The Water Bulletin
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Photo by Cayuga Lake HABs Harrier Holly Davidson

Monitoring Harmful Algal Blooms (HABs) in 2020

The results of the 2020 Cayuga Lake Harmful Algal Bloom (HABs) Monitoring Program indicate that cyanobacteria blooms continue to present a clear threat to the use and enjoyment of Cayuga Lake. According to current scientific thinking, impacts of climate change such as "an expanded seasonal window of warm water temperatures and the potential for episodic increases in nutrient loading" are likely to contribute to increases in HABs on freshwater lakes, ponds, and reservoirs across the continent (Lall et al., 2018, p.157). This prospect strengthens our resolve and reinforces our commitment to work together as a community to collect and share data that can inform strategies to mitigate and manage the occurrence of HABs on Cayuga Lake.

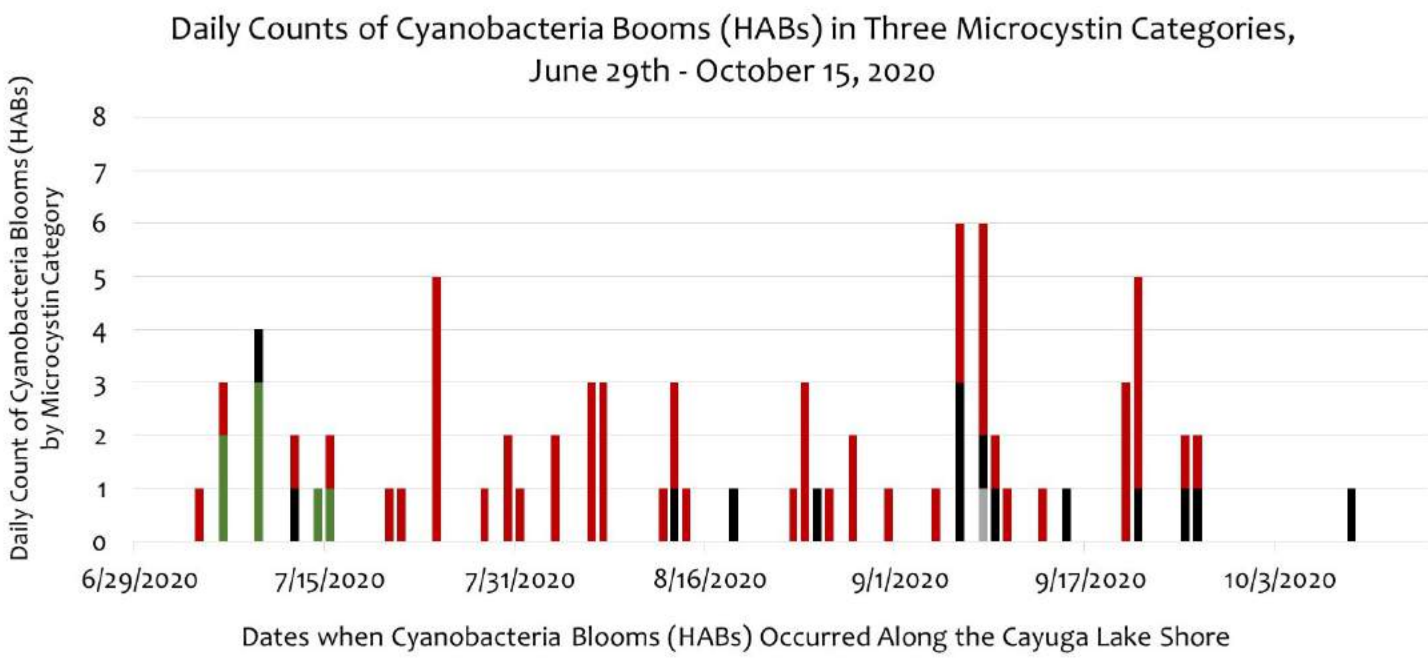
… continued on page 2

Inside this Edition

Monitoring Harmful Algal Blooms (HABs) in 2020

In June, new and returning HABs Harrier volunteers attended online training and orientation meetings, showing a collective commitment to monitor and protect the lake despite the ongoing pandemic. We welcomed 19 new HABs Harriers and established 12 new zones for a total of 74 zones, increasing our overall shoreline coverage from 47% in 2019 to 53% in 2020. Zones were patrolled once per week from June 29 to September 31. If a bloom was observed, the Harrier immediately reported it to CSI, collected a sample, and transported it to the CSI lab in Ithaca, often with the assistance of our extraordinary HABs Quadrant Leaders who each year provide additional coordination and logistical support that we are very grateful for. Upon receiving the report, CSI staff posted the location of the bloom on our Cayuga Lake HABs Reporting Page on our website. The concentrations of microcystin toxin and total chlorophyll a (a measure of bloom density) as well as a list of the dominant cyanobacteria taxa in the bloom were posted within one to three days. CSI's 2020 HABs Reporting Page received over 45,000 views.

In partnership with our dedicated HABs Harrier volunteers, CSI confirmed 78 cyanobacteria blooms, a slight increase from 2019 (67 blooms) that may be due, at least in part, to the increase in shoreline coverage. The timing of HABs occurrence was unlike the previous two years in which there was a lull during August. This summer, blooms occurred continuously throughout July (23 blooms), August (24 blooms), September (30 blooms), and early October (1 bloom). Another distinct temporal pattern was the early and frequent occurrence of high-toxin blooms. In 2020, 55 of the 78 blooms (70%) had levels of microcystin toxin ranging from 4.3 to 1556.7 µg/L, exceeding 4 µg/L, the contact recreation limit (NYSDOH, 2020). High-toxin blooms began appearing in early July and continued throughout the summer (*Figure 1*), unlike the previous two years when nearly all high-toxin HABs occurred during late August and September.



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 1,556.7 µg/L.

* 0.3 µg/L is also the New York State Department of Health (NYSDOH) limit for microcystin in finished drinking water

Figure 1. Blooms occurred steadily throughout the summer months of 2020.

Similar to the spatial pattern of HABs occurrence first observed in 2018 and 2019, most (40 of 55) of the blooms with microcystin concentrations greater than 4 µg/L also occurred in the northern quarter of the lake in 2020. However, this year blooms with elevated microcystin concentrations occurred in the southern three-quarters of the lake as well. Fifteen of the blooms that occurred on the southern shoreline had microcystin concentrations that exceeded the recreation limit of 4 µg/L, including those that occurred on the shorelines of Stewart Park and East Shore Park in Ithaca (*Figure 2, map*).

