

Taughannock Falls in Trumansburg, NY.
CSI's Streamwatch volunteer team has been monitoring
the water quality of Taughannock Creek since 2006.
Photo taken by Director of Outreach, Nathaniel Launer.



Community Science
Institute

Partnering with Communities to Protect Water

Annual Report 2021



Synoptic Stream Monitoring Program

It was another eventful year for our Synoptic Stream Monitoring volunteer teams. In March, 2021, the monitoring season began quickly; volunteer teams monitoring Taughannock Creek, Trumansburg Creek, Salmon Creek, and tributary streams of Seneca Lake, collected samples during early stormwater events caused by rain showers and runoff from snowmelt. These early stormwater events were a precursor of what turned out to be a wet year with intense and prolonged rainstorms that kept stream flows well above the historic average throughout the year. Thanks to our volunteer teams, we were able to document water quality during these stormwater events. The results reinforce our understanding that stormwater events constitute roughly 80-90% of nutrient and sediment loading into Cayuga Lake.

During 2021, we also partnered with members of the Canandaigua Lake Watershed Association to monitor locations on nine tributary streams of Canandaigua Lake and two near-shore lake locations for levels of *E.coli*. The results have proved helpful for identifying tributaries with high levels of *E.coli* and informing how these streams may impact *E.coli* levels at two public swimming beaches on Canandaigua Lake. These initial findings can be found in our [Fall 2021 Water Bulletin Newsletter](#), available on our website.

By the end of the year, we had completed another successful Synoptic Stream Monitoring season that included 58 monitoring events covering twenty-one tributary streams of Cayuga Lake, six tributary streams of Seneca Lake, five tributary streams of Keuka Lake, and nine tributary streams of Canandaigua Lake. All data collected during the 2021 monitoring season, and our long-term datasets of water quality, can be found on our public Water Quality Database at database.communityscience.org.



Volunteer David Weinstein collecting samples from Fall Creek locations during a stormwater event.

Red Flag Monitoring Program



Volunteers in the Red Flag Monitoring Program use portable LaMotte testing kits to collect accurate field measurements of water quality.

In 2021, ten volunteer teams of our Red Flag Monitoring Program continued to collect field measurements of water quality from tributary streams across the Finger Lakes Region and Central New York. These volunteers collect measurements of basic, but informative and important water quality indicators including temperature, pH, dissolved oxygen, total hardness and conductivity. Initially developed to set a baseline of water quality in streams across the region in anticipation of the introduction of hydrofracking in New York, data collected now contributes to long-term datasets of water quality. We hope that this model of water quality monitoring can continue to empower teams of volunteers. We hope to expand the program to more stream locations throughout the region and use this model of monitoring for new purposes. For example, this year Red Flag volunteer, Neil Wagner, began monitoring two upstream locations on Cascadilla Creek during the summer of 2021. These locations will continue to be monitored to ensure that the drilling of the Cornell University Borehole Observatory (CUBO) does not impact the water quality of the creek.

All Red Flag data collected by our volunteers can be found on our public Water Quality Database at www.database.communityscience.org.

Biomonitoring Program

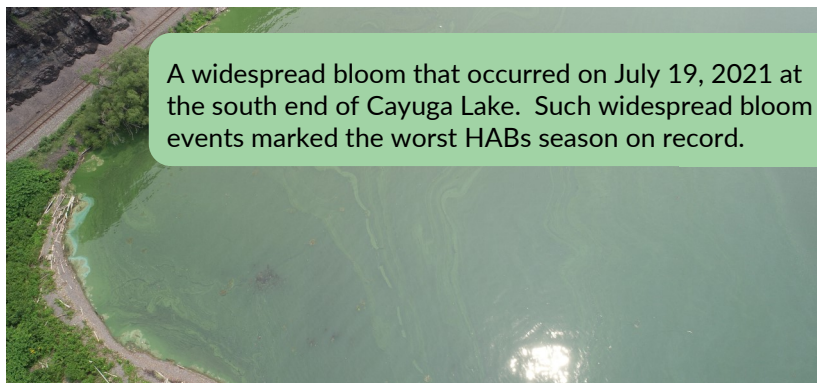
In the summer of 2021 (and into the winter of 2022), volunteers collected and analyzed benthic macroinvertebrate (BMI) samples from nineteen sites on twelve different creeks. Biomonitoring results, which include family-level BMI diversity, tolerance to impaired conditions, and BMI composition as compared to an average NY healthy stream, give a good overall picture of water quality and ecosystem health. CSI's 2021 results, along with over a decade of prior results, are destined for inclusion in a searchable CSI Biomonitoring database.

