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Paleoenvironmental investigation of Pacific salmon lakes in British Columbia

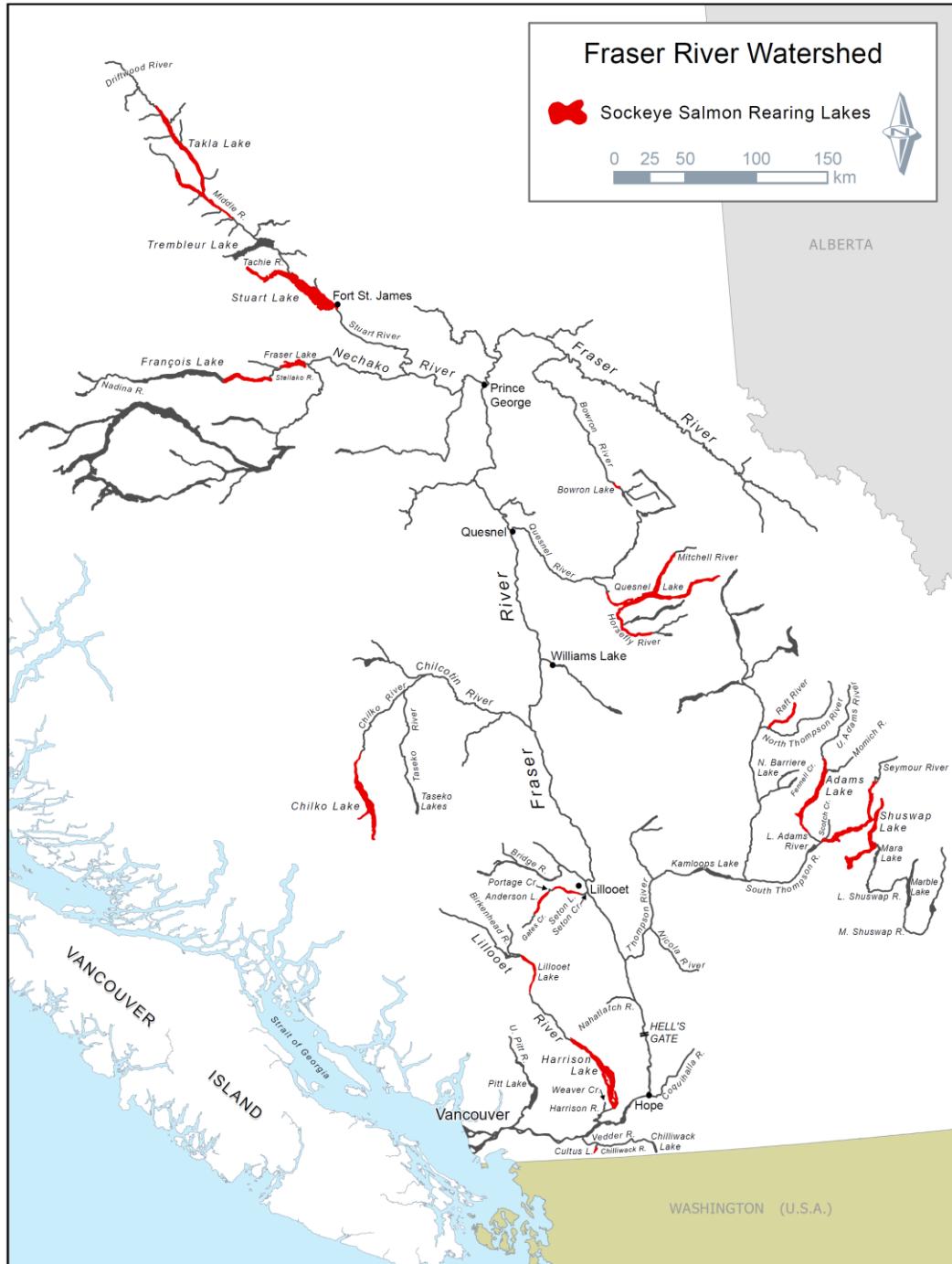
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Science Branch, Fisheries and Oceans Canada
Cultus Lake Salmon Research Laboratory



Canada

Fraser River Watershed



- 220,000 km² (23% of BC)
- Sockeye Salmon rear juveniles across diverse nursery lakes
- Multiple stressors & species imperilment

