



Community 
Science Institute

Annual Report 2019



Volunteer Monitoring Partnerships

Partnering with Communities to Protect Water

Synoptic Stream Monitoring Partnerships in the Finger Lakes Region

In 2019, CSI welcomed a new group of volunteers who will be monitoring the water quality of Johnsons Creek as part of the Synoptic Stream Monitoring Program. The creek flows from its headwaters near the Seneca Army Depot and the Town of Romulus into Cayuga Lake at Dean's Cove State Park. Johnsons Creek will be CSI's 10th stream monitoring partnership in the Cayuga Lake watershed and only the second in Seneca County. The data collected by this new group of volunteers in partnership with CSI's nationally-certified water testing lab will be an important contribution to understanding water quality in Seneca County streams. Also in 2019, we celebrated the publication of an article in the peer-reviewed journal *Water* entitled *Long-Term Study of Soluble Reactive Phosphorus Concentration in Fall Creek and Comparison to Northeastern Tributaries of Cayuga Lake: Implications for Watershed Monitoring and Management*. The paper draws on Fall Creek data collected by Cornell Professor Emeritus Dave Bouldin and his team going back to the 1970s and more recent data collected by CSI's Fall Creek and Direct Streams volunteer monitoring partnerships. The results show, first, that the dissolved phosphorus concentration in Fall Creek has remained essentially constant over four decades, and second, that it averages seven times lower in Fall Creek than in northeastern tributaries. This paper may be found on the *Publications* page on our website.



CSI volunteers are monitoring 17 streams that flow into Cayuga Lake

CSI's long-term datasets of water quality can be viewed and downloaded at www.database.communityscience.org



Volunteers completed their seventh monitoring season on Owego Creek!

Red Flag Monitoring Program in the Chesapeake Bay Watershed

At the height of the Red Flag Monitoring Program from 2009-2014 when permitting of unconventional gas wells, or "fracking," seemed inevitable, 25 groups comprising over 60 volunteers partnered with CSI to monitor 26 sub-watersheds across Central New York. They built water quality data sets for local streams from scratch, setting an invaluable baseline against potential impacts from "fracking." As the prospect of "fracking" has receded, 12 dedicated groups comprising 36 volunteers continue to monitor eleven of the original 26 "Red Flag" sub-watersheds, developing long-term data sets that paint a detailed picture of regional water quality. Since 2016, they have also collected and preserved samples for certified nutrient analysis by the CSI lab, and the results reveal differences within and between sub-watersheds. Seven actively monitored sub-watersheds lie in the Upper Susquehanna River basin, the headwaters region of the Chesapeake Bay watershed. EPA and state governments are increasingly interested in using volunteer data to help improve their model for managing water quality and nutrient loading to the Chesapeake Bay. The Chesapeake Monitoring Cooperative (CMC) is a relatively new partnership between governments and volunteer monitoring organizations that is evaluating volunteer data for its usefulness in Chesapeake Bay mitigation efforts. CSI has agreed to share data collected by Red Flag volunteers, available to view on CSI's Water Quality Database at database.communityscience.org. Soon these data will also be available on the CMC Data Explorer at: cmc.vims.edu/#/home.

**BMI samples
collected at 20
sites on 11
creeks!**

Biomonitoring Program

In 2019, volunteers collected and analyzed benthic macroinvertebrate (BMI) samples from 20 sites on eleven different creeks. Biomonitoring results, which include family-level BMI diversity, tolerance to impaired conditions, and BMI composition as compared to an average NY healthy stream, give a good overall picture of water quality and ecosystem health. CSI's 2019 results, along with over a decade of prior results, are ultimately destined for inclusion in a new, searchable CSI Biomonitoring database (in the works). Attendance at Biomonitoring Open Lab nights on Thursday evenings was strong and steady. Over the course of the fall and winter, volunteers did an amazing job of picking, sorting and identifying over 7,000 BMI organisms in samples that were collected during the summer. Adrianna passed her recertification test for identification of Aquatic Insects to Family Level through the Society for Freshwater Science (needed every 5 years to keep certification active). We're very proud of our volunteers, many of whom have logged an impressive number of hours at Open Lab nights and have become excellent at identifying aquatic organisms, such as Diane Chu who has also become a certified taxonomist of Aquatic Insects to Family Level. CSI collaborated with Finger Lakes State Parks for a second year to offer Biomonitoring Family Picnics at Lower and Upper Buttermilk and Robert H. Treman State Parks. These fun-filled science activities remain popular educational events for the whole family.

