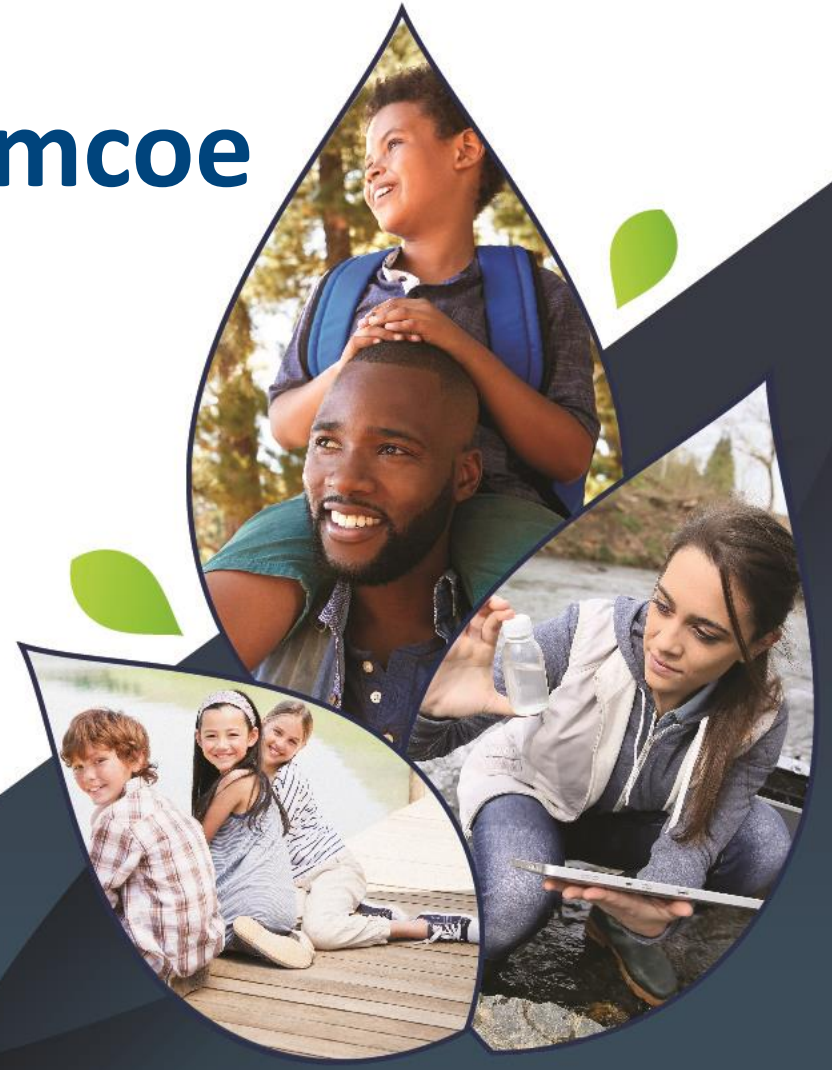
Ecological Health of Lake Simcoe



Georgina Environmental Advisory Committee

April 1, 2025

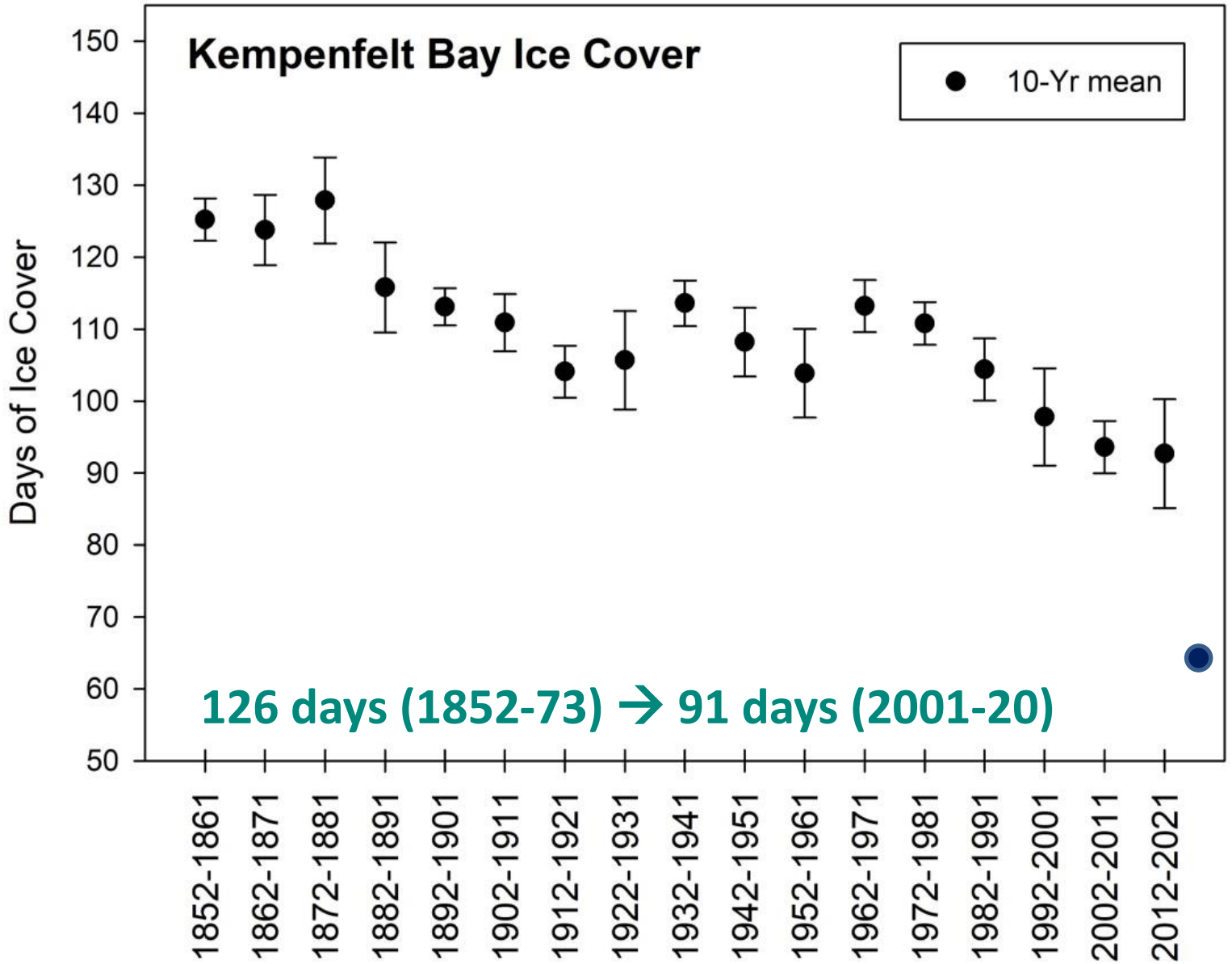
Don Goodyear

General Manager, Integrated Watershed Management

Lake Simcoe Region
conservation authority


Key stressors:
• Climate change
• Invasive species
• Nutrients
NASA Visible Earth; 3 Sept 2010

Decreasing ice cover



Longest:
152 days (1875-6)

Shortest:
50 days (2023-4)

