

Nechako Watershed Roundtable Annual Meeting 2023

An update on Phase 3 of integrated
research in the Nechako Watershed

Nechako Watershed: Unceded lands



Ts'il Kaz Koh



Binche Whut'en



Stelat'en First Nation



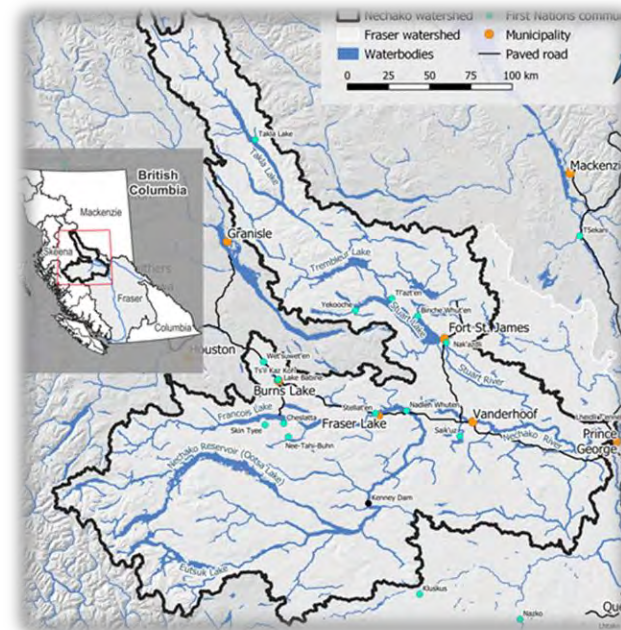
Nadleh Whut'en



Saik'uz First Nation



Lheidli T'enneh
Wheni Lheidli T'enneh ts'inli



Integrated Watershed Research in the Nechako River Basin (Phase 3)

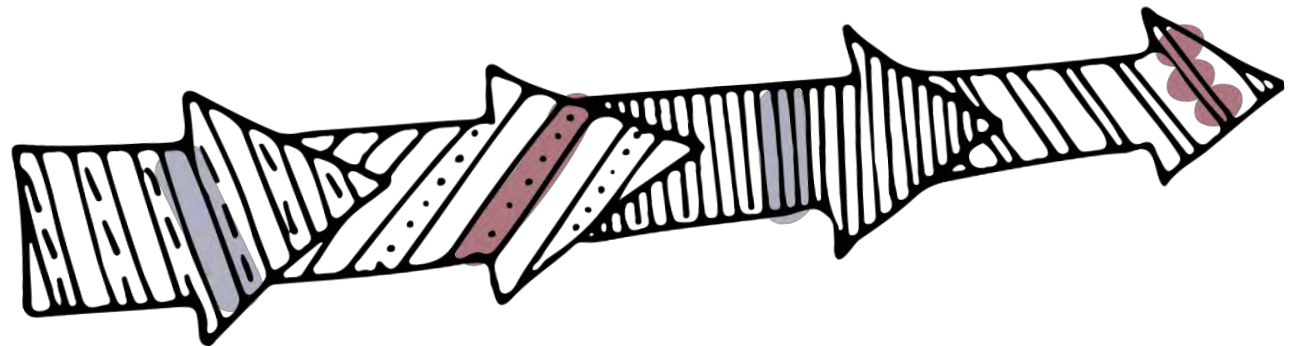
Overarching theme: The climate crisis as a cross-cutting driver of watershed change.

Main goal: : To strengthen community connections and preparedness for integrative responses to climate variability affecting the Nechako Watershed.

Research areas: **(T1)** Network of Experimental Watersheds for Integrated Research, **(T2)** Landscape Disturbances on Sediment and Contaminant Fluxes, **(T3)** Fish Response to Environmental Change and **(T4)** Co-benefits for Climate, Catchments (Watersheds) and Communities.