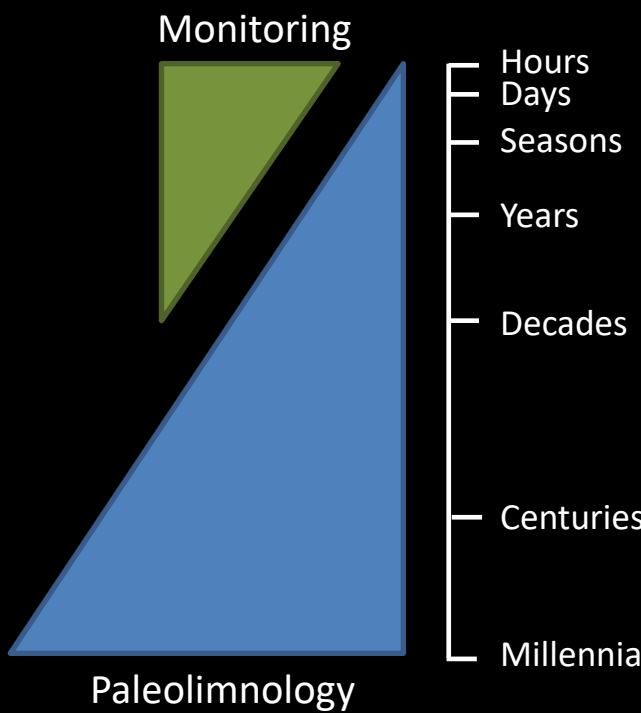
Fraser Sockeye Salmon In Trouble

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
CRSNG

- **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



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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

