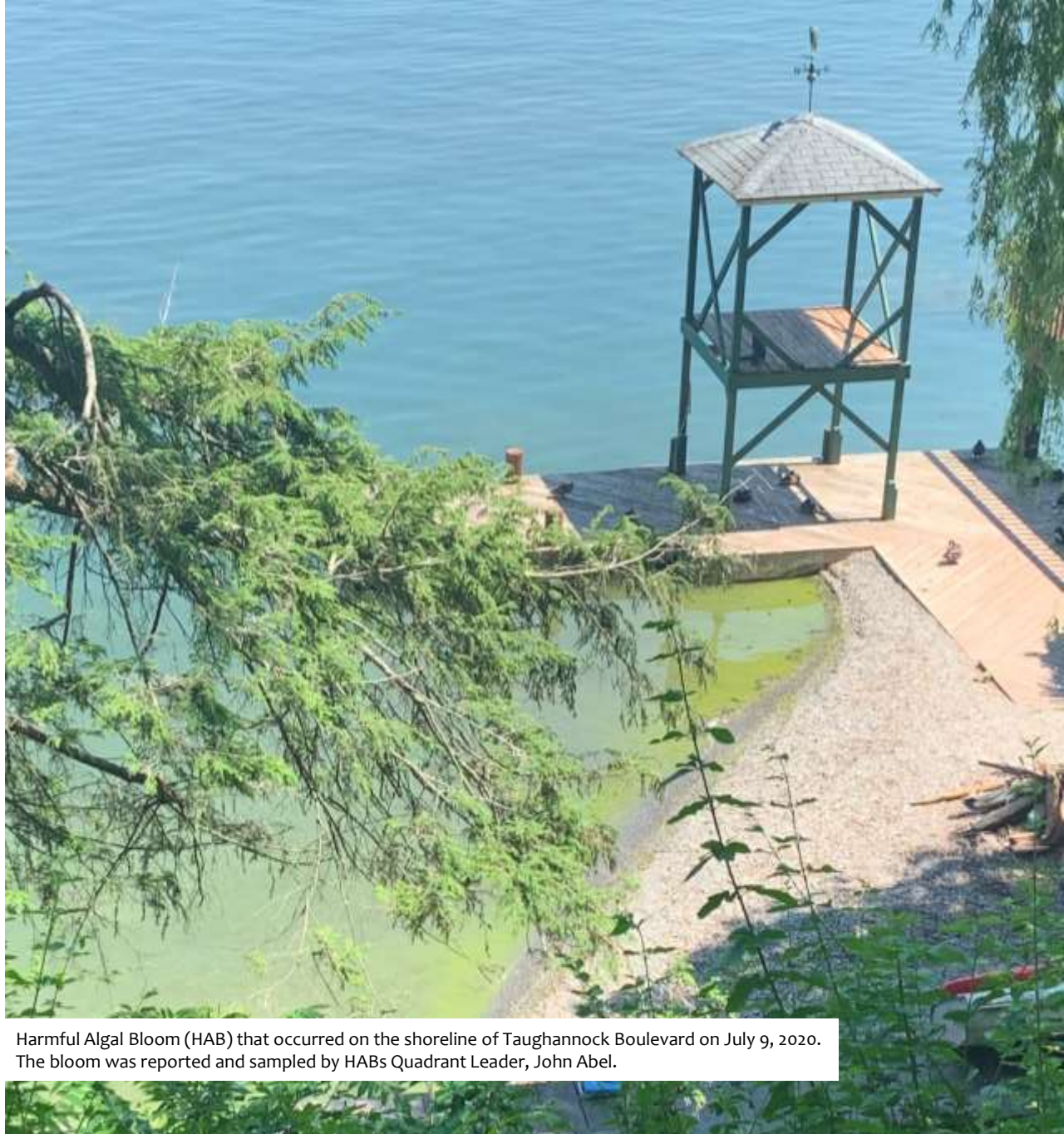


# Monitoring Cayuga Lake with the Community Science Institute

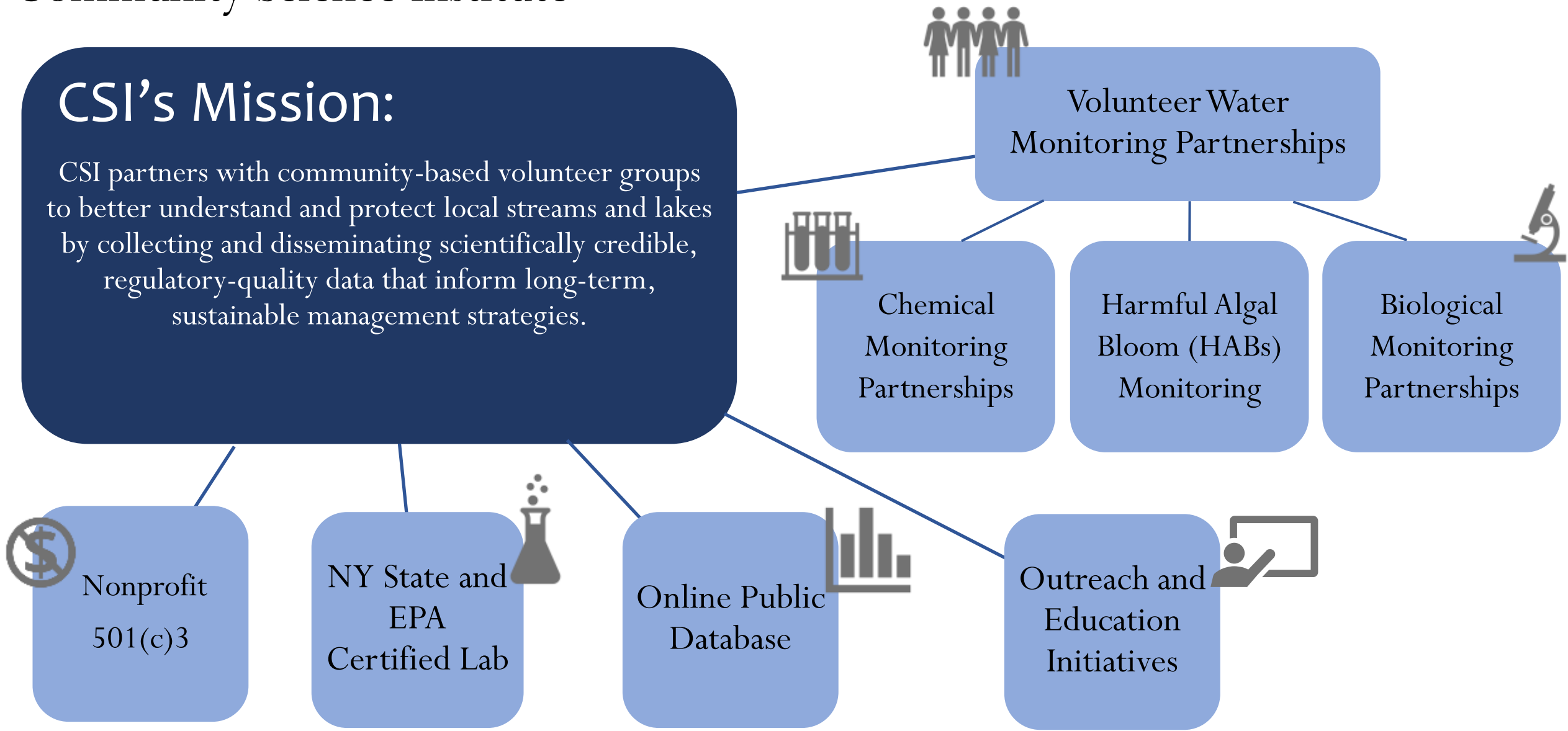
Nathaniel Launer,  
*Director of Outreach,  
Cayuga Lake HABs Monitoring Program Coordinator*



Harmful Algal Bloom (HAB) that occurred on the shoreline of Taughannock Boulevard on July 9, 2020. The bloom was reported and sampled by HABs Quadrant Leader, John Abel.

## CSI's Mission:

CSI partners with community-based volunteer groups to better understand and protect local streams and lakes by collecting and disseminating scientifically credible, regulatory-quality data that inform long-term, sustainable management strategies.



# Our Certified Lab

Community Science Institute lab is certified by the New York State Department of Health-Environmental Laboratory Approval Program (NYSDOH-ELAP) under National Environmental Laboratory Accreditation Conference (NELAC) guidelines.

The lab is certified in potable and non-potable methods to test for chemical and microbiological parameters of water quality.

Our community science monitoring programs are guided by a Quality Assurance Project Plan (QAPP).

Maintaining a certified lab is hard work!

- Quality assurance and quality control measures are extensive
- Inspections are rigorous
- Quality Assurance Project Plans must be updated regularly

## So why make the effort?

1. Certified data can be used for regulatory purposes and to help guide and inform management decisions.
2. Certification allows CSI to address the community's potable water testing needs.