Budget: Total value of the project is \$0.8M with the total award from NEEF being \$0.4M

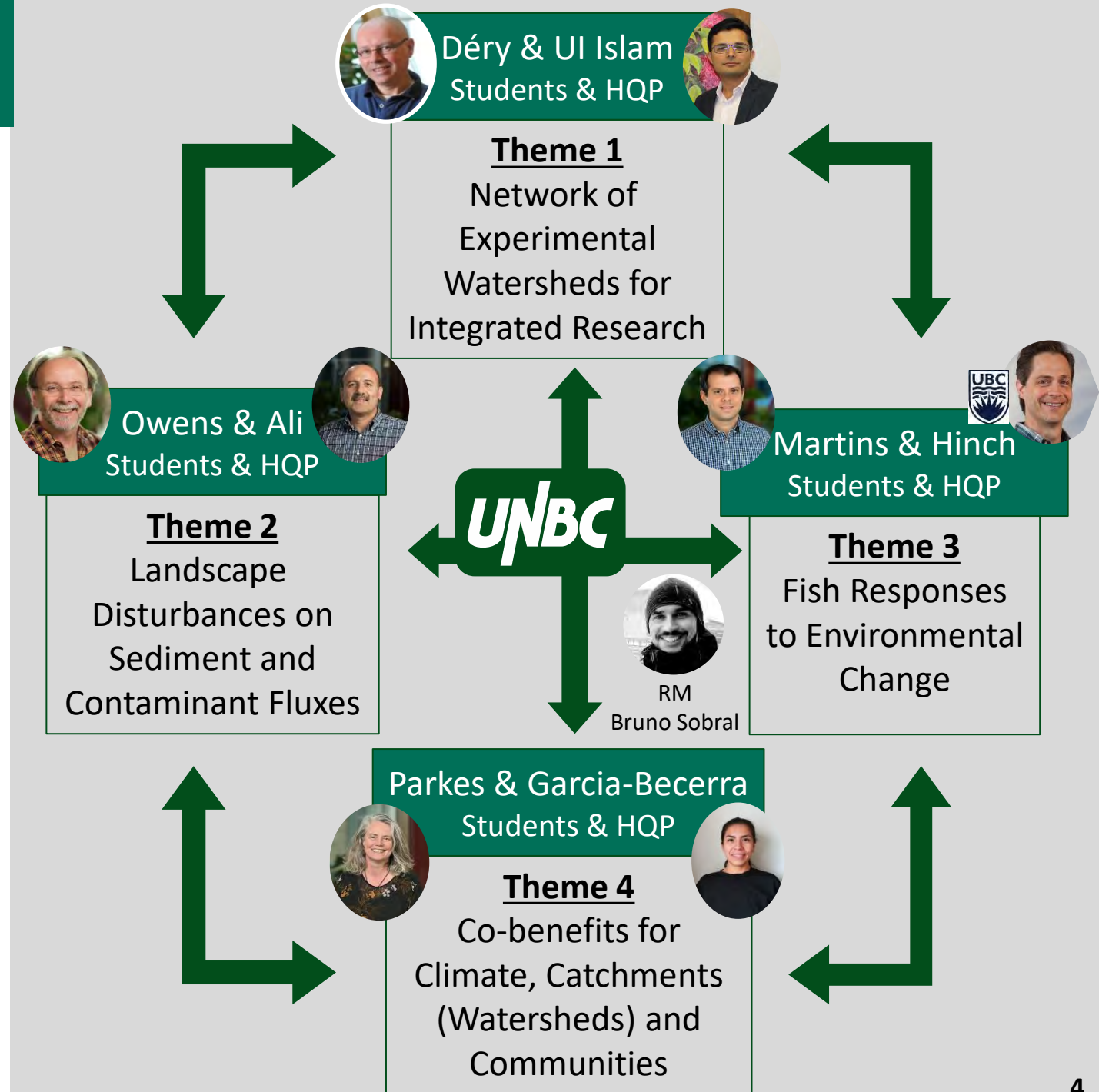
Timeline: 1 July 2023 to 30 June 2025



Phase 3 team & themes

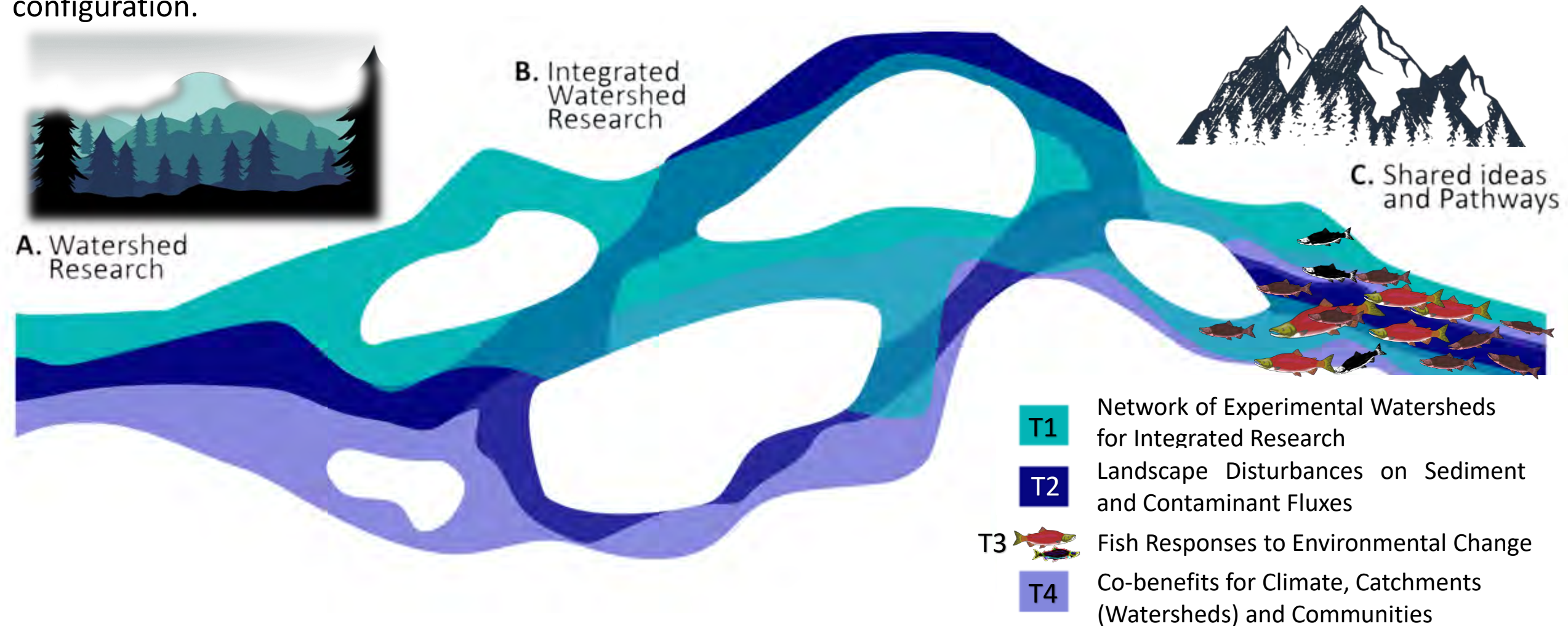
The climate crisis as a cross-cutting driver of watershed change in the Nechako

- Research in **four interrelated themes**
- Supported by **Project Partners**
 - BC Ministry of Forests
 - BC Ministry of Water, Land and Resource Stewardship
 - Cheslatta Carrier Nation
 - Nechako Environment and Water Stewardship Society
 - **Nechako Watershed Roundtable**
 - Northern Health
 - School District 91
 - University of Northern British Columbia
 - Upper Fraser Fisheries Conservation Alliance



IWRG Analogy of Braided River

Work of a river: move sediment and water through landscapes and results in modified channels and watershed
Braiding processes that are highly dynamic, with rapid interactions between water, sediment and channel configuration.



Theme 1: Network of Experimental Watersheds for Integrated Research (NEWIR)

