

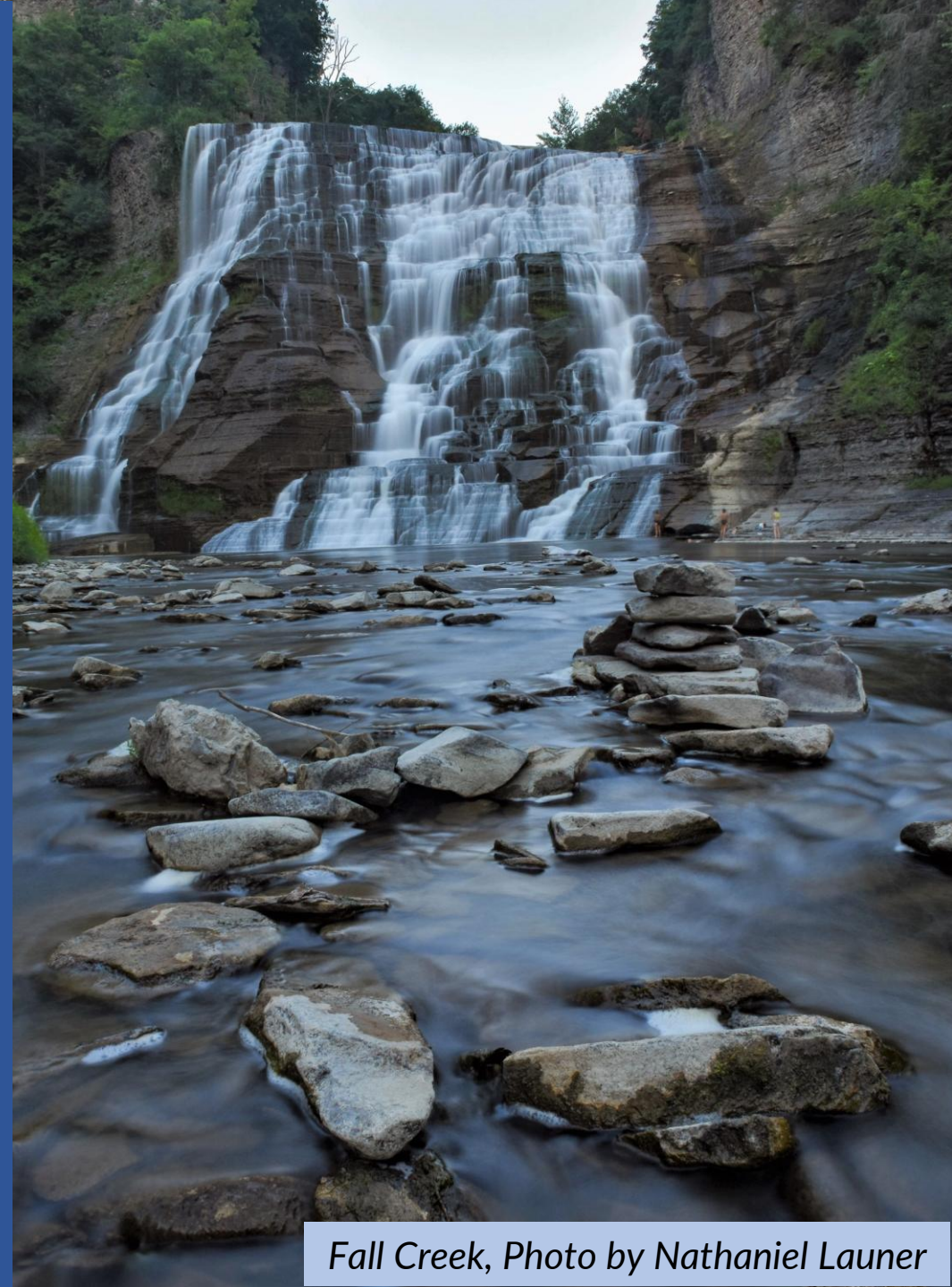
Community Science Institute: From Drinking Water to Surface Water

Cayuga Lake Watershed Intermunicipal
Organization
10/23/2024

Grascen Shidemantle, PhD
Executive Director
Community Science Institute



Partnering with Communities to Protect Water



Fall Creek, Photo by Nathaniel Launer

Agenda

Intro: Community Science Institute

Part 1: Fee-for-Service Water Testing
+ Q&A

Part 2: Volunteer Monitoring &
Water Quality Databases
+ Q&A



CSI Staff

Agenda

Intro: Community Science Institute

**Part 1: Fee-for-Service Water Testing
+ Q&A**

**Part 2: Volunteer Monitoring &
Water Quality Databases
+ Q&A**



CSI Staff

Community Science Institute



CSI is a 501(c)3 non-profit and NYSDOH-ELAP certified water testing lab in Ithaca, NY

CSI offers three types of programming:

Volunteer
Water
Monitoring
Partnerships

Outreach and
Education

Fee-for-
Service Water
Testing

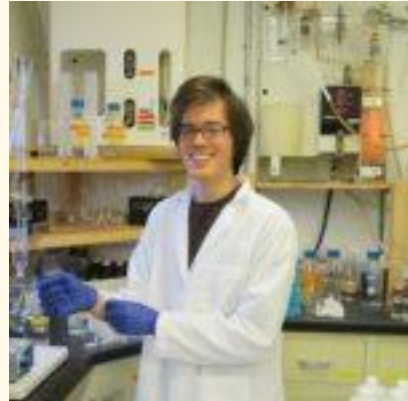
CSI's Mission

To foster and support environmental monitoring in partnership with community-based volunteer groups in order to better understand our shared natural resources and how to manage them for long-term sustainability and protection.

Community Science Institute



Grascen Shidemantle
Executive Director



Noah Mark
Laboratory Director



Adrianna Hirtler
Biomonitoring Coordinator



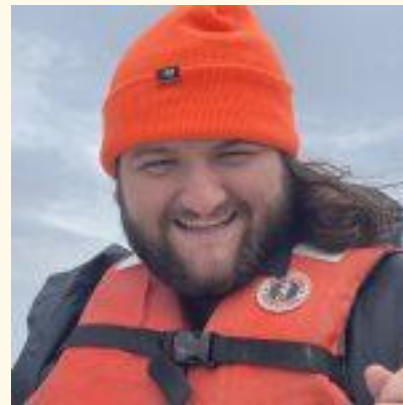
Charlene Mottler
Office Administrator



Alyssa Johnson
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Seth Bingham
Water Quality Scientist



Dan Pascucci
Water Quality Scientist



Rama Hoetzlein
Database Developer



Bill George
Data Entry Specialist

Agenda

Intro: Community Science Institute

**Part 1: Fee-for-Service Water Testing
+ Q&A**

**Part 2: Volunteer Monitoring & Water
Quality Databases
+ Q&A**



CSI's Water Testing Lab

Fee-for-Service Water Testing

We test water from private wells, municipal water systems, swimming beaches, effluents, and more!



Residents

- Home sales
- Routine testing
- Health/taste/quality concerns

We serve:

Local Businesses

- Farms
- Restaurants
- Breweries
- Wineries
- Mobile Home Parks
- Apartment Buildings

Government Agencies

- Tompkins County Health Dept.
- NY State Parks
- NYS Dept. of Environmental Conservation
- NYS Dept. of Health

In 2023, CSI's lab tested
more than 2,500
drinking water samples!

