

Cayuga Lake HABs Harrier Training Workshop 2022

The presentation will begin at 1:10 PM

Presented by Nathaniel Launer, *Director of Outreach, Cayuga Lake HABs
Monitoring Program Coordinator, Community Science Institute*



A harmful algal bloom (HAB) covering a roughly two-mile stretch of shoreline near Union Springs on September 8, 2020. Photo by HABs Harriers Lloyd and Joni Dropkin.

Cyanobacteria

Although commonly referred to as algae, the organisms that form harmful algal blooms are actually **cyanobacteria**.

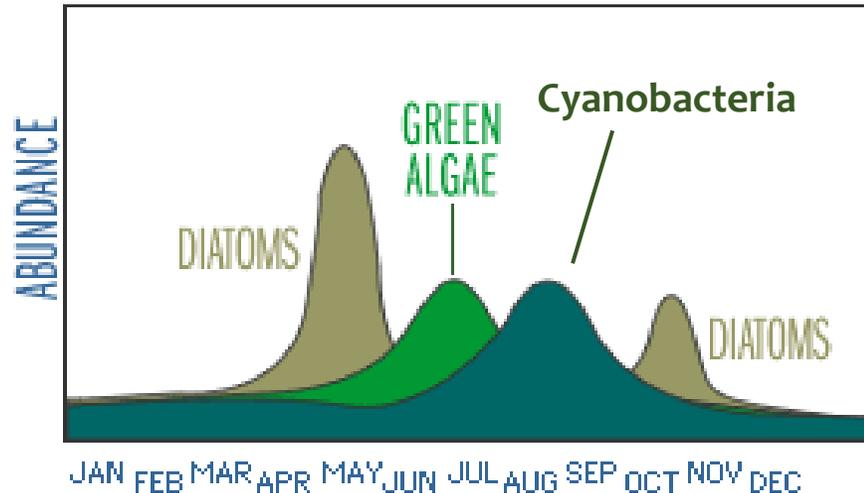
Cyanobacteria are ancient organisms, dating back **billions** of years.

- they are the oldest known **oxygen producing organisms**, responsible for our current oxygen rich atmosphere!

Cyanobacteria are a natural part of the aquatic community in lakes, ponds, and oceans around the world. Small populations of cyanobacteria are **always** present in Cayuga Lake.

Cyanobacteria are the ancient ancestors of plants. Like their multicellular plant descendants, they are **photosynthetic** meaning they use sunlight, CO₂, water, and nutrients (such as phosphorus and nitrogen) to grow.

SEASONAL SUCCESSION OF PHYTOPLANKTON POPULATIONS



Cyanobacteria grow best in warm water temperatures. Because of this, in freshwater lakes and ponds of temperate climates, cyanobacteria populations naturally increase and decrease seasonally with the warming and cooler of the water.

Cyanobacteria

There are many different types of cyanobacteria with unique traits and adaptations. Many can regulate their buoyancy, allowing them to access suitable conditions within a vertical water column.



Microcystis – Produce the toxin microcystin. Have the highest population growth rates at water temperatures around 25° C and have the highest rate of toxin production at a water temperature of 20° C



Dolichospermum – Can fix nitrogen from the atmosphere into a bio-available form. Also can produce the microcystin toxin. Studies show increased growth rates when water rises in temperature from 17° C to 21° C.



Merismopedia



Aphanizomenon



Oscillatoria

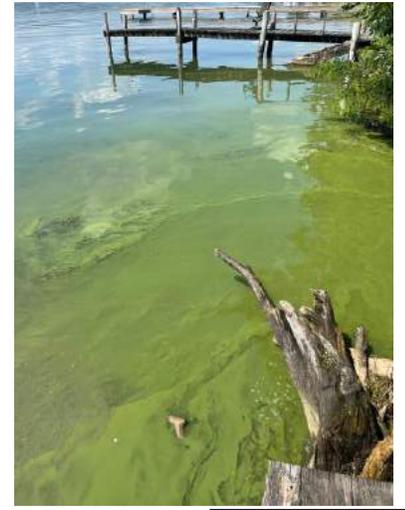
Blooms of Cyanobacteria

Blooms are the **localized, rapid growth of cyanobacteria populations** or **accumulation** of cyanobacteria cells/ colonies.

The cause(s) of blooms are still under study and are likely **multi-factorial**. There is general scientific consensus that...

