

# Monitoring water quality in the Cayuga Lake watershed with volunteers in Cayuga County

Cayuga County WQMA Meeting  
5/2/2024, 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
- Questions



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

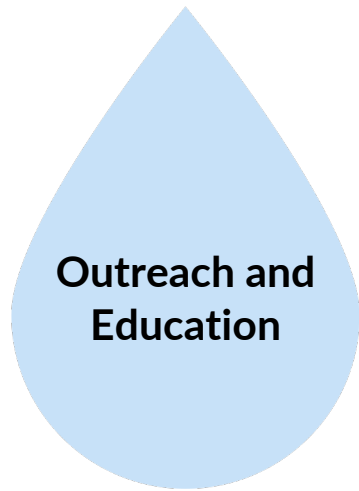
CSI offers three types of programming:



Volunteer  
Water  
Monitoring  
Partnerships



Fee-for-  
Service Water  
Testing



Outreach and  
Education



## 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.

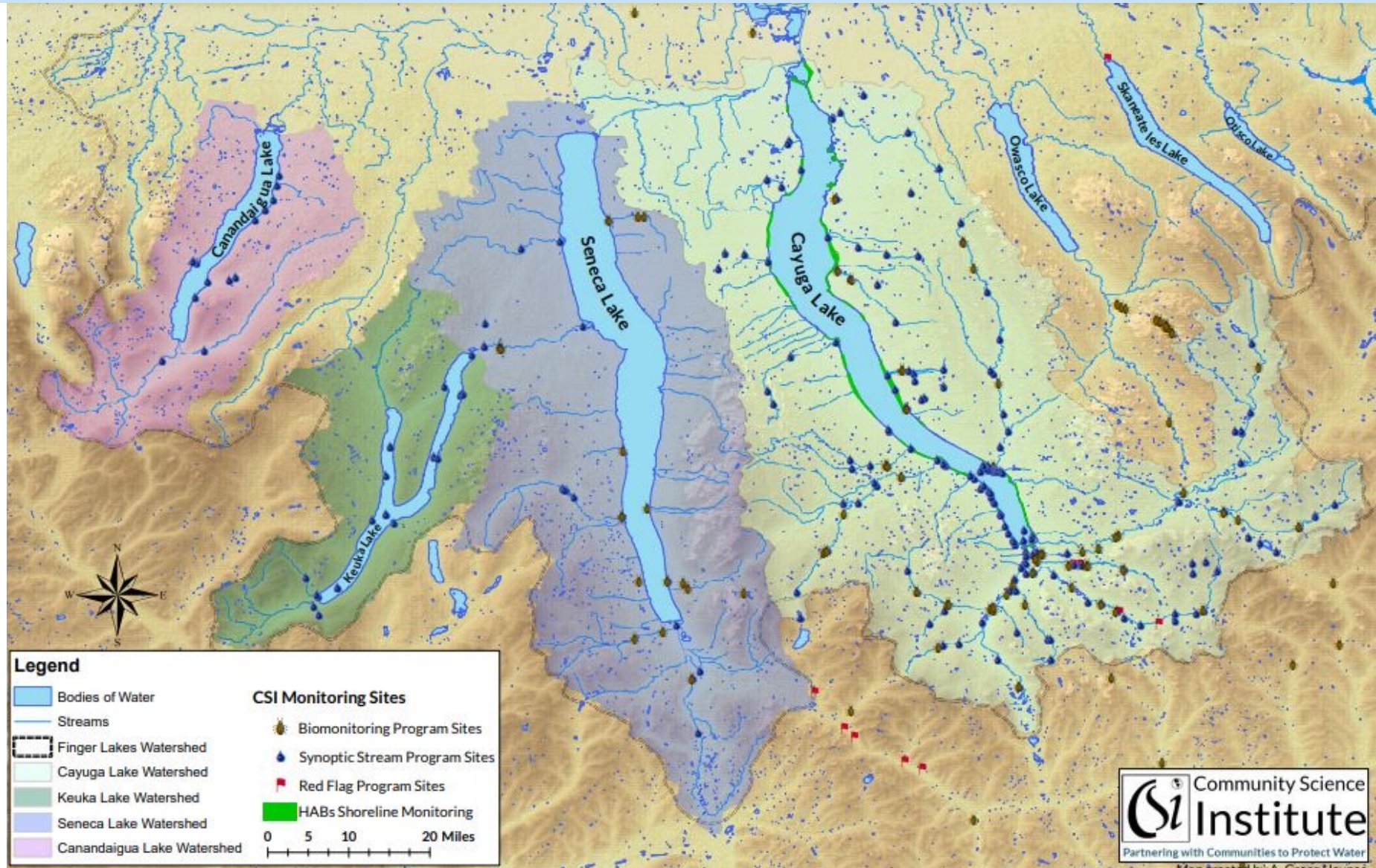


# CSI Volunteer Monitoring Partnerships

## Four Monitoring Partnerships

1. Synoptic Stream and Lake Monitoring
2. Harmful Algal Bloom (HAB) Monitoring
3. Biomonitoring
4. Red Flag Monitoring

CSI recruits, trains, and coordinates over 250 volunteers





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Salmon Creek at  
Tile Kiln Road



# CSI Synoptic Stream and Lake Monitoring Partnership

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



Salmon Creek at Tile Kiln Road

**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:

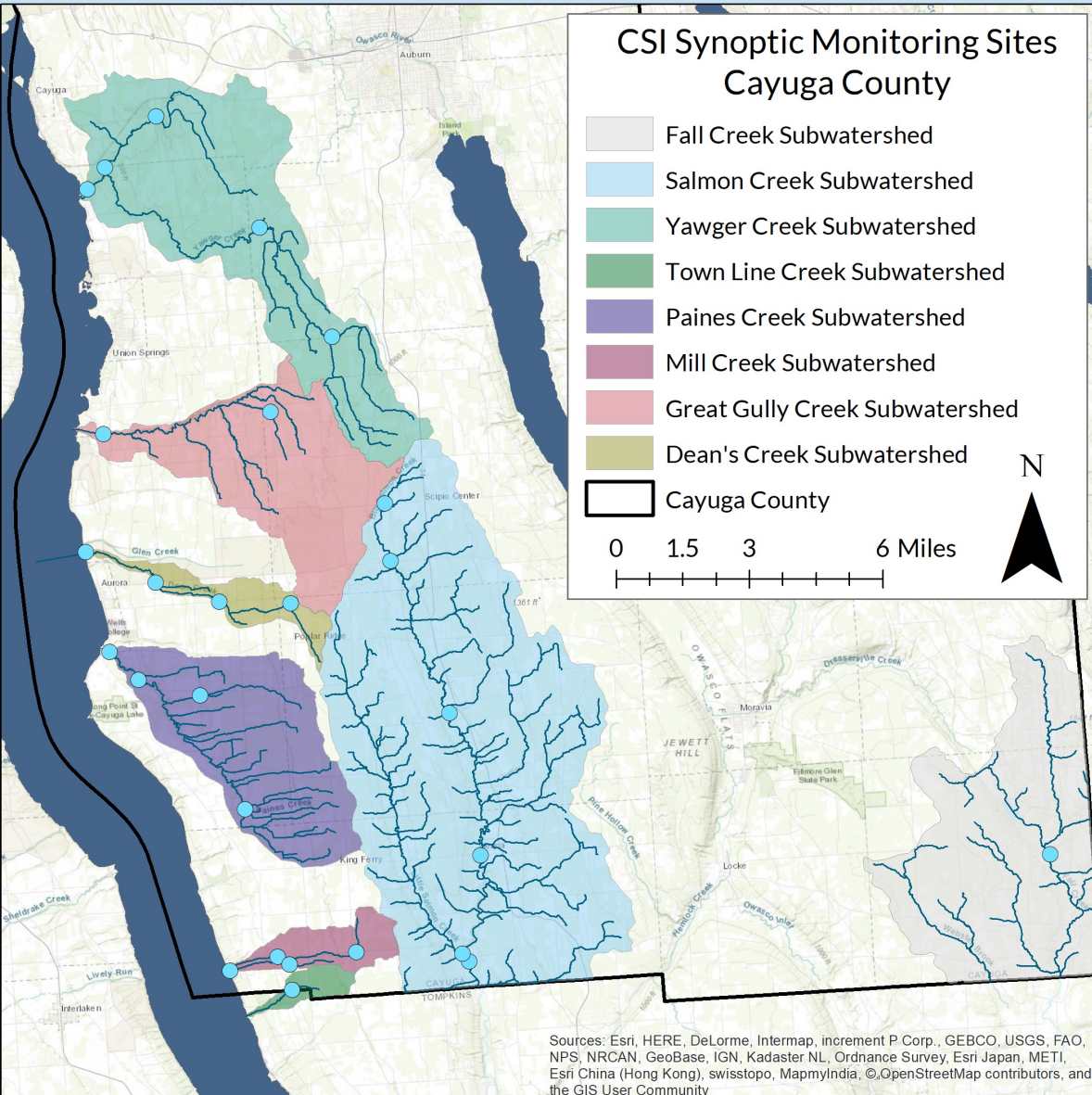
- Nutrients (TP, SRP, NOx)
- Sediment (TSS)
- Bacteria (*E. coli*)
- Salt (Chloride)
- pH, hardness, alkalinity, turbidity, conductivity

