

Partnering with communities to monitor water quality in Cayuga County

Cayuga County WQMA Meeting
5/4/2023, 10 AM

Grascen Shidemantle, Ph.D.
Executive Director



CSI Agenda

- Introduction to CSI
- Synoptic Stream and Lake Monitoring Partnership in Cayuga County
- Harmful Algal Bloom Monitoring Partnership in Cayuga County
- Biomonitoring Partnership in Cayuga County
- CSI and WQMA – how can we work together?



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Nonprofit
501(c)3
Organization

NYSDOH and
EPA Certified
Lab

Lake &
Stream
Chemistry

Volunteer
Water
Monitoring
Partnerships

HABs

BMI
Monitoring

Public Water
Quality Database

Outreach and
Education

CSI's Mission

To empower communities to protect water quality through volunteer stream and lake monitoring.

CSI Water Quality Monitoring Partnerships

Four Monitoring Partnerships

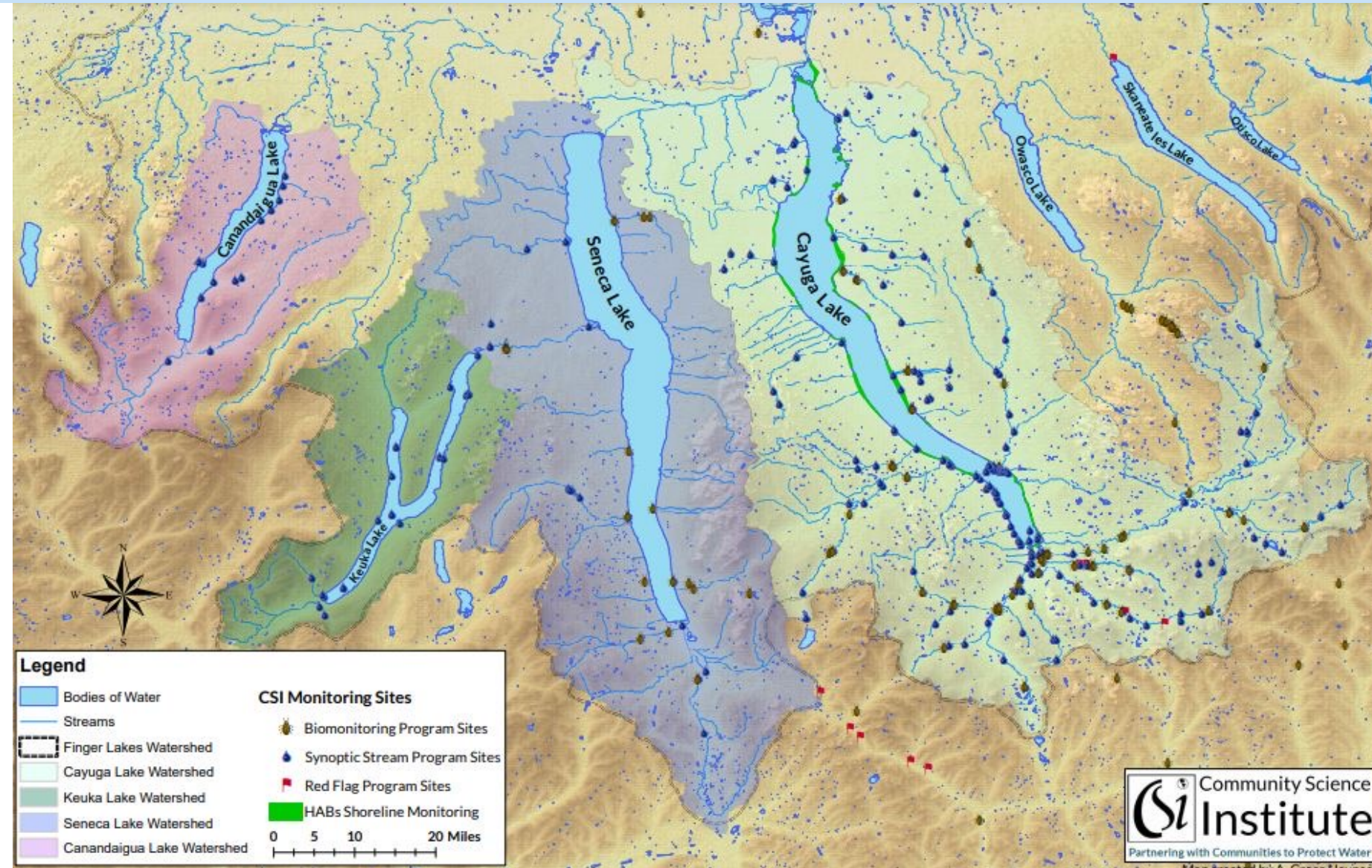
Synoptic Stream and Lake
Chemistry Monitoring

Harmful Algal Bloom (HAB)
Monitoring

Biomonitoring
(Benthic Macroinvertebrate
Monitoring)

Red Flag Monthly Stream
Monitoring

CSI recruits, trains,
and coordinates
over 250
volunteers



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CSI Synoptic Stream and Lake Monitoring Partnership

CSI's synoptic stream volunteers have been monitoring Salmon Creek since 2006!



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.

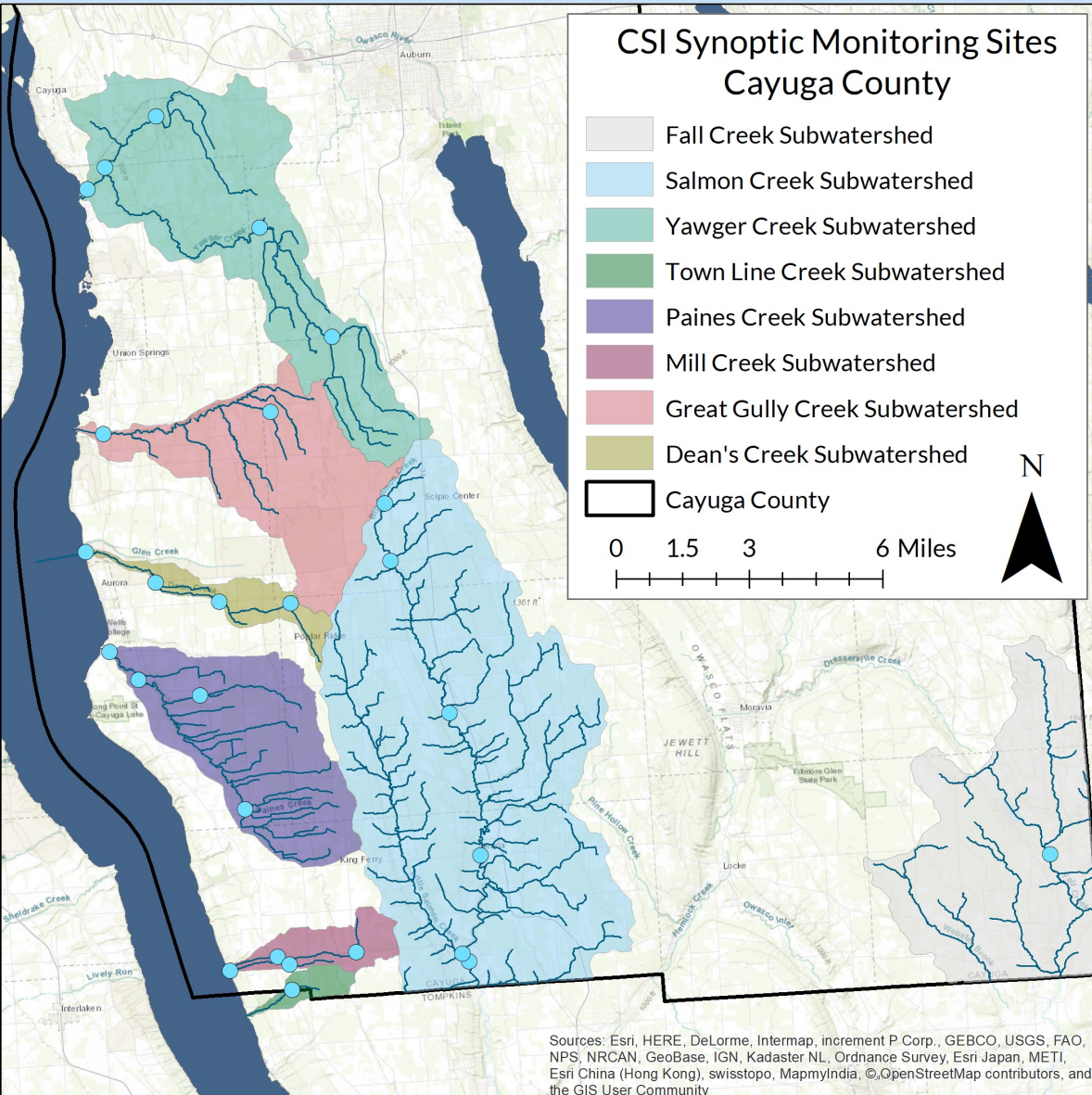
Monitor streams and lakes for:

- Nutrients (TP, SRP, NOx)
- Sediment (TSS)
- Bacteria (E. coli)
- Salt (Chloride)
- pH, hardness, alkalinity, turbidity, conductivity

Volunteers collect samples from their designated stream 3-4 times each year

Samples are analyzed in CSI's state-certified water testing laboratory

CSI Synoptic Stream Monitoring in Cayuga County



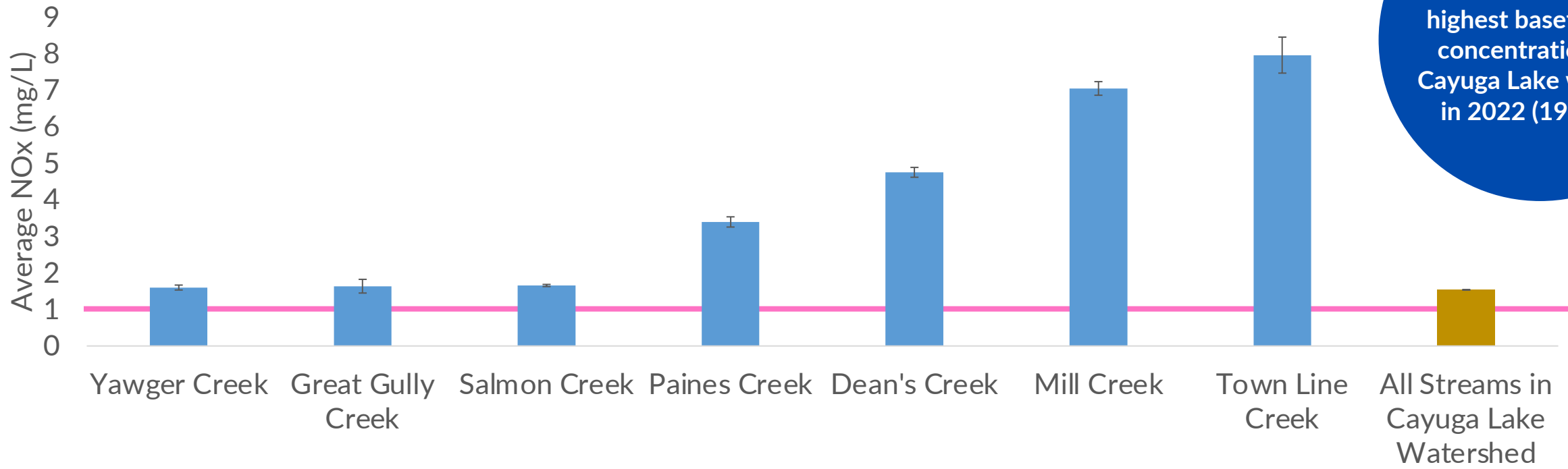
CSI's synoptic stream volunteers monitor the following Cayuga Lake tributaries in Cayuga County:

1. Yawger Creek
2. Great Gully Creek
3. Dean's Creek
4. Paines Creek
5. Mill Creek
6. Town Line Creek
7. Salmon Creek

Thank you to
Cayuga County for
supporting our
stream monitoring
efforts in Cayuga
County since
2018!

Si Synoptic Stream Monitoring in Cayuga County

Average Nitrate+Nitrite-Nitrogen (NOx) in 2022*



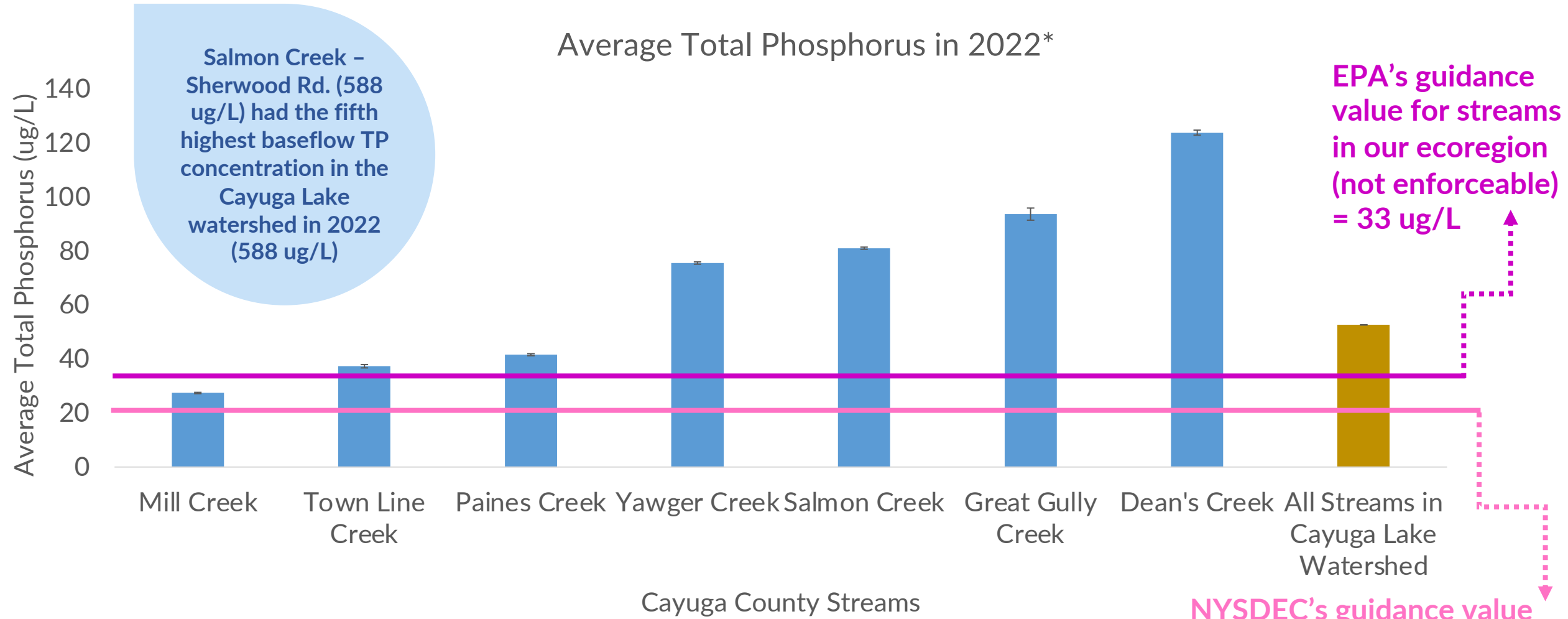
Town Line Creek - Lake Rd. had the fourth highest baseflow NOx concentration in the Cayuga Lake watershed in 2022 (19.5 mg/L)

