Update on Conditions on Farlain Lake

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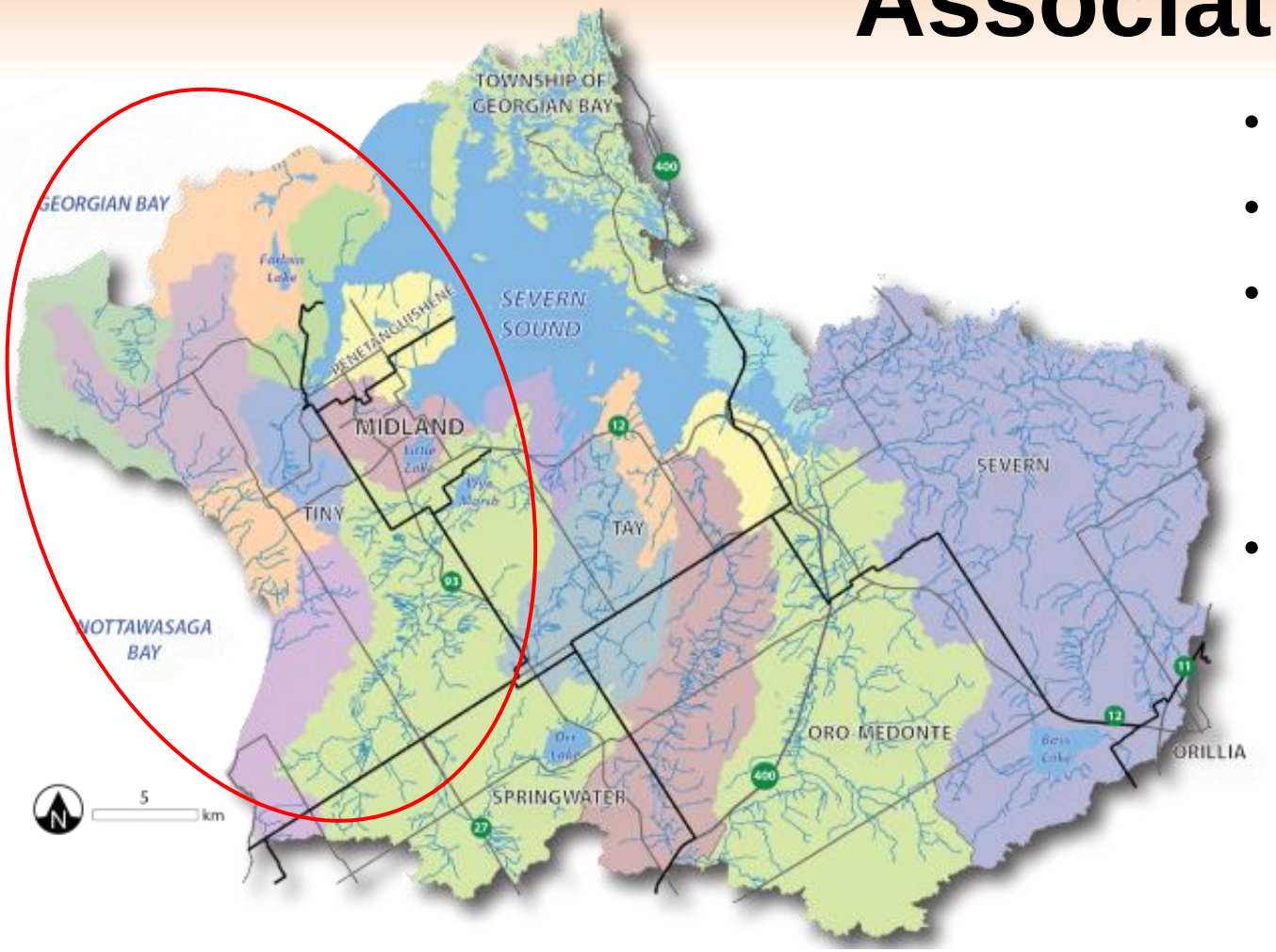
Outline

- Who is SSEA?
- Characteristics of Farlain Lake
- Water level update
- Blue-green algae update
- Algae causation study update and results so far
- Causes and prevention of blooms
- Q&A

What is the Severn Sound Environmental Association?



