



LAKE REPORTER

2020 SHORELINE HARMFUL ALGAL BLOOM MONITORING PROGRAM REPORT

By Sally Napolitano, Citizen Science Committee Chair

Under our Citizen Science efforts, CLWA successfully completed year three of our Volunteer Shoreline HABs (harmful algal blooms) Monitoring Program. As in years past, we continued to partner with the Finger Lakes Institute (FLI) at Hobart and William Smith Colleges, the Canandaigua Lake Watershed Council, the New York State DEC, and Seneca Lake Pure Waters Association.

This year the nine-week program “officially” ran from August 3rd through October 4th although we had some reports entered both before and after the official start and end dates. We faced some new challenges in the 2020 season, which will be noted for its virtual training of 42 Citizen Scientist volunteers by both the NYSDEC and the CLWA Volunteer Shoreline HABs Team Leaders. Program improvements included the introduction of a new mobile app for HABs reporting, an open-water HABs reporting capability, a resource portal on our website for HABs volunteers, and the addition of Regional Coordinators to better support our growing number of volunteers. We increased our volunteer force from 26 last year to 42 (including individuals and couples) giving us expanded shoreline coverage!

Another change this year was the addition of “visual monitors” who used photographic evidence in lieu of water sampling for HABs reporting. This move was in keeping with the guidance of the DEC as they have transitioned to visual-only reporting on their NYHABS statewide system. However, some of our Citizen Scientists continued to collect water samples based on location and date within the monitoring program, adding to our database. These collected samples were transported to FLI in Geneva for timely, sometimes same day, fluoroprobe measurement of *chlorophyll a*, the indicator of the presence of a *microcystis* which is a cyanobacteria responsible for HABs. Some select samples were further transported by CLWA volunteers (Thank you Scott Kreher and Susan Carpenter!) to the Erie County Public Health Lab in Buffalo for *microcystin* analysis, the toxin produced by *microcystis*. In 2020, the testing and analysis at both of these labs was paid for by our membership; Thank You!



Photo of a shoreline bloom taken on 9/8/2020 by a HAB volunteer

Shoreline HABs Program	2020	2019	2018
Number of Volunteers (individuals & couples)	42	26	17
Weekly Shoreline Surveys Performed	375	295	218
Confirmed Blooms	79	65	54



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Cover image: "Early Bird" by Julie Marie Smith

PRESIDENT'S MESSAGE: FALL 2020

By Neil Atkins, CLWA President



The Canandaigua Lake Watershed Association's board and committees have continued to remain active throughout these challenging times. We successfully conducted our annual meeting with a virtual format back in August, with 98 members attending. We welcomed two new board members and recognized the return of five board members who agreed to continue their service.

We are truly proud of what we've been able to accomplish given our current situation, which is a huge testament to the dedication of our volunteers and supporters. In this newsletter, you will read recaps of our Harmful Algal Bloom Shoreline Monitoring Program (page 1) and Secchi Disk Program (page 4), which we were able to successfully complete in a safe, socially distant manner. Our volunteers also participated in a full season of the DEC's Citizens Statewide Lake Assessment Program (CSLAP), with results forthcoming.

The Canandaigua Lake Watershed Council and CLWA continued to work together to distribute weekly "Water Quality Updates" each Friday, using information gathered from our citizen scientists. We hope you found these updates valuable throughout the summer months.

Our Outreach Committee's "Lake Friendly Lawn Care" project was shared with six of our neighboring watershed lake associations. Each chose to adopt the logo developed by CLWA, incorporating the various lake groups logos and messaging (some with 'Lake Friendly Living') and are using a pledge like the one developed by CLWA. As you drive around the Finger Lakes region, from Skaneateles Lake to Canandaigua Lake, you will see the familiar round signs in support of lake protection.



We are in the final stages of our strategic planning process with Causewave Community Partners. We strive to ensure that we maintain our focus on relevant strategies that allow us to preserve and protect our lake and its watershed through education and scientific research in this ever-changing world.

We thank our volunteers for their effort to successfully continue with our programs. And, we thank our members for their continued support. Through your generous contributions, we are able to address the challenges in the protection of Canandaigua Lake and its watershed. Our membership drive is in full swing, and we hope you will continue to support us by joining with the many voices that collectively speak for the lake. CLWA is always in need of volunteers, so please consider joining one of our active committees, our board of directors or becoming active on one of your town committees or boards.

Thank you again for your continued support.

Neil Atkins, CLWA President

A LAKE-FRIENDLY ALTERNATIVE FOR RING OF FIRE FLARES

CLWA Members Linda Dworaczyk and Check Wochele give us their "Consumer Reports" on flare alternatives

As lakefront property owners, the health of Canandaigua Lake is of great importance to us. The Canandaigua Lake Watershed Association is a member driven organization working to inspire the entire watershed community to become better stewards of Canandaigua Lake by offering educational programs, applying scientific research, and advocating sound public policy.

FLARES

As a lakefront homeowner and member of the CLWA board of directors, I supported the CLWA decision a few years ago to no longer be involved in selling flares for the Ring of Fire celebration due to the potential for flare residue ending up in the lake and the obvious air pollution from flares. Anyone walking at Kershaw can see that people lighting flares often leave their flare residue at the waters edge and realize the residue washes into the lake and the lake is our drinking water.

Because everyone enjoys the spectacle, I found myself wishing there was a better way to participate in Ring of Fire without the smoke and residue. This year we did not put out flares and made a commitment to find an environmentally responsible way to participate by next ring of fire. To that end my husband researched available LED flares made for roadside safety and bought 3 different kinds that were highly rated.

We were pleasantly surprised that all the LED lights looked like flares from across the lake and are sharing our findings so that other concerned homeowners can consider making the change. In the off-season some of the lights will be stored in our cars for emergency use.

HIGHLY RECOMMENDED - BEST OPTION

[Twinkle Star Emergency Roadside Flares Kit LED Safety Strobe Road Warning Light Highway Beacon Alert Flare with Magnetic Base, Detachable Stand, Solid Storage Case, Set of 2](#)

Sold by: [Twinkle Star LLC](#) - \$14.99

These actually look like flares but depending on your waterfront, may require a flat surface to stand on. They have a hard side case for storage. Each include 3 batteries. They will pay for themselves in 2 years assuming traditional flares are \$3.75 each.

RECOMMENDED - NEXT BEST OPTION

[Stonepoint Emergency LED Road Flare Kit – Set of 3 Super Bright LED Roadside Beacons with Magnetic Base – Flashing or Steady Red Lights Visible Up to 2 Miles Away – Includes Storage Bag](#)

Sold by: [Tru Inertia](#) - \$19.99

These are flat disc shaped lights that may be harder to position due to low profile. They are approximately \$1 cheaper per light but does not include the 3 batteries required for each light. Soft case included.

