

Cayuga Lake HABs Harrier Training Workshop 2021

The presentation will begin at 10:05

Please ensure that your microphone is muted upon joining the meeting.

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.



What are Harmful Algal Blooms (HABs)?

Although commonly referred to as algae, the organisms that form these 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.

Cyanobacteria produce natural **chemical compounds** whose purposes are poorly understood, and some of these compounds are toxic to humans and other animals. This is part of what makes a bloom **harmful**.

Certain conditions can promote **cyanobacteria** population growth, and rapid growth can lead to the formation of a bloom.

There are many different taxa of cyanobacteria.

H: Harmful

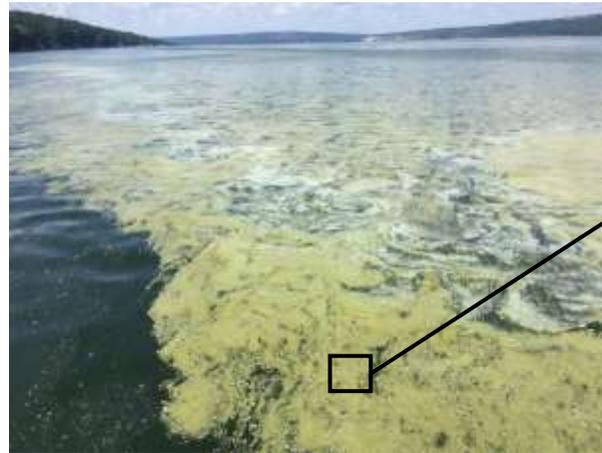
- Toxins, economic, aesthetic, ecological

A: Algal

- Freshwater HABs refer to cyanobacteria. Not true algae.

B: Bloom

- Proliferations of cells, dense concentrations



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.

Blooms

Blooms are the **rapid growth of cyanobacteria populations**, or accumulation of cyanobacteria, concentrated to a local area.

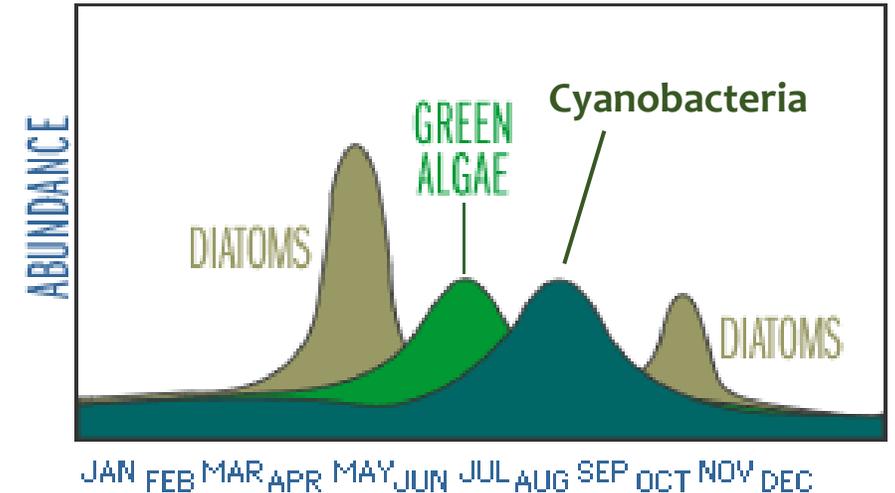
This is different than the modest population growth that occurs as a natural seasonal cycle.

The factors that promote **bloom formation** are still under study. 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 promote cyanobacteria growth.
- Still, calm, and stratified waters facilitate the formation of dense surface blooms.
- On the flip side, prevailing winds may lead to blooms through the accumulation of cyanobacteria on specific shorelines

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

SEASONAL SUCCESSION OF PHYTOPLANKTON POPULATIONS



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) - 2021

- **The monitoring season will start on June 27th.** We ask that you survey your lakeshore zone at least once per week from June 27th to September 30th
- 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

**“Report a HAB” at
www.communityscience.org**

- 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.



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: 

Cayuga Lake No-Bloom Report

Complete this form following weekly shoreline survey only if no bloom is observed.

* Required

Name of HABs Harrier *

Your answer _____

Waterbody Name *

Your answer _____

Zone Number *

Your answer _____

Date the Zone Survey was Completed *

Date

mm/dd/yyyy _____

Time the Zone Survey was Completed *

Time

__ : __ AM

Observations

Your answer _____

SUBMIT

Never submit passwords through Google Forms.

Over 75% No
Bloom Report
completion rate
in 2020!