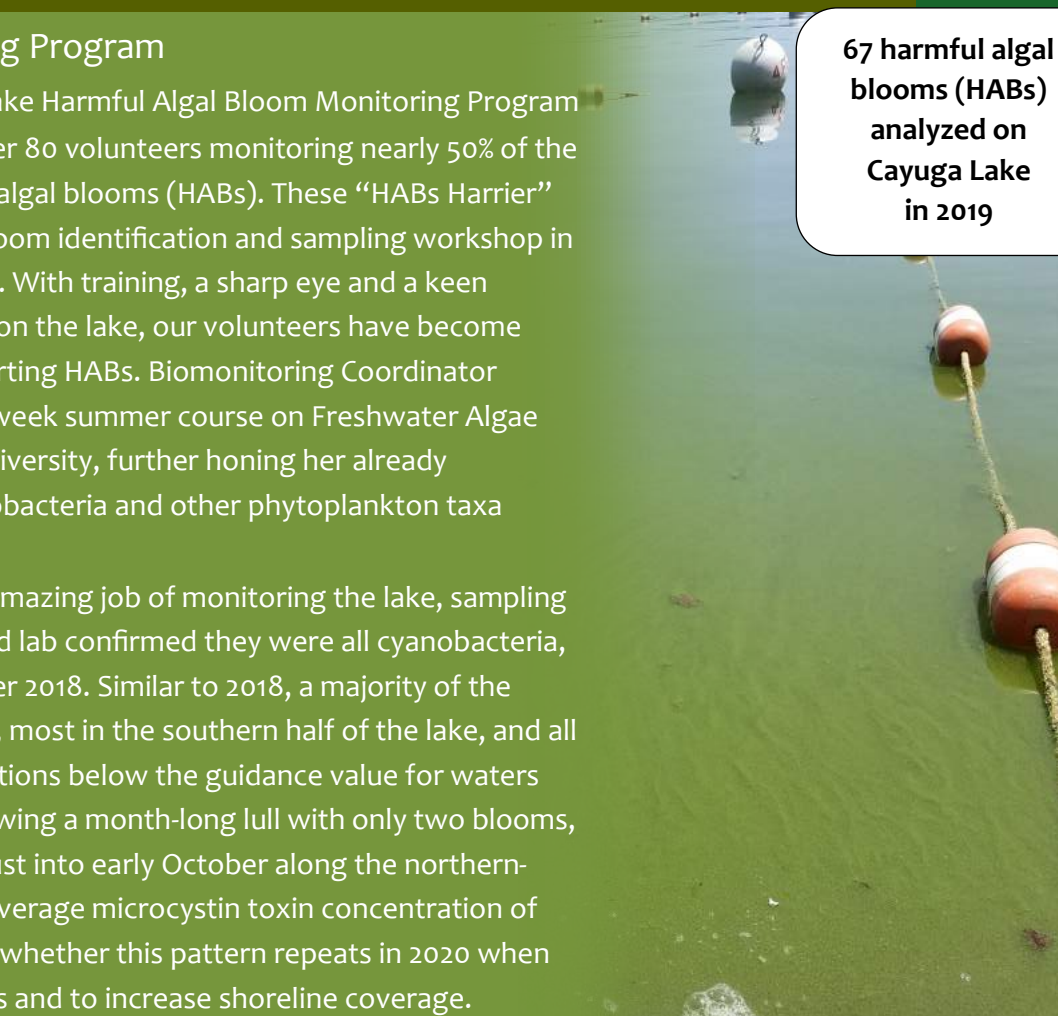


Cayuga Lake HABs Monitoring Program

In its second year, the Cayuga Lake Harmful Algal Bloom Monitoring Program grew to a lake-wide network of over 80 volunteers monitoring nearly 50% of the Cayuga Lake shoreline for harmful algal blooms (HABs). These "HABs Harrier" volunteers attended a two-hour bloom identification and sampling workshop in June offered jointly by DEC and CSI. With training, a sharp eye and a keen awareness of changing conditions on the lake, our volunteers have become experts at tracking down and reporting HABs. Biomonitoring Coordinator Adrianna Hirtler completed a two-week summer course on Freshwater Algae Identification through Fordham University, further honing her already impressive skill at identifying cyanobacteria and other phytoplankton taxa under the microscope.