NOT RECOMMENDED - MORE EXPENSIVE AND ORANGE COLOR (NOT RED LIKE A FLARE)

[MARCALA LED Road Flares 3-Pack | The Only Roadside Safety Disc Kit with a Whistle | DOT Compliant LED Safety Flare Kit Batteries installed, Carry-Case and 4 Bonus Items | Feel safer on the road!](#)

Sold by: [Marcala LLC](#) - \$30.99

Did not look like traditional flare due to Orange color. Soft case. Most expensive. Batteries included. Other car safety items included.

LED Flares make a great gift idea for the lake love that has everything! If you are buying your LED flares on-line, consider adopting Canandaigua Lake Watershed Association as your Amazon Smile Partner - Amazon directs charitable funds to organizations based on customer selection at no additional cost to you when you use Amazon Smile. In the future, CLWA is also considering the option of selling LED flares as a fundraiser – we'd love to hear from you if you are interested in helping with this project! Please contact our office at 585-394-5030.

One more thing: Don't forget to **recycle batteries**. Recycling batteries keeps dangerous materials out of landfills. Batteries contain heavy metals such as mercury, lead, cadmium, and nickel. If released, these metals may be harmful to humans and the environment. When batteries end up in landfills, they corrode and chemicals leach into the soil. Check with your town or trash hauler to find out if they can separate batteries that you divert from your trash.

VOLUNTEER WATER CLARITY MONITORING PROGRAM: SUMMER 2020 REPORT

By Lindsay McMillan, CLWA Association Director

This summer marked the 11th year of CLWA's Take-A-Dip Water Clarity Monitoring Program. The program continues to be an integral part of the overall water quality monitoring efforts on Canandaigua Lake, supplementing the long-term monthly sampling program led by Professor Patty Thompson of Finger Lakes Community College along with the Canandaigua Lake Watershed Council.

Volunteers participate in this program by performing weekly clarity readings using a secchi disk from their own boats to help track changes in water clarity throughout the summer months. These secchi disk readings provide us with a picture of the changing internal lake dynamics, including a potential increase in algal productivity and/or suspended sediments. A sudden decrease in clarity can indicate an increase in algae, keeping us abreast of a potential harmful algae bloom event.

As part of their sampling trip, volunteers also record surface water temperature and fill out a "lake user perception" survey which records observations of the lake on variety of topics such as aquatic plants, algae, and lake foam. Information is submitted by volunteers in an online ArcGIS-based program which captures GPS coordinates and can store photos of anything that volunteers find noteworthy (fish kills, lake foam, a HAB). The data collected is sent in real-time to CLWA and the Canandaigua Lake Watershed Council, notifying us of current water quality conditions. The data is used to draft our weekly "Water Quality Updates" that go out to our members each Friday during the monitoring season.

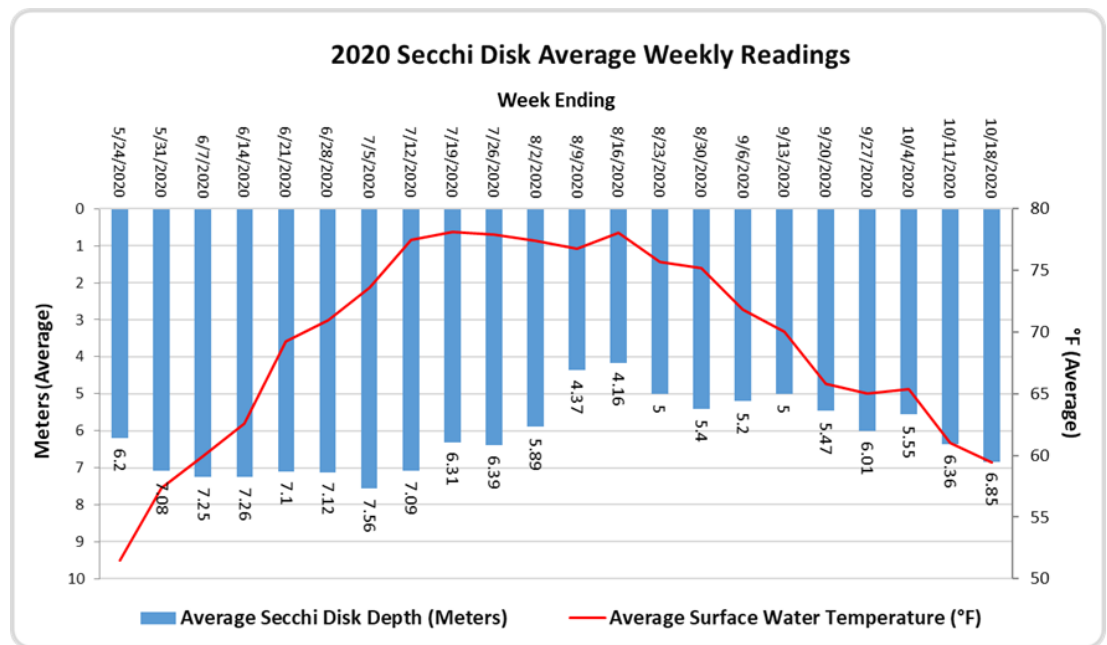
2020 RESULTS

For the 2020 season, 20 volunteers around the lake provided 278 readings!

FIGURE 1

The weekly average clarity held in the 6.2 – 7.5 meter range from the end of May until the end of July. During this time period, our average surface water temperature increased rapidly, from 52°F the third week in May to 78°F the last week in July. {See figure 1}

In early August, these increased surface water temperatures combined with a 2-meter drop in clarity over the first two weeks of the month indicated an increase in algae in the water column. In fact, 27 blooms were reported by Shoreline HABs volunteers over this two-week timeframe.



Our weekly average clarity got a little better the second half of August, bouncing back to 5 to 5.5-meters and staying in that range throughout most of September.

Overall, the average weekly clarity appeared to be up slightly from 2019, with 65% of the reporting weeks in 2020 having higher average weekly clarity readings than in 2019 {Figure 2}.

Average surface water temperatures followed a similar warming trend to 2019, though the weekly averages were up 1 to 3.5 degrees Fahrenheit from the middle of July until the second week in September {Figure 3}. You will see by reviewing the temperature chart that volunteers started collecting data much earlier in 2020. This was likely due to our nice spring and early summer weather in 2020. After those long months of early quarantine, many may have been looking to get out of the house and enjoy the lake!

WATER CLARITY MONITORING PROGRAM, *Continued from page 4*

Volunteers also reported interesting observations on their lake user perception surveys. CLWA added this component to the reporting in 2019 to track the perception of our water quality over time, as reported by lake users. The format of the questions were modeled after the NYS DEC's Citizen's Statewide Lake Assessment Program (CSLAP) surveys. We look forward to continuing to track this information for years to come, with a goal of formally documenting some of the more anecdotal observations regarding changes to our lake environment. This information may be incorporated into grant proposals or "calls to action" with our elected officials. {Figures 4 & 5}

FIGURE 2

A future goal for the program includes working with the NYS DEC and Finger Lakes Community College to give students access to real-world data for use in their Geographic Information Systems (GIS) course work. This partnership approach would benefit students by connecting them with datasets from their own communities, and will benefit CLWA by developing new ways to visually express these data, including spatial analysis.