Volunteers collect samples from their designated stream 3 times each year

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



# CSI Synoptic Stream Monitoring in Cayuga County



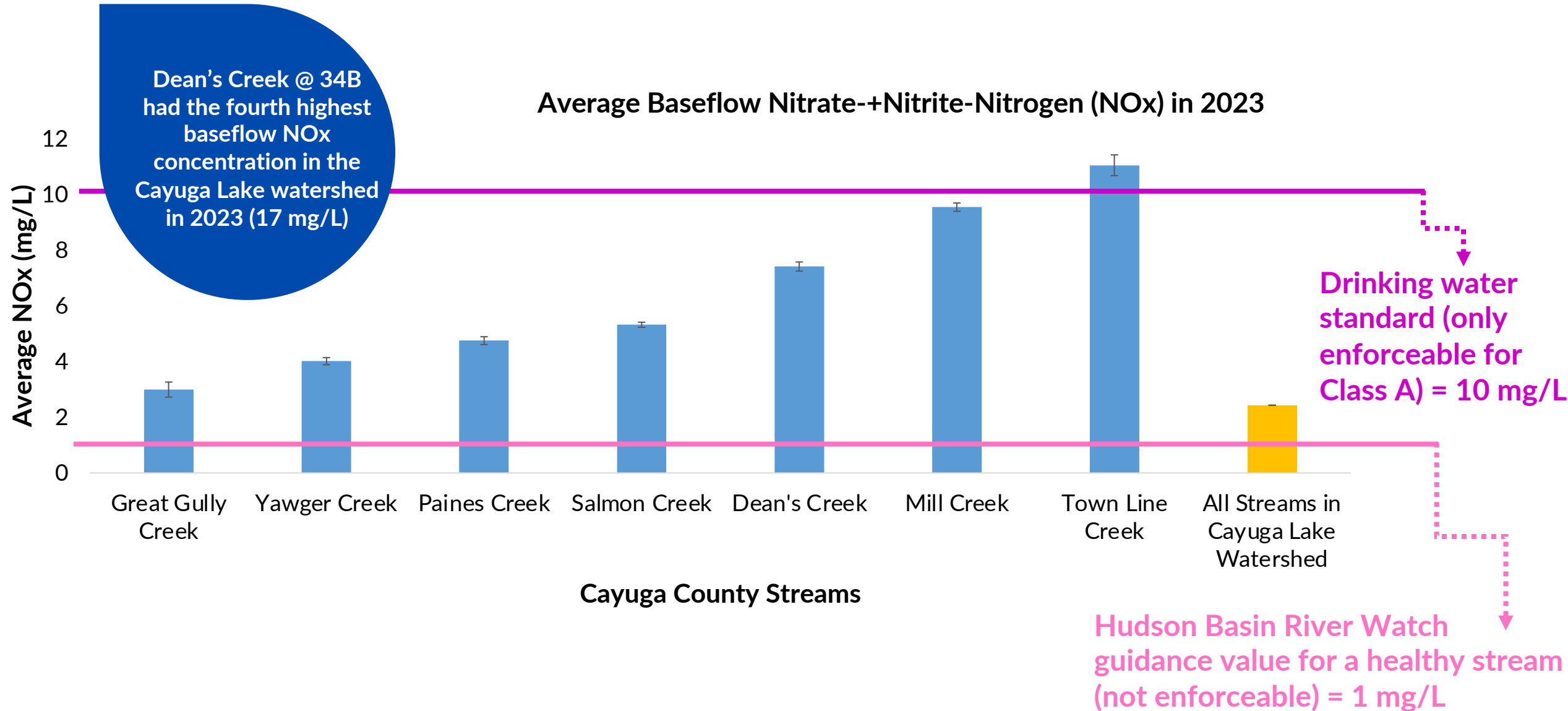
CSI's synoptic stream volunteers monitor the following Cayuga Lake tributaries in Cayuga County:

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

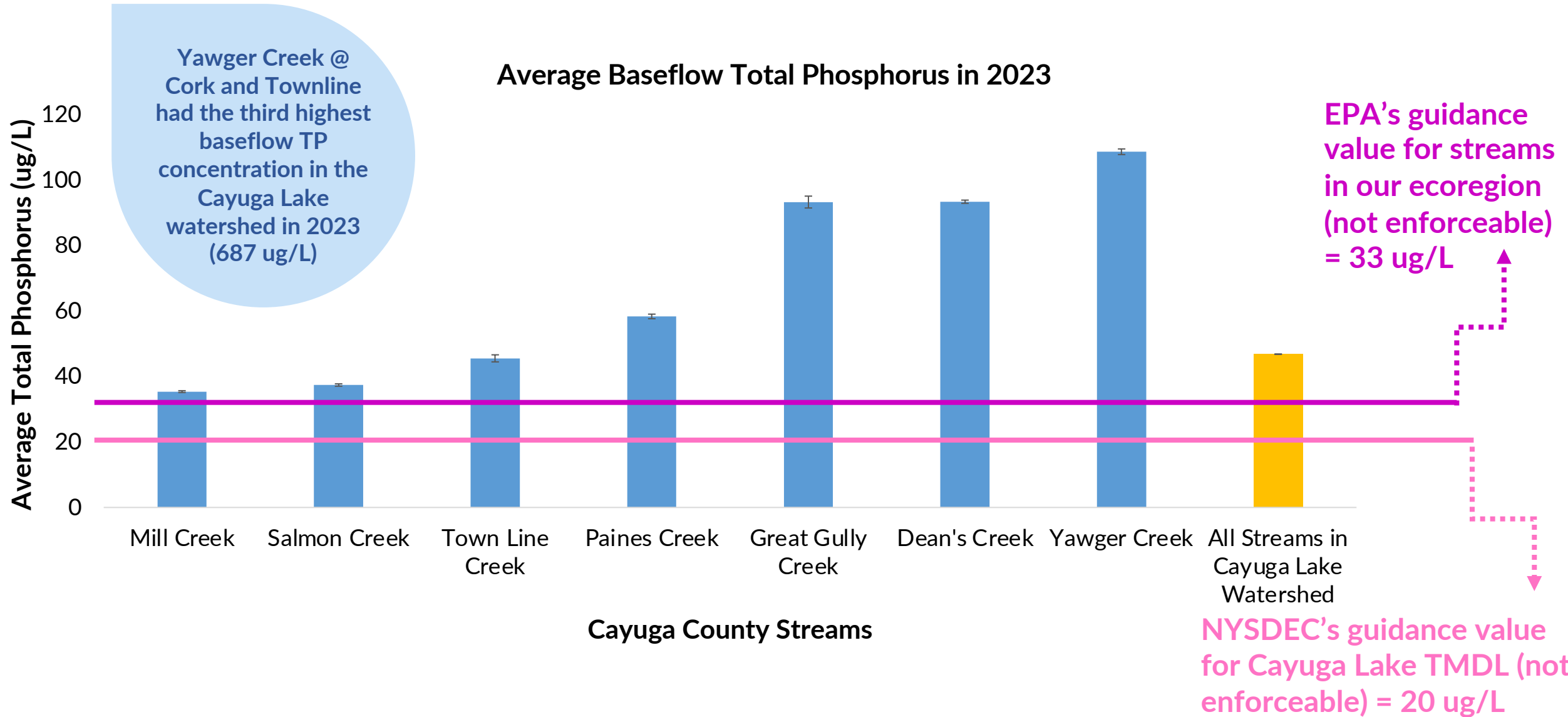
Thank you to  
Cayuga County for  
supporting our  
stream monitoring  
efforts in Cayuga  
County since  
2018!