Let's keep it up!

Reporting a Suspicious Bloom – CSI Website

- Take at least two pictures of bloom:
 - One close up to show bloom composition
 - One from far away to show bloom extent
- 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
- Mobile friendly



Fill out the form below to report a harmful algal bloom.

Please be sure to include your personal information (your name, email, and phone number), bloom information (observation date and time and location of the bloom), and two pictures (one close up to show bloom composition and one from far away to show bloom extent).

A member of the HABs monitoring consortium or one of the Quadrant Leaders will receive your report and follow up with you as soon as possible.

Thank you for taking part in the Cayuga Lake HABs Monitoring Program! By reporting this bloom you've aided the collection of valuable cyanobacteria data and played a significant role in protecting public health.

If you have any questions or are interested in monitoring Cayuga Lake's shoreline on a routine basis by becoming a HABs Harrier, contact Cayuga Lake's HABs Monitoring Program Coordinator, Nathaniel Launer, at nathaniel.launer@communityscience.org or Cayuga Lake Watershed Network's Steward, Hilary Lambert, at steward@cayugalake.org

The image is a screenshot of the online reporting form. It contains several input fields: "Name (required)", "Your Email (required)", "Your Phone Number (optional)", "Date bloom was observed (required)" with a date picker, "Time bloom was observed (required)", "Location of bloom - Exact (GPS coordinates or address) (required)", "Location of bloom - Described (landmarks and nearby points of interest) (required)", "Photo 1 (optional)", "Photo 2 (optional)", and "Additional information (optional)". Each field is followed by a dark grey bar representing a redacted input. At the bottom of the form is a green "SEND" button.

Reporting a Suspicious Bloom - Email

- Email pictures of bloom, GPS coordinates, location description, date, and time observed to habshotline@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 extent



Close-up picture showing composition



Example email



Collect 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.



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.

Directions

Volunteer and Sample Collector Information

Location Information

Date and Time Observed and Sampled

Bloom Extent (description on the back of form)

Sample Preservation and Chain of Custody
Important!

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 habs hotline@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 habs hotline@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/Stn 1044 95 Brown Road, Ithaca NY 14850 Voice/Fax: 807 257 6666
Certified Water Testing NYSDOH-ELAP #11790 EPA Lab Code NY01518
Stephen Posingrook Executive Director <info@communityscience.org>



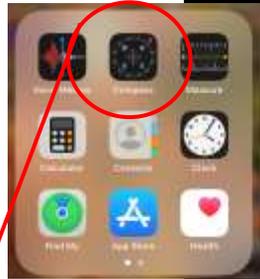
Determining GPS Coordinates

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

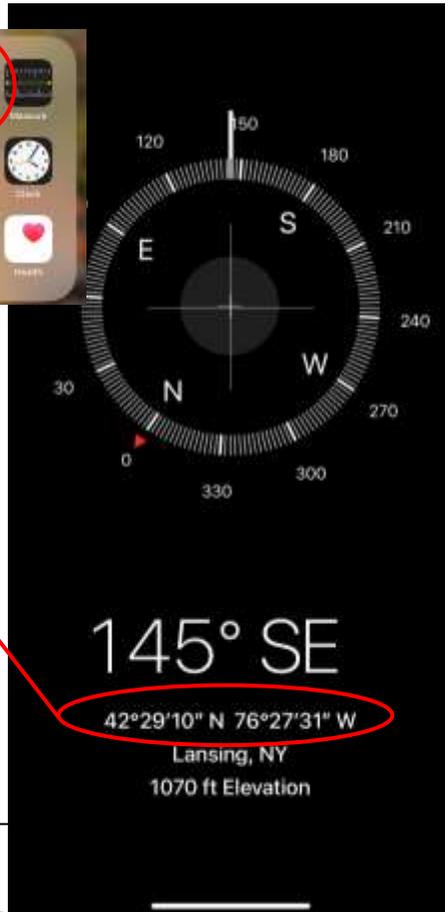
- App called “Coordinates” also works well