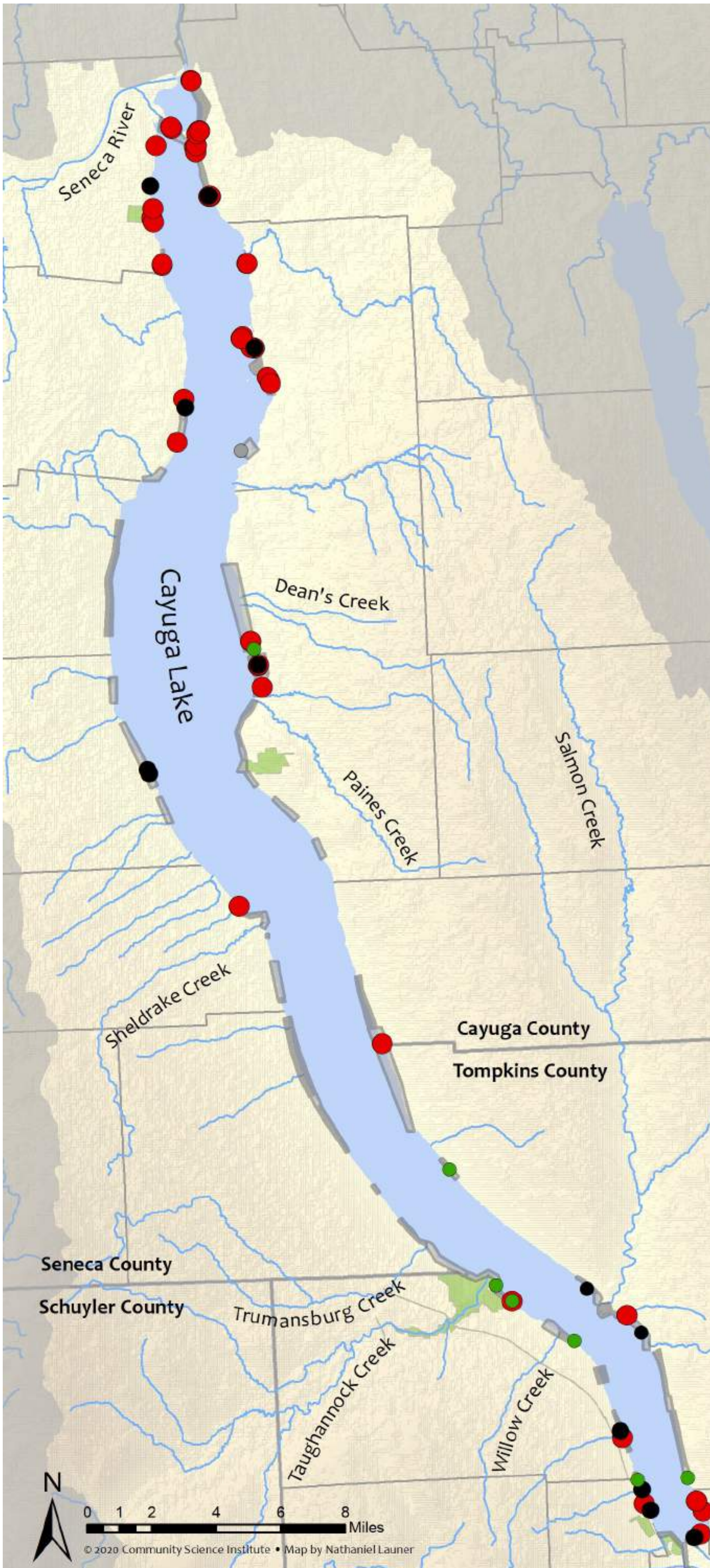


Figure 2. Map of microcystin toxin levels in cyanobacteria blooms on Cayuga Lake during the 2020 monitoring season. For bloom location details, view the interactive HABs reporting map online at: www.communityscience.org

Map Legend

- Blooms with microcystin levels ranging from 4 µg/ L to 1,556.7 µg/ L.
- Blooms with microcystin levels greater than 0.3 µg/ L and less than the recreation limit of 4 µg/ L.
- Blooms with microcystin levels less than the method detection limit of 0.3 µg/ L.*

  *0.3 µg/L is also the NYSDOH limit for microcystin in finished drinking water
- Shoreline zones monitored weekly from July through September by HABs Harriers
- New York State Parks

Another striking observation this year were HABs at the extremes: Either very large and dense or exceptionally small and sparse. Three widespread blooms occurred in the northern end of the lake that were reported to extend for roughly two miles. One had a total chlorophyll a concentration of 18,876 µg/L and a microcystin toxin concentration of over 1,500 µg/L. However, not all blooms were so conspicuous. Harriers reported many instances when sparse cyanobacteria colonies were noticeable in the water but did not accumulate into distinct surface scums. Analysis showed that these sparse colonies can still produce detectable levels of microcystin. For example, one bloom had a total chlorophyll a concentration of just 12.1 µg/L, not much greater than typical chlorophyll a concentrations on Cayuga Lake (see database.communityscience.org/monitoringsets/9). The microcystin toxin concentration, however, was 1.0 µg/L, greater than the method detection limit of 0.3 µg/L but still less than the recreation limit of 4 µg/L. A likely explanation for the relatively high microcystin concentration of this diffuse bloom may be that the main phytoplankton present was *Microcystis*, a genus of cyanobacteria which is consistently associated with microcystin in Cayuga Lake HABs (see *Patterns of "High" Microcystin HABs Occurrence, 2018- 2020*, page 6). These extremes – intense blooms and diffuse blooms of sparse cyanobacteria colonies – illustrate the unique challenges of monitoring cyanobacteria and managing the associated risks. These challenges reinforce the importance of careful bloom analysis – including microscopic examination of cyanobacteria taxa and the certified analysis of toxin concentrations – when assessing the risk cyanobacteria present. These challenges also highlight the importance of monitoring and particularly of trained volunteers who excel at identifying everything from widespread blooms to even the sparsest colonies of cyanobacteria.

A massive HAB that occurred near Union Springs on September 8, 2020. This bloom was reported to extend along roughly two miles of shore (patrolled by boat), with a microcystin toxin concentration greater than 25 µg/L. Photo by HABs Harriers Joni and Lloyd Dropkin.

Diffuse cyanobacteria colonies (difficult to see in a photo) reported by a HABs Harrier in the southern end of the lake on September 21, 2020. The cyanobacteria were found to be of genus *Microcystis* and the sample was found to have a microcystin toxin concentration of 0.65 µg/L, greater than the method detection limit of 0.3 µg/L. Photo by HABs Harrier and Quadrant Leader John Abel.