# Si Synoptic Stream Monitoring in Cayuga County



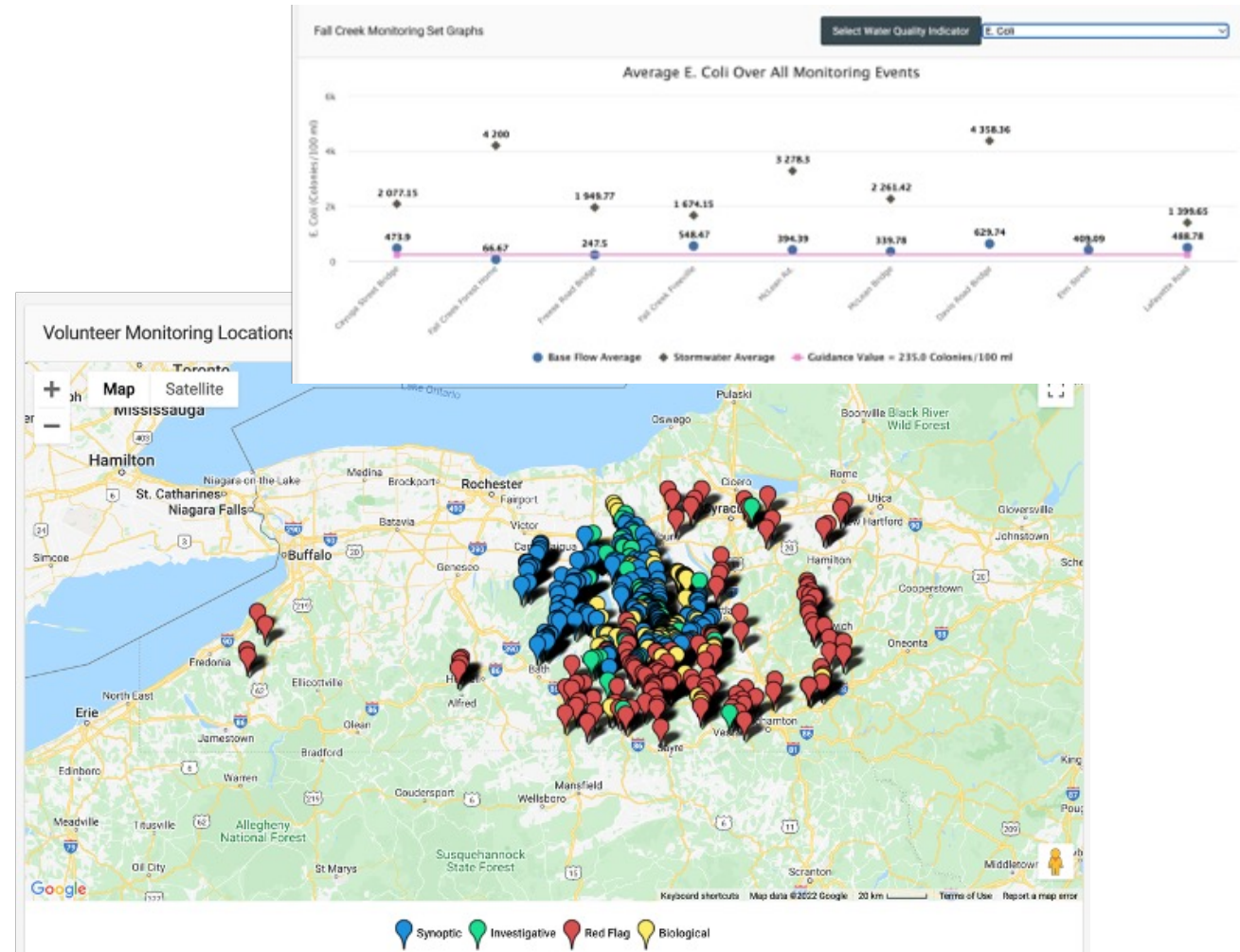
# Si Synoptic Stream Monitoring in Cayuga County





# CSI's Public Database – Streams and Lakes Chemistry

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



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

# CSI Agenda

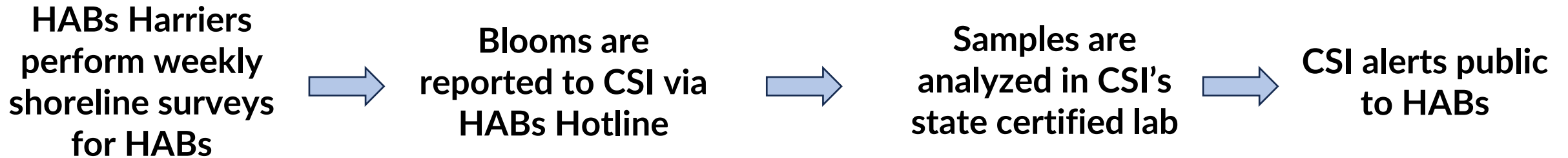
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# Cayuga Lake Harmful Algal Bloom (HAB) Monitoring Partnership