Ice-on:
Earliest: Dec 1, 1875
Latest: Feb 2, 2002

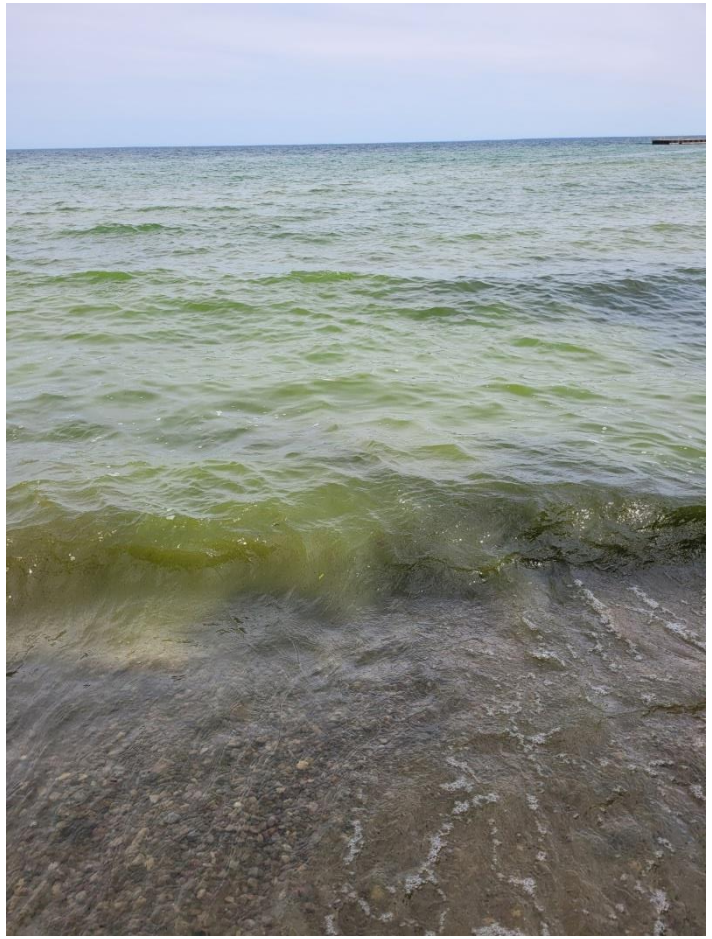
Ice-off:
Earliest: Mar 10, 2024
Latest: May 9, 1873

Main Basin did not freeze: 2002, 2012

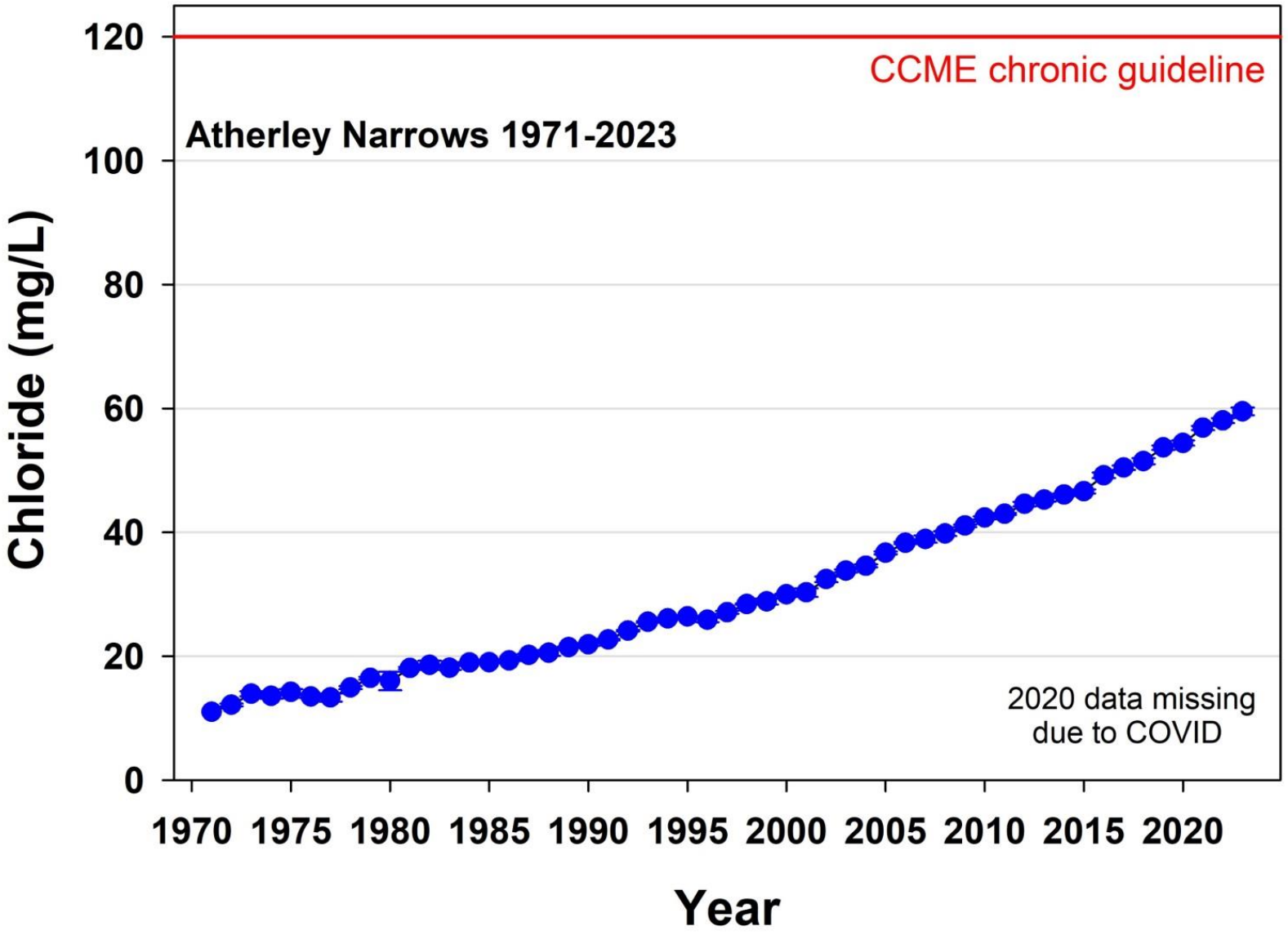
Ice Watch Canada; Alex Mills, pers. comm.; LSRCA unpublished

Climate change and blue-green algae

- July and September 2024: first known lake-wide blooms of blue-green algae
  - Causes: warmer water, no wind



Paved surfaces and freeze / thaw = more winter salt use



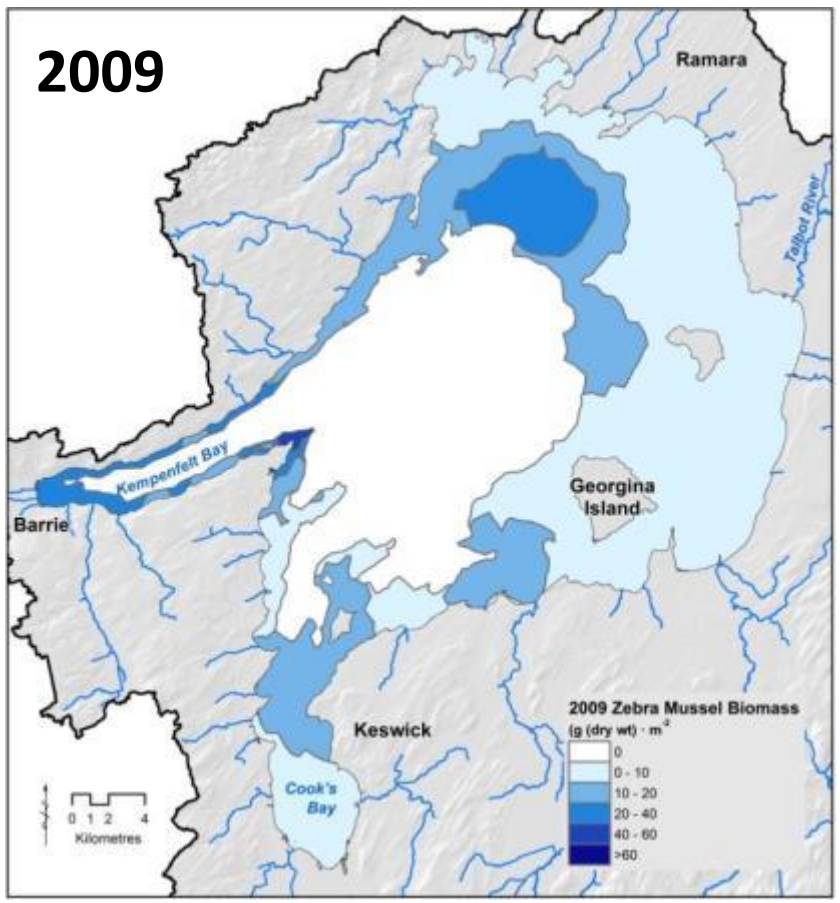
Salt Alternatives?