NYSDOH-ELAP #11790

In-House Testing

Potable Only

Total Coliform/ <i>E.coli</i>
Standard Plate Count
Nitrate, Nitrite
Calcium Hardness
Sulfate
Conductivity
Turbidity
Orthophosphate (SRP)

Both

pH
Chloride
Alkalinity
Total Dissolved Solids
Turbidity
Microcystin

Non-Potable Only

<i>E.coli</i> Enumeration
Fecal Coliform
Nitrate+Nitrite (NO _x)
Total Kjeldahl Nitrogen (TKN)
Ammonia Nitrogen
Soluble Reactive Phosphorous
Total Hardness
Total Solids
Total Suspended Solids
Dissolved Oxygen
Chlorophyll a

We partner with larger labs to subcontract testing for other analytes such as heavy metals, PFOA/PFOS, BOD, etc.

Resources

FAQ page on CSI's website

Handouts on common questions such as how to shock a well, iron and manganese bacteria, and microcystin in beach wells

Referrals for local water treatment specialists

Sample bottles available for pick up at:

- CSI's Lab by the Ithaca Airport
- Greenstar on Cascadilla Street
- ShurSave in Trumansburg
- A new location near you??

Water Testing Frequently Asked Questions

- + How do I know if my water is safe for drinking?
- + What should I test my water for?
- + How can I get my water tested?
- + What kinds of toxic chemicals might be in my water?
- + My water tested positive for coliform bacteria. What should I do?
- + What can I do to take care of my well?
- + How can my water get contaminated?
- + How often should I test my water?
- + What kind of water treatment system should I install?
- + My water looks, tastes, or smells funny. What should I do?
- + I'm concerned about hydrofracking contaminating my well. What should I do?
- + What's the difference between water in streams and lakes and the water in a well?
- + How does my well water quality compare to others in this region?

Coming Soon...

Water Testing Assistance Fund

to provide discounted water testing to those who otherwise could not afford the cost of drinking water testing

Why offer this service?

It is needed!

CSI is the only commercial ELAP-certified lab in the Cayuga Lake watershed

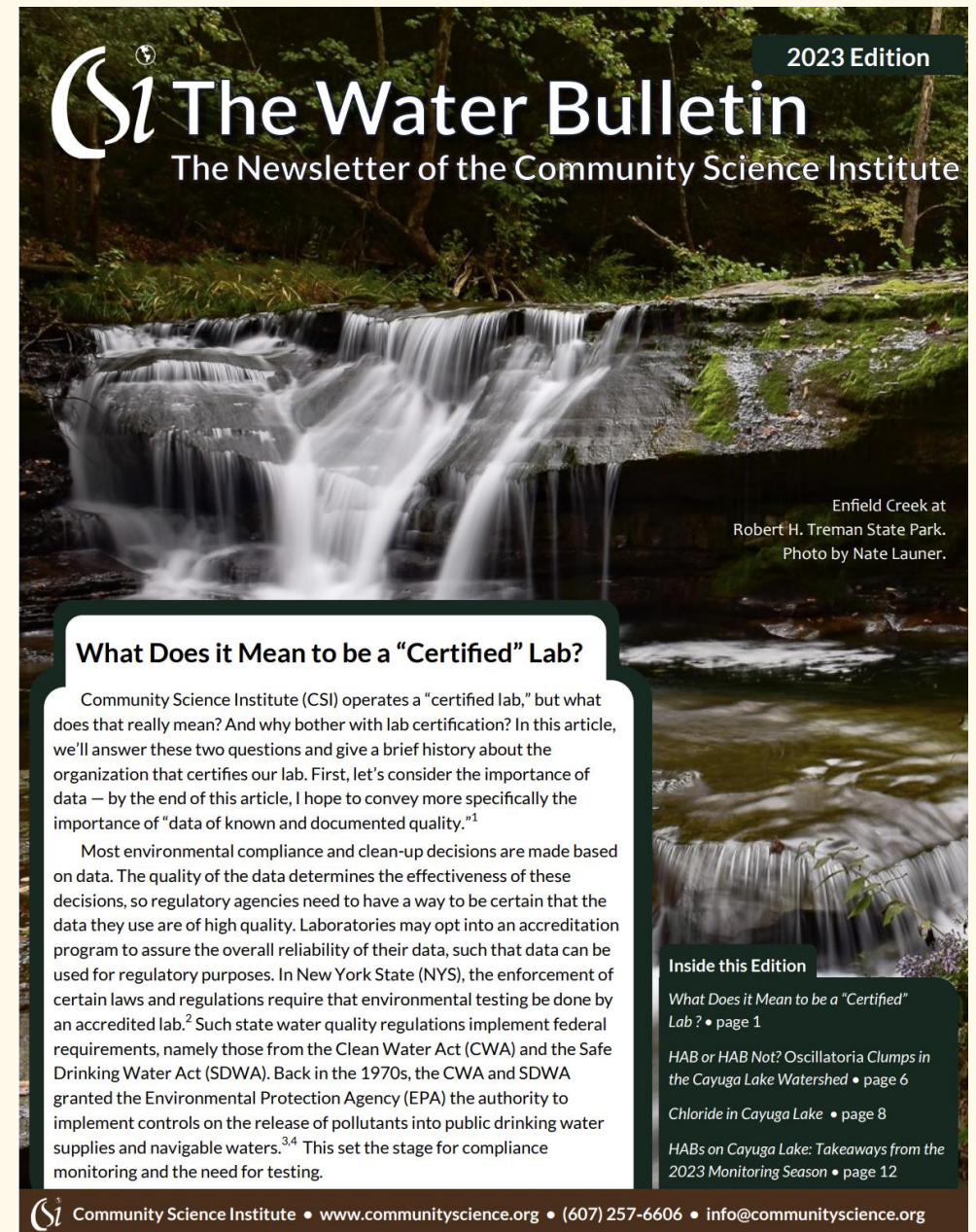
Filling in the gap for a large lab in Syracuse that lost its certification



We provide valuable education to clients about their drinking water resources and recommended testing to fit their specific needs and budgets

Provides a sustainable source of income (~ 50% of our income in 2023)

For more information about what it means to be an ELAP-certified lab check out our 2023 Water Bulletin Newsletter!



2023 Edition

CSi The Water Bulletin

The Newsletter of the Community Science Institute

Enfield Creek at Robert H. Treman State Park.
Photo by Nate Launer.

What Does it Mean to be a “Certified” Lab?

Community Science Institute (CSI) operates a “certified lab,” but what does that really mean? And why bother with lab certification? In this article, we’ll answer these two questions and give a brief history about the organization that certifies our lab. First, let’s consider the importance of data — by the end of this article, I hope to convey more specifically the importance of “data of known and documented quality.”¹

Most environmental compliance and clean-up decisions are made based on data. The quality of the data determines the effectiveness of these decisions, so regulatory agencies need to have a way to be certain that the data they use are of high quality. Laboratories may opt into an accreditation program to assure the overall reliability of their data, such that data can be used for regulatory purposes. In New York State (NYS), the enforcement of certain laws and regulations require that environmental testing be done by an accredited lab.² Such state water quality regulations implement federal requirements, namely those from the Clean Water Act (CWA) and the Safe Drinking Water Act (SDWA). Back in the 1970s, the CWA and SDWA granted the Environmental Protection Agency (EPA) the authority to implement controls on the release of pollutants into public drinking water supplies and navigable waters.^{3,4} This set the stage for compliance monitoring and the need for testing.