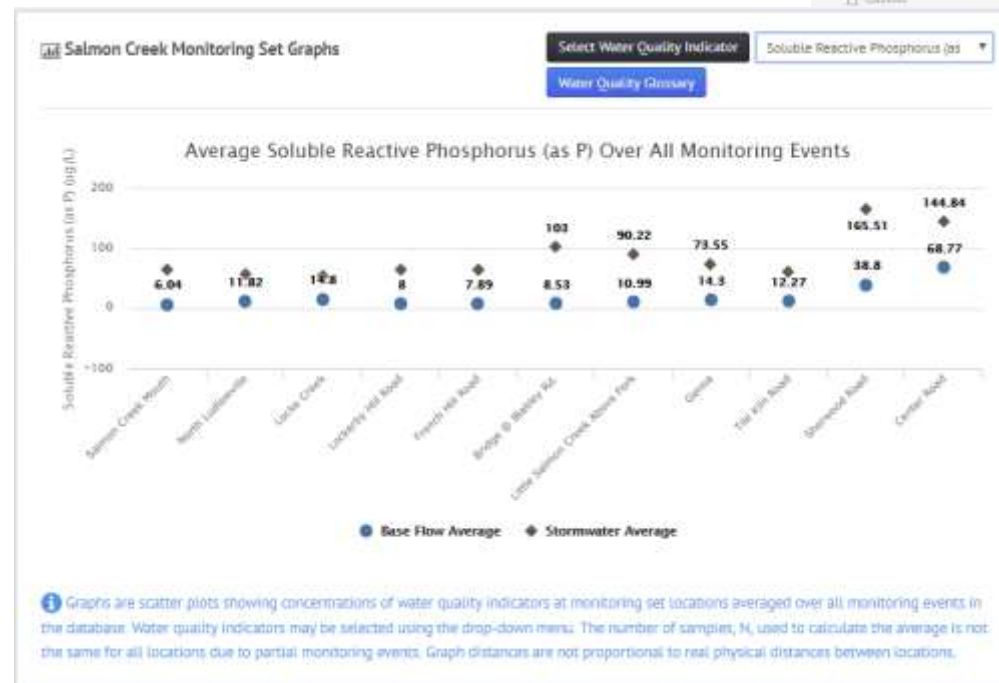
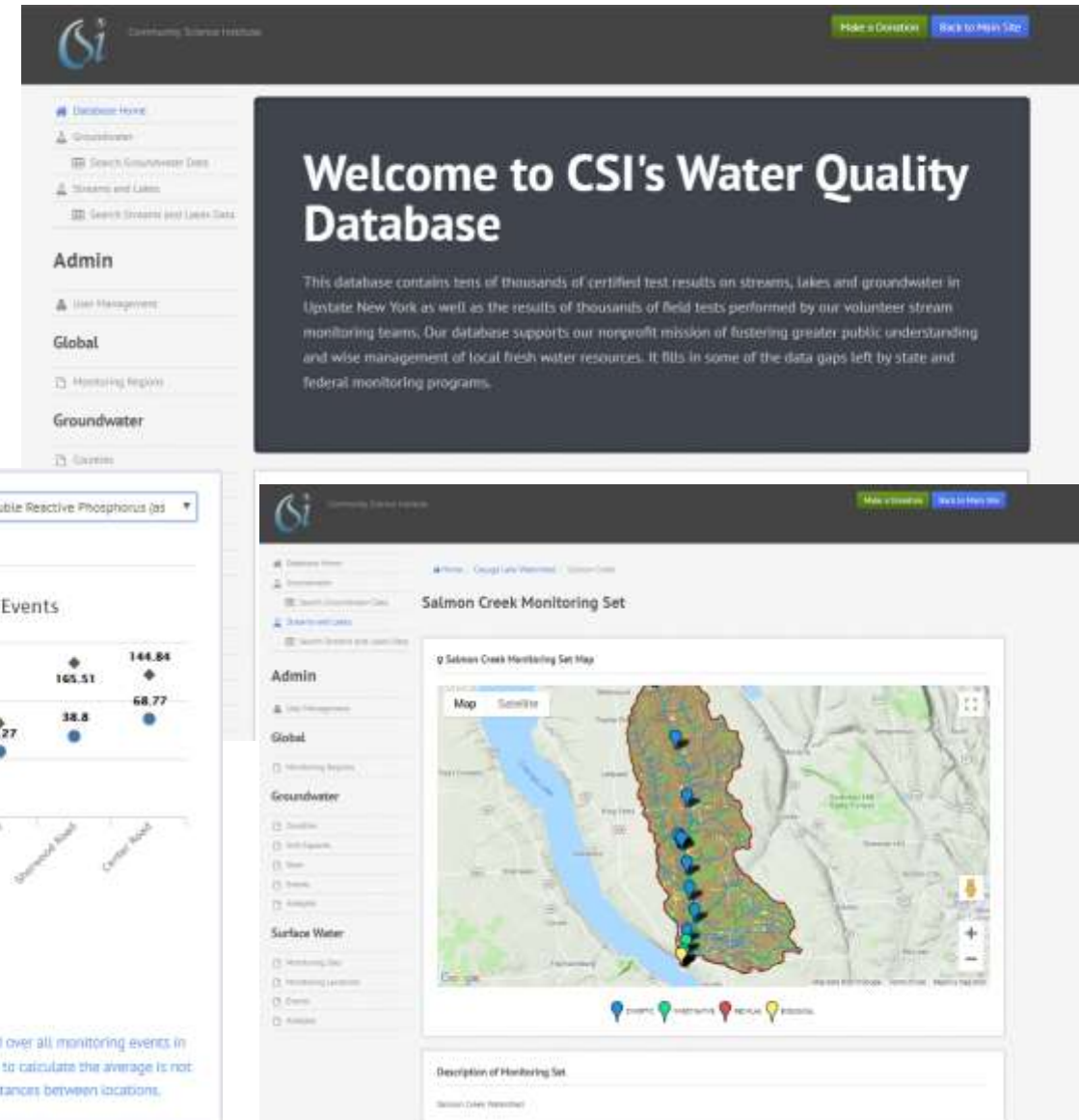


All data that we collect in partnership with our volunteers are archived in CSI's online public Water Quality Database. It can be accessed free of charge at [database.communityscience.org](https://database.communityscience.org)

- The data can be easily viewed or downloaded

The database currently has over 80,000 regulatory quality measurements of water quality.

The purpose of the public database is to disseminate scientifically credible results to the public, to local and regional stakeholders, and to government agencies in order to improve water resource understanding and management.

CSI Community Science Institute

Make a Donation Back to Menu

## Welcome to CSI's Water Quality Database

This database contains tens of thousands of certified test results on streams, lakes and groundwater in Upstate New York as well as the results of thousands of field tests performed by our volunteer stream monitoring teams. Our database supports our nonprofit mission of fostering greater public understanding and wise management of local fresh water resources. It fills in some of the data gaps left by state and federal monitoring programs.

Database Home  
Groundwater  
Search Groundwater Data  
Streams and Lakes  
Search Streams and Lakes Data

Admin  
User Management

Global  
Monitoring Reports

Groundwater  
Queries

CSI Community Science Institute

Make a Donation Back to Menu

Database Home  
Home  
Ground Lake Waterways  
Salmon Creek

Search Groundwater Data  
Search Streams and Lakes Data

### Salmon Creek Monitoring Set

Salmon Creek Monitoring Set Map

Map Satellite

Legend: Base Flow Average (blue dot), Stormwater Average (black diamond)