During the 2021 season, the Six Mile Creek Biomonitoring Group, working mostly independently (as usual), collected and analyzed (sometimes live) two replicate samples for three different sites along Six Mile Creek. In the summer of 2021, CSI collaborated with Finger Lakes State Parks for a fourth year to offer Biomonitoring Fun! events at Lower and Upper Buttermilk and Robert H. Treman State Parks as part of our 4-H2O youth education programming. These fun-filled science activities remain popular educational events for the whole family. We also partnered again with the Ithaca Sciencenter and their Future Science Leaders program. Throughout the course of 2021, we developed support materials for parents and teachers wanting to use the Water Quality Monitoring Report Card (essentially Do-It-Yourself biomonitoring designed for kids and families) and we made those materials as well as the booklet itself downloadable from the CSI website.

To process the summer's samples, Biomonitoring Open Lab nights were offered almost every Thursday evening from November 2021 – March 2022 at the CSI lab. Masking and physical distancing were still required due to ongoing pandemic concerns, and we limited numbers of volunteers to three at a time for most of the season. The volunteers who participated in these sessions did an amazing job of working through the summer's samples and learning new identification skills. It was fun to have a few more first-time sample sorters as well as some committed returning volunteers. We appreciate the patience, enthusiasm, and ever-developing skills that every volunteer brought to the CSI Biomonitoring program this past year.

All biomonitoring data collected by our volunteers can be found on our website at:
www.communityscience.org/bmi-results/

Harmful Algal Bloom (HABs) Monitoring Program



The summer of 2021 was the fourth season of our Cayuga Lake Harmful Algal Bloom (HABs) Monitoring Program. During our three HABs Harrier Training Workshops in June 2021, we were excited to include a presentation from the Cayuga Lake Watershed Network (CLWN) about their Lake Friendly Living program – a program through which watershed residents can pledge to make small yet meaningful lifestyle changes to protect the health of Cayuga Lake. We were also grateful to welcome ten new HABs Harrier volunteers to the program who helped increase our coverage from 53% to roughly 57% of the lakeshore.

Unfortunately, the summer of 2021 was the worst HABs season on record for Cayuga Lake due to the number and severity of blooms that occurred. The summer was marked by two lakewide bloom events on July 19th – 20th and October 6th. During the October 6th lakewide event, widespread blooms were reported and sampled at 18 different shoreline locations around the lake, and microcystin toxin concentrations ranged from 6.62 µg/L to 1,951 µg/L or nearly 500 times the safe guidance value for contact recreation (4 µg/L). The 18 blooms on October 6th were among a total of 26 blooms that occurred in October 2021, a drastic increase in the number of late season HABs compared to the previous three years during which, at most, two HABs had occurred in the month of October.

By the end of the season, 102 HABs were documented on Cayuga Lake thanks to our team of dedicated HABs Harrier volunteers without whom this important program would not be possible. Of the 102 blooms, 60 (59%) had microcystin toxin levels that exceeded the safe guidance value for contact recreation. This was a substantial increase from the number of blooms documented during the 2020 monitoring season when 78 blooms occurred, 55 (70%) of which had high concentrations of microcystin toxin. A detailed report of the 2021 bloom dataset can be read in our [Fall 2021 Water Bulletin Newsletter](#), available online.

Facilitating public conversations among stakeholders and helping to inform our shared understanding of current water quality issues is a foundational part of CSI's mission to partner with communities to protect water. We were able to adapt successfully to the ongoing COVID-19 pandemic, and provide an online Water and Community Public Forum, seven presentations to local governments, sister nonprofits, and community groups, seventeen Biomonitoring Open Lab Nights, and eight 4-H2O Youth Education Program events.

During our online Water and Community Public Forum on February 27, 2021, titled *Patterns of Harmful Algal Blooms (HABs) and Associated Toxins in Cayuga Lake: Findings from Three Years of Bloom Monitoring*, presentations describing the 2020 HABs monitoring season and patterns revealed by detailed HABs data collected during the past three years were provided by HABs Harrier volunteers and CSI staff. We look forward to hosting in person Water and Community Public Forums again soon. These public forums are

invaluable opportunities to discuss the increasingly urgent and complex water quality issues we face, and how we can address these issues together.



