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**NSERC  
CRSNG**

# Paleoenvironmental investigation of Pacific salmon lakes in British Columbia

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Canada 



- 220,000 km<sup>2</sup> (23% of BC)
- Sockeye Salmon rear juveniles across diverse nursery lakes
- Multiple stressors & species imperilment



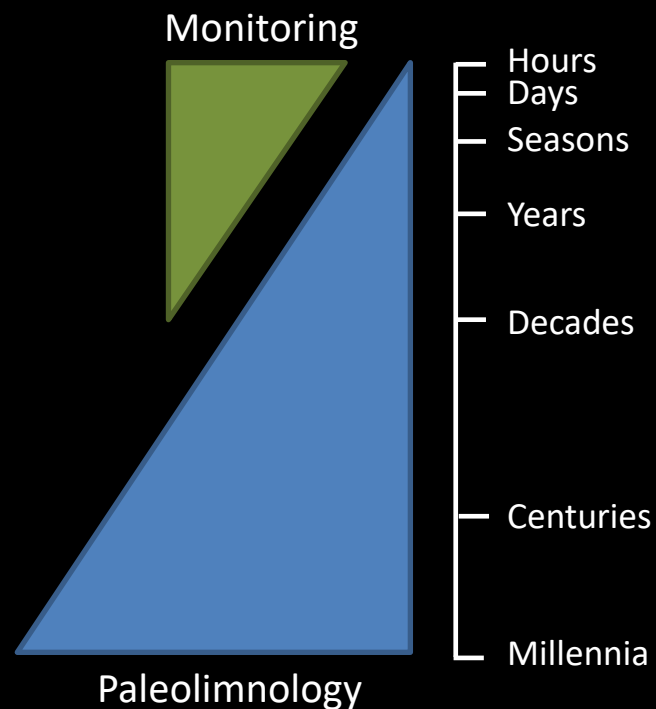
# Fraser Sockeye Salmon In Trouble

Stock	Run Timing Group	COSEWIC Listing Status
CULTUS	LATE	ENDANGERED
BOWRON	EARLY-SUMMER	ENDANGERED
HARRISON (U/S)	LATE	ENDANGERED
QUESNEL	SUMMER	ENDANGERED
SETON	LATE	ENDANGERED
TAKLA-TREMBLEUR	EARLY STUART	ENDANGERED
TAKLA-TREMBLEUR-STUART	SUMMER	ENDANGERED
TASEKO	EARLY SUMMER	ENDANGERED
NORTH BARRIERE	EARLY SUMMER	THREATENED
WIDGEON	RIVER TYPE*	THREATENED
KAMLOOPS	EARLY SUMMER	SPECIAL CONCERN
LILLOOET-HARRISON	LATE	SPECIAL CONCERN
NAHATLATCH	EARLY SUMMER	SPECIAL CONCERN
FRASER-FRANCOIS	SUMMER	SPECIAL CONCERN
HARRISON (D/S)	LATE	SPECIAL CONCERN
NADINA-FRANCOIS	SUMMER	NOT AT RISK
CHILLIWACK	EARLY SUMMER	NOT AT RISK
SHUSWAP COMPLEX	EARLY SUMMER	NOT AT RISK
ANDERSON-SETON	EARLY SUMMER	NOT AT RISK
PITT	EARLY SUMMER	NOT AT RISK
HARRISON RIVER	RIVER TYPE*	NOT AT RISK
CHILKO	EARLY SUMMER	NOT AT RISK
CHILKO	SUMMER	NOT AT RISK



# Paleolimnology:

Reconstruction of lake, watershed & climatic histories using the physical, chemical, & biological information archived in lake sediments



- Yields valuable data on environmental change in lakes, their watersheds, and the atmosphere
- Critical to address major environmental issues (e.g. acid rain, climate change, pollution)
- Reconstruct past Pacific salmon abundances, drivers, & FW habitat changes