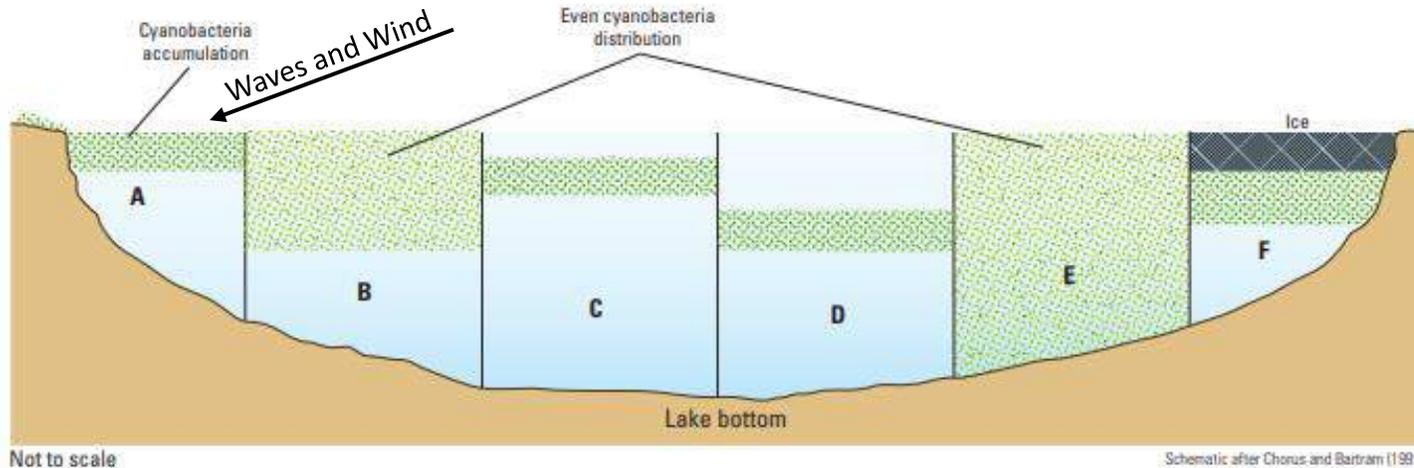
- Cyanobacteria population growth can increase at higher water temperatures.
- High nutrient concentrations of phosphorus and nitrogen have been shown to accelerate cyanobacteria population growth.
- Still, calm, and stratified waters allow cyanobacteria to thrive in the upper layer of warm water and access sunlight.
- Alternatively, prevailing winds may lead to blooms through the accumulation of cyanobacteria populations on specific shorelines.

However these factors can be lake specific and vary even within a lake!



Blooms of Cyanobacteria

Depending on environmental factors, cyanobacteria populations can form different types of blooms.



Different bloom types (USGS, 2008):

- A: Shoreline, near shore, and open water accumulations and scums.
- B: Even distribution throughout the photic zone or epilimnion
- C: Specific depth in the photic zone
- D: Metalimnetic bloom (special case of C type bloom)
- E: Even distribution throughout the water column
- F: Under ice bloom

The most noticeable type of bloom are the shoreline, near shore, and open water accumulations and scums on the surface (Type A).

- These near shoreline and near shore surface accumulations are **often caused by waves and wind** pushing large populations of cyanobacteria into a specific section of the waterbody or shoreline.
- Due to the orientation of Cayuga Lake, and common northwesterly and southeasterly winds, wind and wave caused cyanobacteria accumulations (blooms) often occur in the northern and southern ends (NYSDEC Cayuga Lake HABs Action Plan, 2018).

Another type of bloom often reported on Cayuga Lake are the cyanobacteria accumulations that are evenly distributed throughout the photic zone of epilimnion (Type B).

- These types of blooms are **often observed in shallow parts of the lake**, such as near shore or in the northern and southern shelves, where the photic zone (depth to which sunlight reaches) often extends to the bottom.
- These blooms **often look diffuse**, appearing as small green dots or clumps spread throughout the water.

Harmful

Blooms of cyanobacteria are considered harmful because...

- **Toxic:** Cyanobacteria produce chemical compounds that are toxic to humans and other animals including liver toxins, neurotoxins, and skin and eye irritants. In a dense concentration or accumulation of cyanobacteria (bloom) these toxins can be present in very high concentrations!
 - Microcystin is the most common cyanotoxin that is found in Cayuga Lake HABs. It is a liver toxin. Cyanobacteria can produce many different type of toxins that we are unable to analyze. That is why **we must always avoid exposure to a bloom, regardless** of the reported toxin concentration.
 - When in doubt! Keep out (including pets)!
- **Aesthetically Unpleasing and Limit Recreation:** Cyanobacteria blooms limit our use of lakes and ponds and degrade these invaluable natural resources. This can have detrimental economic impacts!
 - This includes the cost of treating water when lakes are used as drinking water sources.
- **Detriment to Aquatic Environments:** Blooms can degrade aquatic environments, outcompeting other essential phytoplankton, harmful wildlife, reducing water clarity, and causing anoxic (low oxygen) “dead zones”.



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What do they look like?

Test your skills



Department of
Environmental
Conservation

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.



How to Monitor For Harmful Algal Blooms (HABs): 2022

Survey Your Shoreline: The monitoring season will start on June 26th. We ask that you survey your lakeshore zone at least once per week from June 26th to October 1st.

- If you need to map a new shoreline zone, or forget your zone number or extent, please contact Nate at nathaniel.launer@communityscience.org

Report: After you complete your survey, submit a “No Bloom” report electronically if you **do not** observe a suspicious bloom during your survey.

If you observe a suspicious bloom in your zone, either during your weekly survey or at a different time, report the bloom to:

habshotline@gmail.com OR www.communityscience.org/habreport/

Sample: Collect a sample of the suspicious bloom, fill out the “Shoreline Survey Form/ Chain of Custody” entirely, and transport the sample on ice to the CSI lab for analysis.

