

# Below the Water Line

Jeff Ridal, PhD

Executive Director

River Institute, Cornwall, ON

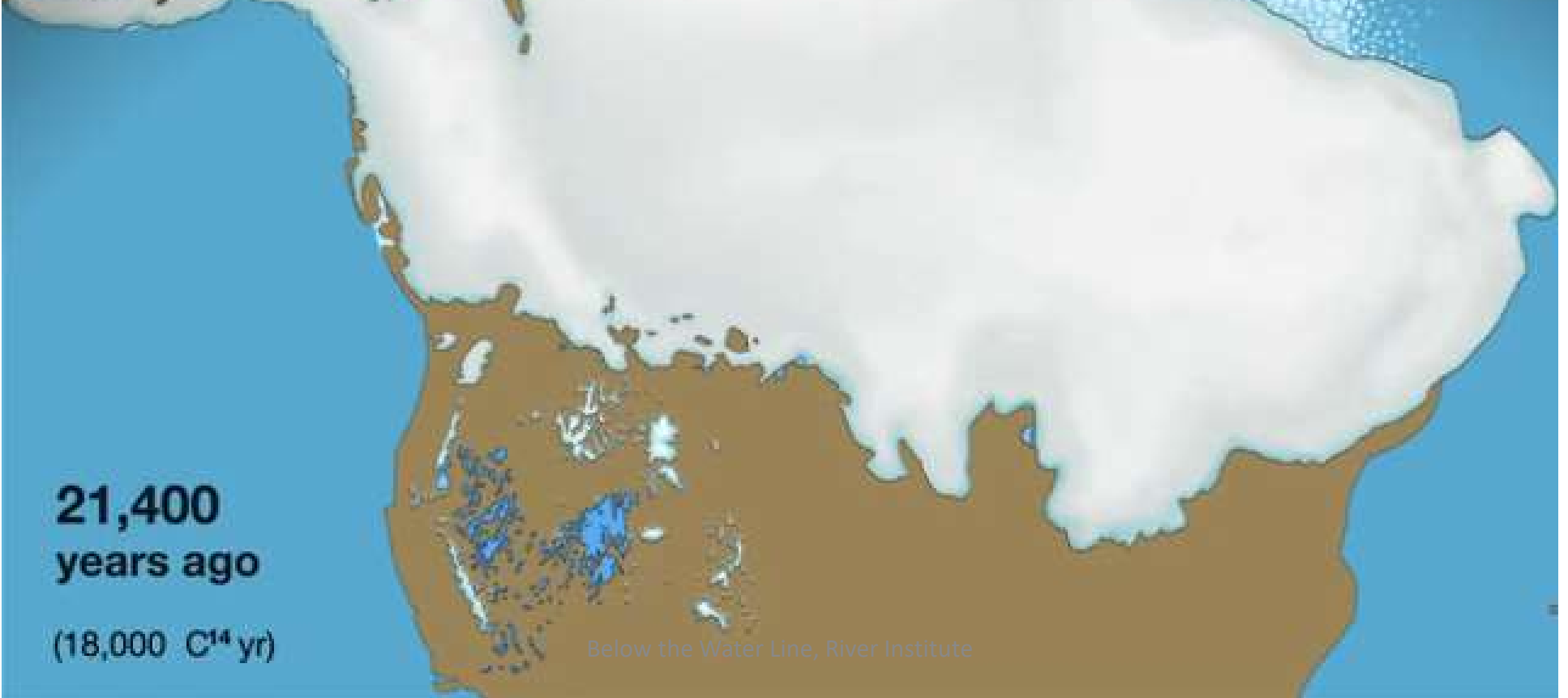
Presentation to:  
Thousand Islands Area  
Residents Association  
Sat., July 13, 2019



# Presentation Overview

- St Lawrence river natural history
  - Formation and geological features
  - Transition zones (from a great lake to a great river)
  - Alterations and Ecological Impacts
- River Institute
  - Research/ Symposium
  - Education
  - Community
  - River Rapport
- Wrap Up






**21,400  
years ago**

**(18,000 C<sup>14</sup> yr)**

Below the Water Line, River Institute

- 
- St. Lawrence River ~ 8,000 years old
    - Mississippi River is ~ 5 million years old
    - Nile River is 5 MYA
    - Amazon River is 11 MYA
    - Yangtze River is 45 MYA

*Below the Water Line, River Institute*



CANADA

> 200 years!

