



Give generously to support our 2021 Annual Appeal!

Could you dig a little deeper this year, and give a bit more to support our lake-protective programs?

his year, the philanthropic priorities of charitable foundations have shifted toward societal needs during these transformational times, and that's only reasonable.

But our work must continue to combat hydrilla and other invasive species, monitor and control Harmful Algal Blooms, and help communities prepare for climate change watershed

impacts. We hope that protecting our watershed remains a top priority for you!

Please
help make up
our funding
shortfall in 2021 with a
donation to our Annual Appeal.

See details inside on page 3 and thank you.

At home, Dave was part of a team as well. He and Cynthia married in 1960. Since she came with three children, Dave had a large family from the start. Kate's and Hope's arrivals brought the children up to five. When Dave's research expanded to include work on tropical soils and watersheds, the younger kids went with him and Cynthia to the Philippines in 1968 and again in 1976. Dave also did work in Colombia, Malawi, Brazil, Sri Lanka, and Puerto Rico, sometimes accompanied by Cynthia and some kids and sometimes not. His family has grown to include 12 grandchildren and 10 great grandchildren.

Fall Creek called to Dave from the time he moved into the family house across the street from it in Forest Home. Starting in the early 1970s Dave consistently sampled and analyzed Fall Creek, recognizing the importance of long term datasets and yearround sampling. Daughters Kate and Hope recall how he would take them with him to

the Creek when he went out to sample. He would be especially excited when there was a storm; they once even went out in a hurricane! Publications are still forthcoming using his Fall Creek data on diverse stream constituents including phosphorus, nitrogen, salt, sediment, and more.

Throughout his retirement Dave has faithfully participated in the life of the lake and is an active and vocal participant in many watershed meetings and conferences, always pushing local, volunteer, and state led monitoring efforts to continually



The Network was delighted to give Dave Bouldin our 2021 Dave Morehouse Award in May. The presentation was made via Zoom during our spring community conference, following David Wolfe's presentation on "Climate Change in the Cayuga Lake Watershed." Dave will receive an in-person award during June, with more honors to follow.

improve their protocols and ultimately the value of their work. He has generously shared his original data and made it available online where it is accessed regularly by scientists around the world. Thus his legacy extends far beyond the local region.

In his half century plus of dedication to the study of local land, creek, and lake interactions Dave has conducted important scientific work and become a much admired scientist as well as a dearly loved and appreciated friend and colleague to many in the area. As we prepared this short tribute we asked someone who knows him well, Dr. Liz Moran, founder and principal scientist of EcoLogic LLC, to share some reflections. Liz says "My first introduction to Dave came as I tackled my first post-college job: working on a watershed management plan for lakes in Maine. My lifeline was the Fall Creek study by Dave and others which integrated water

quality with the landscape and agricultural practices. During and since my time at Cornell, Dave has been an inspiration, dedicated to excellence in his own field while open and curious about the broader management implications. Our conversations now span four decades, and I continue to learn from him." Liz's sentiments are shared by many who know Dave.

In recognition and celebration of a lifetime of contributions we heartily congratulate Dave Bouldin—truly a worthy recipient of the 2021 Dave Morehouse award! **

LAKE FRIENDLY LIVING FINGER LAKES COALITION:

First Awareness Week Commemorated by NY State Assembly

66 commemorating the Finger Lakes' community's celebration of Lake Friendly Living, May 2-5, 2021," launches the April 28, 2021 State of New York Legislative Resolution put forth by Anna Kelles, Assemblyperson for the 125th District. The heart of the document is quoted as follows.

"New York State watershed organizations are looking to advance pollutant reduction strategies through land and water conservation recommendations for residents, operations, and businesses within their respective watersheds; and

"The Lake Friendly Living Coalition of the Finger Lakes offers conservation recommendations for watershed residents through pledge programming, as well as the annual Lake Friendly Living Awareness Week intended to further educate the public about a variety of conservation initiatives being advanced throughout the

"Resolved, that this Legislative Body pause in its deliberations to commemorate the Finger Lakes' community's celebration of

Lake Friendly Living, May 2-8, 2021." Copies of this document were sent to the seven member groups of the LFL Coalition.