The results this year reinforce the results of the past two years: HABs present a clear threat to the water quality of Cayuga Lake due to the presence of microcystin toxin, sometimes at extremely high concentrations. At CSI we are committed to continuing and expanding our efforts to monitor HABs on Cayuga Lake. In 2021 we plan to recruit more volunteers with the long-term objective of monitoring at least 75% of the lakeshore; we will consider investigating other cyanotoxins that may be present in Cayuga Lake HABs; we plan to strengthen our HABs education and outreach materials and further distribute these materials to communities around the lake; and we remain committed to our Synoptic Stream Monitoring Partnerships through which we monitor nutrient concentrations at nine in-lake locations and at locations in 20 sub-watersheds within the Cayuga Lake watershed, providing valuable data that may shed light on the factors that promote blooms on Cayuga Lake. Through collective effort and community science, it should be possible to manage the risk these blooms present and perhaps even reduce their presence on Cayuga Lake in the future.

Nathaniel Launer
Outreach Coordinator

Anatoxin-a in Select HABs on Cayuga Lake

Microcystins (liver toxins) present in Cayuga Lake HABs are not the only cyanotoxins that have been found in our state. Research conducted on New York waterbodies has placed an emphasis on microcystin as the 'priority cyanotoxin' because of its high concentration in local waters and its widespread abundance in the state; however, from a management standpoint, anatoxin-a, a type of neurotoxin, might be considered second most important due to its association with animal deaths (Boyer, 2007).

Anatoxin-a is known to be produced by a variety of cyanobacteria, including those belonging to the genera *Dolichospermum* and *Microcystis*, which have dominated Cayuga Lake blooms for the three years our monitoring program has been in existence (see *Patterns of "High" Microcystin HABs Occurrence, 2018-2020* below). This year, in addition to testing 78 HAB samples for microcystin, the CSI lab analyzed a subset of 19 HABs for anatoxin-a. The same antibody-based ELISA (Enzyme-Linked Immunosorbent Assay) technology used to measure microcystin was used to test for anatoxin-a. While the anatoxin-a ELISA is currently not certifiable, the results are considered accurate. One characteristic that sets anatoxin-a apart from other cyanotoxins is that it degrades rapidly in direct sunlight at pH values typically found in Cayuga Lake and therefore requires the addition of a preservative to lower the pH immediately upon collection (U.S. EPA, 2015). All samples in this study were preserved by HABs Harrier volunteers in the field following EPA guidelines (U.S. EPA, 2017).

Our lab analyses found anatoxin-a concentrations to be relatively low in all 19 HAB samples, ranging from 0.176 µg/L to 1.339 µg/L. In the U.S., what constitutes dangerous levels of anatoxin-a greatly varies by state. For example, the recreational guideline for anatoxin-a in Virginia is 1 µg/L, while Ohio will only issue a no contact advisory if 300 µg/L is detected in recreational waters (U.S. EPA, 2019). New York has not set an anatoxin-a guideline, and no federal guidance level has been set by the EPA. A draft value for recreational water from the World Health Organization (WHO) is 59 µg/L (WHO, 2019), 44 times greater than the highest value we found in Cayuga Lake HABs.

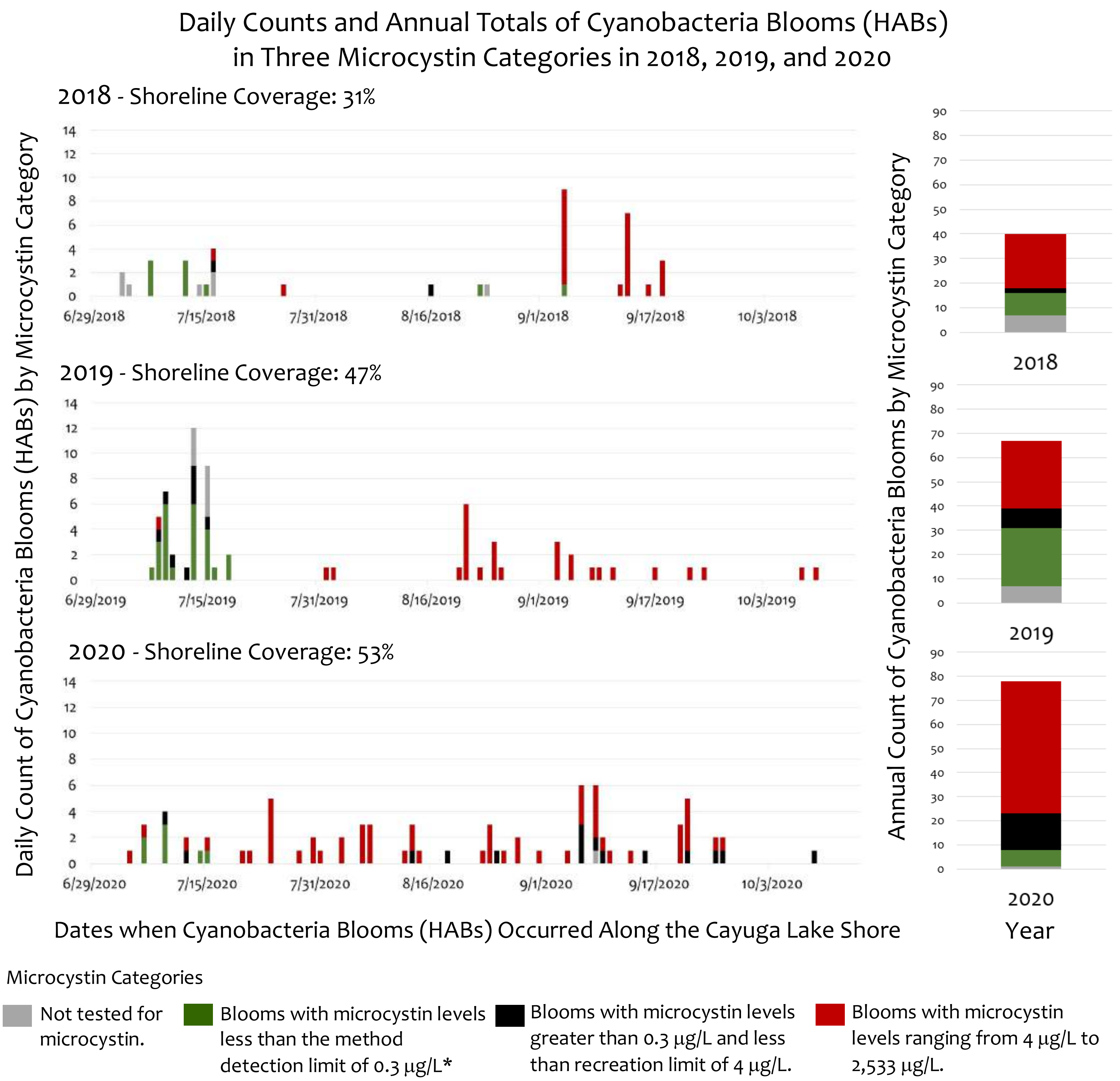
We are immensely grateful to the Emerson Foundation for providing the funds necessary to conduct this year's anatoxin-a study. CSI will consider continuing and/or expanding efforts to monitor anatoxin-a in selected HABs around Cayuga Lake in 2021.