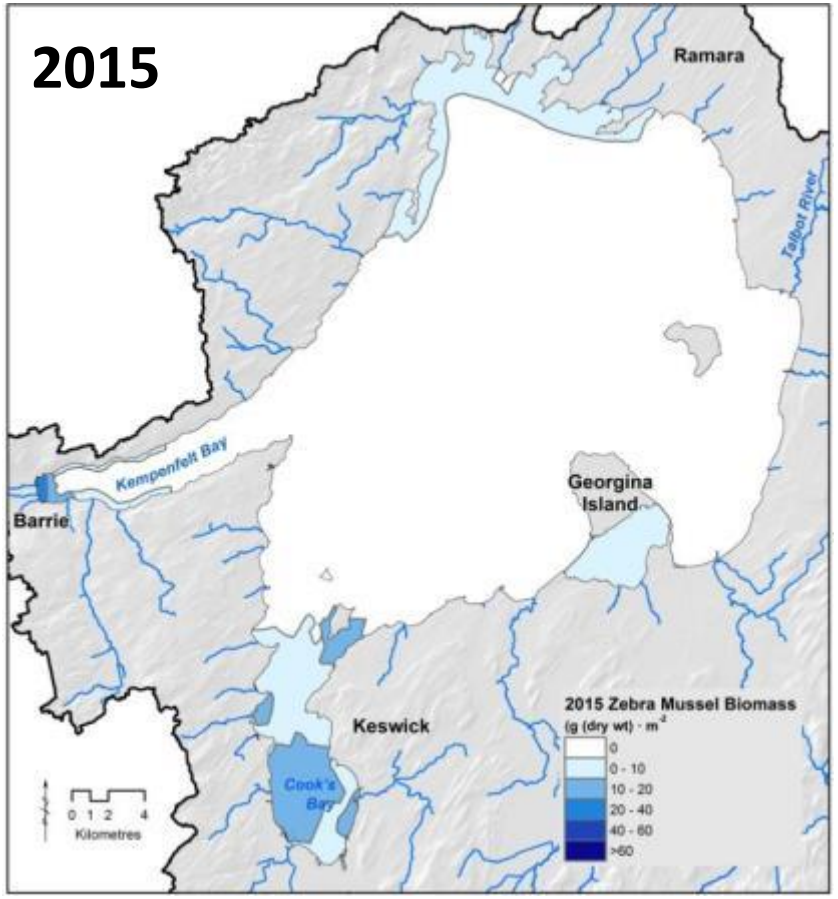
- Beet juice: depletes oxygen
- Sand: smothers benthic invertebrates

