

University of Saskatchewan GWFO Updates – January 2026

John Pomeroy, USask institutional lead

USask GWFO facility leads: Helen Baulch, Tim Jardine, Warren Helgason, Cherie Westbrook, Jeff McDonnell, Andrew Ireson, Colin Whitfield, Krys Chutko

Global Institute for Water Security Director: Corinne Schuster-Wallace



UNIVERSITY OF
SASKATCHEWAN



GLOBAL WATER FUTURES
OBSERVATORIES

GWFO Facilities at USask

Instrumented Sites

Rocky Mountains

Athabasca Glacier
Bow River Headwaters (Bow Hut)
Peyto Glacier Research Basin
Helen Creek Research Basin
Fortress Mountain Research Basin
Burstall Creek
Marmot Creek Research Basin
Sibbald Wetlands

Prairies

Chappell Marsh Conservation Area
Kenaston/Brightwater Creek
Mesonet Site

Outlook CAN-SK Irrigation
Diversification Centre

Clavet Livestock and Forage
Centre of Excellence

St. Denis National Wildlife Area

Duck Lake

Buffalo Pound Lake

Boreal Forest

Old Black Spruce Site – Boreal
Ecosystem Research and
Monitoring Sites (BERMS)

Old Jack Pine Site (BERMS)

Fen Site (BERMS)

Saskatchewan River Delta

Hannin Creek

Deployable Systems

Coldwater Laboratory, Canmore,
AB

Prairie and Boreal Research
Systems, Saskatoon, SK

Smart Water Systems Laboratory,
NHRC, Saskatoon

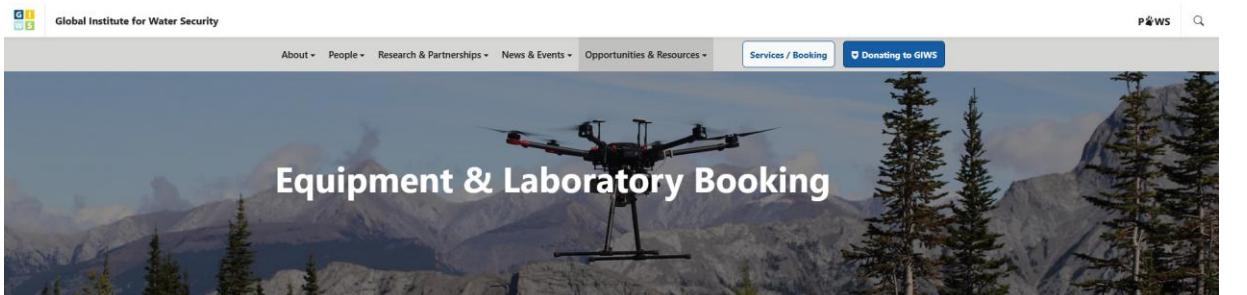
SK Water Chemistry and Ecology
Laboratory, NHRC, Saskatoon

Water Laboratories

Multi-purpOse Soil Testing Facility
(MOST) and Isotope Laboratory,
Saskatoon, SK

Saskatchewan Water Chemistry
and Ecology Laboratory, NHRC,
Saskatoon

Facility Booking



Contents

Booking with QReserve

Available Resources

GIWS offers reservable workspaces, laboratory workspace, lab equipment, field equipment, and rental trucks to our members and partners. Reservations can be made online via QReserve.

If you do not yet have access to the GIWS QReserve, please click below to request access via the online form.

[Request GIWS QReserve Access](#)

Booking with QReserve

Once you have been added as a user, you will be able to submit reservations on QReserve.

- If your QReserve account uses your USask NSID, you will need to log in to QReserve with your USask credentials using the "USask QReserve Login" link below.
- If your QReserve account **does not** use your USask NSID, you will need to log in to QReserve with a regular account using the "Non-USask QReserve Login" link below.

[USask QReserve Login](#)

[Non-USask QReserve Login](#)

After you sign in, the GIWS QReserve site will appear on your list of QReserve Sites. You can browse our resources from that site.

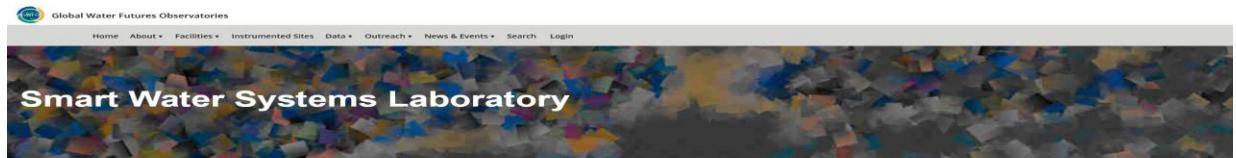
Available Resources

Click on a lab or location below to view the equipment and services available for booking, and their rates.

[GIWS Vehicles, Workspaces, and Resources](#)

[McDonnell Hydrology Laboratory / Stable Isotope Lab](#)

[Saskatchewan Water Chemistry & Ecology Lab - Field Equipment & Lab Services](#)



General Info

Service/Purpose

The SWSL facility is the base for deployable systems such as the drone mounted and terrestrial lidar, multispectral and hyperspectral, optical, thermal, and IR cameras, along with traditional survey equipment, to generate baseline and time-sensitive data on land surface processes during snow and snow-free seasons to transform the observation of Canadian waters by detecting changes in water quantity and quality at high resolutions.