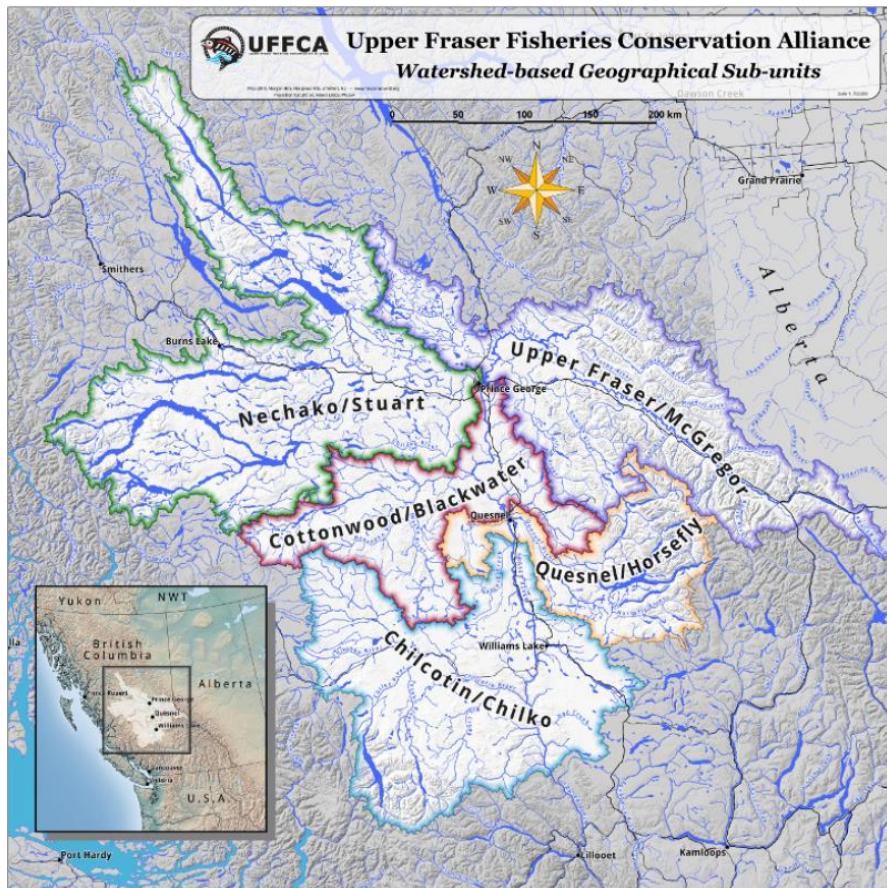


Saik'uz
First Nation



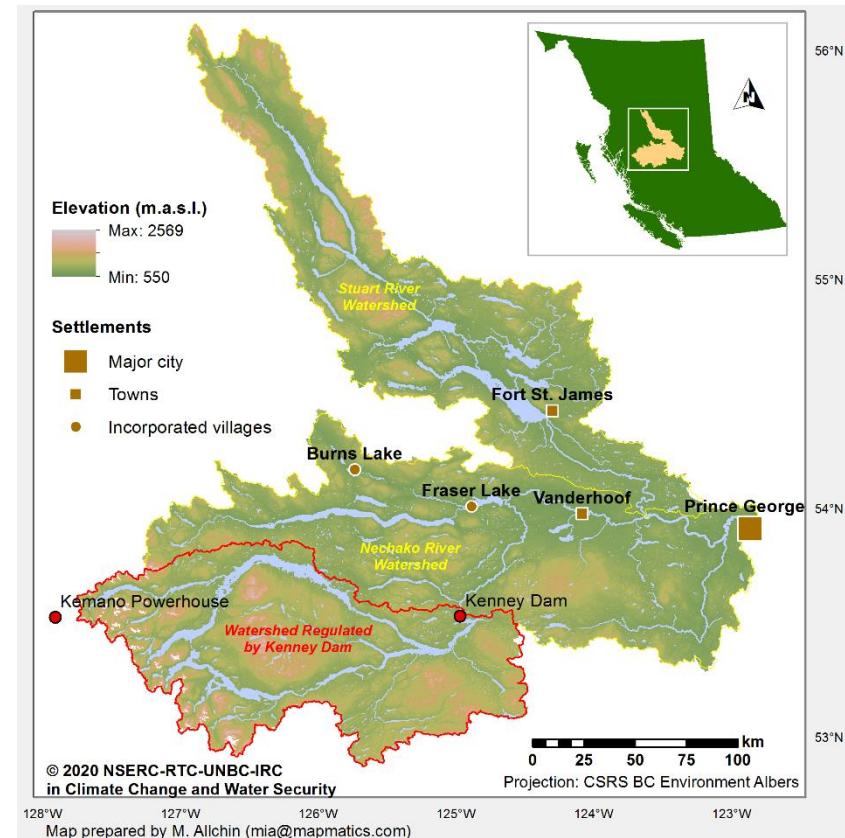
STELLAT'EN FIRST NATION

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

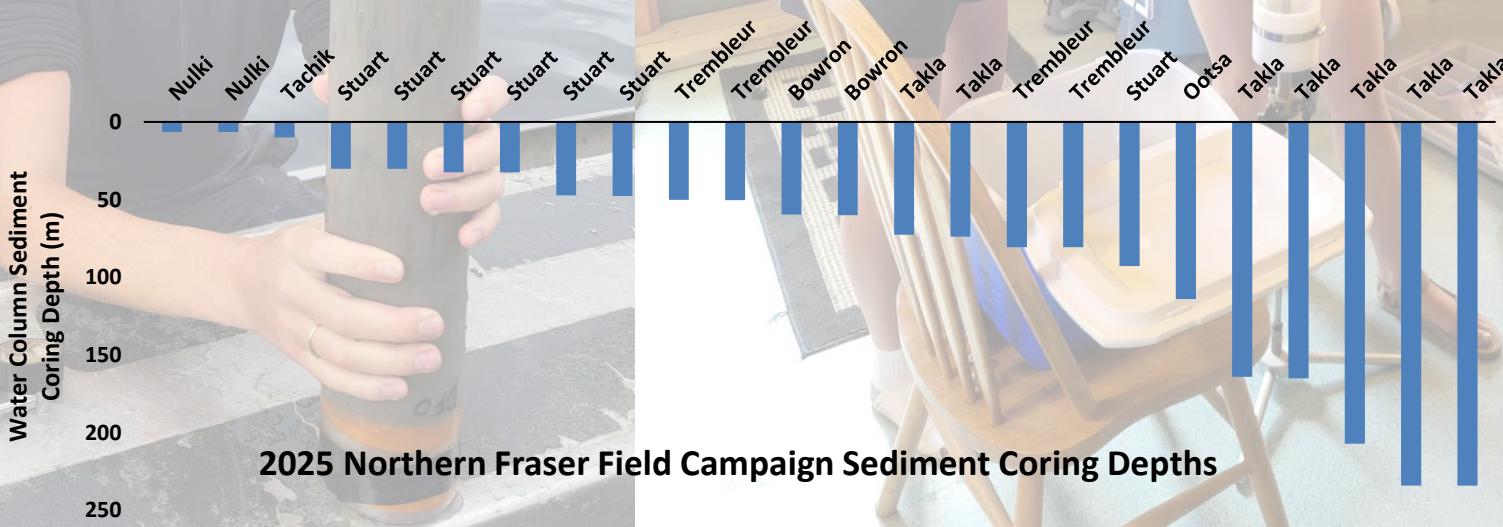
- **Core Funding Provided by Partners – 2025**
 - Nechako WS Roundtable (CWA grant)
 - Cheslatta Carrier, Stellat'en, Nadleh Whut'en & Saikuz First Nations
 - Upper Fraser Fisheries Conservation Alliance
- **NSERC Alliance Grant Submitted July 18, 2025**
- Planning on inclusive oversight committee underway,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

