



Programme

*27th Annual International Workshop on
Physical Processes in Natural Waters*

*July 07-11, 2025
Kingston, Canada*

Physical Processes in Natural Waters 2025

PPNW 2025



*27th Annual International Workshop on
Physical Processes in Natural Waters*

FINAL PROGRAMME

*July 07 - 11, 2025
Kingston, Canada*

Message from the Co-Chairs:



We would like to welcome you to the 2025 Physical Processes in Natural Waters Workshop in Kingston, Canada!

Many of us are limnologists, and I'm sure like us, you often find yourself explaining to friends and family, "*What is a limnologist?*"

This brings to mind Jack Vallentyne's (1969) definition:

'A limnologist is a zoologist who, during the summertime, studies chemical and botanical aspects of geological problems in readily accessible lakes, 15 m deep, located in the vicinity of universities'.

Thankfully we have moved past such early stereotypes of what our field encompasses. At PPNW 2025, we will have an entire session focussing on winter limnology (!), talks on lakes much deeper than 15 m (e.g., Crater Lake is 600 m deep!) and on lakes that are inaccessible and not in the vicinity of universities (e.g., Great Slave Lake and lakes on the Tibetan Plateau). We also assume many of us are engineers, environmental scientists, mathematicians, oceanographers and physicists, maybe along with some zoologists, chemists, botanists and geologists!

Our field has come a long way in the past 56 years. Let's get together and discuss where it's going ... A big thank you to all the authors who have submitted their abstracts and have made the trip to join us at this workshop!

Leon Boegman, Jason Olsthoorn, Mathew Wells & Lidi Shi
PPNW 2025 Co-Chairs, Kingston, ON, Canada

Table of Contents

Message from the Chair..... 1

Local Organizing Committee 3

Conference Sponsors 4

Conference at a Glance 5

Invited Speakers..... 8

Professor Soren Brothers 8

Professor Hilary Dugan 8

Professor John P. Smol 9

Participants 10

Presentation List (Oral) 12

Presentation List (Focus Session)..... 18

Maps..... 1

 Directions to Kingston..... 1

 Directions to Queens University 2

Physical Processes in Natural Waters 2025



Local Organizing Committee Co-Chairs:

Jason Olsthoorn

Queen’s University

Leon Boegman

Queen’s University

Mathew Wells

University of Toronto

Lidi Shi

University of Toronto

Conference Sponsors:



SEA-BIRD
SCIENTIFIC

Sea Bird

<https://www.seabird.com/>



Nortek

<https://www.nortekgroup.com/>



BEATY WATER
RESEARCH CENTRE

Beaty Water
Research
Centre

<https://waterresearchcentre.ca/>



ROCKLAND
SCIENTIFIC

Rockland
Scientific

<https://rocklandscientific.com/>



UNIVERSITY OF
TORONTO
SCARBOROUGH

University of
Toronto

<https://www.utoronto.ca/p/hyssci/>



WATER
PATHWAYS

Water
Pathways

<https://www.utoronto.ca/labs/>

Conference at a Glance

Monday, July 07th, 2025 @ Queen's University

58 university Ave

**18:00-20:00 Conference Registration (Ellis Hall, 251),
and there will be some light food (not dinner)**

Tuesday, July 08th, 2025 @ Biosciences Complex

116 Barrie St, Kingston, ON K7L 3N6

08:30--08:55 Opening Remarks and Welcome to Kingston

08:55—10:10 Session 1

10:10—10:35 Coffee Break

10:35--11:25 Session 2

10:25 – 12:15 Invited Speaker: John Smol

12:15—13:30 Lunch

13:30—14:45 Session 3

14:45—15:10 Coffee Break

15:10--16:00 Session 4

16:00--17:15 Bio Focus Session

17:15—18:05 Walk Downtown

18:05—20:10 Boat Cruise

Wednesday, July 09th, 2025 @ Biosciences Complex
116 Barrie St, Kingston, ON K7L 3N6