History

- New capabilities for measuring and forecasting water quality and quantity
- Increased ability to predict the threat of disaster from floods and droughts
- Information for communities and industries to reduce and manage their flood risk
- Information for farmers and ranchers to manage drought impacts on food production
- New opportunities to develop environmental technologies in Canada

Lab Equipment

- 3 Permanent workstations (Students, Researchers and Scientists)
- Novel Base station (roof mounted continuous operation) (PerPak7)
- Stratasys 3d Printer (Model F370)
- Portable 3d scanners (Terrestrial 3D Spider and Eva models)
- Digital SLR Camera (Canon 70D)
- Custom Computer and Server systems
- Portable diagnostic electronics station
- Reflow Oven and Stencil printer
- Virtual Reality (VR) devices (x3)

Location

University of Saskatchewan

Facility Lead

Alistair Wallace

Primary Contacts

Name	Role	Contact Information
John Pomeroy	PI	E-mail: john.pomeroy@usask.ca Phone: (306) 966-1426
Alistair Wallace	Manager	E-mail: alistair.wallace@usask.ca Phone: (306) 966-8532

Fee for Service

Deployable Systems

Ref SWSL-DS-1

Item: Drone: DJI M600 Pro

Sensors: Riegl Mini VUX-1

Sony RGB

Sensor Description: Lidar Mapping unit with Integrated Sony 24mp camera

Capabilities: Lidar unit product capable of producing 100,000 shots per second in a 360 degree field of view. Riegl data is 200 Hz. Data is post processed in Applanix and Riegl softwares. Products include

las files that are elevation colored, intensity scale or RGB colorized

Wavelength: 905nm,

380nm-740nm

Ref SWSL-DS-2

Item: Drone: DJI M600 Pro

Sensors: Coming Hyperspectral Camera

Sensor Description: Push-Broom Line Imaging Spectrometer

Capabilities: Product: Continuous imaging of narrow spectral bands over a spectral range

Wavelength: 400nm-1000nm

Ref SWSL-DS-3

Item: Drone: DJI Mavic 2 Pro

Sensors: RGB camera

Sensor Description: Hasselblad 20mp camera

Capabilities: Still imagery and video files are created using the 20MP camera. Products are jpg and MP4 files