We continued our series of Water and Community events by hosting a webinar to discuss results and patterns revealed by our multi-year HABs dataset for Cayuga Lake.

4-H2O Education Program

We were fortunate to provide another series of fun, water science 4-H2O Youth Education events during the summer of 2021, thanks to a generous grant from the Park Foundation. These events included Biomonitoring Picnics at local state parks, Amazing Cyanobacteria of Cayuga Lake Workshops, and Water Quality Cruises with Discover Cayuga Lake. Through the eight 4-H2O Youth Education Program events in 2021 we were able to provide nearly 150 area youth and adults with unique, hands-on learning opportunities.



Analyzing samples collected during a Water Quality Cruise event on Cayuga Lake!

To sign up for a summer program, or for more information, please email us at info@communityscience.org or visit the 4-H2O page on our website at www.communityscience.org/4h2o/



Guiding Water Management

In 2021 the New York State Department of Environmental Conservation released the draft Total Maximum Daily Load (TMDL) for Cayuga Lake for public comment. This proposed watershed management plan undertakes to outline phosphorus pollution in Cayuga Lake and its causes and recommends overall reductions in phosphorus loading to be achieved through local government initiatives. Implementation of the TMDL will have lasting impacts on land use, water quality and the regional economy. It is therefore essential that the plan be based on the most comprehensive phosphorus datasets available. CSI's founder, Dr. Stephen Penningroth, submitted comments urging NYSDEC to take advantage of the long-term sets of regulatory quality phosphorus data in CSI's public online database (database.communityscience.org) to revise the loading model the plan is based on. In particular, the extremely high concentrations of dissolved phosphorus in northern tributary streams, which CSI has documented extensively with our volunteer partners, have not been factored in to the draft TMDL. This has resulted in an approximately 3-fold underestimate of bioavailable phosphorus entering Cayuga Lake annually. Dr. Penningroth's comments can be read on our website on our [Public Events and Presentations](#) page under the Outreach and Education tab.

The Water Bulletin

The Fall 2021 Water Bulletin Newsletter featured articles highlighting the role of CSI's data in addressing regional water quality issues, including development of the Seneca-Keuka Nine Element Watershed Management Plan, monitoring the southwest shore of Cayuga Lake in partnership with the West Shore Neighborhood Association for *E.coli*, and monitoring *E.coli* in tributary streams in partnership with the Canandaigua Lake Watershed Association (CLWA). You can read our Water Bulletin Newsletter online at www.communityscience.org/outreach-and-education/newsletters-annual-reports/





Letter from the Founder

Dear Volunteers, Friends, and Supporters of CSI,

The year 2021 marked the 21st anniversary of the first meeting of the CSI Board of Directors on October 26, 2000. Since then, CSI has grown from me multi-tasking as director, volunteer recruiter/coordinator, laboratory analyst and fundraiser to an organization with five full-time and three part-time staff. Our growth has been made possible by our dedicated volunteer monitors, now over 250 strong, and financial support from municipal and county governments throughout the Cayuga Lake watershed. Long-term water quality data sets that CSI has built in partnership with our volunteers have improved water resource management in a number of ways, including the removal of the south end of Cayuga Lake from EPA's 303(d) list for impairment due to pathogenic bacteria in 2014; a \$6.2 million upgrade of the Trumansburg Wastewater Treatment Plant in 2016; confirmation of published estimates of total and dissolved phosphorus loading to Cayuga Lake in 2021; and documentation, unique among volunteer HABs monitoring programs in New York, of multi-year patterns of HABs occurrence and microcystin toxicity. As I retire, CSI appears to have completed an initial stage of development and to be poised to blossom under new leadership. Dr. Grascen Shidemantle, whose training as a biologist and passion for protecting the natural world through science make her a perfect fit for CSI, will take the reins as Executive Director in July 2022. Noah Mark, CSI's Laboratory Director since 2019, brings technical brilliance and managerial acumen to the task of maintaining laboratory certification, essential to the credibility of the data CSI collects with our volunteers. Together, Grascen and Noah will lead CSI on the next stage of its journey. I look forward to serving on the CSI Board of Directors, grateful for the privilege of supporting them in their work. Excelsior!