Inside this Edition

What Does it Mean to be a “Certified” Lab? • page 1

HAB or HAB Not? Oscillatoria Clumps in the Cayuga Lake Watershed • page 6

Chloride in Cayuga Lake • page 8

HABs on Cayuga Lake: Takeaways from the 2023 Monitoring Season • page 12

CSi Community Science Institute • www.communityscience.org • (607) 257-6606 • info@communityscience.org

Fee-for-Service Water Testing Q&A

Testing Your Water at CSI's Certified Lab

Hours of Operation: Monday – Friday 9 AM – 5 PM

Sample Drop-Off Hours:

- Monday – Thursday
- 9:00 AM – 3:00 PM



*Please note: Samples dropped off outside of these times may or may not be accepted, at the discretion of CSI staff. If you are unable to drop off samples during these hours, please call 607-257-6606 to make special arrangements. **Bacteriological samples cannot be accepted on Fridays.***

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+ Q&A

**Part 2: Volunteer Monitoring &
Water Quality Databases**
+ Q&A



CSI volunteer, David, sampling Fall Creek after a storm.

CSI's Volunteer Water Monitoring Partnerships

Synoptic Stream & Lake Monitoring



Test samples for:

- Nutrients (Phosphorus and Nitrogen)
- Pathogenic Bacteria (*E. coli*)
- Total Suspended Solids
- Temperature
- Turbidity
- pH
- Conductivity
- Chloride
- Total Hardness

Biomonitoring (Benthic Macroinvertebrate Monitoring)



Identify samples of benthic macroinvertebrates (BMI) to calculate:

- Total Family Richness
- EPT Richness
 - Ephemeroptera = mayflies, Plecoptera = stoneflies, Trichoptera = caddisflies
- Family Biotic Index
- Percent Model Affinity
- Biological Assessment Profile

non-impacted
slightly impacted
moderately impacted
severely impacted

Harmful Algal Bloom (HAB) Monitoring



Test HABs samples to:

- Identify cyanobacteria genera
- Measure chlorophyll a
- Measure cyanotoxins (e.g., microcystin)

In collaboration with:



CSI Data Makes a Difference

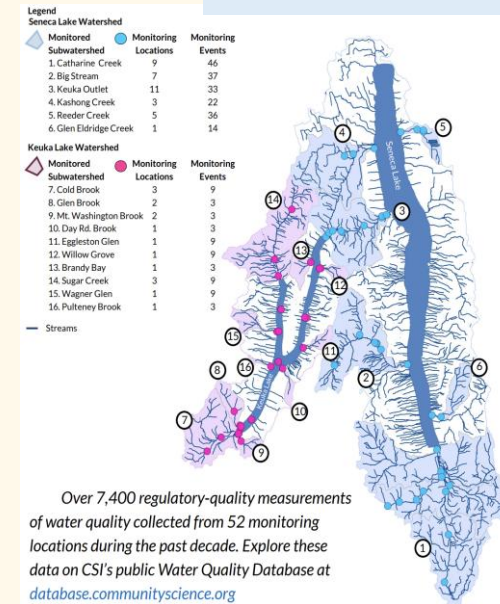


Removal of the southern end of Cayuga Lake from the 303(d) list for pathogenic bacteria

Trumansburg Wastewater Plant upgrades



Seneca-Keuka 9E Plan



Peer-reviewed research

Using Citizen Based Science to Provide Insights on Toxic Cyanobacteria Blooms in a New York Lake

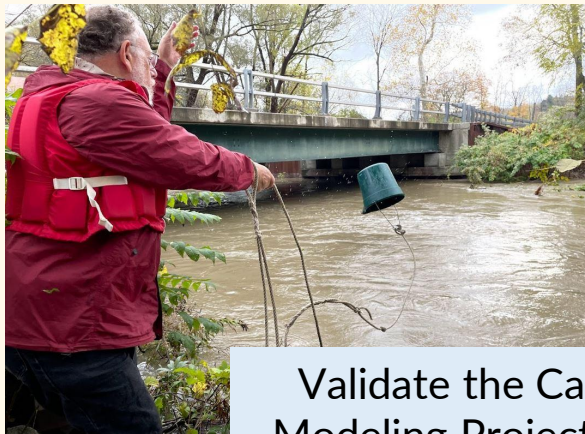
Howarth, R., Swaney, D., Smith, C., Marino, R., Figueroa, A., & Penningroth, S. (2023). Using Citizen Based Science to Provide Insights on Toxic Cyanobacteria Blooms in a New York Lake. Abstract of presentation at the meeting of the Association of the Sciences of Limnology and Oceanography (ASLO) "Resilience and Recovery in Aquatic Ecosystems" - Mallorca, Spain; June 4-9, 2023

Community-Based Risk Assessment of Water Contamination from High-Volume Horizontal Hydraulic Fracturing

Penningroth, S. M., Yarrow, M. M., Figueroa, A. X., Bowen, R. J., & Delgado, S. (2013). Community-Based Risk Assessment of Water Contamination from High-Volume Horizontal Hydraulic Fracturing. NEW SOLUTIONS: A Journal of Environmental and Occupational Health Policy, 23(1), 137-166. <https://doi.org/10.2190/NS.23.1.i>

Long-Term Study of Soluble Reactive Phosphorus Concentration in Fall Creek and Comparison to Northeastern Tributaries of Cayuga Lake, NY: Implications for Watershed Monitoring and Management

O'Leary, N.; Johnston, R.; Gardner, E.L.; Penningroth, S.M.; Bouldin, D.R. Long-Term Study of Soluble Reactive Phosphorus Concentration in Fall Creek and Comparison to Northeastern Tributaries of Cayuga Lake, NY: Implications for Watershed Monitoring and Management. *Water* 2019, 11, 2075. <https://doi.org/10.3390/w11102075>