Wavelength: 400nm-700nm

Ref SWSL-DS-4

Item: eBee RTK

Sensors: Sodis

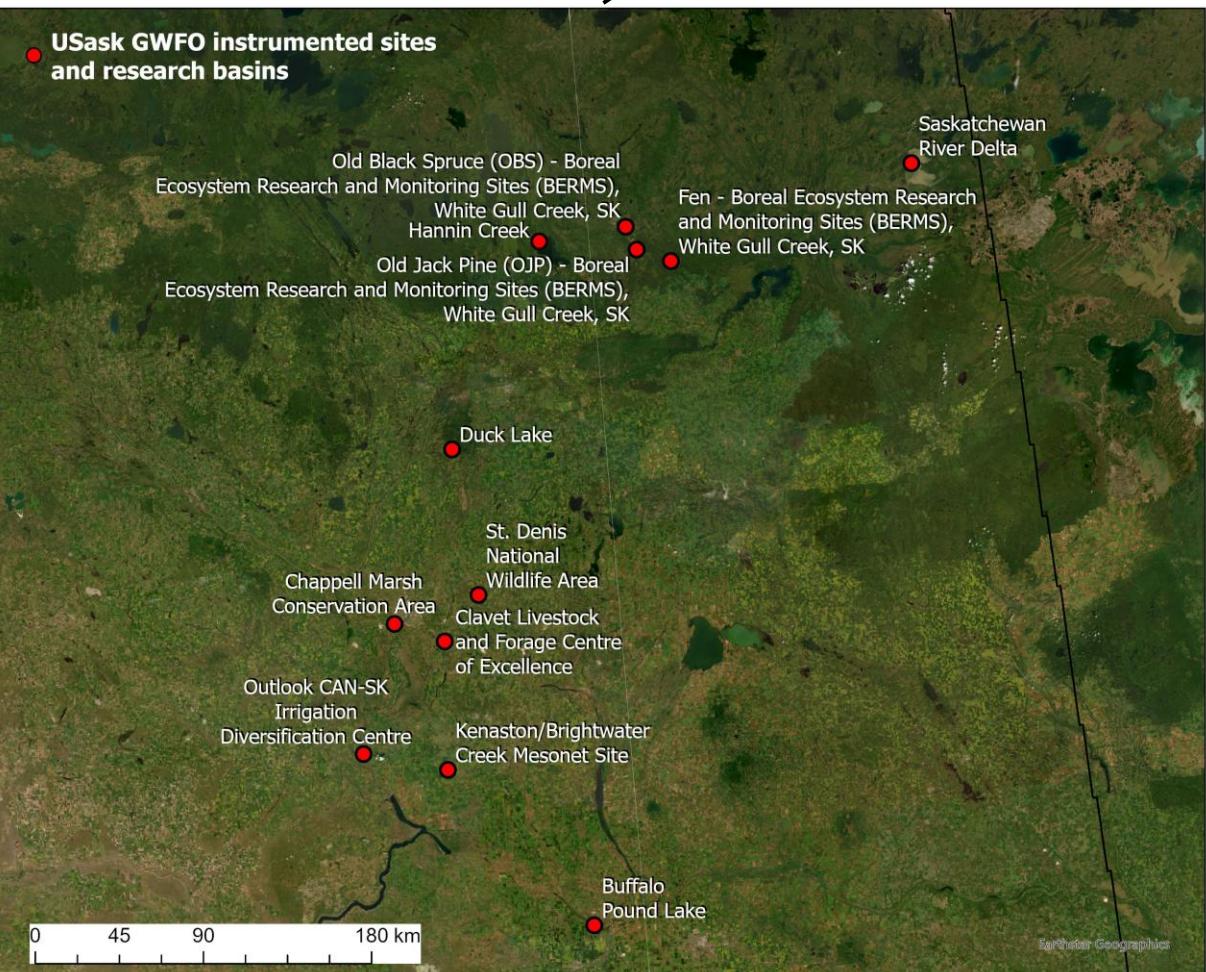
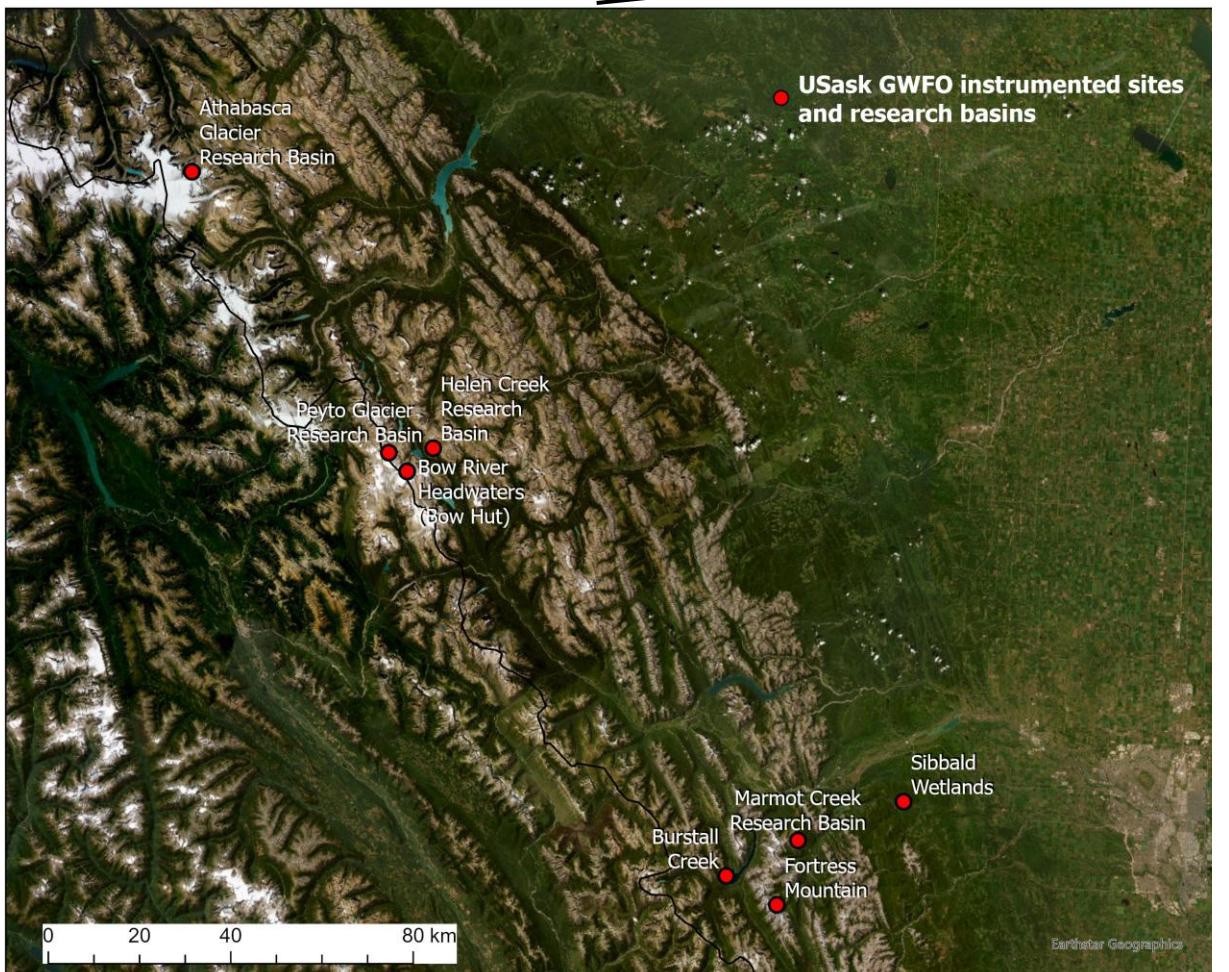
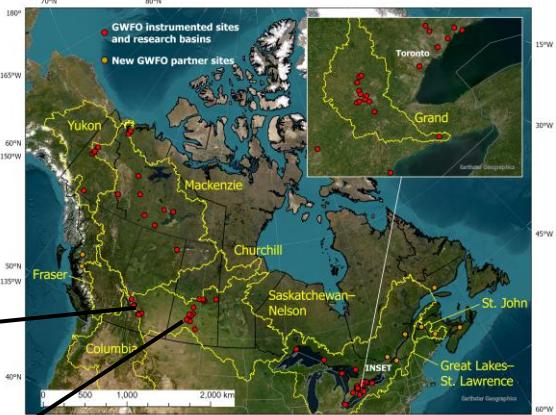
Sensor Description: -----

Deployed At	Unit	Internal Rate	External Rate	Commercial Rate
per day	per day	\$1,000	\$1,200	\$1,400