Description of Monitoring Set

Salmon Creek Monitoring Set

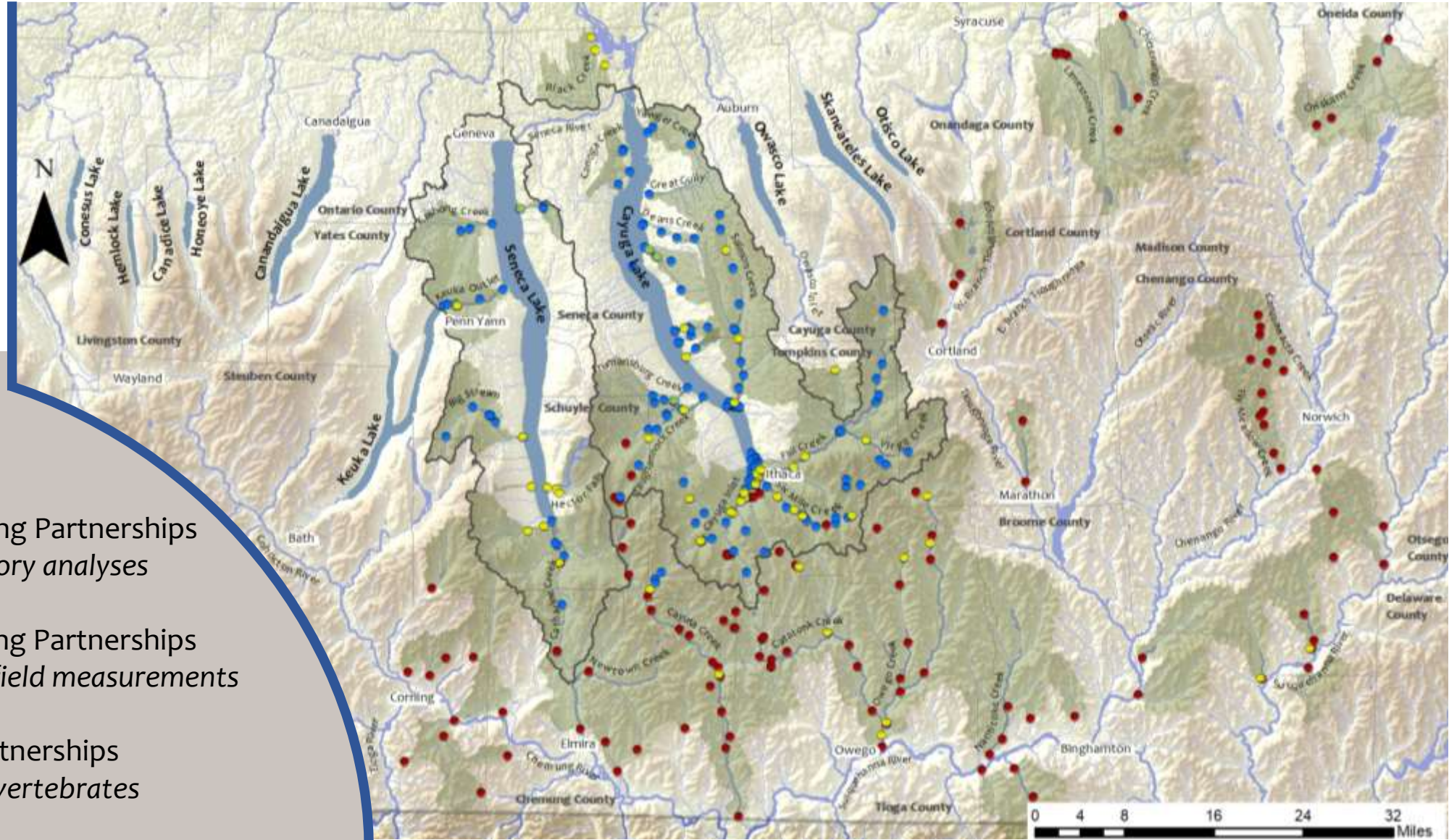


# Volunteer Monitoring Partnerships

- Synoptic Sampling
- Red Flag Monitoring
- Biomonitoring
- Harmful Algal Bloom Monitoring

## Map Legend

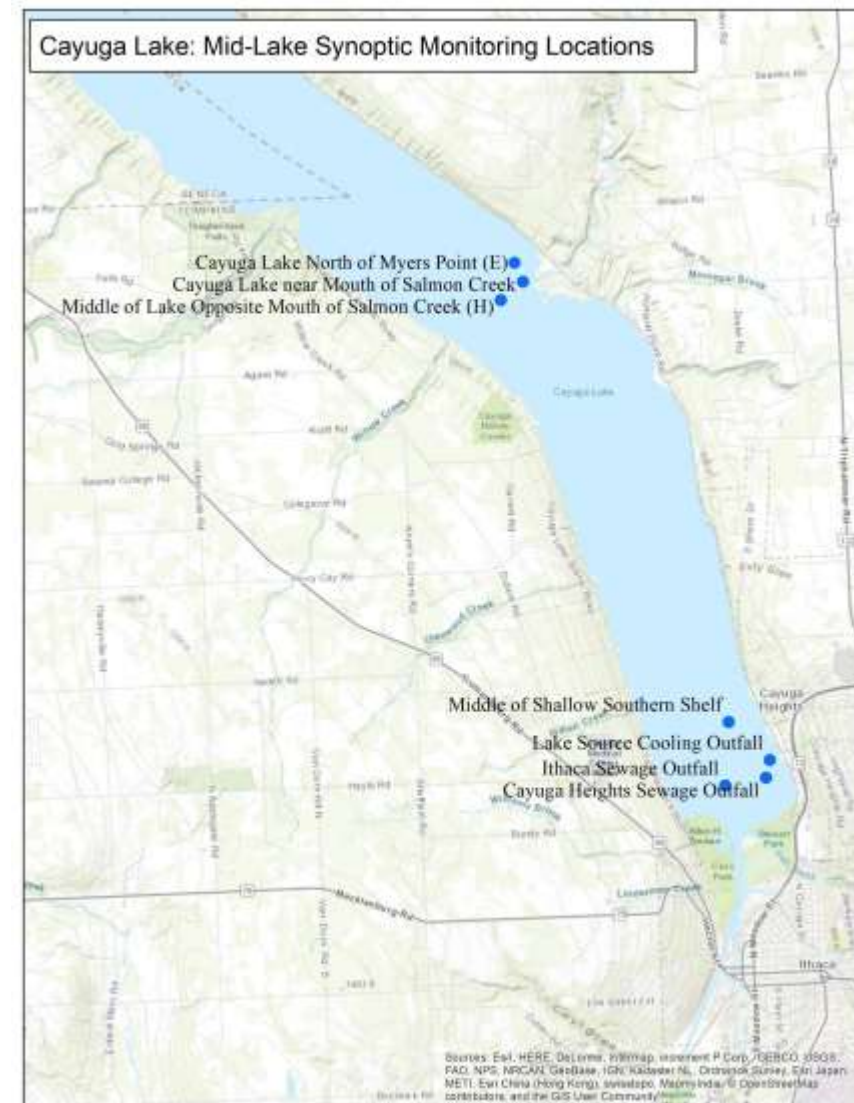
- Synoptic Monitoring Partnerships  
*Certified laboratory analyses*
- Red Flag Monitoring Partnerships  
*Quality-assured field measurements*
- Biomonitoring Partnerships  
*Benthic macroinvertebrates*







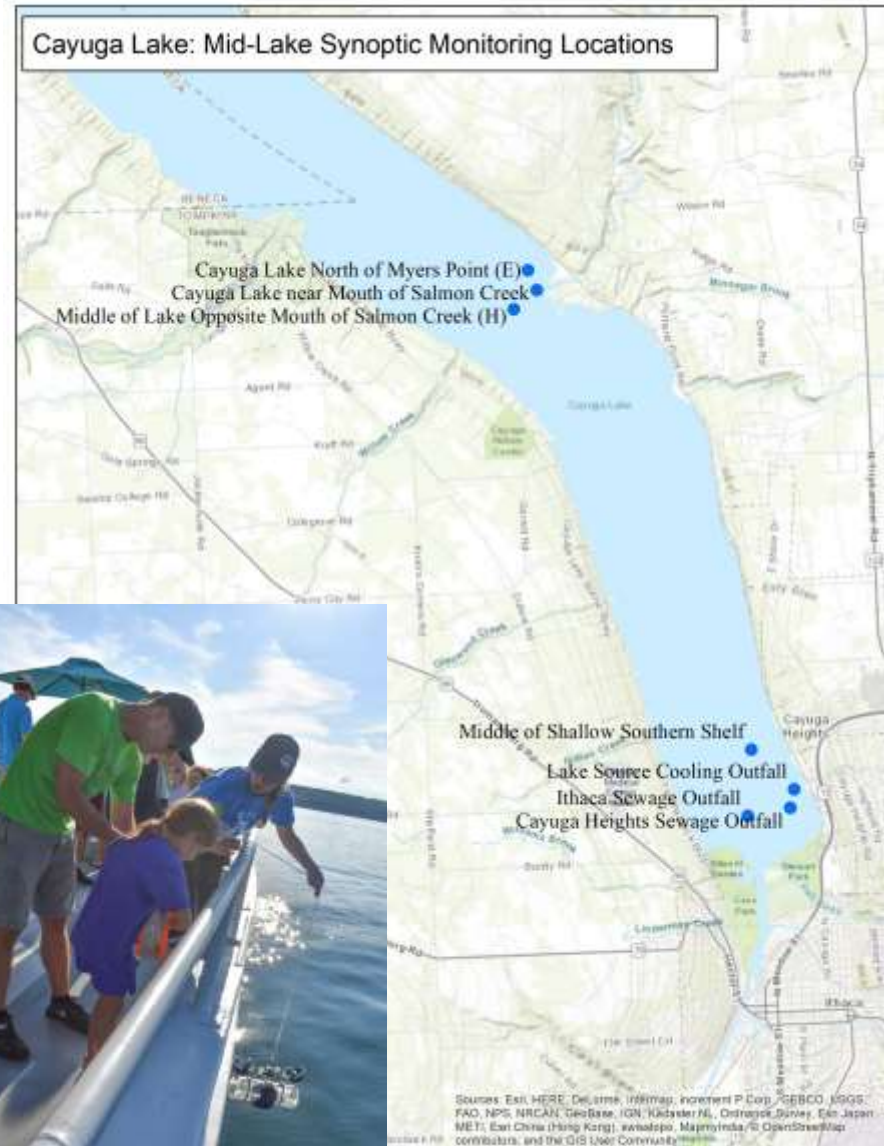
- Open lake monitoring of **seven** locations with the Floating Classroom of Discover Cayuga Lake (DCL)
- Shoreline monitoring of **22** locations on the southwest shore of Cayuga Lake with partners from the West Shore Neighbor Association
- Shoreline monitoring of **eight** locations on the southeast shore near Meyers Park with partners from our Salmon Creek monitoring team.