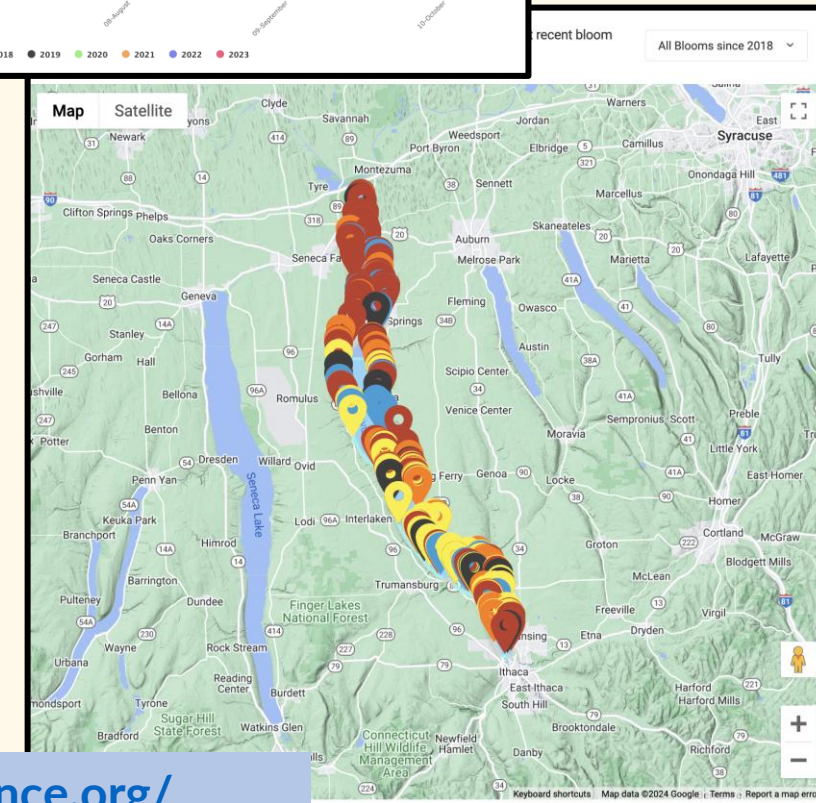
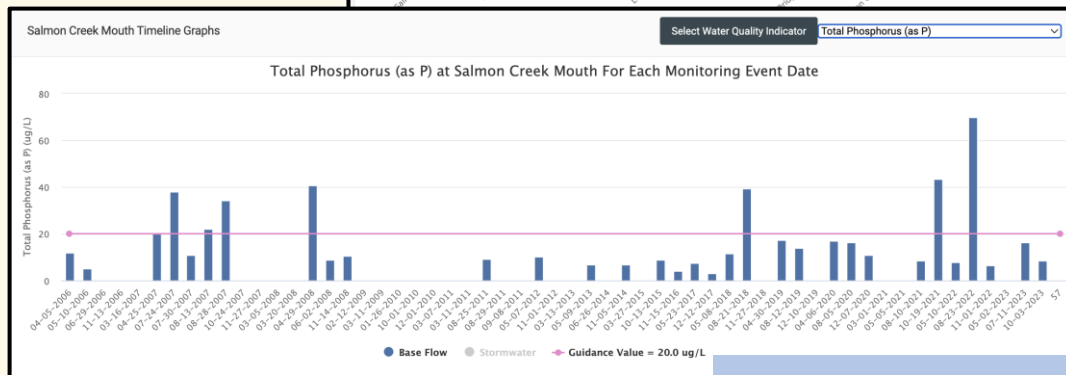
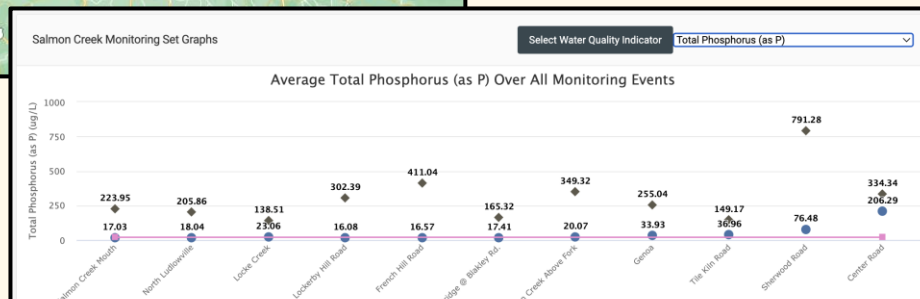
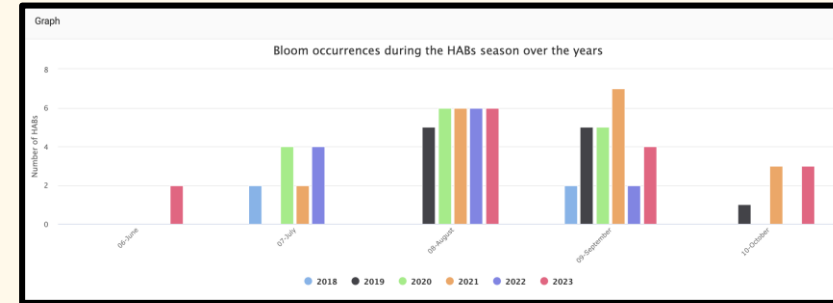
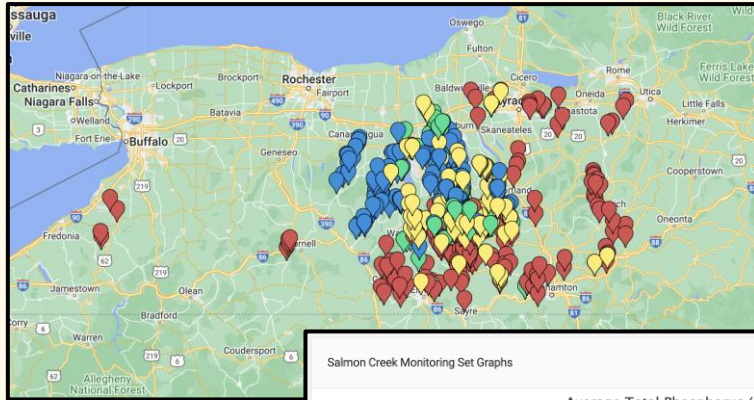
Validate the Cayuga Lake Modeling Project's model of Fall Creek phosphorus loading

Read "The Power of Community-Collected Data" for more details: <http://www.communityscience.org/2022/09/22/power-of-community-collected-data/>

CSI's Water Quality Database Tour

Harmful Algal Blooms

Stream and Lake Chemistry



<http://www.database.communityscience.org/>

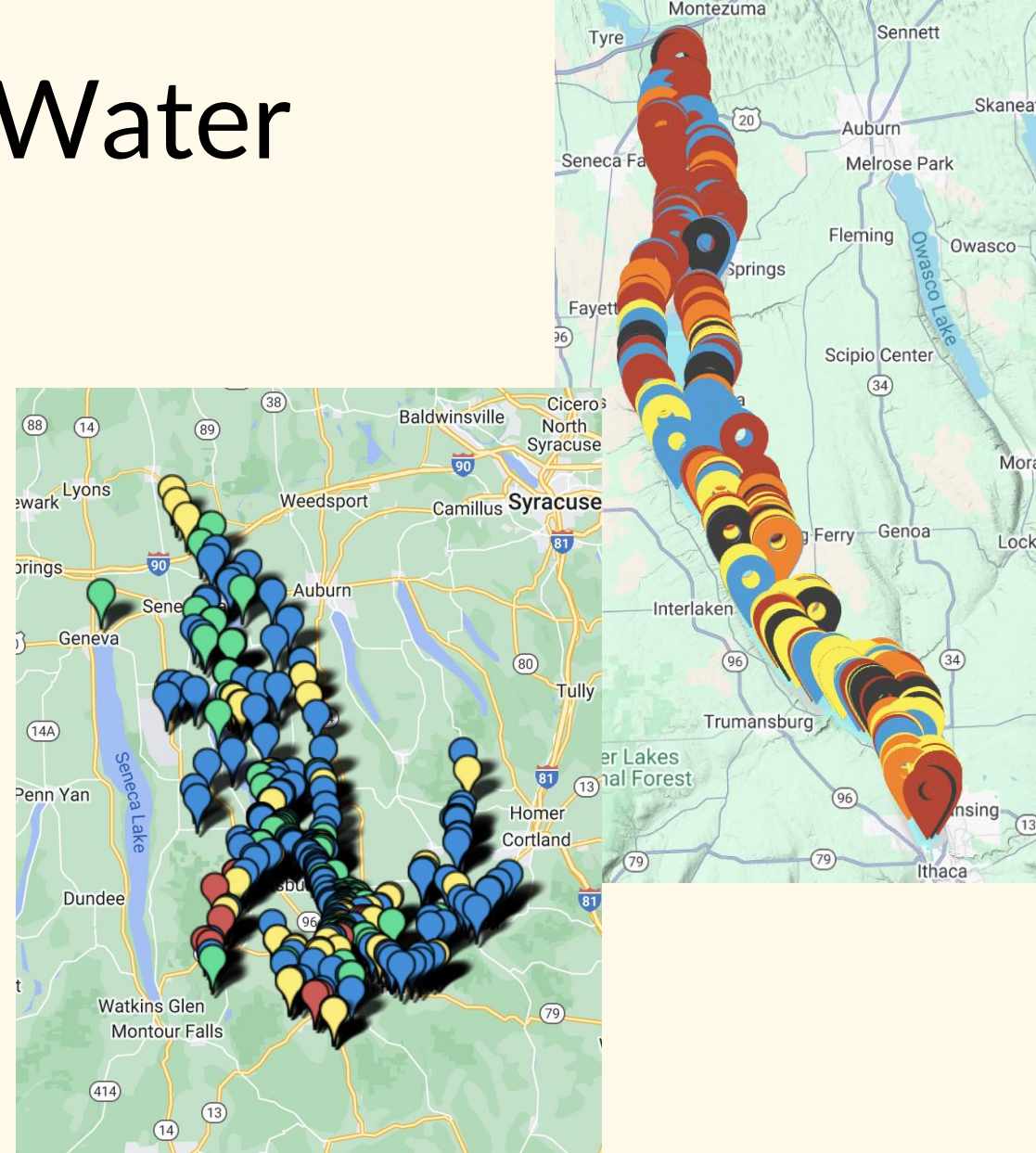
Volunteer Monitoring & Water Quality Databases

Q&A

Please fill out our database survey!