per day	\$800	\$960	\$1,120
per day	\$200	\$240	\$280

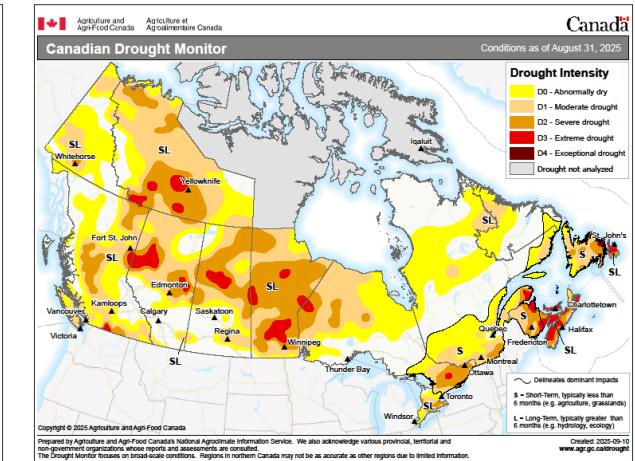
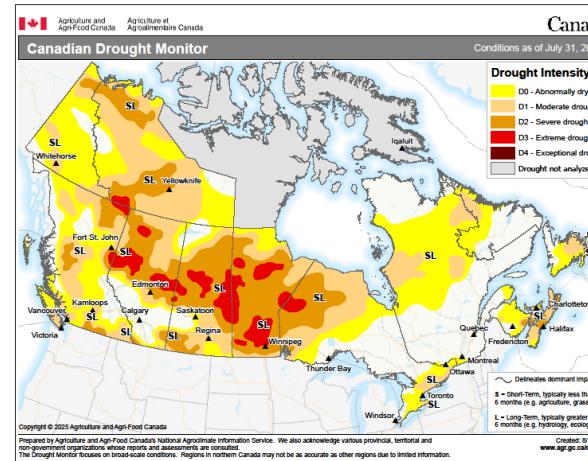
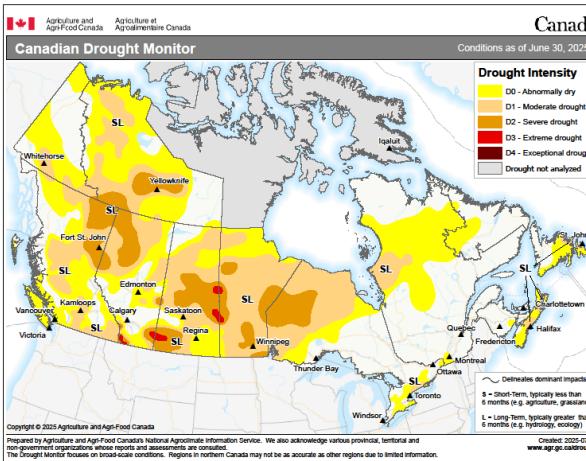
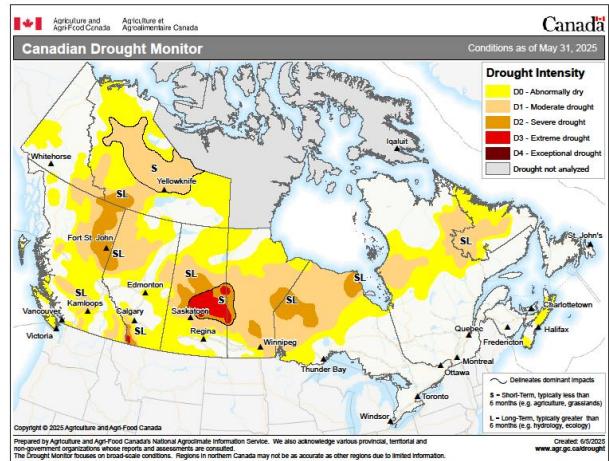
per day	\$200	\$240	\$280
per day	\$300	\$360	\$420

USask GWFO Instrumented Sites and Research Basins



2025 drought

- The 2025 drought across Canada was severe and variable, worsening through spring and summer before partial late-season relief in some areas. Severe in northern parts of the Sask River Basin



May 31

Jun 30

Jul 31

Aug 31

2025 wildfire season and damages

- Canada 2025 wildfires:
 - Second-largest area burned on record
 - Massive fires in Saskatchewan and Manitoba.
- Saskatchewan 2025 wildfires:
 - record or near-record area burned,
 - multiple very large fires, and
 - tens of thousands of people evacuated.
- USask GWFO sites in the Canadian Rockies, Boreal Forest and Prairies tracked
 - low winter snowpack development
 - low river flows,
 - Low soil moisture
- Subsequent record summer temperatures and variable precipitation led to river water shortages, reduced hydroelectricity generation, severe agricultural drought and record provincial wildfires.
- GWFO observations allowed weeks to months of lead time to anticipate the extent and severity of these events.

2025 wildfire season and damages – BERMS

2 of 3 BERMS facilities (Fen and Old Jack Pine) were lost



Before

After



New investments and expansion of infrastructure

- Isotope Ratio Mass Spectrometry analyses of extracted soil and or plant water for 2H 18O analyses that minimize co-extracted isotope contamination (Jeff McDonnell).
- The new system is able to run 2H and 18O simultaneously and has excellent memory and drift control.

EA-IRMS

Elementar isoprime precision IRMS with vario Pyro cube and vario Liquid Sampler analyzes stable isotopes of solid samples of C, N, H, O, S and liquid H, O