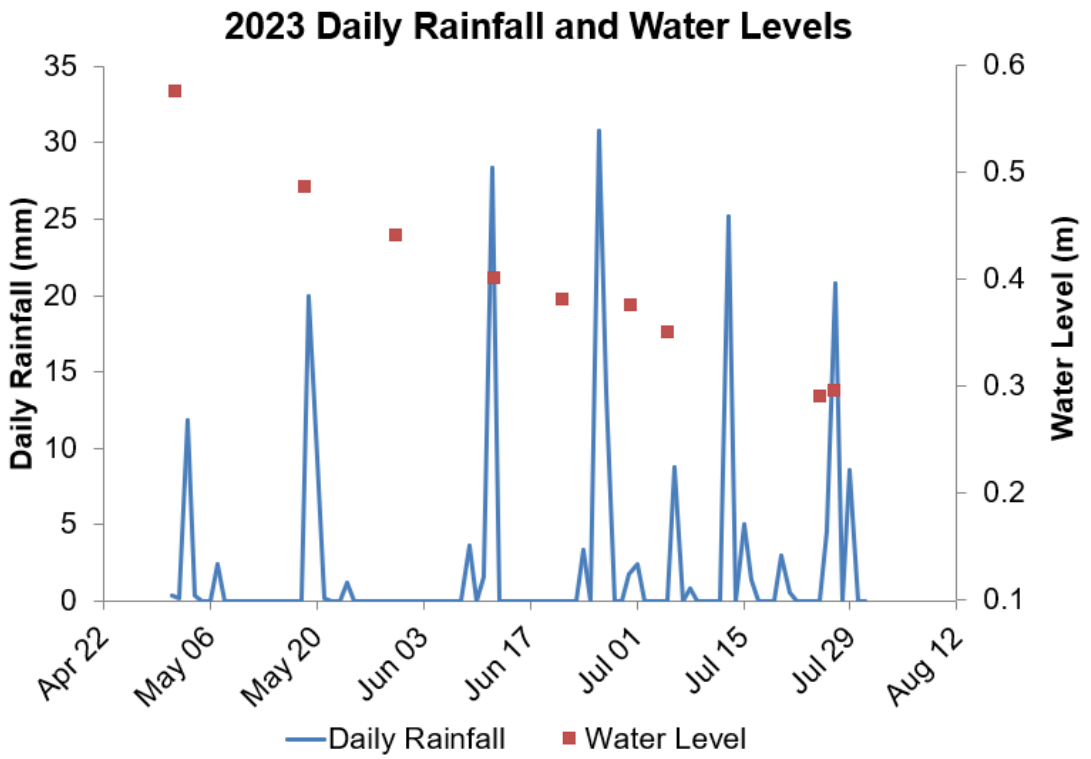
- Watershed based organization
- Tiny Twp. – founding member of SSEA in 1987
- 2009 – Joint Municipal Service Board *(Municipal Act s.202)*
  - *ED reports to Board representing 8 Municipal members*
- Source Protection Authority legally defined under Ontario *Clean Water Act*, 2006

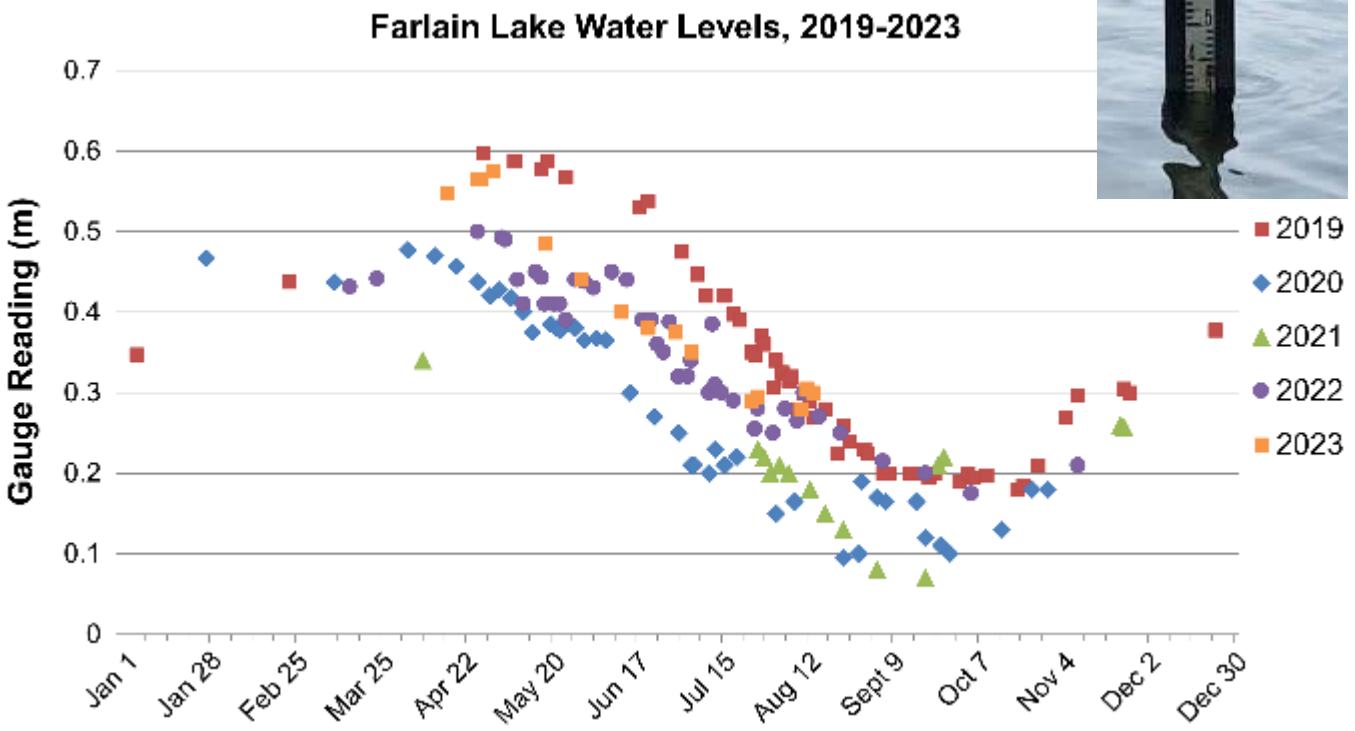
Mission: *"…we are committed to ensuring exceptional environmental quality and exemplary stewardship of the Severn Sound area through sound science, collaboration and partnerships"*

Farlain Lake Characteristics

- Small, shallow lake
- No surface outlet, fed by groundwater and precipitation (seepage)
- Lies within Simcoe uplands formation
- Watershed bedrock geology is 100% limestone
- Shoreline development is a mix of permanent and seasonal residents
- Cooks Lake Municipal Water System located on west side of lake – municipal groundwater drawn from the west

Water Level Update





- Residents encouraged to make their shorelines more resilient to high water and erosion, and capture rainfall and promote slow infiltration of precipitation into the ground where possible
- Adopt a no-wake-near-shore practice to minimize erosion (10 km/hr within 30 m of shore)

What is Algae?