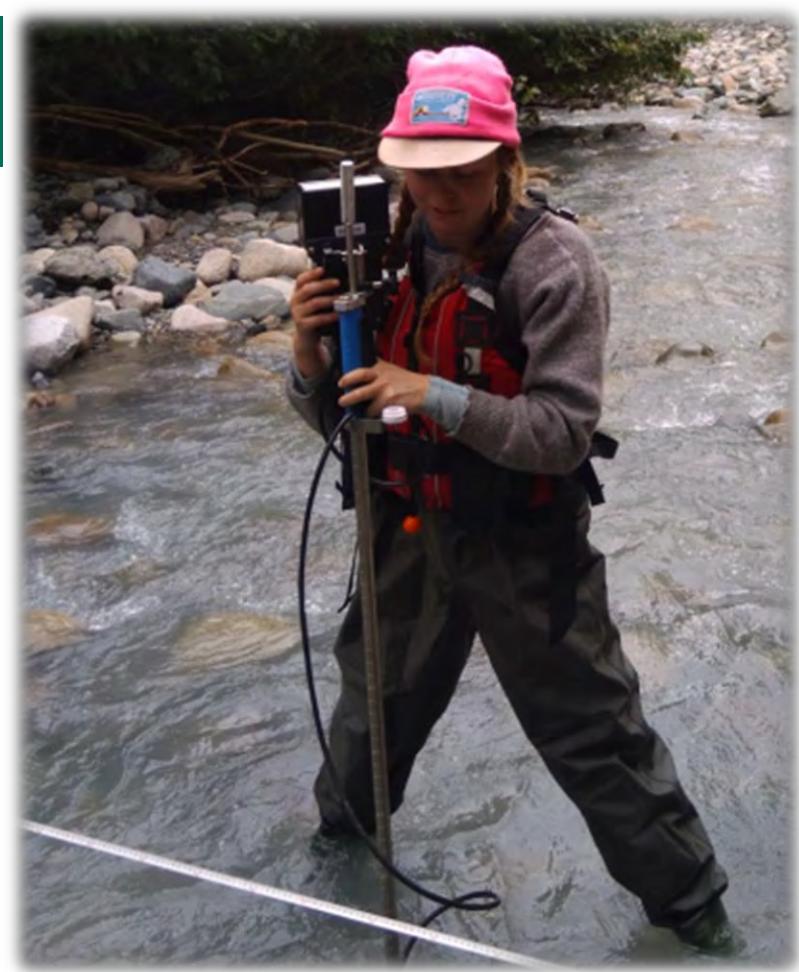
Main Goal: To develop a network of experimental watersheds to improve monitoring and understanding of the impacts of climate and land cover changes on terrestrial water fluxes.

Objectives:

- To develop a network of experimental watersheds for hydroclimatic monitoring;
- To gauge the hydrological response to the cumulative impacts of climate change, land cover disturbances and land use changes (using output from the Variable Infiltration Capacity model in collaboration with Dr. Siraj ul Islam);
- To explore links between land-falling atmospheric rivers, water temperatures, and sediment transport in a joint project with Theme 2 activities.



Experimental set-up



Atmospheric parameters: Air and soil temperature, humidity, pressure, wind speed and direction, precipitation, snow depth, solar/infrared radiation and lightning strikes.

Water parameters: Water level, streamflow, sediment fluxes and water temperature (all important parameters for Themes 2 and 3).

All data is quality controlled and deposited into publicly accessible archives. They will also be uploaded into the Nechako Portal through Theme 4 joint activities.



Theme 2: Effects of Landscape Disturbances on Sediment and Contaminant Fluxes

Main Goal: To determine how landscape disturbances, such as land-falling atmospheric rivers and especially severe wildfires, modify erosion of the landscape and the delivery of fine-grained sediment and associated chemicals to river channels in the NRB.

Outcomes:

- The scientific basis for improved understanding of sediment sources and transfers, thereby helping to protect sensitive aquatic habitats and ecosystems from sediment and contaminants.
- Guidance on the mitigation measures to reduce the mobilization and delivery of fine sediment and contaminants to aquatic habitats following landscape disturbances such as atmospheric rivers and wildfires.
- Improved technical capacity to address the climate crisis on water resources and aquatic ecosystems in the NRB.