HABs Harrier volunteers did an amazing job of monitoring the lake, sampling 67 suspicious blooms. CSI's certified lab confirmed they were all cyanobacteria, marking an increase of 27 HABs over 2018. Similar to 2018, a majority of the blooms, 60%, occurred in early July, most in the southern half of the lake, and all but one had microcystin concentrations below the guidance value for waters used for recreation of 4 ug/L. Following a month-long lull with only two blooms, 25 blooms occurred from late August into early October along the northern-most 8 miles of shoreline with an average microcystin toxin concentration of 347.73 ug/L. We are curious to see whether this pattern repeats in 2020 when we hope to recruit more volunteers and to increase shoreline coverage.

**67 harmful algal
blooms (HABs)
analyzed on
Cayuga Lake
in 2019**



Outreach and Education



Engaging the community in water protection through outreach and education is a foundational part of our mission. In March of 2019, CSI hosted our largest Water and Community event to date entitled *Nutrients in the Watershed, Unusual Weather, and Harmful Algal Blooms: A Public Conversation*. This public forum featured a panel with local farmers, nutrient management specialists, and experts in cyanobacteria, climate, and water quality who took part in an open discussion with over 100 community members about issues related to harmful algal blooms. In September, CSI assisted the Seneca County Farm

Bureau and the Seneca County Soil and Water Conservation District in holding a similar event with stakeholders in Seneca County. We hope that, through events such as these, we can continue to provide the community with opportunities to learn about complex water quality issues and to discuss how they can

be addressed, together. In addition to hosting our Water and Community event, CSI staff gave presentations on our stream and lake monitoring results to sister nonprofits, local governments and college classes and participated in conferences on local and regional water quality issues.



Held on the shore of Cayuga Lake at the Inns of Aurora, over one hundred gathered at our *Water and Community* event in March, 2019 to discuss harmful algal blooms, nutrient management, water quality and climate change.

4-H2O Youth Education Program

Our 4-H2O Youth Education Program, developed in partnership with Tompkins County 4-H, has grown steadily in popularity in recent years. In 2019, we again offered our free summer program of events including



Discovering the amazing diversity of life found in streams during a Biomonitoring Picnic at Buttermilk Falls State Park.

three educational Water Quality Cruises aboard the Floating Classroom of Discover Cayuga Lake (DCL), three Biomonitoring Picnics at local state parks, and two Getting to Know Harmful Algal Blooms workshops.

Each activity is designed to provide a unique educational experience for children, adults, and families and to get children excited about playing and learning in the outdoors. Inspiring the next generation of scientists, activists, and water quality stewards is an essential part of ensuring lasting protection of our shared water resources.

To sign up for a summer program, or for more information, please email us at info@communityscience.org or give us a call at (607) 257-6606

The Water Bulletin

Written by CSI staff, our yearly newsletter, The Water Bulletin, was published in the fall of 2019. Articles included the results of two years of monitoring harmful algal blooms on Cayuga Lake, an overview of our Cayuga Lake Phytoplankton Project led by Adrianna Hirtler, a summary of nutrient monitoring results in the Cayuga Lake watershed, and a note about the publication of data collected by CSI volunteers in a peer-reviewed scientific journal. You can read the Fall 2019 edition, as well as past issues, on CSI's website.





A Path Towards Sustainable Watershed Management

The mission of the Community Science Institute is to partner with communities to protect water. In practical terms, this translates to citizens and scientists making common cause to build long-term data sets that describe the state of water quality in streams and lakes and in doing so make it possible for these watersheds to be managed effectively and sustainably. Water is a dynamic natural resource and monitoring it for management purposes takes time and patience. It requires accumulating water quality data in order, first, to discern characteristics and patterns; second, to compare those characteristics and patterns with known criteria for healthy waterbodies; and finally, to investigate whether water quality patterns are changing over time. Community-based science helps us understand at a visceral level the collective impact we as a society have on natural systems so that we may adjust our behavior to preserve as much of the natural world as necessary to ensure that it can thrive. Its preservation is a matter of the utmost urgency as human alteration of land and climate continues to degrade the natural world within which we are embedded and apart from which our civilizations cannot exist.