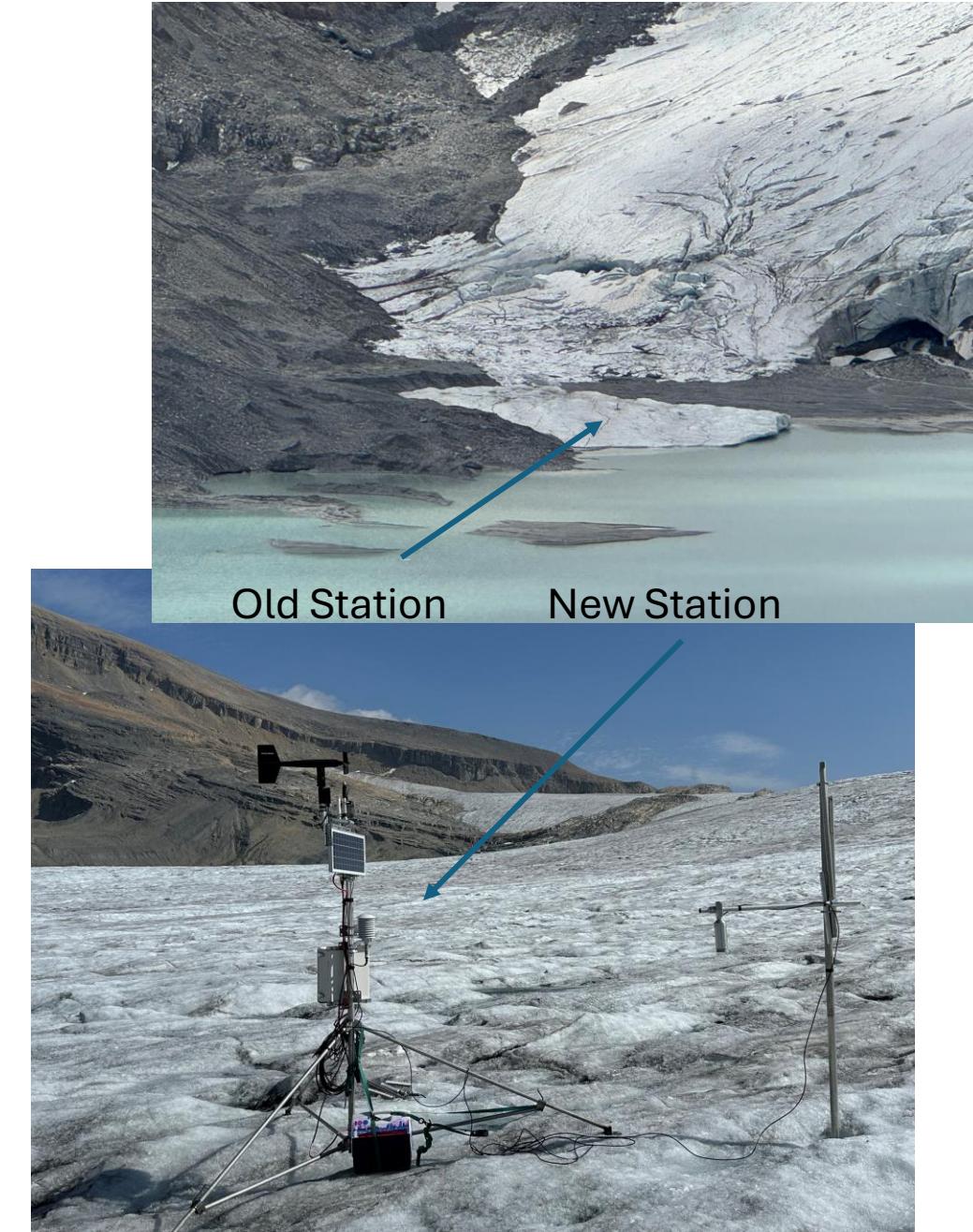
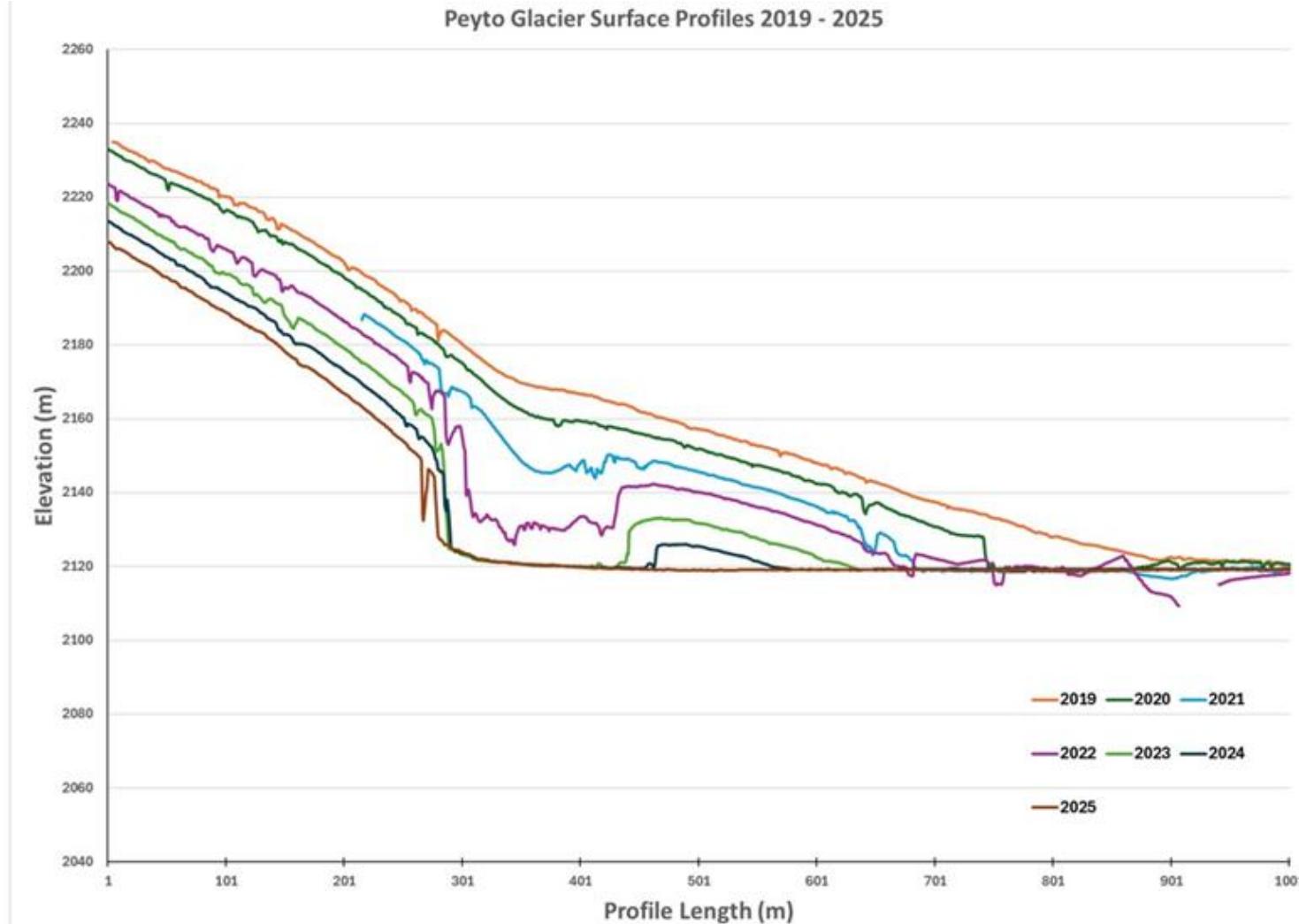
GWFO supporting the ECCC/CSA Terrestrial Snow Mass Mission