Presentations from the LFL Awareness Week may be viewed at CLWN's YouTube channel see a list of presentations on page 7, and click on the YouTube link at our website. Learn about the Coalition and its seven member groups here: https://www.flrwa. org/lake-friendly-living.

For Cayuga Lake-focused information, click on the Lake Friendly Living link under the Resources header at our website. You do not have to live along the lakeshore to help protect our water—please take the pledge. T





It takes a Network to protect a watershed!

July 2021

Dear Network friends and supporters,

We made it through 2020! While it is safe to say none of us came through last year unchanged, because of donors like you, the Network stayed strong and healthy, ready to tackle the challenges of 2021 head on. We can all make a positive difference by supporting causes dear to our hearts. Lake, creek, and watershed health are essential to local lives and communities, as we work together to build a better social and environmental future.

Please give to our 2021 annual appeal. The money raised will be used to keep you and the public informed about Harmful Algal Blooms, and about other threats to human and ecosystem health across the watershed.

Because of the transformations in our world as a result of the COVID-19 pandemic, grant support that we have relied on has been shifted to new priorities. We are hoping that your priorities still include taking care of Cayuga Lake. Please be extra generous this year, if you can, to help us make up for a drop in grant funding.



This summer we pledge to:

- Keep you updated about Harmful Algal Blooms.
- Share steps needed to end Harmful Algal Blooms.
- Provide volunteer opportunities to protect our lake and creeks.
- Inform and take action about other water pollution problems.
- Inform 19 area municipalities about hydrilla & other invasives.
- Encourage residents to adopt Lake Friendly Living practices.

To protect Cayuga Lake...

Please Help Make The Difference This Year!

THANKYOU...

hope to hear from you soon. Have a healthy, positive, water-loving season.

Hilary Lambert, Steward/Executive Director; steward@cayugalake.org Jennifer Tufano Grillo, Program Associate; programs@cayugalake.org

Please donate or join by mailing your check to Cayuga Lake Watershed Network, P.O. Box 348, Aurora, NY 13026 or with PayPal/credit card by visiting www.cayugalake.org. Donations are tax deductible. We will mail you a deeply grateful thank you letter for your records.

A closeup view of Cayuga Lakes HABs: Citizen scientists pilot test use of inexpensive microscopes for rapid on-site HABs screening

Valerie Aubley (HAB Harrier and Cornell student) • Ilana Hill (Cornell student) Lydia LaGorga (Cornell student) • Ruth Richardson (Cornell professor)



Some blooms are seen on Cayuga Lake that are dominated by other genera, most notably *Dolichospermum*. These two types of colonial cyanobacteria have very different features under the microscope. Furthermore, samples of these cyanobacteria can be subjected to biochemical analyses for MC level measurement. However, the biochemical analyses for quantifying MC values requires an accredited laboratory and the use of an analysis called ELISA. These tests are both expensive (\$30-\$200) and can take up to a day or more to get results.

Introduction

Harmful algal blooms (HABs) have been on the rise in New York State, and Cayuga Lake experienced more blooms than any other NY waterbody in 2020. In fact, 10% of the HABs reported to the NYS DEC statewide in 2020 (94 out of 930) were from Cayuga Lake. Algal blooms are triggered by the presence of excessive nutrients like phosphorus, which spur the growth of the naturally occurring microbe cyanobacteria that congregate into colonies, creating the appearance of "pea soup" at the surface of the water. However, not all algal blooms are classified as HABs: only some types of cyanobacteria produce harmful toxins. This article reports on first steps to developing an inexpensive method for trained volunteers to rapidly determine HABs species and toxicity.

In order to address the growing issue of HABs on Cayuga Lake, the Cayuga Lake Watershed Network (CLWN), Community Science Institute (CSI), and Discover Cayuga Lake worked together to establish the HABs Harriers program,

a seminal citizen science program in which community members serve as HABs Harriers who monitor sections of Cayuga Lake on a weekly basis, checking for and sampling blooms when they occur. The HABs Harriers program has successfully provided three years of data from the resulting HABs samples (2018-2020), from which some notable trends have emerged.