<https://forms.gle/F3tqacvsYDWGeZp7A>



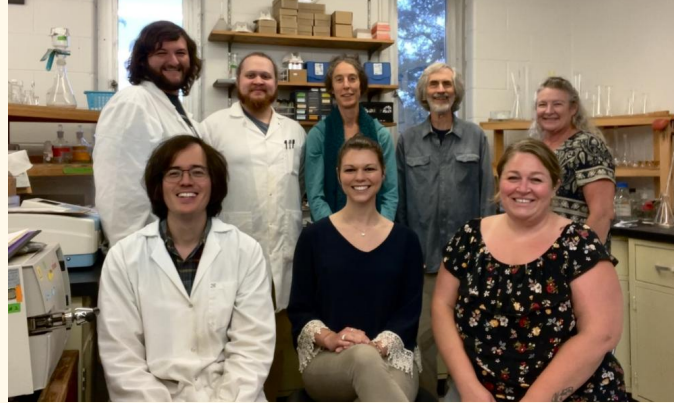
Acknowledgements



Dedicated volunteers!

CSI Members

CSI Staff Past and Present



Partners



CWIO!

Local Governments

Cayuga County
Seneca County
Tompkins County
City of Ithaca
Town of Caroline
Town of Danby
Town of Dryden
Town of Enfield
Town of Ithaca
Town of Lansing
Town of Newfield
Town of Scipio
Town of Ulysses
Village of Cayuga Heights

Thank you!

Stay in touch!

Join CSI's email list for
monthly updates



Follow us on social media



@communityscienceinstitute

Set up a meeting with me

gshidemantle@communityscience.org

(607) 257-6606

www.communityscience.org

Extra Slides

Synoptic Stream and Lake Monitoring Program



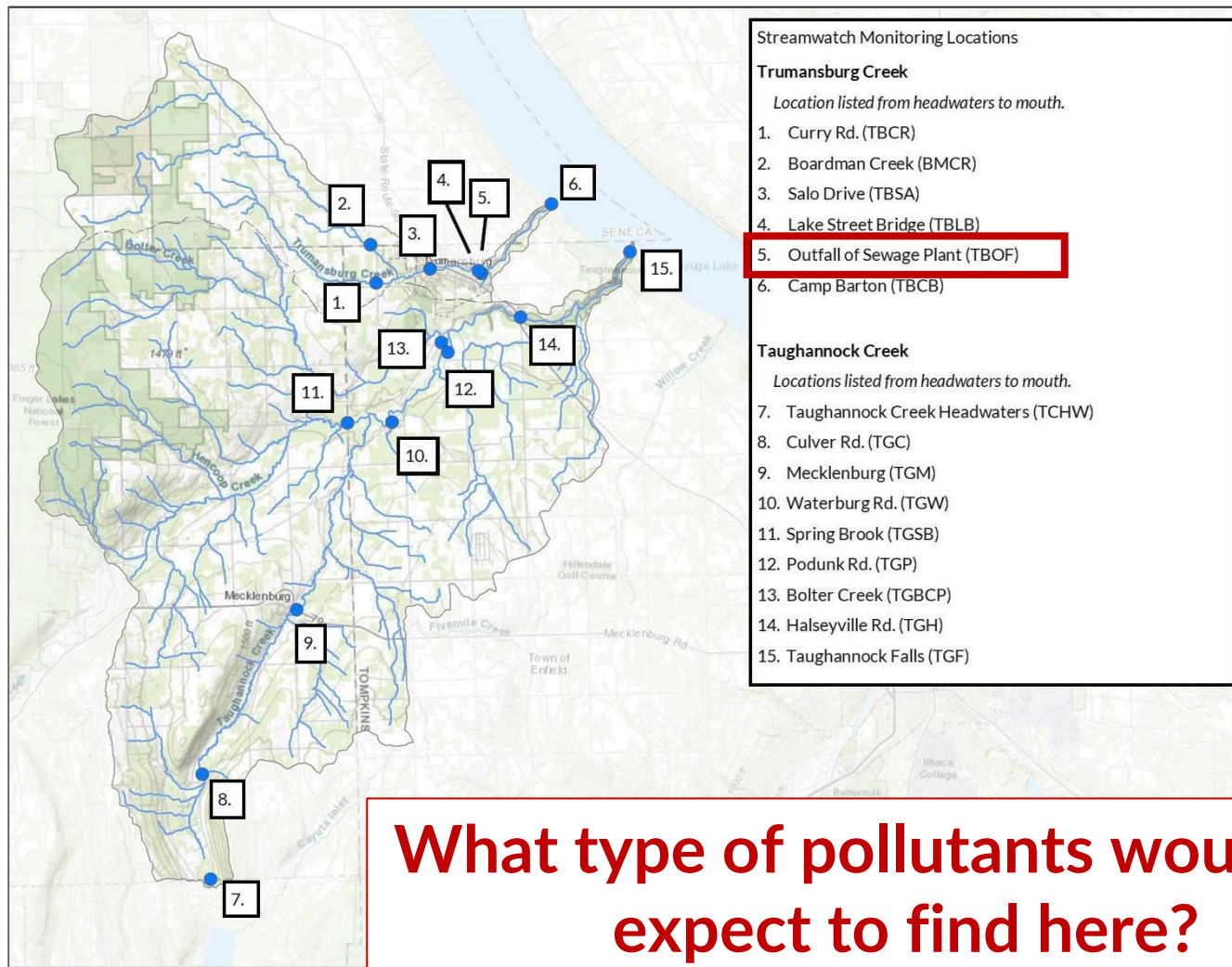
Long-time volunteer, David, has been monitoring water quality on Fall Creek with us since 2002!

Purpose: Produce regulatory-quality stream and lake water chemistry data that can inform water resource management decisions as well as keep the public informed on the state of their local water resources.

Monitor streams and lakes for:

- Nutrients
- Sediment
- Bacteria
- Salt
- pH, hardness, alkalinity, turbidity, conductivity

Impact of CSI's Stream Monitoring: Trumansburg Wastewater Treatment Plant



What type of pollutants would you expect to find here?