08:30—10:10

Session 1

10:10—10:35

Coffee Break

10:35—12:15

Session 2

12:15—13:30

Lunch

13:30--14:45

Session 3

14:45--15:10

Coffee Break

15:10--16:00

Session 4

16:00—17:15

Climate Focus Session

17:15—18:05

Invited Speaker: Soren Brothers

18:05—18:55

Walk Downtown

20:00—21:15

Haunted Walk

Thursday, July 10th, 2025 @ Biosciences Complex
116 Barrie St, Kingston, ON K7L 3N6

08:30—10:10

Session 1

10:10—10:35

Coffee Break

10:35—11:25

Session 2

11:25--12:15

Invited Speaker: Hilary Dugan

12:15—13:30

Lunch

13:30--14:45

Session 3

14:45--15:10

Coffee Break

15:10--16:00

Session 4

16:00—17:15

Winter Focus Session

17:15—18:30

Walk Downtown

18:30—20:10

Banquet

Friday, July 11nd, 2025 @ Biosciences Complex

116 Barrie St, Kingston, ON K7L 3N6

08:30—10:10

Session 1

10:10—10:35

Coffee Break

10:35—11:25

Session 2

11:25—11:50

**Student and ECR awards presentation. A
message from next year's PPNW 2026 hosts.
Closing remarks.**

End of PPNW2025!

Invited Speakers

Professor Soren Brothers



Allan and Helaine Shiff Curator of Climate Change

Dr. Soren Brothers is the Allan and Helaine Shiff Curator of Climate Change at the Royal Ontario Museum, and an Assistant Professor at the Department of Ecology and Evolutionary Biology at the University of Toronto. Soren's research examines the effects of climate change on lakes, and how changes in aquatic systems can influence their greenhouse gas emissions to the atmosphere. As a climate change curator, his work spans research, exhibition development, gallery work, public programming, and collections care, bridging natural, cultural, and artistic lenses through which the climate crisis and its solutions can be understood and communicated.

Professor Hilary Dugan



Center for Limnology, University of Wisconsin–Madison

Hilary Dugan is an associate professor at the Center for Limnology at the University of Wisconsin–Madison. As a limnologist, Hilary studies how terrestrial and atmospheric changes, such as warming air temperatures or land use patterns, alter biogeochemical fluxes and aquatic processes in lakes. Her research balances field-based programs, which rely heavily on sensor networks, with the use and development of analytical models, and the application of geophysical and geospatial tools. Her

research focus is on temperate and polar lakes, with sites spanning from Wisconsin to Antarctica.



Professor John P. Smol

Department of Biology, Queen's University

John P. Smol is a distinguished university professor in the Department of Biology at Queen's University (Kingston, Ontario), where he also held the Canada Research Chair in Environmental Change for the maximum three 7-year terms (2001 – 2021). Smol founded and co-

directs the Paleoeological Environmental Assessment and Research Lab (PEARL), a group of ~35 students and other scientists dedicated to the study of long-term global environmental change, and especially as it relates to lake ecosystems. John has authored >740 journal publications and chapters since 1980, as well as completed 24 books. Much of his research deals with the impacts of climatic change, acidification, eutrophication, contaminant transport, and other environmental stressors. Smol was the founding Editor of the *J. Paleolimnology* (1987-2007) and is current Editor of *Environmental Reviews*. Since 1990 John has received 7 honorary doctorates and has been awarded >100 research and teaching awards and fellowships, including the NSERC Herzberg Gold Medal as Canada's top scientist or engineer, the Vega Medal from the King of Sweden, and the International Ecology Institute Prize. Amongst his 15 teaching and outreach awards, he was named a 3M Teaching Fellow and, following a nation-wide search, Nature chose John as Canada's Top Mid-Career Science Mentor. He was elected President of the Academy of Science, Royal Society of Canada (2019-2022) and, in 2013, he was named an Officer of the Order of Canada.