Algae → Microscopic, single-celled plants

- Ancient and highly diverse life form
- Forms the base of aquatic food webs, produces oxygen
- Five major groups in freshwaters:
  - Green algae, diatoms, red algae, dinoflagellates, golden algae, and blue-green algae

Blue-Green Algae → aka Cyanobacteria

- A kind of bacteria that can photosynthesize
- Can live suspended in water (phytoplankton) or on the lakebed (benthic), then move up to the surface
- Some blue-green species can produce toxins
- Toxin production is difficult to predict – not all blooms contain toxins but best to assume toxins present until testing shows otherwise

How to Identify Green Algae

Non-toxic!

Algae can take many different forms:

- Free floating or surface slick (single cells and colonies)
- Attached or mat forming (filaments and colonies)
- Macro algae (plant-like)

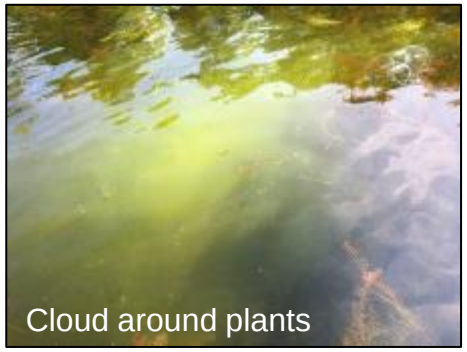
Visual clues:

- Dark to yellowish green colour depending on type and age
- Stringy or woolly, mat-like
- Cloudy-like, often around aquatic plants
- Bubbles embedded in thick mats
- Stringy ring around rocks


Filaments on rocks


Filaments on rocks


Cloud around plants


Cloud around plants


Ring around rocks


Floating mat

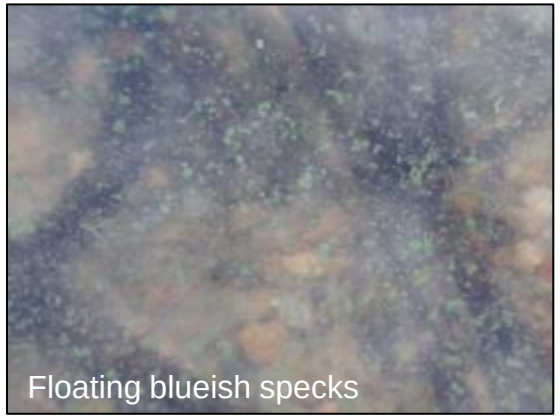
How to Identify Blue-Green Algae

Can produce toxins!

Visual clues:

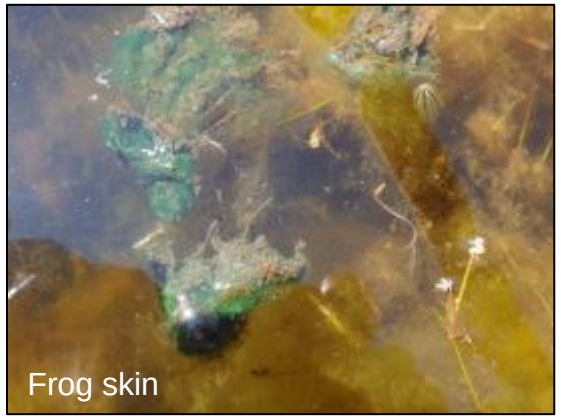
- Bright blueish green colour, but can be yellow, olive-green or red
- Paint-like surface slick
- Floating specks that are distributed throughout the water
- Fingernail clippings
- Peas
- Frog skin
- Can have strong odour