Lake Superior

173 years

Lake Michigan

21 years

Lake Huron

Lake Ontario

7.5 years

Lake Erie

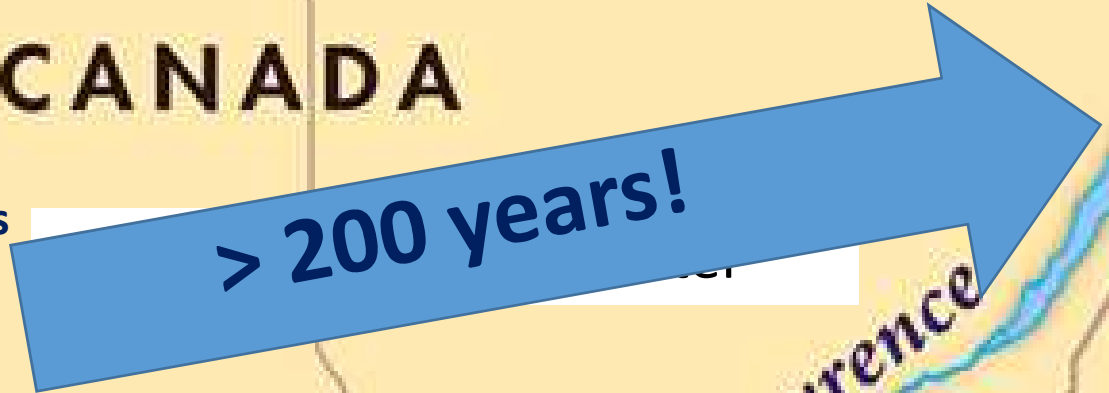
2.7 years

Saint Lawrence River

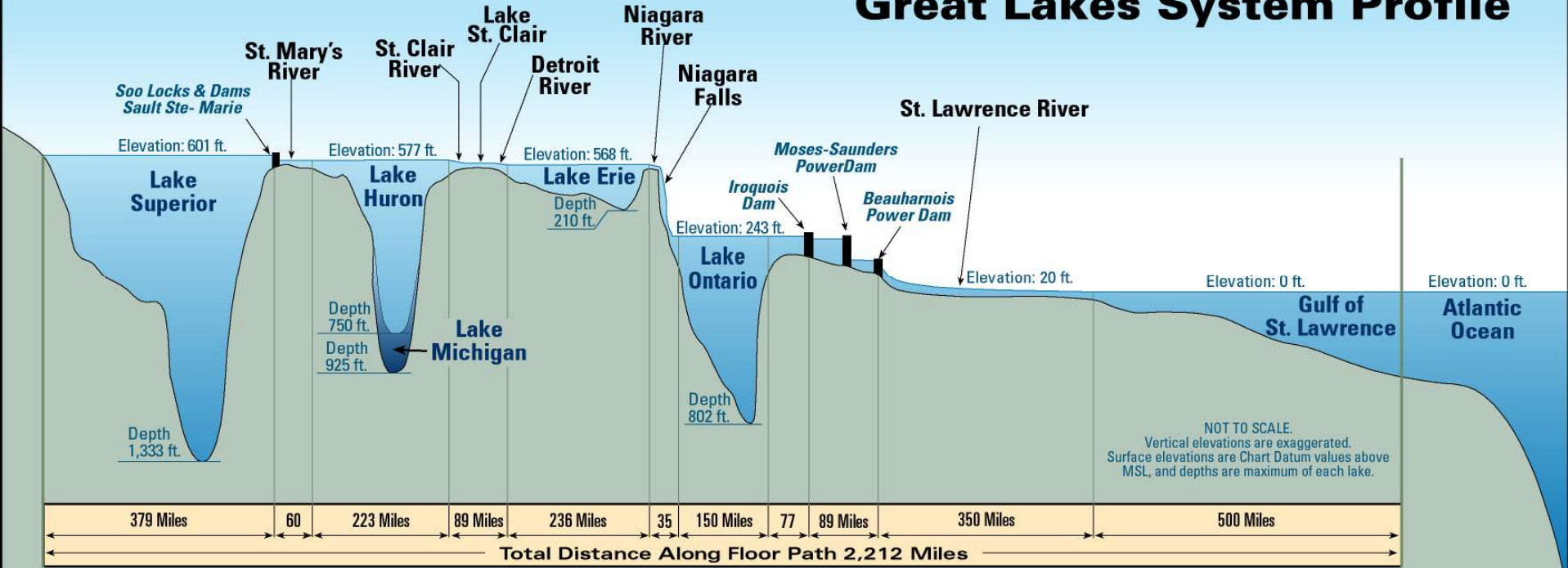
UNITED STATES

ATL  
O

Below the Water Line, River Institute



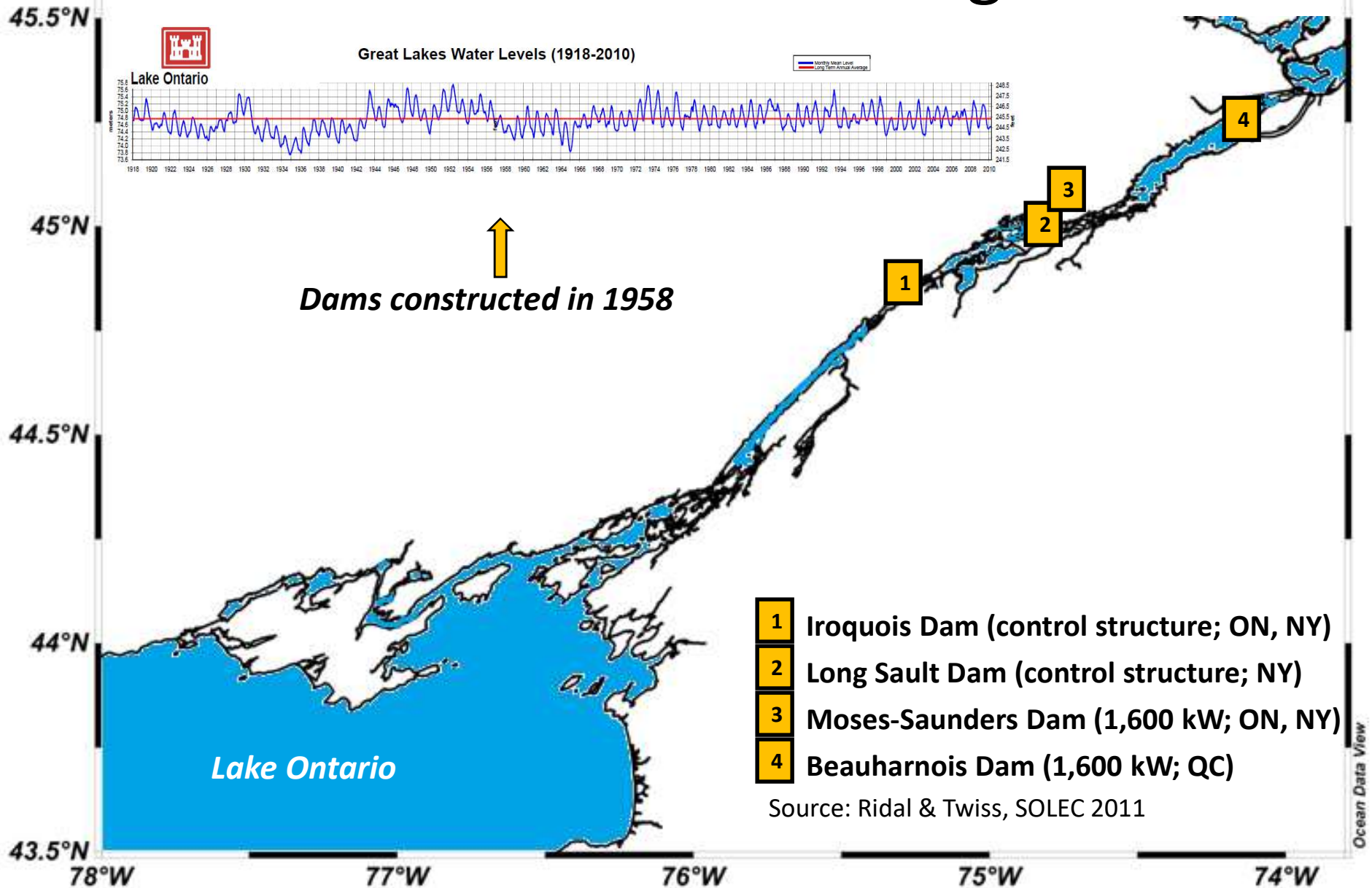