CSI's path toward one small aspect of cohabiting with the natural world, sustainable watershed management, depends on community engagement and the dedication of our volunteers as much, if not more, than it depends on our nationally certified water testing lab. We do science together, we and our volunteers, and CSI makes sure the results are distributed publicly, transparently and free of charge through our online database, at database.communityscience.org. Producing data of a quality on par with universities and state and federal agencies, our long-term monitoring programs represent a hopeful investment in the future of our region. Several historical examples suggest the effectiveness of this investment:

1. Datasets collected by CSI-volunteer monitoring partnerships indicated by 2011 that Fall Creek and the Cayuga Inlet loaded over 80% of dissolved phosphorus to the shallow southern shelf of Cayuga Lake while Cornell University's Lake Source Cooling (LSC) facility loaded less than 5%. Pointing to the importance of non-point sources of nutrient pollution, our early estimates were corroborated in 2016 by the DEC-mandated \$2.1 million Cayuga Lake Modeling Project, confirming the scientific value of nutrient data derived from samples collected by community volunteers.
2. CSI has teamed up with the Floating Classroom of Discover Cayuga Lake and Tompkins County 4-H to collect Cayuga Lake water quality data every summer since 2006. Our E. coli results were used to convince the EPA to change its classification of Cayuga Lake in 2014 from being federally listed as impaired by pathogenic bacteria to being officially recognized as safe for swimming, a significant plus for the economic vitality of our region.
3. CSI and Stream Watch volunteers documented consistent high levels of fecal coliform bacteria in the effluent of the Trumansburg Wastewater Plant beginning in 2009. When local government was unable to solve the problem, the DEC stepped in, ultimately requiring a \$6.1 million upgrade to the plant that finally brought fecal bacteria under control in 2017.
4. CSI-volunteer monitoring partnerships on tributary streams in the northern part of the Cayuga Lake watershed consistently show phosphorus levels many times higher than southern streams, suggesting greater aggregate nutrient loading from small northern streams than larger tributaries in the south. Coincidentally, CSI's harmful algal blooms (HABs) monitoring program continues to document blooms with high levels of the microcystin toxin at the north end of the lake. We are actively investigating whether these two observations might be related.
5. In addition to our monitoring partnerships on Cayuga Lake streams, CSI has partnered with the Seneca Lake Pure Waters Association to monitor Seneca Lake tributaries since 2014. Now, SLPWA-CSI data are being used to develop a Nine Element Management Plan for the Seneca Lake watershed.

CSI's talented and hard-working staff do the essential work of translating our volunteer monitoring partnerships into the long-term datasets reported in our online public database. CSI staff also reach out to our fellow citizens to explain the characteristics and patterns of water quality revealed by these public data. We hope we are progressing, one monitoring event at a time, along a path that connects and ultimately converges with paths taken by others toward managing our region's water resources for future generations.