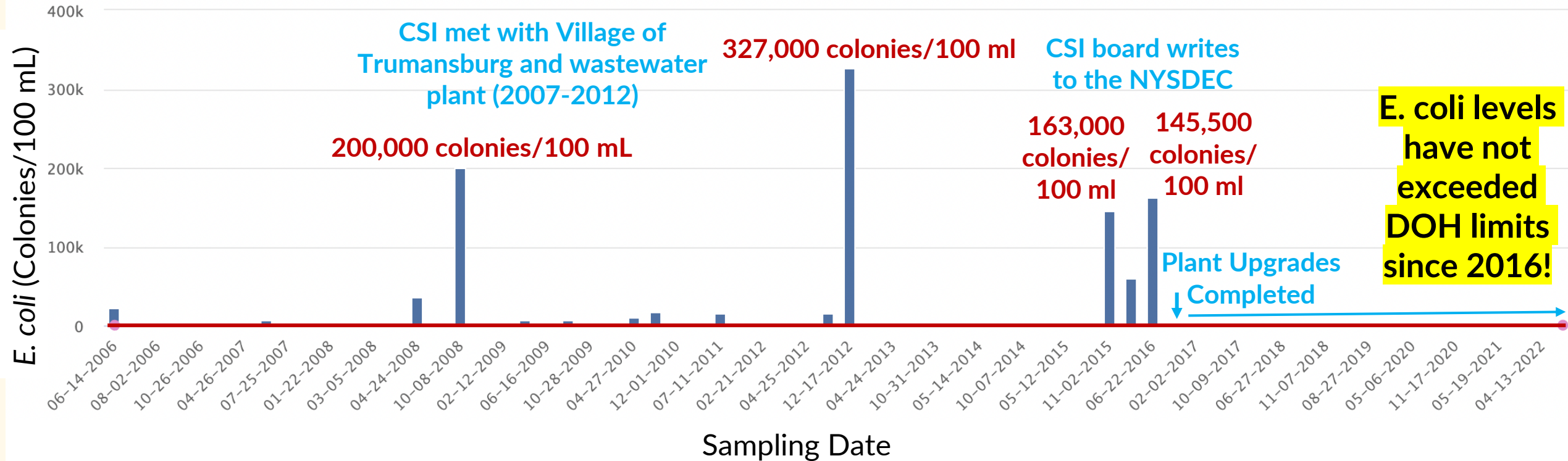
Water samples collected by CSI's Streamwatch volunteer monitoring group 2006 - present



Trumansburg Wastewater Treatment Plant

Impact of CSI's Stream Monitoring: Trumansburg Wastewater Treatment Plant

E. coli at outfall of Trumansburg Wastewater Treatment Plant on Trumansburg Creek

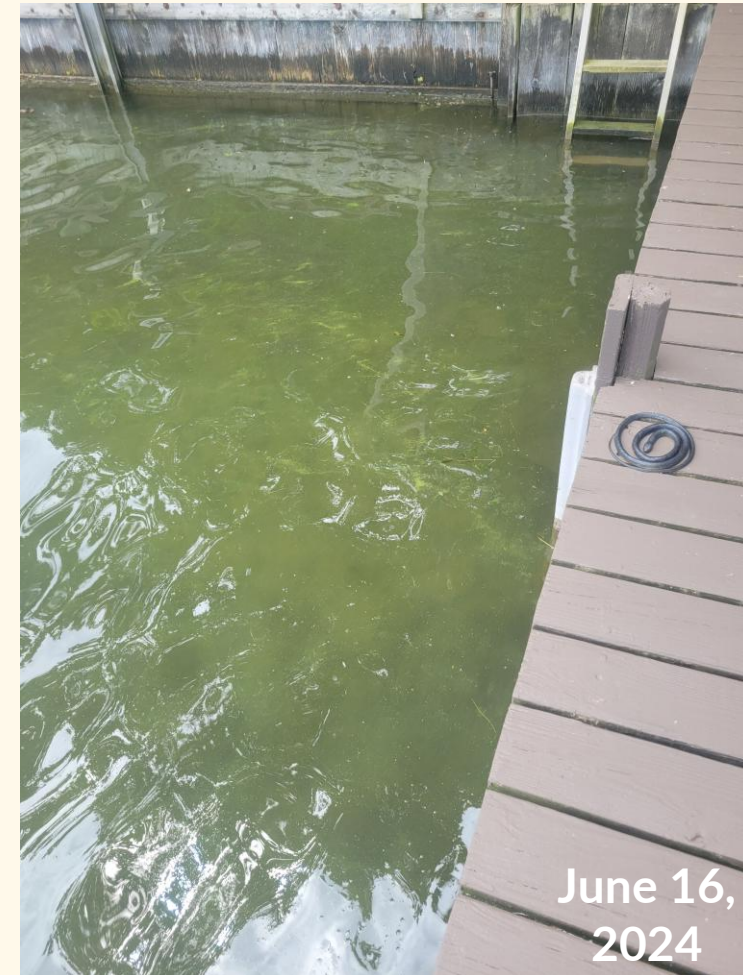
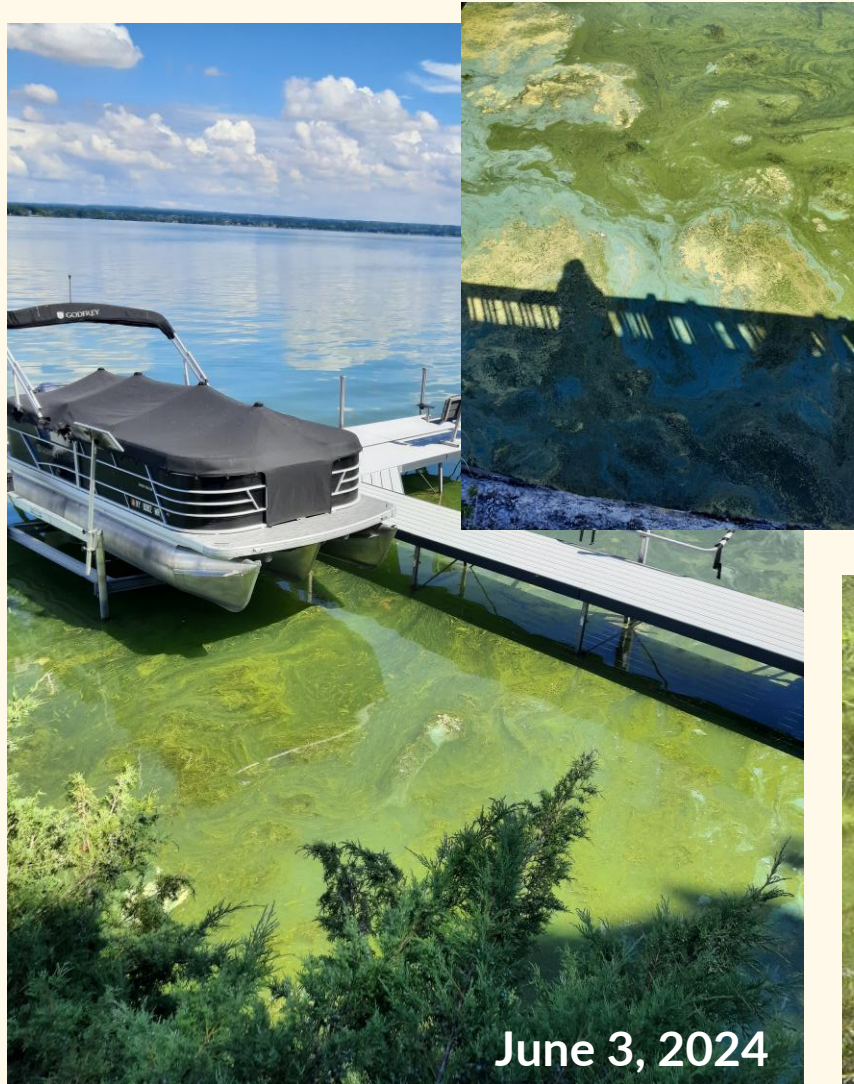


NYSDOH contact recreation limit for *E. coli* = 235.0 colonies/100 mL

A community science success story!

