2025 Edition

The Water Bulletin

The Newsletter of the Community Science Institute

Celebrating 25 YEARS of Science and Service!

Inside this Edition:

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CSI'S STATEWIDE IMPACT:
Advancing Science-Based Water Stewardship Across New York

In 2025, Community Science Institute (CSI) continued to make a powerful impact not only in the Finger Lakes region, but across New York State as well. Through scientific expertise, data transparency, and community partnerships, CSI contributed to four major statewide initiatives that advance science-based management of New York's waters. From policy engagement to data sharing, CSI's work this year underscores the essential role of community-based science in safeguarding clean water for all.

Shaping Statewide Nutrient Criteria: CSI Comments on Proposed Phosphorus Guidelines

In March 2025, CSI's certified laboratory submitted detailed technical comments on the New York State Department of Environmental Conservation's (NYSDEC) proposed total phosphorus guidelines for flowing waters. These guidelines will help determine how the State classifies water quality impairments related to phosphorus in flowing and ponded water—a critical issue for waterbodies vulnerable to harmful algal blooms such as Cayuga Lake.

CSI's comments, submitted by Laboratory Director Noah Mark, drew on two decades of experience monitoring total phosphorus, chlorophyll a, and benthic macroinvertebrates in the Cayuga and Seneca Lake watersheds. In the comments, we raised important technical questions about how the proposed biological response variables were derived, and recommended refining the criteria to better reflect the diversity of New York's stream habitats. In particular, CSI highlighted the need to:

- Clarify how biological assessment metrics like the Biological Assessment Profile (BAP) are used alongside total phosphorus values;
- Consider alternative or complementary biological indicators (e.g., diatom communities) in low-gradient streams; and
- Specify how sampling protocols and timescales will be used to assess compliance with phosphorus criteria.

By providing this feedback based on over 20 years of monitoring experience, CSI is helping to ensure that statewide nutrient guidance values will be both robust and ecologically meaningful.

Testifying Before the State Senate: A Community Science Perspective on Harmful Algal Blooms

In May 2025, CSI was honored to be invited to provide testimony to the New York State Senate Environmental Conservation Committee during its hearing on the effectiveness of the State's monitoring and management of harmful algal blooms (HABs). Executive Director, Dr. Grascen Shidemantle, submitted written testimony which included insights from CSI's seven years leading the Cayuga Lake HAB Monitoring Program, one of the most comprehensive community-based bloom monitoring efforts in the state.

CSI's testimony emphasized that while state agencies play a crucial role in HAB response, they cannot effectively monitor every lake and reservoir alone. Community partnerships fill vital gaps by providing on-the-ground data, public education, and rapid reporting. CSI urged the State to strengthen coordination between NYSDEC, local governments, and community science groups through regular communication and data-sharing frameworks.

The testimony also included several key recommendations:

- Increase funding for the NYSDEC and provide funding to community-led monitoring, ensuring that trained volunteers and certified labs have the resources to maintain consistent data quality.
- Establish a statewide HAB-related illness tracking system to better understand the human health impacts of cyanobacteria exposure.
- Balance voluntary conservation programs with updated watershed regulations to address nutrient loading at its source.

CSI's testimony was co-signed by leaders from the Cayuga Lake Watershed Network, Cayuga Lake Environmental Action Now, and the Cayuga Lake Watershed Intermunicipal Organization—underscoring the collective voice of local partners advocating for stronger, science-based water policy.

Informing State Legislation: The HAB Monitoring and Prevention Act

CSI's HAB monitoring program not only impacts scientific understanding and community awareness—it has also played a direct role in informing potential statewide policy. During the early stages of drafting the HAB Monitoring and Prevention Act (Assembly Bill A5150A), Assemblymember Anna Kelles and her team met with CSI staff to learn more about our monitoring efforts and to hear our perspectives on how New York could more effectively address the growing issue of HABs. These early conversations helped ensure the proposed legislation was grounded in the real-world experiences of lakefront communities and organizations that monitor water quality.