Cayuga County Streams

Hudson Basin River Watch guidance value for a healthy stream (not enforceable) = 1 mg/L

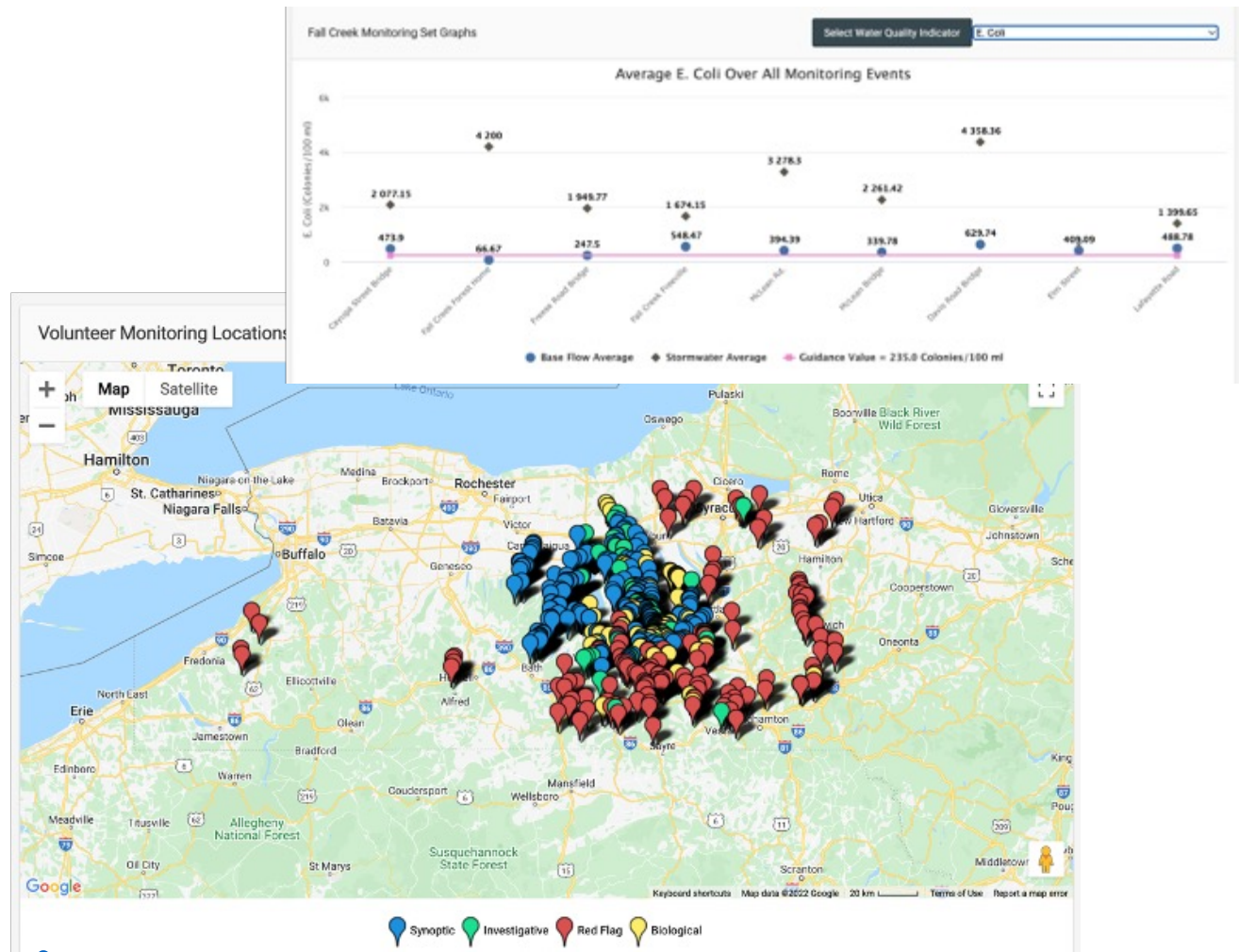
*All data represented here are from baseflow sampling events. No stormwater data were collected in Cayuga County in 2022 due to drought-like conditions.

Si Synoptic Stream Monitoring in Cayuga County



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No stormwater data were collected in Cayuga County in 2022 due to drought-like conditions.

Our database houses over 100,000 regulatory-quality measurements of water quality!



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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.

Test HABs samples to:

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

Bloom information is uploaded to our **NEW [HABs Database](#)**



HABs Harriers perform weekly shoreline surveys for HABs

Blooms are reported to CSI via our HABs Hotline

Samples are analyzed in our state certified lab



Collaboration with
CLWN

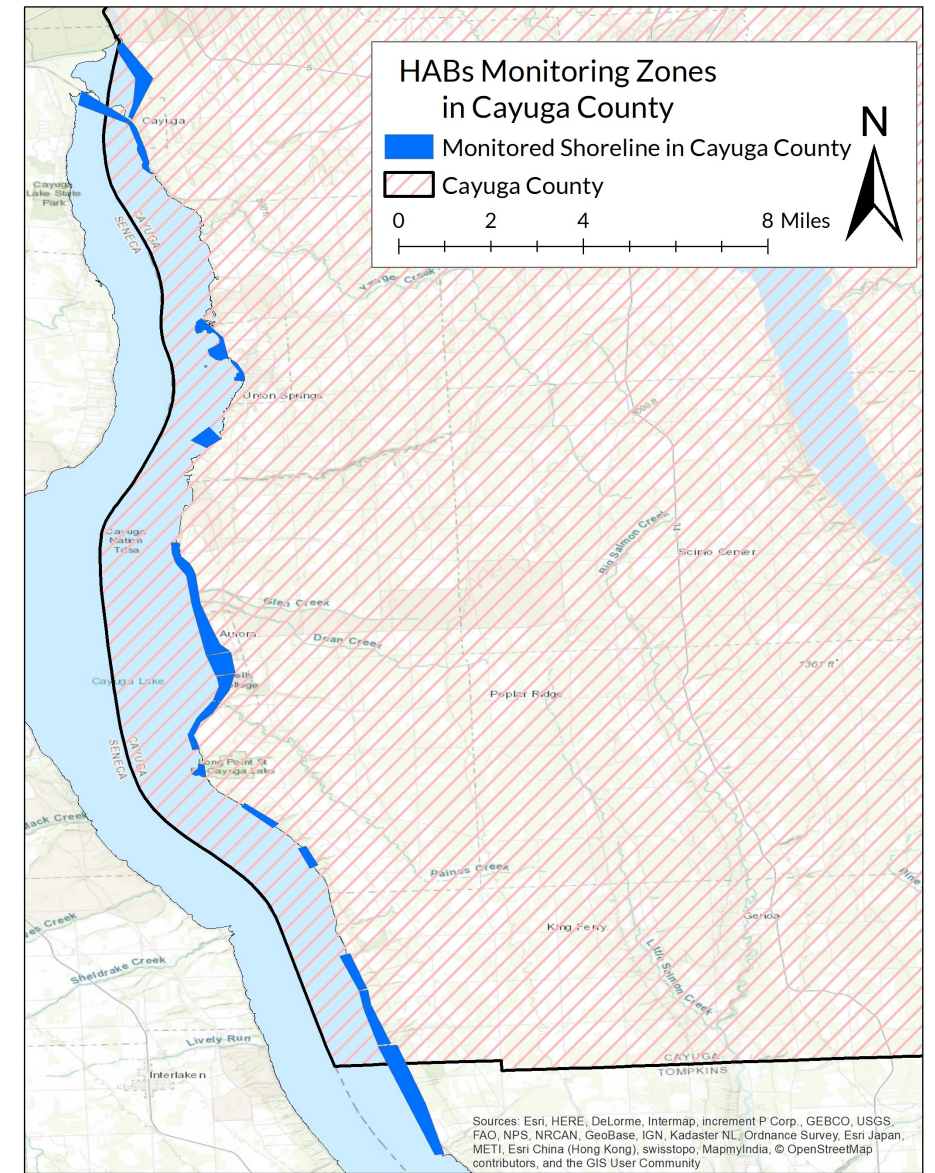
CSI HAB Monitoring in Cayuga County

CSI's HABs Harriers monitor 53% of the shoreline in Cayuga County

Members of the public can also report HABs to our HABs hotline

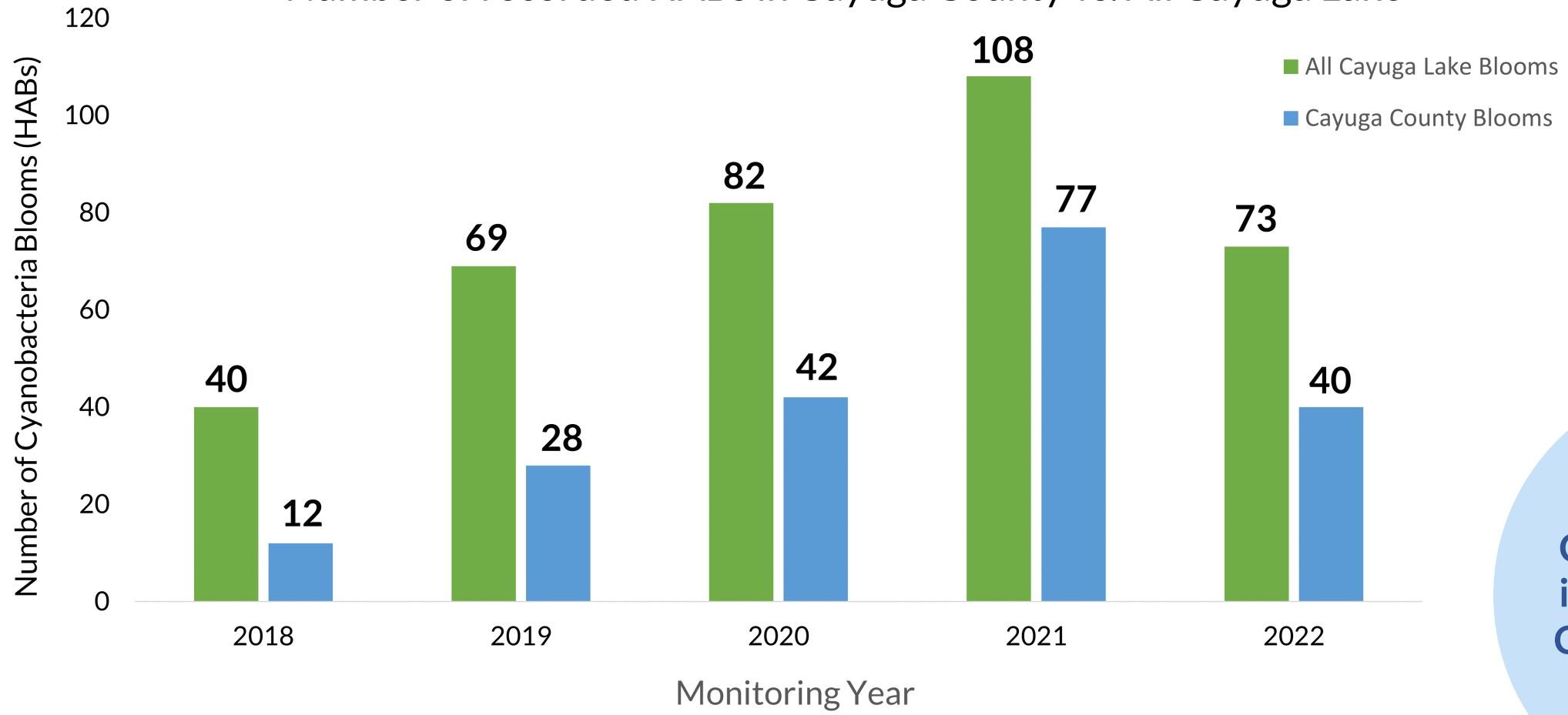
Thank you to Cayuga County for supporting our HAB monitoring program in Cayuga County!

We are always looking for more volunteers to fill in the gaps! For more information, email Grace at aghaynes@communityscience.org



Si HAB Monitoring in Cayuga County

Number of recorded HABs in Cayuga County vs. All Cayuga Lake



Learn more about Cayuga Lake HABs in 2022 at CLWN's Cayuga Lake Spring Conference on May 18.