If a bloom is reported by a person who is not a volunteer, you may be contacted by a member of our HABs Leadership team to investigate the report and collect a sample if necessary.

Monitoring Your Shoreline

Monitor your shoreline at least once per week by walking or paddling the extent of your shoreline zone. During your survey, look for any signs of suspicious blooms.

- If you do not yet have a zone, we will work with you to map out a zone.

Please **do not** walk on shoreline that is not public property or your own private property.

Make sure to **bring your HABs Sampling kit with you** during your weekly shoreline survey.

If you are willing, we encourage you to speak to your neighbors to get permission to survey their section of shoreline.

- In speaking with your neighbors, you will not only secure a sizeable monitoring zone, but you will also play a significant part in informing and educating the community about HABs and the threat they pose to Cayuga Lake.
- We have extra copies of our HABs Information and Reporting Guide brochures that we can provide you to have on hand when speaking with neighbors or the public.



Submitting a ‘No Bloom Report’

The ‘No Bloom Report’ should be filled out every week that you survey your zone but **do not** observe a bloom.

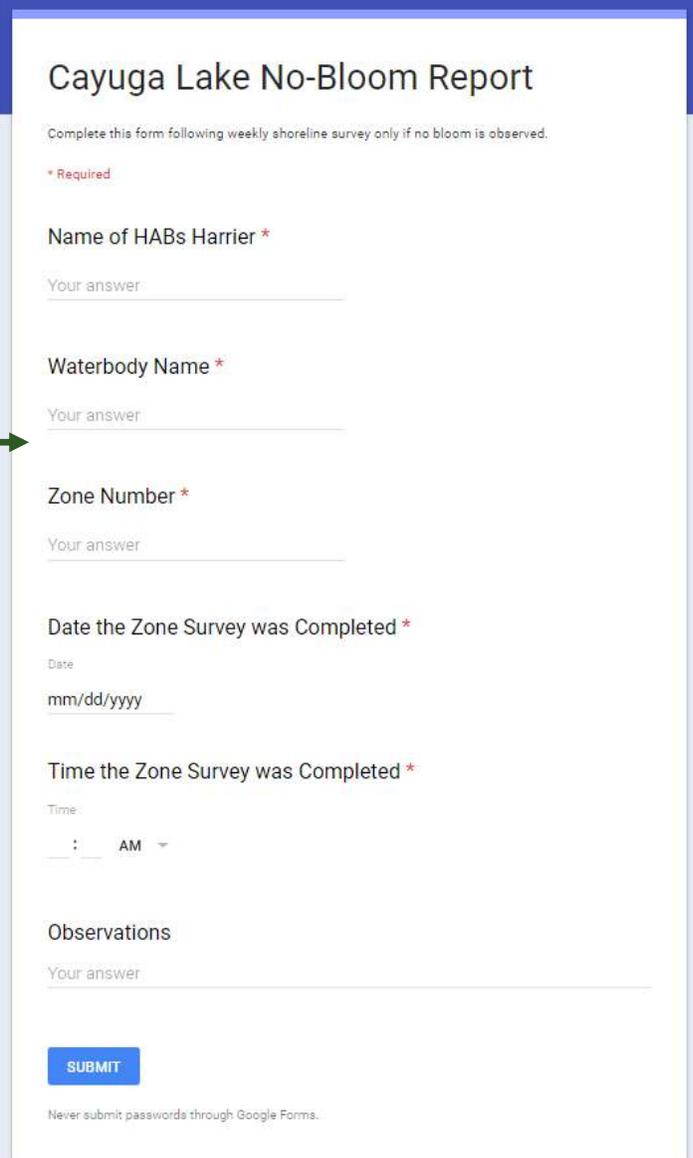
The ‘No Bloom Report’ should only be submitted electronically.

The link needed to access the ‘No Bloom Report’ will be shared with you via email before you begin monitoring in July. The link can also be accessed on CSI’s website.

- No Bloom Reports look like this: 

If you need any assistance accessing or submitting a ‘No Bloom Report’, please contact us!

If we don’t receive a ‘No Bloom Report’ for two consecutive weeks and you haven’t reported a bloom during that time, we’ll check in.



The screenshot shows a Google Form titled "Cayuga Lake No-Bloom Report". The form includes the following fields:

- Name of HABs Harrier ***: A text input field with the placeholder "Your answer".
- Waterbody Name ***: A text input field with the placeholder "Your answer".
- Zone Number ***: A text input field with the placeholder "Your answer".
- Date the Zone Survey was Completed ***: A date input field with the placeholder "mm/dd/yyyy".
- Time the Zone Survey was Completed ***: A time input field with a dropdown menu for AM/PM and a placeholder for the time.
- Observations**: A text input field with the placeholder "Your answer".

At the bottom of the form is a blue "SUBMIT" button and a footer note: "Never submit passwords through Google Forms."

Reporting a Suspicious Bloom: CSI Website

Take **at least** two pictures of bloom:

1. From far away to show the extent of the bloom
2. From close-up to show detail (helps us confirm it as cyanobacteria)

Picture showing bloom extent



Picture showing detail



Record GPS coordinates, location description, date, and time observed.