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



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



**HABs samples are tested to:**

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

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

**CSI reports all  
blooms to  
county health  
department  
officials and  
NYSDEC**



**HAB reported on  
8/17/23 in the  
Village of Cayuga**



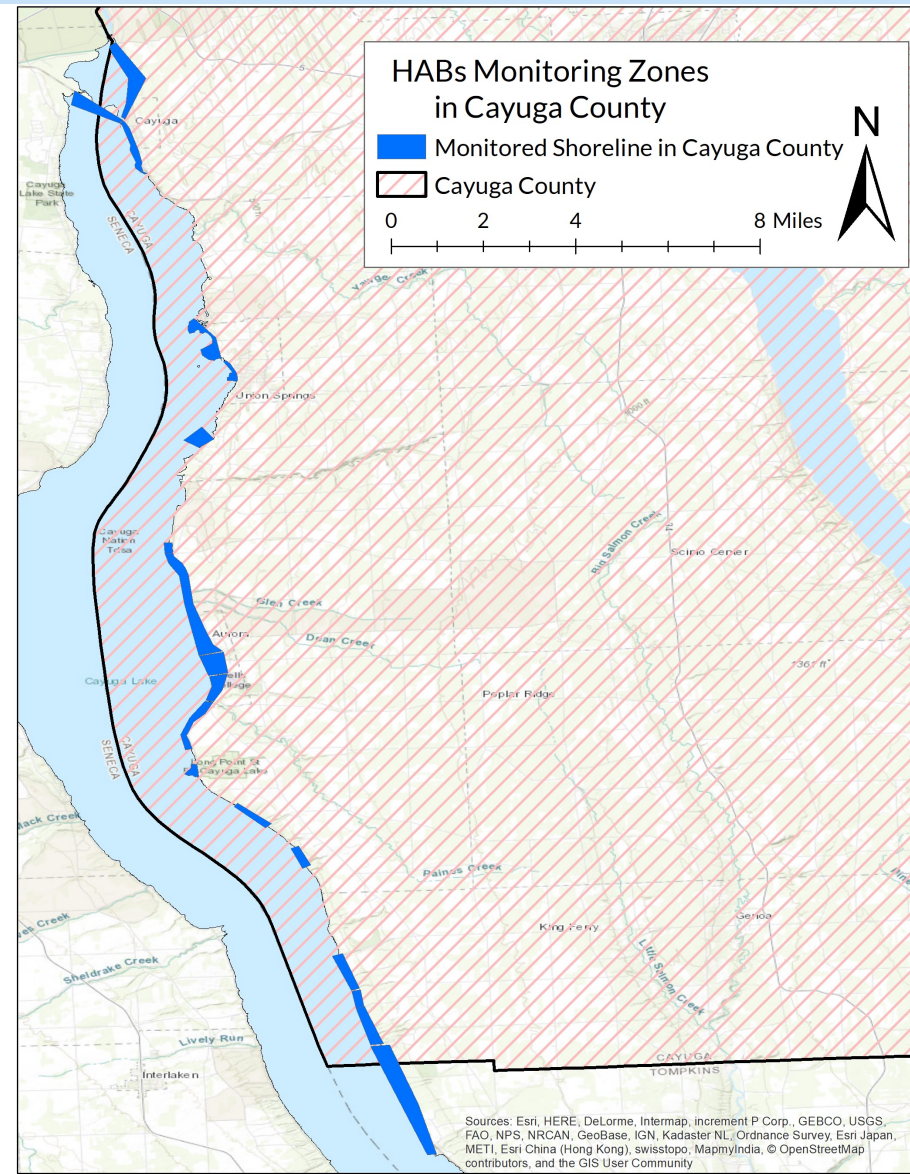
# CSI HAB Monitoring in Cayuga County

CSI's HABs Harriers monitor more than 50% of the shoreline in Cayuga County

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

We are actively recruiting volunteers to fill in the gaps!  
If interested, email [alyssa@communityscience.org](mailto:alyssa@communityscience.org)

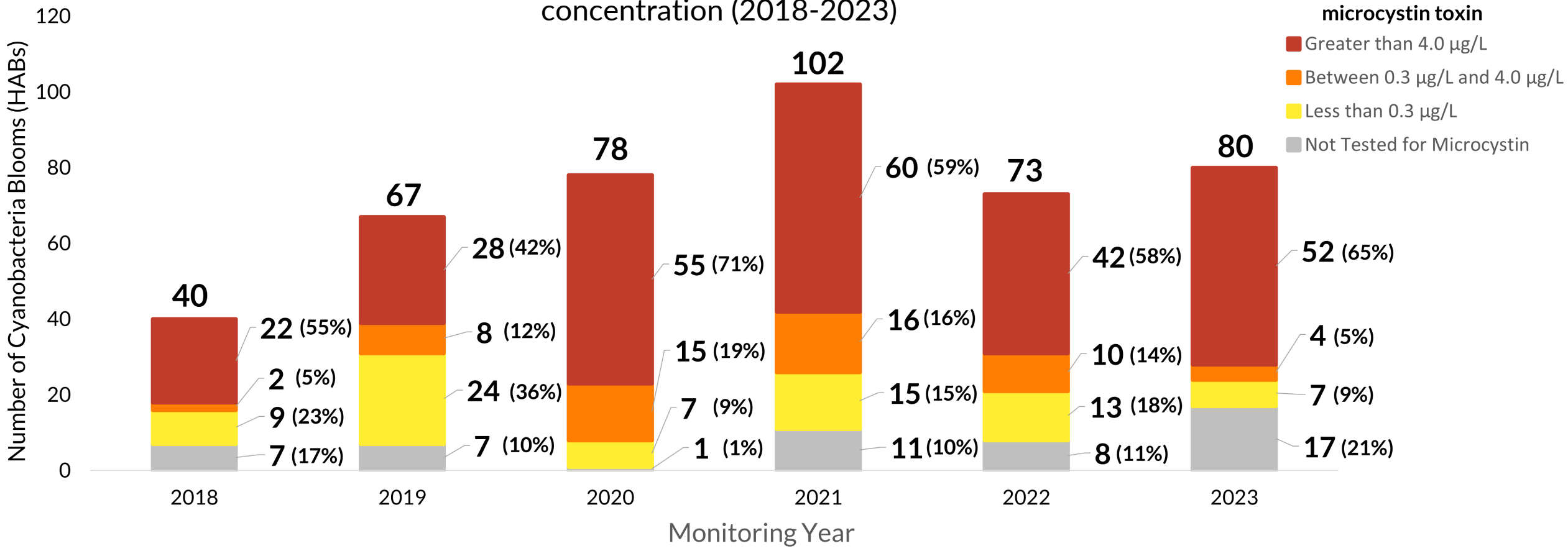
**Thank you to Cayuga County for supporting our HAB monitoring program in Cayuga County!**



Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

# HAB Monitoring in Cayuga County

Number of reported HABs on Cayuga Lake and their corresponding microcystin concentration (2018-2023)