Stephen Penningroth, Ph.D., Executive Director



Letter from the Director

Dear Friends of the Community Science Institute,

It is an honor to be joining the Community Science Institute's dedicated team of volunteers, staff, partners, and supporters in our efforts to monitor and protect water quality in the Finger Lakes region. My connection to nature started as a young person growing up in the hills and creeks of western Pennsylvania. I felt strongly that the best way to protect the natural world that I loved so much was to learn as much as I could about it. I earned my bachelor's degree in Biology from Slippery Rock University and then made my way to New York state to pursue my doctorate in biology at Binghamton University. At BU, I researched how human activities, such as pollution, impact sensitive aquatic wildlife. At the same time, I was falling in love with New York state and its many natural wonders. In my research, I was confronted with the ways that humans negatively impact the environment. Now, at CSI, I get to experience the ways in which humans can have a positive impact on the natural world.

For the past 21 years, you all have reinforced the saying "knowledge is power", by generating over two decades worth of regulatory quality data that have been used to effect positive change in our community. Your dedication to the protection of our natural resources and in turn, the health of our neighbors and environment inspires me. I love that I get to come to work and do something that matters every single day. I would like to express my deepest gratitude to each of you, and especially to Steve, for making my dream job a reality. I look forward to seeing what we can all achieve together as a united, scientifically curious community in the years to come.

Respectfully,

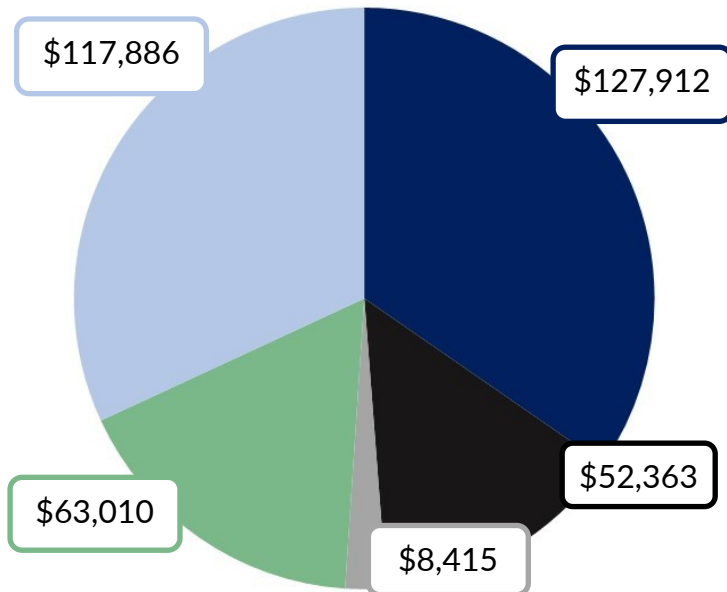
Grascen Shidemantle, Ph.D., Executive Director

Financial Report



CSI 2021 Income Total: \$369,623.95

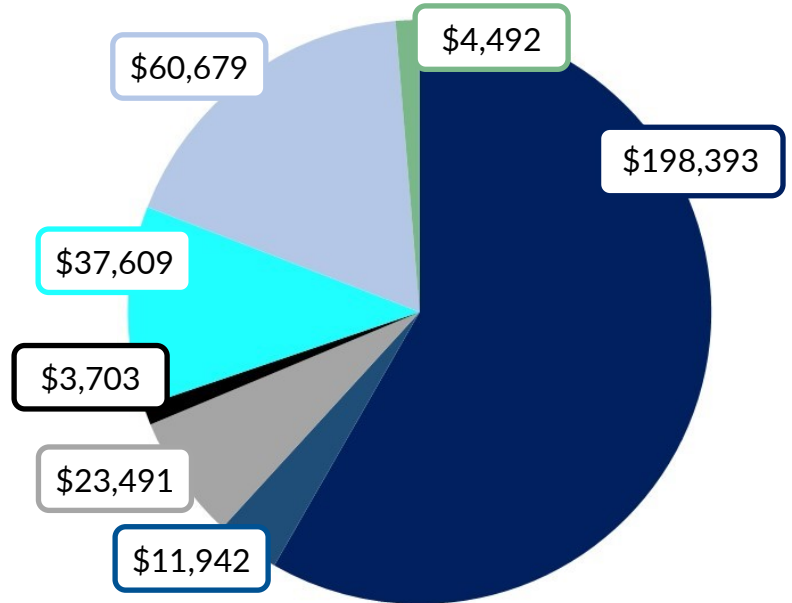
*Including \$43.05 interest and dividends