# Monitoring Mid-Lake Locations

CSI has monitored **seven** mid-lake locations in partnership with Discover Cayuga Lake (DCL) and Tompkins County 4-H since 2004.

- Four locations at the southern shelf, and three further up the lake near Salt Point. At two of the locations, samples from deep (50m) are collected.
- Field measurements and samples are collected aboard the Floating Classroom of Discover Cayuga Lake during summertime Water Quality Cruises.
- These monitoring cruises serve as events in our 4-H2O Youth Education Program provided in partnership with Tompkins County 4-H. Children and families are invited on the cruise to learn about water science and to contribute to monitoring the lake!

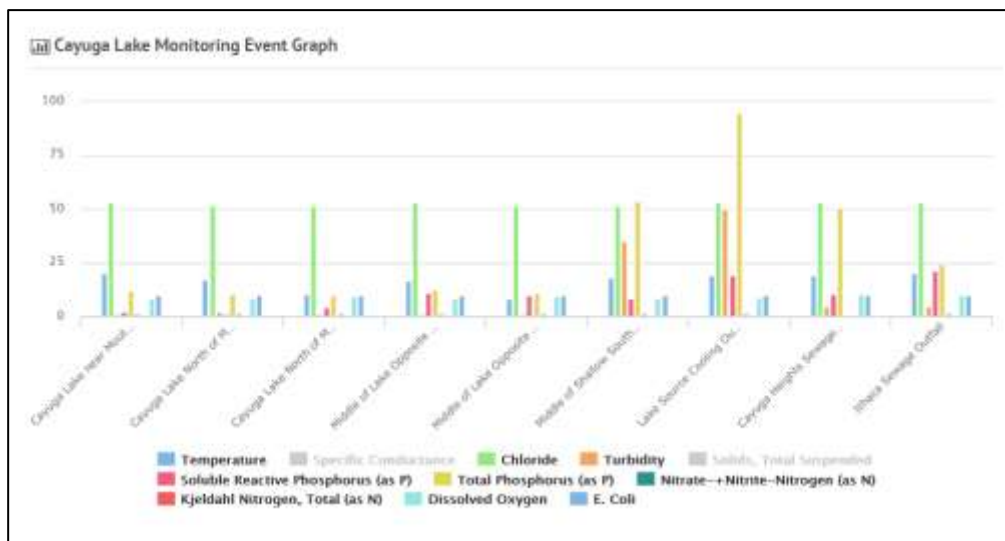




# What are We Monitoring For?

The samples collected during these monitoring cruises are analyzed at our state-certified water testing lab for the following parameters of water quality:

- Conductivity
- Chloride
- Turbidity
- Total Suspended Solids
- Soluble Reactive Phosphorus
- Total Phosphorus
- Nitrate + Nitrite Nitrogen
- Dissolved Oxygen
- E.coli



One of the many interactive graphs found on CSI's public Water Quality Database at [www.database.communityscience.org](http://www.database.communityscience.org)

These parameters are important for characterizing Cayuga Lake water quality. Building long-term datasets helps to reveal any long-term water quality trends.



# What are We Monitoring For?

## Data in Action: De-listing Southern Cayuga Lake

Until 2014, the southern shelf of Cayuga Lake was listed on the 303(d) list of impaired waterbodies for levels of phosphorus and E.coli bacteria. With data collected during our monitoring cruises, CSI was able to de-list the southern shelf as impaired by pathogenic bacteria (E.coli) – importantly showing that Cayuga Lake is a high-quality resource for drinking water, swimming and recreation.

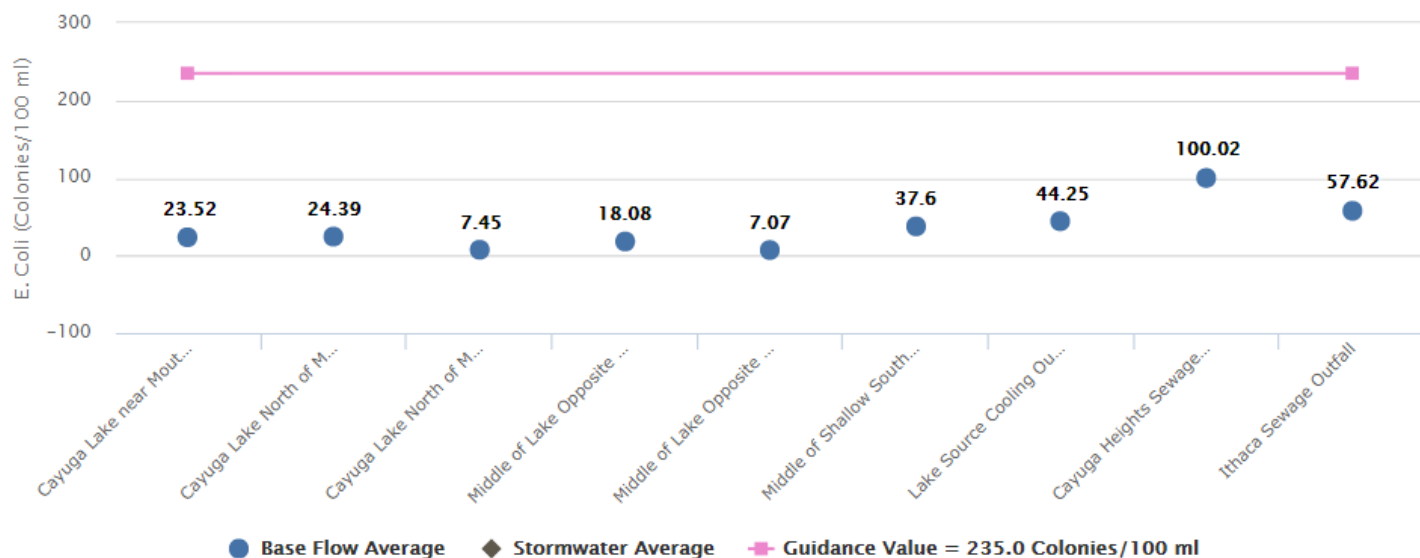
### Cayuga Lake Monitoring Set Graphs

Select Water Quality Indicator

E. Coli

Water Quality Glossary

#### Average E. Coli Over All Monitoring Events



This graph can be found on CSI's public [Water Quality Database](http://www.database.communityscience.org) at [www.database.communityscience.org](http://www.database.communityscience.org)

# Monitoring Cayuga's Western Shore

CSI has monitored **22** shoreline locations in partnership with the West Shore Neighbors Association since 2014 – nearly seven years of water quality monitoring!

- Members collect samples near the shoreline of their residence to be tested at CSI's state-certified water testing lab.
- Samples are collected on the same day once per month during the summer as a “Synoptic Monitoring Event”, providing a comprehensive “snapshot” of water quality.
- Samples are collected along an approximately **10-mile** length of shoreline!
- All data collected over the past six years can be found on our public Water Quality Database.

## What are we monitoring for?

Here at the lab we analyze the samples for levels of **E.coli** bacteria. E.coli serves as a “red flag” indicator of **failing septic systems** and **runoff**.