CLWA would like to thank our 2020 Secchi Disk Volunteers for all the time and effort they put into this program: Amy Bowen, Dee Crofton, Rob Gray, Nadia Harvieux, Scott Hill, Gary and Pam Helming, Bruce Kennedy, Alan Krautwurst, Scott Kreher, Bill Mehls, Joel Pasternack, Brian and Dolores Perkins, Kathy Postma, Dave Schwaner, Lynn Thurston, and Wade Sarkis. We thank them for their continued support!

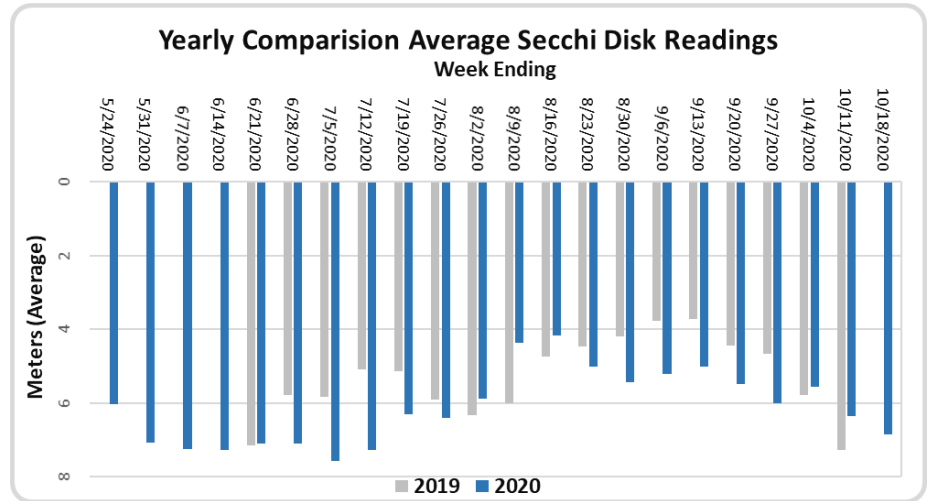


FIGURE 3

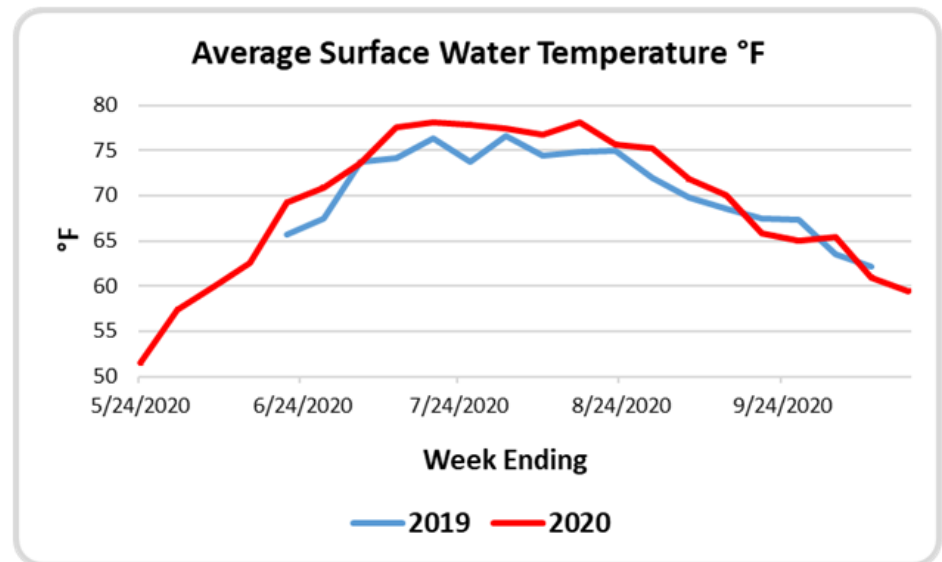


FIGURE 5

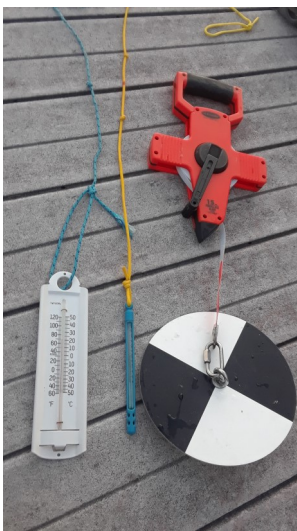
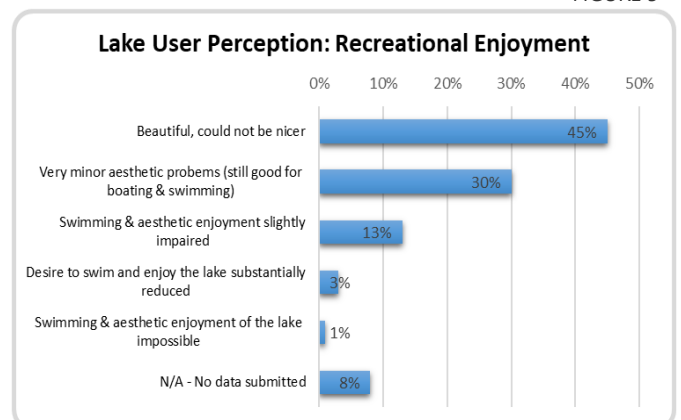
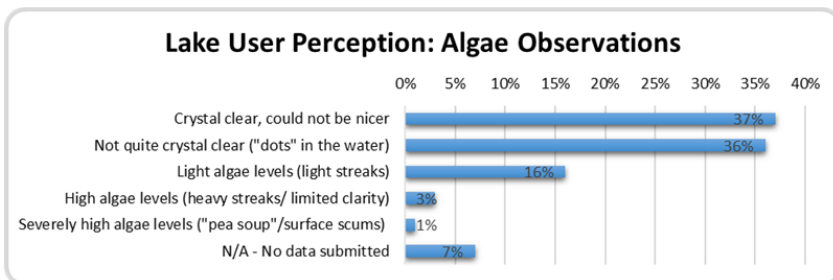