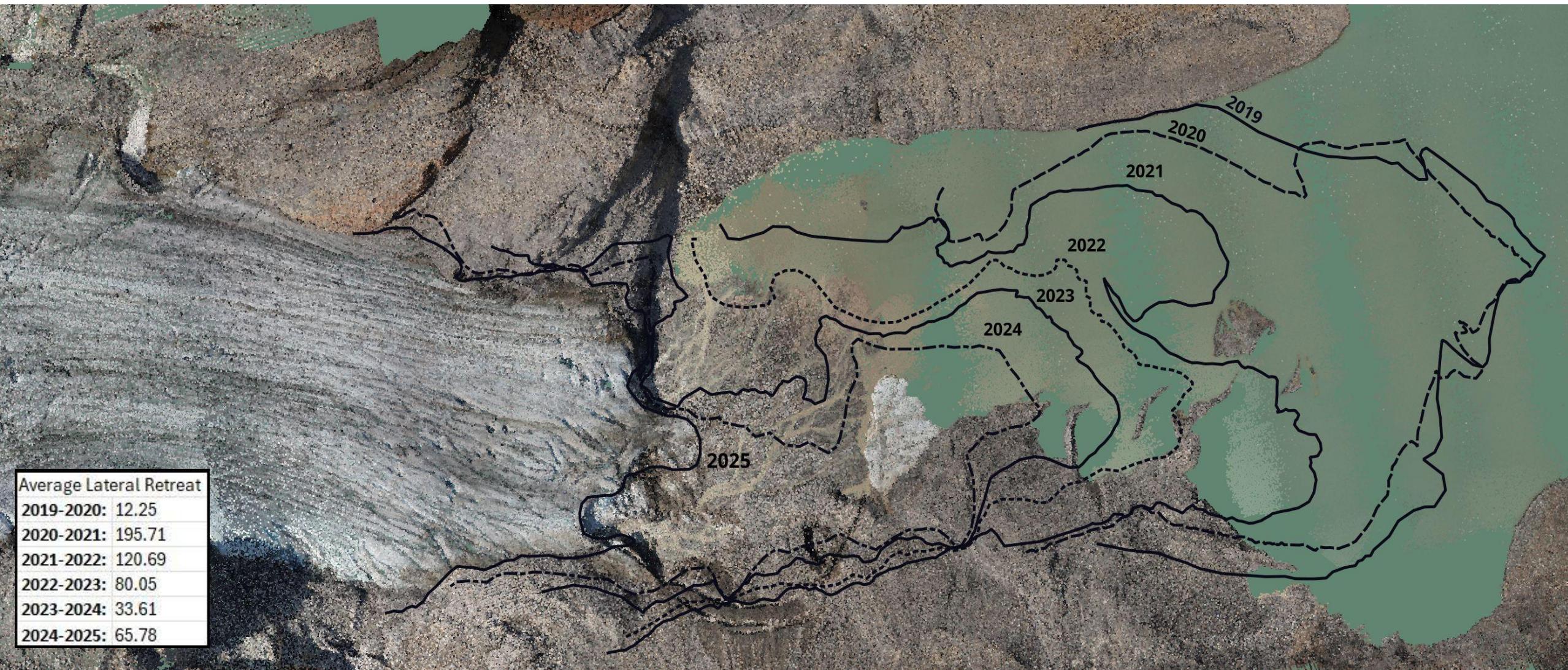
Glacier Monitoring – Global Water Futures Observatories



Peyto Glacier Retreat – 2019-2025



Peyto Glacier Ablation Extents 2019 - 2025



Peyto Glacier: 508 m retreat, 31m ablation (lower ice) over six years, 2019-2025

Mackenzie River Basin MESH modelling

- The Mackenzie River basin cryohydrological model MESH, <https://doi.org/10.1029/2024WR039276>, full permafrost, glacier, lake capabilities. Changing vegetation.
- Concepts developed and modelling verified at GWFO research basins.
- Envisioned during the Mackenzie GEWEX Study in the 1990s.
- The results show dramatic hydrological, permafrost and glacier change by end of this century. 90% permafrost loss; earlier, higher streamflow peaks; mountain deglaciation.

Water Resources Research*

RESEARCH ARTICLE

10.1029/2024WR039276

Key Points:

- Streamflow is expected to peak higher and earlier for most subbasins of the Mackenzie River Basin in response to climate change
- Most of the basin is expected to be permafrost-free by 2080s under RCP8.5 resulting in higher connectivity and larger subsurface flows
- Deglaciation of mountainous headwaters is expected to reduce summer flows with implications for water resources management and navigation

Supporting Information:

Supporting Information may be found in

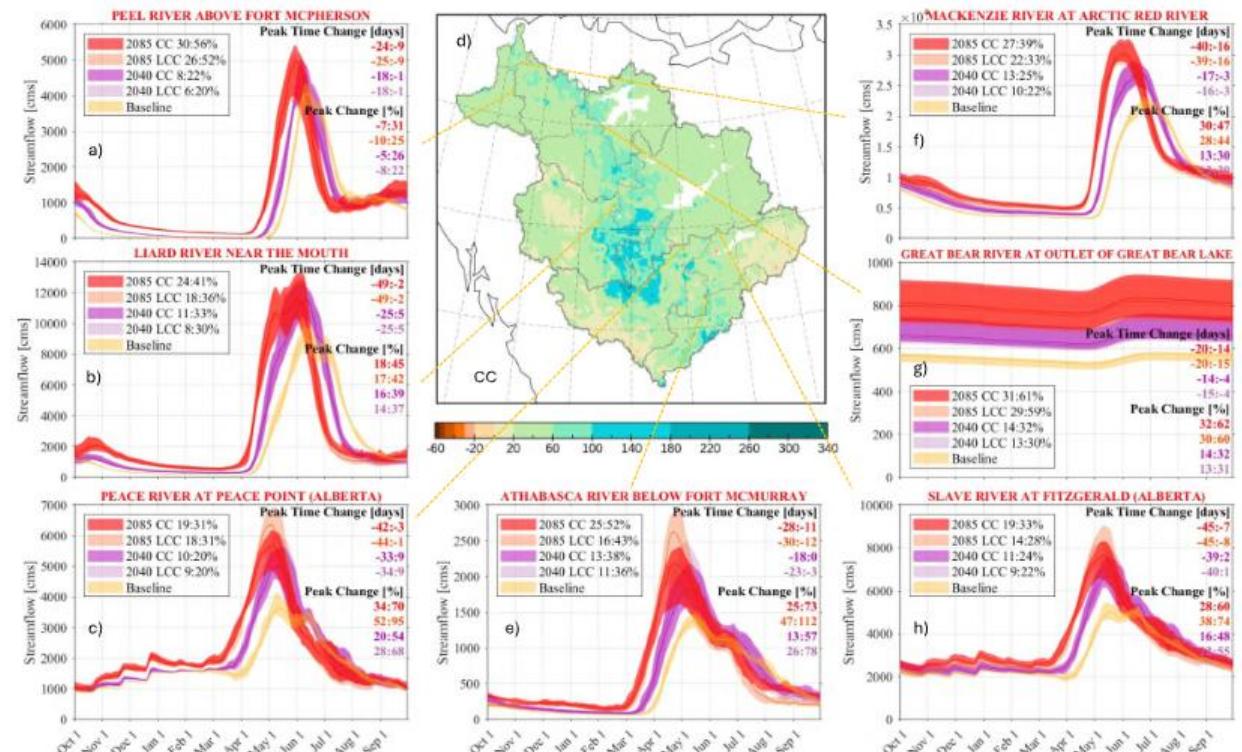


The Impact of Climate and Land Cover Change on the Cryosphere and Hydrology of the Mackenzie River Basin, Canada

Mohamed E. Elshamy^{1,2} , John W. Pomeroy^{1,2} , Alain Pietroniro^{2,3} , Howard Wheater^{1,4} , and Mohamed Abdelhamed¹

¹Global Institute for Water Security, University of Saskatchewan, Saskatoon, SK, Canada, ²Centre for Hydrology, University of Saskatchewan, Saskatoon, SK, Canada, ³Schulich School of Engineering, University of Calgary, Calgary, AB, Canada, ⁴Department of Civil and Environmental Engineering, Imperial College London, London, UK

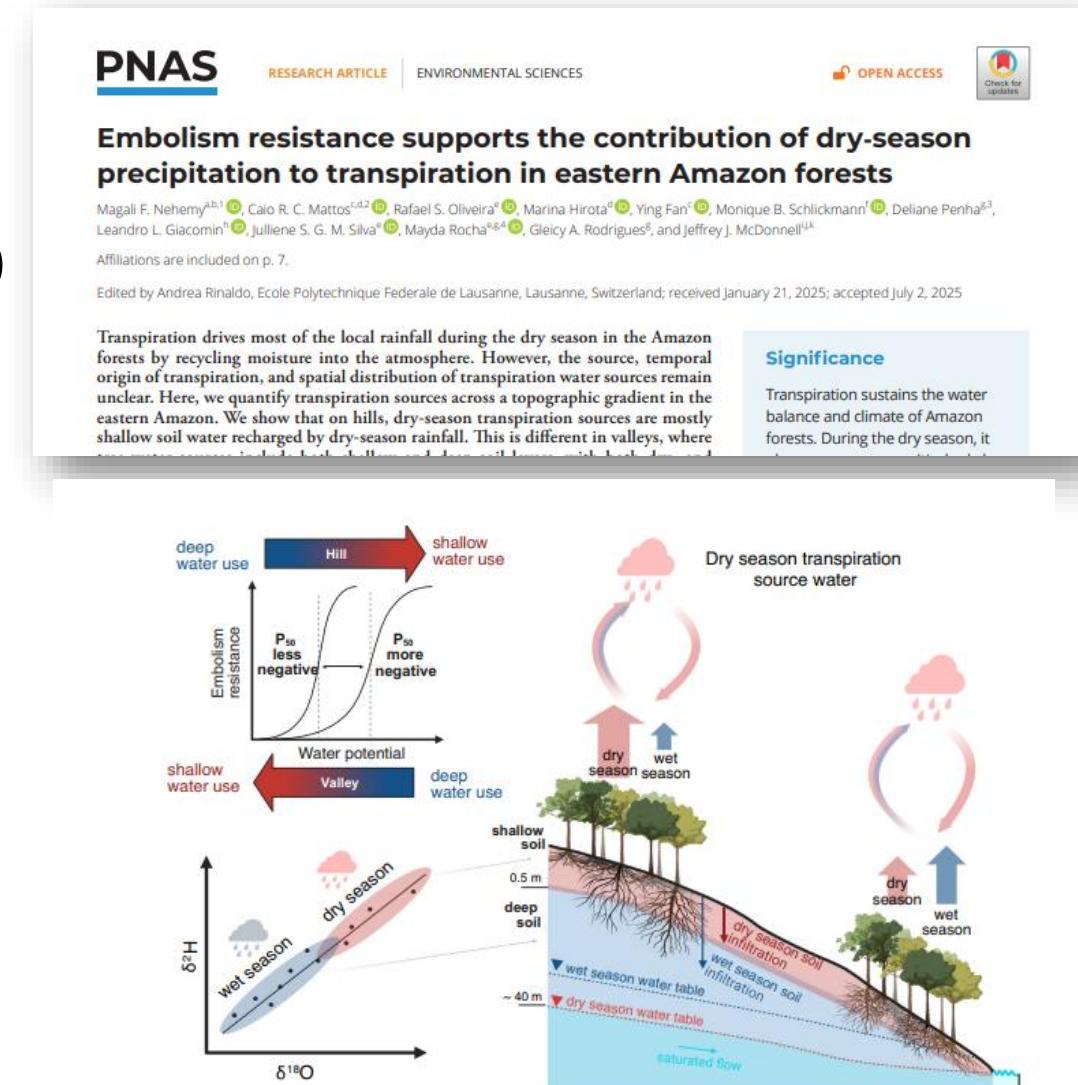
Abstract Northern basins are projected to continue warming at rates higher than the global average, with the impacts of warming compounded by concomitant deglaciation, permafrost thaw and vegetation shifts. The Mackenzie River Basin drains headwaters in the glaciated Canadian Rockies to the Arctic Ocean and is mostly underlain by permafrost. Scenarios of future change in this basin were simulated using the MESH distributed hydrological-cryospheric land surface model. MESH was forced with bias-corrected, downscaled RCM



