

The background features abstract, overlapping geometric shapes in various shades of green, ranging from light lime to dark forest green. These shapes are primarily located on the left and right sides of the slide, framing the central white area where the text is placed.

Using Citizen Science to Tackle a Blue Green Algae Problem in Long Lake

Laura Risser

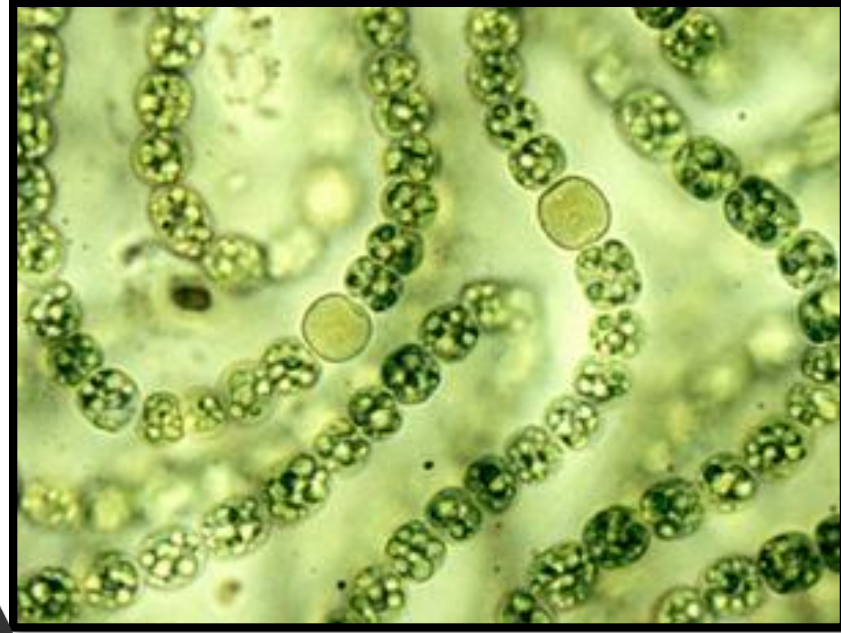
Overview

- ▶ What is Blue Green Algae?
- ▶ Why should we care?
- ▶ Long Lake's Problem
- ▶ Citizen Science
 - ▶ What was our goal?

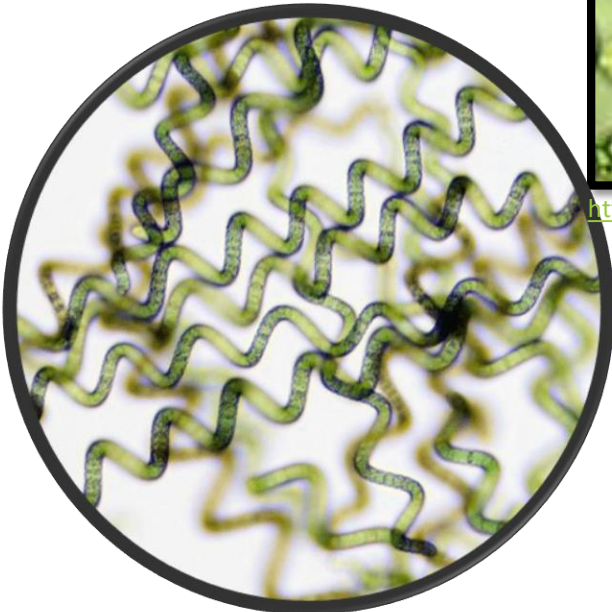


What is Blue Green Algae?

- ▶ Cyanobacteria
- ▶ Photosynthesis evolution
 - ▶ Aerobic respiration
- ▶ May produce toxins
 - ▶ Ex: Microcystin