# Great Lakes System Profile

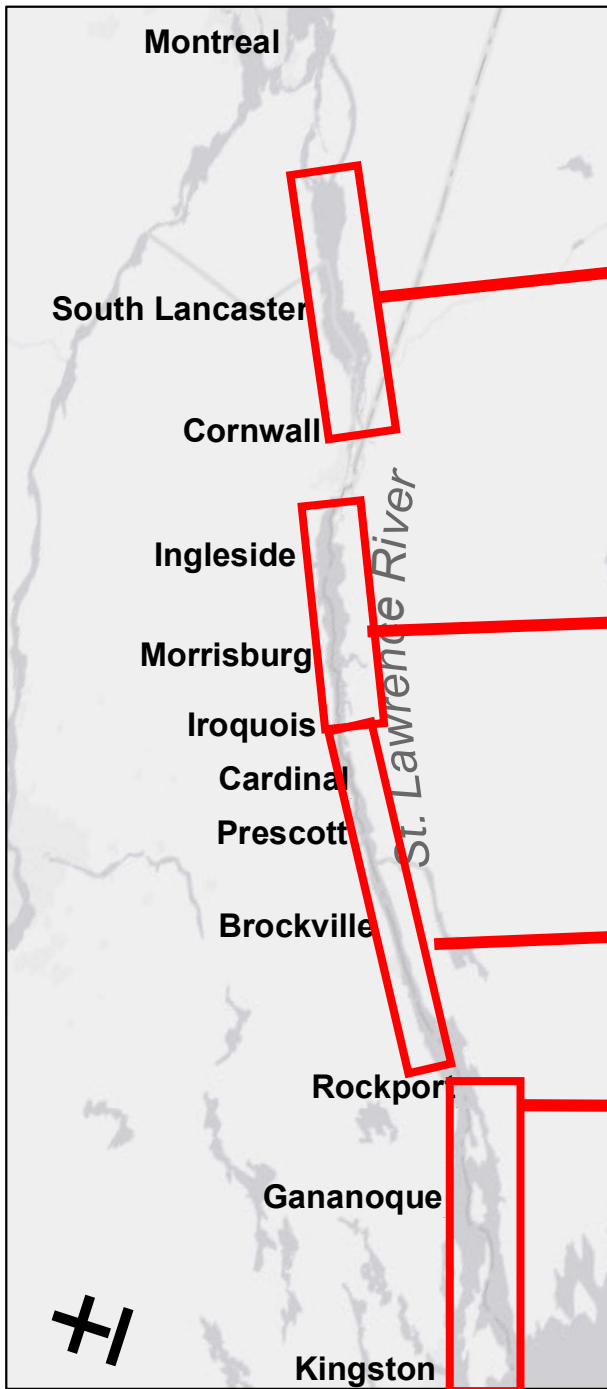


Modified from Michigan Sea Grant



# Dams and water level regulation



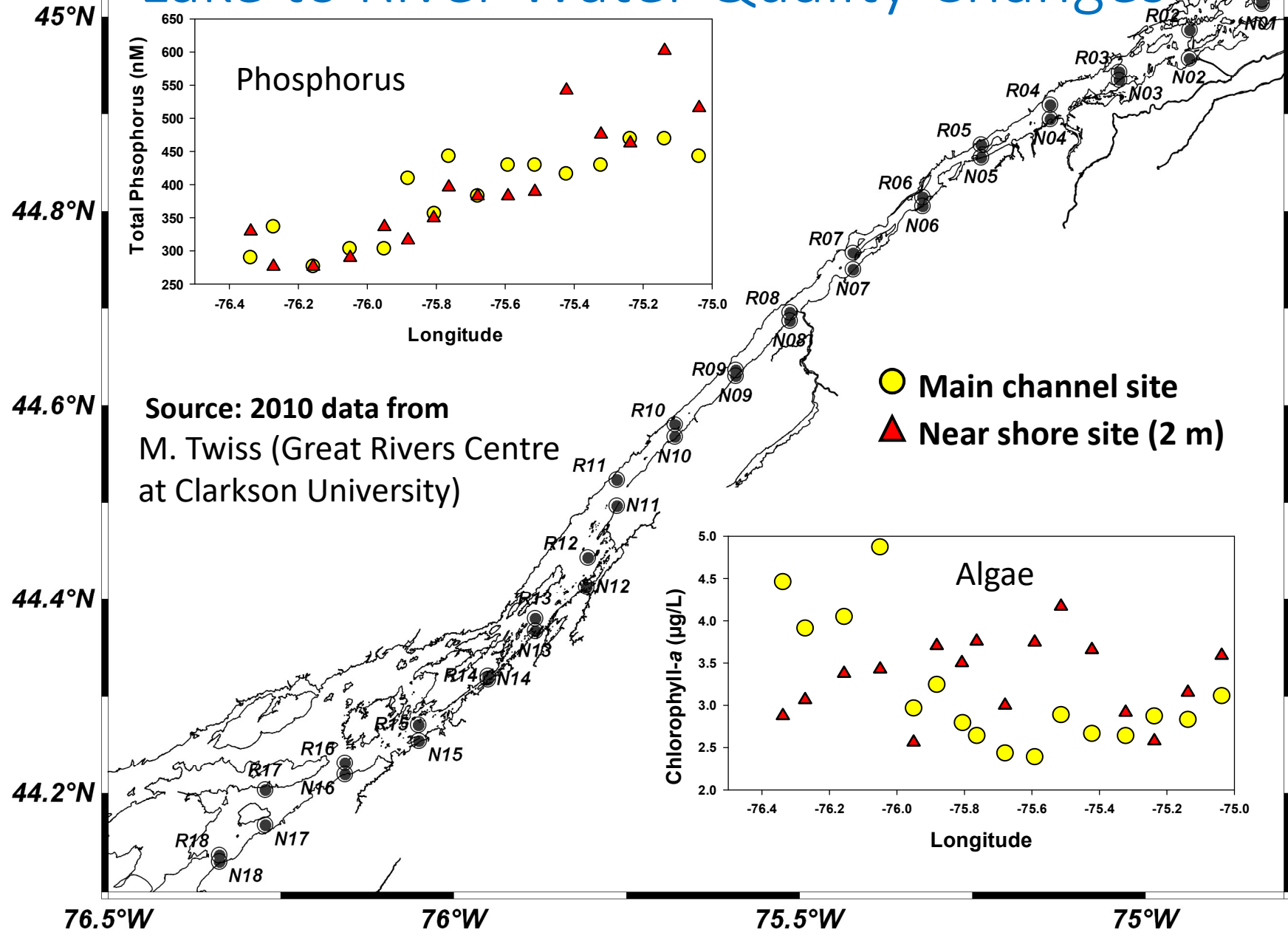


## UPPER ST LAWRENCE RIVER FOUR DISTINCT SECTIONS



- **Lake St. Francis**
  - Fluvial lake between MS and Beauharnois Dam
  - Wide (max 5 km)
  - Shallow (average 18 ft)
  - Large shallow shelves cut by deep channels