Fill out the online “Report a HAB” form on CSI’s website at www.communityscience.org/habreport/

Mobile friendly

Bloom Reports look like this:



HABs Report

The name and photo associated with your Google account will be recorded when you upload files and submit this form. Only the email you enter is part of your response.

* Required

Email *

Your email

First Name *

Your answer

Last Name *

Your answer

Email *

Your answer

Reporting a Suspicious Bloom: Email

Email pictures of bloom, GPS coordinates, location description, date, and time observed to habs hotline@gmail.com as soon as possible.

Format the subject line of the email containing the bloom pictures and form as follows:

- SUSPICIOUS CYANOBACTERIA BLOOM PICTURES *zone#* *GPS Coordinates/landmarks* *date*
time

- **Example:** SUSPICIOUS CYANOBACTERIA BLOOM PICTURES, Zone 3408, 42.6761 -76. 7189, 8/23/18, 1330

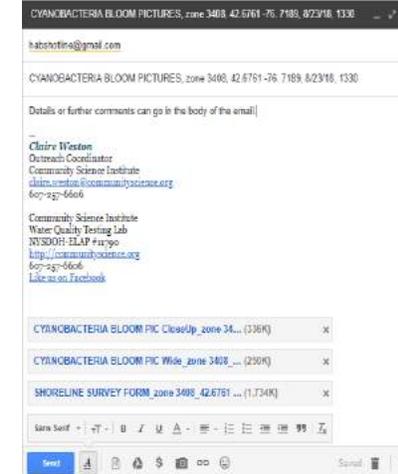
Picture showing bloom extent



Picture showing detail



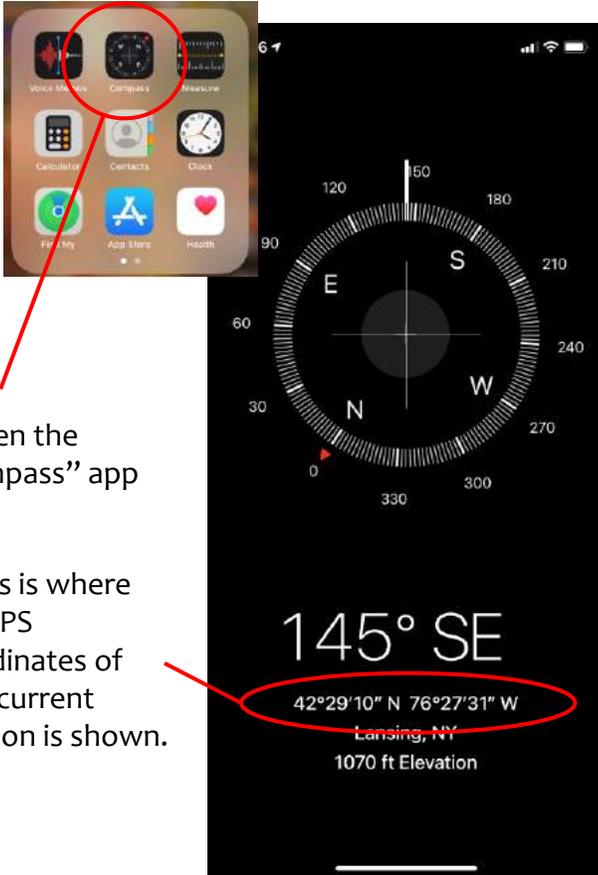
Example email



Determining GPS Coordinates

There are multiple ways to find the GPS coordinates of a suspicious bloom. Here are two that I like:

1. Using the “Compass” smart phone app



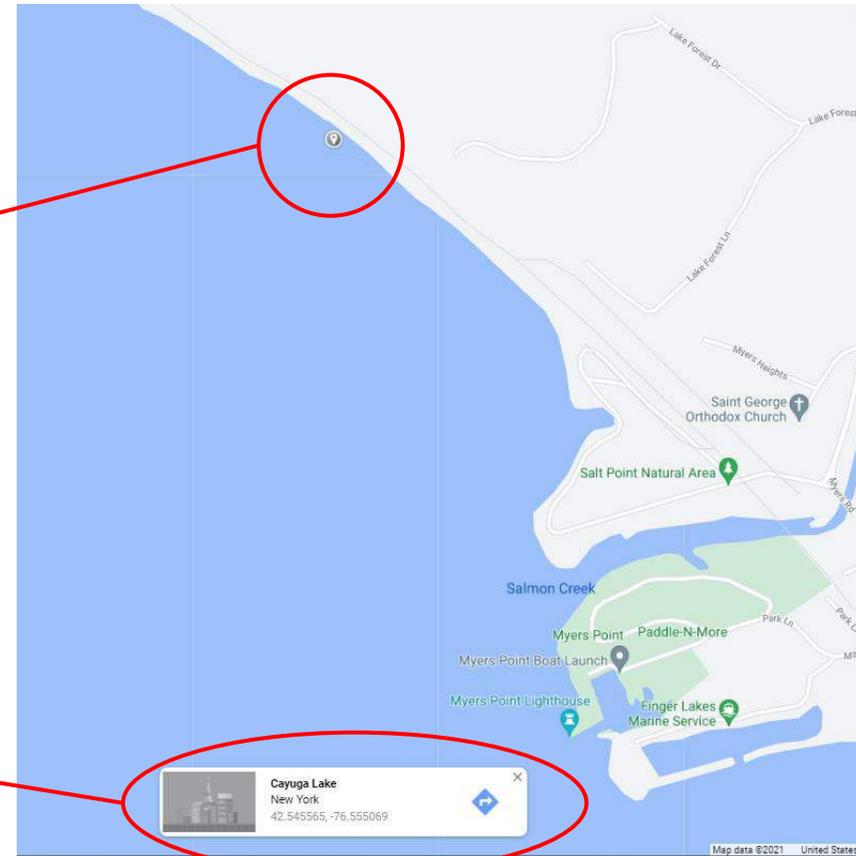
1. Open the “Compass” app

2. This is where the GPS coordinates of your current location is shown.

2. Using GoogleMaps

1. Open www.google.com/maps

2. Double-click a spot on the map.



3. GPS Coordinates of the point will pop up below.

Collecting a Sample of the Suspicious Bloom

Use the amber glass bottle provided in the sampling kit

Make sure to pick up a sampling kit prior to June 27th

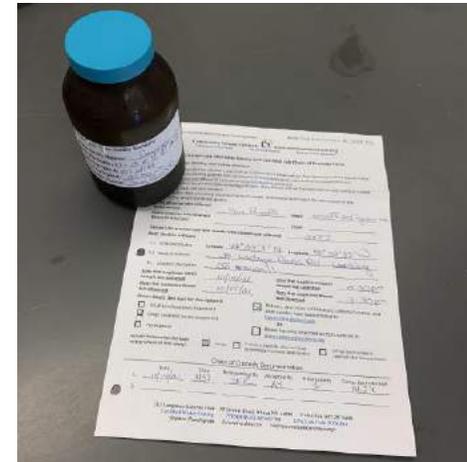
Wear gloves!

Collect the sample by skimming the surface at the densest location of the suspicious bloom.

- this method provides a “worst-case scenario”

Sample must be refrigerated or stored on ice. The sample must be transported to the CSI lab **on ice the same day** it is collected or **no later than 4:00 PM the day following** collection.

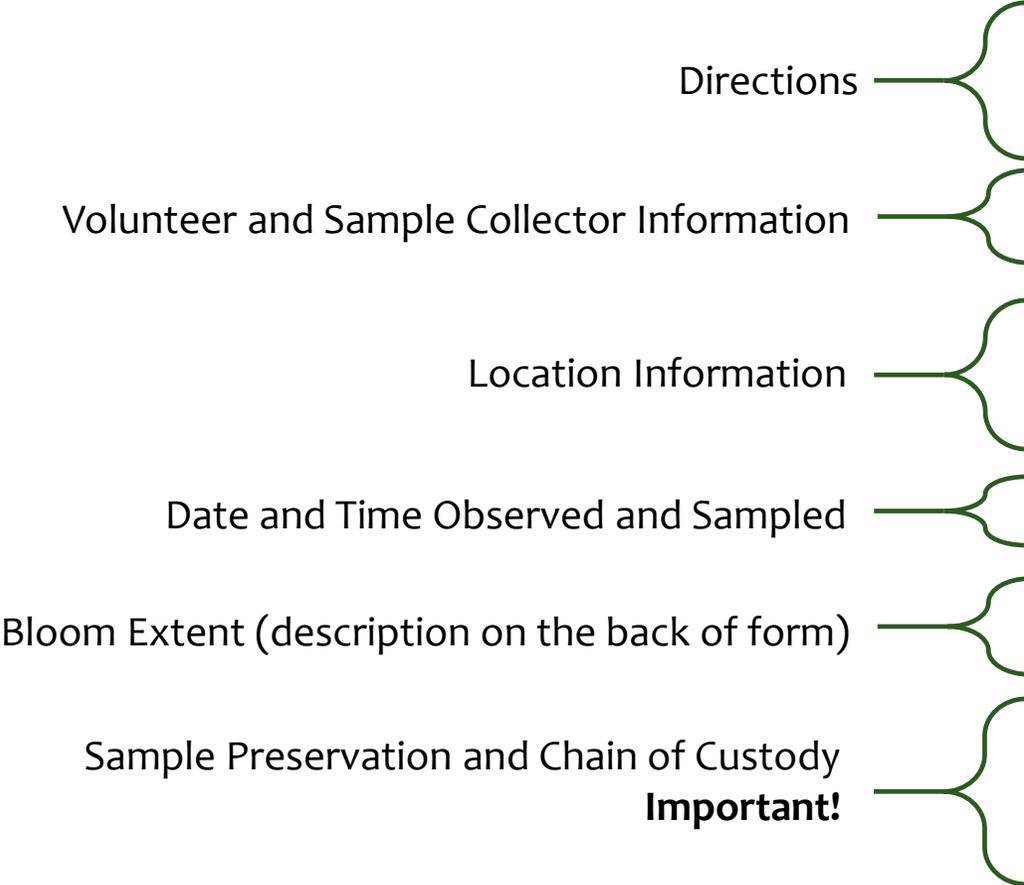
Some volunteers may be provided with an additional set of bottles and instructions to collect samples to be analyzed for anatoxin-a, another cyanotoxin of concern.