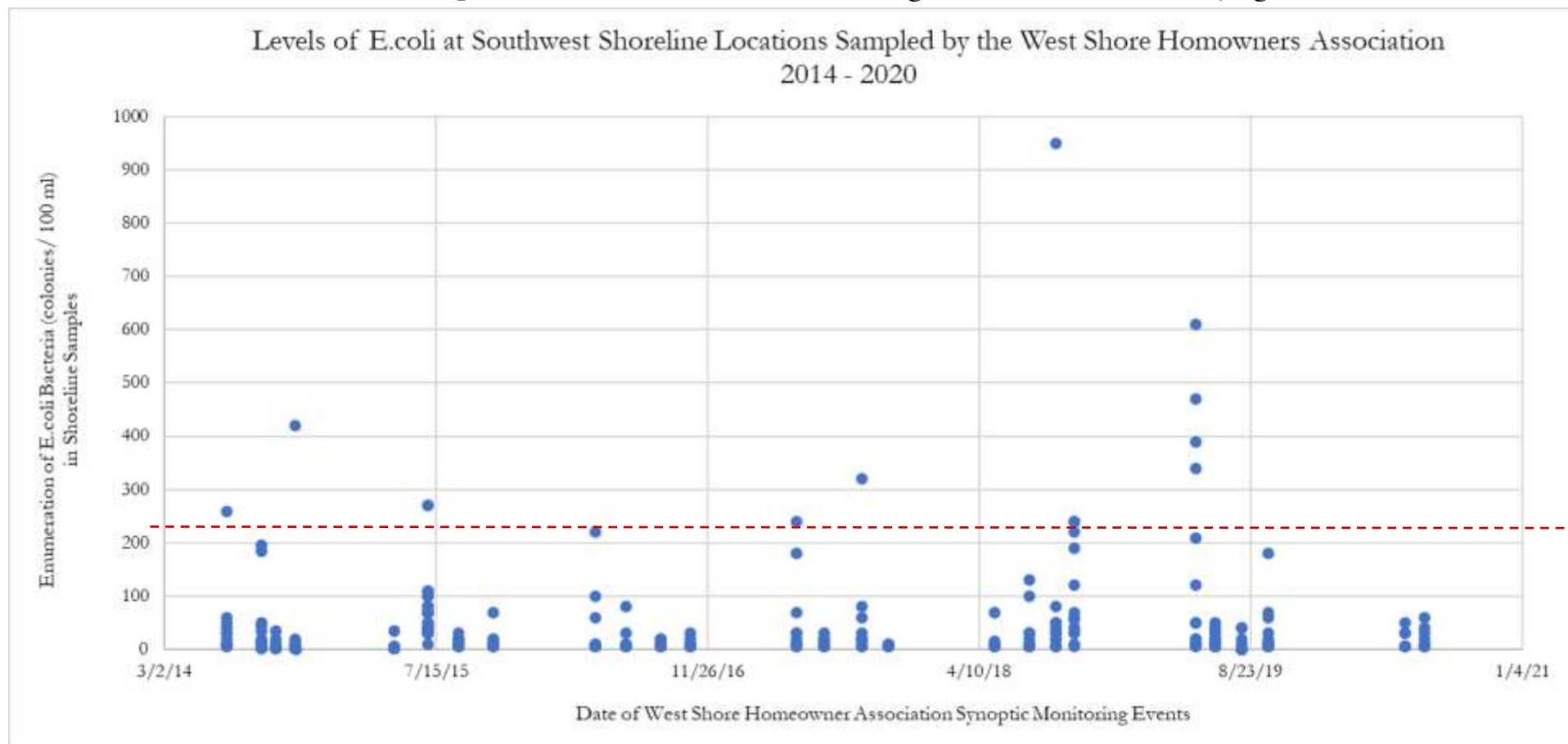




# What Have We Found?

Of the 300+ samples collected by West Shore Neighborhood Association members analyzed at CSI's certified testing lab, only 13 or 4% have had E.coli levels that exceed the safe limit of 235 colonies/ 100 ml used to regulate NY State swimming beaches.

- this long-term dataset indicates that shoreline septic systems **are not** a source of contamination at these locations, and that during most instances, levels of E.coli do not present a risk to those swimming on this section of Cayuga's shoreline.



Safe Limit for NY State  
swimming beaches  
**235 colonies/ 100 ml**

# What Have We Found?

This is further substantiated by the fact that all locations monitored on the western shoreline have seven-year average E.coli concentrations well below the safe limit for recreation. Average E.coli concentrations range from 8.33 to 74.33 colonies/ 100 mL.

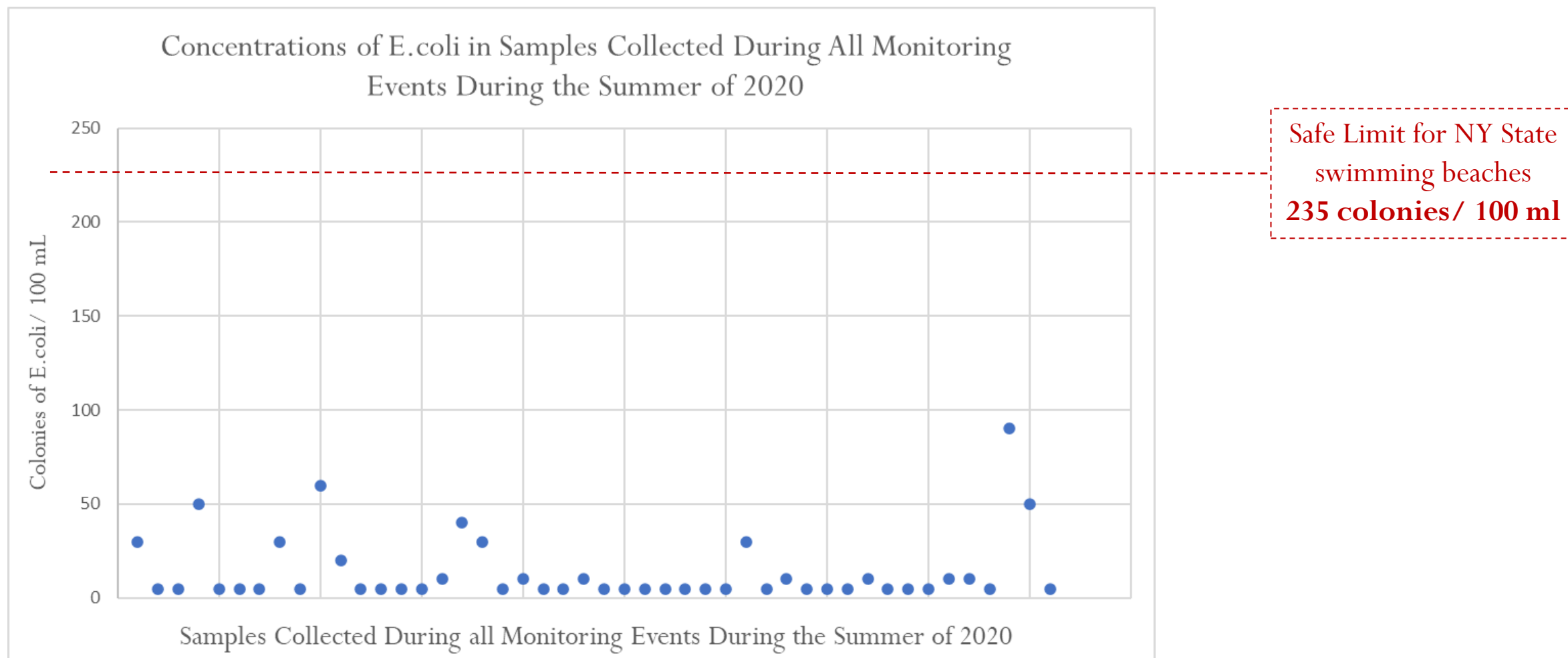


Safe Limit for NY State  
swimming beaches  
**235 colonies/ 100 ml**



# What Have We Found?

In 2020, all E.coli concentrations were found to be well below the safe limit – at every location, and during each monitoring event – in June, July, August, and September.



# The Cayuga Lake HABs Monitoring Program

The Cayuga Lake HABs Monitoring Program is led by the Community Science Institute (CSI), in collaboration with the Cayuga Lake Watershed Network (CLWN) and Discover Cayuga Lake (DCL).

## The purpose of the program is to:

1. Provide timely information and hazard warnings to the users of Cayuga Lake.
2. Develop information about the occurrence of HABs, which may be useful in future responses and long-term mitigation of cyanobacteria blooms on Cayuga Lake.

The program is a partnership of these organizations and you, dedicated volunteers who monitor sections of shoreline around the lake and report their observations.





# Reporting HABs on Cayuga Lake

# The Cayuga Lake HABs Reporting Page

All bloom reports and results of bloom analysis are reported on CSI's website in **near to real-time** to provide quick hazard warnings and alerts to all who use Cayuga's waters.

# The Cayuga Lake HABs Reporting Page



## Cayuga Lake HABs Reporting Page

#### Locations of Cyanobacteria Blooms and Results of Lab Analyses

Our work to monitor and report harmful algal blooms on Cayuga Lake is supported by Tompkins County and the Park Foundation.

## Cayuga Lake Cyanobacteria (HABs) Reporting Map

The Cayuga Lake Cyanobacteria Reporting Map serves as an interactive resource for all cyanobacteria blooms on Cayuga Lake. Click on an icon to view a description of the bloom including photos as well as test results from the CSI lab.

Our lake-wide HABs monitoring program still depends on local support from people like you. Thank you for helping us address the risk posed by HABs and develop the information necessary to guide HABs management strategies for Cayuga Lake!

We recommend viewing the map in full screen mode in order to see all the information provided. Click on the broken box in the upper right hand corner of the map. This will open the full screen map in a new tab.

**Important Note:** HABs are usually transient, often lasting no more than a couple of days. This map is retrospective, meaning that it reports blooms since the beginning of the 2021 HABs season. If you are concerned about a particular part of the lake, check the date of the bloom on the map and in the table. Blooms reported more than a couple of days ago could well have dissipated. Regardless of where you choose to swim or boat on our beautiful lake, learn to recognize the appearance of HABs on CST's [HABs Monitoring information page](#), and avoid all suspicious blooms. Call local state parks for current information regarding beach closures.

### Guide to Map Icons

Colored icons indicate the microcystin toxin status of the cyanobacteria bloom. The status of the bloom can be found by clicking on the bloom icon, or on the side menu when viewing the map full screen.

Cyanoacrylate-Blood (HAB) Hydrogels in Their States

**Blue** - Suspicious Bloom: Photos indicate that the suspicious bloom may be a harmful algal bloom. [Click here](#) for more information on this bloom.