At CSI's annual volunteer recognition event on August 23, Assemblymember Kelles spoke about how she regularly uses CSI's publicly accessible HABs interactive map and database to justify the need for stronger legislative action to prevent and respond to algal blooms (Figure 1). Since the bill's initial drafting, Kelles and her staff have continued to engage with CSI, meeting this fall to discuss updates to the bill's language and ensure that it reflects both scientific insight and the lived experience of affected communities.

Through these ongoing collaborations, CSI has provided valuable context and data that support statewide recognition of the importance of local, science-based monitoring networks. The HAB Monitoring and Prevention Act stands as an example of how community science can directly inform policy—transforming grassroots environmental work into tangible, statewide action. At press, the HABs Monitoring and Prevention Act has not yet reached the Assembly floor.

Contributing Data to the NYSDEC's 2026 Integrated Water Quality Report

CSI's influence at the state level extended beyond policy and testimony. In October 2025, CSI submitted two years' worth of data (2023-2024) from our Synoptic Stream and Lake Monitoring Program in the Cayuga Lake watershed to the NYSDEC for inclusion in the 2026 Integrated Report on New York State Water Quality. CSI previously submitted data from 2020-2022 for the 2024 Integrated Report.

Figure 1. New York State Assemblymember Dr. Anna Kelles represents the 125th District, including Tompkins County and the southwest of Cortland County. In August 2025, Dr. Kelles addressed attendees at CSI's annual volunteer recognition event held at Stewart Park in Ithaca. *Photo credit: Alyssa Johnson*

This biannual report, required under the Clean Water Act, evaluates the condition of New York's waters and identifies which waterbodies do or do not meet water quality standards. The data submission process requires a Data Usability Assessment Report which details how closely our monitoring met data quality objectives and followed the plans and protocols in our Quality Assurance Project Plan. CSI's data submission included over 3,500 datapoints on water quality parameters including Total Phosphorus, pH, Turbidity, Total Suspended Solids, Nitrate+Nitrite Nitrogen, Chloride, and Dissolved Oxygen. The submission was prepared by CSI staff: Grascen Shidemantle, Noah Mark, Seth Bingham, and CSI's Ithaca College Federal Work Study student, Jacqueline Fischer.

–**Grascen Shidemantle**, PhD, *Executive Director*

Reports vs. Reality:
Refining How We Read Cayuga Lake's Harmful Algal Blooms

Each summer, Cayuga Lake tells a new story, written in shades of blue and green. Through CSI's Cayuga Lake Harmful Algal Bloom (HAB) Monitoring Program, volunteers and community members help us read that story, one shoreline observation at a time. In 2025, these efforts produced the highest number of Cayuga Lake HAB reports ever: 284 confirmed reports, reflecting both the importance of this monitoring program and the dedication of our community scientists.

A Prolonged and Complex Season

The 2025 HAB season highlighted the increasingly unpredictable nature of harmful algal blooms. Similar to 2024, Cayuga Lake experienced just over four months of HABs, however this year was shaped by frequent early rainstorms followed by hot, dry weather that led to local drought conditions in the fall. Cayuga County recorded the most Cayuga Lake reports (107), followed by Seneca County (93) and Tompkins County (82).

In 2025, CSI received 284 confirmed reports, corresponding to 71 bloom days, with September being the most active month at 115 reports and 25 confirmed bloom days (Figure 1). A bloom day represents a distinct calendar day on which at least one harmful algal bloom was confirmed somewhere on Cayuga Lake. Multiple reports from the same or different locations on that day are counted collectively as a single bloom day. Seven days saw 10 or more reports submitted—significantly more than in 2024, which had only two such days. These high-report days, sometimes called "bloom events" or "bloom explosions," indicate periods of particularly widespread or intense bloom activity. Comparing these days to previous years illustrates both the rapid bloom growth across the lake and the value of our community scientists' engagement.

This extended season underscored the importance of frequent, distributed observations. Early July saw the first surge in reporting, while blooms persisted into November, demonstrating how variable HAB patterns have become and highlighting the critical importance of routine monitoring.

