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# Innovations I: Using Sediment Core Analyses to Attempt to Quantify the Historical Impact of Spawning Alewife

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# Using sediment core analyses to attempt to quantify the historical impact of spawning Alewife

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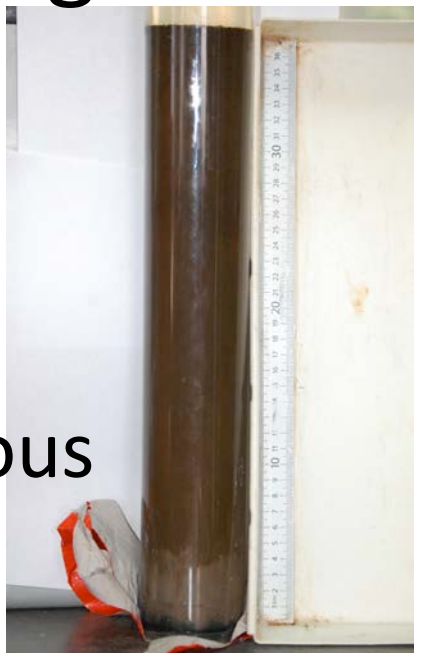
# Dams, Fishways and Fish

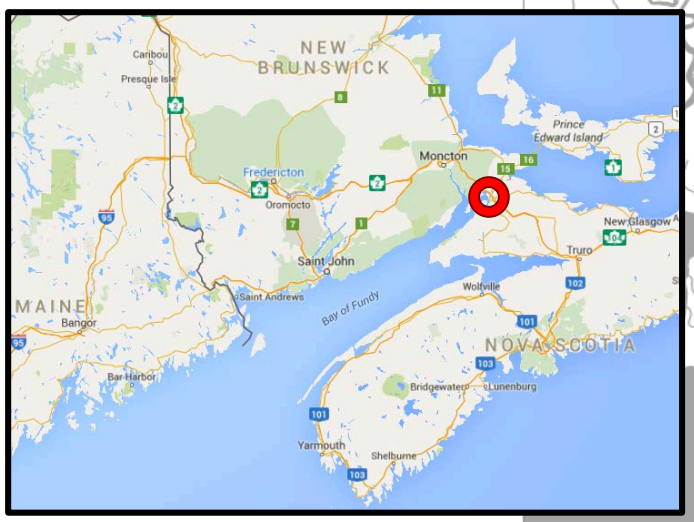
- Anadromous fish transport marine derived nutrients (MDN) into freshwater
- Provide obstacles for anadromous fish migration
  - Limit input of MDN
- Historical records of fish abundance can be severely lacking.
- Dams and fishways are too often unstudied, and impacts on freshwater productivity and fish migration are unknown.

