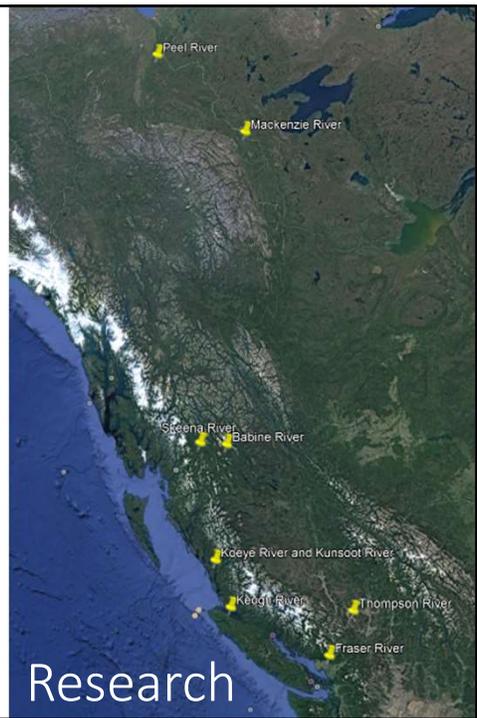


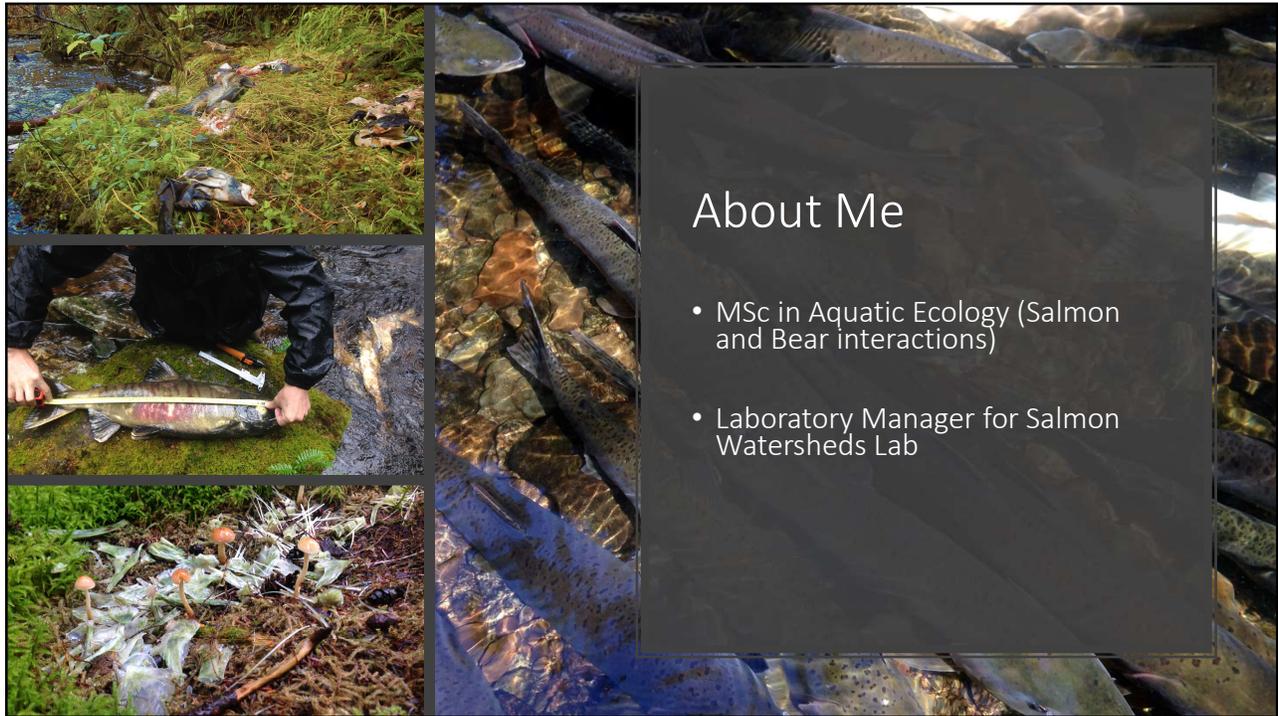
Large-scale temperature monitoring to add to the collaborative understanding of river temperatures with potential relevance to salmon and land-use management

NICOLA SYMPOSIUM FEBRUARY 1, 2018
Luke Andersson for Jonathan Moore, Simon Fraser University