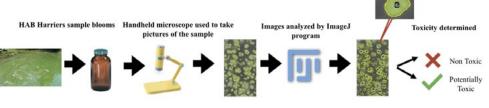
Key datasets include values measured by the Community Science Institute: chlorophyll A levels (measure of overall bloom level), microcystin toxin levels (MC), and microscopic confirmation of the presence of cyanobacteria. Cyanobacteria are the key toxin producing organisms in freshwater HABs (sometimes called cHABs). Microscopic identification can also be made as to which genera of cyanobacteria are present. By analyzing all cHABs from 2018-2020, it is clear that the high toxin blooms (>4 micrograms per L of microcystin) all have dense colonies of one particular genus: Microcystis.

Dolichospermum bloom colonies vs Microcystis bloom colonies in a single sample as viewed with an inexpensive microscope kit. Dolichospermum colonies, which usually form thin, curly-q shaped with nitrogen fixation cells called heterocysts, do not produce microcystin. Microcystis, which form globular, thick colonies, are the main culprits of microcystin production on Cayuga Lake. Sample from zone 3416 in southern Cayuga Lake, Bloom 1, September 2020.

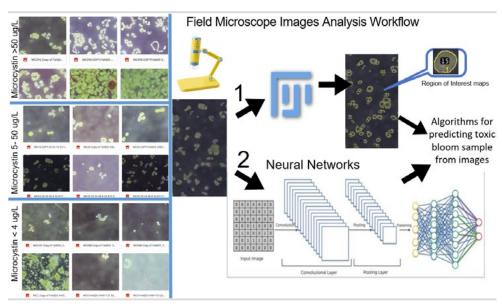
Microcystis Colonies

Current Happenings

Inspired by the first two years of HABs Harriers data, a Cornell team of students under the direction of Associate Professor Ruth Richardson decided to do a trial as to whether inexpensive microscopes (\$40) could be used by trained volunteers to visualize how dense the colonies are in a water sample and to discern which genera are present



Flow chart Richardson Lab sampling and analysis overview.



Left: representative raw bloom images taken with the inexpensive microscopes grouped by level of microcystin toxin by ELISA assay. Right, example workflow for automated image analysis to predict level of toxicity of a water sample. Priority pathway is "1" with "2" as alternate/contingency. Either pathway takes less than one minute to analyze.

by capitalizing on the distinct shape difference between the genera. This led to the creation of a HABs identification program using handheld microscopes, qPCR and automated image analysis to create an efficient, cheaper alternative to the current HABs identification method. Over the summer of 2020, we at the Richardson lab teamed up with volunteers from the HABs Harriers program to prototype this field kit identification method. Throughout the summer, Harriers who prototyped the Richardson Lab's field kit used the handheld microscope kit to take pictures of any and all blooms they observed in their monitoring section.

We were able to compile hundreds of images, capturing microscopy pictures for more than fifty HABs. We also used qPCR, a method of gene detection similar to those used for Covid-19 exposure testing, to analyze the toxin gene levels in the bloom microbial community.

Our team is in the process of creating an image analysis system using the

cheap scope images and the results of qPCR as rapid, inexpensive screens for the presence of high toxin cHABs. Using the software ImageJ, we parse through the colors, shapes and bloom density within a sample image to isolate Microcystis colonies. By running the sample images through the analysis, we aim to create a program that can discern toxin producing colonies from nontoxic ones, and present an expected MC value for each provided sample. The MC level attained from the image analysis is compared to the toxicity level results obtained from the qPCR tests, as a way to determine the effectiveness of the program.

Future Plans

We aim to eventually expand our image analysis program to other Finger Lakes and upstate New York watersheds. We are currently working with groups on Canandaigua Lake and Cayuga Lake. The tool could conceivably be used in any water body with HABs issues caused by *Microcystis* colonies. As the image

analysis program progresses, we will continue sampling blooms and relying on our HABs Harriers volunteers to help our research continue. We will also be continuing our field kit prototyping in the Summer of 2021 so be on the lookout for more information about volunteering—we'd love to have more community members involved.