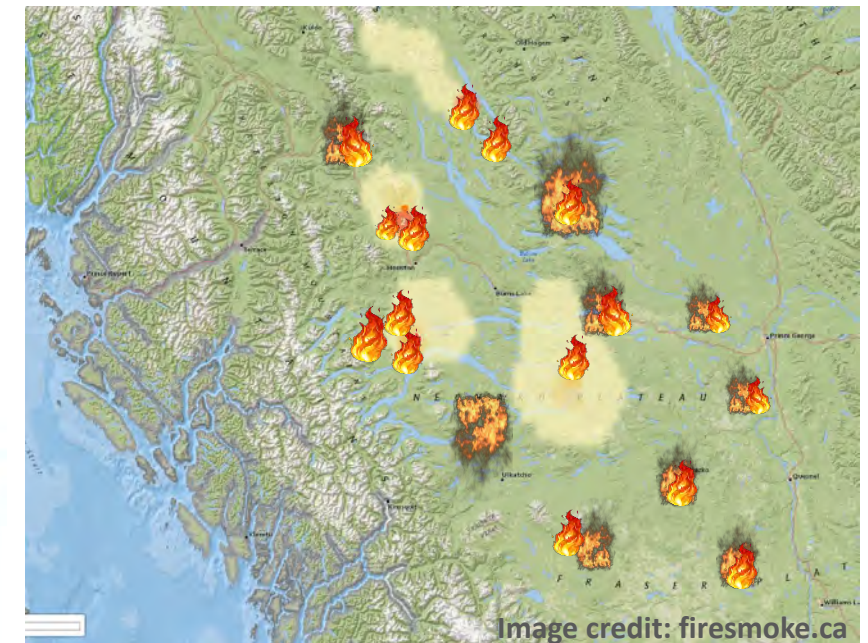
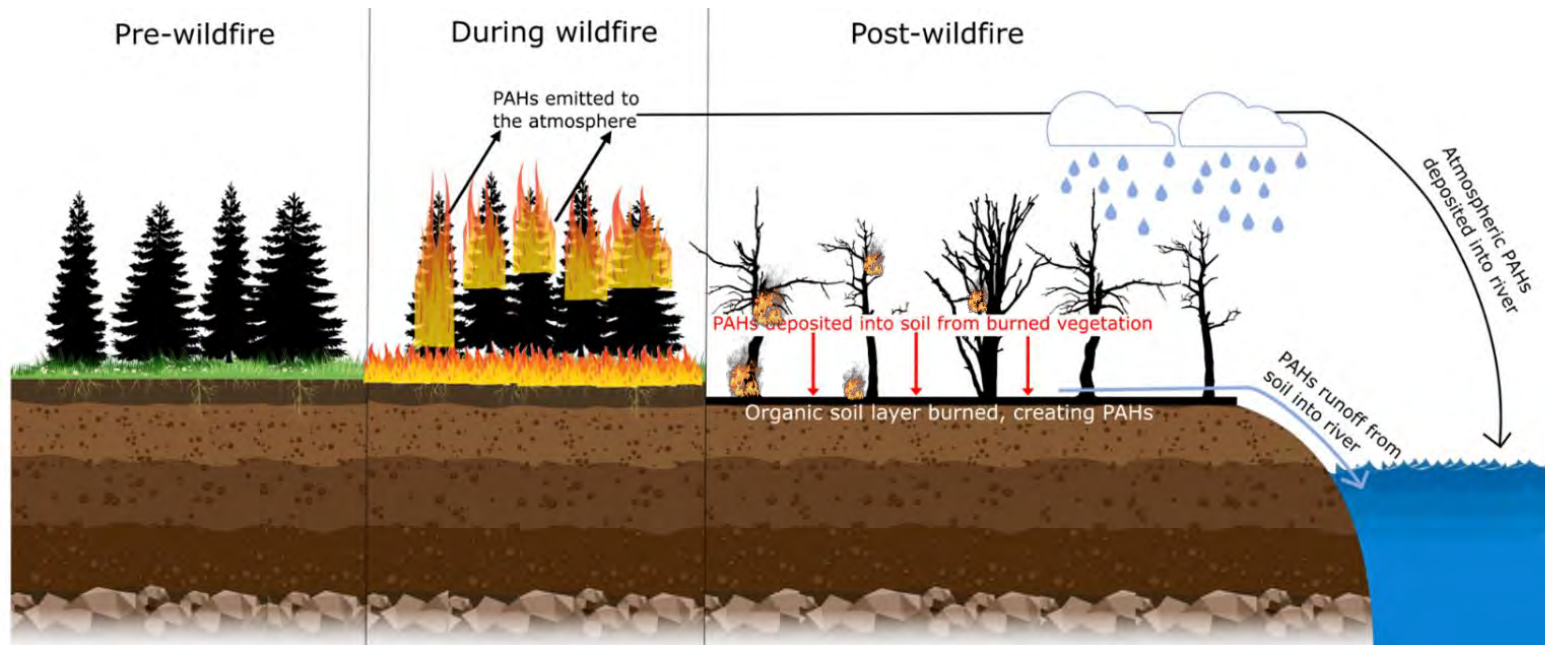