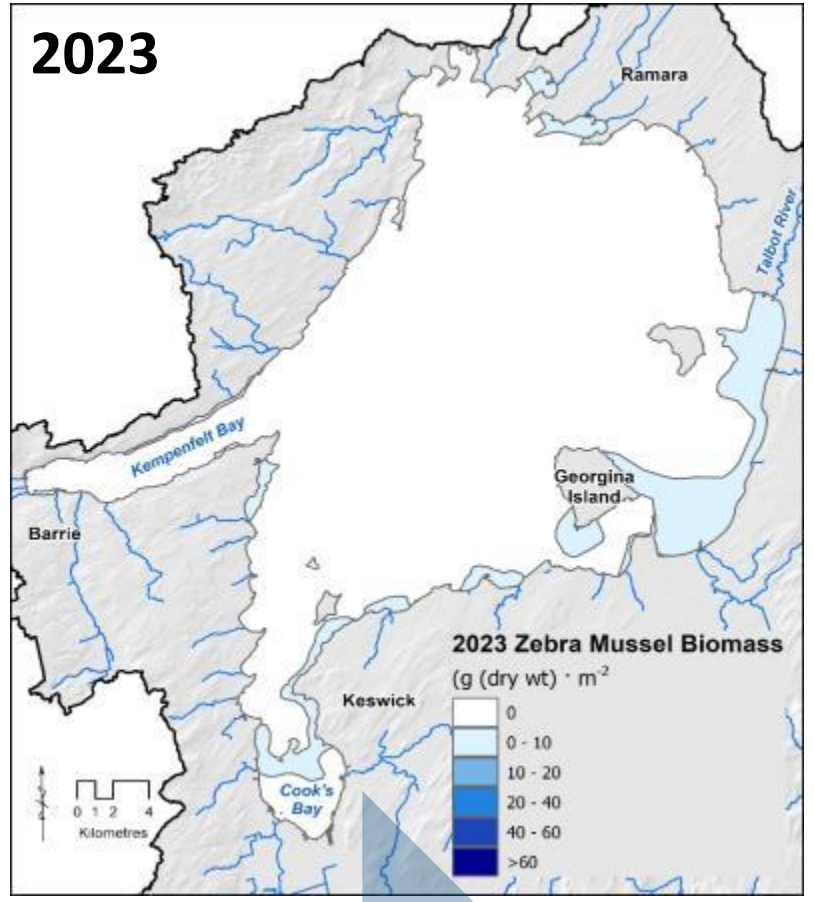
Limit application rate / liability

Seawater chloride = 19,400 mg/L

Zebra mussel trends







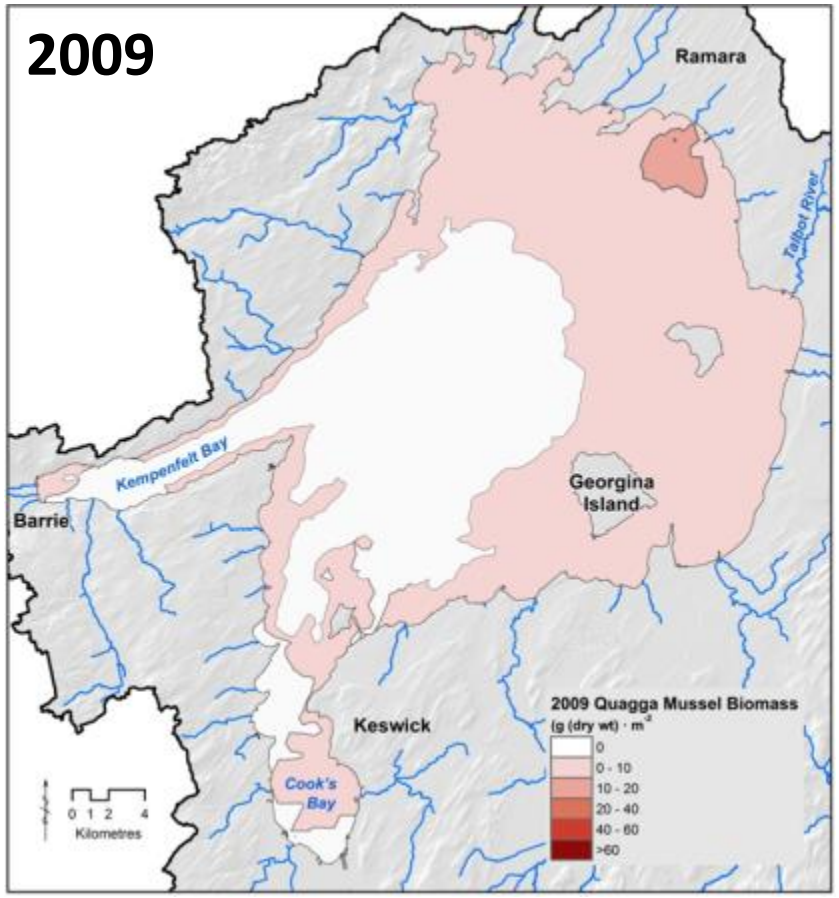
87 %

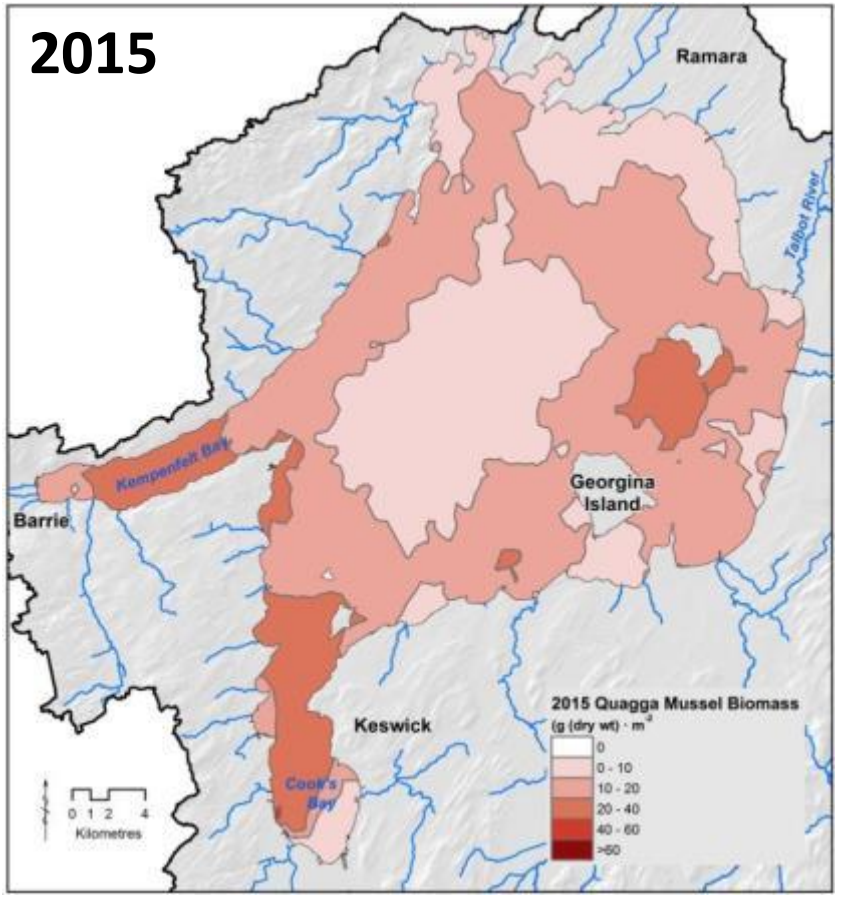
12.2 %

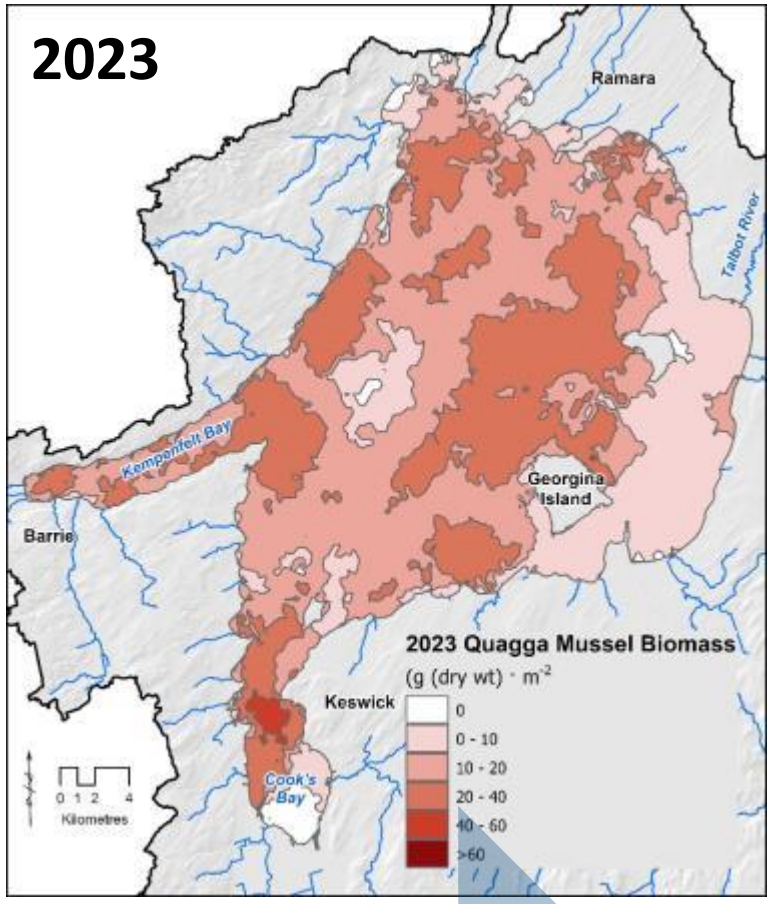
0.8 %

2009/15 Maps: Ginn et al. 2018. J. Great Lakes Res.

Quagga mussel trends







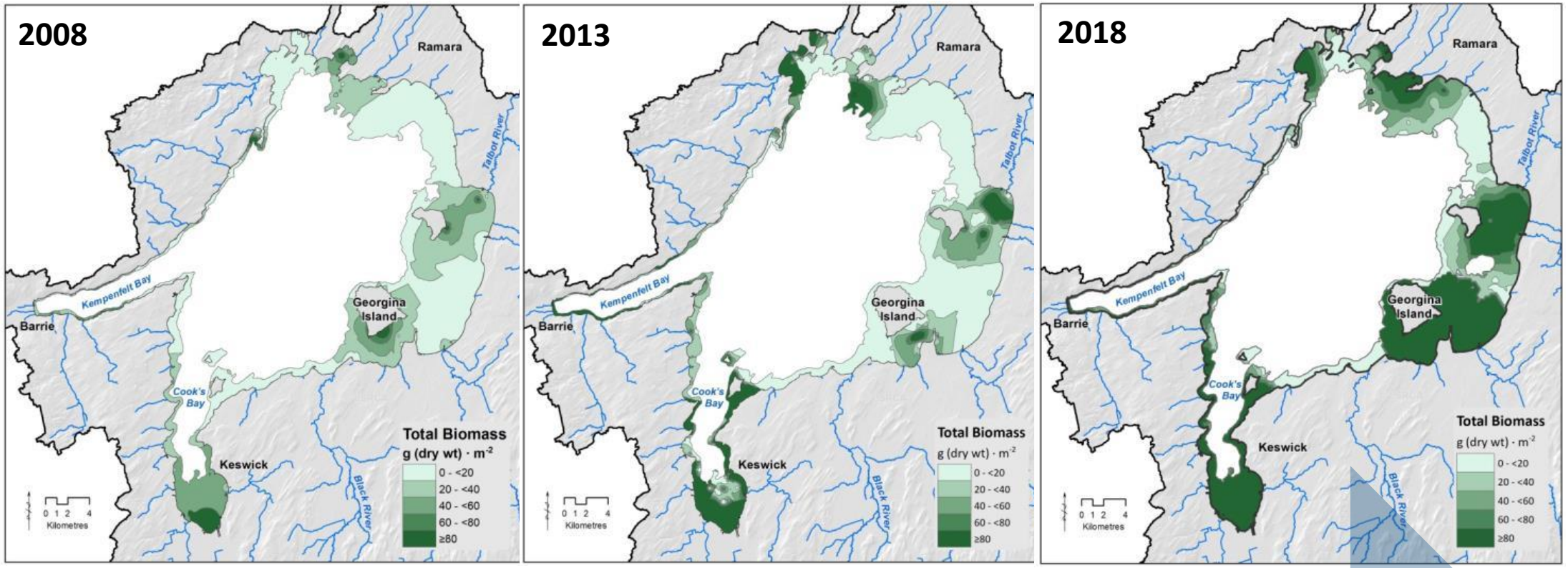
13 %

87.8 %

99.2 %

2009/15 Maps: Ginn et al. 2018. J. Great Lakes Res.