Stephen Penningroth

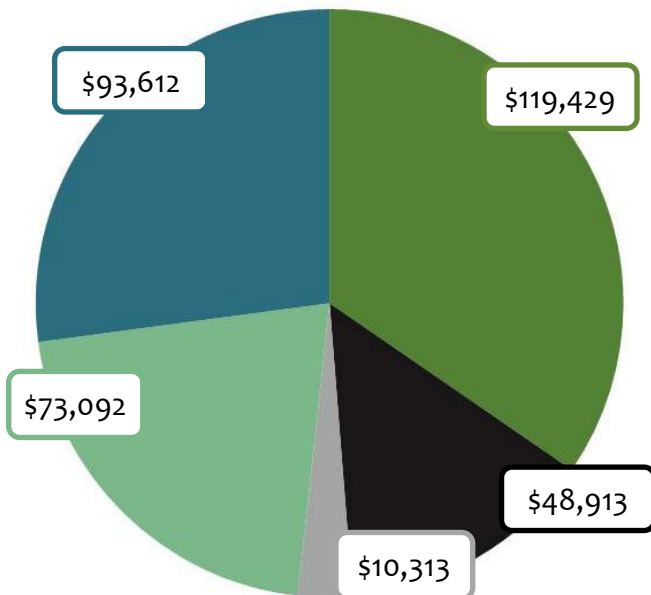
Financial Report



CSI 2019 Income

Total: 345,394

*Including \$35.85 interest and dividends

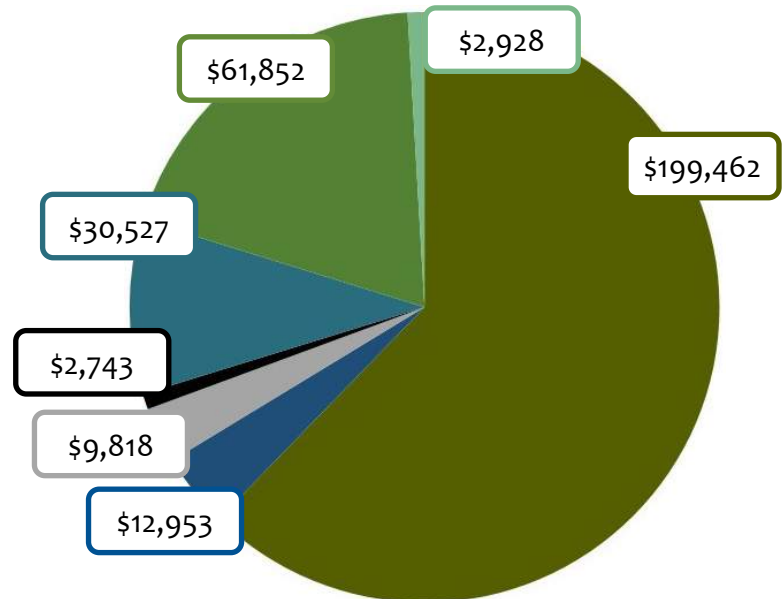


- Local Government Support for Stream and Lake Monitoring°
- Monitoring Grants from Foundations & Not-for-Profits (NFPs)*
- Membership Donations
- Agency and Lake Association Testing Contracts
- Fee-for-Service Drinking Water Tests

CSI 2019 Expenses

Total: 322,406

*Including \$2,123.18 travel and transportation



- Personnel
- Web Services
- Sub-Contract Lab Tests
- Contract Labor
- Lab and Office Supplies
- Indirect Costs
- Fees and Miscellaneous Expenses

Thank You to Our Donors!

Watershed

\$1,000 +

Dylan Penningroth
David Weinstein

Lake

\$250 +

Robert Barton
West Shore Homeowners Assoc.
Edwin and Roberta Przybylowicz
Stephen Penningroth
Curtis and Amanda Ufford
Susan and Stephen Ruoff
Grace Bates

River

\$100 +

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James and Elizabeth Gossett
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Christopher Riley
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Stream

\$50 +

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Roger H. and Suzanne Hinderliter
Leslie Monostory
Diane Chu
Johnathan Miller