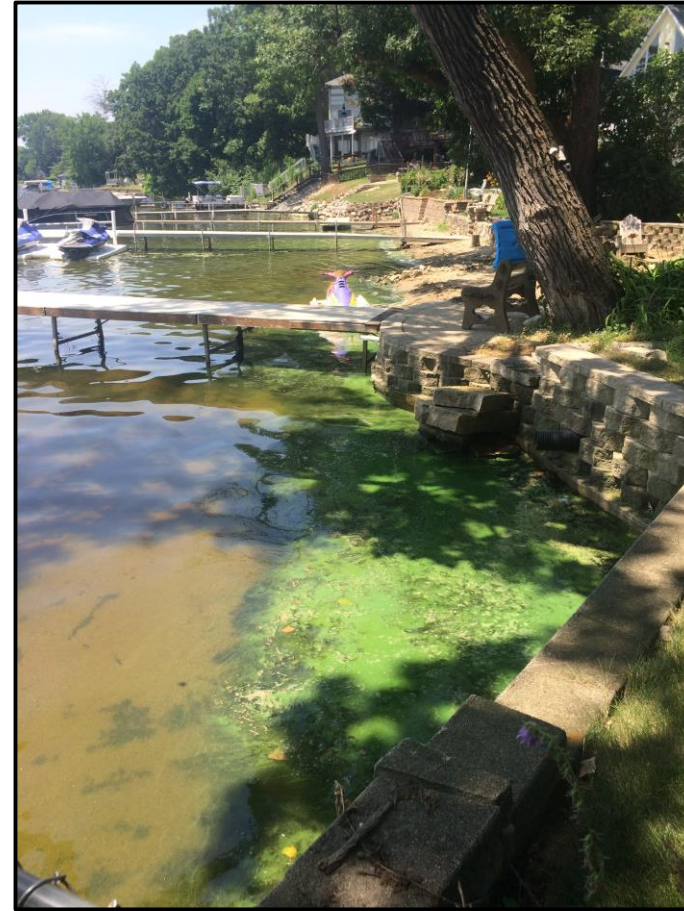
https://microbewiki.kenyon.edu/index.php/Cyanobacteria_and_Cyanotoxins



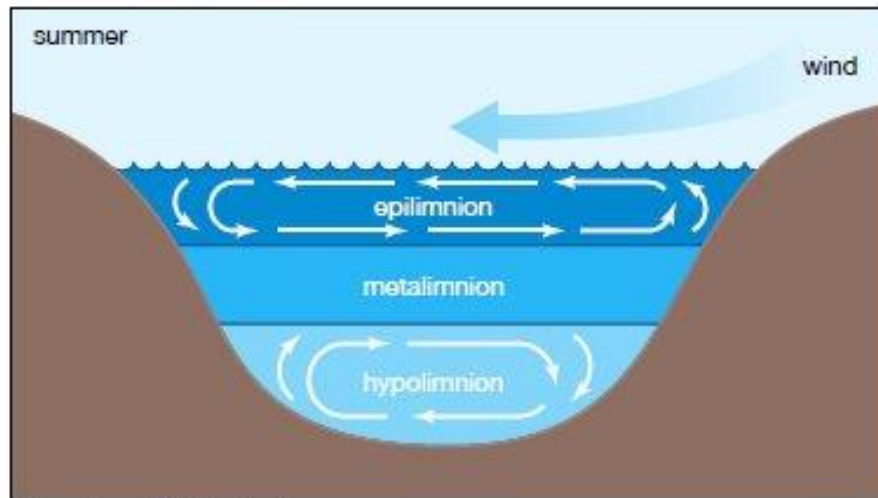
<https://www.freshspirulina.com.au/spirulina/spirulina-under-the-microscope/>

What is Blue Green Algae?

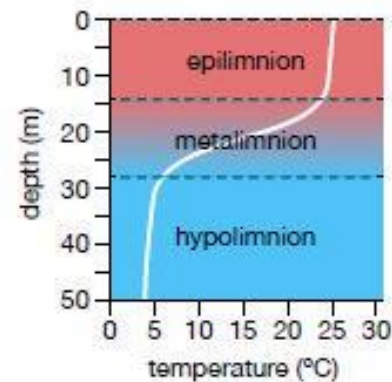
- ▶ Harmful Algae Blooms (HAB)
 - ▶ Weather
 - ▶ Nutrient concentration
 - ▶ Lake characteristics
- ▶ Stratification
 - ▶ Turnover events = internal loading