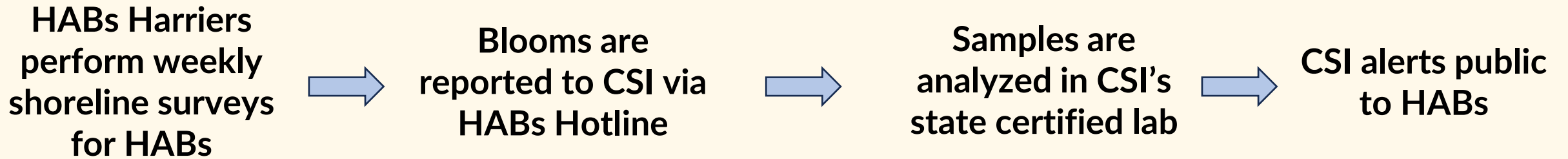


Cayuga Lake Harmful Algal Bloom (HAB) Monitoring Partnership



Cayuga Lake Harmful Algal Bloom (HAB) Monitoring Partnership

Purpose: Collect actionable data on cyanobacteria blooms, protect public health, and relay bloom information and testing results quickly and efficiently.

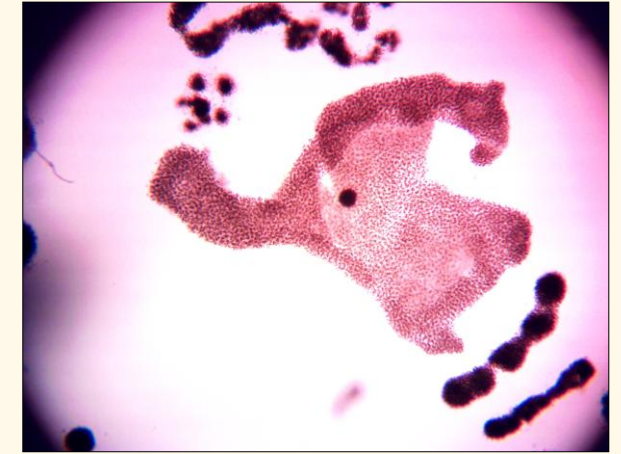


The Cayuga Lake HABs Monitoring Program is led by CSI in collaboration with CLWN and DCL

Cayuga Lake Harmful Algal Bloom (HAB) Monitoring Partnership

HAB samples are analyzed to:

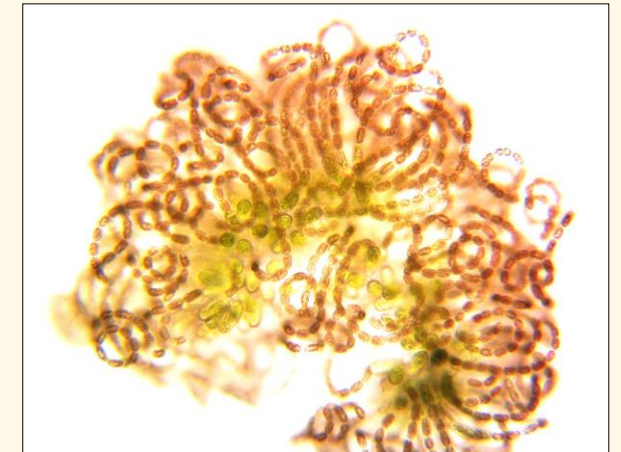
- Identify cyanobacteria genera
- Measure chlorophyll a
- Measure microcystin



Microcystis sp.

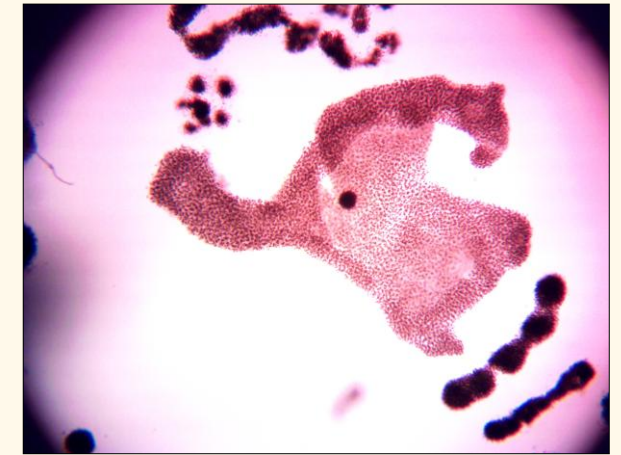
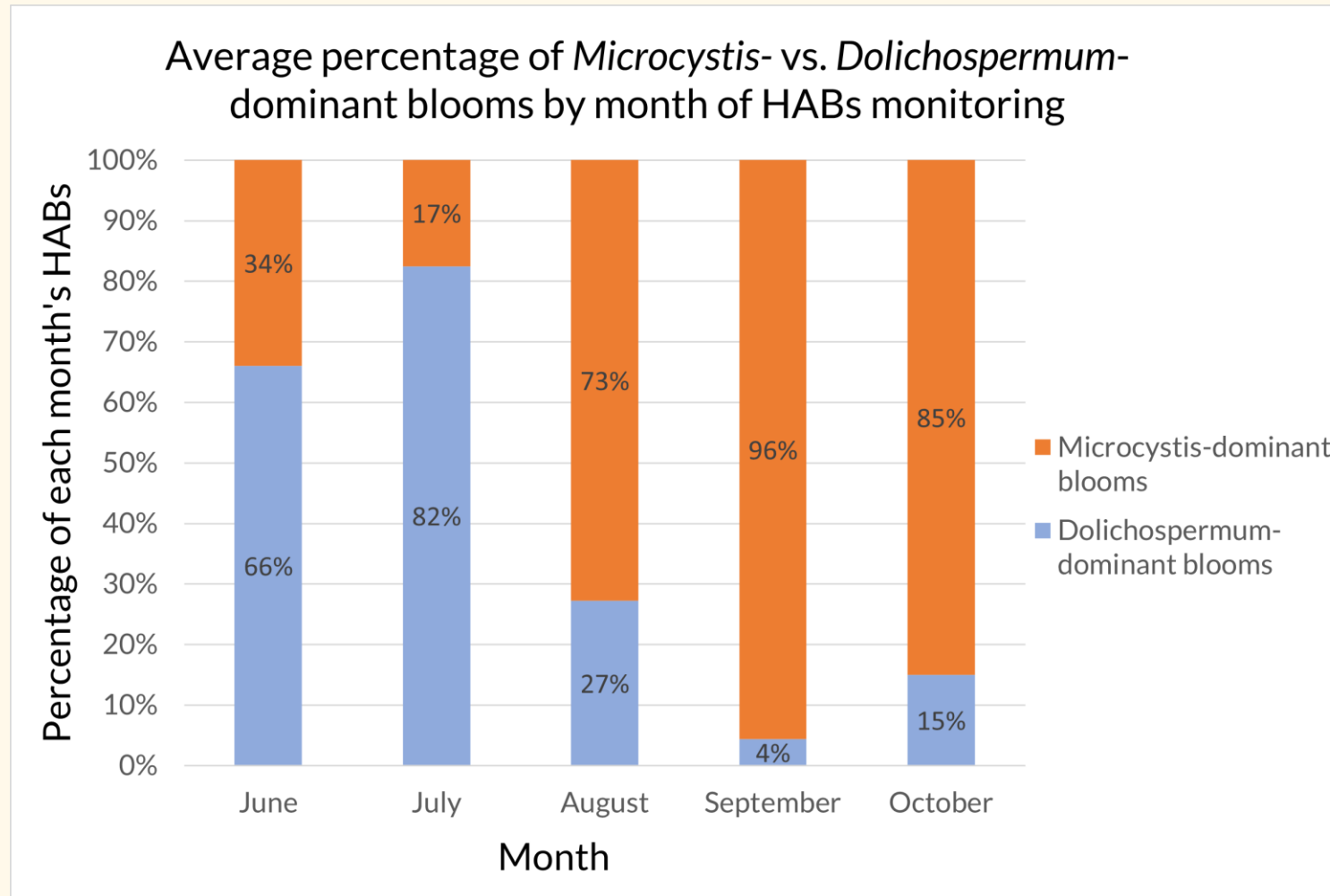
Bloom information is uploaded to CSI's NEW
[HABs Database](#)