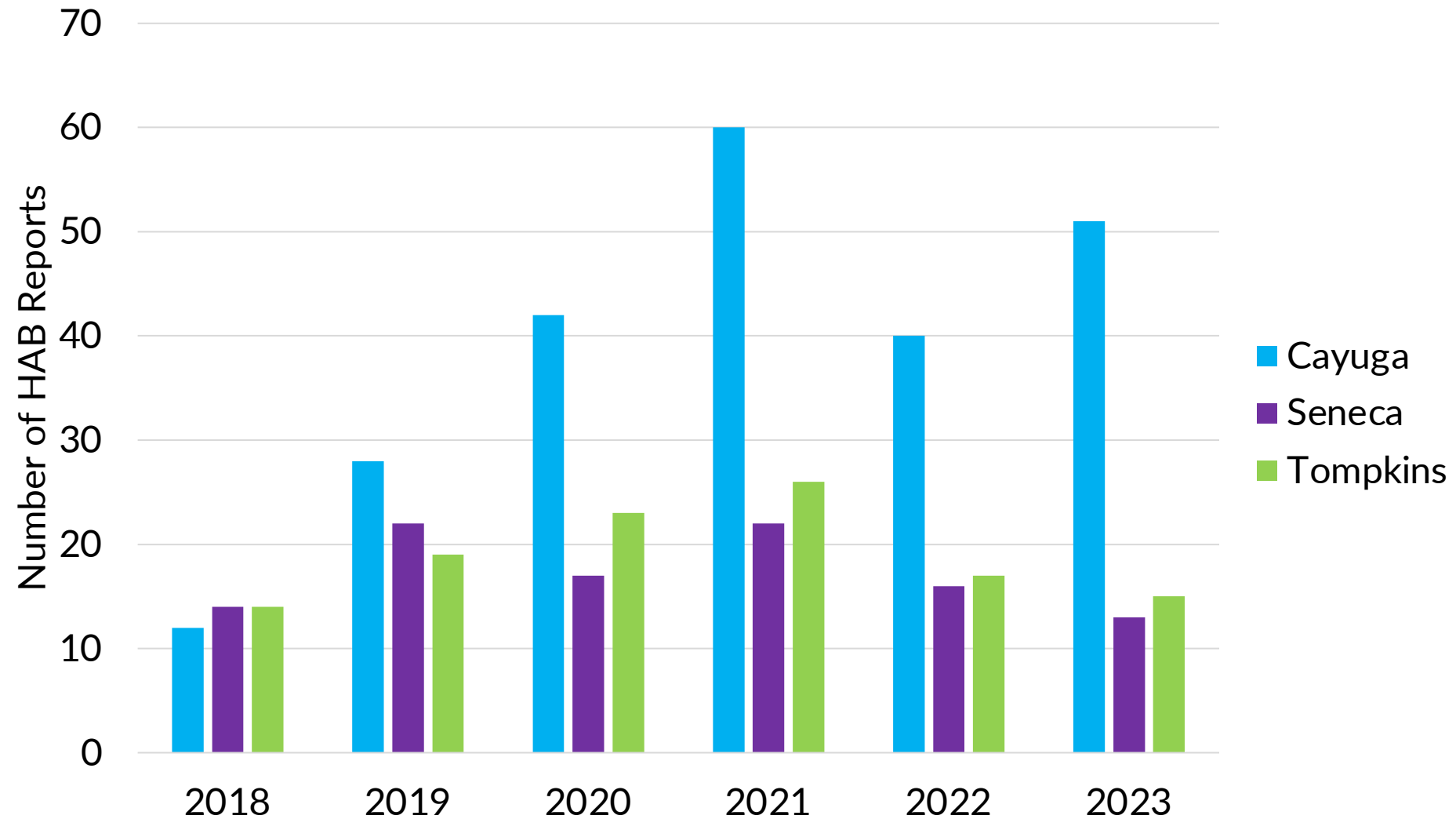






# HAB Monitoring in Cayuga County

Number of Cayuga Lake HAB Reports by County and Year

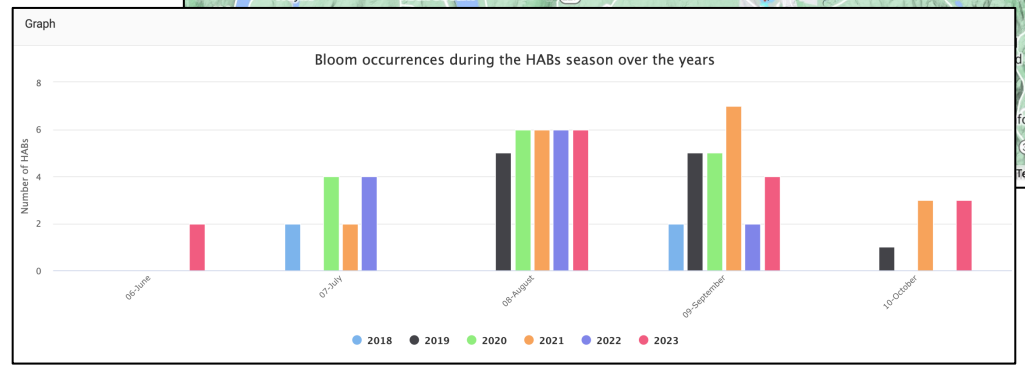
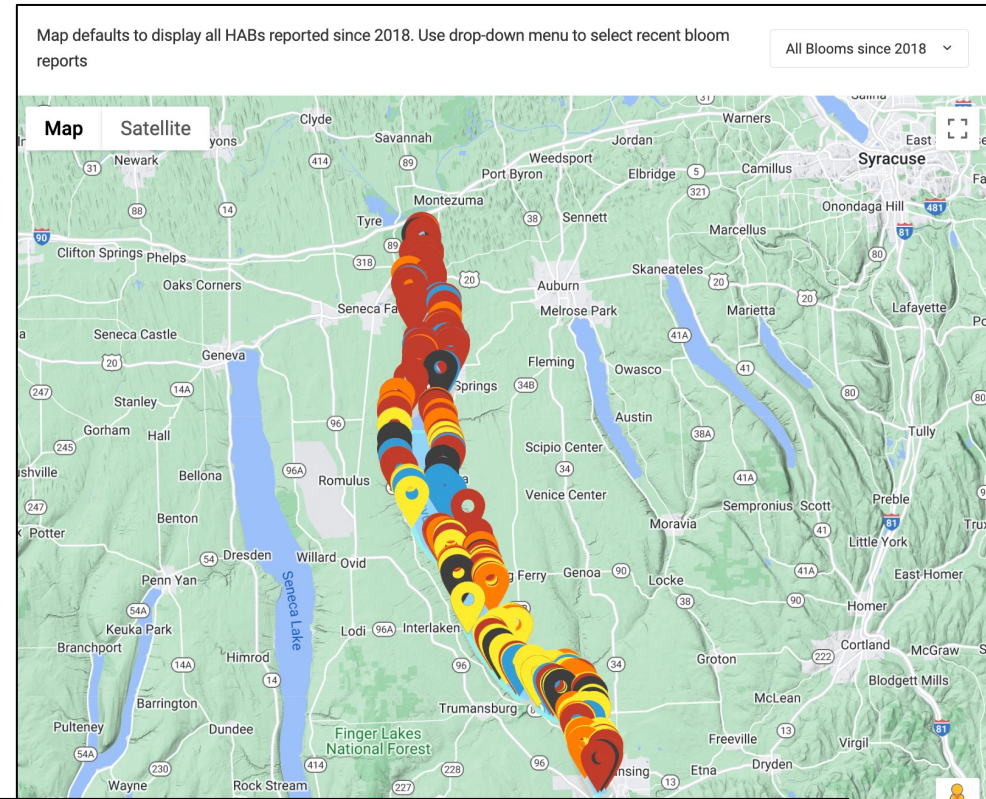


Learn more about Cayuga Lake HABs in 2023 at CLWN's Cayuga Lake Spring Conference.