For more information see:

- 1. CSI HABs reporting page:http://www.communityscience.org/volunteer/harmful-algal-bloom-monitoring/cayuga-lake-habs-reporting-page/
- 2. For the link to a map with micrograms/ videos from the 2020 blooms, and additional graphs and charts, all in full color, please look for this article at CLWN's website under the Algal Blooms header.
- 3. Richardson lab website: https://richardson.cee.cornell.edu/
- 4. Beautiful images of cyanobacterial types (websites):
 - a. Algae, Cyanobacteria, and other aquatic objects: http://cfb.unh.edu/phycokey/phycokey.htm
 - b. Algae image library: http:// snoringcat.net/AlgaePage/index. php?path=Algae//Bluegreen_Algae
 - c. Microscope UK (includes more than algae, eg rotifers, zooplankton): http://www.microscopy-uk.org.uk/

Interest Form if you want to sign up for our 2021 monitoring project:

https://docs.google.com/ forms/d/e/1FAIpQLSftH8Ia-V5tA3myjaisMMBVd_ bxVzLxrM1nxr43JzJJrVDoSg/viewform

Members of the HABs Richardson Lab Team

Ruth Richardson; Nan Wang; Kelly Xavier; Chloe Faehndrich; Ilana Hill; Lydia LaGorga; Valerie Aubley.

Thanks to our 2020 microscope test project Citizen HABs Harriers monitors: Shelley& Si Meyer, Laura Mirabito, Leo Soderland, Sue Ruoff, David Atwell, and Valerie Aubley.

Cayuga Climate Action

Rebecca Ruggles Cayuga Climate Action

The Network is digging in to our new Strategic Plan's commitment to be a climate change information leader for the watershed. And we are not alone! Cayuga Climate Action is a Cayuga County-focused group of volunteers working to educate, advocate, and act on the climate crisis.



oin us! We welcome your unique skills and perspective. Our mission statement: "Cayuga Climate Action seeks to educate, advocate, and act on the climate crisis to protect and restore our lakes and lands. We work to restore and protect our local lakes and lands."

Stewardship of our precious region is a year-round privilege. Our lakes, farms, and cultural history are interdependent, connected through relationships between people and nature over time. In other places, people are trying to cope with devastating climate change impacts from floods, heatwaves, and forest fires. Here in the Finger Lakes, we have an opportunity to address our climate threats proactively.

Yes, we have weird weather, torrential rains, and algae blooms on our lakes. These are advance warning signals of climate change. But scientists and citizens are working together to understand the sources of HABs (Harmful Algal Blooms) in Cayuga and Owasco Lakes. Towns and landowners are working together to prevent extreme weather torrential rains from washing out roads and flushing precious soils into creeks.

Perhaps most impressive is the number of local governments—from villages to Cayuga County itself—that are taking advantage of the state's programs that provide funding and guidance on how to move into the new clean energy economy. Here are two examples:

Cayuga County, the City of Auburn, four towns, and one village are registered but not yet certified as a Climate Smart Communities. New York State's Climate Smart Communities (CSC) program helps local governments reduce greenhouse gas emissions, adapt to the effects of climate change, and thrive in a green economy. Municipalities that adopt the 10-element CSC pledge are considered "registered," while communities that go above and beyond the pledge by completing climate smart actions and submitting documentation can become "certified" at the bronze or silver level. The benefits of CSC certification include statewide leadership recognition and priority status in the Climate Smart Communities annual grant program. For more information on CSC, visit https://climatesmart.ny.gov/about

Cayuga County, the City of Auburn, 19 towns, and 9 villages are currently participating in the Clean Energy Communities (CEC). This is a New York State Energy Research and Development Authority (NYSERDA) program that provides grants, coordinated support, and guidance to local governments on implementing high-impact clean energy actions. Installing charging stations, purchasing electric vehicles, performing clean energy upgrades at municipal facilities, or converting streetlights to LEDs are a few examples of the clean energy actions that are a part of this program. CEC participation indicates that many local governments want their communities to benefit from the new clean energy economy. For more information on CEC, visit https://www.nyserda.ny.gov/All-Programs/Programs/Clean-Energy-Communities.

While the climate crisis worries us, many initiatives give us hope. Cayuga Climate Action has compiled a partial list of work underway in our towns, the City of Auburn, and across Cayuga County. Join us in supporting these important local efforts to prepare for climate change and care for our environment. Most of these initiatives are not limited to Cayuga County.