Noah Mark
Technical Director

Patterns of "High" Microcystin HABs Occurrence, 2018-2020

Launched in 2018, the Cayuga Lake HABs Monitoring Program has been conducted in each of the past three years as a partnership between CSI and a dedicated group of "HABs Harrier" volunteers, who this year numbered 91. The purpose of this article is to compare results of the past three HABs seasons with respect to when blooms occurred, where they were located and how much microcystin toxin they produced. When considering these results, it is important to keep our Cayuga Lake HABs Monitoring Program protocol in mind: Volunteers generally patrol their zones once a week, and while a handful of volunteers patrol more frequently, the results should be understood as a compilation of weekly snapshots of shoreline HABs. Since blooms often disperse after a few hours, it is almost certain that our results underestimate the total number of HABs. Moreover, zones patrolled by volunteers have covered about half or less of the Cayuga Lake shoreline, depending on the year. Nevertheless, given the lake-wide scope of our program, it seems reasonable to assume that volunteers succeed in capturing the relative frequencies of HABs occurrences from zone to zone and from year to year, even if the total number of HABs remains uncertain.

The HABs season on Cayuga Lake lasts approximately three months, from early July to early October. In 2018, volunteers patrolling 31% of the Cayuga Lake shoreline reported 16 blooms in July, three in August and 21 in September for a total of 40 blooms (*Figure 3, top*). Most of the 2018 July HABs were dominated by the genus *Dolichospermum*. Almost all had concentrations of microcystin toxin below the detection limit of 0.3 µg/L. September blooms clustered in the "northern" quarter of Cayuga Lake, defined here as the shoreline north of zone 3446 near Fayette on the west side and north of Great Gully Brook near zone 3405 (see *Figure 4*) on the east side, and were dominated by the genus *Microcystis*. All but one had "high" microcystin concentrations, defined here as greater than the contact recreation limit of 4 µg/L, with concentrations ranging up to 2,533 µg/L. A total of eight "high" microcystin blooms were reported in "northern" zones.



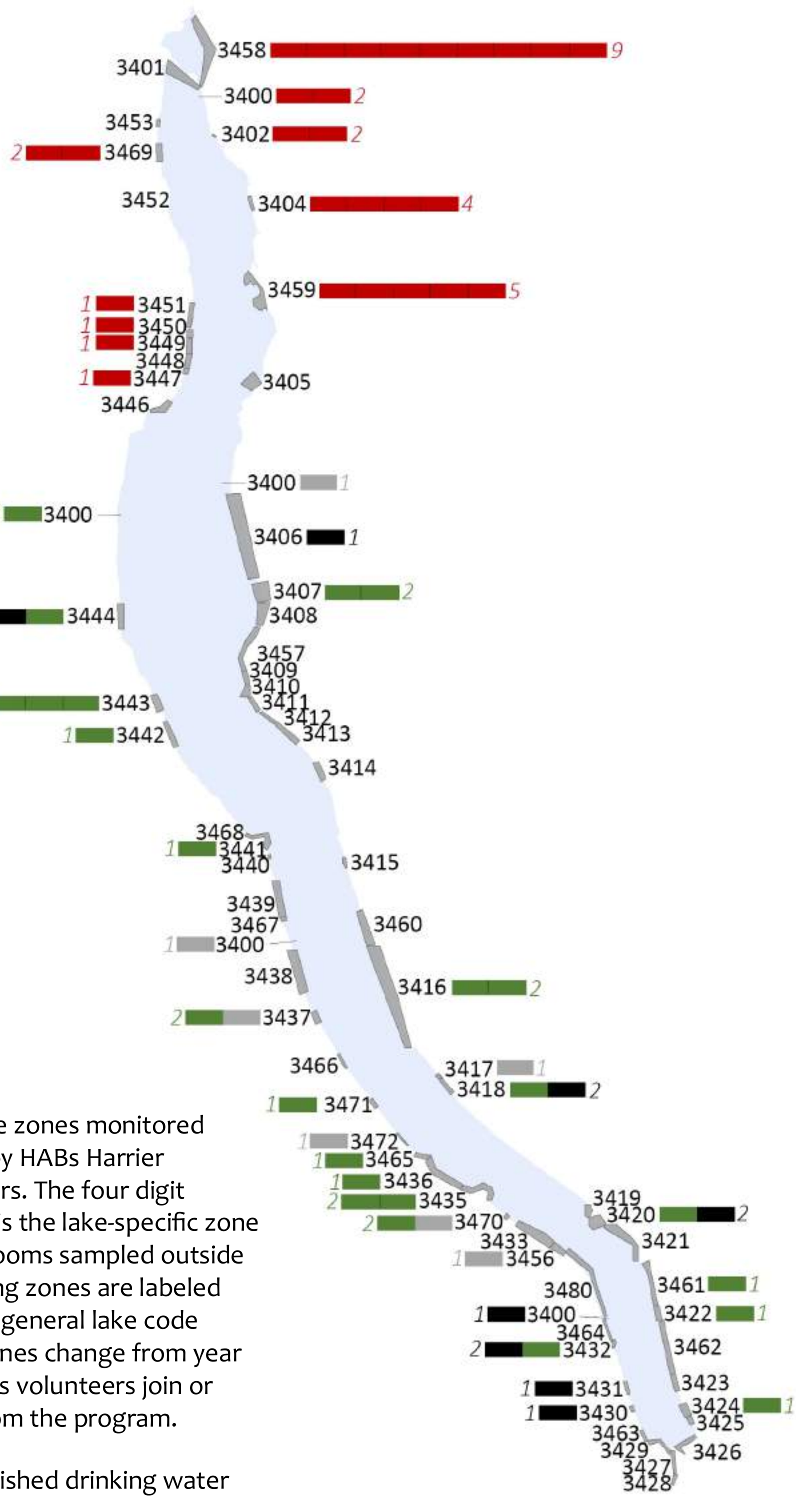
* 0.3 µg/L is also the NYSDOH limit for microcystin in finished drinking water

Figure 3. The temporal pattern of "high" microcystin bloom occurrences was different in 2020 compared to 2018 and 2019.

In 2019, volunteers patrolled 47% of the shoreline and reported 40 blooms in July, two blooms in the first three weeks of August, and 25 blooms from late August to mid-October for a total of 67 cyanobacteria blooms (*Figure 3, middle*). July blooms were again dominated by *Dolichospermum* and were low in microcystin. Following a lull in August and continuing for the remainder of the season, blooms were dominated by *Microcystis,* and microcystin concentrations ranged as high as 2,200 µg/L. A total of 28 "high" microcystin blooms were reported in "northern" zones including two blooms (3400) that were not located in a zone (*Figure 4a*).