Participants

First Name	Last Name	Country
Adam	Yang	Canada
Aidin	Jabbari	New Zealand
Amin	Sadeghpour	Canada
Andres	Posada Bedoya	Canada
Anson	Chow	Canada
Benjamin	Smith	USA
Bertram	Boehrer	Germany
Bogdan	Hlevca	Canada
Brian	Moore	Canada
Bridget	Hart	
Burak	Kuyumcu	Canada
Candace	Smith	Canada
damien	Bouffard	Switzerland
Dan	Robb	
Danielle	Wain	US
David	Birt	United Kingdom
Dawson	Ethier	Canada
Don	Pierson	Sweden
Edmund	Tedford	Canada
Gaia	Donini	Italy
Greg	Crawford	Canada
Gregory	Lawrence	Canada
Guillaume	Auger	United States
Hamed	ebrahimi	Canada
Hannah	Harrison	Canada
Janelle	Hrycik	USA
Jason	Olsthoorn	Canada
Jay	Austin	USA
Joachim	Jansen	Finland
John	Little	USA
John	Smol	Canada
Jonas	Stankevicius	Canada

First Name	Last Name	Country
Joshua	Marks	Germany
Joshua	Culpepper	Canada
Josef	Ackerman	Canada
Keisuke	Nakayama	Japan
Kevin	Vikstrom	Canada
Khush	Bhavsar	Canada
Lee	Bryant	UK
Leon	Boegman	Canada
Leonard	Korreshi	Canada
Lidi	Shi	Canada
Marco	Toffolon	Italy
Marek	Stastna	Canada
Mathew	Wells	Canada
Nicolas	Castro-Folker	Canada
Patricia	Semcesen	Canada
Patrick	Aurich	Germany
Qi	Zhou	Canada
Rebecca	Topness	United States
Rich	Pawlowicz	Canada
Roger	Pieters	Canada
Ryan	Scott	Canada
Sam	De Abreu	United States
Samuel	Salemink-Harry	USA
Sapna	Sharma	Canada
Sherif	Ibrahim	Canada
Shuqi	Lin	Canada
Sierra	Legare	Canada
Stephen	Henderson	United States
Sofia	Rocha	UK
Soren	Brothers	Canada
Sydney	Bacon	Canada
Talia	Houston	Canada
Thomas	Pendergast	Canada
Yasasi	Fernando	Canada
Yulong	Kuai	Canada
Zheng	Zhu	Canada

Presentation List (Oral)

<u>Tuesday</u>	Session 1
8:55--9:20	Introduction
9:20—9:45	<i>Impacts of climate change on thermal and oxygen dynamics in a pristine deep lake, Lake Taupō</i> Authors: <u>Aidin Jabbari</u> , D. Plew, and C. Zammit
9:45—10:10	<i>Surface CO₂ Gradients Challenge Conventional CO₂ Emission Quantification in Lentic Water Bodies under Calm Conditions</i> Authors: Patrick Aurich , U. Spank, M. Koschorreck
	Session 2
10:35-- 11:00	<i>A framework for lake proxy system model calibration to optimize field data collection and to guide quantitative interpretation of paleoclimate proxies</i> Authors: <u>Rebecca Topness</u> , E. K. Thomas, Nancy M. Leon
11:00-- 11:25	<i>A Screening Method to Identify Extreme Events Affecting Drinking Water Quality</i> Authors: <u>Don Pierson</u> , H. Markensten, J.P. Mesman, K. Bolding and J Bruggeman
	Session 3
13:55-- 14:20	<i>The role of a lateral constriction in controlling water exchange and oxygen distribution in a two-basin lake</i> Authors: Jemima Rama, Tomy Doda, Oscar Sepúlveda Steiner, Hugo N. Ulloa, David Janssen, and <u>Damien Bouffard</u>
14:20-- 14:45	<i>A predictably intermittent rotating gravity current in the Strait of Georgia, Canada</i> Authors: <u>Richard Pawlowicz</u> , M. Masoud, S. Allen
	Session 4

15:10-- 15:35	<i>The role of hydrodynamic processes in cyanobacteria bloom formation</i> Authors: <u>Guillaume Auger</u> , K. Rose
15:35-- 16:00	<i>Physical-biological interactions in the benthos: Dislodgement of Walleye eggs.</i> Authors: <u>Josef Ackerman</u> , J. Carman , and Y. Zhao