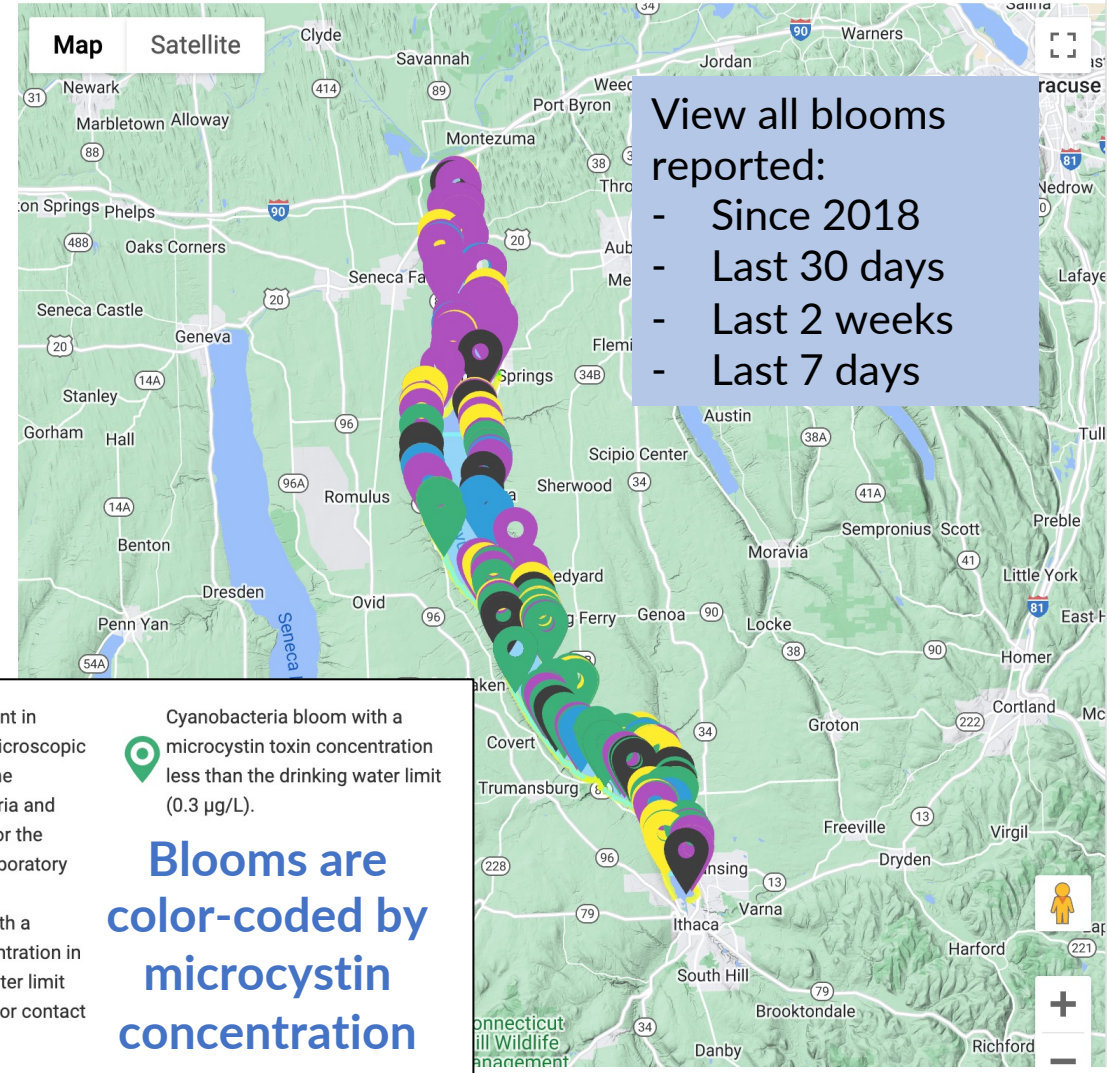
Landing Page

Events				
	Bloom Code	Observed	Segment	Extent
1	22-3492-B2	October 05, 2022	Lakeshore Segment Southeast 1: Elmwood Point to Lake Ridge Point	Small Localized (few properties)
2	22-3458-B7	September 30, 2022	Lakeshore Segment Northeast 1: Northern Marshes to Harris Park	Large Localized
3	22-3492-B1	September 30, 2022	Lakeshore Segment Southeast 1: Elmwood Point to Lake Ridge Point	Large Localized
4	22-3414-B1	September 24, 2022	Lakeshore Segment Northeast 10: Long Point State Park to Elmwood Point	Small Localized (few properties)
5	22-3410-B1	September 24, 2022	Lakeshore Segment Northeast 9: Long Point State Park	Widespread
6	22-3478-B2	September 24, 2022	Lakeshore Segment Southeast 1: Elmwood Point to Lake Ridge Point	Large Localized

Table of HAB Events with links to lakeshore segments and blooms

Map defaults to display all HABs since 2018. Use drop-down menu to select recent bloom reports

All Blooms since 2018



View all blooms reported:

- Since 2018
- Last 30 days
- Last 2 weeks
- Last 7 days

378
HABS REPORTED SINCE 2018

Tally of the number of blooms reported since the start of our monitoring program

Suspicious Bloom. Photos indicate that the suspicious bloom is highly likely to be a harmful algal bloom (HAB). No laboratory results are yet available.

Cyanobacteria bloom with a microcystin toxin concentration that exceeds the limit for contact recreation (4.0 µg/L).

Cyanobacteria are present in bloom (HAB) sample. Microscopic examination indicates the presence of cyanobacteria and therefore the potential for the bloom to be harmful. Laboratory results are pending.

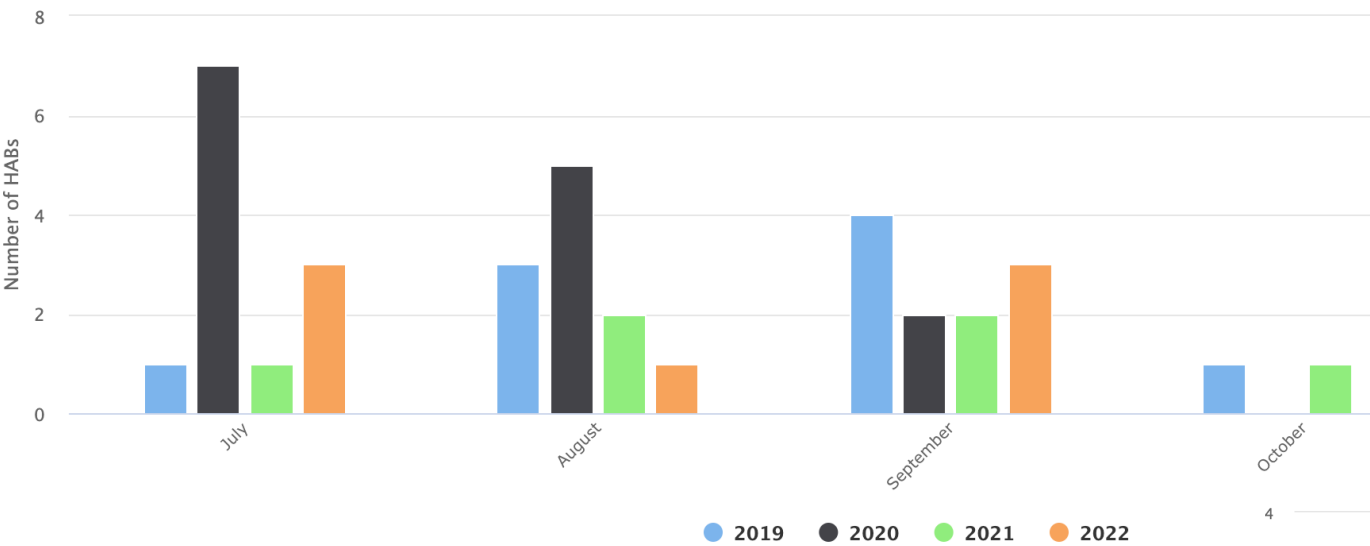
Cyanobacteria bloom with a microcystin toxin concentration in between the drinking water limit (0.3 µg/L) and the limit for contact recreation (4.0 µg/L).