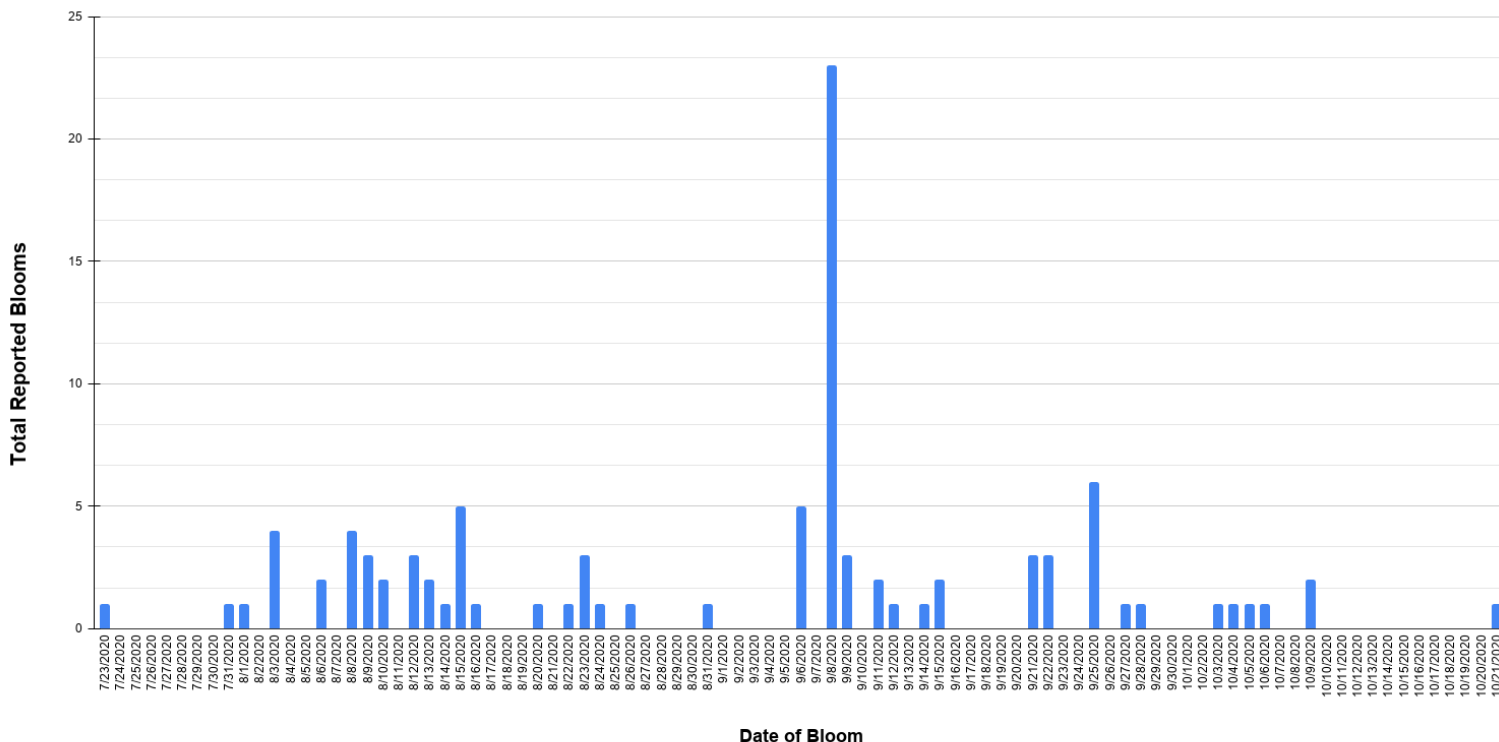
FIGURE 4



HABS, Continued from page 1.

So, what did our surveillance efforts show us for 2020? First, we had a confirmed bloom reported on July 23rd, *three weeks earlier* than 2019 and before the “official” start date of our program. Incidentally, the first confirmed bloom in 2019 was also confirmed *three weeks earlier* than in 2018. By looking at the table, it also indicates we had more “reported” blooms in 2020 than in 2019 or 2018. However, we also had more volunteers looking for and reporting blooms. The below chart indicates that many of the reported blooms happened on the same day, particularly on September 8th when 23 reports were entered indicating a lake wide bloom. The chart below also indicates we had many more days with no reported blooms between July 23rd and our last report on October 9th.

Total Reported Blooms vs. Date of Bloom



As you are all aware, 2020 was a dry summer with few rain events bringing run-off into the lake and likely reducing the nutrient loading into the lake. Some wind events we experienced may have made available nutrients in lake sediment, spurring the appearance of the HABS we reported, but also may have thwarted blooms from forming on wind-disturbed surface water; more data is needed to draw any conclusion. Our work will continue to document HABS and support our partners as we all investigate how to best mitigate their occurrence.

If you would like to get involved next year as a HABS volunteer with this program, please email us at HABS@canandaiguallakeassoc.org and type “2021 HABS” in the subject line.

We anticipate the volunteer commitment will include:

- Attending a 2-hour training session, early summer (hopefully in-person)
- Monitoring the same segment of shoreline from August 2 - October 3, 2021
- Documenting conditions using a digital camera or smart phone
- Submitting a weekly observation report online (or more frequently as blooms occur)

For further information about our 2020 Volunteer Shoreline HABS Monitoring reports by location, please see the interactive map at <https://www.canandaiguallakeassoc.org/science-education/blue-green-algae-2/>

We would also be interested in hearing from those who have weather stations (measuring temperature, wind speed and direction, rainfall); again, please send us an email with “Weather Stations” in the subject line to HABS@canandaiguallakeassoc.org.

Continued on page 7

3 TIPS TO MAKE WAKESURFING MORE ENJOYABLE TO ALL

By Scott Hill, CLWA Member and Volunteer

This summer, more recreational boaters took to the waters of Canandaigua Lake than ever before. In 2019 the number of boats launched at the Canandaigua Lake public launches recorded by Watercraft Stewards was 10,922. In 2020, this number jumped to 14,450! Daily boat counts at the Canandaigua Lake State Marine Park boat launch can be as high as 280 boats launched on a single day. When combined with the approximately 500 boat slips at the three northern marinas and cottage boats, the weekend count can be 600 to 1000 boats on the lake at one time.

This increased recreational use of our wonderful resource requires all of us to adapt to the change and use thoughtful boating practices as we share our water space not only with fellow boaters, but also with those enjoying the lake from its shores.

The most dramatic change this year was the increase in wake surfing boats and the massive waves they generate. Manufacturers of these boats use ballast tanks, wedges, and hydraulic fins to increase the size of the boats wake. Bigger is better. Wake surfing is a relatively new and increasingly popular water sport. Much like wakeboarding, wake surfers are initially towed by a rope to get up to speed. Once a sufficient wake has been developed, the rider lets go of the rope and then continues to surf the wake.

The larger the wake the better the ride. Unfortunately, these large wakes cause quite a disruption on the lake.

TIP #1: USE MORE OF THE LAKE

All wakes, particularly large wakes, affect other users of the lake. For example, at the north end of the lake there are many break walls. Boat wakes bounce off the break walls and back into the lake creating a bathtub effect that increases the boat chop. This also increases erosion of the lake shore. A few suggestions:

- Use more of the lake, not just the north end; head south where there is more room and fewer boats. There is less bathtub effect in the more southern area of the lake.
- Try not to make multiple parallel passes along the same section of shoreline – move around when you can.