Fingernail clippings


Floating blueish specks


Surface Slick

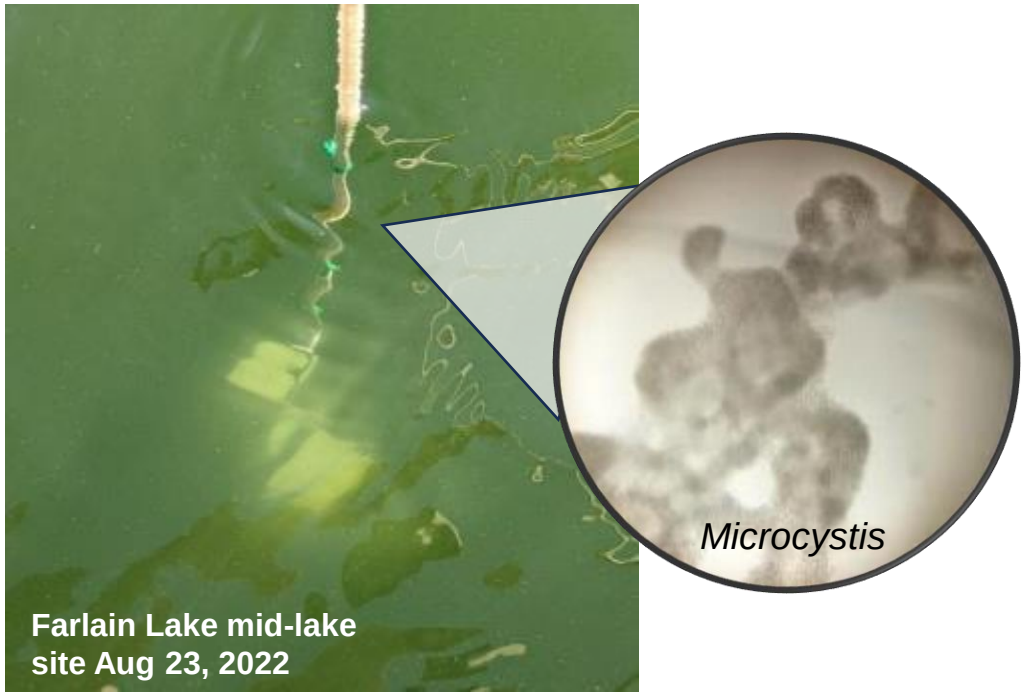

Floating peas


Frog skin


Surface Slick

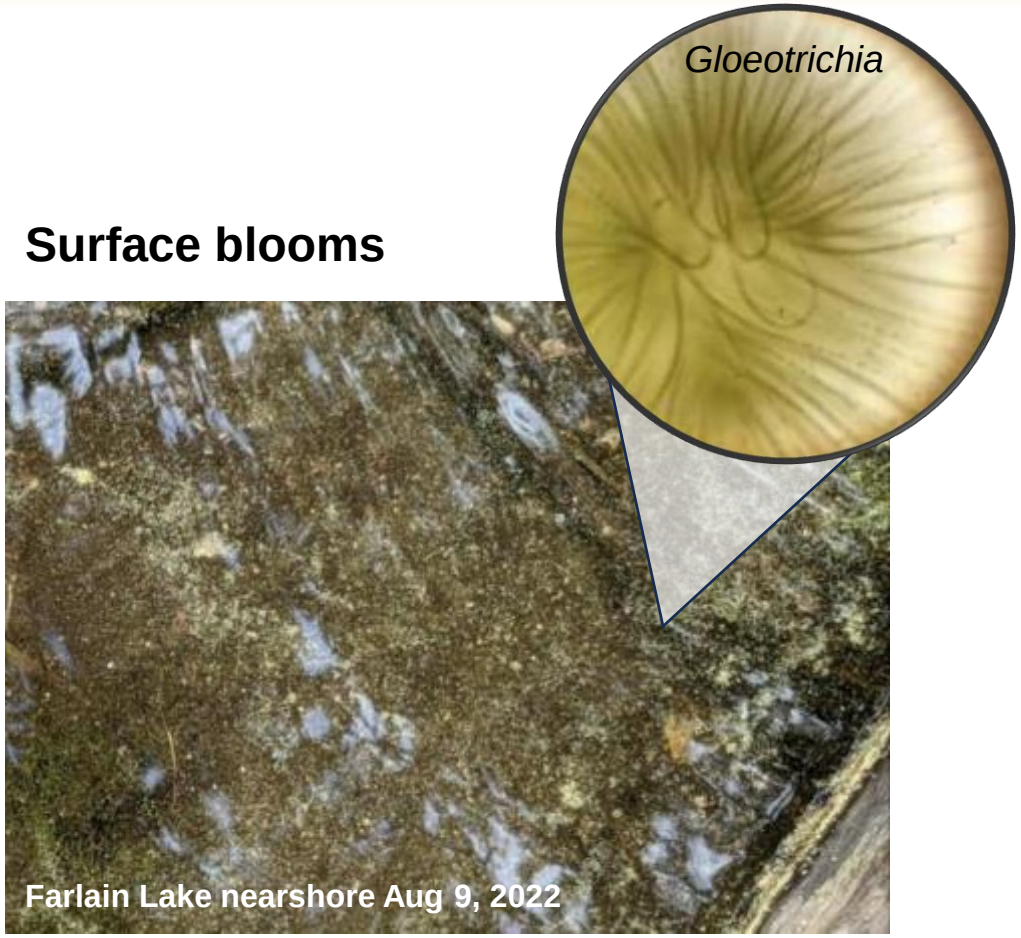
Appearance of Blue-Green Algal Blooms

Blooms mixed in water column



- Blooms mixed throughout the water column more difficult to visually identify
- Water can look cloudy and greenish, or greenish with larger specks that may look white, yellow or blueish-green

Surface blooms



- Surface blooms can take different forms e.g., spilled paint, fingernail clippings, green peas.

What Should I Do If I Spot Blue-Green Algae?

If you suspect a blue-green algae bloom:

- Be cautious and assume toxins are present and avoid all exposure including: using, drinking, bathing or swimming in the water, and restrict pet and livestock access to the water
- Contact the Ministry of Environment Conservation and Parks (MECP) Spills Action Centre. Incidents can be reported online (https://report-pollution.ene.gov.on.ca/) or by phone 1-866-MOE-TIPS (TTY:1-855-889-5775)
- Contact the Simcoe Muskoka District Health Unit (SMDHU) for information on health risks

Note: Boiling or chlorinating water does not get rid of toxins

When a Water Quality Advisory is Issued and Why

- A Water Quality Advisory will be issued by the Health Unit if bacteria levels at public beaches are elevated, or an algae bloom is identified to be a public health risk
- Whole lake or just a small section depending on severity
- Check local advisories and active blooms listed on the SMDHU website https://www.simcoemuskokahealth.org/Topics/SafeWater/bluegreenalgae_copy1.aspx

Causes of Blue-Green Algal Blooms

Factors that can increase the likelihood of bloom formation:

- History of excess nutrients and algal blooms
- Natural features that make some water bodies more prone to algal blooms than others
- Set of unique environmental conditions:
  - Pulse of nutrients (phosphorus and nitrogen)
  - Warmer temperatures, abundant light, calm wind conditions
- Increasing water temperatures and shortening of the ice cover period due to climate change

Causes of Blue-Green Algal Blooms

- Phosphorus and nitrogen are key nutrients for algae production
- Increased concentrations of nutrients → increased algal production, increased risk of a bloom forming
- This process of nutrient enrichment is called **eutrophication**, which can be exacerbated by human influences:
  - Agricultural and stormwater runoff
  - Poorly functioning septic systems
  - Shoreline development

Blue-green bloom, MacLean Lake 2019

Farlain Lake Algae Causation Study

Goal: To determine contributing factors that led to last year's blue-green algae bloom