CSI reports all blooms to county health department
officials and NYSDEC

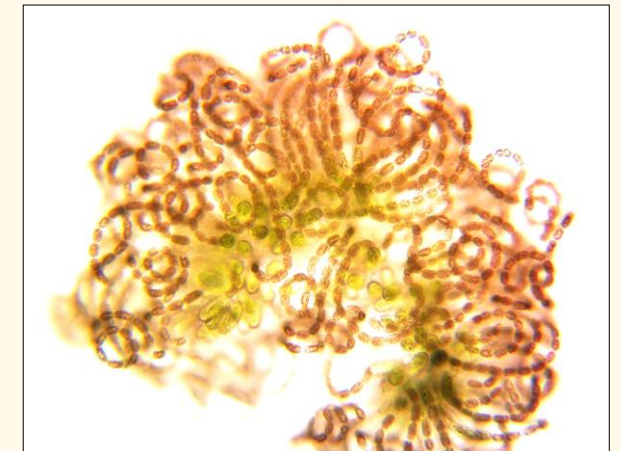


Dolichospermum sp.

HAB Monitoring 2018-2023

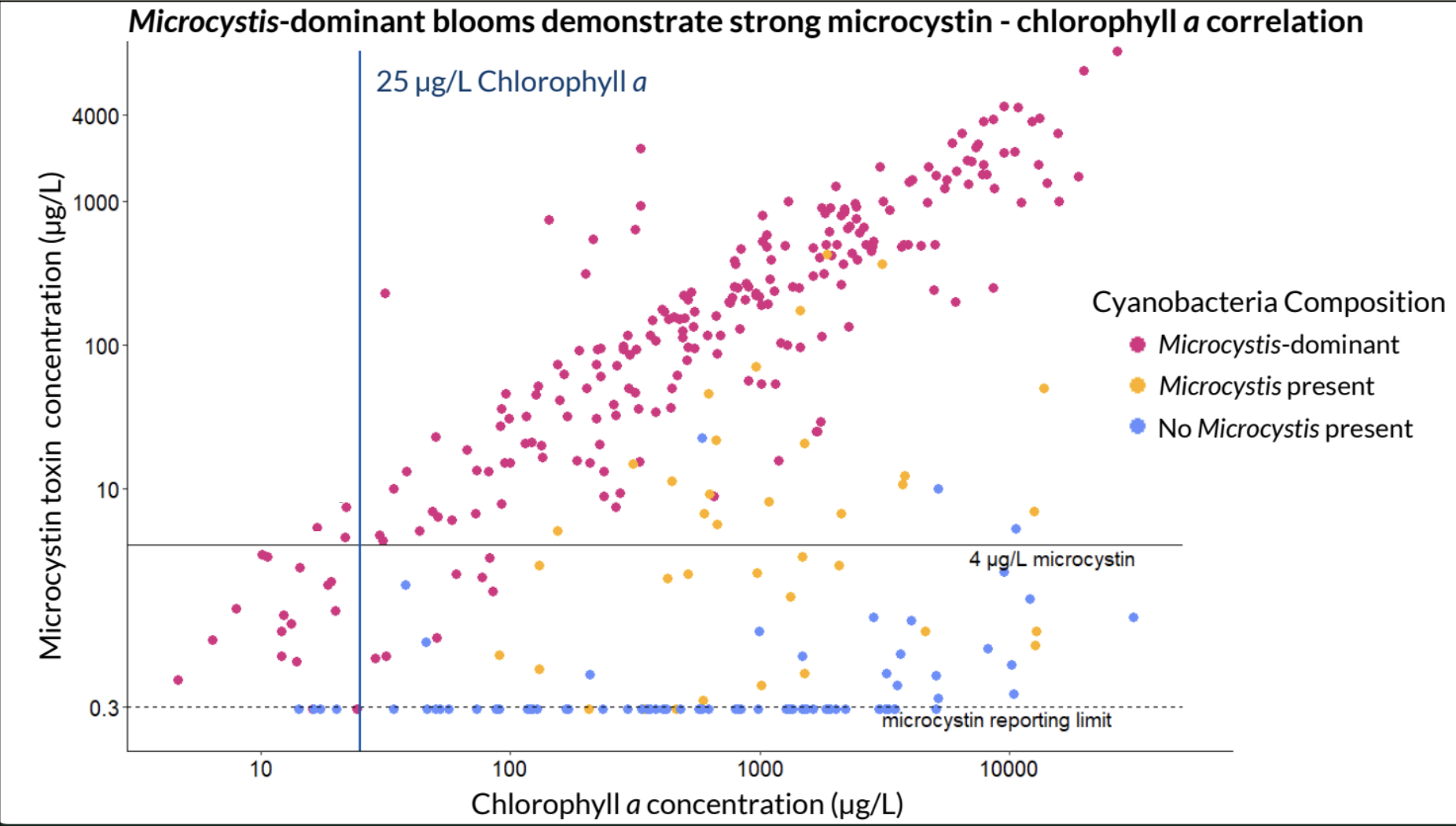


Microcystis sp.



Dolichospermum sp.

HAB Monitoring 2018-2023



Biomonitoring Partnership



Biomonitoring Partnership

Purpose: Determine the ecological and long term health of streams while educating community members about local aquatic biodiversity

Collect and identify samples of benthic macroinvertebrates (BMI) to calculate:

- Total Family Richness
- EPT Richness
 - Ephemeroptera = mayflies, Plecoptera = stoneflies, Trichoptera = caddisflies
- Family Biotic Index
- Percent Model Affinity
- Biological Assessment Profile

non-impacted
slightly impacted
moderately impacted
severely impacted



Volunteers collect samples in the field during the summer.

They sort and identify organisms during Open Lab Nights in the winter.

[Biological Monitoring Results](#) are posted on CSI's Website.

Red Flag Monitoring Partnership



Red Flag Monitoring Partnership

Purpose: Establish baseline water quality for parameters related to shale gas wells, specifically hydrofracking; and should hydrofracking begin in New York, to document whether impacts on streams and lakes occur as a result.



Monitor streams for:

- Temperature
- pH
- Dissolved oxygen
- Total hardness
- Conductivity

Volunteers perform quality-assured tests in the field using testing kits

Fracking was banned in NYS in 2016

Outreach and Education



Journey of Water Summer Youth Education Program



Annual Water Bulletin Newsletter

CHLORIDE

Chlorine + electron = chloride

WHAT IS CHLORIDE?

Chloride is a naturally-occurring ion formed when chlorine *gains* an electron. It most frequently occurs in salt compounds like **sodium chloride**.

In small amounts, chloride is essential for our cells to function.

Community Science Institute
 Partnering with Communities to Protect Water

WHY DO WE MEASURE CHLORIDE?

Brackish or marine ecosystems naturally have a much higher concentration of chloride than freshwater. We test chloride concentrations in streams and lakes to see if they fall within the normal range for these ecosystems.

Typical chloride concentrations

- Freshwater: <50 mg/L
- Brackish water: ~300 mg/L
- Seawater: ~20,000 mg/L

Chloride is often the active ingredient in road salts. It can also be introduced to waterways via irrigation runoff or salt mines.

In the environment, chloride can trigger the mobilization of heavy metals like lead and mercury from soil particles into water. Within an organism, some chloride is normal or even beneficial. However, in large amounts, chloride can interfere with healthy cell function. The following organisms start to see sublethal effects at:

 372 mg/L chloride	 922.7 mg/L chloride	 433.1 mg/L chloride
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Free Learning Materials