  - Water levels held constant
- **Lake St. Lawrence**
  - Reservoir created by MS Dam
  - Average depth is 26 ft (max 98 ft)
  - Experiences regular drawdowns up to 6 ft
- **Middle Corridor**
  - Few islands, little shallow water, swift currents
  - Average depth is 65-82 ft
- **Thousand Islands**
  - Complex series of 1768 islands
  - Numerous shoals, channels, diverse habitat
  - Max depth is 197 ft

# Lake to River Water Quality Changes

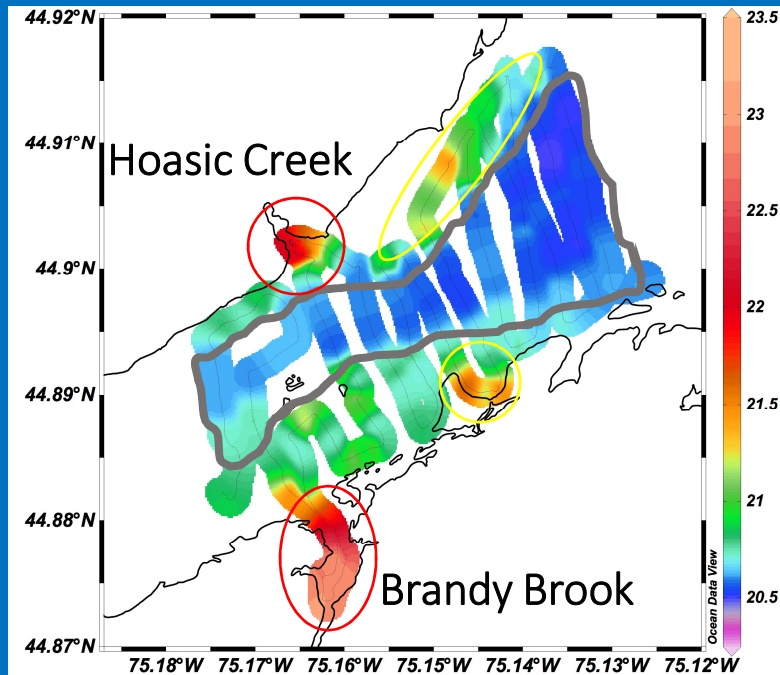


# Tributary Inputs Affect Nearshore

Mapping hydraulic mixing zones in Lake St. Lawrence

Inputs have detectable influence on the near shore water quality

Scale = 2 km



Water temperature (°C)