<u>Wed.</u>	Session 1
8:30—8:55	<i>Layers and interfaces in stably stratified waters: A DNS perspective</i> Authors: <u>Qi Zhou</u>
8:55--9:20	<i>On the Reynolds-Averaged and Large Eddy Simulation methodology for active tracers</i> Authors: <u>Marek Stastna</u> and S. Legare
9:20—9:45	<i>New Insights Into Deep Mixing in Crater Lake, Oregon</i> Authors: <u>Greg Crawford</u> , S. Girdner, and S. Piccolroaz
9:45—10:10	<i>Parsimonious Modelling of Thermobaric Mixing in a Deep Lake</i> Authors: <u>Joshua Marks</u> and B. Boehrer
	Session 2
10:35--11:00	<i>Thermobarically stratified lake: theoretical aspects, consequences for deep water circulation and observations</i> Authors: <u>Bertram Boehrer</u>
11:00--11:25	<i>Multi-year 3D lake modelling in a large northern lake</i> Authors: <u>Shuqi Lin</u> and J. Zhao
11:25--11:50	<i>Thermobaric Instability in a deep Fjord-Type Lake, Quesnel Lake, Canada</i> Authors: <u>SHERIF IBRAHIM</u> , B E Laval, S Vagle, S J Déry
11:50--12:15	<i>Internal Kelvin and Poincaré waves and the bottom boundary layer in Lake Biwa</i> Authors: H. Yoneda, T. Morikawa, <u>Keisuke</u>

Nakayama, H. Matsumoto, K. Hayakawa and C. Jiao

Session 3

- 13:30--13:55 *Summertime Upwelling Events in Multi-Arm Fjord-Type Lakes: A Case Study of Quesnel Lake*
Authors: **Amin Sadeghpour**, B. E. Laval, S. Vagle, S. J. Déry
- 13:55--14:20 *Cabbeling-driven lateral instabilities on a vertical portion of the thermal bar*
Authors: **Nicolas Castro-Folker** and M, Stastna
- 14:20--14:45 *Evaluating the effectiveness of destratification aeration on spatialtemporal distributions of manganese in a drinking water reservoir*
Authors: M. Amani, E. Slavin, T. R. Kjeldsen, J. Rand and **Lee Bryant**

Session 4

- 15:10--15:35 *Modelling the impact of changing water clarity on lake stratification*
Authors: **Danielle Wain**, D. Birt , R. Ladwig
- 15:35--16:00 *Breathing life into ocean dead zones using excess oxygen from the super-green hydrogen economy*
Authors: **John C. Little** and L. Bryant

Thursday

Session 1

- 8:30--8:55 *Hydrodynamic modelling of Great Slave Lake using NEMO*
Authors: **Jonas Stankevicius** and A. Pietroniro, Q. Zhou, M. Elshamy and J. W. Pomeroy
- 8:55--9:20 *Hydrodynamic Modelling of a Fluvial Lake: Influence of Seasonal Submerged Aquatic Vegetation on Circulation and Nutrient Dynamics*
Authors: Qi Wang and **Reza Valipour**