- 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 2021 Expenses Total: \$341,057.02

*Including \$748.67 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 +

Lei and Kevin Mark
David Weinstein and Christina Stark
Ezra and Mary Ellen Oyer
The Busfield Foundation

Lake

\$250 +

West Shore Neighborhood Association
Edwin and Roberta Przybylowicz
Mark and Alicia Wittink
Ruth Richardson
Louise Mudrak
Curtis and Amanda Ufford
Roxanne Marino
Eric Evans
Susan and Stephen Ruoff

River

\$100 +

Stephen and Amy Yale-Loehr
Robert and Elizabeth Thomas
William and Shirley McAneny
James Chamberlain and Karen Dyson
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Christopher Riley
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Elaine Quaroni
James Gossett
Darby Kiley
Roxanna Johnston
Elizabeth Thomas

Stream

\$50 +

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Taylor Peck
Cally Arthur
Marty Johnson
Cait Darfler
Harriet Becker

Stream

\$50 +

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Carol Hardy
Randy Allen
Pete Meyers
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Diane Chu
Martha Fischer and Susan Robinson
Paul Alderige
Angel Hinickle
Barbara DeWall
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Janice Glover
Ted Marks
Les and Eva Monostory
Casey Bangs
Hollie Ellison
Douglas Brown
Jonathan Miller
Tony Del Plato

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\$25 +

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Nancy Emerson and Roy Luft
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Norm Trigoboff
Linda and Cory Byard
Ann Kaminski
Sheila Dean
Elizabeth Sanders
Gundula Lee
Marlaine Darfler
Becca Harber
David Astorini
Mel Greene
Patricia Stevenson

Local Government Support for Stream and Lake Monitoring °

Tompkins County - \$34,000
Cayuga County - \$20,012
Town of Ithaca - \$21,957
Town of Dryden - \$10,976
City of Ithaca - \$10,372
Town of Lansing - \$7,000
Town of Ulysses - \$6,312
Town of Newfield - \$6,278
Town of Danby - \$4,206
Town of Caroline - \$3,299
Town of Enfield - \$2,500
Town of Hector - \$1,000

Monitoring Grants from Foundations and NFPs*

Park Foundation - \$24,000
Seneca Lake Pure Waters Association - \$17,199
Keuka Lake Association - \$3,357
Sciencenter - \$2,500
The Community Foundation of Tompkins County
- Social Justice Fund - \$1,750
Cayuga Foundation - \$1,500
Canandaigua Lake Watershed Association - \$1,170
The Community Foundation of Tompkins County
- Taylor Peck Fund - \$500
Seneca Lake Guardians - \$387

We give our sincere thanks to the dedicated volunteers of our Synoptic Stream Monitoring Program, HABs Monitoring Program, Red Flag Monitoring Program, and Biomonitoring Program. Their work to monitor the health of our shared water resources is an investment that will help guide the sustainable management and protection of our streams and lakes for decades.

Staff

Grascen Shidemantle, *Executive Director*
Noah Mark, *Technical Director*
Kathryn Graham, *Lab Analyst*
Nathaniel Launer, *Director of Outreach, Cayuga Lake HABs Monitoring Program Coordinator*
Adrianna Hirtler, *Biomonitoring Coordinator*
Aleah Young, *Administrative and Laboratory Assistant*

Supporting Services

Abner Figueroa, *Web and Database Developer*
William George, *Data Entry Specialist*

Board of Directors

Robert Barton, *President*
Angel Hinickle, *Vice-President*
Darby Kiley, *Secretary*
Stephen Penningroth, *Founder and Treasurer*
Gerald Van Orden
Deborah Jones
Sheila Dean
Robert Thomas

Partners

Cayuga Lake Watershed Network
Discover Cayuga Lake
Tompkins County 4-H
Tompkins County Soil and Water Conservation District
West Shore Neighborhood Association
Cayuga Lake Environmental Action Now
Seneca Lake Pure Waters Association
Keuka Lake Association
Seneca Lake Guardians
Canandaigua Lake Watershed Association



Partnering with Communities to Protect Water

Annual Report - 2021

95 Brown Road

283 Langmuir Lab/ Box 1044

Ithaca, NY 14850

Phone/ Fax: (607) 257-6606

Email: info@communityscience.org

Website: www.communityscience.org

Send To:

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.

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