Photo: C. Critoph,  
Raisin Region Conservation Authority

High °C & high water colour

Source: M. Twiss; Great Rivers Center at Clarkson University

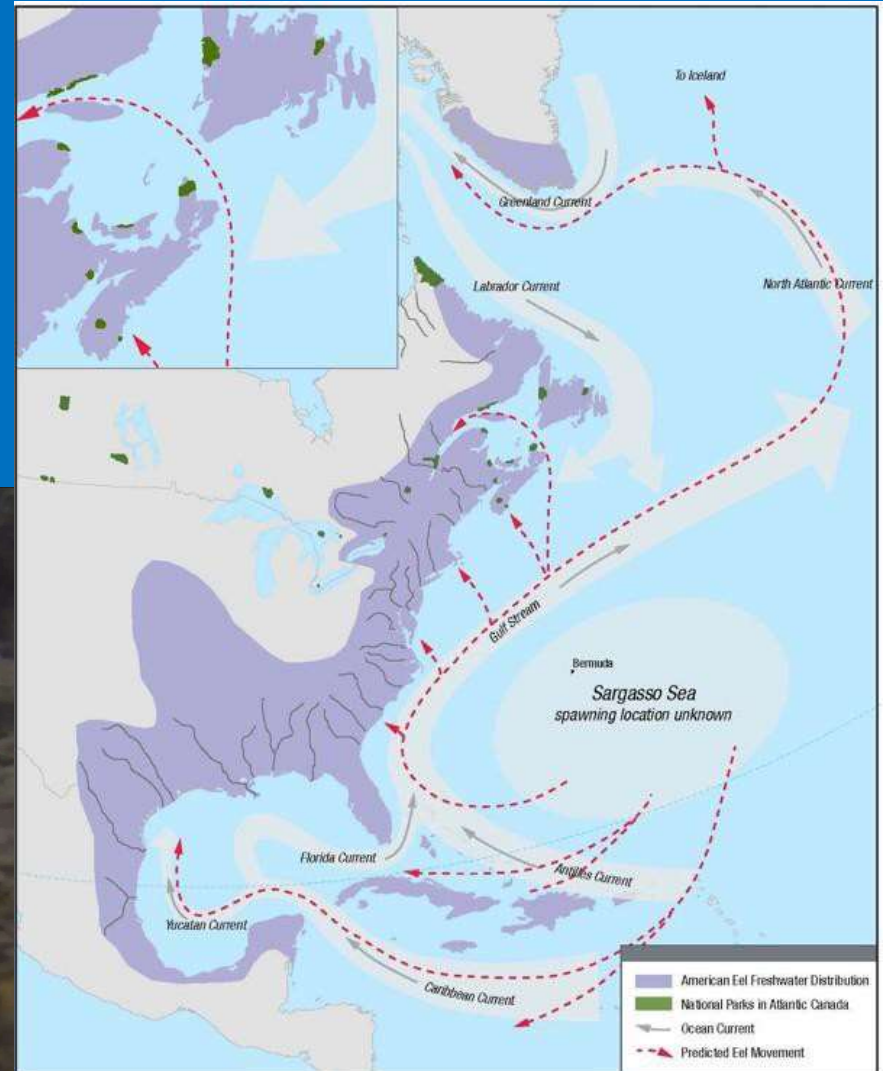
Below the Water Line, River Institute

# Over 60 fish species in the Upper St. Lawrence River!



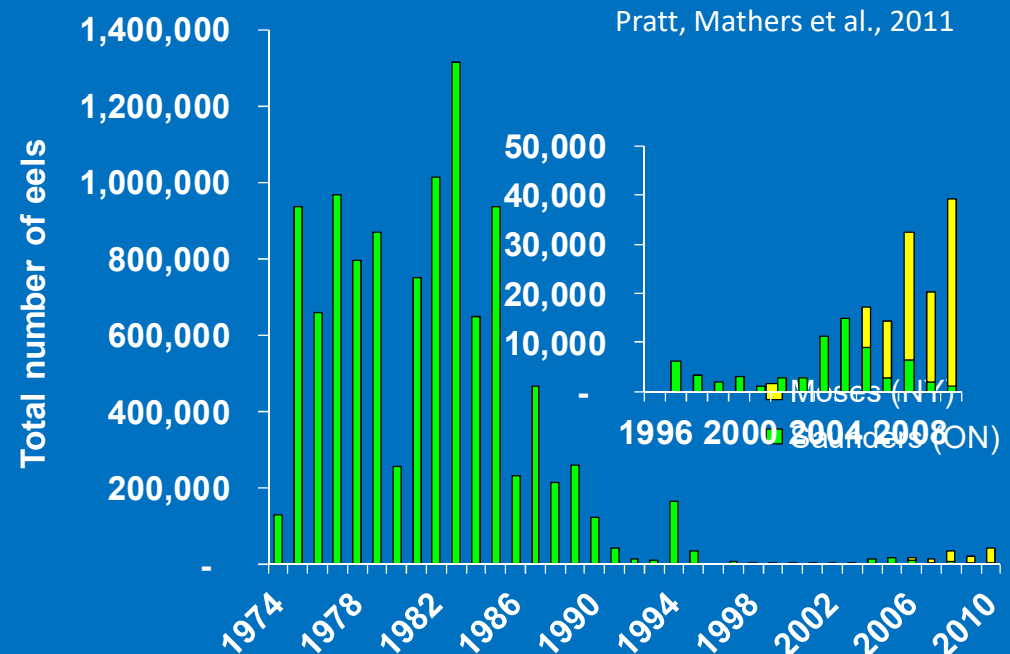
# ST LAWRENCE RIVER HOME TO FISH WITH AMAZING LIFE CYCLES

## The American Eel



# Habitat Fragmentation is a Major Physical Impairment in the Upper St. Lawrence River

Dams remove access to spawning beds and increases mortality due to turbines for fish that pass through dams, e.g., American eel, *Anguilla rostrata*