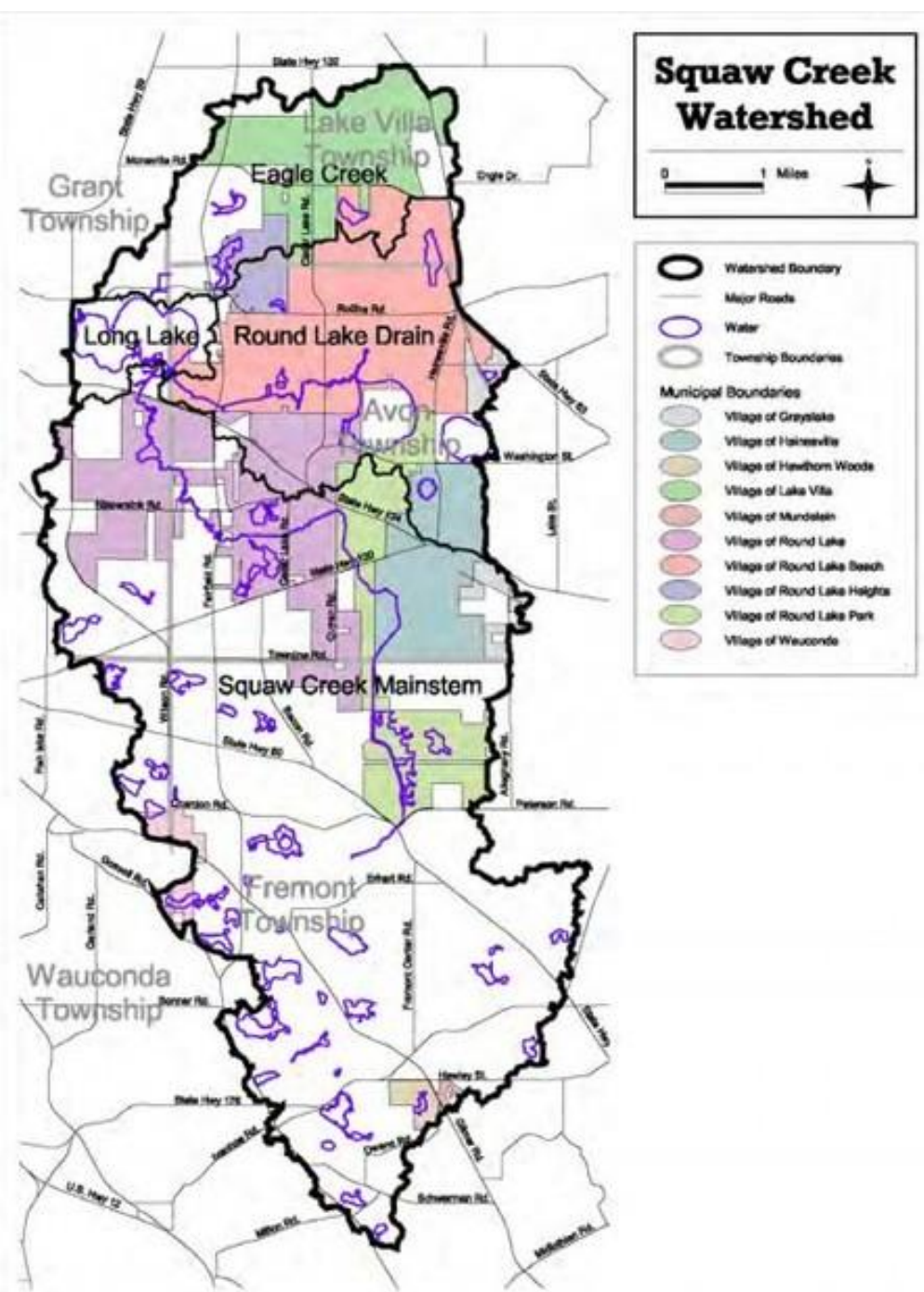


Lake stratification



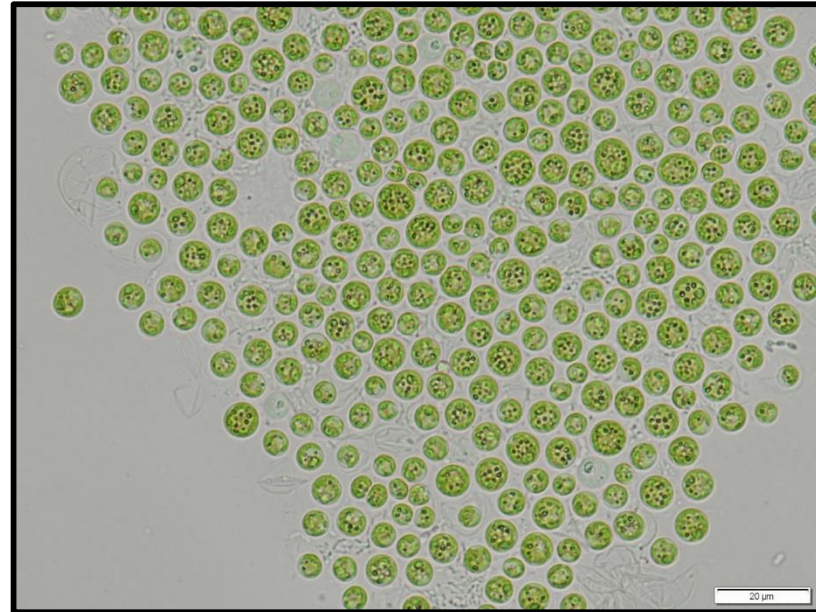
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Long Lake's Problem

- ▶ Historical monitoring
 - ▶ Lake County Health Department 1982
 - ▶ Baxter Health Care 2001
 - ▶ Lake County Stormwater Commission 2004
- ▶ 2015 HAB ~20,000 ug/L microcystin
- ▶ Public health concern



<http://romaniacyanobacteria.blogspot.com/2014/04/microcystis-aeruginosa.html>

Long Lake's Problem

- ▶ Phosphorus is limiting nutrient
- ▶ Where is the phosphorus coming from?
 - ▶ Internal vs. External loading
- ▶ How can we mitigate the problem?
- ▶ What is the Total Maximum Daily Load (TMDL)?