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.

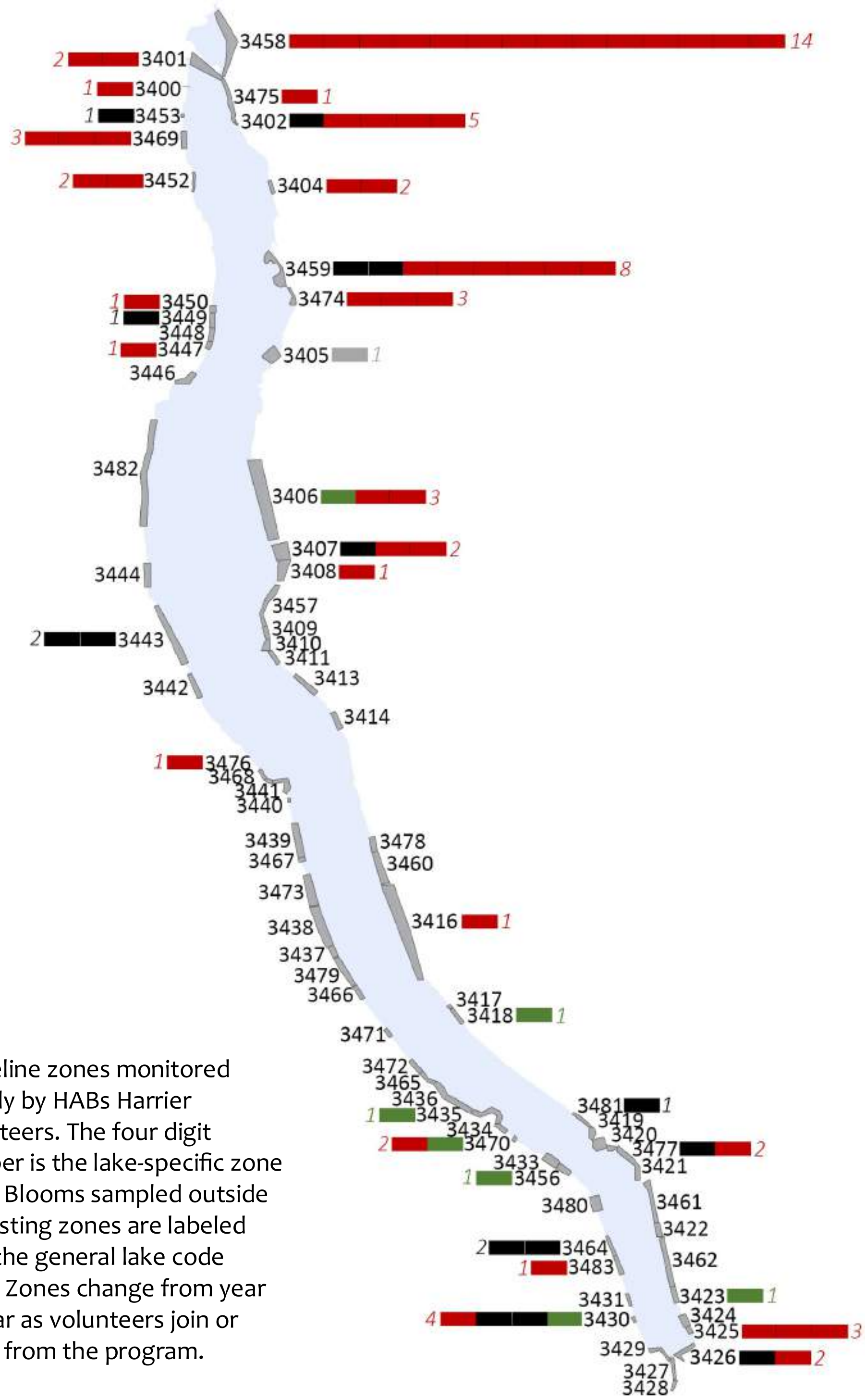
Shoreline zones monitored weekly by HABs Harrier volunteers. The four digit number is the lake-specific zone code. Blooms sampled outside of existing zones are labeled with the general lake code 3400. Zones change from year to year as volunteers join or retire from the program.

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

In contrast to 2018 and 2019, blooms in 2020 occurred continuously from July to October, a total of 78 for the season (*Figure 3, bottom*). In July, 16 of 23 blooms were dominated by *Microcystis* and contained "high" microcystin concentrations, a change from 2018 and 2019 when not more than two July blooms fell in this category (*Figure 3*). Further, "high" microcystin blooms occurred along most of the shoreline in 2020 in addition to clustering in the "northern" quarter (*Figure 4b*). A total of 55 "high" microcystin blooms were documented, an increase of 27 over 2019: Fifteen along the "southern" three-quarters of the shoreline, and 40 in the "northern" quarter including one bloom not located in a zone (*Figure 4b*). Microcystin concentrations ranged as high as 1556.7 µg/L. Overall shoreline coverage was 53%, a slight increase from 2019.

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 "northern" quarter.



Map Legend

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Blooms with microcystin levels ranging from 4 µg/L to 1,556.7 µg/L.

Shoreline zones monitored weekly by HABs Harrier volunteers. The four digit number is the lake-specific zone code. Blooms sampled outside of existing zones are labeled with the general lake code 3400. Zones change from year to year as volunteers join or retire from the program.

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

We are not able to obtain direct evidence that microcystin is produced by the genus *Microcystis* on Cayuga Lake. Strong indirect evidence includes: 1) Microcystin was found almost exclusively in blooms containing *Microcystis*; 2) Microcystin was found rarely and at low concentrations in *Dolichospermum* blooms; and 3) Microcystin concentration correlated generally with bloom density as measured by total chlorophyll a when *Microcystis* was present in the bloom (*Figure 5*).