# Invasive Species in the SLR

Zebra Mussel



Quagga Mussel



Sea Lamprey



Below the Water Line, River Institute

Round Goby

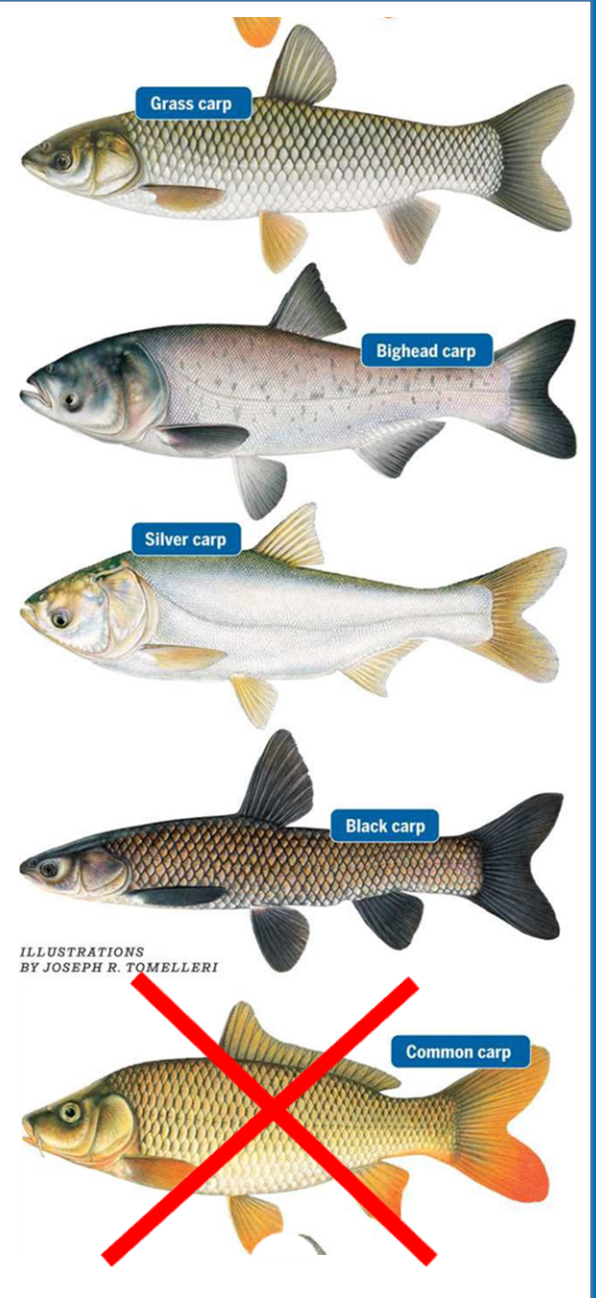


Spiny Water Flea



Eurasian Water Chestnut

# Not here yet....



ILLUSTRATIONS BY JOSEPH R. TOMELLERI

# St. Lawrence River Area of Concern

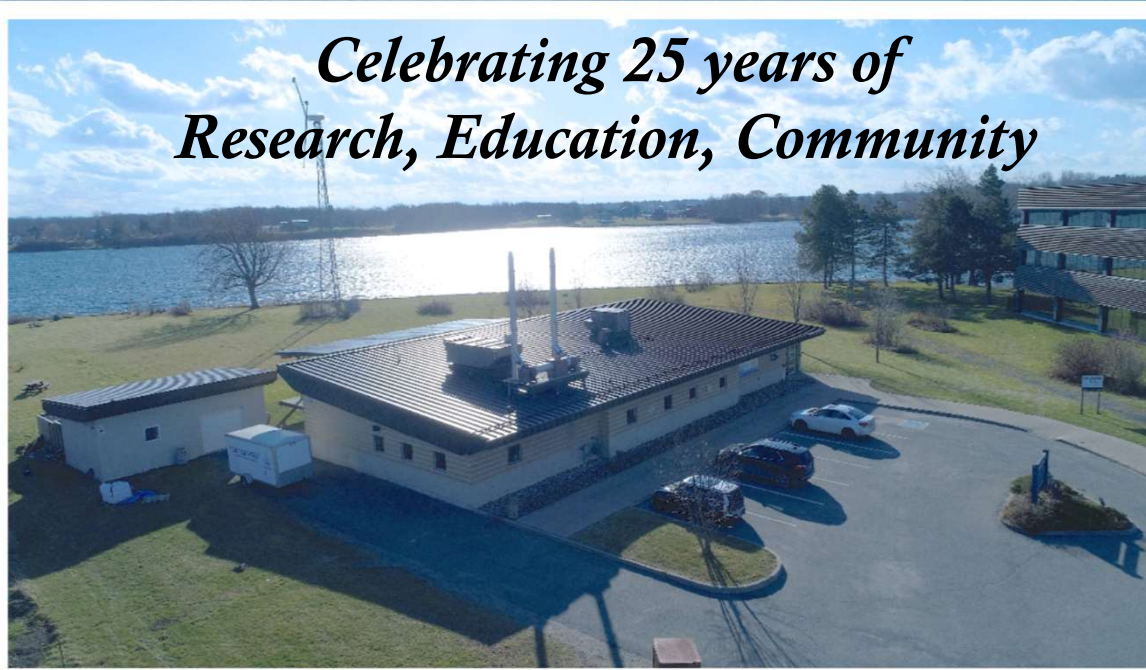




**River**  
INSTITUTE



*Celebrating 25 years of  
Research, Education, Community*



# About us

- **Established in 1994 – Non-profit, non-government, charity-status**
- **Volunteer Board of Directors**
- **Funded by grants, donations, contract services**
- **Endowments (Sustainability Fund, RI Foundation)**
- **River Institute Foundation / River Champions**
- **Extensive universities /colleges, community and industry partnerships throughout the region and beyond**
- **Strong links with Mohawks of Akwesasne**



*Vision: A globally-recognized science-based organization inspiring communities to create and maintain healthy and sustainable river ecosystems*

# Our Team



Currently 32 Staff – 16 Full time; 16 part-time and summer students

Below the Water Line, River Institute



An aerial photograph of a wide river with green banks and a blue sky with scattered clouds. Overlaid on the center of the image is a Venn diagram consisting of four overlapping circles. The top circle is light green and labeled 'Research'. The left circle is a darker green and labeled 'Education'. The right circle is light orange and labeled 'Community'. The bottom circle is light blue and labeled 'Technical Services'. The circles overlap in various combinations, creating a central area where all four intersect.

**Research**

**Education**

**Community**

**Technical Services**



Below the Water Line, River Institute

# Our Research

- River biodiversity
- Restoration progress
- Climate change impacts
- Contaminants
- Habitat assessments