Reports vs. Confirmed Blooms

A key lesson from this season is that the number of HAB reports may not equal the number of unique bloom occurences. Understanding this distinction matters for both public health and science:

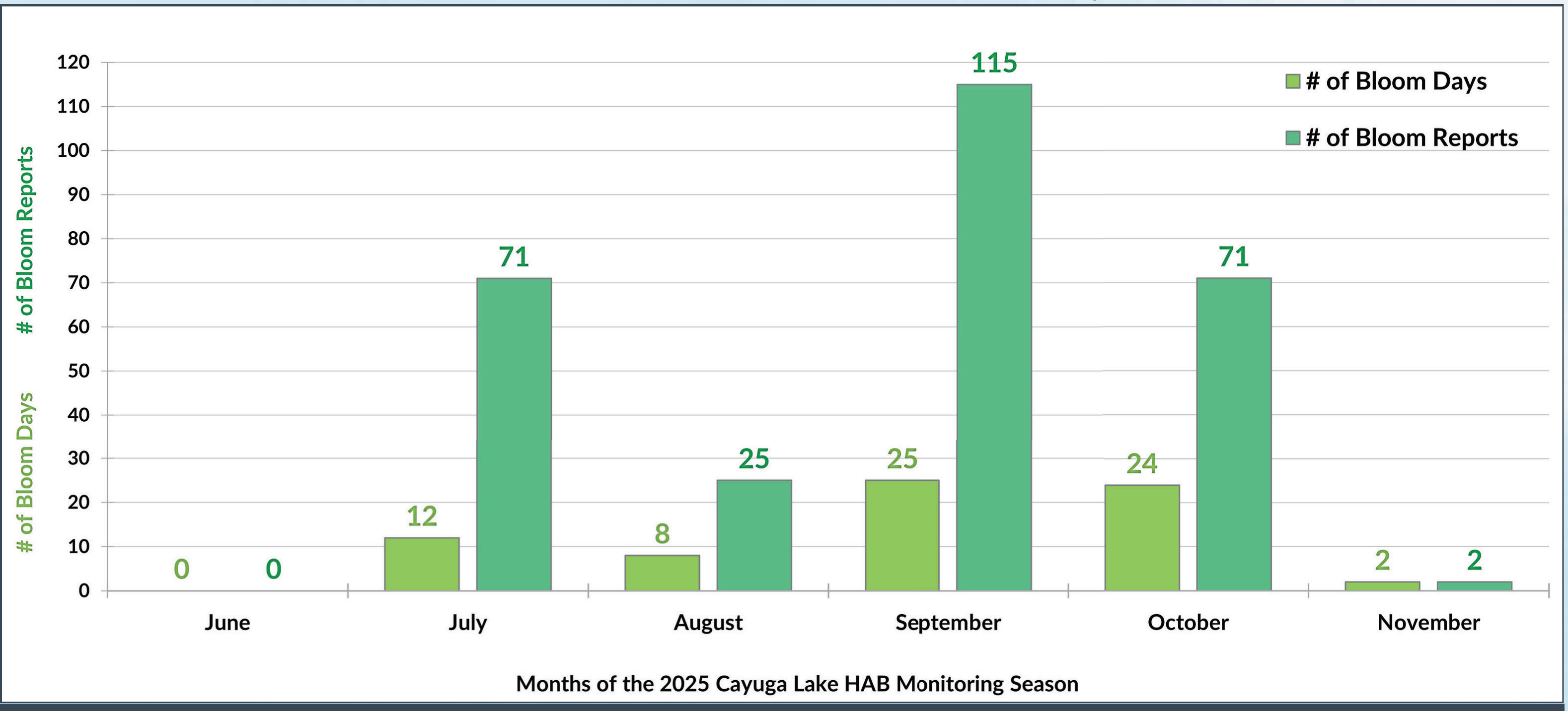


Figure 1. Number of Bloom Days and Bloom Reports on Cayuga Lake in 2025

multiple reports—even of a single bloom—help ensure the public knows where and when blooms are occurring, while scientifically, they provide a more accurate depiction of bloom distribution. Without consistent aerial and remote water quality monitoring, however, we cannot determine precisely where one bloom ends and another begins.