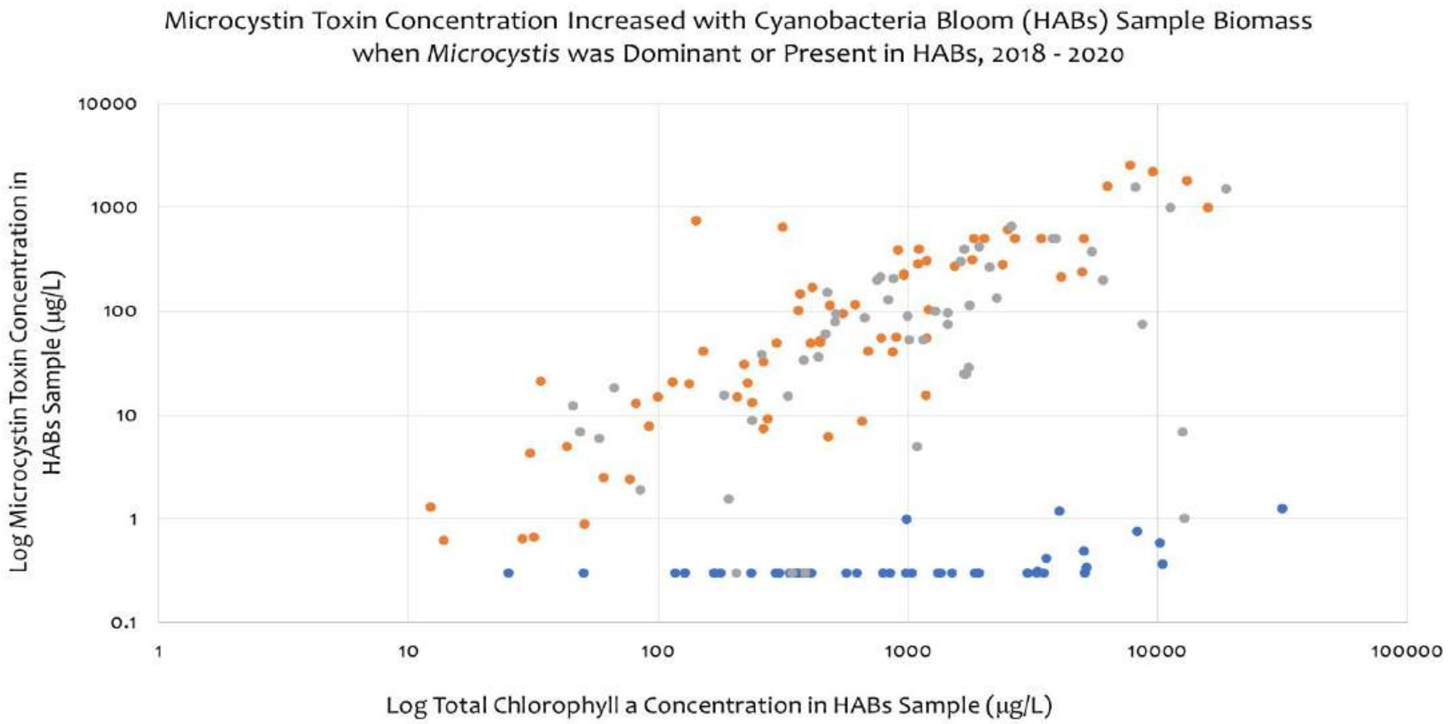


Figure 5. Dominant cyanobacteria taxa were identified by microscopic examination of 170 HABs samples, 2018-2020. A 0.1 ml sub-sample was placed under a 2 cm x 3 cm coverslip and scanned in its entirety at 40x magnification. Higher magnification was used to confirm taxa as needed. A genus was considered dominant if colonies or clumps of filaments were present and more numerous than other taxa in most (>90%) fields of view.

- *Dolichospermum* is estimated to be the dominant cyanobacteria genus in bloom sample.
- *Microcystis* is estimated to be the dominant cyanobacteria genus in bloom sample.
- Mixed assemblage of cyanobacteria taxa. *Dolichospermum* and *Microcystis* are present in approximately even abundance.

The results of three years of monitoring the Cayuga Lake shoreline for harmful algal blooms indicate that the timing and distribution of "high" microcystin blooms, i.e., blooms with microcystin concentrations greater than the contact recreation limit of 4 µg/L, can vary from year to year. In 2018 and 2019, there was a lull in bloom activity for three to four weeks in August, but there was no lull in 2020 (*Figure 3, bottom*). "High" microcystin blooms occurred along most of the Cayuga Lake shoreline in 2020 whereas they clustered almost exclusively in the "northern" quarter in 2019 (*Figures 4a and 4b*) and also in 2018 (data not shown). After factoring in the possible skewing effects of the intensity of "hot spot" monitoring at the far north end of the lake, the increase in the overall number of "high" microcystin blooms from 28 in 2019 to 55 in 2020 was driven mainly by the occurrence of 15 blooms along the southern three-quarters of the shoreline. It is possible that the new temporal and spatial patterns of "high" microcystin bloom occurrence in 2020 are related to a more substantial presence of *Microcystis* populations along the "southern" three-quarters of the shoreline (see *Cyanobacteria "Signatures" of Cayuga Lake*, page 11). It remains to be seen whether 2021 HABs patterns will repeat those observed in 2020.

Stephen Penningroth
Executive Director

Cyanobacteria "Signatures" of Cayuga Lake

In 2019, CSI initiated a lake plankton project of biweekly surveys of cyanobacteria and other plankton communities at eight different locations around the shoreline of Cayuga Lake. These surveys were conducted during the Harmful Algal Bloom (HAB) season (and a bit beyond) and captured snapshots of plankton populations under non-bloom conditions. This project was extended into 2020 in order to continue to characterize cyanobacteria and general plankton populations as a potential framework within which to better understand patterns of Cayuga Lake HABs. One question on our minds has been whether non-bloom cyanobacteria populations throughout the HABs season relate to patterns of HABs and their toxicity. The lake did indeed show a different cyanobacteria "signature" in 2020 compared with 2019, which seems to relate to differences also observed in the record of HABs and their toxicity.

Eight survey sites were selected in 2019 (*Figure 6*). Locations with public access were favored so that sites could reflect both the geographic reach of the lake and also be most relevant to the greatest number of people who interact with the lake. From south to north, counter-clockwise around the lake, the sites included the Town of Ithaca's East Shore Park (CLES); the dock of a HABs Harrier volunteer along Atwater Rd in King Ferry (CLAT); the Wells College Boat Dock in Aurora (CLWE); the Village of Union Spring's Frontenac Park Boat Launch (CLUS); the New York State Department of Environmental Conservation Mud Lock Canal Park near the outlet of the lake into lock # 1 (CLNE); Cayuga Lake State Park in Seneca Falls (CLCL); Dean's Cove State Boat Launch in Romulus (CLDC); and Taughannock Falls State Park in Trumansburg (CLTG). All surveys were conducted by the author between late July and early November in 2019 and between early July and late October in 2020. A few surveys were also conducted outside of the typical bloom season (April of 2019 and February and March of 2020; see *Figure 6*).