Key components:

- Citizen Science Algae Monitoring Program to collect water samples and monitor conditions
- Testing and analyzing samples at SSEA office using fluorometers
- Analyzing historical climate and water quality data to determine cause of blooms
- Developing educational materials and presenting our findings to the Farlain Lake community and beyond

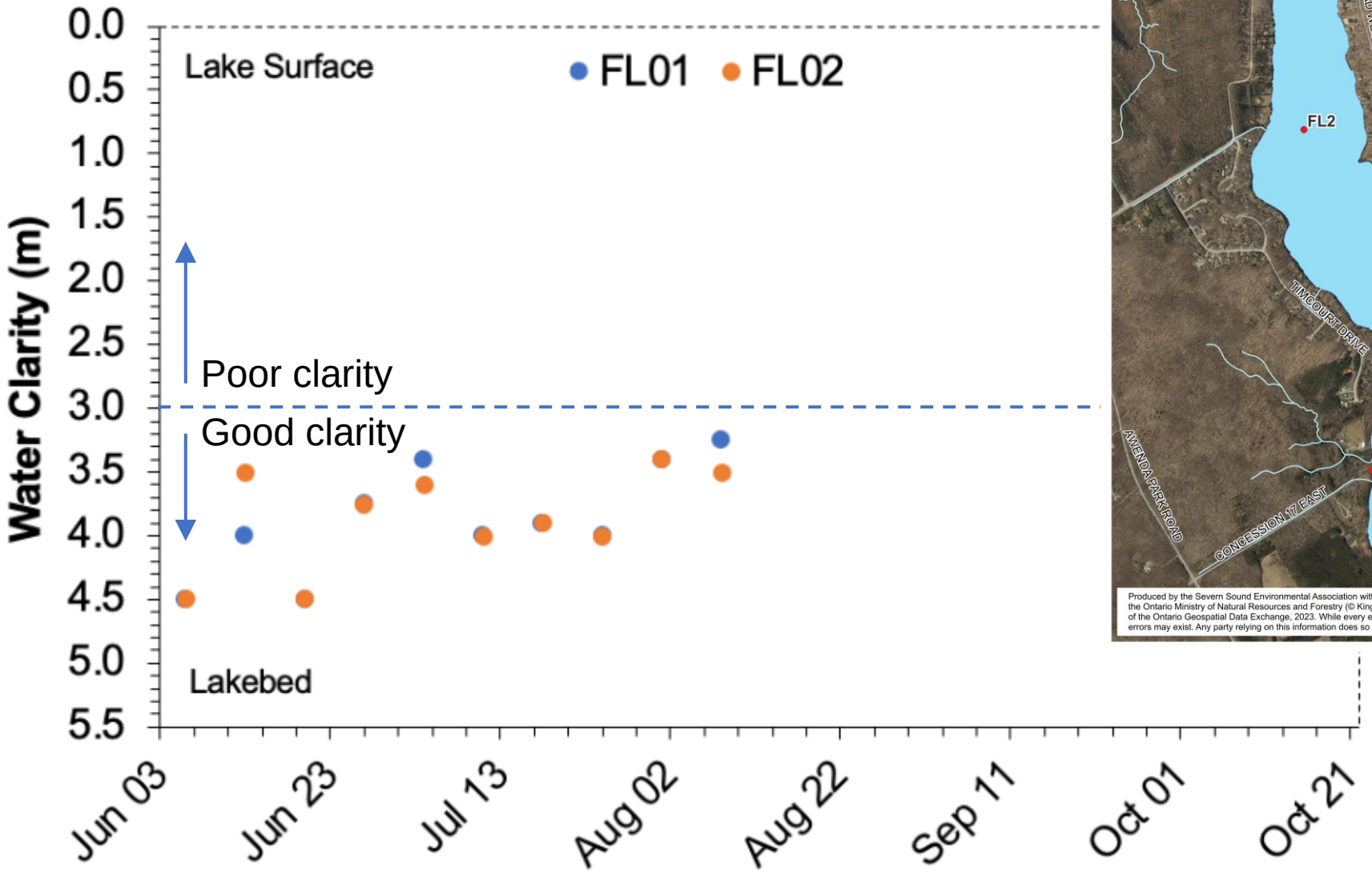
Farlain Lake Algae Causation Study

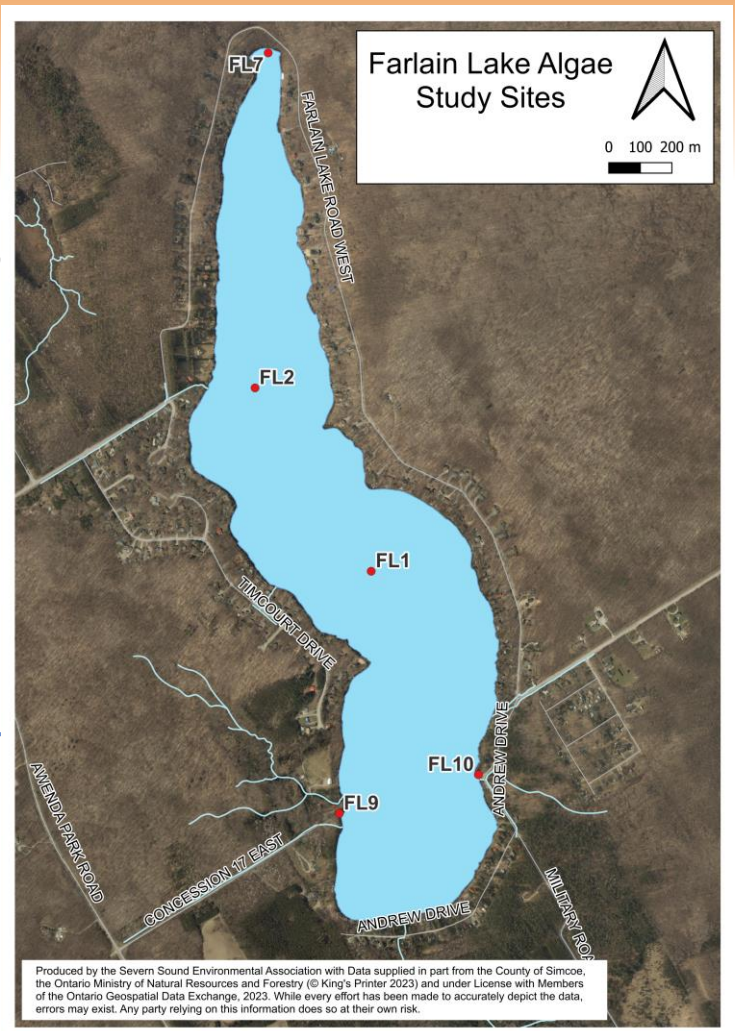
Testing and analyzing samples at SSEA office using fluorometers:

- Chlorophyll-*a* – green pigment found in all algae
- Phycocyanin – pigment primarily found in blue-green algae

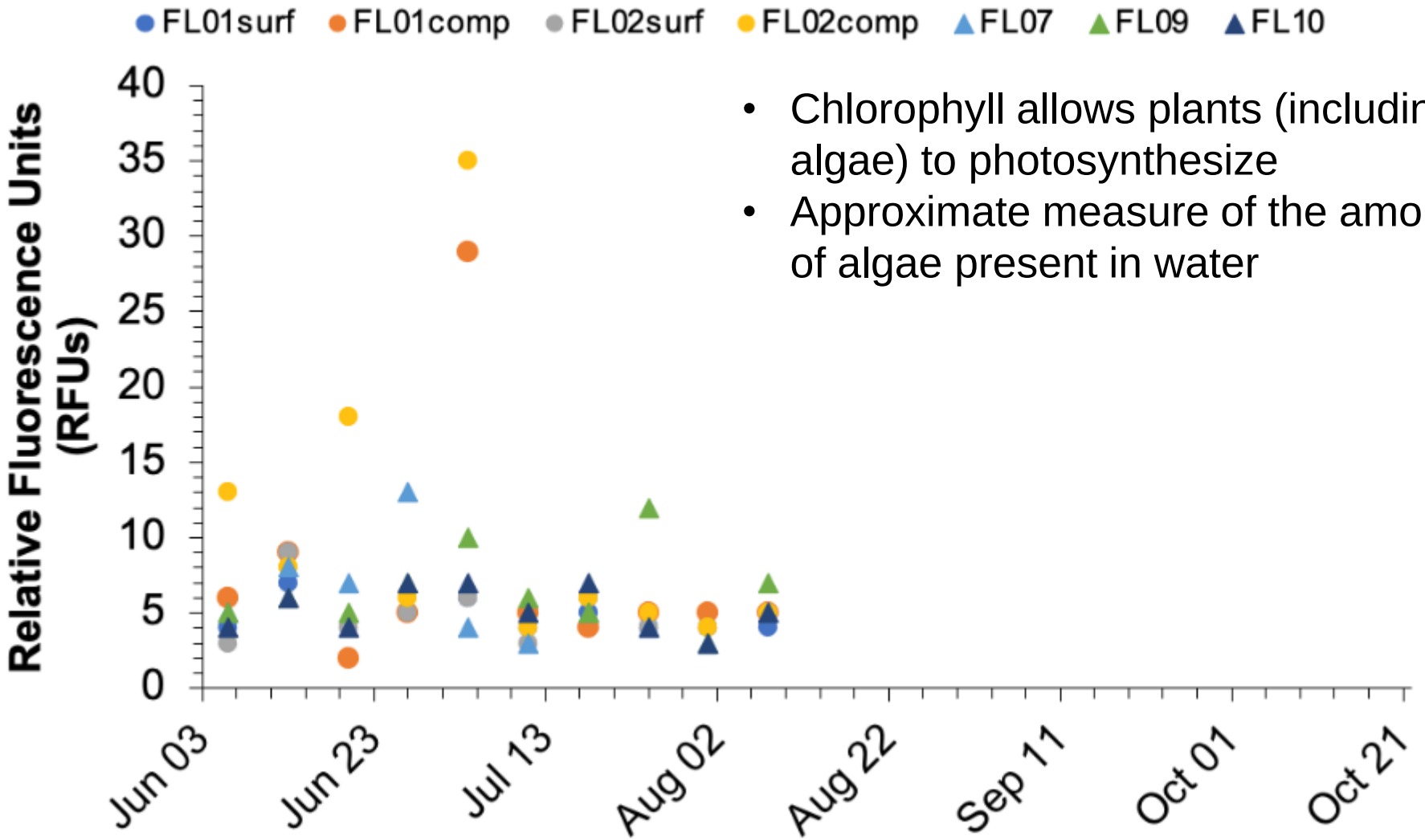
- Ratio of two pigments can be used to determine when blue-green algae are in a bloom state
- Baseline conditions and levels of blue-green algae in near real-time
- Provides key information to the Farlain Lake Community, MECP, and SMDHU