9:20—9:45	<p><i>Hindcasting a century of winter thermal conditions in the upper Great Lakes</i></p> <p>Authors: <u>Jay A. Austin</u>, Eric J. Anderson, Andrew D. Gronewold, Steven A. Ruberg, Craig A. Stow, and Mathew G. Wells</p>
9:45—10:10	<p><i>Meromixis in Brackish Pit-Lakes with Ice Cover</i></p> <p>Authors: <u>Roger Pieters</u> and Gregory A. Lawrence</p>
Session 2	
10:35--11:00	<p><i>Divergent oxygen trends in ice-covered lakes</i></p> <p>Authors: <u>Joachim Jansen</u>, Gesa A. Weyhenmeyer, Laura H. Härkönen, Andrew M. Paterson, Paul A. del Giorgio and Yves T. Prairie</p>
11:00--11:25	<p><i>Impact of Ice Cover Composition on Radiatively Driven Convection in Lakes</i></p> <p>Authors: <u>Benjamin J. Smith</u>, Till J. W. Wagner, Nimish Pujara, Timothy H. Bertram, Hilary A. Dugan, Grace M. Wilkinson, Lucas K. Zoet and Jennifer A. Franck</p>
Session 3	
13:55--14:20	<p><i>Laboratory Model of Stratification and Circulation Under Lake Ice</i></p> <p>Authors: Edmund Tedford, Jesse Watt, Roger Pieters, and <u>Greg Lawrence</u></p>
14:20--14:45	<p><i>How winter inverse temperature stratification and thermal biology influence the depth distribution a cold water fish -lake trout</i></p> <p>Authors: <u>Lidi Shi</u>, Mathew Wells, Mark Ridgeway, Trevor Middel, Erin Dunlop, Justin Trumpikas, Joelle Young, Bailey McMeans, Aaron Fisk, Paul Blanchfield, Matthew Guzzo, Benjamin Hlina, Steve Cooke, Michael Rennie</p>
Session 4	
15:10--15:35	<p><i>Future scenarios of under-ice irradiance in Swedish lakes</i></p> <p>Authors: <u>Gaia Donini</u>, G. Weyhenmeyer, S. Piccolroaz</p>

15:35--16:00

Methane Bubbles in Lake Ice

Authors: Edmund Tedford, **Talia Houston**, Lauren Ing, and Gregory Lawrence

Friday

Session 1

8:30—8:55

Can satellite SAR be used to retrieve information about wind, waves and currents in medium-sized lakes?

Authors: **Marco Toffolon**, M. Amadori, A. Farrokhi, L. Giovannini, S. Piccolroaz and Francesca De Santi

8:55--9:20

The influence of velocity shear on sediment transport in particle laden flows

Authors: **Adam J.K. Yang** and Mary-Louise Timmermans

9:20—9:45

Light attenuation due to preferential orientation of non-spherical particles in waves and shear flow

Authors: **Samuel Salemink-Harry**, Benjamin Smith, Timothy Bertram, Hilary Dugan, Jennifer Franck, Till Wagner, Grace Wilkinson, Lucas Zoet, and Nimish Pujara

9:45—10:10

A Simple Model for Vertically Propagating Seiches

Authors: **Stephen M. Henderson**

Session 2

10:35--11:00

Optimizing Floating Solar Configuration Design to Mitigate Environmental Impact on Freshwater Reservoirs

Authors: **Midauar Gondim Rocha, Sofia**, R. L. G. Nobre, D. A. Casas, S. Boulêtreau, J. Cucherousset, A.

11:00--11:25

Floating Photovoltaics on Lakes: What Coverage is Needed to Counteract Climate Change Effects?

Authors: **David Birt**, M.J. Chipps, A. Armstrong, D. Vernon, S.J. Thackeray and A.M. Folkard

11:25--11:50

Student and ECR awards presentation. A message from next year's PPNW 2026 hosts. Closing remarks.

Presentation List (Focus Session)

Tuesday

Bio Focus Session

- 1 *Investigating the effects of wind on floating particles*
Authors: Khush Bhavsar and M. Stastna
- 2 *Wave Basin Experiments to Quantify Sediment Transport From Localized Beach Nourishments in Idealized Wave Conditions*
Authors: Dawson Ethier, R. P. Mulligan, J. Olsthoorn
- 3 *Application of machine learning to improve hydrodynamic and surface water quality modelling*
Authors: Hamed Ebrahimi, Leon Boegman, Reza Valipour, and Rohit Shukla
- 4 *Observing surface water currents and plastic pollution transport using GPS-tracked drifters in Georgian Bay, Lake Huron*
Authors: Patricia Semcesen, M. Wells, and A. Gordon
- 5 *The characteristics of the seasonal internal waves and the effectivenesses on the Lake Trout habitats: A near shore study in Lake Ontario*
Authors: Zheng (Zac) Zhu, Mathew Wells, and Jon Midwood
- 6 *Bubble Facilitated Bitumen Transport*
Authors: Brian Moore, R. Mulligan, J. Olsthoorn, and K. G. Mumford
- 7 *Integrating Ecological and Hydrodynamic Modelling to Understand Nearshore Phosphorus and Cladophora Dynamics in Lake Ontario*
Authors: Yasasi Fernando, Lisa Yu, Alexey Neumann, George B. Arhonditsis