5X increase in aquatic plants



29.9 g/m^2

80.3 g/m^2

153.9 g/m^2

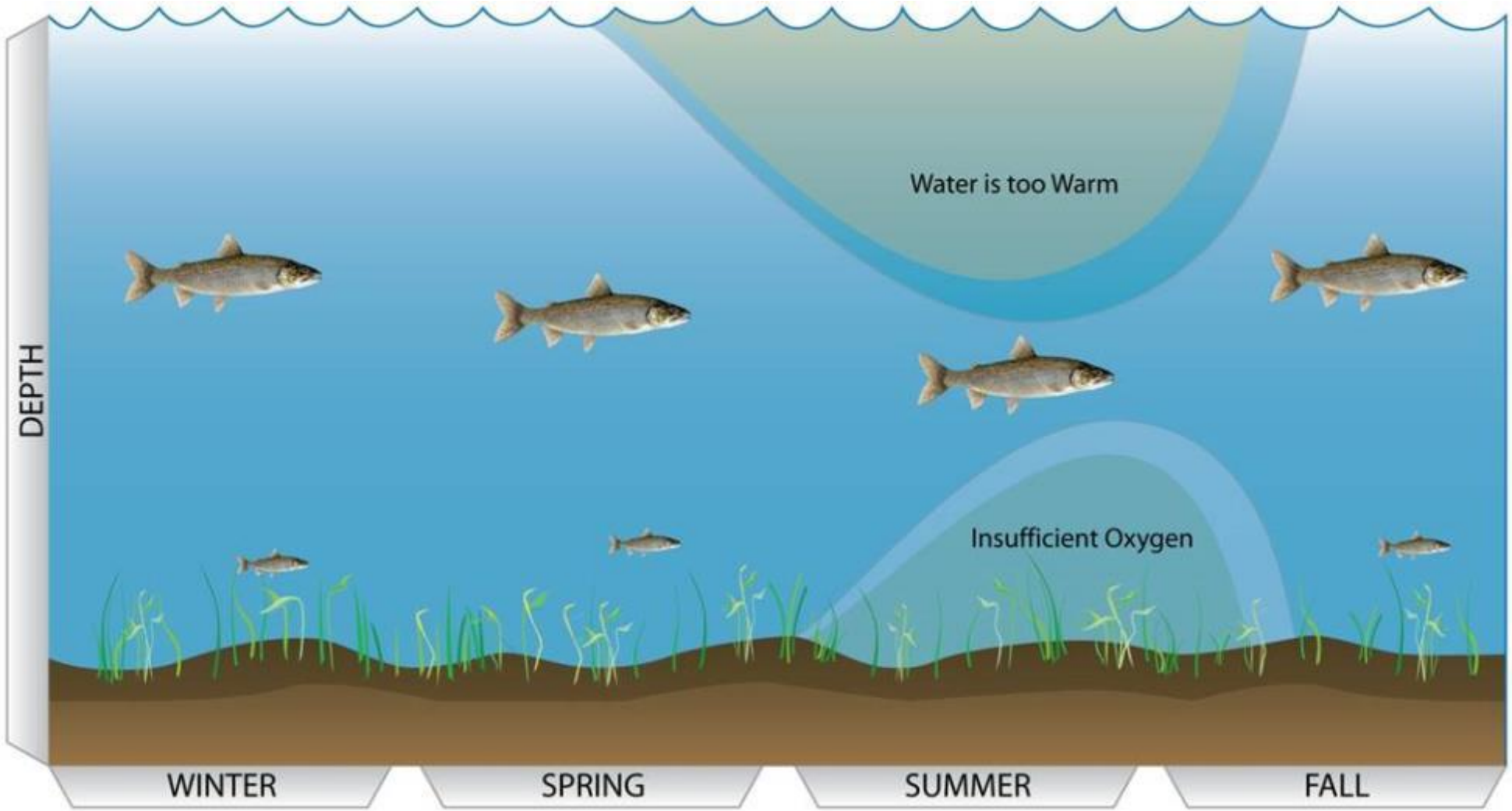
Ginn et al. 2021. Lake Reserv. Manage.

Water soldier

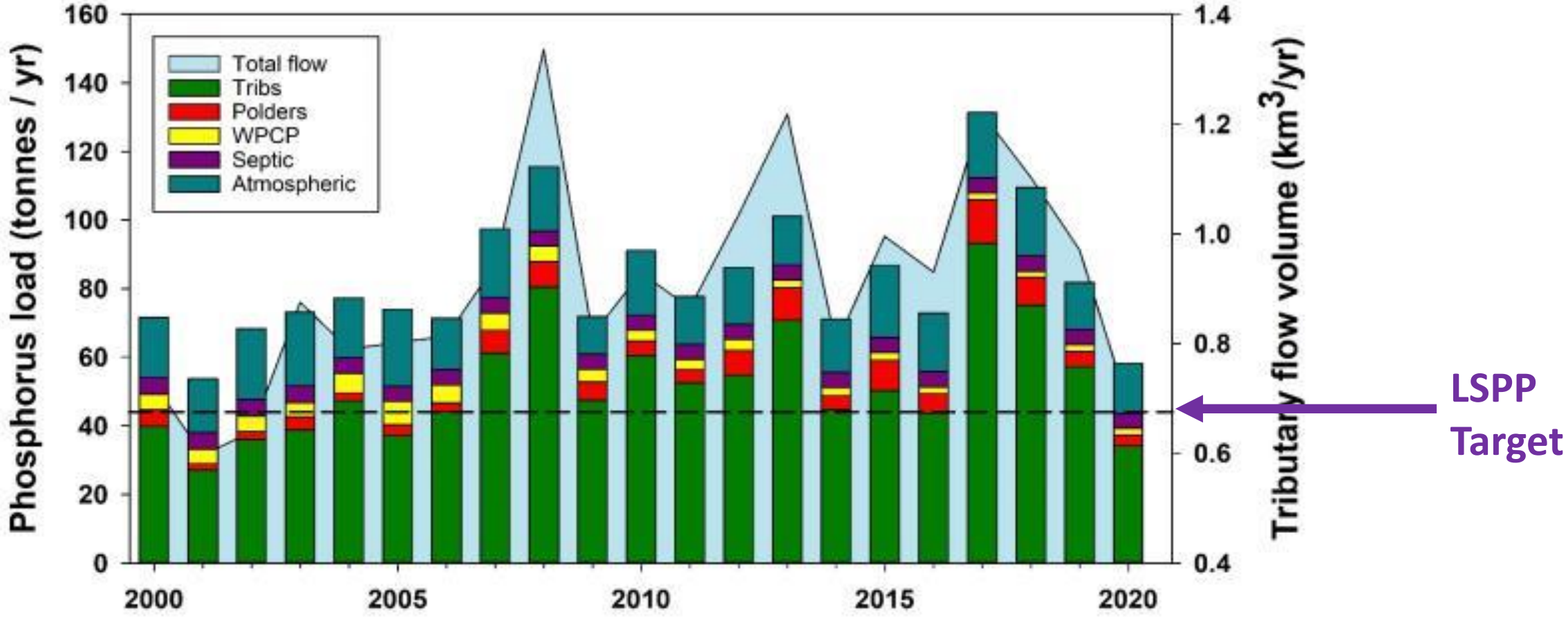
- Found in southern Cook’s Bay, July 2024
- Likely present for 3-5 years

Lake Simcoe Protection Plan (2009)

- Target for dissolved oxygen = 7 mg/L
- Estimated load = 44 tonnes of phosphorus per year



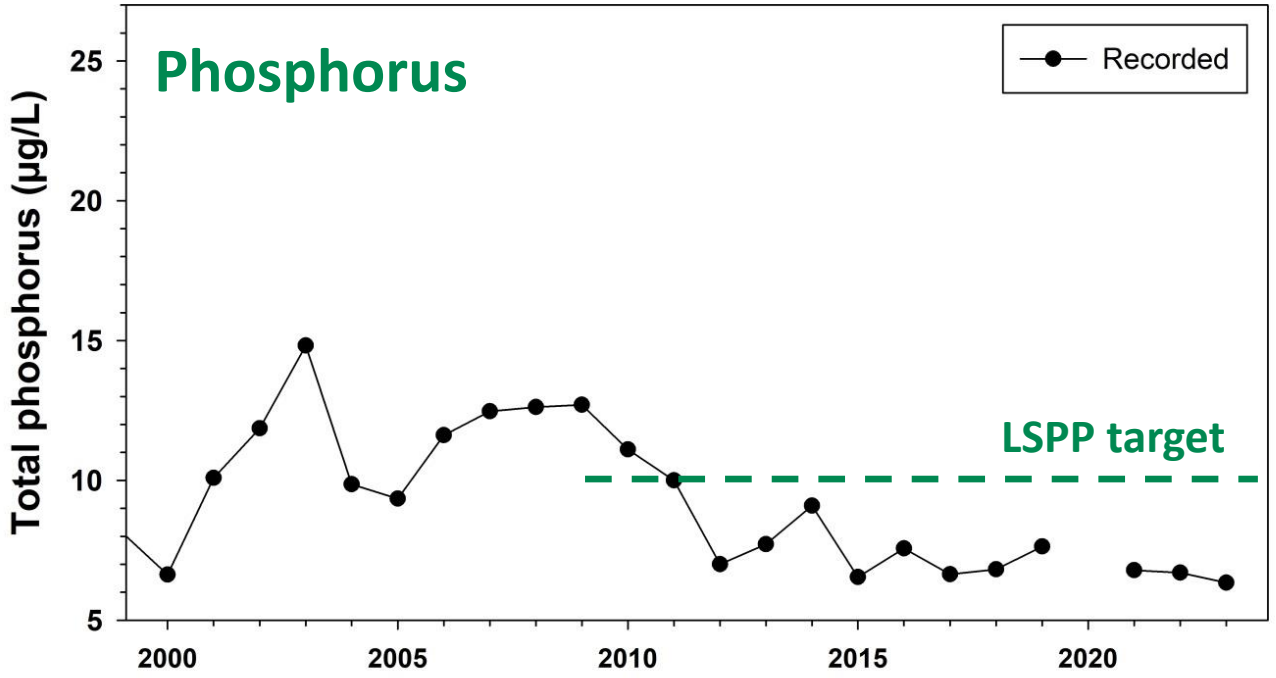
Nutrient Inputs (Loads)