Cyanobacteria bloom with a microcystin toxin concentration less than the drinking water limit (0.3 µg/L).

Blooms are color-coded by microcystin concentration

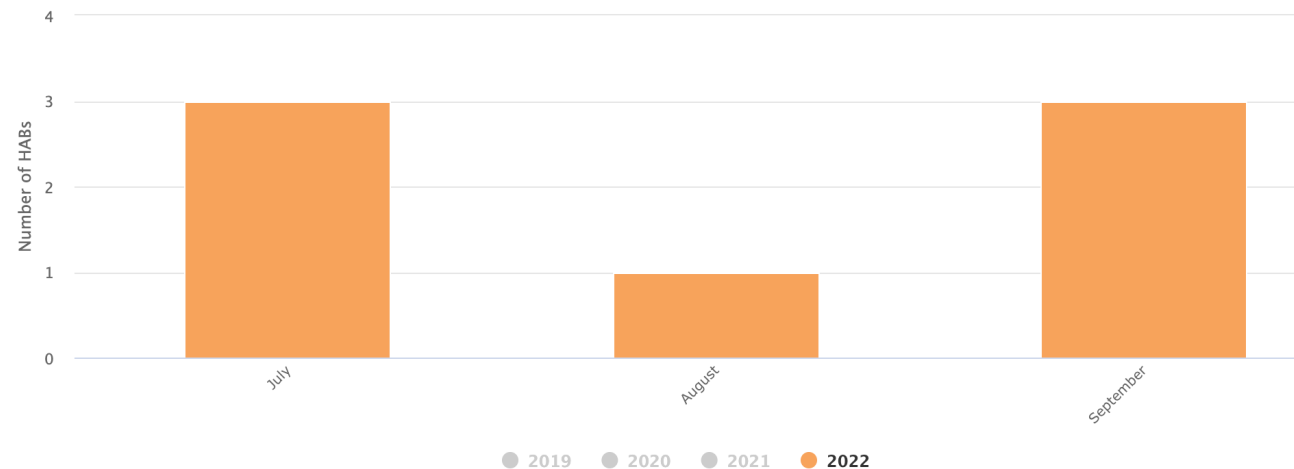
Segment Page

Bloom occurrences during the HABs season over the years



Visualize monthly trends in HABs during each year of our monitoring program

Graphs can be modified to include multiple years or just one year



Event Page

Where, When, and What details for a single bloom

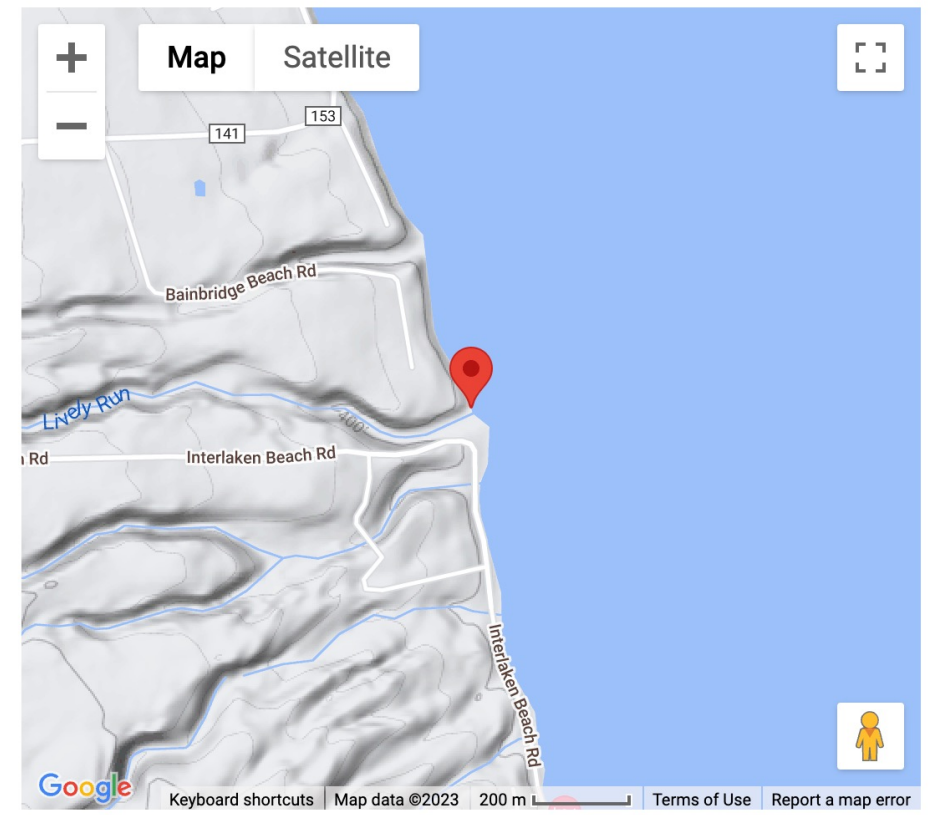
Photo of bloom



Harmful Algal Bloom (HAB) Event Information		Bloom Code	22-3473-B2
Where			
Water Body	Cayuga Lake		
LatLong	42.63014, -76.68778		
Segment	Lakeshore Segment Southwest 9: Frontenac Point to Lively Run		
County	Seneca		
Extent	Large Localized		
When			
Bloom Reported	September 13, 2022		
Bloom Sampled	September 13, 2022		
Microscopic Examination	September 14, 2022		