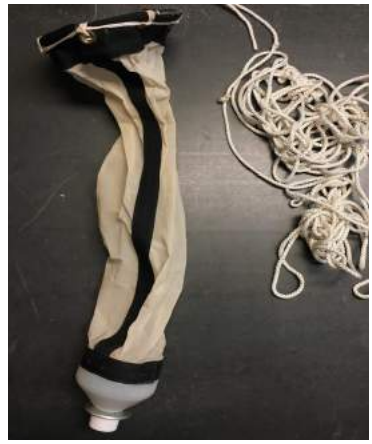
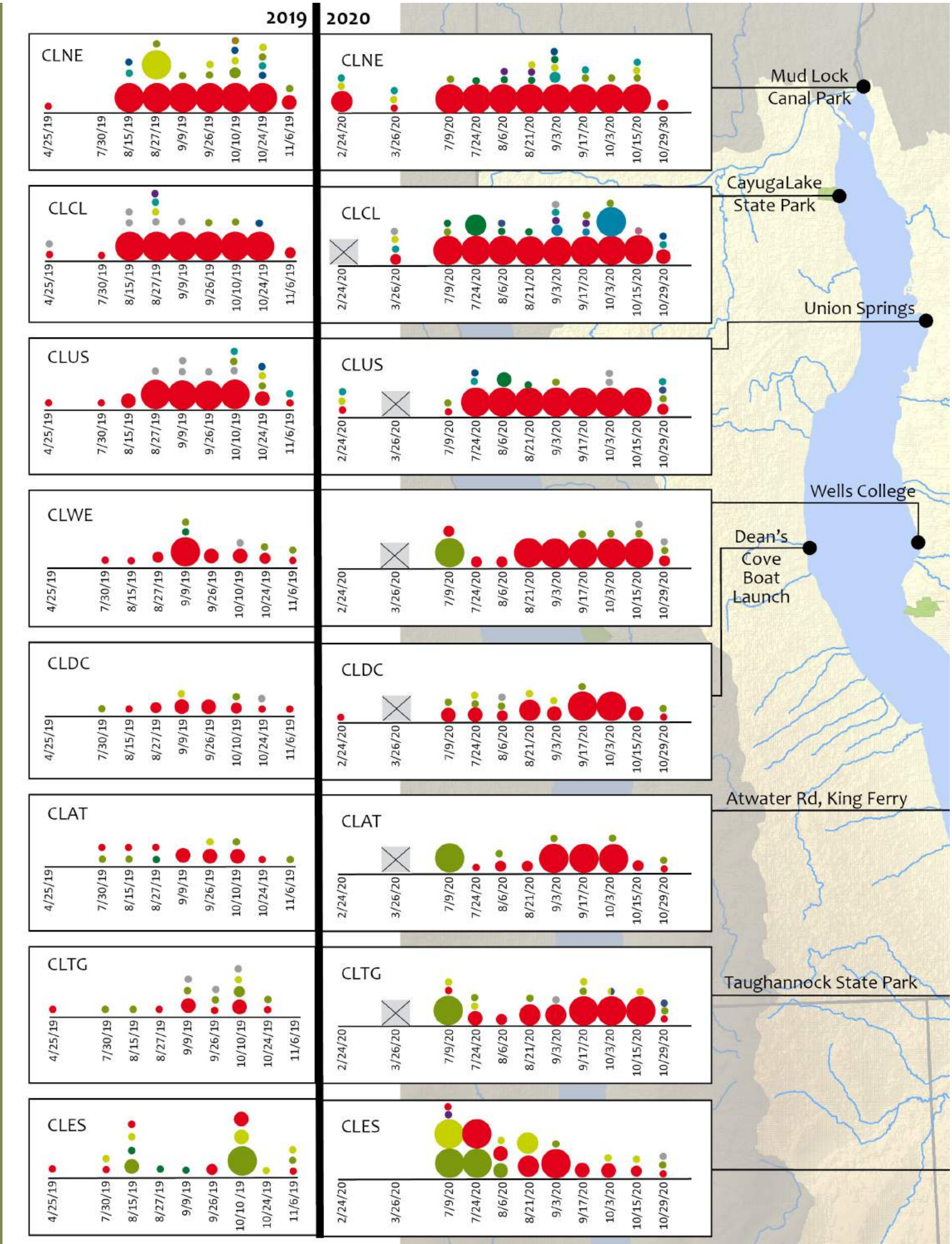


Photo of Plankton Net.
A plankton net is made out of a narrowing tube of very fine nylon mesh (the mesh size of the net used by CSI is 53 microns) that at its narrower end focuses lake water into a small plastic container that is also weighted on its bottom and has a removable piece that later allows the sample to be moved to a collection jar. The wider end of the conical mesh tube consists of a metal ring that holds it open so that water can flow into the net when it is dragged along the surface of the water, by means of an attached rope, or lowered down below the surface and pulled up again. While water passes freely through the mesh of the net, anything larger than 53 microns in size (including colonies of most of the common bloom-forming cyanobacteria) gets caught within the net and settles into the plastic cup at the bottom.

Samples were collected by throwing a plankton net (see photo, right) out about 3 meters from shore or dock and pulling it back along the surface of the water in order to concentrate the microscopic organisms that are always present in lake water. This was repeated ten times to collect each sample. Approximately 0.1 milliliter of each sample was analyzed by light microscopy at the CSI lab. The identities of organisms larger than about 25 microns were recorded (as well as some which were smaller but noticed frequently) and relative densities were approximated for all cyanobacteria taxa. Taxon density was estimated by observing the colonies or clumps of filaments in the entire ~0.1 mL sub-sample under the microscope coverslip. A taxon was considered "sparse" if ten or fewer colonies/clumps were observed; "moderate" if more than 20 colonies/clumps were observed (but generally only one or two in a given field of view); and "dense" if there were at least three colonies/clumps, and often many more, in most fields of view.

The cyanobacteria "signature" for Cayuga Lake seen through bi-weekly plankton surveys changed somewhat from 2019 to 2020, while some aspects remained very similar. *Microcystis* is the cyanobacteria taxon that has most commonly dominated Cayuga Lake HABs since the monitoring program started in 2018, and it has also been present in 95% (146/154) of all plankton net samples collected over the two years of the lake plankton project. *Microcystis* is the cyanobacteria genus most often associated with blooms that test positive for microcystin toxin (see *Patterns of "High" Microcystin HABs Occurrence, 2018- 2020*, *Figure 5*, page 10). *Dolichospermum* is the other main bloom -forming genus that has been recorded in Cayuga Lake, though it generally has not been correlated with detectable levels of microcystin. It was seen much less regularly than *Microcystis* in the lake plankton survey (*Figure 6*).


2019
2020
CLNE
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7/9/20
7/24/20
8/6/20
8/21/20
9/3/20
9/17/20
10/3/20
10/15/20
10/29/20
Mud Lock Canal Park
CayugaLake State Park
Union Springs
Wells College
Dean's Cove Boat Launch
Atwater Rd, King Ferry
Taughannock State Park

Figure 6. Map and charts showing population densities of cyanobacteria genera recorded in 2019 and 2020 by plankton survey location over time.