Project Updates



Project Updates

- **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



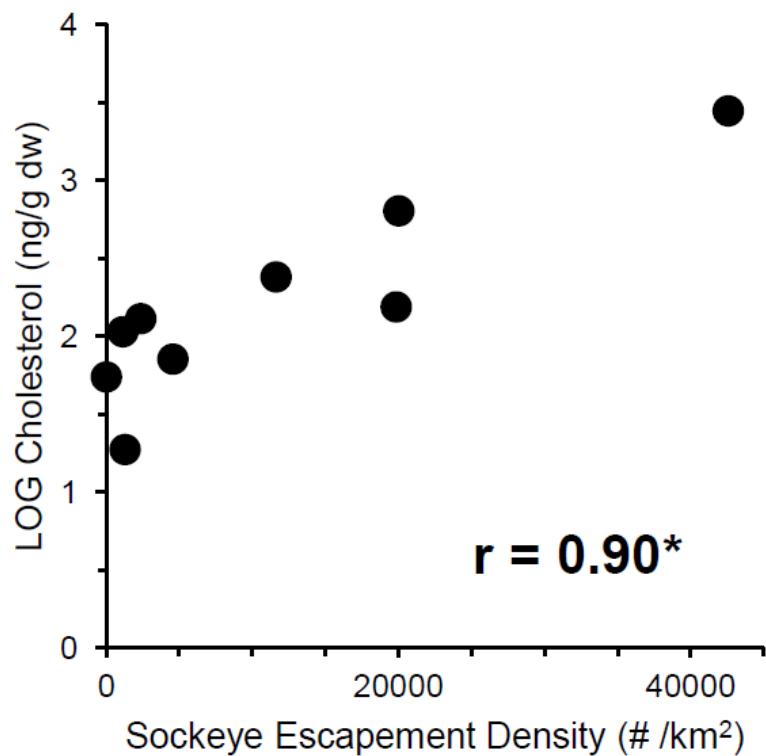
Project Updates

- **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

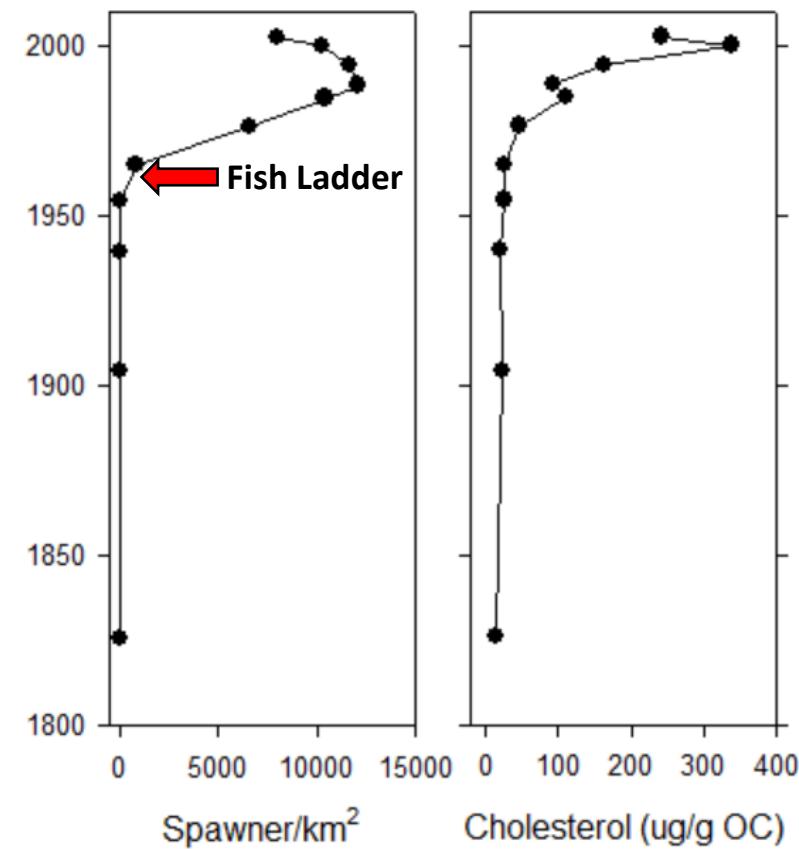


Extra Slides for Depth

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



**Sockeye Nursery Lake
Surface Sediments**

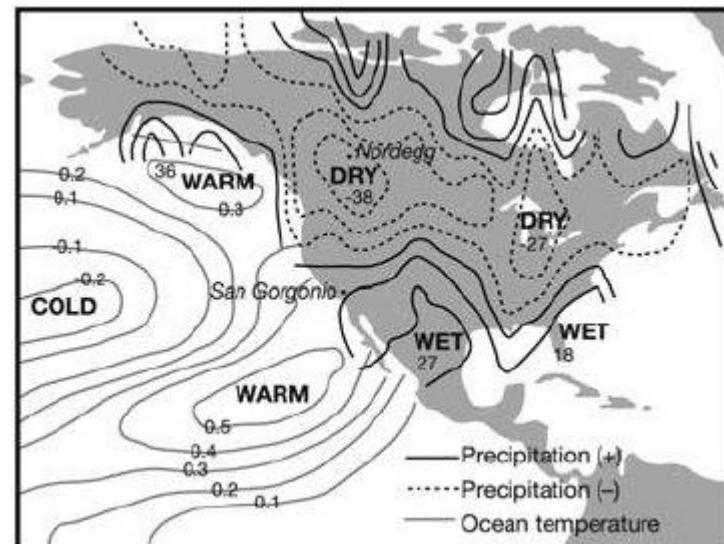