What	
Bloom Genera ^[1]	Bloom Chemistry

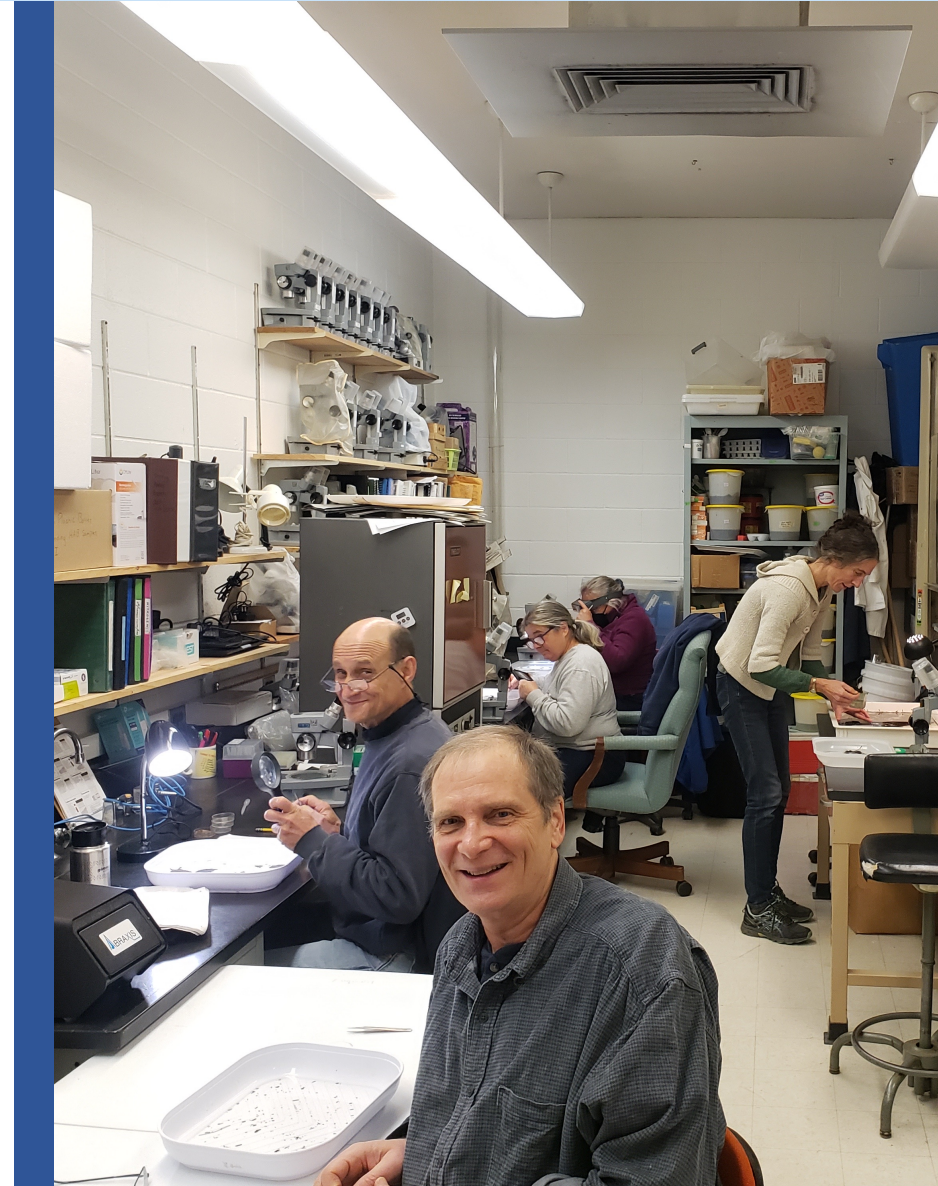
Map



Bloom Description
 shoreline along Interlaken Beach Rd, just east of Shepherdess Cellars

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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](#) – Database in progress!

Si Biomonitoring in Cayuga County



THE COMMUNITY SCIENCE INSTITUTE Great Gully Bio-monitoring Results

non-impacted
slightly impacted
moderately impacted
severely impacted

Want to help monitor this site?
Email Adrianna at Adrianna@communityscience.org

	Total Family Richness	EPT Richness	Family Biotic Index	Percent Model Affinity	Density Orgs/sample	BAP Value <small>Biological Assessment Profile</small>
Great Gully Creek 9/26/21 42.807746N, 76.701681W Upstream Rte 90	9.0# moderate impact	4.0# slight impact	4.66# slight impact	63%# slight impact	44	6.1# slight impact
Great Gully Creek 9/29/22 42.807746N, 76.701681W Upstream Rte 90	15.0# no impact	6.0# slight impact	4.95# slight impact	60%# slight impact	77	7.2# slight impact

Total number of organisms collected in sample was less than 100 required for accurate metrics calculations. Organism counts were lower than previous seasons for many samples, likely due to heavy flow conditions washing organisms away. Some sites seemed to take longer than expected to repopulate.

BAP is a composite index that incorporates Total Family Richness, Family Biotic Index, EPT Richness and Percent Model Affinity.

Continued monitoring at this site is needed to understand if low abundance is typical for this site.

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Two Questions for WQMA:

1. When CSI finds concerning water quality results in Cayuga County, what would WQMA like us to do?*
2. When new stream data is published on our database, I email the volunteers in that monitoring group to let them know. Would a representative from WQMA like to be included in those emails?

**All HABs are reported to Cayuga County Health Dept. as soon as possible*



Thank you!



Partnering with Communities to Protect Water

info@communityscience.org

(607) 257-6606

www.communityscience.org



[@communityscienceinstitute](https://www.facebook.com/communityscienceinstitute)

[@CSlwater](https://twitter.com/CSlwater)



Extra Slides

CSI Outreach and Education



4-H2O Summer Youth Education Program

2022 Edition
The Water Bulletin
 The Newsletter of the Community Science Institute

Ithaca Falls
 Photo by Nathanael Launer

The Clean Water Act - 50 Year Anniversary

The year 2022 was the 50th anniversary of the Federal Water Pollution Control Act Amendments of 1972, more commonly known as the Clean Water Act. After decades of limited and ineffective water quality legislation, the Clean Water Act improved standards, regulation, and enforcement of water protection.

A History of US Water Legislation

1899—The Refuse Act

This was the nation's first water-related regulation and was intended only to prevent dumping that would physically impede navigation.¹ The Refuse Act banned direct dumping of solid waste or refuse into navigable waters or their tributaries but did not ban the dumping of liquid waste from streets and sewers directly into waterways.

1948—The Federal Water Pollution Control Act (FWPCA)

This was the first legislation directly aiming to address water quality. It formed the basis of what would become the Clean Water Act. While the 1948 Act encouraged state action and interstate cooperation to tackle water quality problems, its enforceability was severely limited because it only governed interstate waters. Abatement actions could only be authorized when pollution affected the health or ... continued on page 2

Inside this Edition

The Clean Water Act - 50 Year Anniversary • page 1

CSI Staff Highlights: The Faces Behind the Organization • page 4

The Not-So-Apparent Implications of Drought • page 8

Journey of Water: Cultivating a Place-Based Sense of the Water Cycle • page 11

How Does Weather Impact Harmful Algal Blooms? • page 12

Annual Water Bulletin Newsletter

Community Science Institute
 Partnering with Communities to Protect Water

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.

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:

 Daphnia sp. (water fleas) 372 mg/L chloride	 Rainbow trout 922.7 mg/L chloride	 Fathead minnows 433.1 mg/L chloride
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Free Learning Materials

CSI's Outreach and Education Committee provides an opportunity for community members to get involved in educating their friends and neighbors about water quality.

Meetings are held via Zoom once per month

Jody, an educator for over 40 years, serves on CSI's outreach and education committee



Jody and her husband, Griff, also monitor Sheldrake Creek and are HABs Harriers!

CSI Impact of Synoptic Stream Monitoring: Seneca-Keuka 9E Plan



2013 – SLPWA started collaborating with CSI to monitor water quality in Seneca Lake tributaries.

2017 – KLA started collaborating with CSI to monitor water quality in Keuka Lake tributaries.