Outline

- Salmon Watersheds Lab
- Watershed Research Highlights
- Nicola Watershed Research



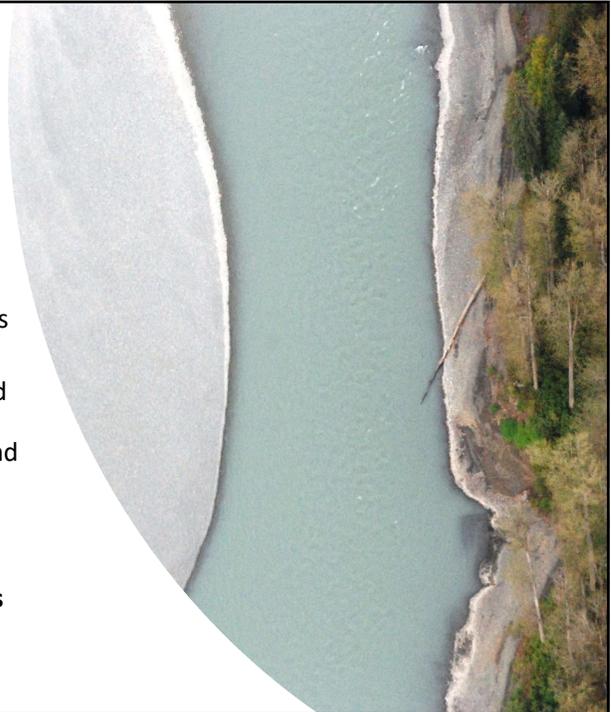


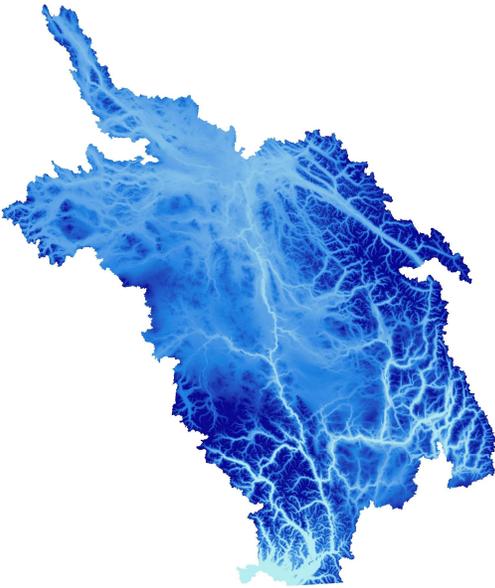
About Me

- MSc in Aquatic Ecology (Salmon and Bear interactions)
- Laboratory Manager for Salmon Watersheds Lab

Watershed Research

- Interested in the connections and flows that link watersheds (e.g., water supply, sediment, fisheries and migrations)
- Using a combination of data synthesis, theory, and field research, we are exploring how these branching networks influence river biodiversity and stability.
- Watersheds integrate land-use and propagate downstream
- **Watersheds are more than the sum of their parts**