Each HAB report represents a moment when someone observed unusual conditions on the water—paint-like streaks, surface scums, or bright green discoloration—and submitted an online report. CSI follows the New York State Department of Environmental Conservation's (NYSDEC) HAB program protocol, which classifies a report as "confirmed" based on at least two photos plus required location details and field observations. While NYSDEC does not require sample collection or analysis, CSI is uniquely positioned as a certified water testing laboratory, allowing us to go further by analyzing samples to understand bloom composition and potential health risks.

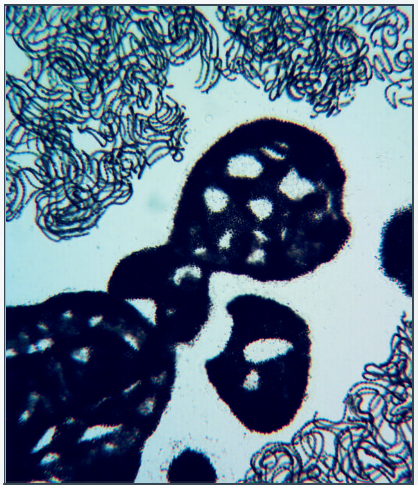


Figure 2. Two common genera of cyanobacteria detected in Cayuga Lake: *Dolichospermum* sp. and *Microcystis* sp. *Photo credit: Alyssa Johnson*

All samples are first examined under a microscope to determine if cyanobacteria are present (Figure 2). If cyanobacteria are present in the sample, total chlorophyll-a is measured using spectrophotometry to estimate bloom biomass, reported in micrograms per liter (µg/L). Cyanobacteria can produce cyanotoxins harmful to human and animal health, with microcystin being the most common in New York State[1]. The New York State Department of Health (NYSDOH) sets microcystin safety limits at 0.3 µg/L for drinking water and 4.0 µg/L for swimming beaches.

CSI's 2025 results show that all samples contained cyanobacteria, confirming that volunteers can consistently visually recognize a HAB versus other conditions, such as pollen. Furthermore, 88% of samples exceeded NYSDOH microcystin safety limits for both drinking water and recreational exposure. Considering the broader dataset from 2018–2025, more than half of analyzed samples each year contained microcystin concentrations above recommended recreation thresholds (except 2019, when 42% exceeded limits). These analyses provide critical data for local health departments and the public to understand HAB risks.

Strategic Sampling

From 2018 through 2024, CSI collected and analyzed samples from as many reported HABs as possible. If multiple reports appeared to reflect the same bloom, only one sample was analyzed to conserve resources, though all reports were accepted to document spatial and temporal distribution. After seven years of intensive monitoring and sample collection, CSI established a strong foundation of data confirming consistent patterns, including HAB "hot spots," which cyanobacteria genera are most common and when they appear, and how microcystin concentrations vary across Cayuga Lake and over time[2]. In early 2025, CSI worked with its funding partners—the Tompkins, Seneca, and Cayuga County Health Departments—to develop a more strategic and manageable sampling approach. The three counties identified 14 priority sites around the lake: four in Cayuga, five in Tompkins, and five in Seneca (Figure 3). Each was selected for public health relevance, such as unregulated swimming areas, kayak launches, and drinking water intakes.

Figure 3. Fourteen priority sites sampled in 2025, listed clockwise from the northern end: Cayuga Marina & Outfitters, Harris Park, Frontenac Park, Long Point State Park, Salt Point Natural Area, Lansing Harbor, Bolton Point, East Shore Park, Ithaca Yacht Club, Spotted Sandpiper, Cayuga Shoreline, Sheldrake Point, Thirsty Owl Wine Company, and Seneca Falls Water Treatment Plant.

Between these 14 priority sites, 34 samples were collected from July 8 through October 29, 2025. By focusing on representative bloom events at these priority locations, the program provided critical public health data while reducing logistical demands on volunteers and staff. The result

Reports vs. Reality: *Continued*

is a dataset that reflects fewer laboratory-confirmed samples but a more focused, strategic monitoring effort that maintains scientific and public health value.