- Contact your local officials and ask about their progress towards becoming certified in New York's Climate Smart Communities program, described above. Some elements of the CSC certification involve community education and engagement.
- Check out Heat Smart Central NY, a community campaign to make homes more energy efficient; this group helps homeowners and building owners who want to upgrade their heating systems and insulation. https://heatsmartcny.org/
- Learn about solar installations in your community. Large scale solar installations are approved or underway in Conquest, Genoa, Scipio, Venice, and Ledyard. Farmland Protection is part of the site review; land leases should allow for agricultural uses underneath panels, and full land restoration when the facility is decommissioned.
- Read up on New York State's Climate Action Plan, reducing greenhouse gas emissions while making New York "a hub of clean technology industry" and creating good jobs for New Yorkers. https://www.dec.ny.gov/energy/80930.html
- Visit the Auburn Permaculture Park, an edible forest garden and educational gathering space located at Michael Lepak Memorial Park. This low-cost, low-maintenance park is an example of community empowerment, creating a reproducible model for regenerating urban lands with forest ecosystems that promote food security.

You can also take direct action at home:

- Compost your kitchen scraps and yard waste; when food waste, grass clippings, and brush end up in a landfill, they contribute to the creation of methane, a powerful greenhouse gas. Check out Reuse Refuge in downtown Auburn to drop off compostables (and also shop the sustainable products in stock) if you're unable to start a pile in your own backyard.
- Start a backyard garden or tend the one you started last year.
 Our gardens contribute to building soil health, offer us fresh vegetables, and provide a healthy form of physical activity.
- Support local farmers and patronize your nearest farmer's market or farm stand. Our region supplies us with fruit, vegetables, eggs, wines, ciders, and craft beers, honey, maple syrup, dairy, and much more.

We live in a beautiful place with a cornucopia of resources. Let's remember every day to be good stewards of the land and water that surrounds us. Visit cayugaclimateaction.org for more information. Please 'like' us on Facebook! **

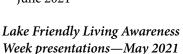
Enjoy! Our YouTube video library

During 2020, we established a YouTube channel for the Network. A year later, we have a substantial library of fun, informative, and beautiful videos to share with you. The url link and a list of titles follows. Visit as often as you wish. We'll be adding more. Enjoy!

ayuga Lake Watershed Network's YouTube channel: Find it via a Google search, or click on the direct link at our website.

- CLWN Welcome—June 2020
- The Summer 2020 Interns of the CLWN & Community Science Institute—August 2020
- Harmful Algal Blooms and the Cayuga Lake HABs Monitoring Program—August 2020
- Frank Muller's Sky, Water, Land, a Cayuga Lake celebration— August 2020
- Frank Muller's Winter Six Mile 2020—August 2020
- Cayuga Lake January to March 2020—September 2020
- Fall 2020 Community Conference: HABs presentations— October 2020
- Fall 2020 Community Conference: Hydrilla presentations— October 2020
- Brittany Anderson's The Watershed Wanderer Vlogs 1, 2, 3— April & May 2021
- Lake Friendly Living Coalition of the Finger Lakes Introduction—April 2021
- Kristen Moore's W.O.W. (Women On Water): CLWN & Lake Friendly Living—May 2021

 Bill Ebert & Tom Casella, CLWN Water Quality Committee: Make Your Own HABs Collection Device— June 2021



- Landscaping for Cayuga Lake shorelines
- Citizen Science
- Creating an Earth friendly landscape
- LFL practices for every day and everyone
- Hemlock Woolly Adelgid threat to the Owasco Lake watershed
- Identify, survey and report Aquatic Invasive Species
- Native plants: Lake friendly by nature

Coming Soon: Spring 2021 Community Conference presentations—May 2021

- Michael Brown: Historical and Contemporary Variability in Finger Lakes HABs
- David Wolfe: Climate Change in the Cayuga Lake Watershed
- David Bouldin: Presentation of the 2021 Dave Morehouse Award **

The Network's New Summer Lakewear!

The Network has new hats and shirts available for purchase!

All proceeds benefit the Network, and a portion of our earnings will be used to purchase future gear. Hats and shirts feature "AIS" (Aquatic Invasive Species), and logos from CLWN and our partners at the Finger Lakes Institute and Finger Lakes PRISM (Partnership for Regional Invasive Species Management) in Geneva.