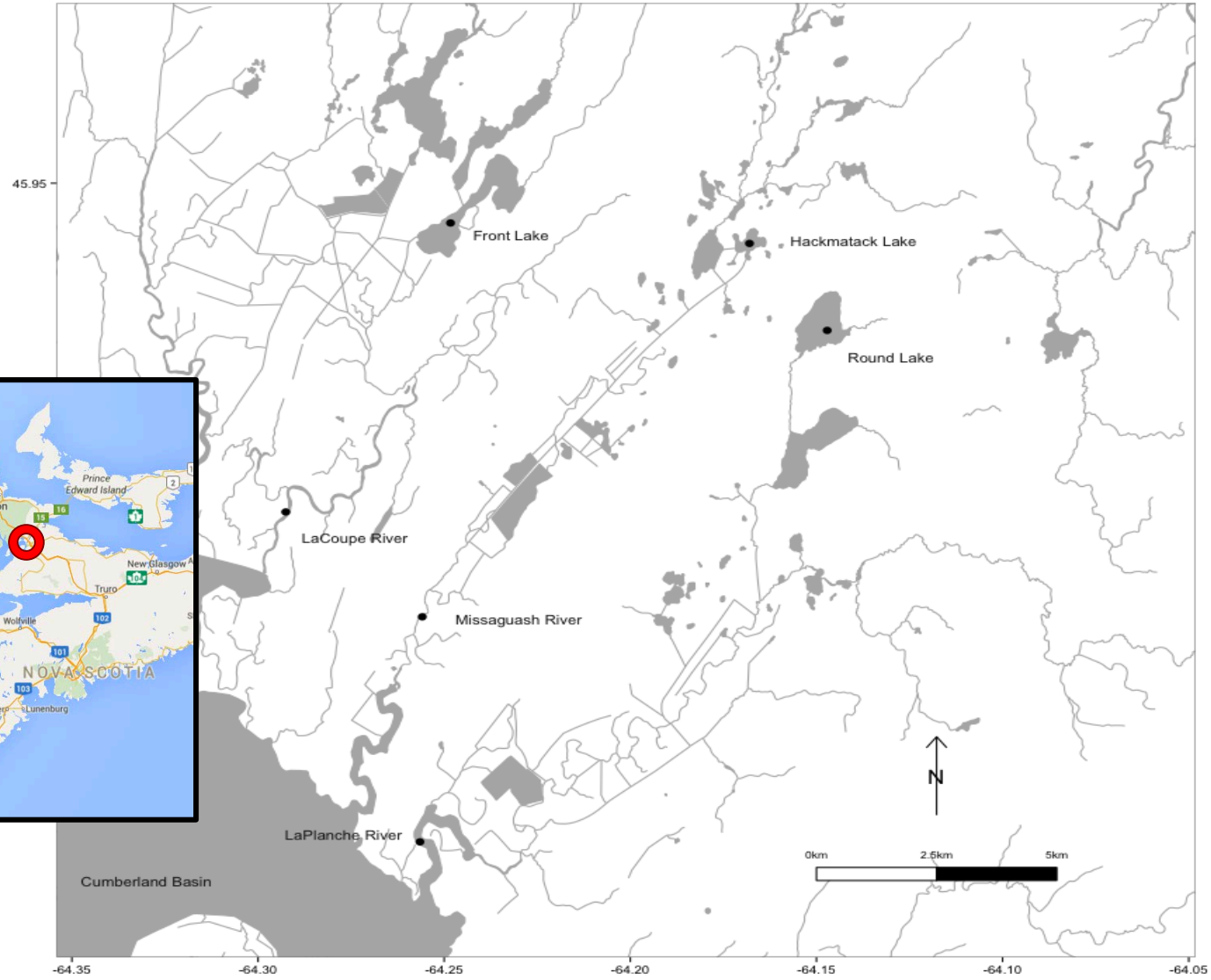
# Detecting a Historical Marine Signal



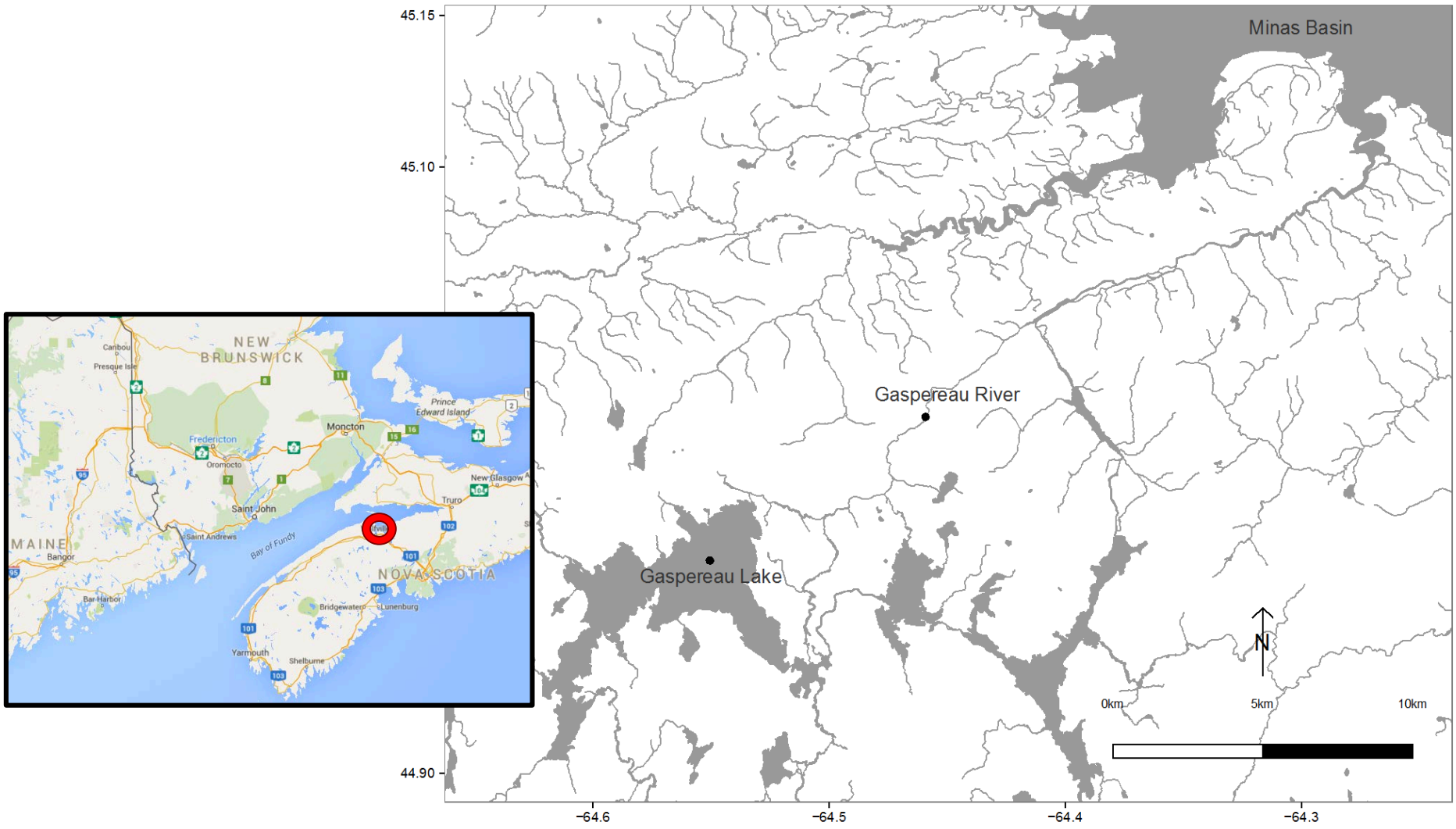
- Lake history in sediment
  - Record of historical lake ecosystems
  - Spawning grounds
- Is there an abiotic proxy for anadromous fish presence?
- Has the installation of dams, fishways and tidegates affected productivity?
  - Can a change in productivity be attributed to altered fish migration?

# Study Sites: Cumberland Marsh Region, Nova Scotia and New Brunswick, Canada



# Gaspereau River System, Nova Scotia, Canada



# Study Sites

- Hackmatack Lake, Cumberland Marshes
  - Heavily modified, very little records
- Round Lake, Cumberland Marshes
  - Relatively undisturbed, very little records
- Gaspereau Lake, Gaspereau Valley
  - Heavily modified, well recorded, deep history

# Sediment Coring

- Nova Scotia:
  - Round Lake
  - Gaspereau Lake
- New Brunswick:
  - Hackmatack Lake
  - Silver Lake
- Maine, USA:
  - Togus Pond

# Sediment Cores

XRF:

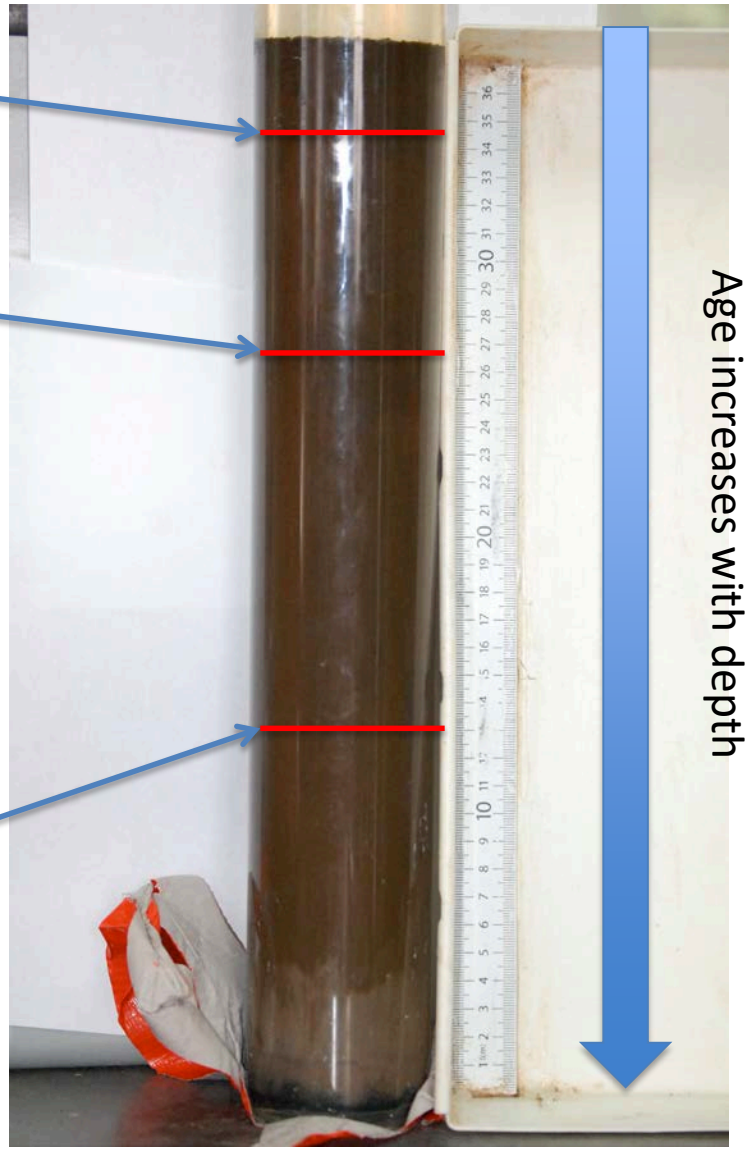
- Dating: Pb
- Input of trace metals

Stable Isotopes:

- -δC + δN:

Productivity

- -δS: Marine influence



# Fish blending and analysis

- Whole alewife blended; subsample dried and analyzed
  - ICP-MS, SIA(δC + δN + δS)

- Results of fish analyses will help in identifying abiotic proxy, as well as in estimating historical nutrient inputs by fishes.
  - Can be compared to current knowledge of fish passage and population

# Future steps

- Process results of SIA
  - Productivity changes
  - Marine signal

- Process and analyze Gaspereau Lake core
  - Identification of abiotic proxy for anadromous fish

# Implications

- Dam and tide gate effects
  - Freshwater productivity
  - Fish access to spawning habitat

- Reliable assessment of historical anadromous fish abundance
  - Can be adapted for use in lakes in other regions and for different species.

# Challenges (so far)

- Lack of historical records
  - Modifications and disturbance
  - Fish abundance
- Lack of controls
  - Pervasiveness of dams and fishways in maritime provinces
  - Unique habitat
- Time and resources
  - Limited in number of cores per lake
  - Limited in resolution

# Thanks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Questions?

Comments?

Suggestions?

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