Expanding Community Engagement

Community involvement played a significant role in 2025. Twenty-five percent of all HAB reports came from community members—defined as individuals who submitted reports but were not trained CSI volunteers with assigned monitoring roles—compared with 11% in 2024, reflecting both enhanced outreach and the public's improved ability to recognize blooms. While the number of active volunteers remained comparable to 2024, higher report totals may have resulted from both expanded community engagement and increased HAB activity, both spatially and temporally.

To further expand engagement, CSI hosted a HAB-focused community event, HABby Hour, at Cayuga Shoreline, a lakefront restaurant and event space in Interlaken, where community members could enjoy a cocktail, ask questions, and learn about HABs. The event was a resounding success, sparking enthusiastic discussion and setting the stage for future years. CSI was also invited to present at local libraries, including the Edith B. Ford Memorial Library in Ovid and the Ulysses Philomathic Library in Trumansburg, as well as at the Cayuga Lake Watershed Network's Spring Community Conference. Throughout the season, CSI participated in

Cayuga Lake Watershed Network also shared program results in their weekly HABs newsletter, reaching over 1,700 subscribers. This heightened visibility significantly elevated the program and inspired broader community participation in 2025.

Why Every Report Matters

Not every report reflects a unique bloom, but every report strengthens the dataset. Multiple reports help define bloom duration, development, and spatial extent, guiding sampling priorities and ensuring public health communications accurately reflect when and where blooms are occurring. These reports also inform scientific understanding of bloom patterns—critical when precise boundaries cannot be determined without consistent aerial or remote sensing.

Want to learn more about Cayuga Lake HABs? You can view over 800 reports of Cayuga Lake HABs from 2018–2025, as well as explore laboratory results from over 500 bloom samples, on CSI's Cayuga Lake HABs Database: www.database.communityscience.org/hab

CSI extends sincere thanks to all the volunteers, community members, and partners—Cayuga Lake Watershed Network, Discover Cayuga Lake, Nicholas Leonard Dronography (Figure 4), Cayuga County Health Department, Seneca County Health Department, Tompkins County Whole Health, and the New York State Office of Parks, Recreation and Historic Preservation who made the 2025 season possible. Through your collective vigilance and support, we're learning not just when blooms appear, but how they behave—and how, together, we can continue reading the story of Cayuga Lake with ever greater clarity.

–Alyssa Johnson
Cayuga Lake HAB Monitoring Program Coordinator

Figure 4. A persistent harmful algal bloom was observed at Frontenac Park in Union Springs on October 4, 2025, documented via drone imagery. Photo credit: Nicholas Leonard Dronography.

Where Bugs and Water Quality Hide:
Reflecting on Decades of Biomonitoring with CSI

Sometimes the answer is right under your feet. Each summer, CSI's adventurous biomonitoring volunteers don waterproof boots and step into the fast-flowing, shallow places where water riffles its way through our landscape into long, deep lakes. Underneath the sometimes slippery rocks, fascinating, small stream animals called benthic macroinvertebrates (BMI) make their homes. The task of CSI's biomonitoring volunteers is to look closely at who (of the tiny BMI organisms) is living in a particular stream segment in any given year.

These creek walkers ask a simple question – one about water quality over the past year. BMI is one of the best ways to answer it. The health of all living things reflects what we've been exposed to in our environment (Figure 1). And none of us, especially not the BMI, can avoid the water we live amidst. It takes a team of volunteers about an hour to collect a sample and document habitat conditions. Another team (or sometimes the same team) then spends at least three hours with tweezers, patience and a low power microscope to pick, sort, identify and count organisms so that four different metrics reflecting diversity, tolerance to impairment and distribution of the BMI community can be calculated. Those metrics are combined into one number called the Biological Assessment Profile (BAP) which gives an overall water quality rating[3]. See page 14 for a glossary of Biomonitoring metric terms.