# NSERC Alliance: A New Pathway to Partnership



- **NSERC Alliance Advantage Grant**

- Federal funding for academic-based partnered research
- Partnership fund (2:1) with defined goals
  - Generate knowledge to address complex challenges
  - Create economic, social & environmental benefits
  - Support public policy
  - Diverse perspectives & skills accelerate translation & application of research



Fisheries and Oceans  
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One New  
Partnerships  
Program

**Alliance  
Grants**

Flexible  
Simplified  
Enhanced  
Responsive

# Academic Partners



**Jules M. Blais, PhD**

Professor,  
Department of Biology, University of Ottawa  
Editor in Chief, *FACETS*



**John P. Smol, OC, PhD, FRSC, FRS**

*Distinguished University Professor &  
Canada Research Chair in Environmental Change*  
Department of Biology, Queen's University  
President, Academy of Science, Royal Society of Canada  
Editor, *Environmental Reviews*



# Some brave & visionary souls wanted answers, and put their money where their mouth was...



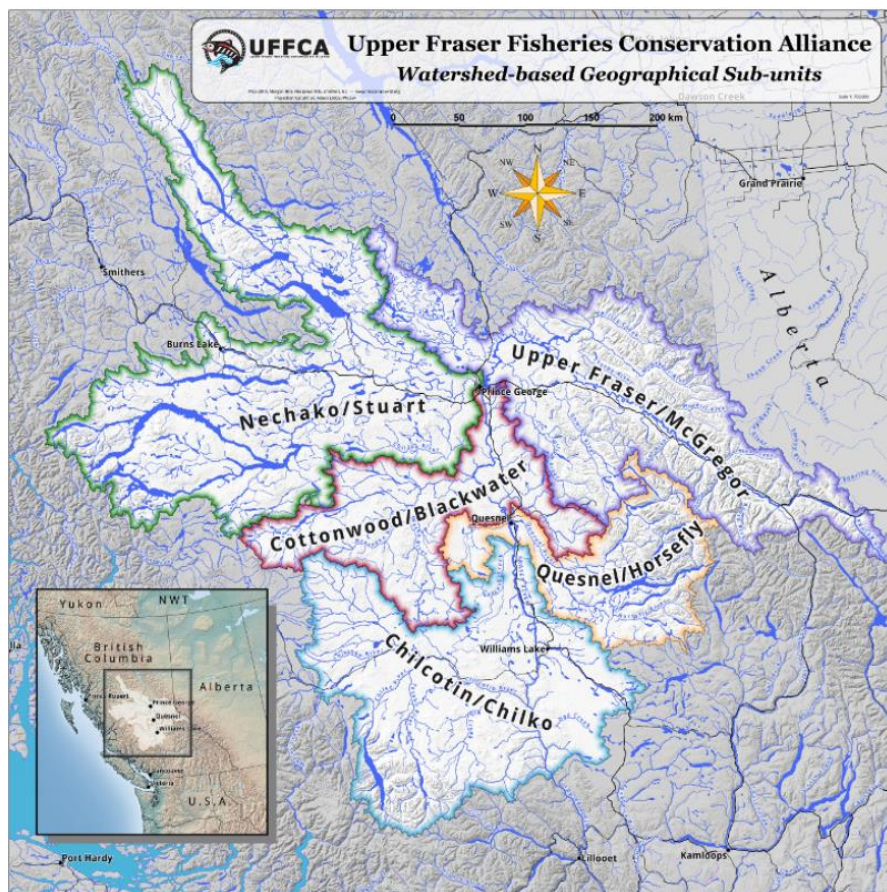
**Upper Fraser Fisheries  
Conservation Alliance**