Water Clarity



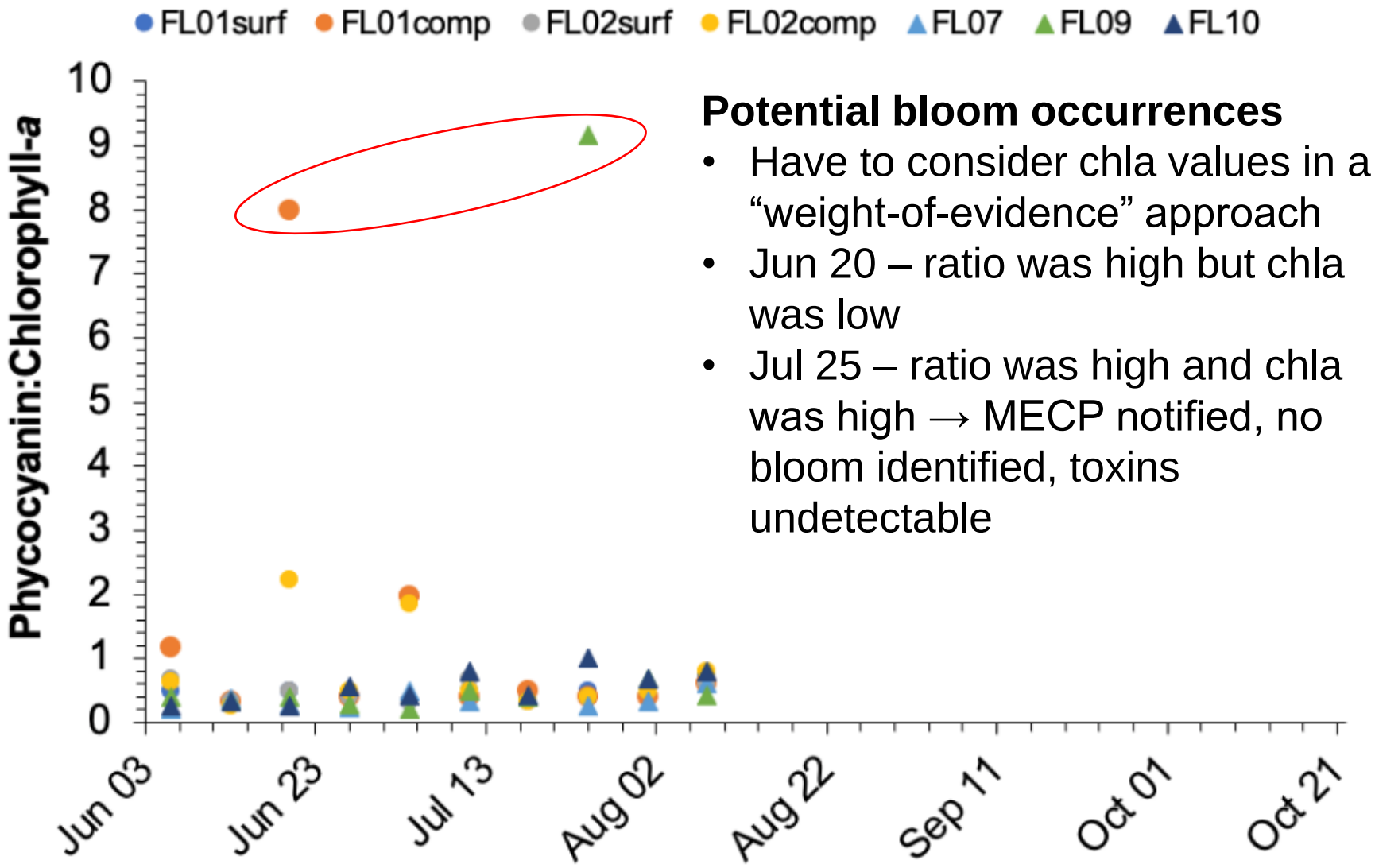


Chlorophyll-*a*



- Chlorophyll allows plants (including algae) to photosynthesize
- Approximate measure of the amount of algae present in water