We encourage anyone working with, volunteering to protect, or simply enjoying our lake and creeks, to purchase and proudly wear these items. They also make great gifts!

Hat or Shirt: \$25/each Two of any combination (two hats, or two shirts, or hat/ shirt): \$40 total

Shirts are unisex, sized from adult Small to XXL.

Caps are adjustable, for adult head sizes. There's one color selection for caps and shirts—blue shirts, and cream caps with matching blue piping.

How to order

Please contact us at programs@ cayugalake.org to place an order.

- Provide your name, mailing address, and number of items to be ordered, including shirt sizes.
- To calculate shipping costs, please provide your mailing address, so that we can calculate cost of shipping to your location, based on the number of items you order. We'll add that to the cost of the items, and provide you with a total amount for payment.
- Items will be shipped upon cleared payment.



The mission...

The Cayuga Lake
Watershed Network
identifies key threats
to Cayuga Lake
and its watershed,
and it advocates
for solutions that
support a healthy
environment and
vibrant, sustainable
communities.



Cayuga Lake Shed Network to protect a subsection

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Current Resident

** Educate

** Advocate

** Protect

Cayuga Lake Watershed Network 170 Main St., PO Box 348 Aurora, NY 13026 www.cayugalake.org Office: 607-319-0475

OFFICE HOURS: By appointment. Please contact steward@cayugalake.org

to arrange. STAFF:

Hilary Lambert, Steward steward@cayugalake.org Jennifer Tufano Grillo, Staff programs@cayugalake.org

2021 Summer Interns

Alora Cisneroz, Brittany Beckwith, Hannah Jo, Maeve Day

Newsletter Advisory Committee: Niamh O'Leary, Nancy Currier, Ed Currier

Photographs by Hilary Lambert unless otherwise noted.

The Cayuga Lake Watershed Network thanks Leigh Dezelan of Dezelan Dezign and Pioneer Printing of Lodi for newsletter production excellence.







Upcoming Events

Check our website, listserv and Facebook page for announcements about events, and contact **steward@cayugalake.org** or **programs@cayugalake.org** for the latest information.

CLWN's Picnic & Annual Members Meeting returns in person! We have reserved picnic Pavilion B at Lansing's Myers Point Park, 5–8:30ish p.m., on Tuesday August 10. We will provide cookout food (vegetarian and meat), fixins', beverages, cutlery and plates. We will pay for park admission. Please bring a little something to share. More details will be sent to members during the second half of July with a ballot for our Board of Directors election/Bylaws update. You do not need to be a member to attend. Come get acquainted! Please plan to wear a mask if unvaccinated/if you prefer to wear a mask.

Cayuga Lake Cup, August 13-15 Aloha Paddlers! Welcome to the largest fresh water paddling race in New York State! The Cayuga Lake Cup takes place on August 13-15 at beautiful Myers Park in Lansing, NY. This is a 3-day community expo celebrating lake, land, and human wellness in the beautiful Finger Lakes Region of Upstate NY. Check out the schedule for the full list of fun SUP events and wellness activities: https://www.cayugalakecup.com/.

Hydrilla in Cayuga Lake: The invasive aquatic species *Hydrilla verticillata* is presently monitored

and treated at four sites around the lake. Look for Dave's Team hydrilla information boxes at marinas and launches in Ithaca, Lansing, and Aurora. Contact us to be added to the CayugaHydrilla listserv. We will provide a season-end report later this year.

Harmful Algal Blooms (HABs): CLWN's 2021 HABs Communications Intern is Alora Cisneroz. Contact her at habs.newsletter@gmail. com to receive the weekly emailed newsletter HABs Weekly Newsletter. Learn what's going on with HABs on Cayuga Lake this summer at the Community Science Institute's website: http://www.communityscience.org/volunteer/harmful-algal-bloom-monitoring/.

DiscoverCayugaLake has summer cruises aboard the Teal for everyone: CLUB CAYUGA DJ Sunset Cruises on Sundays, Community Sunset Cruises with guest presenters on board on Wednesdays, Night Sky Cruise on Fridays and Farmer's Market Cruises on weekends! Currently booking Private Charters as well! Schedule & booking here: https://www.discovercayugalake.org/.