## Interactive reporting map



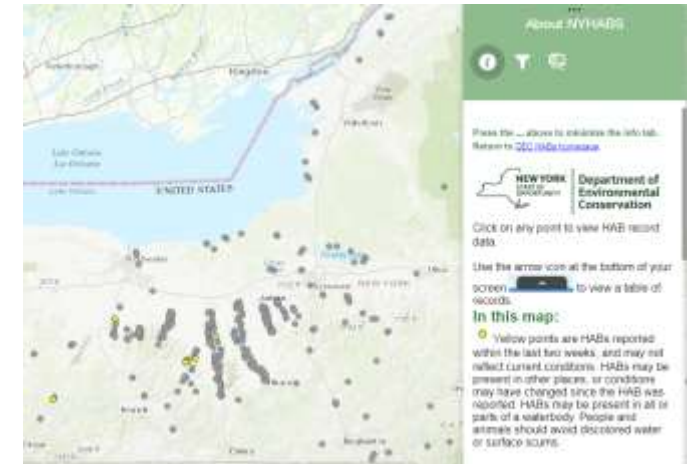
Complete table of bloom results to date

Cayuga Lake HABs Information and Master Results Table								
2019 Cayuga Lake HABs Information and Results Table - Cayuga Lake 2019 HABs Results								
75.7561				Bloom Location Information				
Result Number Sample	Date Sampled	Time Sampled	Date Sample Received at CLU Lab	Monitoring Station	Location Description	Bloom System	Latitude	Longitude
75.7561-01	7/15/2019	8:30	7/15/2019 at 9:30 AM	Northwest	Offshore area of Cayuga Lake, 10 miles SW	Great Lakes	43.7700	-76.2800
75.7561-02	7/15/2019	9:30	7/15/2019 at 10:30 AM	Northwest	Close to shoreline of Cayuga Lake, 10 miles SW	Great Lakes	43.7600	-76.2800
75.7561-03	7/15/2019	10:30	7/15/2019 at 11:30 AM	Northwest	Offshore area of Cayuga Lake, 10 miles SW	Great Lakes	43.7500	-76.2800
75.7561-04	7/15/2019	11:30	7/15/2019 at 12:30 PM	Northwest	Offshore area of Cayuga Lake, 10 miles SW	Great Lakes	43.7400	-76.2800
75.7561-05	7/15/2019	12:30	7/15/2019 at 1:30 PM	Northwest	Offshore area of Cayuga Lake, 10 miles SW	Great Lakes	43.7300	-76.2800
75.7561-06	7/15/2019	1:30	7/15/2019 at 2:30 PM	Northwest	Offshore area of Cayuga Lake, 10 miles SW	Great Lakes	43.7200	-76.2800
75.7561-07	7/15/2019	2:30	7/15/2019 at 3:30 PM	Northwest	Offshore area of Cayuga Lake, 10 miles SW	Great Lakes	43.7100	-76.2800
75.7561-08	7/15/2019	3:30	7/15/2019 at 4:30 PM	Northwest	Offshore area of Cayuga Lake, 10 miles SW	Great Lakes	43.7000	-76.2800
75.7561-09	7/15/2019	4:30	7/15/2019 at 5:30 PM	Northwest	Offshore area of Cayuga Lake, 10 miles SW	Great Lakes	43.6900	-76.2800

## CLWN Weekly Updates to the Public



## Report to NYHABs State-wide Reporting System

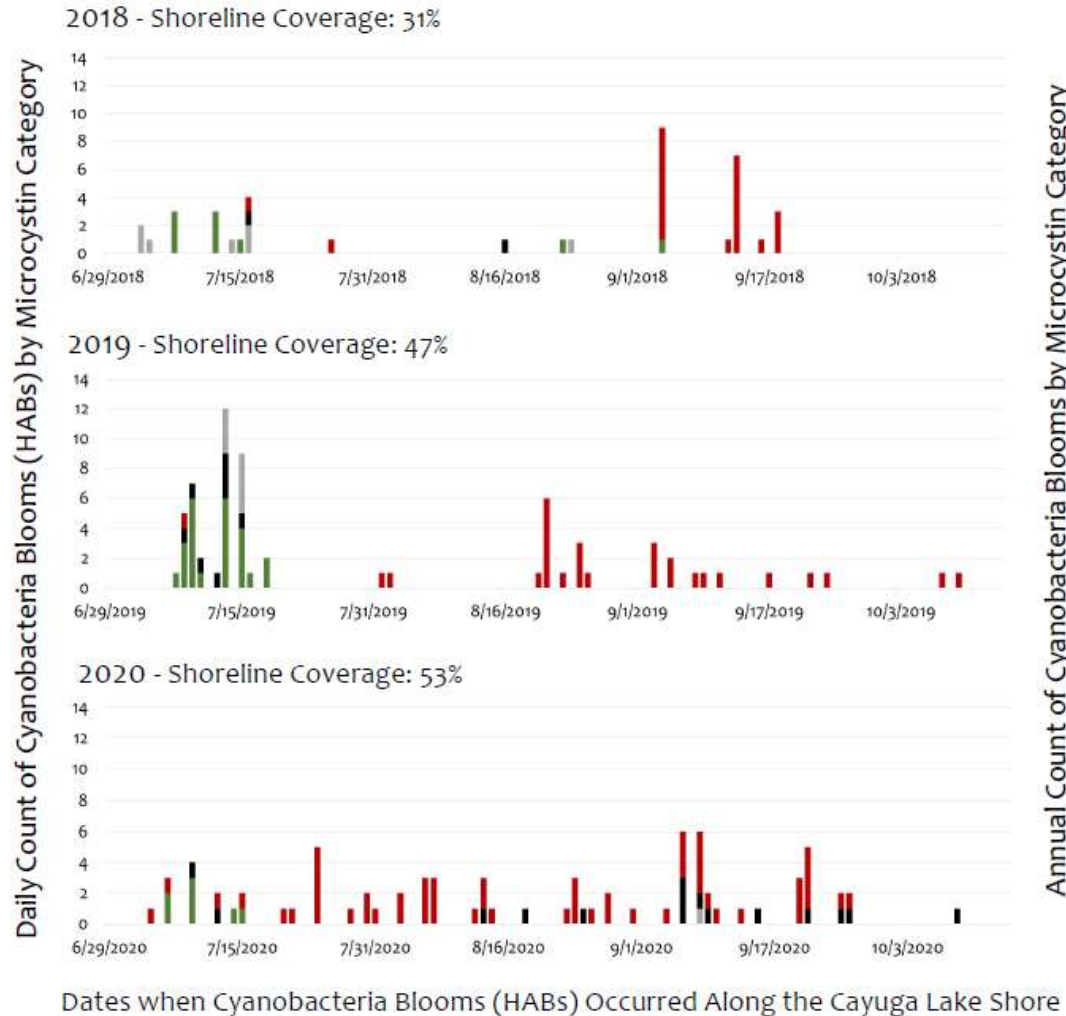


View on CSI's website at [www.communityscience.org](http://www.communityscience.org)



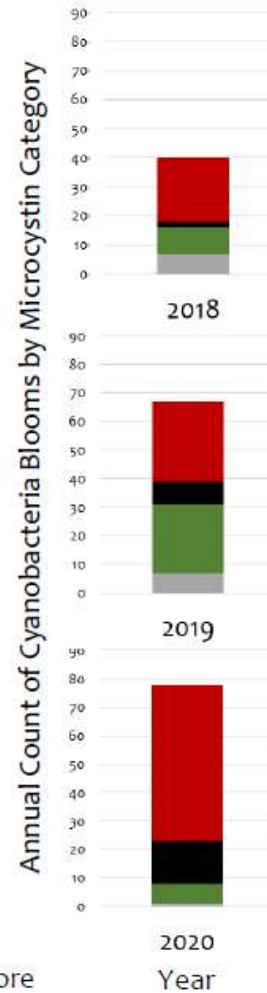
# Multi-Year Patterns: Temporal Patterns

Daily Counts and Annual Totals of Cyanobacteria Blooms (HABs) in Three Microcystin Categories in 2018, 2019, and 2020



The temporal pattern of “high” microcystin blooms was different in 2020 compared to 2018 and 2019.

- In 2020 blooms occurred continuously throughout the summer.
- “High” microcystin blooms began occurring in early July