**STELLAT'EN FIRST NATION**

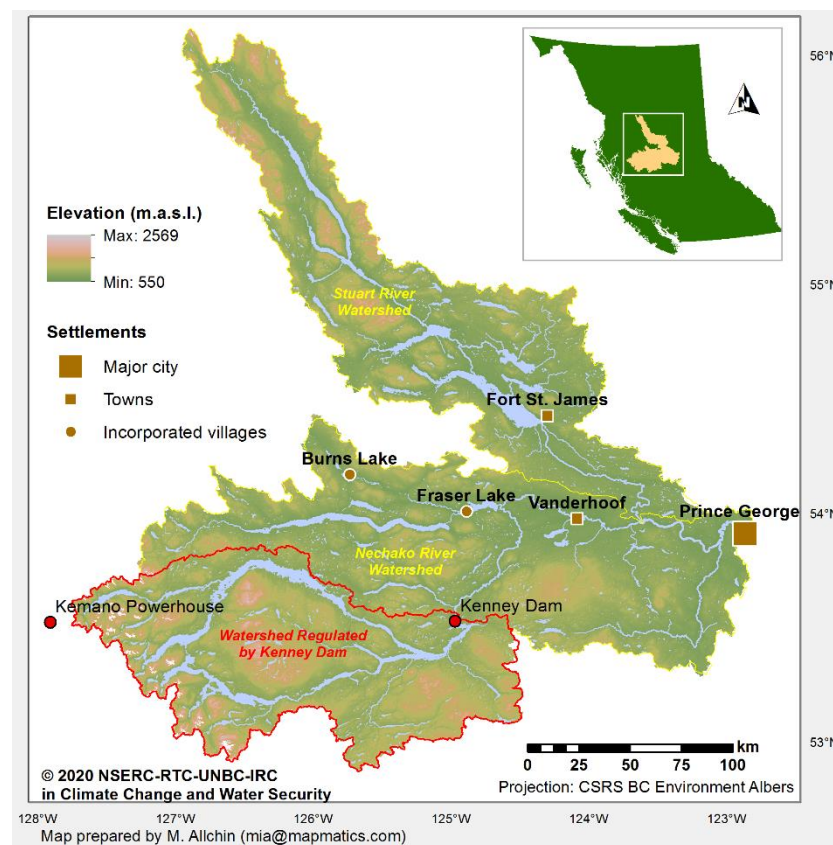
A member of the Carrier Sekani Tribal Council in Fraser Lake BC





Courtesy of the UFFCA

# Understanding Environmental Change in the Upper Fraser for Salmon, Water, & People



Modified from [UNBC](#)



# Project Updates

- **Core Funding Provided by Partners – 2025**
  - Nechako WS Roundtable (CWA grant)
  - Cheslatta Carrier, Stellat'en, Nadleh Whut'en & Saikuz First Nations
  - Upper Fraser Fisheries Conservation Alliance
- **NSERC Alliance Grant Submitted July 18, 2025**
- Planning on inclusive **oversight committee** underway, with UFFCA as a lead