- Avoid making parallel passes of multiple wake boats at one time.

TIP #2: STAY 200 FEET FROM DOCKS AND OTHER BOATS AND REDUCE SPEED TO 5 MPH; STAY 500 FEET FROM SHORE AT TYPICAL WAKE SPEED.

Boat chop, large wakes and the bathtub effect make it more difficult for people using stand-up paddleboards, kayaks, canoes, sculls, bass boats, jet skis, and old-school water skis to enjoy the lake. A few suggestions:

- As posted at the State Marine Park boat launch, the speed limit is 5 mph within 200 feet of a dock or another boat; 200 feet is approximately the length of 5 telephone poles.
- Even better, try to stay 500 feet from shore.

TIP #3: BE AWARE OF MUSIC VOLUME

Wakeboarders play music as they ride the waves behind their boats. This music, while it may not seem loud on the boat, carries far and wide and can be disturbing to others on shore and on the water. As posted at the State Marine Park boat launch, the noise limit while moving is 75 decibels, which in layman's terms is the sound of a standard vacuum cleaner.

- Please be aware of music volume - sounds travel easily across water. If a wake surfer can hear it, people on shore can hear it too. Keep it down to 75 decibels.
- Playing music while someone is surfing is cool. Playing it loud at night when others are trying to enjoy a quiet evening is not necessary.

Following these suggestions will improve the wake surfing experience for both the surfer and other users of the lake. Have fun and enjoy the lake.

HAB's, *continued from page 6.*

CLWA would like to thank our 2020 HABs Volunteers for their dedication to this important program!

Regional Coordinators: Joel Pasternack, Ted Carman, Elaine Messina, Lynn Thurston, and Dorothy Roach

Shoreline Monitors: Patti/Roger Brazill, Lindsay McMillan, Terry Smith, Steve Zumbo, Marty Lasher, David Smith, Terese Genecco, Margie O'Jea, Greg Talomie/Kathy Bromley, Lynn Klotz, Sally Napolitano, Beth Fladd, Sandy Behan, Cindy Mellen Smith, Susan Carpenter, Kathy Postma, Janie Runion/Marc Marshark, Brad Braddon, Bill Yust, Bob Olsen, Case Smeenk, Sharon Sanford, Dave Bornholdt, Amy Bowen, Judy VonBucher, Nancy Kannianen, Maureen/Tom O'Rourke, Dee Crofton, Saralinda Hooker, Dick McGavern, Nadia Harvieux, Scott Kreher, Kathy Page, Barbara Braun, Chuck Wochele/Linda Dworaczyk, and Neil Atkins.

****bold names indicate returning HAB volunteers****

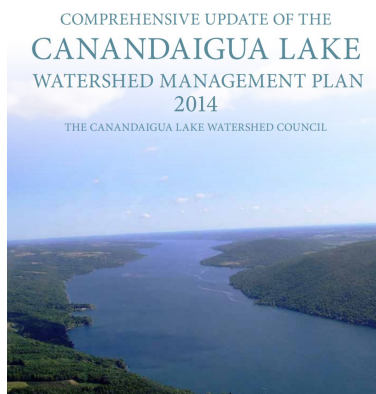
AMENDING THE CANANDAIGUA LAKE WATSHED PLAN TO MEET NEW CHALLENGES AND REQUIREMENTS

By Kevin Olvany, Watershed Program Manager, Canandaigua Lake Watershed Council

Our Watershed management plan has played an important role in guiding management efforts by documenting lake and watershed conditions, identifying on-going and new risks to the lake, and prioritizing actions. State agencies have often used the success of our [watershed plan](#) (most recent update in 2014) and ongoing watershed programs as a model across the New York State.

In the last few years, the US EPA and the NYS DEC have put a new emphasis on plans that meet a threshold called a 9 Element Watershed Management Plan. In fact, grant applications are starting to get higher priority if the watershed has a 9-element plan completed.

Over the last couple decades, we have been very successful in obtaining state grants to implement many high priority projects identified in the Watershed Plan. To stay grant competitive and to address new concerns to the lake, the Canandaigua Lake Watershed Council, along with its partners, are in the process of completing the necessary steps to update our plan to meet the criteria of a 9E Plan.



The NYS DEC had reviewed our plan and highlighted that we meet many of the 9 Element components listed below. The area that we need to showcase more clearly in our plan is to utilize a computer model to calculate existing pollutant loads into the lake and evaluate the effectiveness of practices identified in the existing watershed plan. Our lake and stream sampling program are being used to calibrate the model to reality.

What are the 9 Elements?

- A) Identify and quantify sources of pollution in watershed
- B) Identify water quality target or goal and pollutant reductions needed to achieve goal
- C) Identify the best management practices (BMPs) that will help to achieve reductions needed to meet water quality goal/target
- D) Describe the financial and technical assistance needed to implement BMPs identified in Element C
- E) Describe the outreach to stakeholders and how their input was incorporated and the role of stakeholders to implement the plan
- F) Estimate a schedule to implement BMPs identified in plan

- G) Describe the milestones and estimated time frames for the implementation of BMPs implemented
- H) Identify the criteria that will be used to assess water quality improvement as the plan is
- I) Describe the monitoring plan that will collect water quality data needed to measure water quality improvements (criteria identified in Element H)

For more information on 9 Element Plans:

- See this factsheet from NYS DEC - https://www.dec.ny.gov/docs/water_pdf/9efaq17.pdf
- Visit the NYS DEC 9E Plan website - <https://www.dec.ny.gov/chemical/103264.html>

The Canandaigua Lake 9E Addendum Status

The first step to the 9E Addendum is to complete the non-point source pollution watershed model to estimate nutrient and sediment loading to the lake. Our watershed area is large and the factors affecting loads are very complex. Therefore, the watershed model provides a very rough estimate of loading. The power of the model is really in assessing relative load reductions from different management practices in the watershed. We have partnered with Dr. Todd Walter, Dr. Scott Steinschneider, and their PhD student Mahnaz Sepehrmanesh to complete the watershed model. We are in the final stages of having a draft of these results complete. Once the model is complete for current conditions, we will hold a meeting to review the results and get feedback on best management practice scenarios for the next phase of modeling.

Stay Up to Date and Send Us Your Comments

The pandemic has upended all aspects of life. Likewise, it makes it difficult for us to hold in-person meetings throughout the 9E Planning Process. Therefore, we have set up an online comment submission section on our website that will also be linked to the Association website. Your comments, suggestions, feedback, etc. on the 9E Addendum will be critical. We will be collecting your feedback throughout the process and would be happy to follow up with any questions and concerns you may have.