# CSI's Public Cayuga Lake HAB Database

Our Cayuga Lake HAB database contains data from HABs reported to CSI from 2018-present

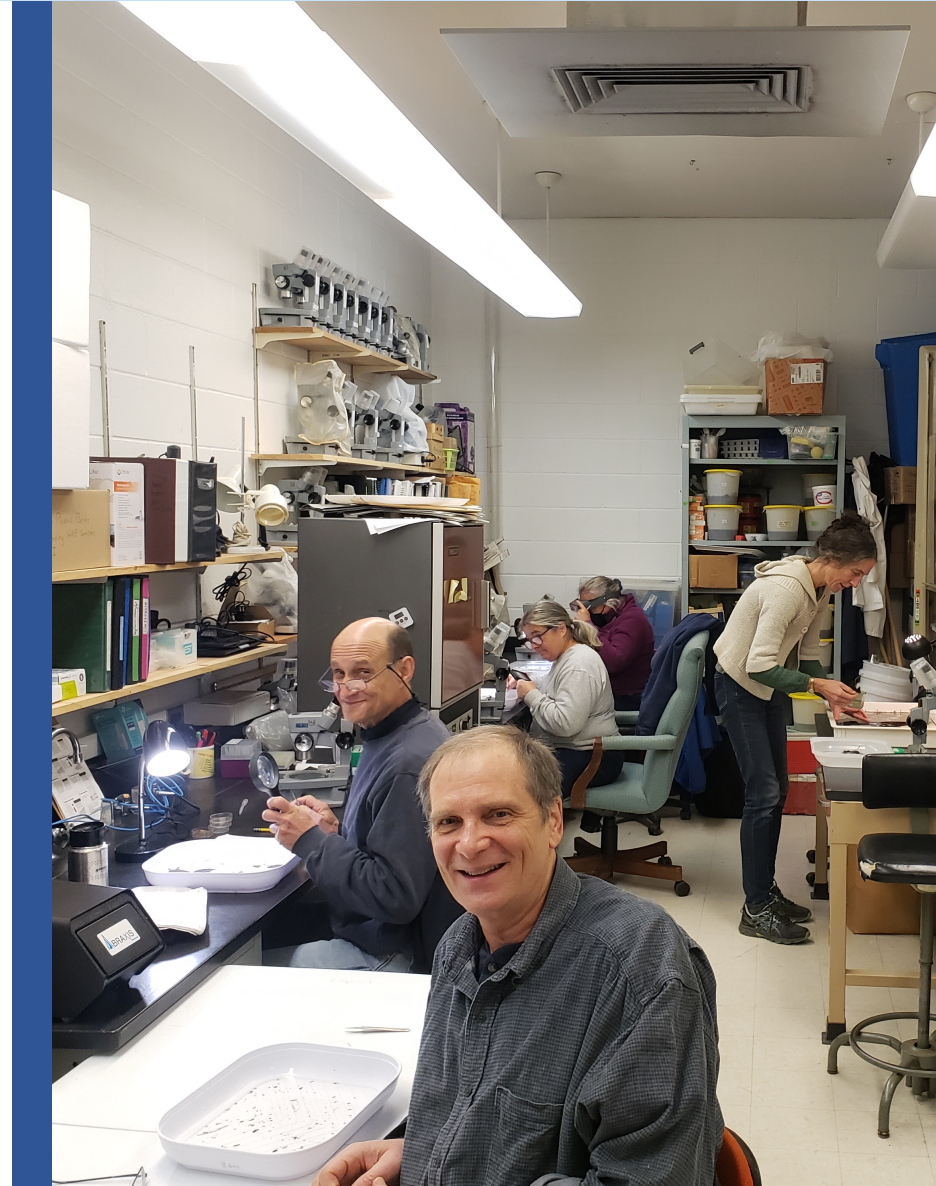
<http://database.communityscience.org/hab>





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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](#) are posted on CSI's Website.



# 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](mailto:Adrianna@communityscience.org)

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

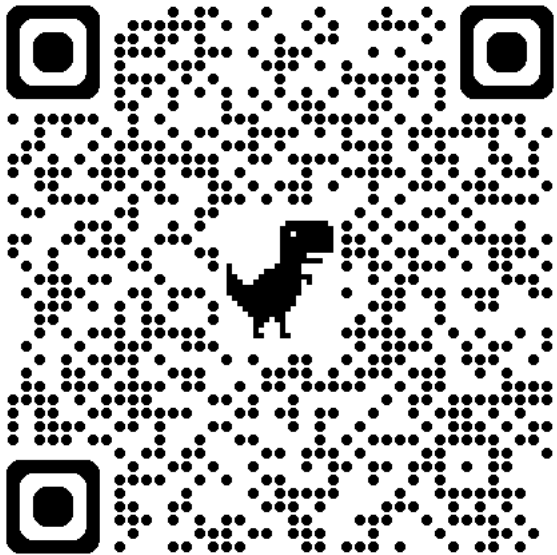
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Stay in touch and learn more