CSI Bloom Report Form and Chain of Custody

The CSI Shoreline Survey Form/Chain of Custody should be filled out **every time** a bloom sample is collected.

Please be sure to follow directions and complete each field. This is a **very important** part of data collection and quality assurance.



Volunteer
Suspicious Cyanobacteria Bloom Sample Tracking Sheet

Bloom Code: _____



Community Science Institute www.communityscience.org
 Volunteer Partnerships Watershed Science Online Public Database

Cayuga Lake Shoreline Survey Form and Certified Lab Chain of Custody

Suspicious Bloom Sampling and Tracking Procedure

1. Take at least two pictures of bloom: one close-up to show bloom detail and one from far away to show bloom extent.
2. Report bloom on CSI's website at www.communityscience.org OR email pictures, GPS Coordinates, location description, date and time of observation to habshotline@gmail.com.
3. Collect sample in the provided glass sampling container. Wear Gloves! Fill out the label with sample collector's name, zone number, date, and time sampled.
4. Complete this chain-of-custody document for each sample. Information must match the information on the corresponding sample bottle and photos.

Name of person who collected bloom sample: _____ **Email:** _____

Name of person who observed bloom (if different): _____ **Email:** _____

Cayuga Lake quadrant and zone number where bloom was collected: _____

Exact Location of Bloom

- 1.) GPS Coordinates **Latitude:** _____ **Longitude:** _____
- 2.) Nearest Address _____
- 3.) Location Description _____

Date that suspicious bloom sample was collected: _____ **Time that suspicious bloom sample was collected:** _____

Date that suspicious bloom was observed: _____ **Time that suspicious bloom was observed:** _____

Bloom Extent (See back for descriptions):

Small Localized (few properties) Bloom has been reported on CSI's website at www.communityscience.org

Large Localized (many properties) **OR**

Widespread Pictures, date, time, GPS location, collector's name, and zone number have been emailed to habshotline@gmail.com

Sample Preservation for toxin testing (check all that apply) On ice If no ice is available, drive to CSI lab **immediately** to prevent deterioration Refrigerate if sample is collected after business hours

Chain of Custody Documentation

	Date	Time	Relinquished By	Accepted By	# Containers	Temp. Upon Receipt
1.	_____	_____	_____	_____	_____	_____
2.	_____	_____	_____	_____	_____	_____

283 Langmuir Lab/Ste 1044 95 Brown Road, Ithaca NY 14850 Voice/Fax 607 257 6606
 Certified Water Testing NYSDOH-ELAP #11790 EPA Lab Code NY01S18
 Stephen Penningroth Executive Director <info@communityscience.org>

Bloom Sample Drop-off

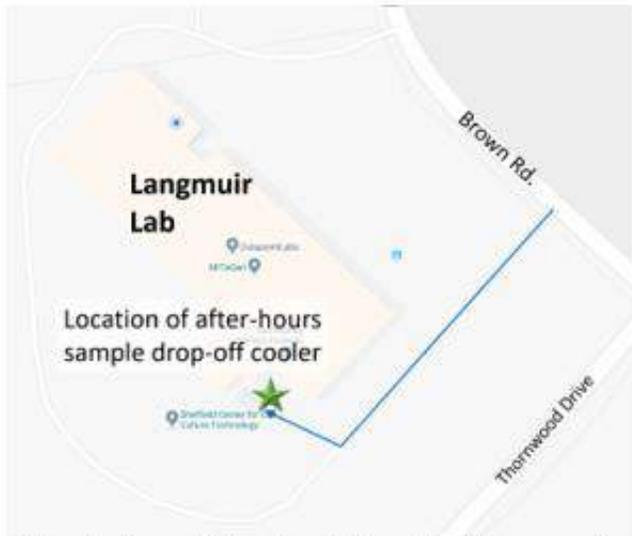
CSI's certified water testing lab is in Room 283 of the Langmuir Lab on 95 Brown Rd in Ithaca, NY

Our office hours are Monday through Friday, 9:00 AM to 5:00 PM

- Samples may be dropped off at any time during these hours.
- Samples can be dropped off after hours or on weekends in the sample drop-off station behind the building.

Bloom sample relay system for northern volunteers can be used as needed.

Figure 1) HABs sample drop-off location for the weekend and after normal business hours



Map to drop-off location: Follow the blue arrow to the drop-off location marked by the green star. The cooler will be inside the fenced structure (see right).



Fenced structure with cooler: The door to the structure will be unlocked. Please close the door after depositing the sample.

Bloom samples must be kept refrigerated and/or transported on ice!

We must receive the bloom sample at the lab **within 48 hours** of sample collection.

- If you need to transport a HABs sample the day after collection, make sure to keep the sample on ice overnight.

HABs Leadership Team

We divide the lake into four “monitoring quadrants”. There is a volunteer Quadrant Leader for each.