Our website is also the place to stay up to date on the planning process, see draft documents as they are completed, and get information on upcoming meetings.

Visit the 9E webpage on our website at <https://www.canandaigualake.org/9e-plan>

Please let us know if you have any questions and we look forward to your comments!

PREVENT THE SPREAD OF OAK WILT DISEASE: WHEN TO PRUNE IS IMPORTANT

By Cynthia Mellen Smith, CLWA Member and Volunteer

Oak wilt, caused by the fungus *Bretziella fagacearum*, is a serious disease of all species of oak trees and has no known effective treatment. Infection by this non-native invasive pathogen restricts water movement in the tree and causes the leaves to suddenly wilt, start to turn brown, and fall prematurely, usually leading to tree death. Red oaks are more quickly affected than white oaks, but wherever oak wilt is found, it is important that infected trees get properly removed to prevent the disease from spreading. Merely cutting a tree down does not eliminate the pathogen.

Since 2016, oak wilt has been found in three towns in the Canandaigua Lake watershed - Canandaigua, South Bristol, and Middlesex. Infected trees were removed and the DEC continues to monitor for further spread of the fungus. But it is extremely important for all of us to continue to look for any signs of the disease and to prevent its spread.

Oak wilt can be spread in two ways. Fungal spores can be carried by sap beetles or bark beetles from infected wood to wounds on new trees caused by injury or pruning. Also, underground root grafting between diseased trees and neighboring trees can lead to the fungus being transferred from one tree to another.



Symptomatic leaves from an oak wilt infected tree

Here's what can be done to reduce the spread of oak wilt:

- Follow NYS firewood regulations regarding moving untreated firewood and obey rules restricting movement of wood from quarantine districts.
- Do not prune or otherwise wound oak trees from March through September when the beetles are most active.
- Immediately seal any oak wounds during spring and summer to prevent beetles from accessing the wound. This can be done using water-based paint or wound dressing.
- If you think a tree is infected with oak wilt, contact DEC Forest Health at 1-866-640-0652 or foresthealth@dec.ny.gov

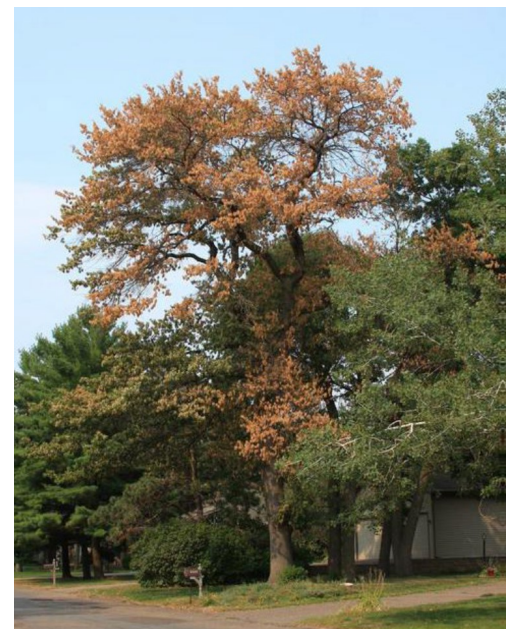
If you want to prune your oak trees, then now (October to February) is the time to do so. Not only are the beetles inactive at this time, but it's also easier to see which branches may need removing while the leaves are off the tree. Deciduous trees, including oaks, fare better when they are pruned during winter dormancy, and branches are more easily moved without the additional leaf weight.

You can learn more about oak wilt by visiting the DEC's website at <https://www.dec.ny.gov/lands/46919.html> .



Left: A symptomatic red oak leaf (Image courtesy of the Division of Lands and Forests' Forest Health Imaging Lab)

Right: Oak tree killed by oak wilt (Steven Katovich, USFS, Bugwood.org)



SCIENCE IN ACTION: NEW WATER QUALITY RESEARCH

By Lynn Klotz, CLWA Secretary and Citizen Science Team Member

Starting in mid-July, the Citizen Science team began working with Dr. Lisa Cleckner of the Finger Lakes Institute (FLI) at Hobart and William Smith Colleges and Dr. Ruth Richardson of Cornell University on a new research project to assess the genetic information of harmful algal blooms (HABs) in the Finger Lakes, specifically, microcystis and its ability to produce toxins.

As part of this study, volunteers from two lake groups, the Canandaigua Lake Watershed Association and the Cayuga Lake Watershed Network, were trained in sampling and microscopy techniques to assist researchers in the collection of data that will contribute towards their research of HABs community composition and how it changes throughout the season. An additional component of this research included the validation of a rapid in-field screening device that will be useful in determining toxicity of blooms in a short window of time. If successful, this type of technology could have many real-life applications, benefitting beach operators and water treatment plants.

CLWA was thrilled to be selected to participate in this project that investigates new, emerging technology for HABs notifications. Here's how we were able to help:



Drones outfitted with hyperspectral imaging sensors captured near shore blooms in September

WEEKLY "WATER DIPS"

Four lakeside volunteers and one alternate were selected based on their proximity to frequent HABs (harmful algal blooms) and trained to collect two integrated water column samples off their docks - one from near the bottom and the other near the surface. The samples were gathered by collecting lake water in a long pvc tube with a check valve, labeled and refrigerated, then transported to FLI every Tuesday morning.

- Each volunteer was given an inexpensive digital microscope and asked to view a few milliliters from each water dip, looking for cyanobacteria, which were photographed and emailed to Cornell.
- The samples were then run through the fluoroprobe at FLI (measuring blue green chlorophyll a in micrograms/liter) and microscopy was performed on some of the samples (identifying the type of cyanobacteria). Both volunteer and FLI microscopy confirmed microcystis was the dominant species, but dolichospermum was also present.
- From FLI, the samples were transported to Cornell where they were examined under the microscope.
- Several of these samples were also sent for toxin analysis at the Community Science Institute in Syracuse (a NYS certified lab). This last step provided cross-comparison between the three labs.
- FLI also deployed two VuSitu Aqua TROLL 500 multi-parameter sondes off of two of our volunteers' docks. These multi-parameter probes sit below the surface of the water recording multiple water quality measurements every 10 minutes. Volunteers downloaded the data measurements via an app and transmitted it to FLI every 2-3 days. The data collected includes: Date & Time, Conductivity, Salinity, Total Dissolved Solids, Resistivity, Density, RDO Concentration & Saturation, Oxygen Partial Pressure, Chlorophyll-a Fluorescence & Concentration, Temperature, Barometric Pressure, and Depth.