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

(607) 257-6606

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

Extra Slides



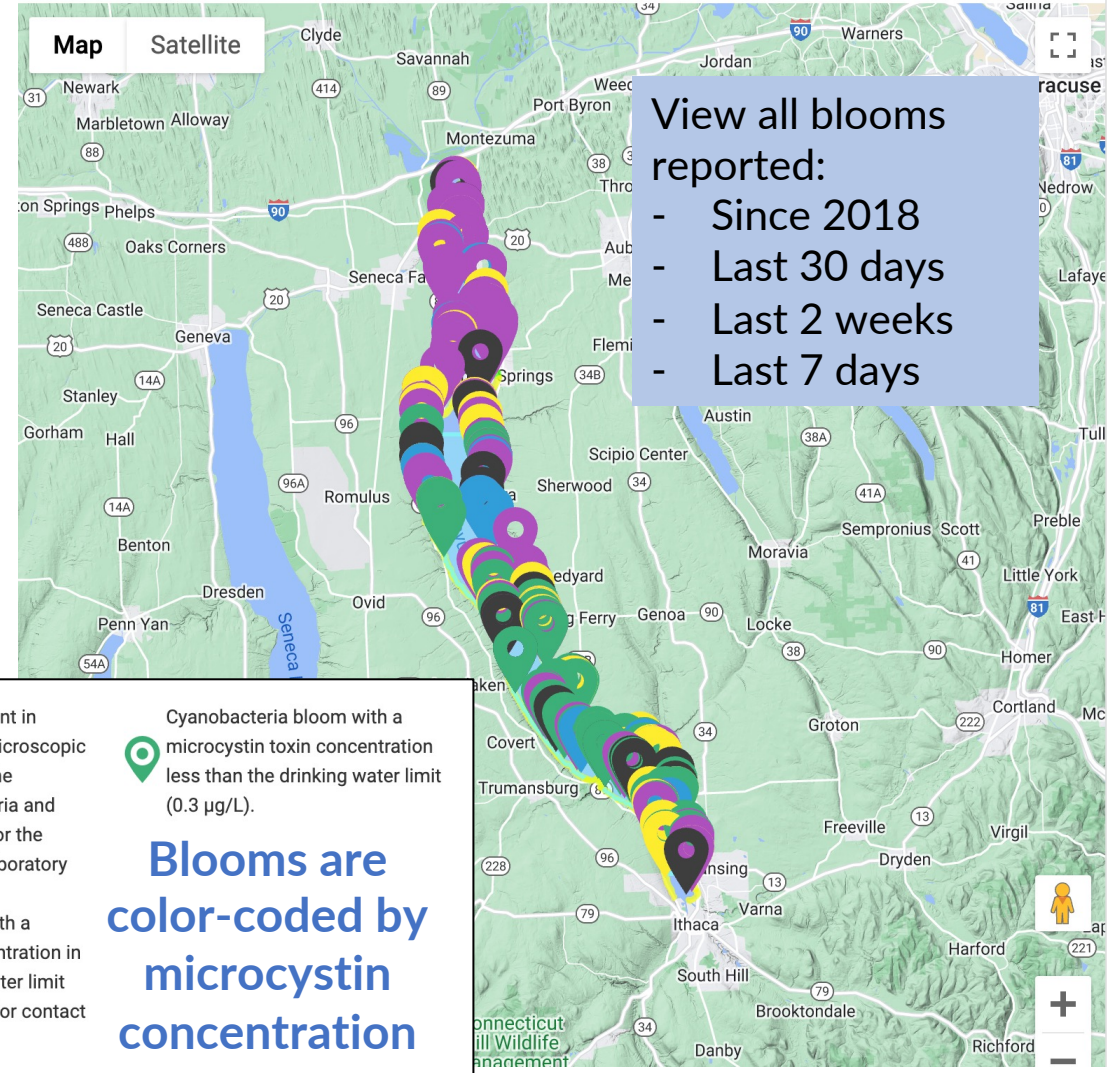
## Landing Page

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

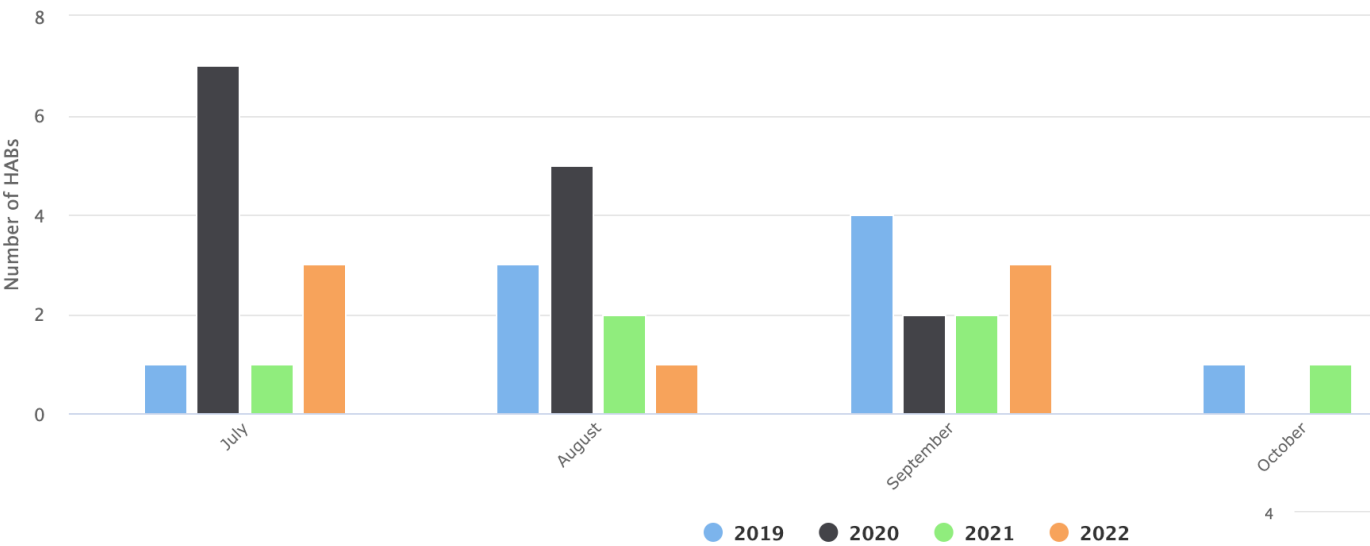
**Cyanobacteria bloom with a microcystin toxin concentration between the drinking water limit (0.3 µg/L) and the limit for contact recreation (4.0 µg/L).**

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

**Blooms are color-coded by microcystin concentration**

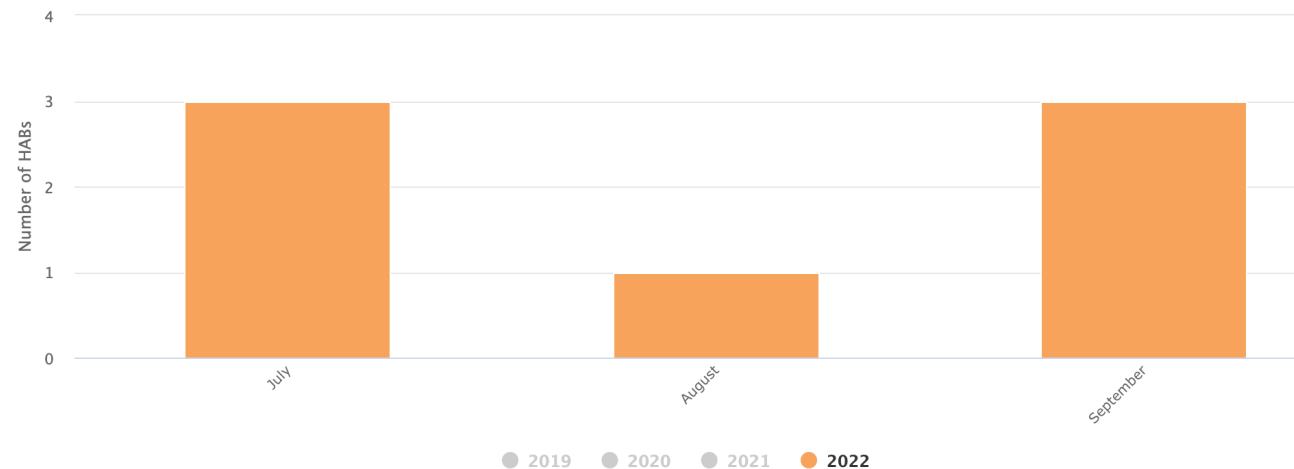
## Segment Page

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

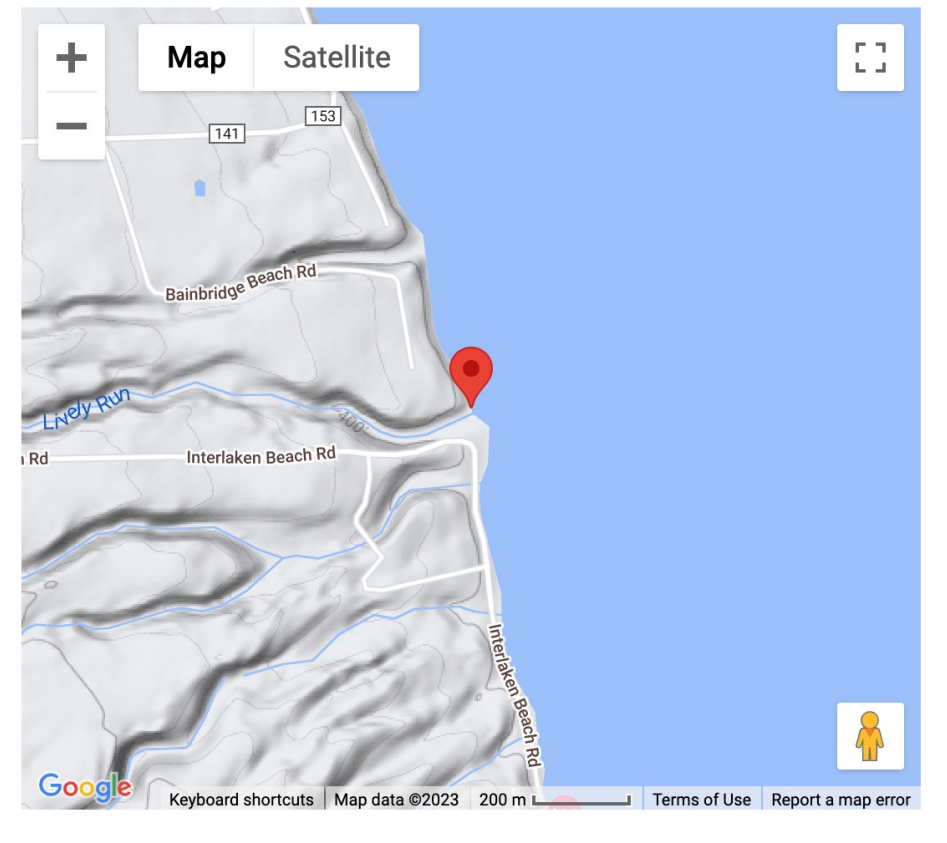
### Photo of bloom



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

<b>What</b>	
Bloom Genera <sup>[1]</sup>	Bloom Chemistry

### Map



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

# CSI Outreach and Education



**Journey of Water Summer Youth Education Program**

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

**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.<sup>1</sup> 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