HABs Leadership Team

Glenn Ratajczak - Southeast Quadrant Leader

Email: gratajczak@boltonpoint.org

Bill Ebert – Northwest Quadrant Leader

Email: wsebert@yahoo.com

John Abel – Southwest Quadrant Leader

Email: jfa5@cornell.edu

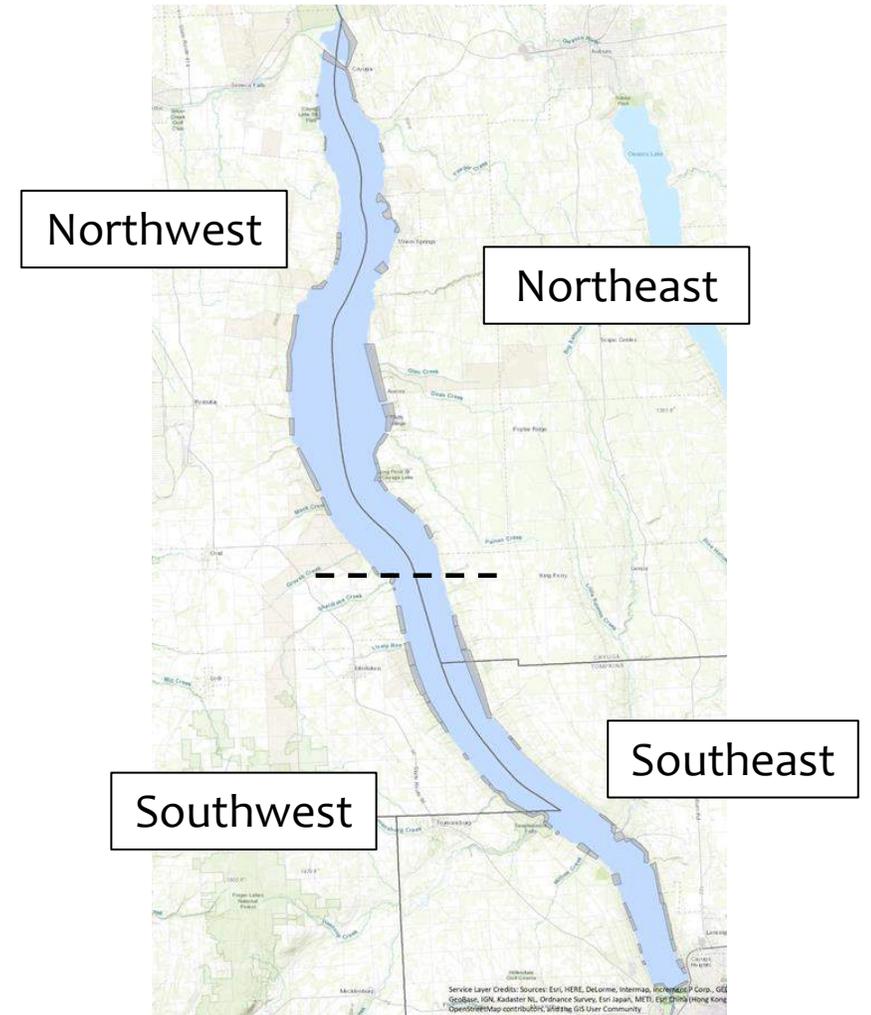
We are looking for a new Northeast Quadrant Leader! Please let us know if you’re interested!

Nathaniel Launer – Cayuga Lake HABs Monitoring Program Coordinator

Email: nathaniel.launer@communityscience.org

Jennifer Tufano – Program Associate at Cayuga Lake Watershed Network

Email: programs@communityscience.org



Testing Bloom Samples at CSI Lab

The ability to test bloom samples at a local certified lab is a **unique** strength of Cayuga Lake's program.

- We are one of the only HABs Monitoring Programs still capable of analyzing samples of blooms that occur.

At CSI lab bloom samples are analyzed to...

1. Determine which cyanobacteria are present in the bloom sample

Dolichospermum



Microcystis



2. Determine the concentration of microcystin toxin

0.3 µg/L and 1 µg/L in drinking water

4.0 µg/ L in surface water used for recreation

These values were set by the EPA and are used by the Department of Health of many states including New York.

Always avoid contact with any suspicious bloom!

Cyanobacteria may produce a variety of other toxic compounds for which labs do not have a certified test method for.

3. Determine the concentration of Total Chlorophyll a as a measure of bloom density

Understanding the concentration of Total Chlorophyll helps us understand bloom density and how it relates to concentrations of cyanotoxins.

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. **A HABs section of our database is in development!**

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 by a grant from the Fred L. Emerson 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.

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 2020 HABs season on June 25. 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 CSI's [HABs Monitoring Information page](#), and avoid all suspicious blooms. Call local state parks for current information regarding beach closures.