What have CSI Biomonitoring volunteers found?

CSI's Biomonitoring program dates back to the early 2000s and shifted to its current protocols in 2011. In the past 15 years of the most rigorous family-level BMI analysis, volunteers have sampled more than 100 sites in nearly 50 local streams. Water quality at most sites shows "no" or "slight" impact. A few sites have shown a "moderate impact," notably Ninemile Creek at Amboy Dam (Onondaga Lake tributary) in 2022, Owego Creek at Turner Bridge (Susquehanna watershed) in 2017, Cayuga Inlet (behind the Ithaca box stores along Rte 13) in 2015 and Trumansburg Creek (below the Trumansburg Wastewater Treatment facility, prior to much needed upgrades) in 2012. Some regularly sampled sites have also shown changes worth further investigation.

For example, Enfield Creek just downstream of Robert H. Treman State Park, has been sampled every year since 2011 (Route 13 site in Figure 2 - though not enough organisms were counted in the 2011 sample to

Figure 1. Participants in the JoW *Biomonitoring Fun!* event sorted benthic macroinvertebrates from Fishkill and Enfield Creeks (June 2025). A hellgrammite (on spoon), the larval stage of a dobsonfly, indicates a healthy stream. *Photo credit: Alyssa Johnson*

calculate metrics). In early years sampling with CSI, the Route 13 site always had a reliable diversity of organisms, but in 2025, it is no longer one of the top BMI diverse sites that comes to mind. Until 2017, this site had mostly shown a BAP rating of "no impact", with the exception of a "slight impact" rating in 2014. From 2017 to 2024 it has been sliding deeper into the "slight impact" range. In 2012, an upstream sample was collected at Route 327 above Robert H. Treman State Park and in order to learn more about this stream, we added a second regular upstream sampling location in 2018.

From 2018 through the present, kids in CSI's *Journey of Water (JoW), Biomonitoring Fun!* program[4] (Figure 1) have routinely compared water quality in upper Enfield Creek and Fishkill Creek just before the two creeks merge and plummet down Enfield gorge (Upper Treman sites in Figure 2). In 2019, this Enfield Creek site showed "no impact," though at the lower end of that range. From 2019-2022, JoW kids (with great enthusiasm and youthful eyes) consistently found better water quality in Fishkill Creek than in Enfield Creek at Upper Treman (the sites are less than 100m apart). Official biomonitoring samples processed during winter Biomonitoring Open Labs showed "slight impact" at the Enfield Upper Treman site.

Where Bugs and Water Quality Hide: *Continued*

Then in 2023, the Upper Treman sites (Enfield and Fishkill Creeks) both showed a healthy community of BMI indicating "non-impacted" water quality. This was confirmed in both the quick youth surveys and lab-processed samples. Though it started out that water quality above the gorge and park in the main branch of Enfield Creek seemed to be about the same and then worse as compared with the water below the gorge and park (2019-2022), now the water quality above Enfield gorge was showing a higher BAP than the water downstream (2023-2024) – there also seems to be an inverse relationship between water quality in Fishkill and Enfield Creeks at Upper Treman during the same period that the downstream water quality was declining (see Figure 2). What will the 2025 results show? Come join one of our Open Labs to help us find out.

Another long-sampled site, German Cross Road on Six Mile Creek, has also been slipping deeper into the "slight impact" range (Figure 3). An amazing group of mostly independent volunteers has sampled four locations along Six Mile Creek annually since the program's early years, highlighted in a recent Ithaca Voice article[5]. The upstream Slaterville 600 Rd site has shown consistently good water quality between 2011 and 2024. Potters Falls - just downstream of the City of Ithaca drinking water reservoir - has mostly shown a "slight impact," likely due to proximity to a dam. The Plain Street site downtown has fluctuated between "slight impact" and "no impact," while the German Cross Road site has also fluctuated but appears to have now shifted towards a more consistent "slight impact" after several years of better water quality.