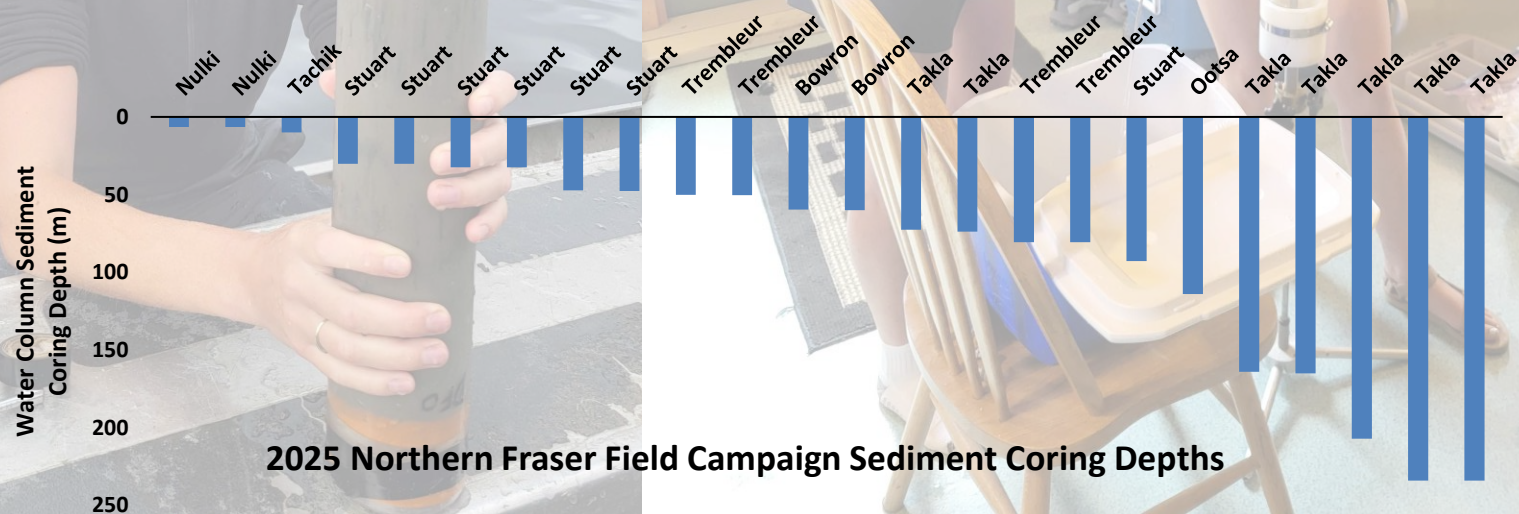
# Project Updates





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- **Initial Fieldwork Campaign - August 2025**
  - On the water with Queen's, DFO, UFFCA, Cheslatta-Carrier Nation
  - Stuart, Takla, Trembleur, Bowron, Nulki, Tachik, Ootsa (24 sediment cores; @ est. 2-5Kyr+)







# Project Updates





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- **Highly-Skilled Personnel (HSP; pre-NSERC)**
  - Julia Paton, Queen's University, Ph.D. candidate
  - Matthew Damboise, U Ottawa, Msc. candidate
  - Jacob Rudolph, U Ottawa, MSc. candidate
- **Next Steps**
  - Await NSERC decision, in order to expand
  - Conversations through winter with project partners on foci, fieldwork, etc.
  - Stewardship committee expected to be struck