Multi-parameter sondes were installed off two volunteers' docks to look at a suite of water quality indicators

- Small cameras were also installed dockside, capturing views of the surface water every 10 minutes, near the sonde and where blooms have occurred.
- Weekly call-in zoom sessions to discuss our samples & technical challenges, provided LOTS of support from Drs Richardson and Cleckner along with their staff and research students! These sessions also allowed us to interact with HABs Volunteers on Cayuga Lake, leading to more fascinating discussions.
- The goals of this research are two-fold. Since the density and color of the cyanobacteria colonies have the potential to predict toxin levels, Part one hopes to use the digital photos taken by volunteers, evaluate the density and color of the cyanobacteria colonies using ImageJ technology and develop an algorithm and web interface for volunteers to upload photos for image analysis.
- The goal of Part two of this study is to validate the efficacy of the qPCR* Biomeme rapid field kit for toxin quantification. **quantitative Polymerase Chain Reaction*

We are very excited to receive the analyzed data and share it with you.

Additionally, CLWA's Citizen Science team has had the opportunity to contribute towards these other great projects.

OTHER SCIENTIFIC PROGRAM HIGHLIGHTS:

- On a sunny, late September afternoon, PhD students and faculty from SUNY Binghamton, in conjunction with FLI, arrived with several drones to collect data along parts of the Canandaigua Lake shoreline. One of these drones was equipped with an \$80,000 hyperspectral imaging sensor manufactured and provided by Corning. The goal of this FLI /SUNY- Binghamton research project is to determine whether hyperspectral imaging can differentiate not only cyanobacteria, but perhaps even species. Check our website for a quick view of the aerial video.
- A real-time demonstration by Dr. Richardson of the in-field rapid screening test (qPCR) which provides results in under an hour. This particular test was for *e. Coli*, but the same test is being researched for cyanotoxins.
- Our generous partners at Seneca Lake Pure Waters Association also delivered four Blue Green Algae Rapid Test kits that gave positive results for microcystin which was later confirmed by testing at FLI. This test does not quantify toxins, but did show their presence.



Dr. Ruth Richardson of Cornell University demonstrates the rapid in-field screening test

As a CLWA member, you can be confident that we are working hard with local and regional researchers at higher institutions, dedicated volunteers, and other lake associations to make a difference!

CALLING ALL CANANDAIGUA LAKE ANGLERS:

Warm water (bass, pike, etc.) angler diary cooperators are needed for Seneca, Keuka, Canandaigua, Hemlock, and Canadice Lakes.

The NYS DEC is always looking for new participants in our Angler Diary Cooperator Program for our program on the Finger Lakes. Our numbers have dropped in recent years, and we need new cooperators now more than ever. If you fish Canadice Lake, Canandaigua Lake, Conesus Lake, Hemlock Lake, Honeoye Lake, Keuka Lake or Seneca Lake and want to learn more about this program and how to sign up, please contact the Region 8 Fisheries office at (585) 226-5343, or on-line at fwfish8@dec.ny.gov.

If you would like to contribute to the fishing report, or need more fishing information, or have any fishing/fishing equipment related questions, you can contact fwfish7@dec.ny.gov. Good luck fishing.

The fishing line can also be heard at (607) 753-1551.

CLWA COMPLETES FIRST PHASE OF FOAM STUDY WITH GLOBAL AQUATIC RESEARCH PARTNERS

Lake foam is one of the most frequent inquiries made to the CLWA office from our members and the general public. Intense foam accumulations along the shoreline in recent years has prompted a new wave of questions about the lake foam: What makes up the foam? Is the timing of foam events linked to harmful algal blooms? Is it safe to be in contact with the foam? The last foam study was conducted in 2002/2003 by Dr. Greg Boyer, Ph.D., at SUNY ESF (available on the CLWA website). Since then, some notable changes have occurred in Canandaigua Lake, including the establishment of invasive Quagga mussels and the dominance of cyanobacteria in the late summer, resulting in harmful algal blooms. CLWA decided to revisit the questions about lake foam during the summer of 2019 with research partners, Dr. Rick Smith, Ph.D. and Dr. Stella Woodard, Ph.D., of Global Aquatic Research (GAR).

Rick and Stella presented their findings at the CLWA Annual Meeting back in August, and a "Foam Research Summary" was distributed to our members, local media, as well as our partners at neighboring lake associations and research institutions. Since then, we have hosted small group discussions with local and state research partners to discuss findings and talk collaboratively about next steps in the research. Good science generally leads to more questions!

In case you missed it, we wanted to share our initial findings in this issue of the Lake Reporter. We want to thank you, our members, for supporting this important research through your contributions to our annual appeal campaign, which helped fund the first phase of this research. We look forward to sharing more information with you in the near future.

Foam Study Summary: Canandaigua Lake

Global Aquatic Research (GAR) and the Canandaigua Lake Watershed Association (CLWA) surveyed and sampled lake foam with the help of citizen scientists throughout the late summer and fall of 2019.

Conducted by Global Aquatic Research | August 2020

NEW RESEARCH CONDUCTED

- Many chemical analyses were performed on the foam and the results were compared with the chemical signatures of tributary streams, lake water, invasive mussels, plankton, and seaweed, in order to identify the source of the foam.
- Carbon isotope and fatty acid signatures indicate the source of the foam comes from within the lake.
- Very high concentrations of carbon and low concentrations of nitrogen in the foam suggest it is enriched in one type of biological component that is low in nitrogen. This means that invasive mussel proteins are not the source.
- FTIR (fourier-transform infrared spectroscopy), an advanced technique used to identify organic substances, indicated the foam is primarily made of carbohydrates, in particular polysaccharides, which are long chains of sugars. A range of aquatic organisms commonly produces these, but the FTIR signature of the foam was most similar to the phytoplankton sample from the lake.
- All measurements were consistent with Microcystis algae, the cyanobacteria that are responsible for the harmful algal blooms (HABs) and produce the microcystin toxins responsible for beach closures, as the source of these foam-causing polysaccharides.

WHAT'S GOING ON IN THE LAKE?

- Plankton, which include all microscopic plants and animals suspended in the lake water, are filtered by the invasive zebra and quagga mussels.
- Microcystis cyanobacteria are a poor food source for the mussels. The mussels eat other plankton and spit the cyanobacteria out. Over time this selectively concentrates the cyanobacteria in the water.
- Phosphorous and nitrogen concentrations in the lake support phytoplankton growth, and during the summer when sunlight is abundant, cyanobacteria grow at fast rates.
- Microcystis cyanobacteria release polysaccharides outside of their cells in order to create large colonies and to regulate their environment. These "exopolysaccharides" or "EPSs" are produced in large quantities during phytoplankton blooms and change the chemistry of the surface of the lake.
- Invasive mussels get "sick" when feeding on the cyanobacteria and start producing polysaccharide- rich mucus of their own while recycling and ejecting the cyanobacteria EPSs, exacerbating the problem.
- Over time, these EPSs, which are not very soluble in the water and are stable in the environment, accumulate in the SML (see Foam Facts) and provide the right conditions for foam production. In fact, these types of polysaccharides are used in industries to stabilize foam and create emulsions.

Foam Study Summary, Continued

WHAT CAN WE DO TO PREVENT THIS?