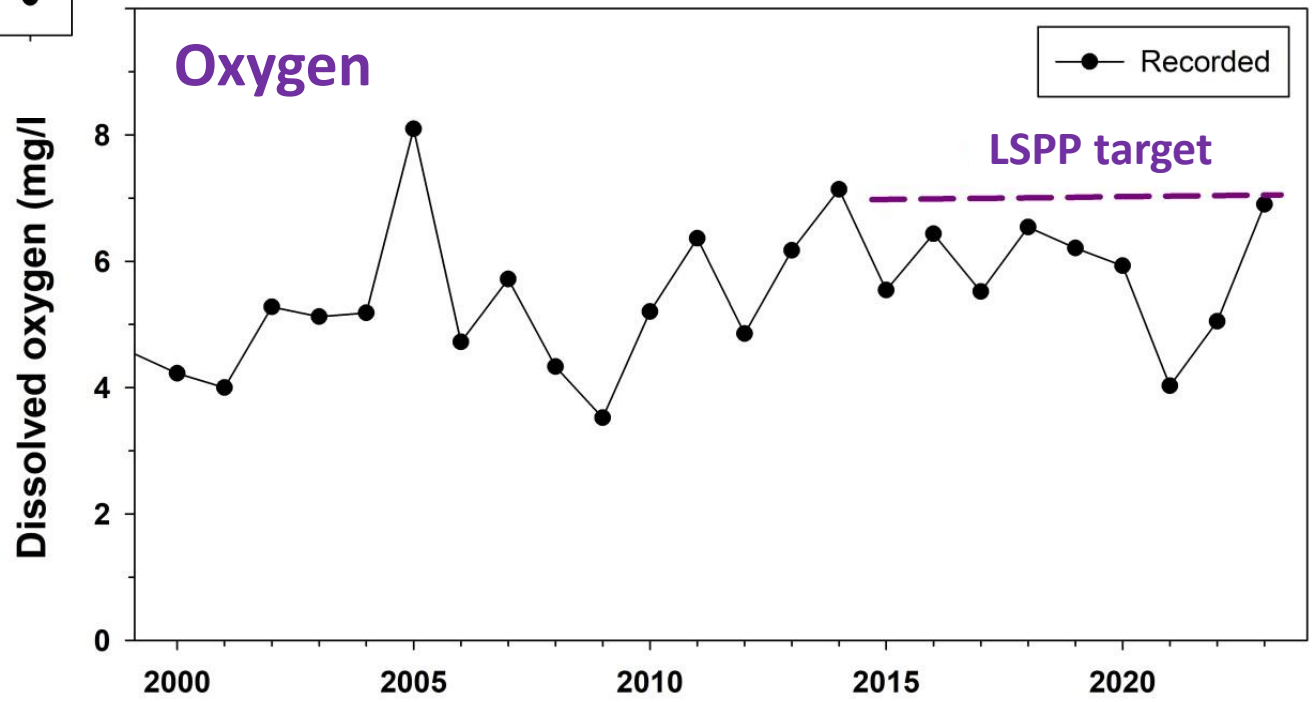


Hydrological year (June 1 → May 31)

Higher tributary flows
=
Higher loads

In-Lake Nutrients and Oxygen





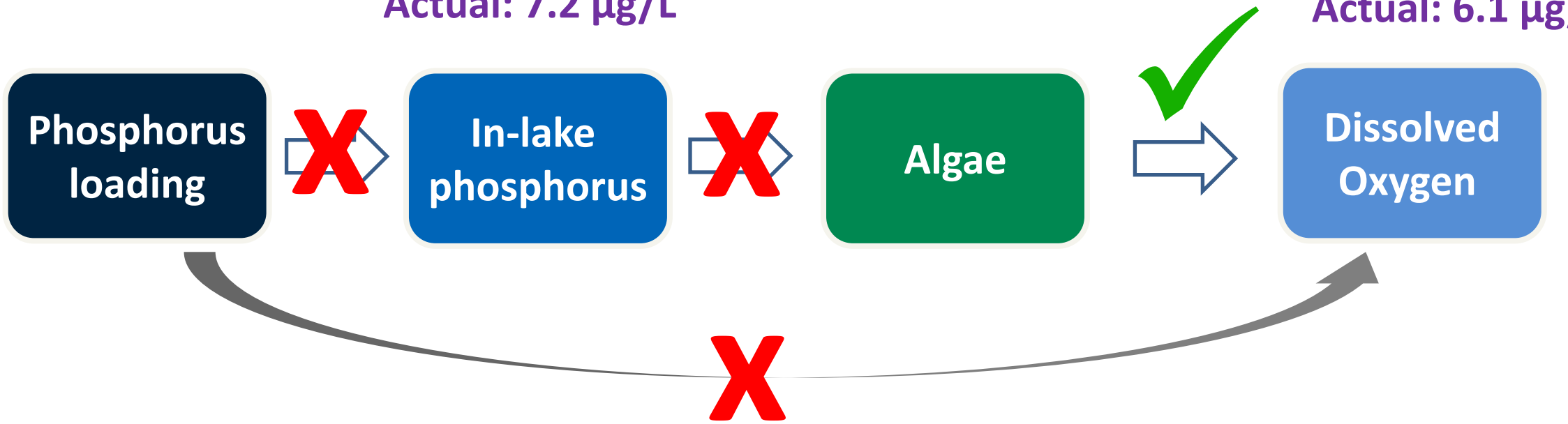
Data: LSRCA, MECP

LSPP: 44 tonnes **10 µg/L** **7 mg/L**

2016-2020 average:

90.7 tonnes **Predicted: 29 µg/L** **Predicted: 4.0 mg/L**

Actual: 7.2 µg/L **Actual: 6.1 µg/L**



Nutrient “decoupling”