2. Using GoogleMaps



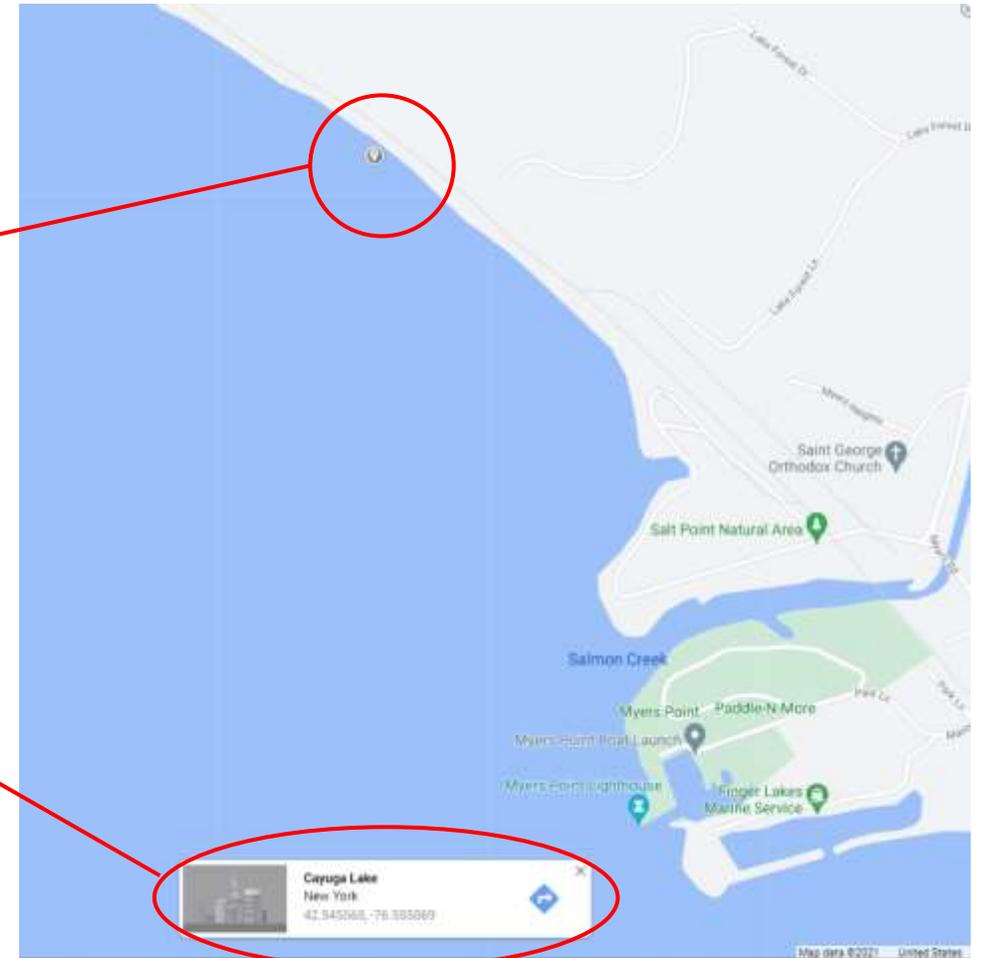
1. Open the “Compass” app

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



1. Open www.google.com/maps

2. Double-click a spot on the map.



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

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

Christy Vanarnum – Northeast Quadrant Leader

Email: christyvanarnum95@yahoo.com

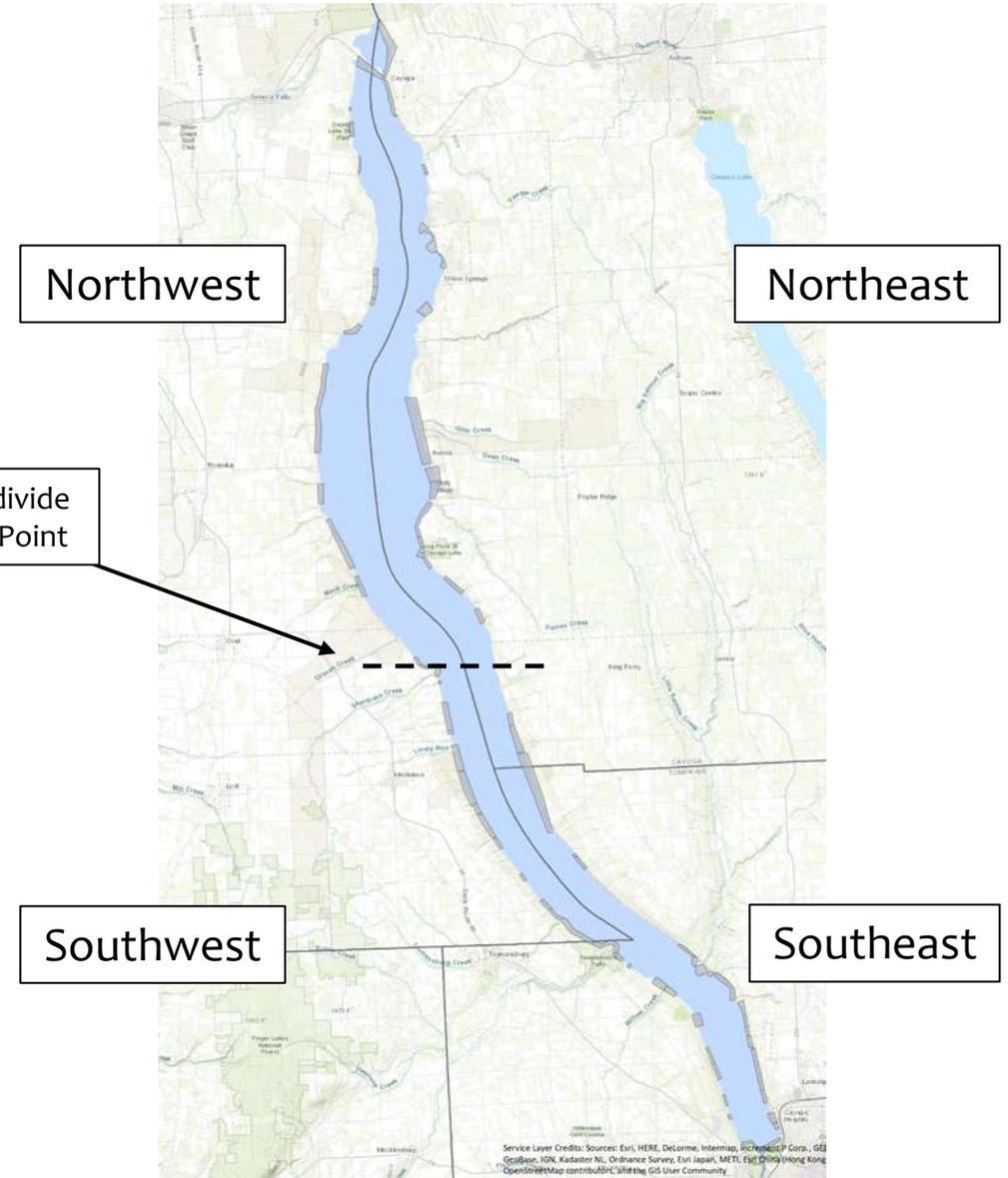
Bill Ebert – Northwest Quadrant Leader

Email: wsebert@yahoo.com

John Abel – Southwest Quadrant Leader

Email: jfa5@cornell.edu

Quadrant Leader bios can be found on the Cayuga Lake Watershed Network website!



Public Bloom Report Process



Report is submitted to
www.communityscience.org or
habshotline@gmail.com

CSI, CLWN, DCL and all Quadrant Leaders
receive email notification.

Depending on the location of the reported
bloom, the appropriate quadrant leader
will contact a nearby HABs Harrier via
phone or email.

If available, a HABs Harrier will go to the
site of reported bloom to investigate and
collect a sample if necessary.

HABs Harrier will transport sample and
completed Shoreline Survey Form/Chain
of Custody to CSI lab.

Getting Permission

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

Bloom Sample Drop-off

- CSI Lab Location: 283 Langmuir Lab, 95 Brown Rd, Ithaca, NY
- CSI hours: Monday – Friday 9:00 AM – 5:00 PM
- 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

- Weekend and after-hours drop-off location



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.

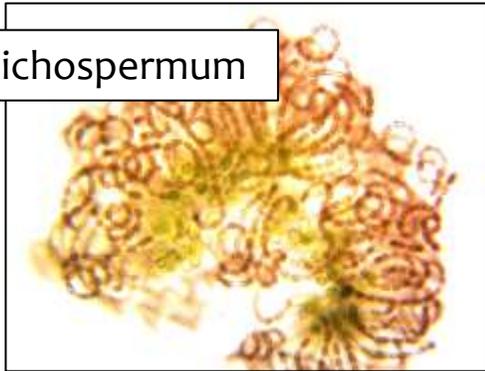
Testing Bloom Samples at CSI Lab

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

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 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 of bloom density.

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 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.