Citizen Science

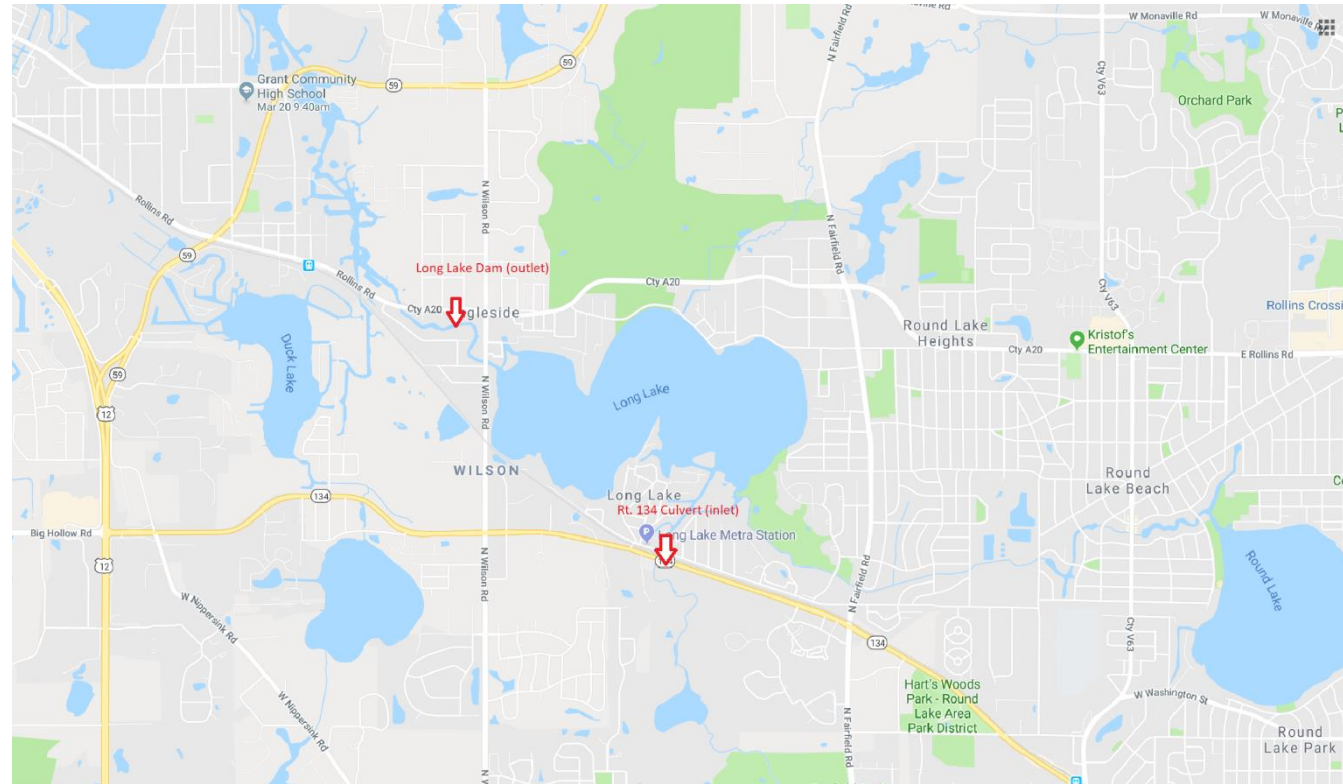
- ▶ Squaw Creek Clean Water Alliance (SCCWA)
- ▶ 6 month monitoring study- PDC Laboratories
 - ▶ TSS
 - ▶ Ortho-phosphorus
 - ▶ Total phosphorus
 - ▶ Ammonia
 - ▶ Nitrate
 - ▶ Turbidity



Photo by Gloria Charland

Study Design

- ▶ Weekly sampling (4/15/18 - 10/14/18)
- ▶ Inlet
 - ▶ Rt. 134 culverts
 - ▶ Mud Lake
- ▶ Outlet
 - ▶ Long Lake Dam
- ▶ Flow rate
- ▶ Temperature
- ▶ Weather Data