1: Changing supply

- Too much water
- Too fast
- Wrong time of year

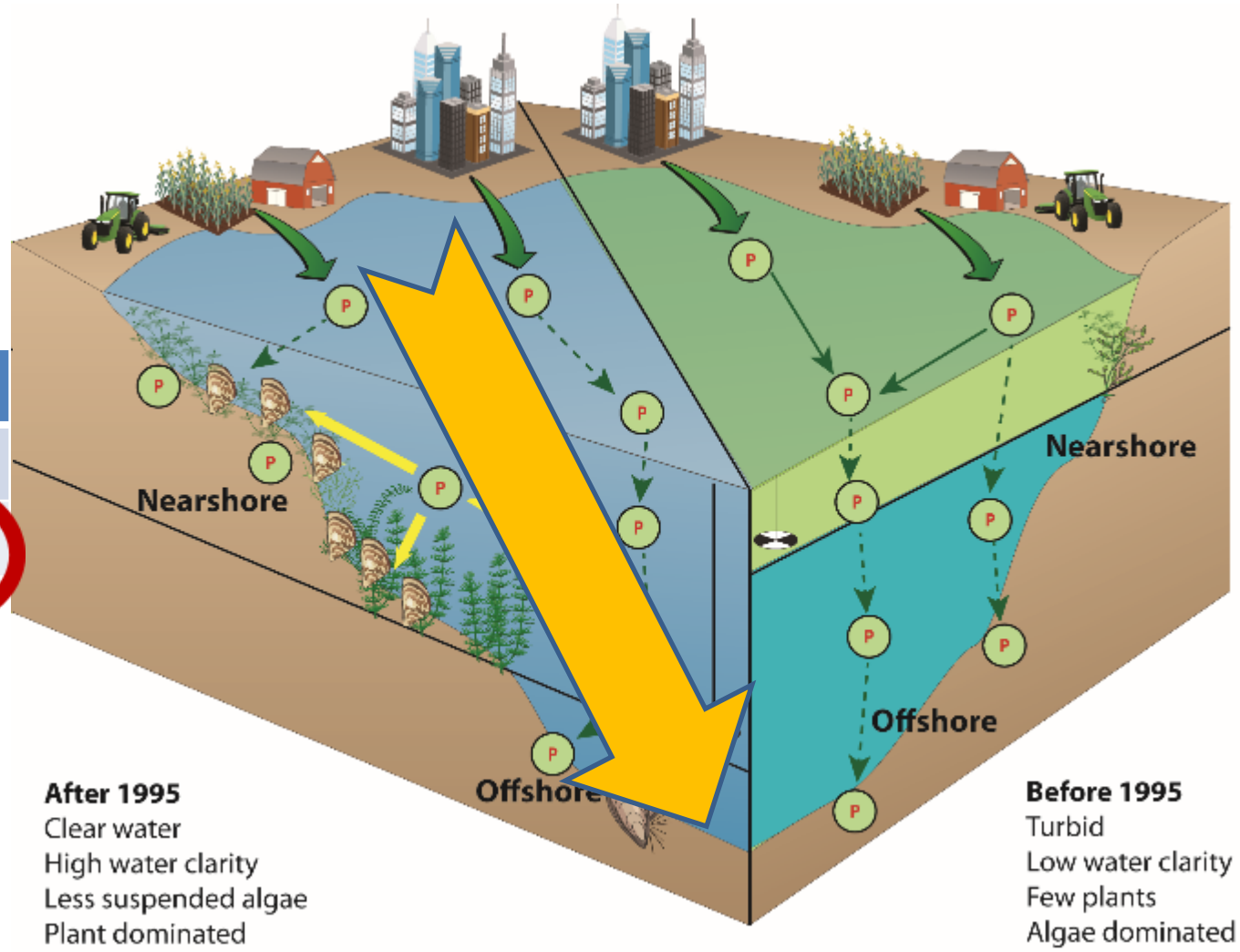
- High flows = high loads

Nutrient "decoupling"

2: Changing in-lake use

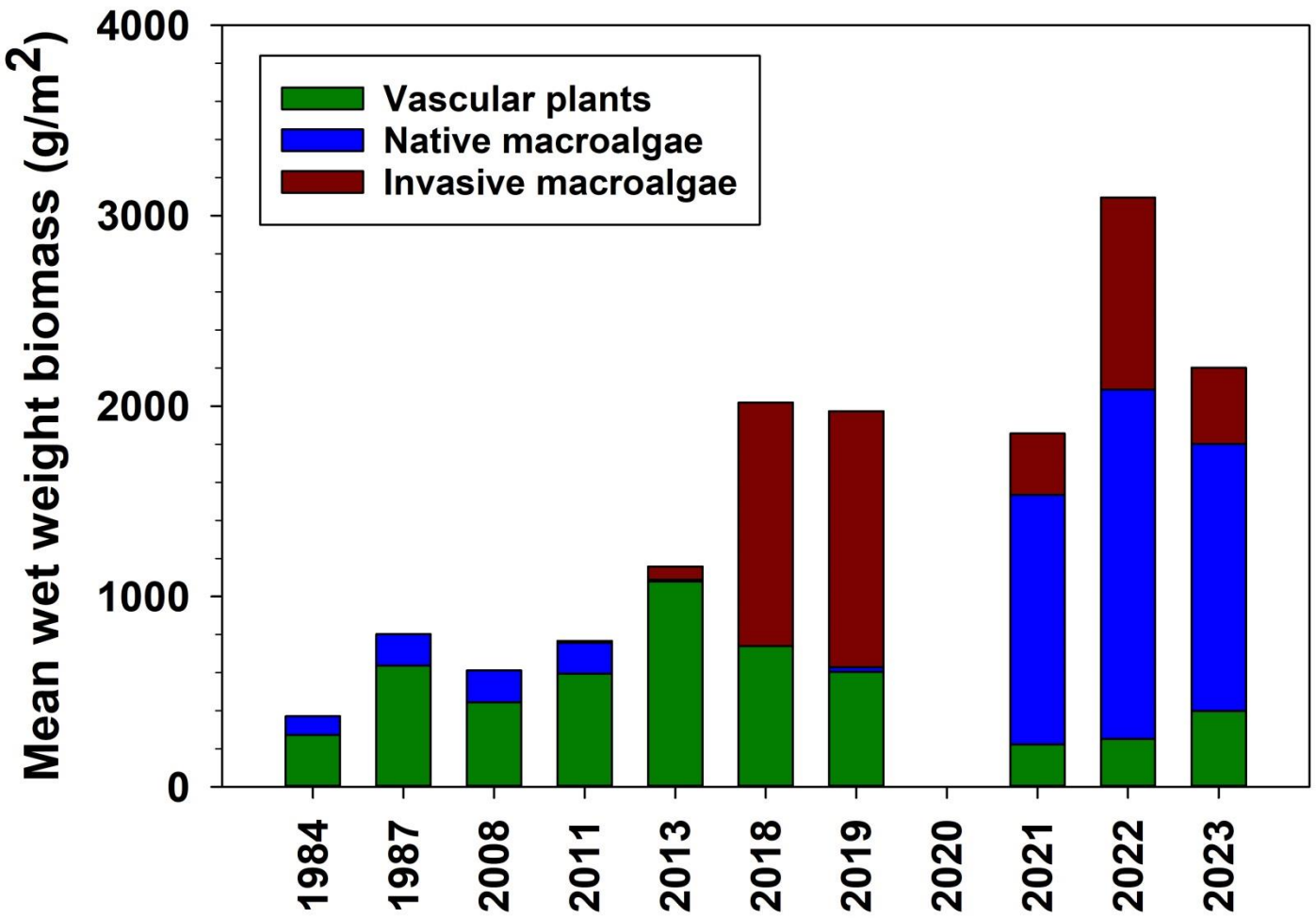
Filtering rate	2009	2015	2023
Shallow (billions L/h)	126.5	169.0	130.6
Deep (billions L/h)	3.5	9.2	20.9

8360 Olympic swimming pools per hour!



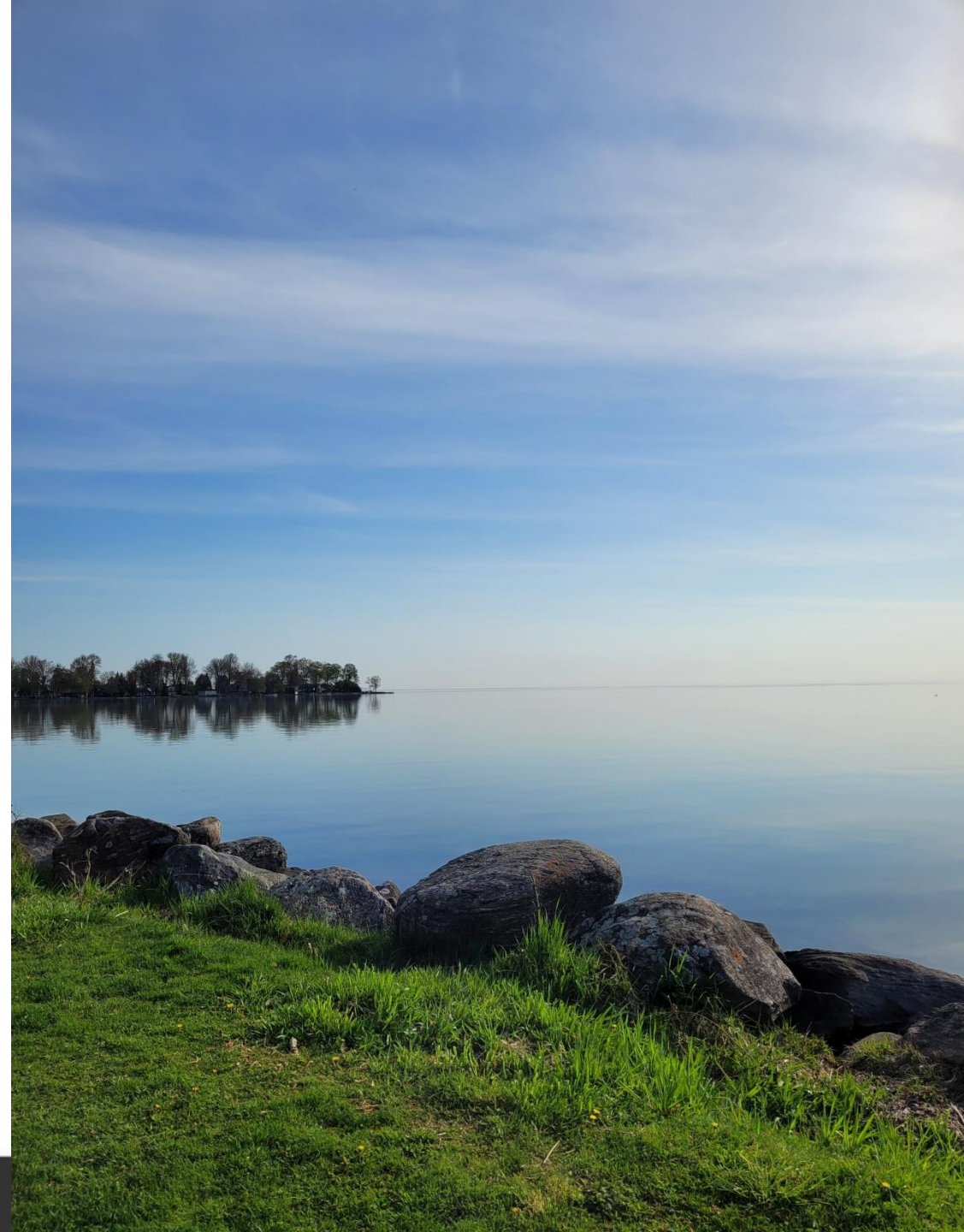
Nutrient "decoupling"