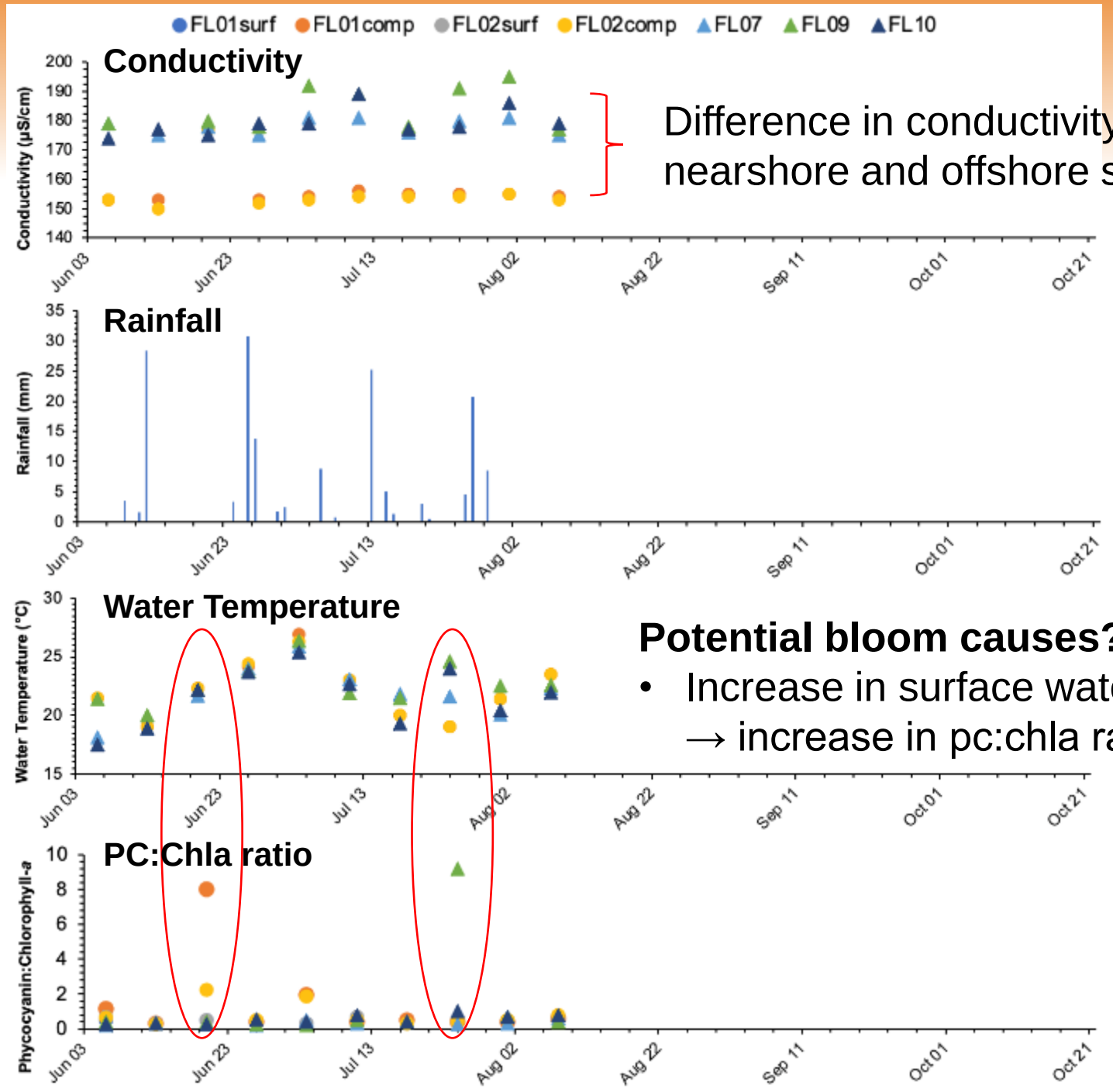
Ratio of Phycocyanin to Chlorophyll-*a*



Potential bloom occurrences

- Have to consider chla values in a "weight-of-evidence" approach
- Jun 20 – ratio was high but chla was low
- Jul 25 – ratio was high and chla was high → MECP notified, no bloom identified, toxins undetectable

Impact of Environmental Factors on Bloom Indicator



Difference in conductivity from nearshore and offshore sites

Potential bloom causes?

- Increase in surface water temperatures → increase in pc:chla ratio

What Can We Do To Prevent Blooms?

Take these simple steps to prevent the growth of blue-green algae:

- Phosphorus is the key nutrient controlling growth – limiting nutrient inputs will help to control blooms
- Avoid using fertilizers on lawns, especially within 100 m of the shoreline
- Maintain a natural shoreline (wide buffer of native plants – not turfgrass) on lakefront properties
- Reduce runoff by planting or maintaining vegetation in vulnerable sloped areas and minimize the amount of impervious surfaces (paved areas)

What Can We Do To Prevent Blooms?

Example of naturalized shorelines:

Before (2004)

After (2023)

Veterans Waterfront Park, Midland

What Can We Do To Prevent Blooms?

- Maintain your septic system with regular pump-outs/ inspections and avoid chemicals that will kill beneficial bacteria in the system (bleach, antibacterial products)
- Reduce septic output by using efficient water fixtures and minimizing water use
- Use phosphate-free detergents, personal care and household cleaning products, and NEVER directly in the lake
- Do not restrict water circulation around docks
- Take care to avoid transporting invasive species in/out of the lake

Poor water circulation around these docks created the perfect conditions for filamentous green algae

Retaining Walls

- Temporary solution to erosion → can result in more damage to downstream/neighbouring properties and the shoreline
- Interferes with fish habitat, natural shoreline processes including movement of sand, and currents, and doesn't allow for natural shorelines that take up nutrients
- Impact of wave action on retaining walls, in combination with surface water runoff, leads to slumping, eroding gullies, undercutting, and eventual failure of the wall

Example of a hardened shoreline

Alternatives to Retaining Walls

- A heavily vegetated buffer zone is a more resilient and cost-effective way to protect against high water levels and storm surges
- An ideal shoreline buffer is a strip of native wildflowers, trees, and shrubs and grasses at least 30 m wide from the waterline
- Maintaining a gentle slope into the water allows wave energy to dissipate
- Combine native shrubs with a sloped rock shore wall to get the best of both options –helps filter runoff and reduce erosion, and protect your shoreline
- Great info from past Shoreline & Shallows Conferences: https://www.shorelinepartnership.org/shoreline--shallows-conference.html

Example of a natural shoreline

Resources for Landowners

Shoreline Guides

- www.severnsound.ca/programs-projects/public-involvement-and-stewardship-2/natural-shorelines
- www.gbbr.ca/conservation-guides/
- www.lakehuron.ca/stewardship-plans-and-guides
- https://foca.on.ca/shorelines-stewardship/
- https://watersheds.ca/our-work/resources/publications/

Using and Sourcing Native Plants

- www.severnsound.ca/programs-projects/wildlife-habitat-2/pollinators/
- www.ontarioinvasiveplants.ca/resources/grow-me-instead/
- www.thelandbetween.ca/shoreline-plant-guides/
- http://loveyourlake.ca/natural-shoreline/
- http://nanps.org/commercial-growers/
- www.haliburtonmastergardener.ca/resource/aquatic-plants-of-the-near-shoreline-and-wetlands/

Septic Maintenance Tips

- https://foca.on.ca/septic-systems/

Thank You to Our Partners!

Special thanks to Tiny Township:

and

Thank You for Listening!
Any Questions?

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