Wednesday

Climate/Hydrodynamics Focus Session

- 1 *Rising air temperatures and slowing wind speed delay Fall Overturn in Lake Simcoe, Ontario*
Authors: Bridget Hart, Mathew Wells, and Lidi Shi
- 2 *Optimized Vertical Heat Flux Estimation using Data Assimilation*
Authors: Thomas Pendergast, R.P. Mulligan, J. Olsthoorn
- 3 *Experimental investigation of bedform growth beneath periodic internal solitary waves propagating through a tidal flow*
Authors: Andrés Posada Bedoya, J. Olsthoorn¹ and L. Boegman
- 4 *Modeling the Impact of Physical Processes on Lake Erie Walleye Egg Survival and Recruitment*
Authors: Burak Kuyumcu, L. Boegman, S. Shan, W. Shi, Y. Zhao and J. Ackerman
- 5 *Predicting near-bed hypoxia via stratification in a large polymictic basin—a machine learning approach*
Authors: Yulong Kuai, Shuqi Lin, and Mathew Wells
- 6 *A Dramatic Delay in Fall Overturn Dates in a Two-Decade Stratification Record from a Dimictic Lake: Disasters for Ectothermic Fish Populations*
Authors: Anson Chow, Mathew Wells
- 7 *Numerical investigation of sediment resuspension beneath internal solitary waves*

Authors: Daniel M. Robb and Jason Olsthoorn

8

Climate-Induced Changes in Nearshore Circulation Patterns in Lake Ontario: Insights from Fine-Scale 3D Hydrodynamic Modeling

Authors: Bogdan Hlevca

Thursday

Winter Focus Session

1

Lake ice quality influences winter thermal stability and biogeochemistry: a case study of two southern Ontario lakes

Authors: Ryan Scott, J. Culpepper, J. Rusak, M. Wells, S. Sharma

2

The role of changing winters on ice quality and light transmission in two southern Ontario lakes

Authors: Joshua Abel Culpepper, R. Scott, K. Vikström, J. Rusak, M. Wells, S. Sharma

3

Rapid lake ice structure changes across Swedish lakes puts public ice safety at risk

Authors: Kevin Vikström, Gesa Weyehenmeyer, E. Jakobsson, M. Peterzell
Exploratory Data Analysis of Winter Stratification in Lake Superior

4

Authors: Leonard Korreshi and M. Stastna

5

Inhibition of spring turnover in a brackish lake subject to ice cover

Authors: Sara Jamali, R. Pieters, **Edmund(Ted) Tedford**, B. Laval and G. A. Lawrence

6

Winter dynamics in Lake Ontario

Authors: Mathew Wells and Emiel Teeven

- 7 *Bathymetry modulates the shape of lake ice*
Authors: Dana Arends, Edmund Tedford,
Jason Olsthoorn
- 8 *Dynamics of Arctic Mixed-Layer Deepening*
Authors: **S. De Abreu** and M.-L.
Timmermans