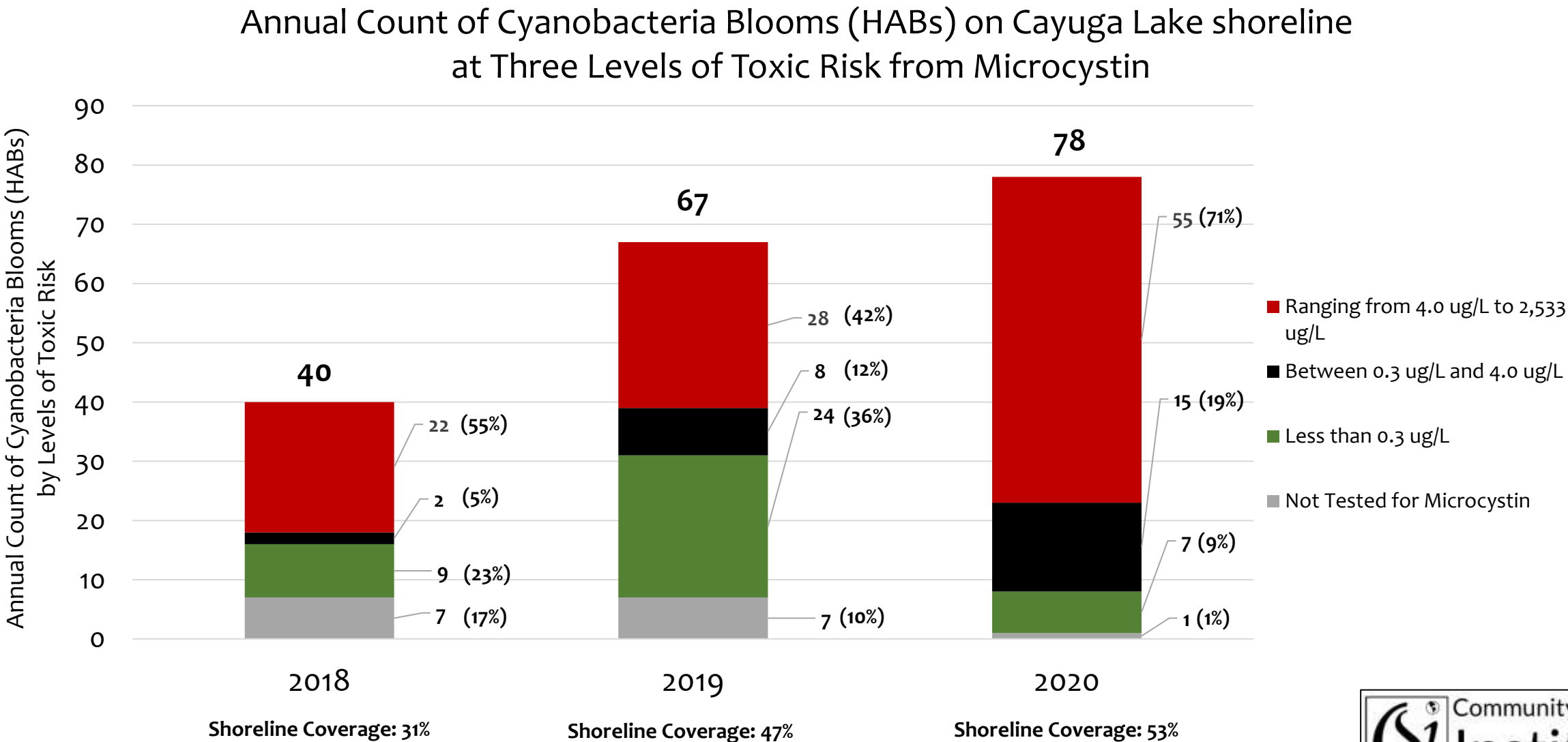


## Legend

- Blooms with a microcystin level ranging from 4 µg/L to 2,533 µg/L.
- Blooms with a microcystin level greater than 0.3 µg/L but less than the recreation limit of 4.0 µg/L .
- Blooms with a microcystin level less than the method detection limit of 0.3 µg/L\*.
- Not tested for microcystin.

\*0.3 µg/L is also the NYSDOH limit for microcystin in finished drinking water.

# Multi-Year Patterns: An Increase of “High” Microcystin Blooms

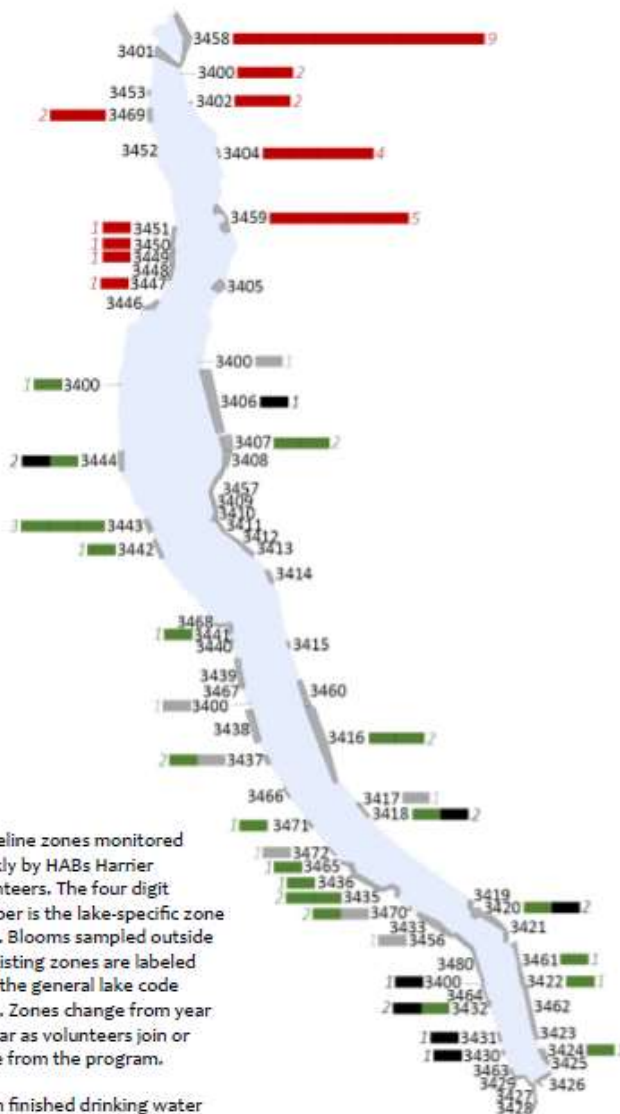




# Multi-Year Patterns: Spatial Patterns

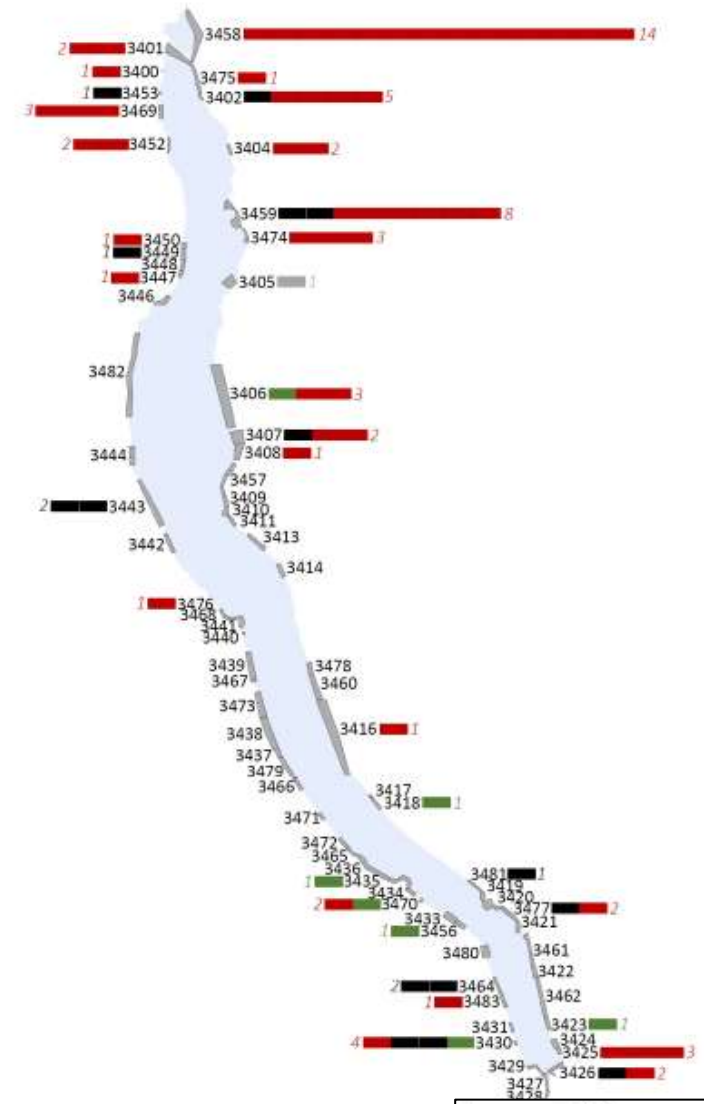
## Annual Count of HABs for each Monitoring Zone by Microcystin Category in 2019

Figure 4a. The distribution of “high” microcystin blooms was characterized by a cluster along approximately 25 miles of northern shoreline in Cayuga and Seneca Counties.