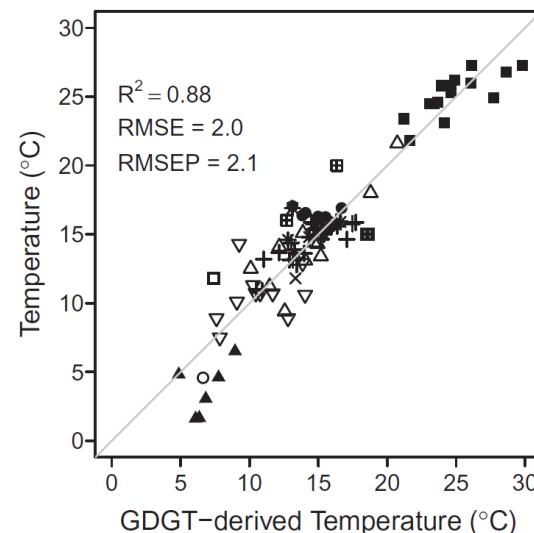
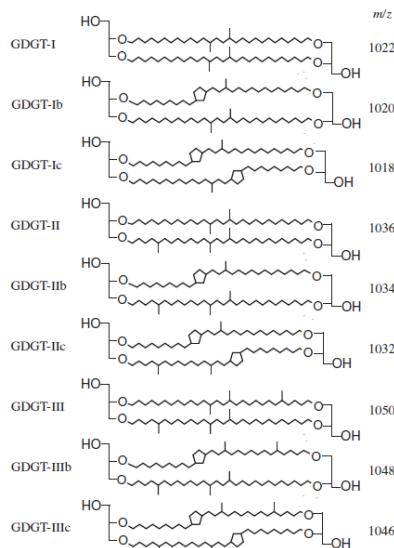


**Downcore Application
Frazer Lake, AK**

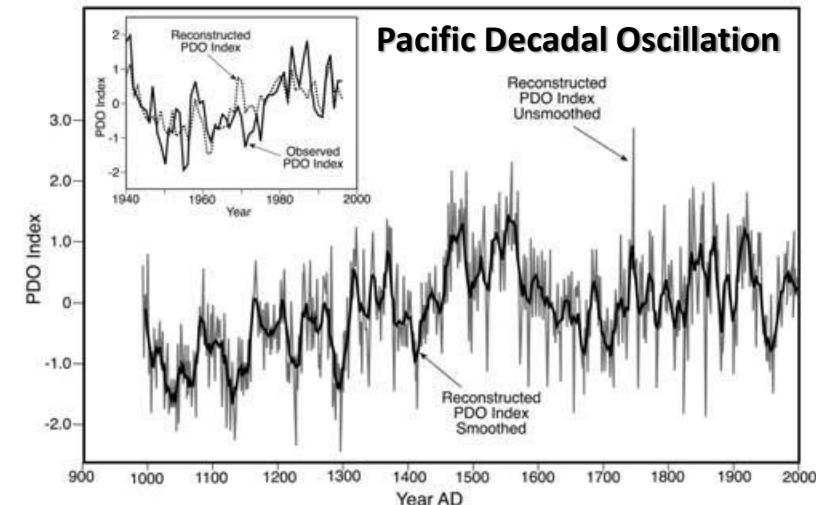
Sedimentary salmon-derived sterols show promising application in salmon reconstruction

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 α 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)



NSERC Alliance Innovation Goal:

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