Ithaca Falls  
 Photo by Nathanael Launer

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**Annual Water Bulletin Newsletter**

**CHLORIDE** Community Science Institute  
Partnering with Communities to Protect Water

**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.

**Chlorine + electron = 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:

 372 mg/L chloride	 922.7 mg/L chloride	 433.1 mg/L chloride
-----------------------	-------------------------	-------------------------

**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!](#)*

### CSI's role:

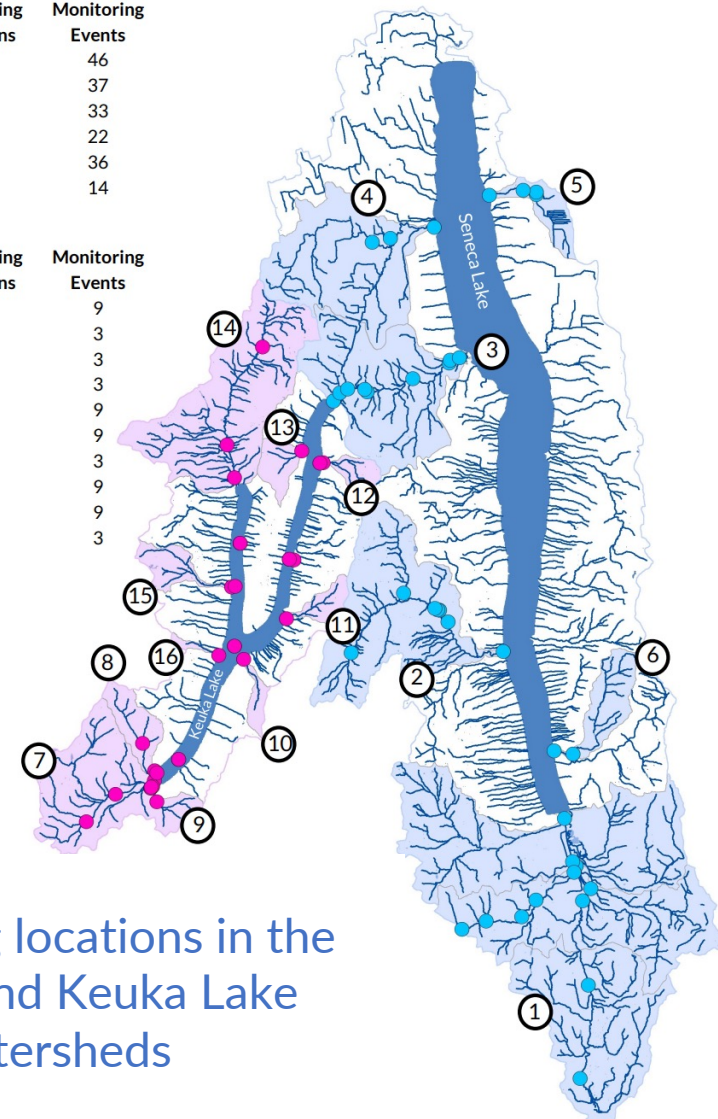
- Provide volunteer training and supplies
- Certified water testing
- Publish data on public database

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

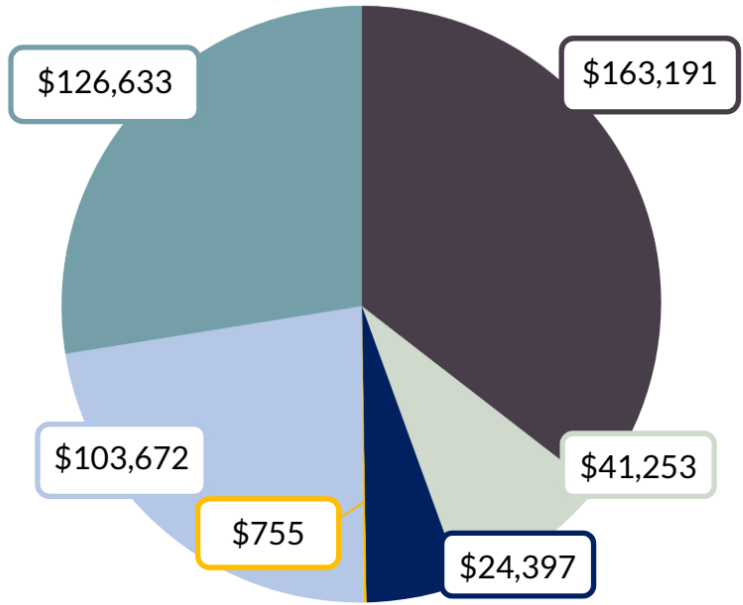
# CSI's 2023 Finances

## Financial Report



### CSI 2023 Income Total: \$459,948.36

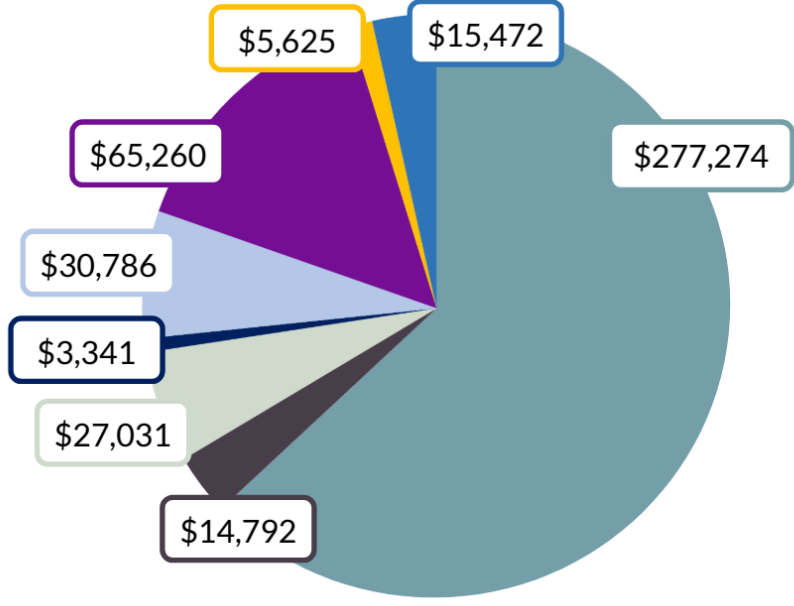
Includes \$49.49 interest and dividends



- Local Government Support for Stream and Lake Monitoring<sup>o</sup>
- Grants from Foundations & Not-for-Profits (NFPs)<sup>†</sup>
- Donations
- Agency and Lake Association Testing Contracts
- Fee-for-Service Drinking Water Tests
- Silent Auction

### CSI 2023 Expenses Total: \$440,780.13

Includes \$1,200.10 travel and transportation



- Personnel
- Web Services
- Sub-Contract Lab Tests
- Contract Labor
- Lab and Office Supplies
- Fees and Miscellaneous Expenses
- Indirect Costs
- Strategic Planning

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

Town of Enfield	\$2,601
Town of Lansing	\$7,140
Town of Caroline	\$3,432
Town of Danby	\$4,376
Town of Ulysses	\$6,567
City of Ithaca	\$10,790
Town of Dryden	\$11,420
Town of Ithaca	\$22,844
Town of Newfield	\$6,532
Town of Scipio	\$500
Cayuga County	\$39,594
Seneca County	\$5,300
Tompkins County	\$42,095