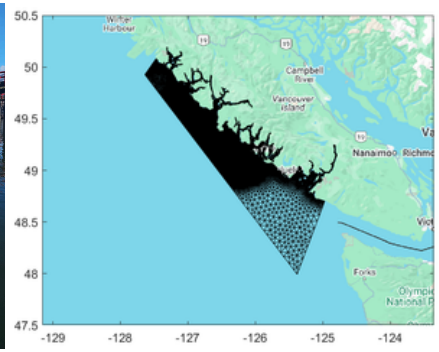

Training on conductivity-temperature-depth sampling with the First Nations, and figure of the model domain.

Near-surface hypoxia (as shallow as 12 m) has been identified in Herbert Inlet, Clayoquot Sound. The historical record suggests that shallow hypoxia is found occasionally in this inlet. Are salmon runs affected by low-oxygen conditions near the surface in the fjords? Do these shallow hypoxic events restrict salmon habitat during their migration? Are these conditions increasing in frequency or can they be predicted? A monitoring program is needed to address the more generic question: “What is the environment that salmon encounter during their migration into and out of the rivers?”

Combining observations and high-resolution (tens of meters) ocean models, researchers are able to understand the mechanisms that drive oxygen conditions in the inlets, and predict how these will be impacted by a changing climate. Project actions include:

1) Establishing a Clayoquot Sound Monitoring Program in collaboration with the local First Nations (FN) and other organizations. Provide training and equipment so FN can use their vessels to perform monthly conductivity-temperature-depth sampling throughout Clayoquot Sound (45 stations).

2) Contributing to the development of a coupled physical-biogeochemical model for the west coast of Vancouver Island. In particular, lead the simulation of future scenarios and act as a liaison with salmon experts to ensure that the outputs of simulations are useful for population distribution modelling.

3) Contributing towards DFO-led fieldwork in the WCVI inlets, as well as data processing and management. Technical support is needed for the maintenance of a weather station network in the region.

Take-aways

- Low-oxygen (hypoxia) conditions have been observed near the surface in salmon migration inlets on west coast Vancouver Island.
- The ecosystem monitoring component of this study measures salinity, temperature, and oxygen at different depths in Clayoquot Sound fjords in collaboration with Indigenous groups to establish present-day baseline conditions.
- The modelling component helps understand the drivers of hypoxia and how they may change in the future. Will salmon have to face more or less hypoxic conditions while migrating?

Timeline

✓ to Mar 2024: service weather stations and DFO-led sampling, atmospheric and ocean datasets, model development and outputs, journal publication, FN training, FN take over CTD sampling

🔄 to Mar 2025: service weather stations, DFO- and FN-led sampling, atmospheric and ocean datasets, model outputs, journal publication

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Locations
Clayoquot Sound, West Coast Vancouver Island

Collaborations
Ahousaht First Nation, Hesquiaht First Nation, , Tla-o-qui-aht First Nation, Nuu-cha-nulth Tribal Council, Hakai Institute, Nature Trust of BC

Climate Vulnerability

Follow the Fish

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2404