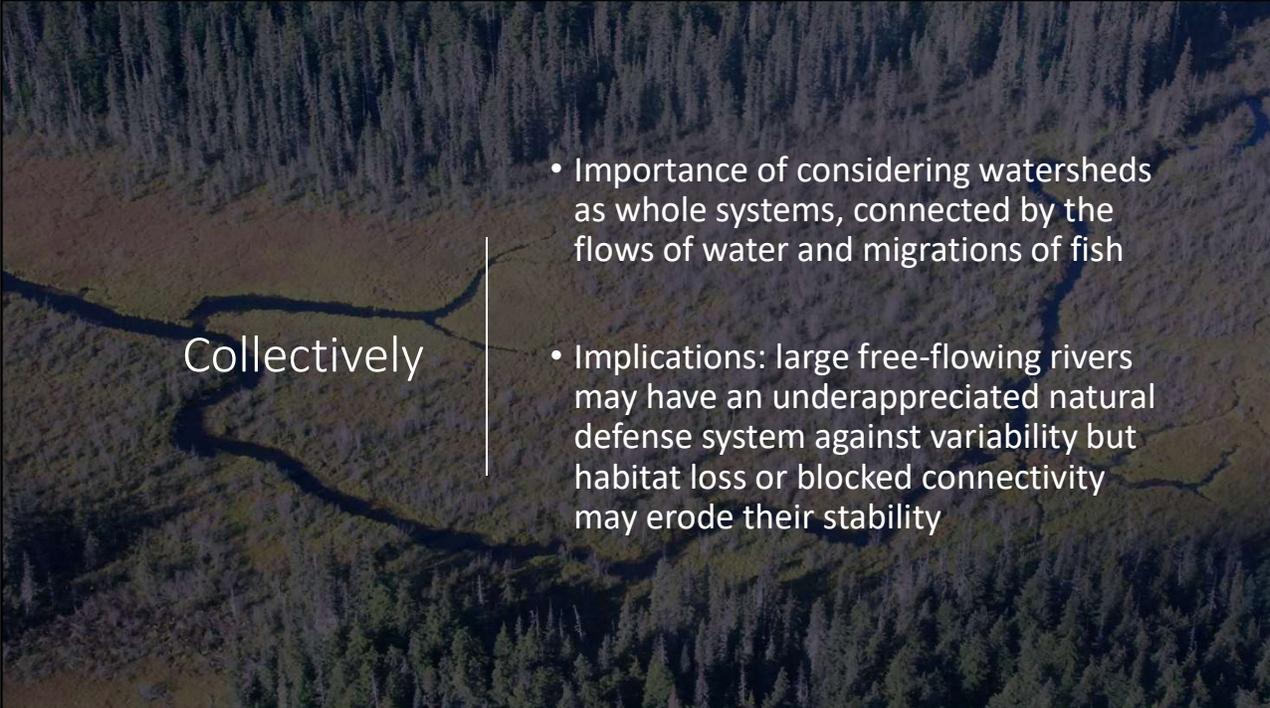




Rivers as Nature's Portfolios

- The Moore lab team as well as Fisheries and Oceans collaborators compiled and analyzed an enormous dataset of fisheries catches, water flows, and water temperatures that spanned 30 years from a total of 142 sites located throughout the vast Fraser River watershed.
- **Sites that drained larger catchments had more stable flows, temperatures, and fisheries, with less frequent fisheries crashes and floods.**

Moore, J. W., Beakes, M. P., Nesbitt, H. K., Yeakel, J. D., Patterson, D. A., Thompson, L. A., Phillis, C. C., Braun, D. C., Favaro, C., Scott, D., Carr-Harris, C. and Atlas, W. I. (2015), Emergent stability in a large, free-flowing watershed. *Ecology*, 96: 340–347.



Collectively

- Importance of considering watersheds as whole systems, connected by the flows of water and migrations of fish
- Implications: large free-flowing rivers may have an underappreciated natural defense system against variability but habitat loss or blocked connectivity may erode their stability