Stream

\$50 +

Hilary Lambert
Douglas and Olive Brown
Lois Fahey

Creek

\$25 +

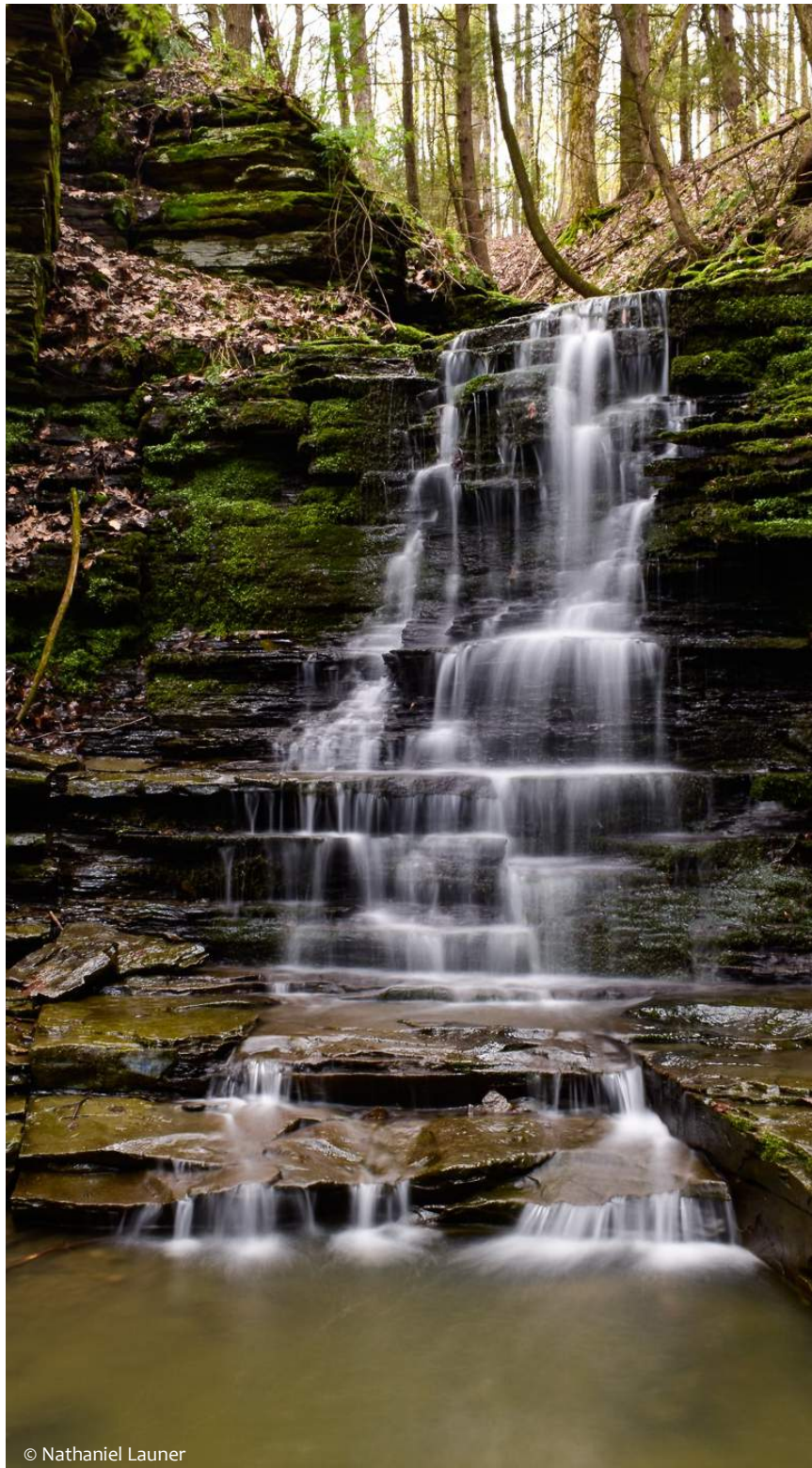
Louise Munch and Susanne Maloy
William Heaviside
Roy Luft
Kathy and Philip Koons
Nancy Emerson
Judith Barrett
Becca Harber
Roberta Healey

Local Government Support for Stream and Lake Monitoring°

Tompkins County - \$30,750
Cayuga County - \$25,351
Town of Ithaca - \$21,104
City of Ithaca - \$10,535
Town of Dryden - \$10,550
Town of Ulysses - \$6,188
Town of Newfield - \$6,034
Town of Danby - \$4,043
Town of Caroline - \$3,171
Town of Hector - \$1,000

Monitoring Grants from Foundations and NFPs*

Seneca Lake Pure Waters Association - \$29,592
Cornell University - \$7,000
Tompkins County Soil and Water - \$7,000
Cayuga Lake Watershed Network - \$4,570
The Community Foundation of Tompkins County
- Taylor Peck Fund - \$500
Sciencenter - \$250



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Staff

Stephen Penningroth, *Executive Director, Senior Scientist*
Noah Mark, *Technical Director*
Alex Sopilniak, *Senior Lab Analyst*
Diana Beckenhaupt, *Lab Analyst*
Nathaniel Launer, *Outreach Coordinator, Cayuga Lake
HABs Monitoring Program Coordinator*
Adrianna Hirtler, *Biomonitoring Coordinator*

Supporting Services

Abner Figueroa, *Web and Database Development*
William George, *Data Entry*

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Robert Barton, *President*
Angel Hinickle, *Vice-President*
Darby Kiley, *Secretary*
Stephen Penningroth, *Acting Treasurer*
Gerald Van Orden
Deborah Jones
Sheila Dean
Marina Howarth

Partners

Seneca Lake Pure Waters Association
Tompkins County 4-H
Tompkins County Soil and Water
Conservation District
West Shore Homeowners Association

Collaborators

Cayuga Lake Watershed Network
Discover Cayuga Lake
Cayuga Lake Environmental Action
Now (CLEAN)



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Certified Water Quality Testing Lab

NYSDOH-ELAP #11790

EPA Lab Code NY01518



Our Mission

The mission of the Community Science Institute is to foster and support environmental monitoring in partnership with local groups of volunteers in order to gain a better understanding of natural resources, particularly water, and how to manage them for long-term sustainability.