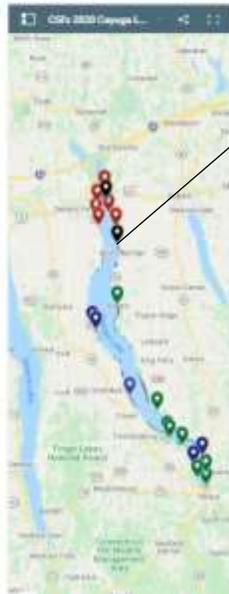
Guide to Map Icons

Colored icons indicate the microcystin toxin status of the cyanobacteria bloom. The date 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. Analysis 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

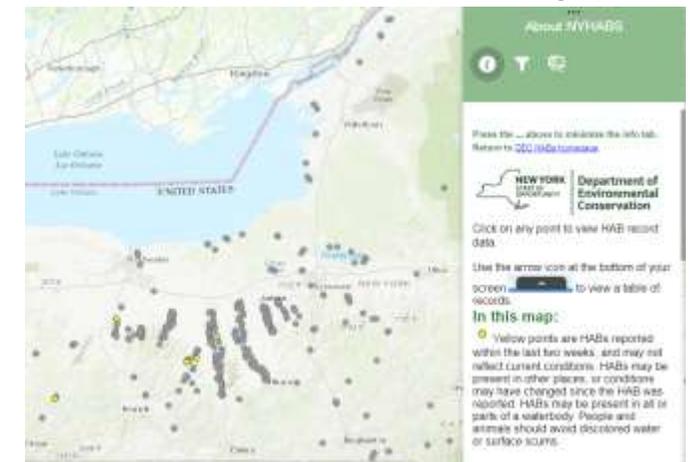
2020 Cayuga Lake HABs Information and Results Table - Cayuga Lake 2020 HABs Results

Microcystin Toxin	Date Reported	Time Reported	Date Sample Received at CSI Lab	Monitoring Station	Location Description	Bloom Status	Latitude	Longitude
Black	7/15/20	10:00	7/15/20 at 11:30 AM	Westlake	Off the shore of Westlake St. in Cayuga Lake	Small Location	42.7111	-76.7021
Black	7/16/20	10:00	7/16/20 at 11:30 AM	Westlake	Close to entrance of West Lake St. in Cayuga Lake	Small Location	42.6885	-76.7087
Black	7/16/20	10:00	7/16/20 at 11:30 AM	Westlake	Off the shore of West Lake St. in Cayuga Lake	Large Location	42.7412	-76.7087
Black	7/16/20	10:00	7/16/20 at 11:30 AM	Westlake	Using the property of West Lake St. in Cayuga Lake	Large Location	42.7380	-76.7087
Black	7/16/20	10:00	7/16/20 at 11:30 AM	Westlake	Using the property of West Lake St. in Cayuga Lake	Large Location	42.7380	-76.7087
Black	7/16/20	10:00	7/16/20 at 11:30 AM	Westlake	Using the property of West Lake St. in Cayuga Lake	Large Location	42.7380	-76.7087