UNBC postdoctoral researcher, Dr David Gateuille, sampling the banks of the Nechako River as part of Phase 1 work (source: NEEF)

Theme 2: Effects of Landscape Disturbances on Sediment and Contaminant Fluxes

Specific objectives:

- To understand the role of atmospheric rivers in driving sediment sources and fluxes by instrumenting select sub-watersheds in the Coast Mountains (in collaboration with Theme 1);
- To determine how wildfires of different severity, characteristics and age influence sediment sources and sediment delivery to channels;
- To determine the sources of fine sediment to, and assess sediment quality (i.e., particles size, chemical contaminants such as metals and PAHs) on, sensitive fish habitats (in collaboration with Theme 3);
- To provide guidance on mitigation measures to control erosion and limit the delivery of fine sediment and associated chemicals to river channels in the NRB.



Theme 3: Fish Responses to Environmental Change



Main Goal: To establish a program for investigating short- and long-term responses of fish to environmental changes in the Nechako Watershed.

Specific objectives:

- To use a network of acoustic telemetry receivers to investigate burbot spatio-temporal distribution and oxythermal habitat use and selection in Fraser Lake;
- To use radio telemetry to investigate thermal habitat use and selection by white sturgeon;
- To investigate long-term responses of fish (e.g., abundance, spawning success) to temperature in the Nechako Watershed using historical datasets.



Theme 3: Fish Responses to Environmental Change



Outcomes:

- Improved understanding of how different fish species respond to alterations in temperature and flow due to climate change, land use change, and river regulation;
- Guidance on potential management actions that could be taken to mitigate for potential impacts of future temperature and dissolved oxygen conditions on key fish species in the Nechako watershed.

Burbot
(*Lota lota*)

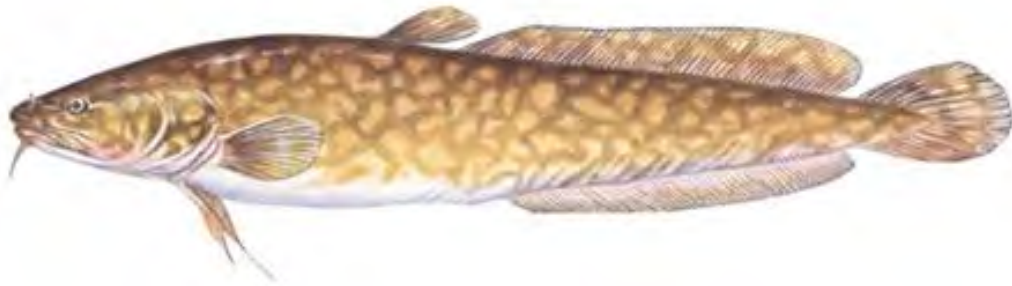


Image credit: tackleshare.com.



White Sturgeon
(*Acipenser transmontanus*)

Image credit: Sunfish Fish Farms.

ECOHYDROLOGY
Ecohydrol. **8**, 1095–1108 (2015)
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Preserving, augmenting, and creating cold-water thermal refugia in rivers: concepts derived from research on the Miramichi River, New Brunswick (Canada)

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Theme 4: Amplifying Co-benefits for Climate, Catchments (Watersheds) and Communities

Main Goal: to identify and amplify opportunities for **co-benefits to contribute to a healthy, just and sustainable future in the Nechako**. The focus of this theme is to identify, trial and refine watershed-based tools and processes that support the integration of climate, catchment (watershed) and community information, and to leverage these approaches to support knowledge exchange partnerships that are better equipped to move knowledge into action.