New paper from Jeff McDonnell using a GWFO laboratory

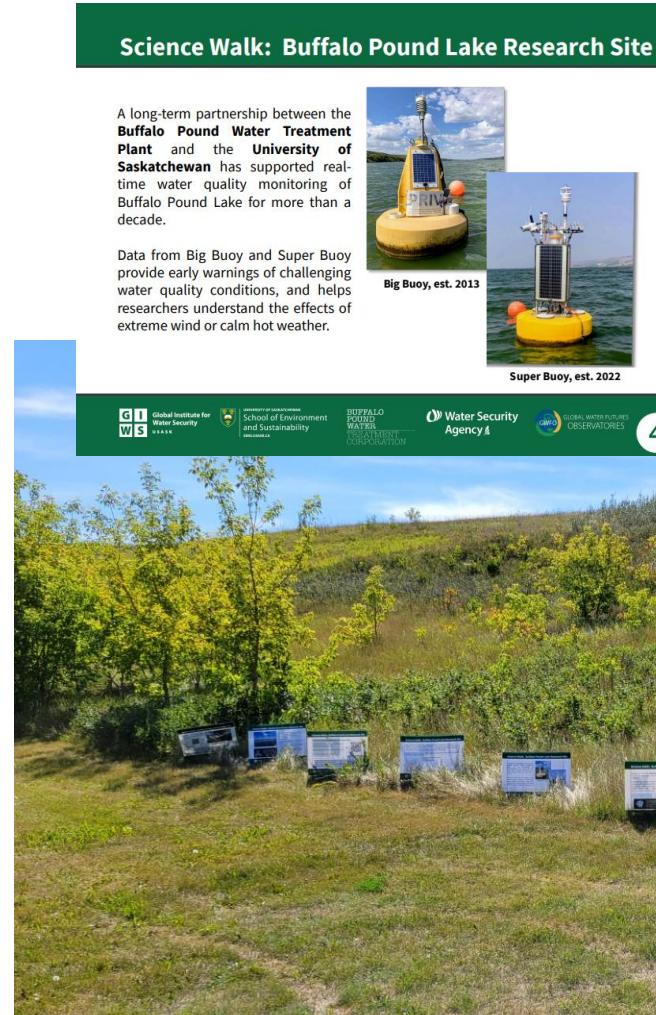
- Embolism resistance (drought tolerance) explains about half of the variation in shallow vs deep water use by trees during the dry season.
- On hills, most dry-season transpiration (~70–85%) comes from shallow soil recharged by current dry-season rainfall, implying very “young” transpiration water. High embolism resistance.
- Valley transpiration uses deeper water sources as well. Lower embolism resistance
- Process-based constraints and a trait link ($P_{50} \rightarrow$ water source depth/age) can be directly incorporated into land-surface and Earth system models to better represent Amazon moisture recycling and drought response.

https://water.usask.ca/hillslope/documents/pdfs/2025/nehemy_2025.pdf



Public Outreach – Science Walk at Buffalo Pound Provincial Park, SK

- The Science Walk, set up in 2025, describes the importance of Buffalo Pound as a water supply and recreational lake
- provides information about the monitoring work done in partnership between USask and the treatment Plant
- Links to data feed and other resources



Science Walk: Buffalo Pound Lake Research Site

A long-term partnership between the Buffalo Pound Water Treatment Plant and the University of Saskatchewan has supported real-time water quality monitoring of Buffalo Pound Lake for more than a decade.



Data from Big Buoy and Super Buoy provide early warnings of challenging water quality conditions, and helps researchers understand the effects of extreme wind or calm hot weather.



Science Walk: Buffalo Pound Lake Research Site

Learn more about the partnership and research happening at Buffalo Pound Lake!



Supporters

Research on Buffalo Pound Lake is ongoing and covers multiple topics. It is supported by researchers at the University of Saskatchewan, the University of Regina and other universities, personnel at the Buffalo Pound Water Treatment Plant, government agencies, and funding agencies.



8



New Citizen Science Project

231 submissions since July 2025!

Castor Tracker

Be a community scientist and help us gather data!

Beavers (part of the genus *Castor*) can be found living in water bodies across Canada. They are skilled builders, capable of constructing impressive dams and lodges. These extraordinary structures can completely change how the landscape looks and functions over time. These structures can cause conflict when close to humans because the altered water levels can cause flooding.

Castor Tracker is a community science project with the goal of learning more about how beavers alter their environment. By gathering photos throughout the year (from community scientists like you!) we'll be able to track changes in both the dam and the water level. These data will be the starting point for a system that helps to handle conflicts between humans and beavers as they come up in an effective and sustainable way.



Instructions

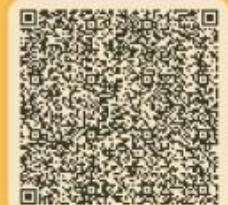
1 Place your phone in the cradle as shown



2 Take a photo without zooming in or adding special effects



3 Scan the QR code below and follow the prompts to submit your photo



ALBERTA INNOVATES



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Institute

castortracker.ca



GLOBAL WATER FUTURES

THE GREAT THAW

A Homage in Art to the Vanishing Cryosphere



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SASKATCHEWAN

THE GREAT THAW:
a Homage in Art
to the Vanishing Cryosphere

Authors:

JOHN W. POMEROY
TREVOR D. DAVIES
GENNADIY V. IVANOV



<https://gwf.usask.ca/outcomes/the-great-thaw.php>

UN's Decade of Action for Cryospheric Sciences