CLWN Weekly Updates to the Public



Report to NYHABs State-wide Reporting System



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

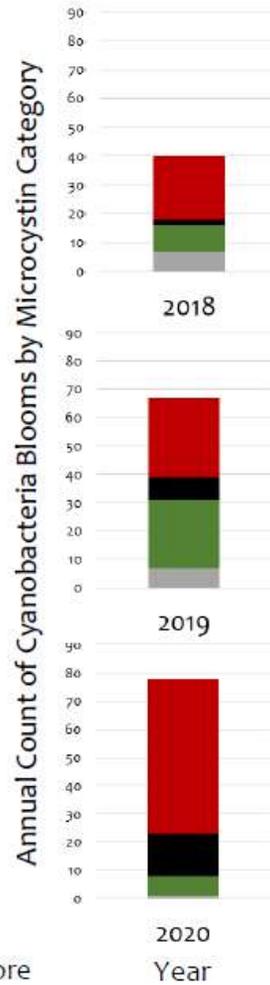
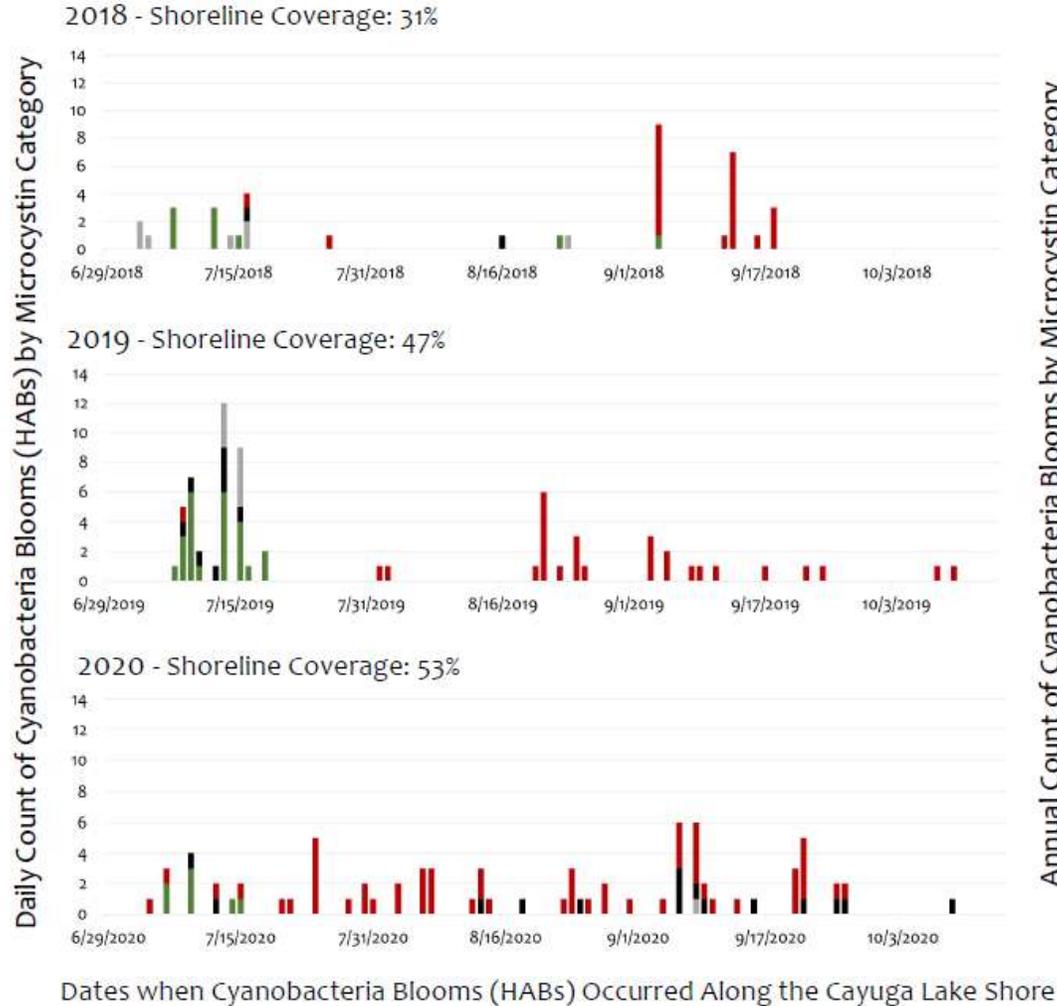


Final Steps and Additional Resources

- 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 **2021 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.

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

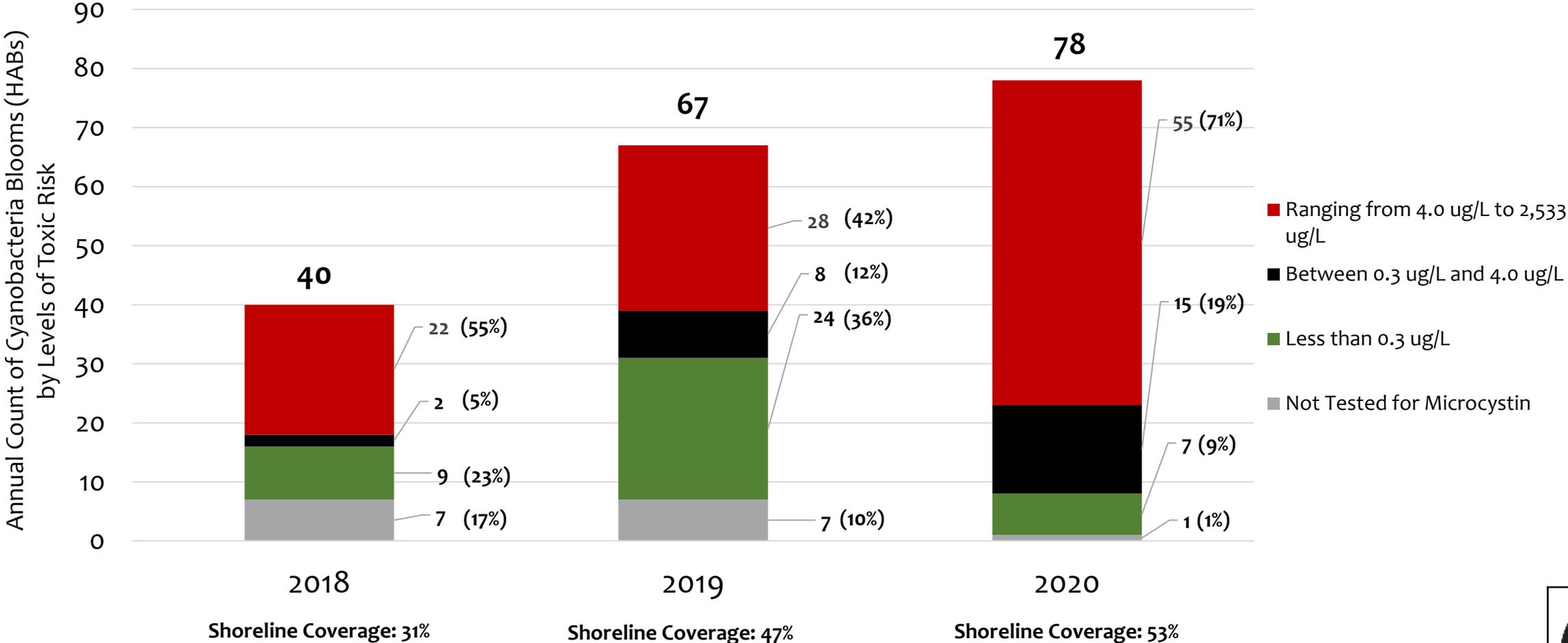
- Blooms with a microcystin level ranging from 4 µg/L to 2,533 µg/L.
- Blooms with a microcystin level greater than 0.3 µg/L but less than the recreation limit of 4.0 µg/L .
- Blooms with a microcystin level less than the method detection limit of 0.3 µg/L*.
- Not tested for microcystin.