Outcomes:

- An expanded suite of integrative tools and processes that **amplify co-benefits across climate, catchment and community objectives**;
- Improved access to data and information to inform decision-making at the watershed level ;
- Enhanced data availability that can inform provincial processes such as the forthcoming modernized land-use-planning process



Theme 4: Amplifying Co-benefits for Climate, Catchments (Watersheds) and Communities

Specific objectives:

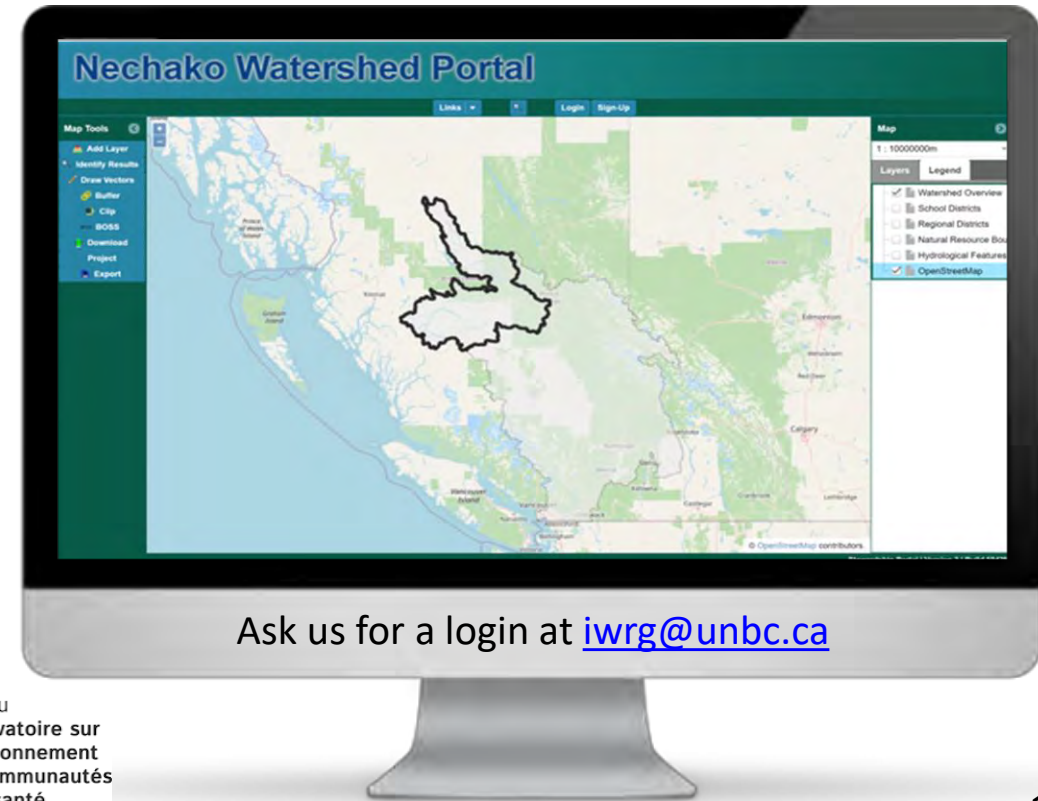
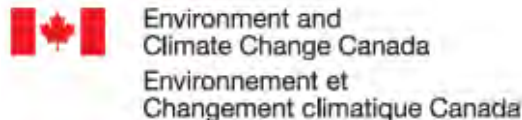
- To refine and strengthen the **Nechako Watershed Portal** to support the diverse data archiving, profiling and sharing needs of established and emerging partners in the NRB (including IWRG team members);
- To **identify and trial integrative tools and processes that enhance capacity to amplify co-benefits** in the NRB, especially across climate, catchments, and community objectives;
- To explore and expand **knowledge exchange opportunities** by linking and connecting integrative approaches to data integration, visualization and communication within the Nechako Watershed Portal tool;
- To evaluate the impact of the Nechako Watershed Portal (and related tools and process) on **partner learning, knowledge exchange and intersectoral** action to support and amplify the co-benefits of watershed security.



Image credit: accokeek.org.

The Nechako Watershed Portal

- Ongoing partnerships have enabled multiple groups to learn about the portal in Phases 1 & 2;
- Phase 3 will deepen opportunities for **intersectoral knowledge exchange** that increases opportunities to bridge sectoral data and information silos e.g.
 - connection with **Northern Health Authority's 'Climate and Health'** programming (since 2022);
 - ongoing **partnership with NWR** increases potential to expand visualization and sharing options, with news users (e.g. PCIC, BC River Forecast Centre and BC Ministry of Forests)
 - **renewed CRA with Cheslatta Carrier Nation**, creates opportunities to profile their new digitized archive;
 - **synergies with other integrative tools** through Flor (June) Garcia-Becerra's expertise and networks.



Thank you and Acknowledgements