Google maps

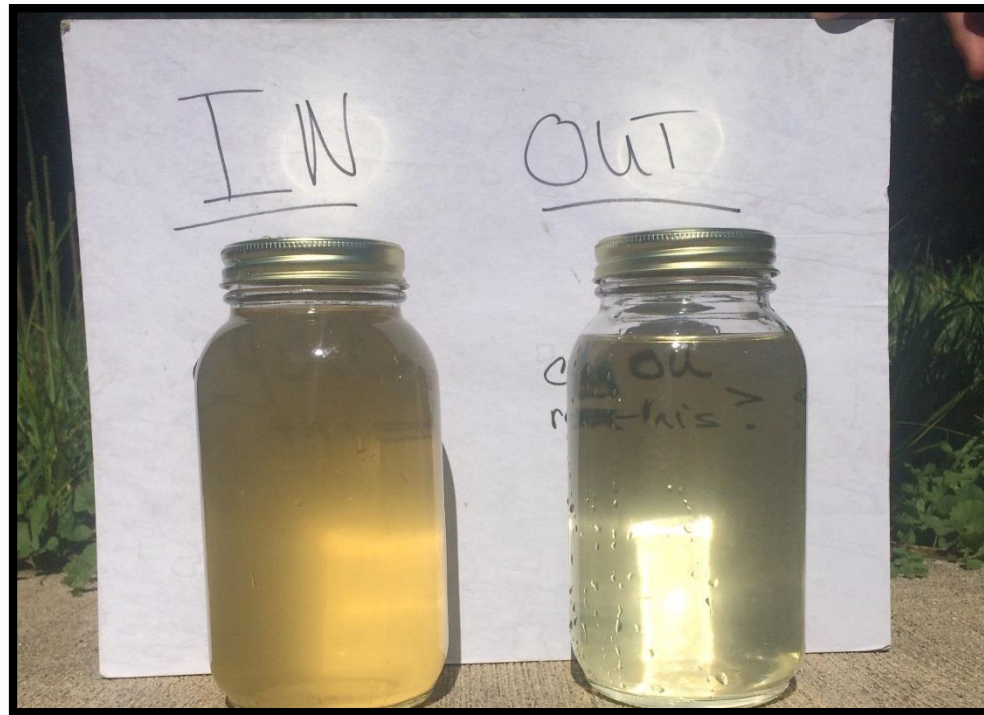
Methods

- ▶ Flow Monitors from Hey & Associates
- ▶ Lake level monitoring
- ▶ Flow rate monitoring