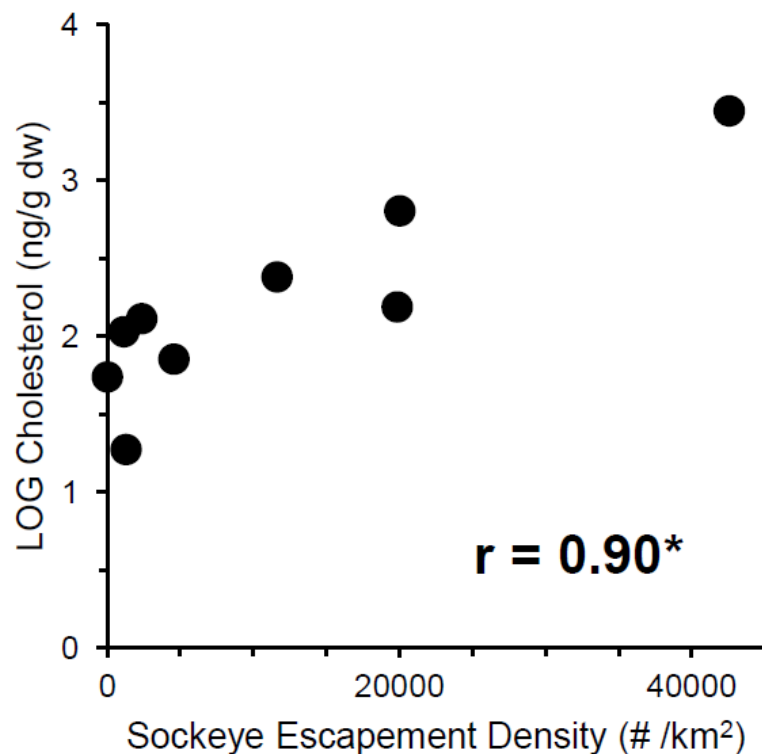




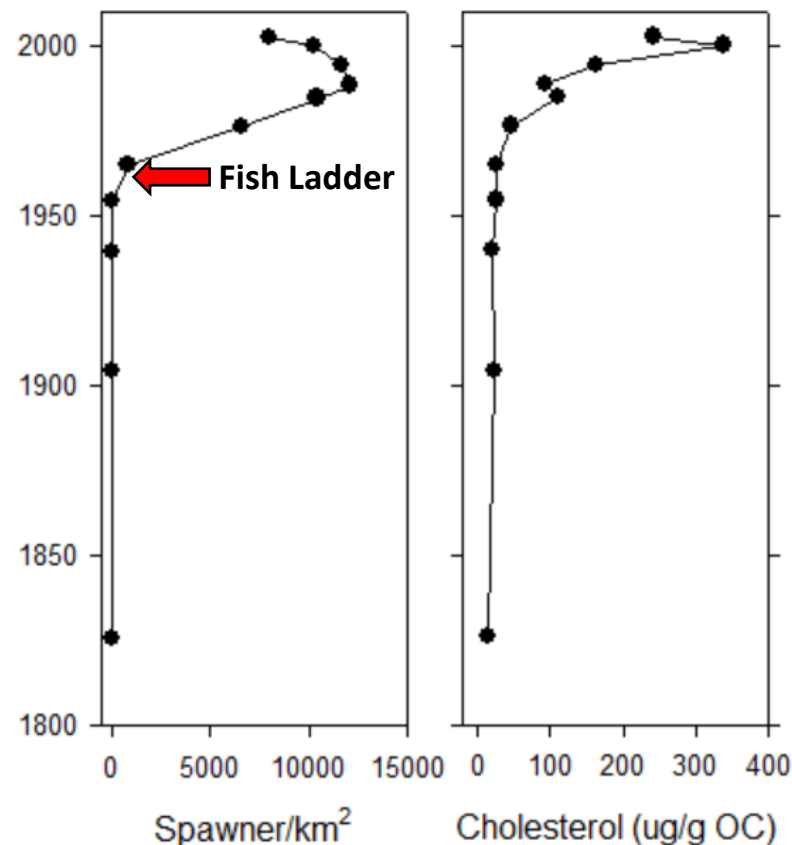


# Extra Slides for Depth

# NSERC Alliance Innovation Goal: Development & Application of a New Paleo-Salmon Indicator



**Sockeye Nursery Lake**  
**Surface Sediments**

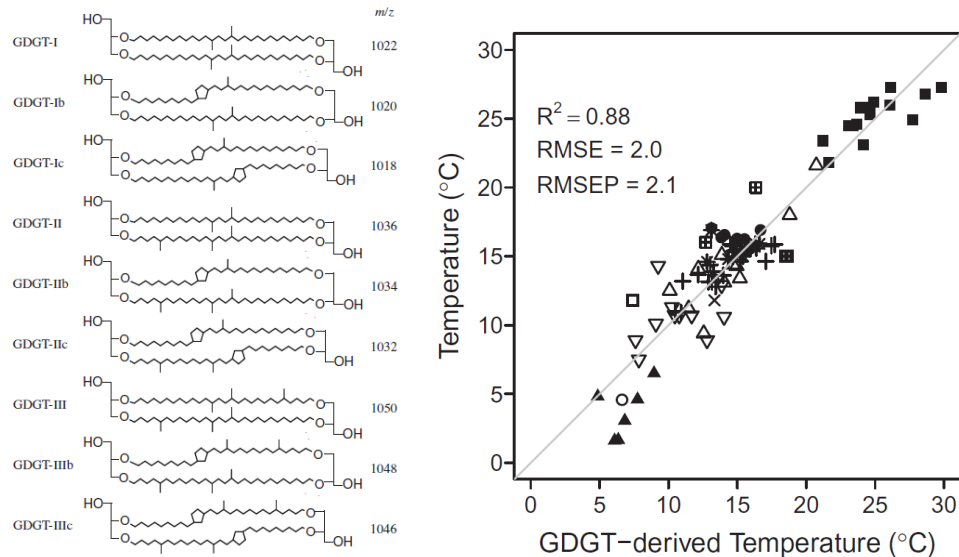


**Downcore Application**  
**Frazer Lake, AK**

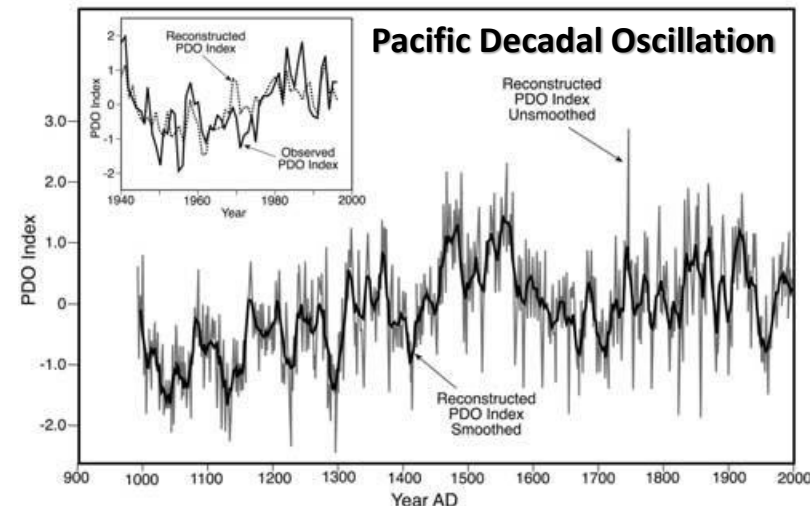
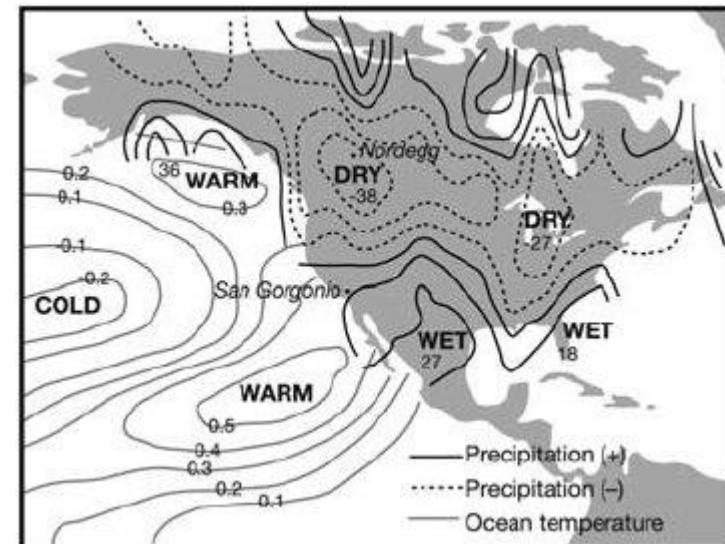
Sedimentary salmon-derived sterols show promising application in salmon reconstruction

# NSERC Alliance Innovation Goal: Calibration & Application of a New FW Paleo-thermometer

## Glycerol Dialkyl Glycerol Tetraethers (GDGT's)



- Molecules in membranes of bacteria & archaea
- Molecular branching  $\alpha$  temperature
- Calibration yields accurate & precise paleo-thermometer applicable across nursery lakes
- Reconstruct major climate variations in relation to salmon production around North Pacific (e.g. ENSO, PDO)



Pearson et al. 2011. *Geochim. Cosmochim. Acta.* 75: 6225-6238

MacDonald & Case. 2005. *Geophys. Res. Lett.* 32: L08703



# **NSERC Alliance Innovation Goal:**

## **Establish the salmon-climate relationship at ecologically-relevant spatial & time scales**