3: Freshwater seaweeds replacing plants

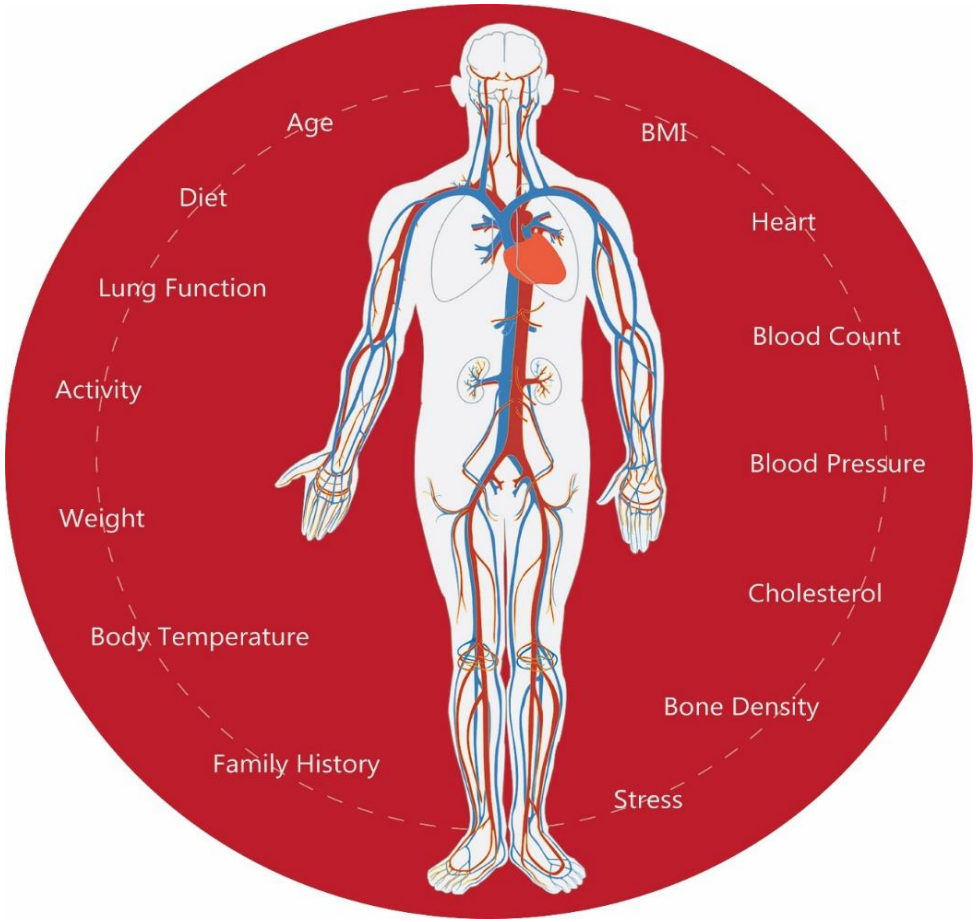


Adaptive lake management

- Science-based, monitor and evaluate
- Problems now will not be the same in 10 years
- Lake Simcoe is not the same as it was in 2009
- Effective lake management requires a holistic and adaptive approach



Assessing health requires a holistic approach



Our Health

Lake Health

How can I help?

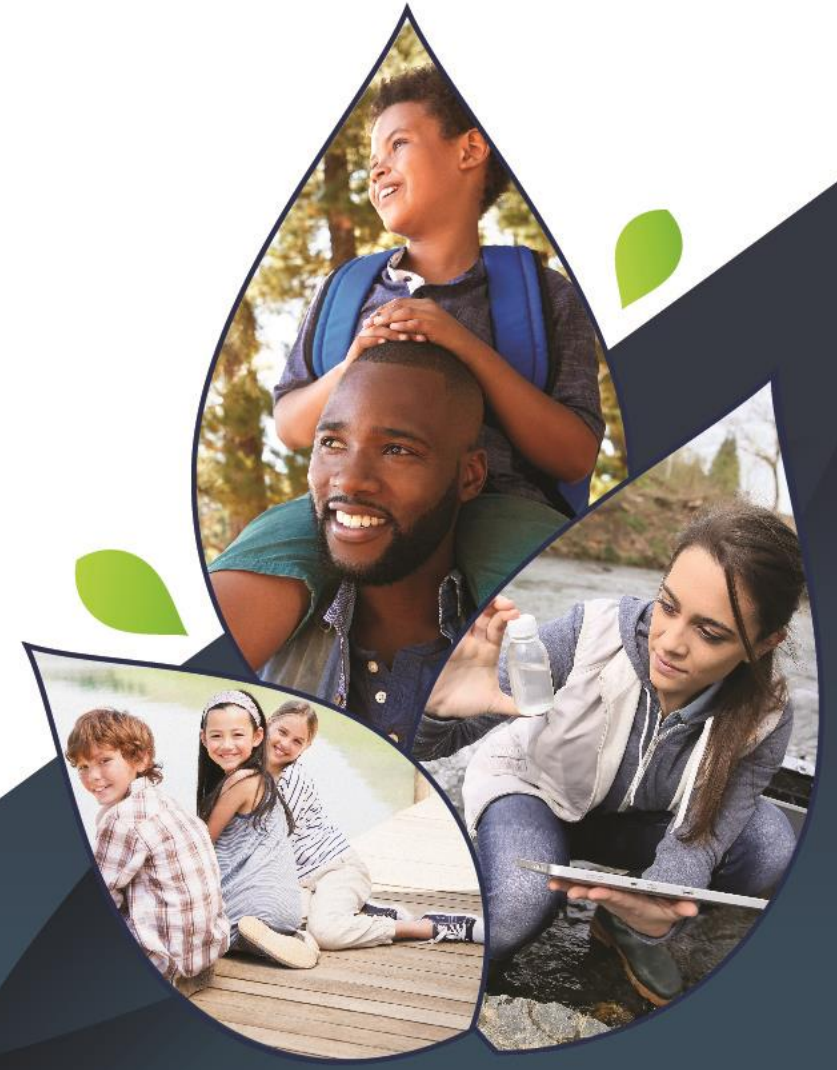
- Maintain septic systems
- Garden with native plants, use compost, or phosphorus-free fertilizer

- Stabilize shorelines
- Respect “no wake” zones

- Clean, Drain, Dry your boat when trailering between lakes
  - **Mussels survive 7 days out of water**
  - **Larvae: 30 days in a wet bilge**

- Don’t dump bait / buy local bait
- Use environmentally friendly cleaning products
- Keep engines well maintained

Thank You



Lake Simcoe Region
conservation authority