## Annual Count of HABs for each Monitoring Zone by Microcystin Category in 2020

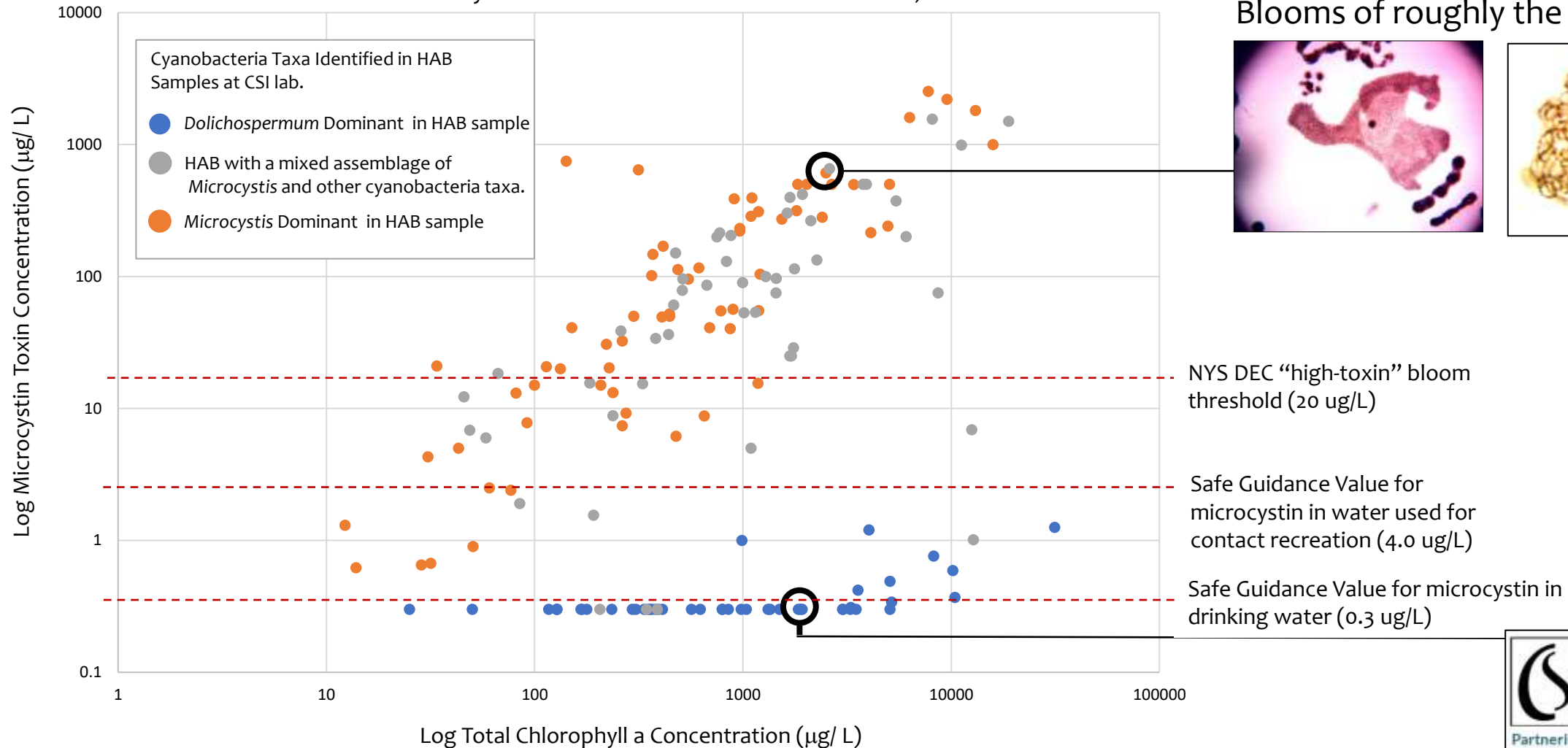
Figure 4b. “High” microcystin blooms were recorded along the southern 75 miles of shoreline in addition to a large cluster in the north.



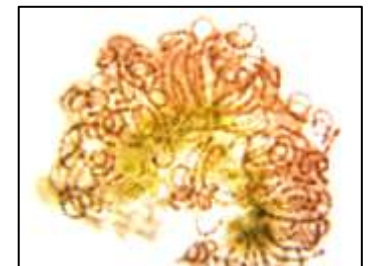
# Multi-Year Patterns: Taxa Associated Microcystin

Three years of bloom data reinforces the idea that the microcystin toxin concentrations of blooms on Cayuga Lake are associated with the type of cyanobacteria that forms the bloom.

Microcystin Toxin Concentration Increased with Cyanobacteria Bloom (HABs) Sample Biomass when *Microcystis* was Dominant or Present in HABs, 2018 - 2020



Blooms of roughly the same density



# The 2021 Monitoring Season

Over **90 HABs Harrier** volunteers are participating in the program this year! Approximately **28 volunteers** on the southwest shore!

With **87 monitoring zones**, roughly **60%** of lake shoreline is being monitored weekly, including State Parks, municipal lakefront parks, natural areas, and other public shoreline.

**HAB Information and Reporting Guide** brochures installed at **six** lakefront parks.

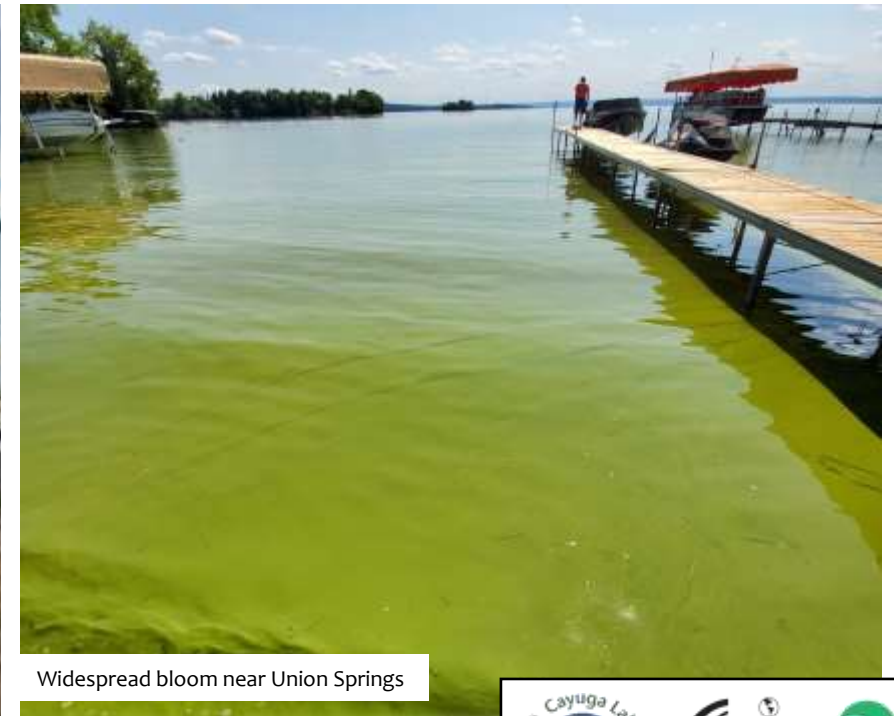
Over **13,000 views** of our Cayuga Lake HABs Reporting Page so far this summer.



Bill Ebert collecting a late summer bloom sample



HABs Information and Reporting Guide installed at Harris Park in the Village of Cayuga



Widespread bloom near Union Springs



# The 2021 Monitoring Season

So far this year, **48 blooms** have occurred on the Cayuga Lake shoreline.

Many of these blooms occurred in mid-July, following intense rainstorms. These blooms were widespread and dense.

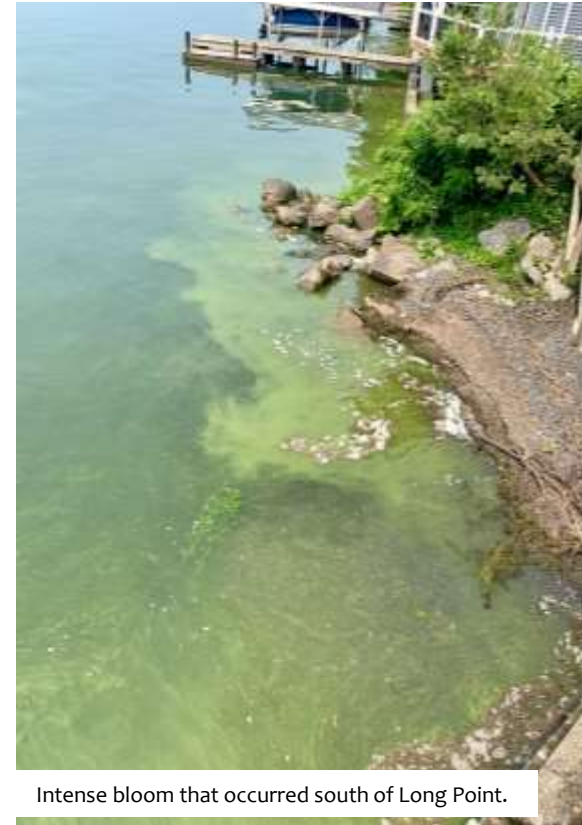
**Based on tentative multi-year patterns** revealed by the past three years of data, we can anticipate bloom occurrences to become more frequent again in early September, and then fade away by the first week of October.



Intense bloom that occurred south of Myers Park



Widespread, open water bloom in the north on Thursday, 8/26/2021. Photo taken by Bill Hecht



Intense bloom that occurred south of Long Point.



# Thank You

## How You Can Help Protect Water Quality?

Volunteer to monitor water quality with the Community Science Institute! Data initiates and informs action! We always welcome new volunteers! If you'd like to volunteer, please contact us at:

**[info@communityscience.org](mailto:info@communityscience.org)**

**(607) 257-6606**

or

**[www.communityscience.org](http://www.communityscience.org)**

Take part in the Lake Friendly Living Program to learn how you can continue to be a water quality responsible landowner. For more information in Lake Friendly Living, please contact the CLWN Program Associate, Jennifer Tufano, at:

**[programs@cayugalake.org](mailto:programs@cayugalake.org)**

Learn about current proposals to manage Cayuga Lake such as the recently released DRAFT Cayuga Lake TMDL for phosphorus. Participate in public comment of these proposals and take part in local government proceedings when possible.