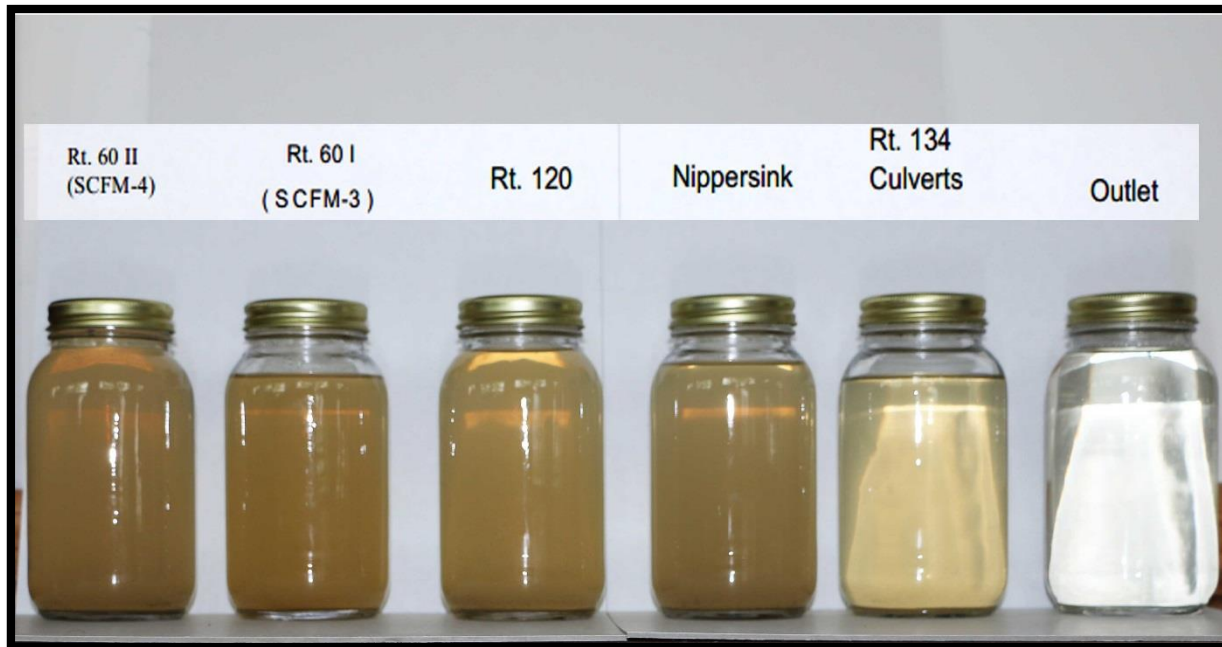


Results

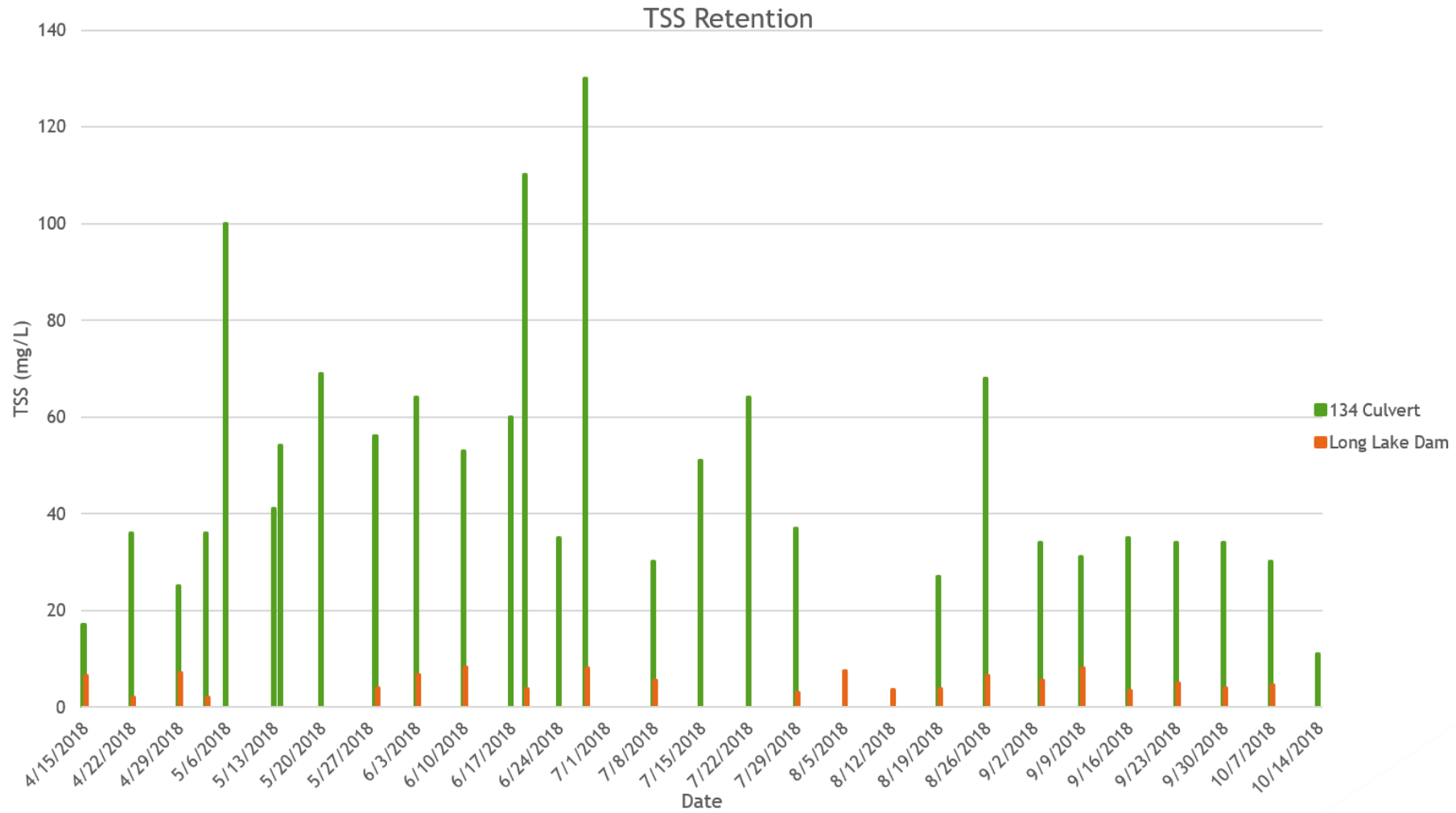
- ▶ 4 Blooms
 - ▶ One bloom >200 ug/L microcystin
- ▶ Overall good water quality
 - ▶ Meeting state standard for Total P
- ▶ High TSS & Total P retention