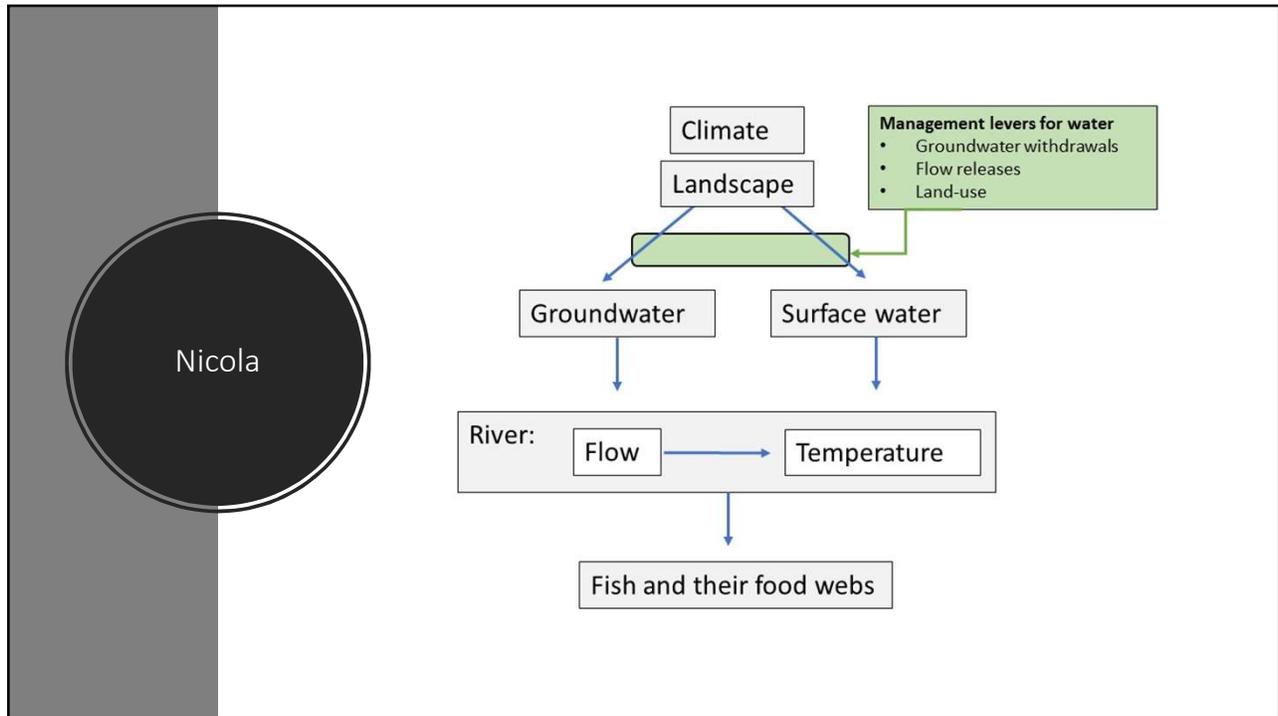


River networks integrate large and complex climate-scapes and consequently dampen local signals of climate change

- Key finding: Larger, more diverse river subcatchments dampen impacts of climate change by integrating varied climate responses across complex landscapes
- Rivers can act like diverse stock portfolios that dampen variability (e.g., flow, temperature)
- **Watersheds may possess an underappreciated capacity and provide a tool for mitigating the impacts of climate change**
- Chezik, K.A., Anderson, S.C. and J.W. Moore. 2017. River networks dampen long-term hydrological signals of climate change. *Geophysical Research Letters*. 44.

Nicola Watershed

This project will use stream network models to create whole-river models of temperature change through time. Ultimately, through a lens of fish migration and habitat needs



River Temperatures Throughout the Nicola Watershed

- **Objective:** initiate a large-scale temperature monitoring program that adds to the collaborative understanding of river temperatures with potential relevance to salmon and land-use management. To build on temperature work from various organizations.
- This project will deploy river temperature loggers throughout the entire Nicola River system and then use stream network models to create whole-river models of temperature change through time.
- The data generated here will help enhance our understanding of this dynamic system at an even more detailed scale.

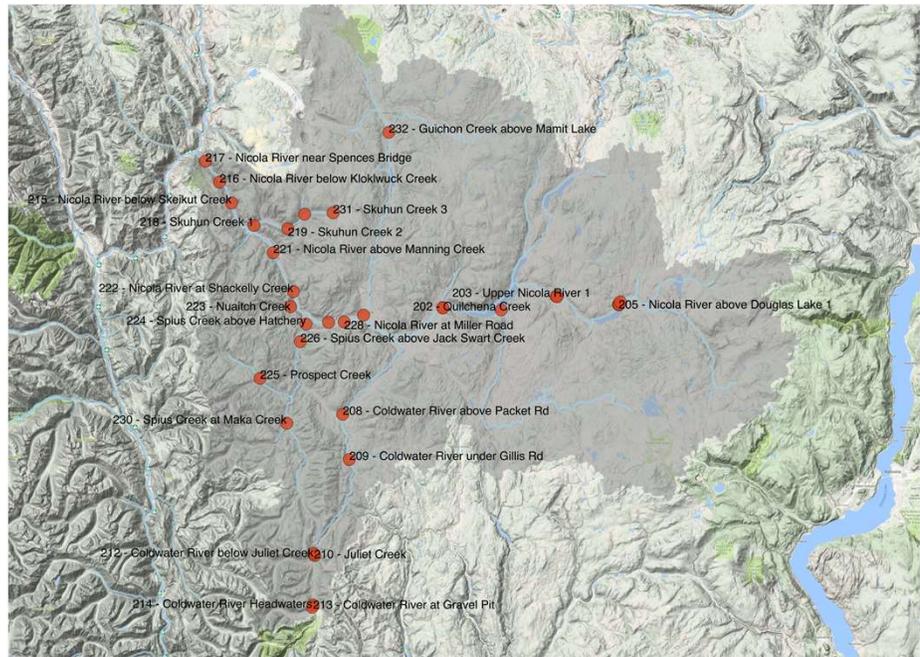


Year 1: 32 tidbit loggers deployed

- 1 Clapperton
- 6 Coldwater
- 2 Guichon
- 1 Juillet
- 13 Nicola
- 1 Nuaitch
- 1 Prospect
- 1 Quilchena
- 3 Skuhun
- 1 Skuhun trib.
- 3 Spius