While *Microcystis* was present in most plankton net samples collected over the two years of the project, in 2019 only about 24% of survey plankton net samples showed “dense” concentrations of *Microcystis*. Samples showing greater densities of *Microcystis* colonies were mainly concentrated at the three northernmost sampling locations (CLNE, CLCL, CLUS) between mid to late August and mid to late October. Other than one “dense” *Microcystis* sample in Aurora (CLWE) in mid-September, *Microcystis* never reached “dense” concentrations in plankton net samples collected under non-bloom conditions anywhere else on the lake during the 2019 season (*Figure 6*).

In 2020, “dense” concentrations of *Microcystis* were seen in plankton net samples around the entire perimeter of the lake. While the frequency of “dense” *Microcystis* was again greatest at the three northernmost survey locations, “dense” Microcystis was also recorded at the other five survey sites around the lake. No site had fewer than two sampling days exhibiting “dense” *Microcystis* in plankton net samples throughout the season. Compared with roughly 24% of 2019 survey samples, about 46% of 2020 survey samples contained “dense” *Microcystis* (*Figure 6*).

It should be emphasized that the lake plankton surveys are NOT a rigorous quantitative study of lake plankton. To conduct such a study would require expensive equipment that CSI does not, at present, have. These surveys might be characterized as a qualitative or semi-quantitative study, perhaps better understood as a naturalist description of observed lake plankton at eight specific locations around the lake. Each of the eight sampling locations has varying local conditions such as depth and wind protection that might additionally influence phytoplankton populations. With that said, certain overall patterns that were noticed in the plankton surveys in 2019 and 2020 were similar to overall patterns noticed in the HAB record for these two years. An increased frequency and geographic range of survey samples containing “dense” *Microcystis* in 2020 compared with 2019 is consistent with HABs Harriers’ observations of increased frequency and geographic range of high toxin blooms throughout the 2020 sampling season compared with 2019 (see *Patterns of “High” Microcystin HABs Occurrence, 2018- 2020*, *Figures 4a and 4b*, pages 8-9). Is the appearance of denser concentrations of *Microcystis* and high microcystin HABs around the entire lake a trend that will intensify in 2021? Or is it a temporary phenomenon, perhaps somehow related to near-drought conditions in 2020, that will reverse itself? Either way, our results suggest that the chronology and locations of Cayuga Lake HABs occurrences are dynamic and subject to variation from year to year.

While we have focused on cyanobacteria populations in our lake surveys, we have also been accumulating a naturalist record of wider plankton communities that are always present in the lake. The sheer diversity and abundance of these other organisms are reminders that HABs do not exist in a vacuum. All of these plankton are integral parts of lake ecosystems and critical to the clean water we cherish in the Finger Lakes region. As we continue to monitor and respond to HABs on Cayuga Lake, we must always keep this larger ecosystem perspective in mind.

Adrianna Hirtler
Biomonitoring Coordinator

Acknowledgements

Generous support for the 2020 Cayuga Lake HABs Monitoring Program was provided by the Emerson Foundation ($14,000), the Tompkins County Health Department ($6,000), and by individuals in the Cayuga Lake community through donations to our online GoFundMe ($2,085) and Giving is Gorgeous ($515) campaigns. Continuing to monitor Cayuga Lake HABs and their toxins will require broad community support in 2021 and beyond.

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Photo of a bloom near Canoga on September 4, 2020. The bloom was sampled by HABs Harrier and Quadrant Leader Bill Ebert.

Help Monitor HABs on Cayuga Lake

You can support the effort to understand these harmful blooms and protect Cayuga Lake. To learn more about blooms and how to recognize them visit www.dec.ny.gov or www.communityscience.org.

If you see a suspicious algal bloom,
AVOID IT and report it.
Keep kids and pets away!

Quickly report it on CSI's website at www.communityscience.org
or by email at habshotline@gmail.com

Join the Cayuga Lake HABs Monitoring Program as a HABs Harrier volunteer and help monitor blooms on Cayuga Lake. Anyone is welcome to volunteer! HABs Harriers do the following:

- Attend a two hour HABs identification and sampling workshop in June.
- Survey assigned lengths of shoreline once a week, mid-July through September.
- Collect HABs samples and transport them to CSI lab for further analysis.
- Be available to respond to HABs sightings reported by members of the public.

If you can't volunteer, but you still want to help, you can!

- Learn about HABs and how to recognize blooms on CSI's website
- Donate to CSI to support the Cayuga Lake HABs Monitoring Program

For more information about volunteering contact:

Community Science Institute
info@communityscience.org
(607) 257-6606
www.communityscience.org

Cayuga Lake Watershed Network
programs@cayugalake.org
(607) 319-0475
www.cayugalake.org

Community Science Institute

Water Bulletin - Fall 2020

283 Langmuir Lab

95 Brown Road/ Box 1044

Ithaca, NY 14850

Phone/ Fax: (607) 257-6606

Send To:

Certified Water Quality Testing Lab

NYSDOH-ELAP #11790

EPA Lab Code NY01518

Partnering with Communities to Protect Water Since 2002

In recent years, harmful algal blooms (HABs) have become a water quality threat of increasing concern. These blooms may produce toxins, threatening our ability to use and enjoy Cayuga Lake. HABs are a water quality threat that requires us to take action to protect our shared water resources.

This Fall 2020 issue of the Water Bulletin highlights the ability of the Community Science Institute (CSI) to respond to this water quality threat. By operating a certified water testing lab and partnering with 91 HABs Harrier volunteers, CSI is uniquely positioned to provide rapid and detailed HABs information necessary for residents and visitors to make safe decisions and for agencies to respond to public health threats that HABs present. Through this partnership, we also collect regulatory quality data capable of informing long-term strategies to manage blooms and perhaps even reduce HABs on Cayuga Lake in the future.

You can support our efforts by becoming a member of the Community Science Institute or renewing your membership today! By becoming a member, you will be joining and supporting a community that is taking action to protect our shared water resources – now, and in the future.

With sincere thanks,
The CSI Team

Membership Levels

- ☐ $25 (Creek)
- ☐ $50 (Stream)
- ☐ $100 (River)
- ☐ $250 (Lake)
- ☐ $500 (Estuary)
- ☐ $1000 (Watershed)
- ☐ > $1000 (Ocean)

HELP PROTECT CLEAN WATER! DONATE TODAY

Send contributions to Community Science Institute, 283 Langmuir lab, 95 Brown Rd/ Box 1044, Ithaca, NY 14850

To contribute by credit card, visit the “Donations” page on our website at www.communityscience.org/donations