# **FINS Project (Fish Identification Nearshore Survey)**

**River-based indicator program; MCA partnership**

**Interactions between:**

- **nearshore fish populations**
- **water quality**
- **food sources**
- **habitat**
- **Over 80,000 fish, 52 species**



Below the Water Line, River Institute





# RiverLabs



[www.riverlabs.ca](http://www.riverlabs.ca)

# Sharing knowledge for future generations

Mentoring the next generation of researchers



River  
INSTITUTE

Below the Water Line, River Institute

# LEARNING Science from Scientists



Student Mentorship





**River**  
INSTITUTE

**7500+**

**young people reached each yr**

**2018 - NSERC National Prize for Science Promotion!**



Below the Water Line, River Institute



# Community Outreach

- Science & Nature Speaker Series
- Family workshops
- River Award
- Public presentations
- Eco-friends camp
- Jr. Scientist camp
- Open House



Below the Water Line, River Institute



# SHARING KNOWLEDGE ANNUAL RIVER SYMPOSIA 1993 - 2019



## Watersheds Water levels and Wetlands



Below the Water Line, River Institute

MAY 29&30 2019 • OPG VISITOR CENTER • CORNWALL, ON

# Great River Protection Network

Regional cooperation to clean up river  
Citizen-led and action oriented



Below the Water Line, River.Institute-



# What is the **Health** of the St. Lawrence River?

## *The Great River Rapport*

- Collaborative
- Ecosystem Health Indicators
- Fill Data Gaps
- Recommend Future Work
- Easy to Read, Web-based Report
- Goal: 2020
- Have Your Say survey:  
[www.riverinstitute.ca/riverrapport](http://www.riverinstitute.ca/riverrapport)



**Dr. Leigh McGaughey, Lead Scientist**

# Communities



Collective Actions

# Healthy River

# Decision Making



Below the Water Line, River Institute



**Thank You!**



[www.riverinstitute.ca](http://www.riverinstitute.ca)

[jridal@riverinstitute.ca](mailto:jridal@riverinstitute.ca)

Below the Water Line, River Institute