Temperature Logger Locations



Data Management System

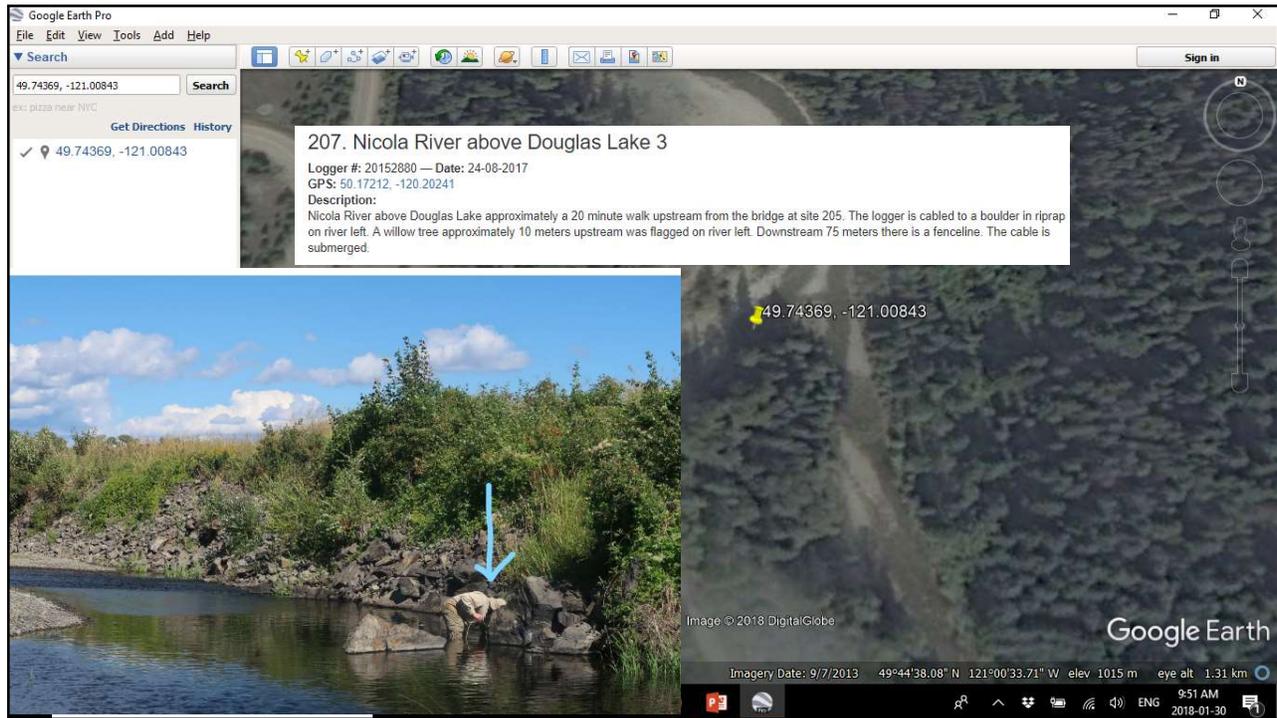
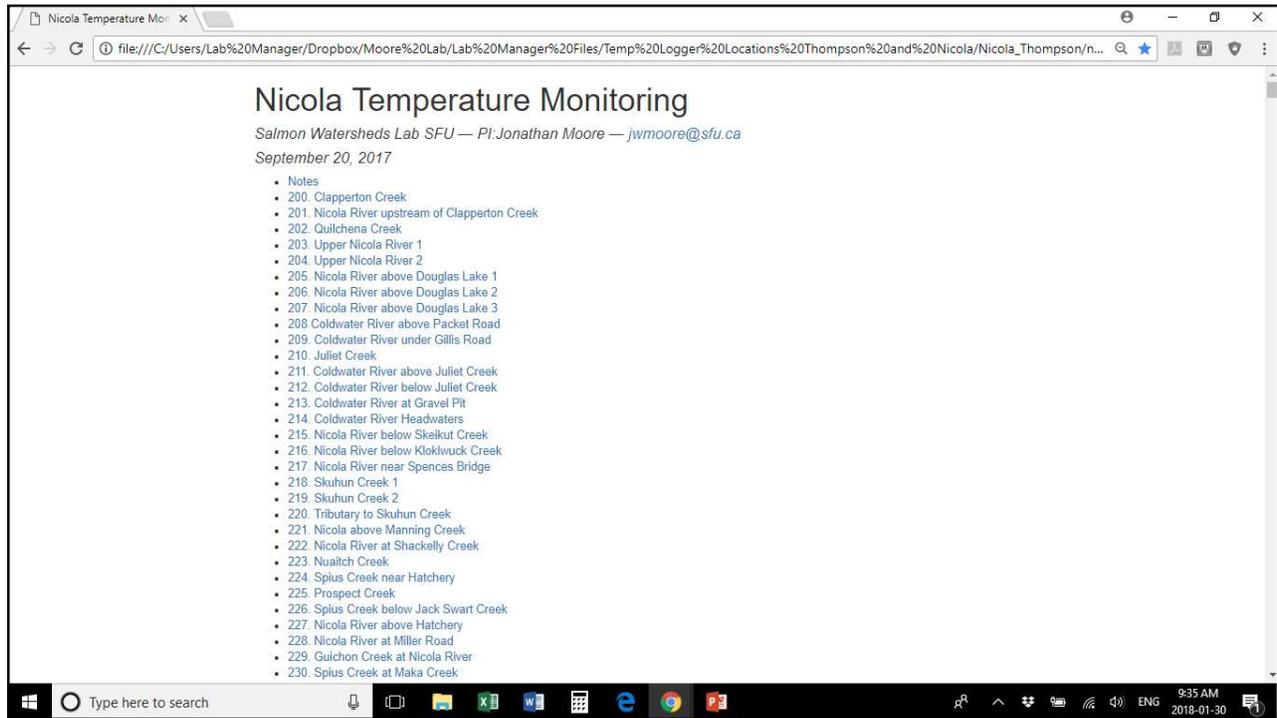
b%20Manager/Dropbox/Moore%20Lab/Lab%20Manager%20Files/Temp%20Logger%20Locations%20Thompson%20and%20Nicola/Nicola