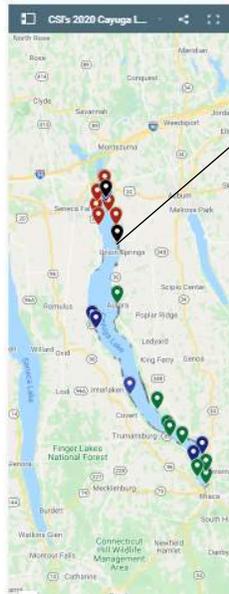
Guide to Map Icons

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

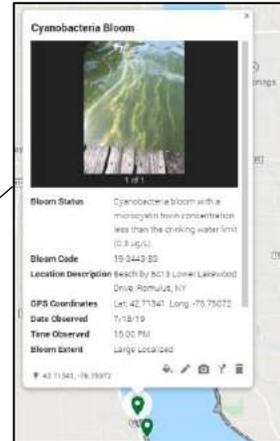
Cyanobacteria Bloom (HAB) Microcystin Toxin Status

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

Blue - Cyanobacteria are present in bloom (HAB) sample. Microscopic examination indicates the presence of cyanobacteria and therefore the potential for the bloom to be harmful. Analyses of microcystin toxin and total chlorophyll a have not been performed because the cyanobacteria identified in the bloom sample was too sparse to be considered bloom conditions; or the bloom is



Interactive reporting map



Complete table of bloom results to date

Cayuga Lake HABs Information and Master Results Table

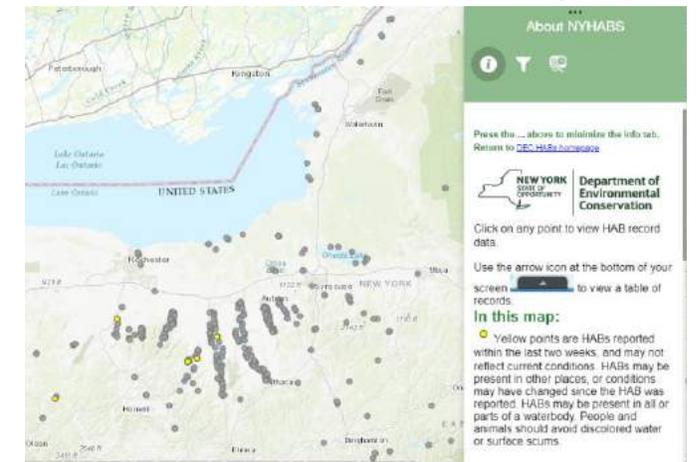
2019 Cayuga Lake HABs Information and Results Table - Cayuga Lake 2019 HABs Results

Bloom Sample Date	Date Sampled	Time Sampled	Date Sample Received at CSI Lab	Monitoring Quadrant	Location Description	Bloom Extent	Latitude	Longitude	Boor Date
19-3663-B1	7/7/2019	12:30	7/8/2019 at 9:00 AM	Northwest	Off the shore of Lakeshore Dr. in Ovid, NY	Small Localized	42.71371	-76.79209	Boor Date: Most
19-3462-B1	7/8/2019	9:20	7/8/2019 at 11:27 AM	Northwest	Close to shoreline at 6367 Water St. Cayuga, NY.	Small Localized	42.62956	-76.72897	Boor Date: Most
19-3468-B1	7/8/2019	15:35	7/8/2019 at 6:00 PM	Northwest	Off the shore of Route 89 stretching a far extent along both the north and south shorelines.	Large Localized	42.76372	-76.76760	Boor Date: Most
19-3444-B1	7/8/2019	15:59	7/8/2019 at 3:30 PM	Northwest	Along the shoreline of Winyard Road Ext. in Romulus, NY. Stretching south to Proctor Beach.	Large Localized	42.7392	-76.7668	Boor Date: Most
19-3442-B1	7/8/2019	15:45	7/8/2019 at 4:15 PM	Northwest	Along the shoreline of Elm Beach Rd. and Elm Beach Spur in Ovid, NY.	Large Localized	42.7051	-76.7459	Boor Date: Most
19-3443-B2	7/8/2019	16:16	7/8/2019 at 2:30 PM	Northwest	Along the shoreline of Lakeshore Dr. in Ovid, NY.	Large Localized	42.7144	-76.7513	Boor Date: Most

CLWN Weekly Updates to the Public



Report to NYHABs State-wide Reporting System



View on CSI's website at www.communityscience.org

Final Steps and Additional Resources

We will work with new volunteers to map out a monitoring zone that works for you.

Sampling kits will be available to pick up at the lab, and from your quadrant leaders. **Please be sure to pick up a sampling kit prior to the start of the monitoring season!**

Please make sure to review our [Harmful Algal Bloom Monitoring information page](#). It contains important resources and materials such as:

- Your HAB Monitoring Program Guide
- Links to the No Bloom Report and Bloom Report forms
- The recorded NYSDEC HABs presentation.
- The HABs identification training video
- Much more!

Everything covered today can be found in the **2022 HABs Monitoring Program Guide** which I will email to each of you following the presentation along with these slides.

**If you haven't any questions, don't hesitate to call or email!
We are here to support you!**

These slides and a recording of the workshop will be available on our HABs Monitoring information page.

Thank You!

The Cayuga Lake Harmful Algal Bloom Monitoring Program would not be possible without you!

We'd like to give a special thanks to Tompkins County, Cayuga County, and Seneca County who have provided full funding – in equal parts – for our Cayuga Lake HABs Monitoring Program this year!