One thing we can do is help limit nutrient inputs into the lake. This can help control both cyanobacteria and mussels, which proliferate from abundant phosphorus and nitrogen.

The best ways to reduce nutrients are to:

1. Use less fertilizer
2. Control animal waste and wastewater discharge
3. Reduce erosion
4. Preserve and plant shrubs, trees, and groundcover along tributary streams.

IS THE FOAM SAFE?

- Some foam can concentrate pollutants at much higher levels than in the surrounding environment. This part of the study is ongoing. However, we have found microcystin toxins in the foam at higher concentrations than in nearby lake water, and in a few cases, higher than the NYS Department of Health's recreational limit.
- Further study of PCBs and other potential contaminants will be critical to better understand the safety of the foam.



NEXT STEPS

Future research should assess the foam's potential to accumulate heavy metals and industrial toxins (including PFASs) in addition to further investigation of microcystin toxins in the foam.

- CLWA and GAR are developing a phase 2 plan to assess 4-season sampling and further testing for pollutants.
- CLWA needs your support to fund this expanded foam research and to support our efforts to improve water quality throughout our watershed.

Research conducted by aquatic scientists Richard W. Smith, PhD and Stella C. Woodard, PhD.
Sponsored by Canandaigua Lake Watershed Association.



Global Aquatic Research

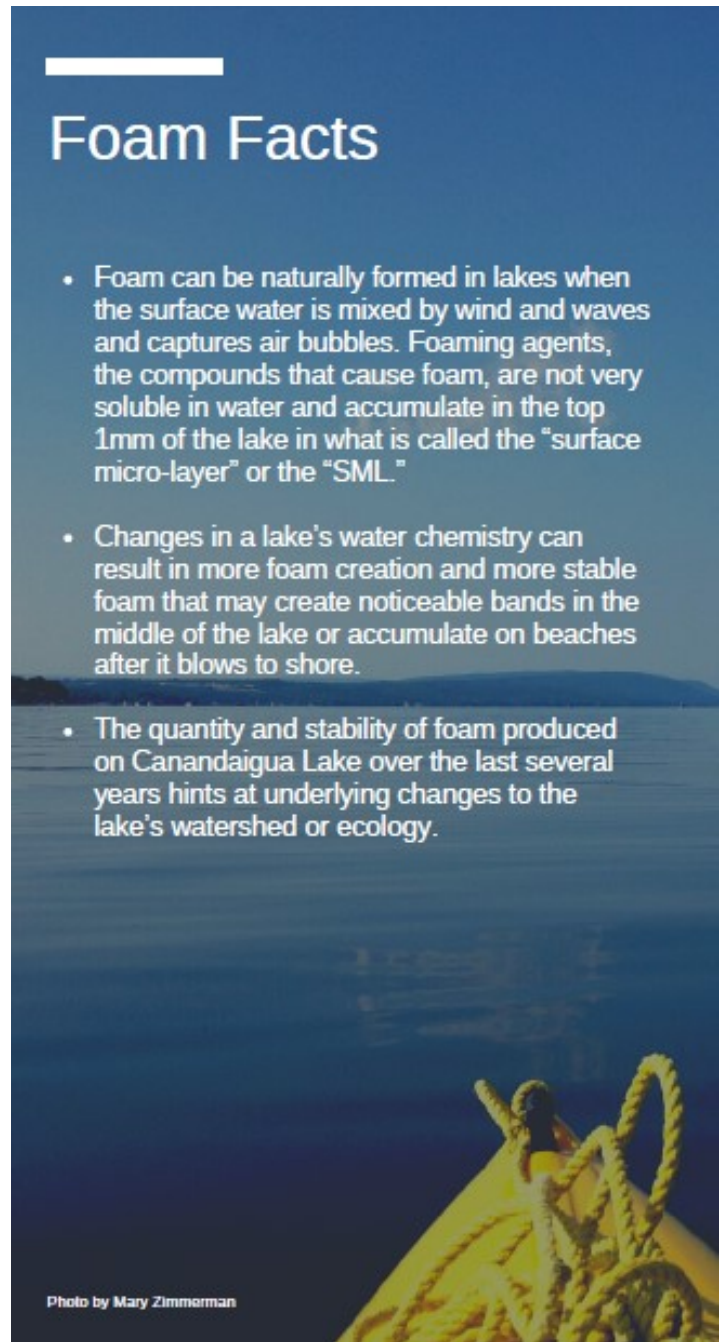


Photo by Mary Zimmerman



2020 ANNUAL APPEAL SUPPORTER LIST

We thank this incredible list of supporters that donated to the 2020 Annual Appeal Campaign! CLWA's Annual Appeal is a summer campaign that goes to fund a list of special projects, above and beyond what membership dollars support.

This year's project list included the Foam Research Project (read more about the first phase on page 12) as well as support for our Shoreline HAB Program (Page 1) and the Cornell research project (page 10—more to come soon!). We thank our supporters for investing in new research and technology that will help us better understand the many water quality challenges we are up against. Thank you!

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WATERSHED EDUCATION LOOKS A BIT DIFFERENT THIS YEAR!

By Beth Altemus, Watershed Educator

In the new reality of COVID-19 safety concerns and protocols in schools, it goes without saying that the Education Program will not look the same as it typically does this year. However, we are happy to report that we still have been able to interact with students this fall. We have adapted our usual sixth grade lab to a Zoom session which, given that it typically involves the observation of live macroinvertebrates, might seem counterintuitive. However, we were able to develop a lesson that maintains the concept of macroinvertebrates as bioindicators of water quality and engages students in the scientific method to develop hypotheses, collect data sets and draw conclusions.

We also were able to visit students in an Environmental Field Studies class in person at the Cumming Nature Center for a day of watershed study. Students observed the watershed model, a soil erosion experiment, watershed maps and did the Sum of the Parts activity to see how they each fit into a greater watershed community. Additionally, we have planned a trip the Marcus Whitman Outdoor Classroom near Rushville to study pond environments with fifth graders from Gorham Elementary. Observations of vegetation, macroinvertebrates, plankton and soils are on the docket.

Going forward, in person visits such as these will be very limited to best ensure the safety of students, teachers and the watershed instructors. As much as is possible we will keep in person contact outside, and of course be diligent about masking, distancing and sanitizing. As teachers indicate interest, we will be working on developing more Zoom lessons for the rest of our curriculum throughout the winter. While we don't expect to reach the numbers of students we usually do (even Zoom sessions can be difficult for teachers to incorporate into hybrid schedules) we do hope we'll still be able to maintain a presence in the school communities and continue to give students and teachers meaningful watershed learning experiences.



Reviewing land uses with students within the Canandaigua Lake watershed at Cumming Nature Center.



Students engaged in the Sum of the Parts activity at Cumming Nature Center

The Watershed Education Program is supported by :



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