207. Nicola River above Douglas Lake 3

Logger #: 20152988 — Date: 24-09-2017
GPS: 50.17212, -120.20241

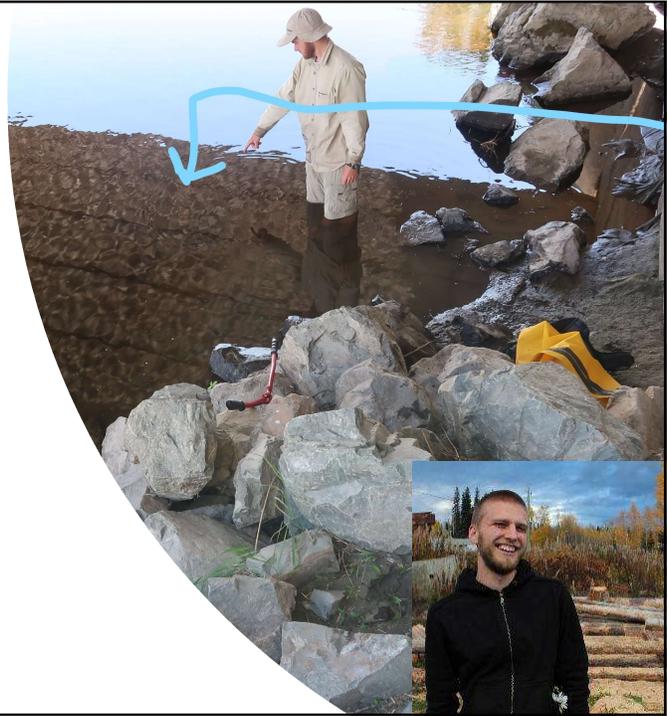
Description:
Nicola River above Douglas Lake approximately a 20 minute walk upstream from the bridge at site 205. The logger is cabled to a boulder in riprap on river left. A willow tree approximately 10 meters upstream was flagged on river left. Downstream 75 meters there is a fence line. The cable is submerged.





Future

- Grad student Luke Warkentin to download and redeploy
- 3 main applications of data
 - River temp model
 - Fish data can be overlaid and analysed against these temperatures
 - Support other partners in the watershed



Data

Thank You



Fisheries and Oceans
Canada

Pêches et Océans
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RESEARCH
COMMITTEE



LIBER  **ERO**
FELLOWSHIP PROGRAM