Physical Processes in Natural Waters 2025

PPNW 2025



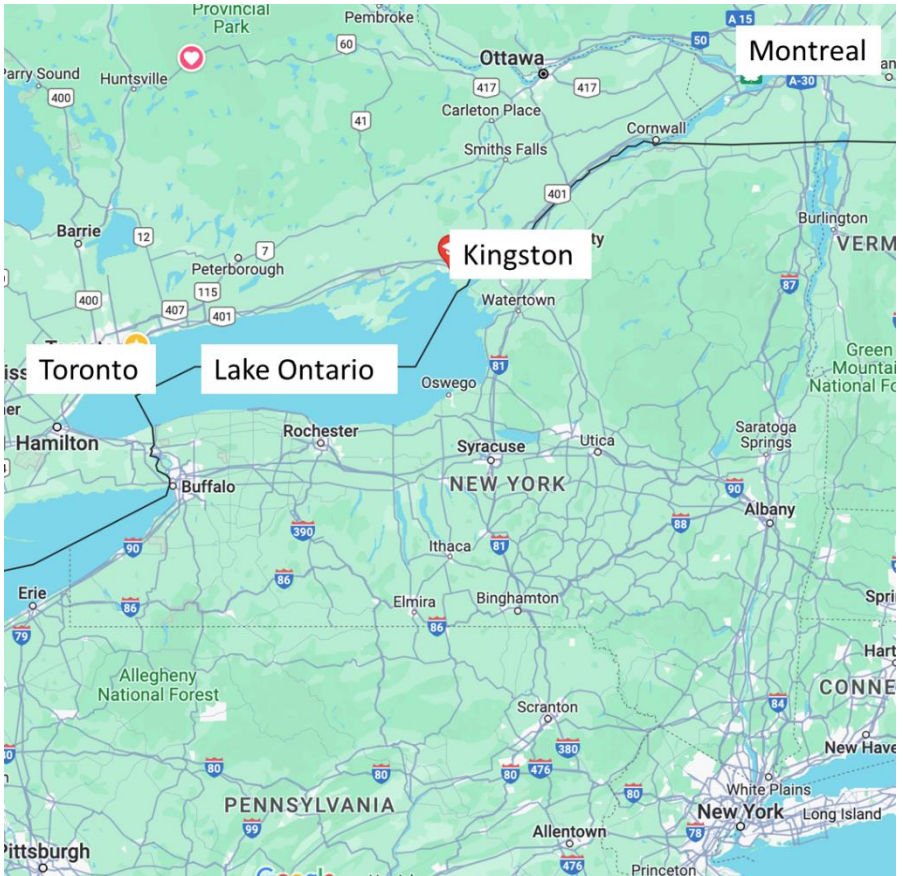
Maps

Directions to Kingston

Queen's University is in Kingston, Ontario, midway between Toronto (YYZ), Montreal (YUL) and Ottawa (YOW).

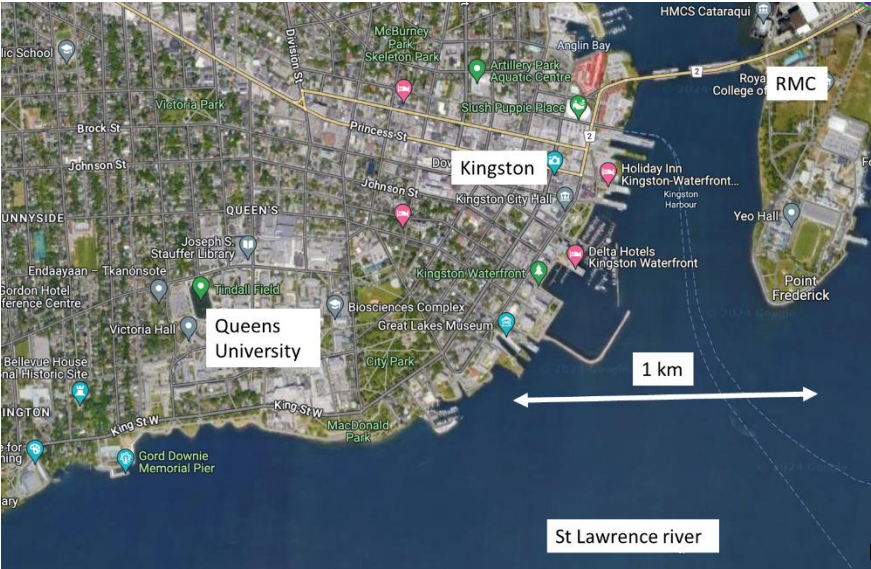
There are Via Rail connections to Kingston available from all three airports and bus options.

You can also drive from Toronto (3 hrs), Montreal (3 hrs) or Ottawa (2 hrs).



Directions to Queen's University

116 Barrie St, Kingston, ON K7L 3N6



PPNW2025

Notes



Notes



Notes



Physical Processes in Natural Waters 2025

PPNW 2025