Photos by Jim Bland

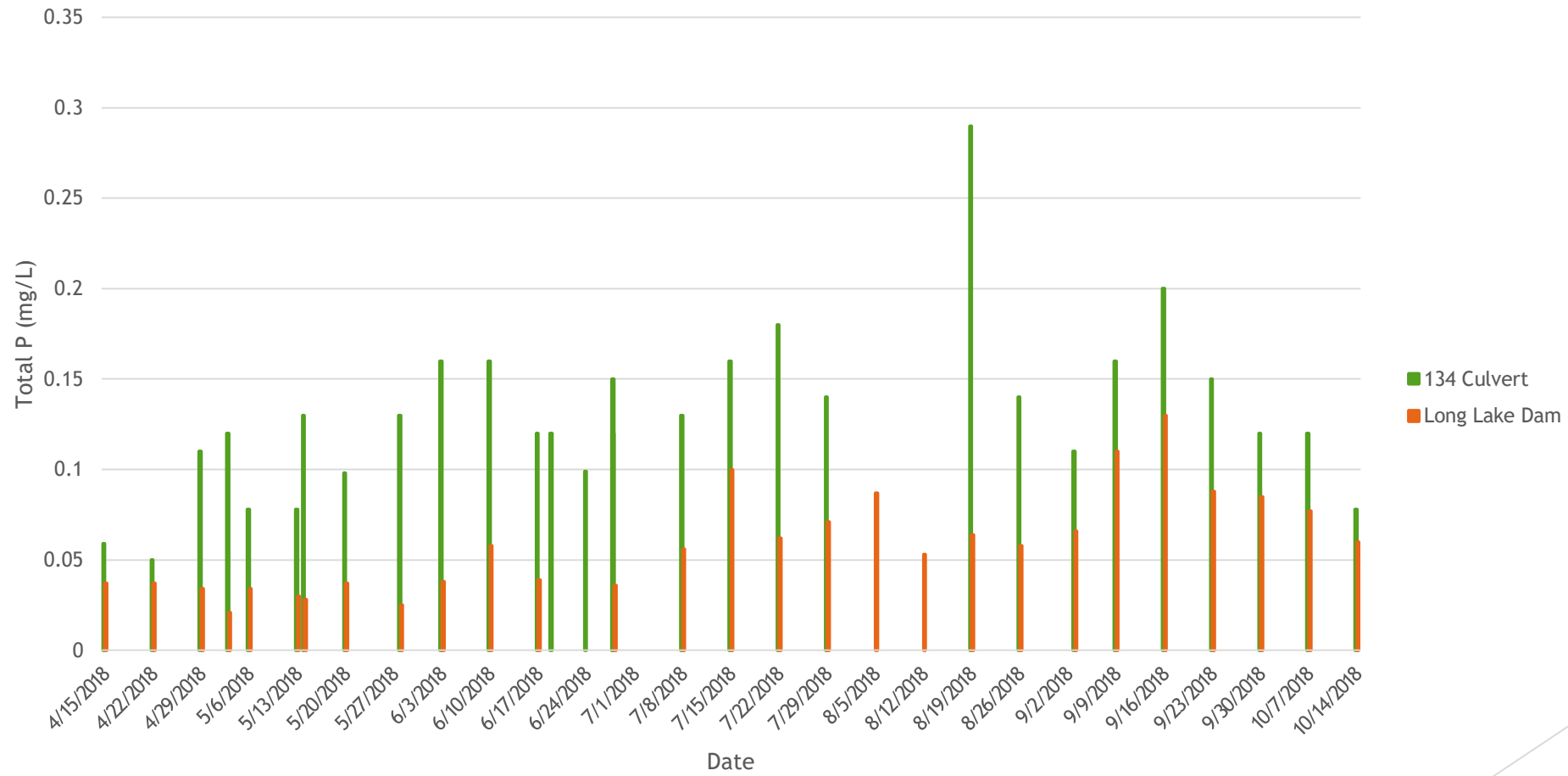


Results



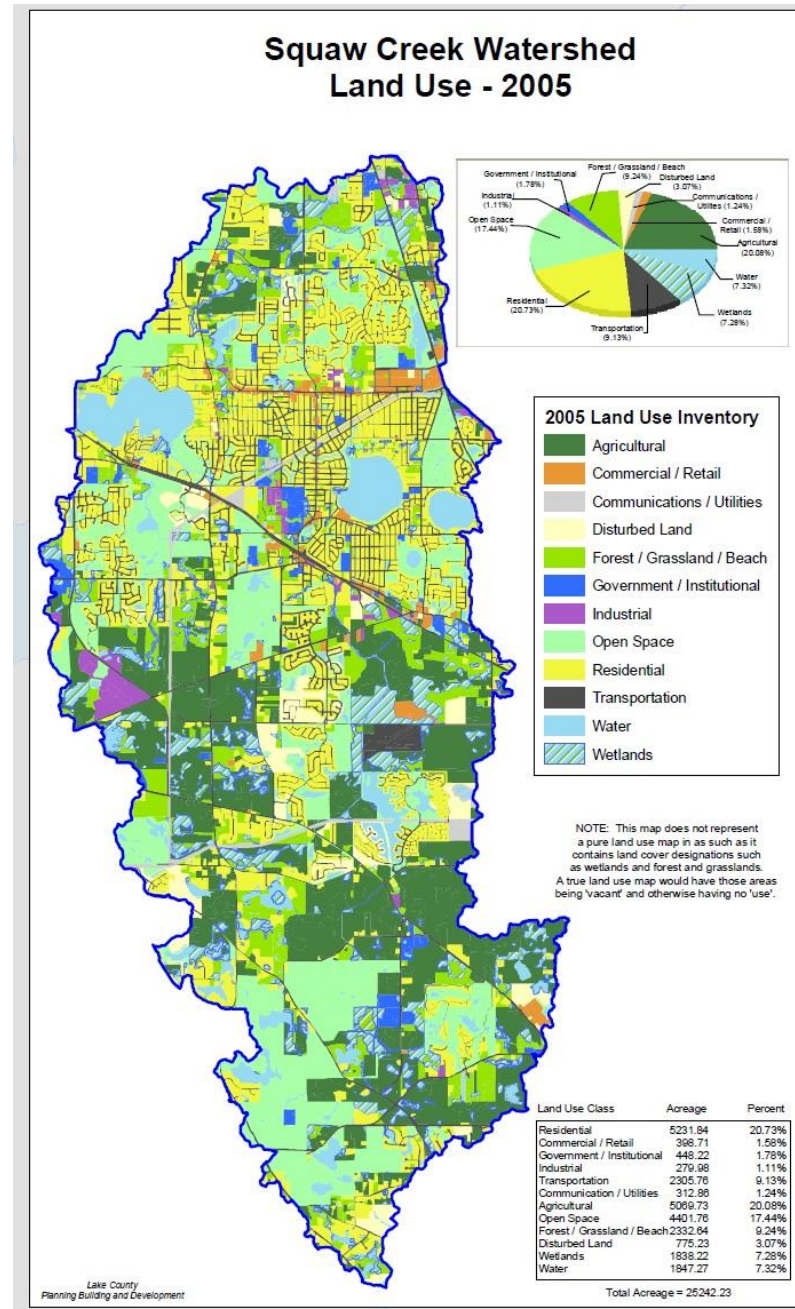
Results

Total P Retention



Interpretation

- ▶ Drainage tiles possible
- ▶ External loading
 - ▶ Mud Lake contributes sediment and nutrients
- ▶ Total P Loading Estimate- Jim Bland
 - ▶ 10,560 lbs annually @ inlet
 - ▶ 1,000 lbs internal load
- ▶ Flooding of July 2017
- ▶ Cannot conclude the trigger of blooms this season



FLOW

Recommendations

- ▶ Early warning system- Dr. Todd Miller
 - ▶ SPATT sampling
 - ▶ Abraxis strip test
 - ▶ June- October
- ▶ Adhere to lower total P standard
- ▶ Algaecide Spot Treatment
- ▶ Barley Straw
- ▶ Native plant buffer strips



Photo by Gloria Charland

Challenges

- ▶ Funding
 - ▶ Grant
 - ▶ Fundraising
 - ▶ Donations
- ▶ Organization & Planning
- ▶ Data Interpretation
- ▶ Time & Effort



Special Thanks...

- ▶ Jim Bland
- ▶ Gloria Charland
- ▶ Ron Gurak
- ▶ Joe Popeck
- ▶ Kristine Doetsch
- ▶ Hey & Associates
- ▶ Lake County Health Department
- ▶ Lake County Forest Preserve
- ▶ Lake County Stormwater Management Commission

Sources

- ▶ Simpson, J. T. 1991. Volunteer Lake Monitoring: A Methods Manual. EPA 440/4-91-002.
- ▶ Miller, T. R., Beversdorf L. J., Weirich C. A. & Bartlett S. L. 2017. Cyanobacterial Toxins of the Laurentian Great Lakes and Their Toxicological Effects, and Numerical Limits in Drinking Water. Joseph J. Zilber School of Public Health, University of Wisconsin-Milwaukee.
- ▶ <https://www.epa.gov/nutrient-policy-data/guidelines-and-recommendations>
- ▶ World Health Organization. Guidelines for safe recreational water environments. Volume 1, Coastal and fresh waters.