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



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

Annual Count of Cyanobacteria Blooms (HABs) on Cayuga Lake shoreline at Three Levels of Toxic Risk from Microcystin



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.



Map Legend

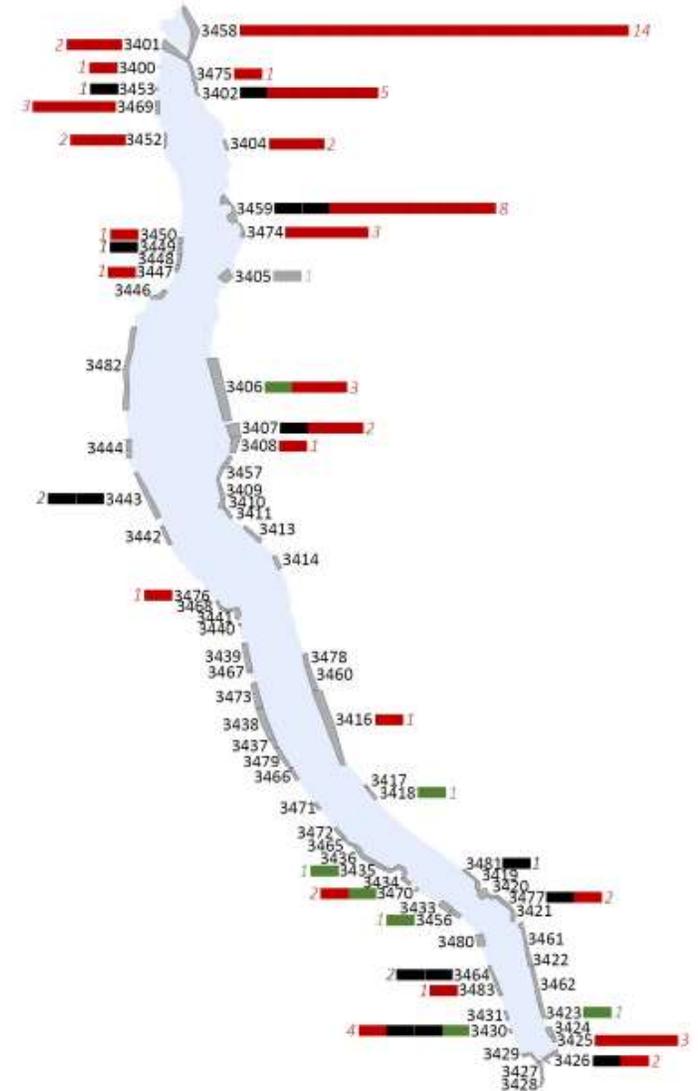
Microcystin Categories

- Not tested for microcystin.
- Blooms with microcystin levels less than the method detection limit of 0.3 µg/L.*
- Blooms with microcystin levels greater than 0.3 µg/L and less than recreation limit of 4 µg/L.
- Blooms with microcystin levels ranging from 4 µg/L to 2,200 µg/L.