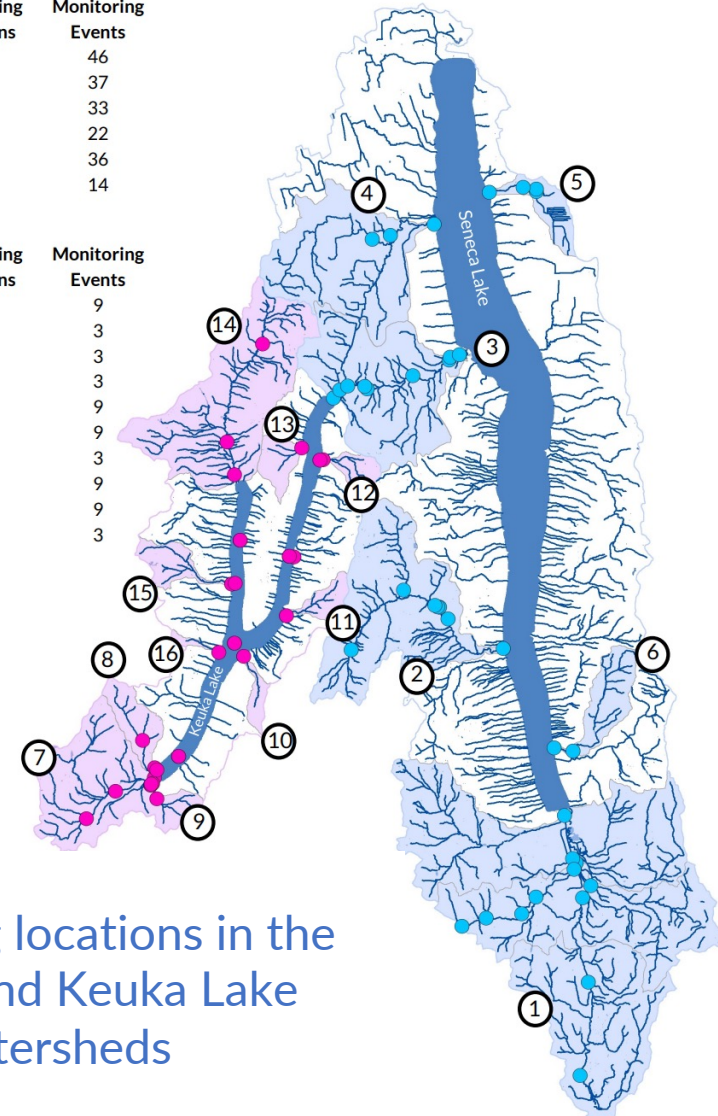
2022 - The samples collected by SLPWA and KLA volunteers and analyzed in CSI's certified lab were foundational to the formation of the now approved Seneca-Keuka 9E Plan.

Read more about CSI's role in the Seneca-Keuka 9E plan in our [2021 Water Bulletin Newsletter!](#)

Seneca Lake Watershed		
Monitored Subwatershed	Monitoring Locations	Monitoring Events
1. Catharine Creek	9	46
2. Big Stream	7	37
3. Keuka Outlet	11	33
4. Kashong Creek	3	22
5. Reeder Creek	5	36
6. Glen Eldridge Creek	1	14

Keuka Lake Watershed		
Monitored Subwatershed	Monitoring Locations	Monitoring Events
7. Cold Brook	3	9
8. Glen Brook	2	3
9. Mt. Washington Brook	2	3
10. Day Rd. Brook	1	3
11. Eggleston Glen	1	9
12. Willow Grove	1	9
13. Brandy Bay	1	3
14. Sugar Creek	3	9
15. Wagner Glen	1	9
16. Pulteney Brook	1	3

— Streams



Monitoring locations in the Seneca and Keuka Lake watersheds

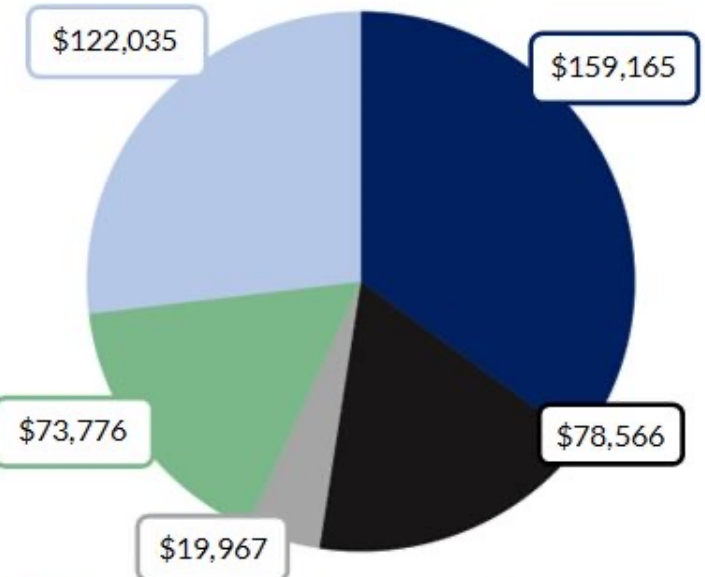
- CSI's role:**
- Provide volunteer training and supplies
 - Certified water testing
 - Publish data on public database

CSI's 2022 Finances

CSI 2022 Income

Total: \$453,552.03

*Including \$43.45 interest and dividends

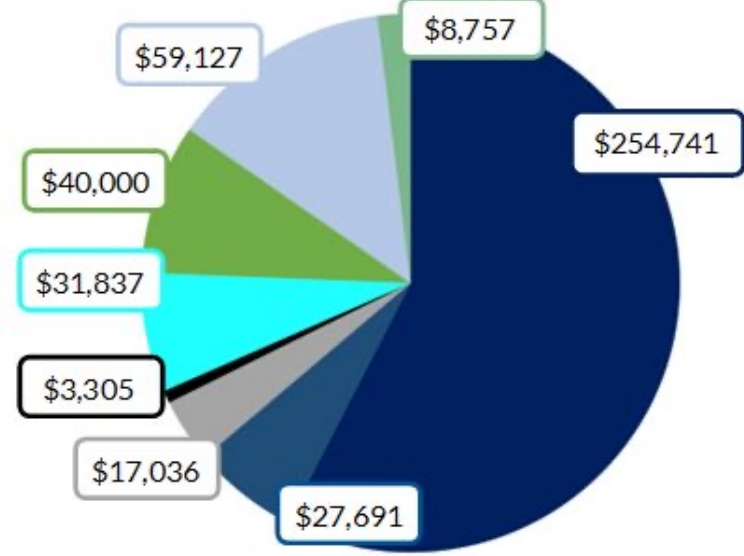


- Local Government Support for Stream and Lake Monitoring°
- Monitoring Grants from Foundations & Not-for-Profits (NFPs)*
- Membership Donations
- Agency and Lake Association Testing Contracts
- Fee-for-Service Drinking Water Tests

CSI 2022 Expenses

Total: \$443,262.60

*Including \$769.04 travel and transportation



- Personnel
- Web Services
- Sub-Contract Lab Tests
- Contract Labor
- Lab and Office Supplies
- Japan Mitra Agency Fund
- Indirect Costs
- Fees and Miscellaneous Expenses

Thank you to the local governments who support CSI's monitoring partnerships!

Town of Enfield	\$2,550
Town of Lansing	\$7,000
Town of Hector	\$1,000.00
Town of Caroline	\$3,365.00
Town of Danby	\$4,290.00
Town of Ulysses	\$6,438.00
City of Ithaca	\$10,579.00
Town of Dryden	\$11,196.00
Town of Ithaca	\$22,396.00
Town of Newfield	\$6,404.00
Cayuga County	\$24,447
Seneca County	\$6,000.00
Tompkins County	\$53,500.00*

*Tompkins County provided CSI with \$25,000 for the development of our HABs database in 2022