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

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

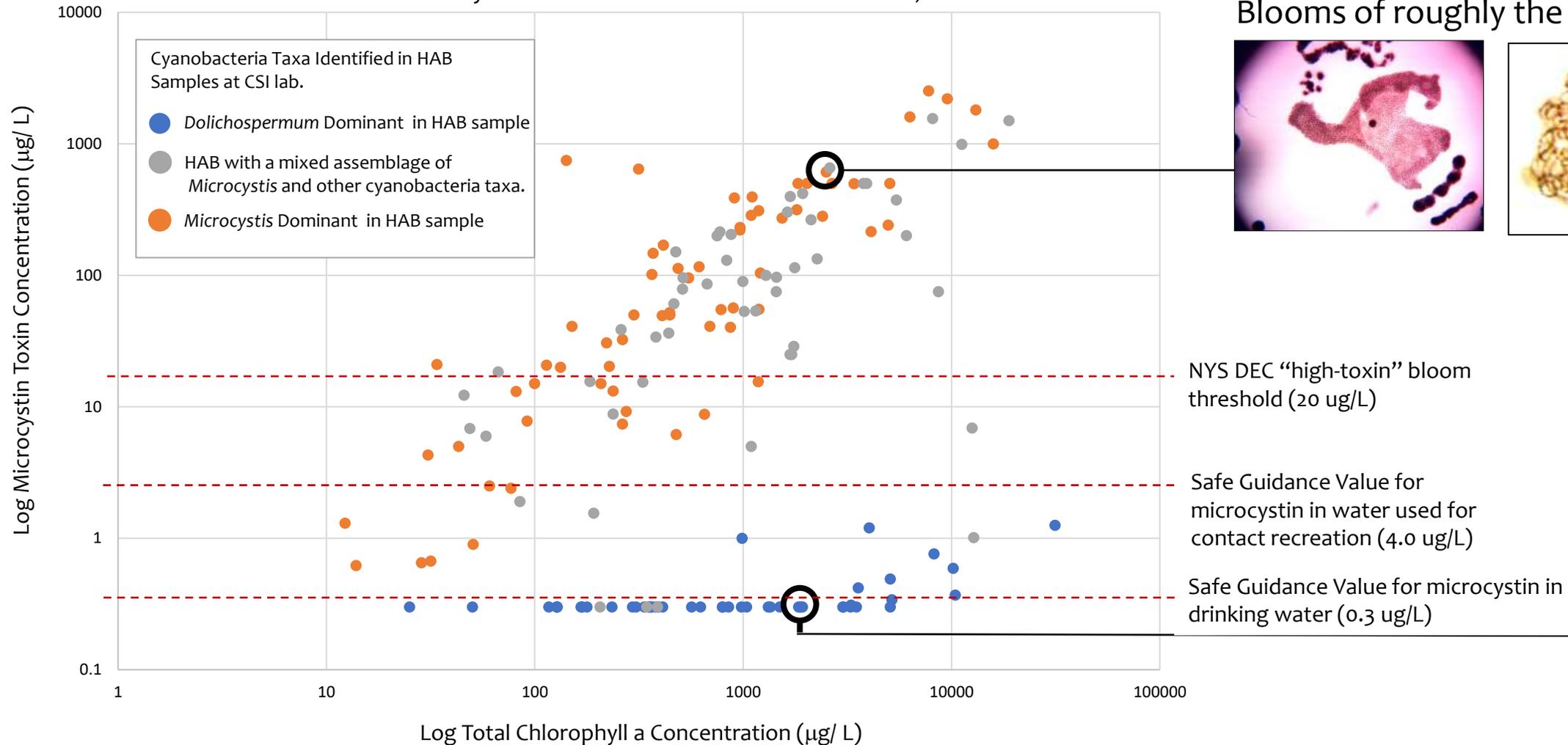
Figure 4b. "High" microcystin blooms were recorded along the southern 75 miles of shoreline in addition to a large cluster in the north.



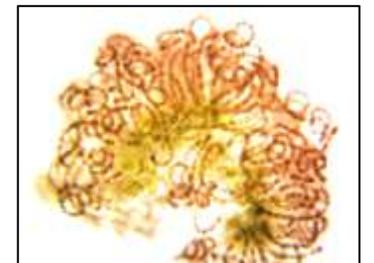
Multi-Year Patterns: Taxa Associated Microcystin

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



Thank You!

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

Please let me know if you have any questions or concerns. All of the information presented today will be available on our Harmful Algal Bloom Monitoring information page following the presentation so that you can review it throughout the monitoring season.