CSI's unique volunteer biomonitoring program

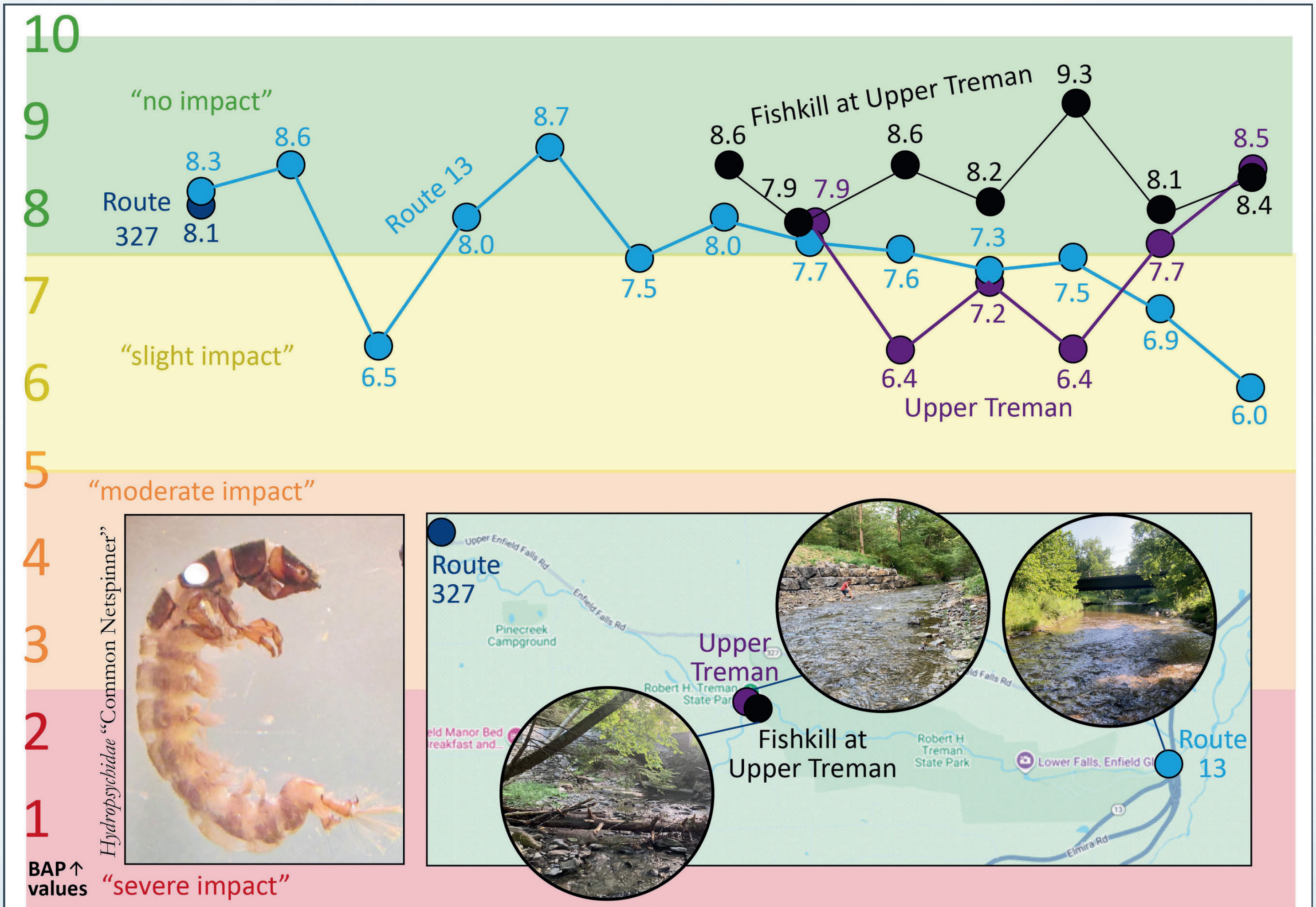


Figure 2. CSI Biomonitoring results for Enfield Creek 2012-2024: Biological Assessment Profiles (BAP) by year for three sites along the main branch of Enfield Creek and one tributary (Fishkill Creek).

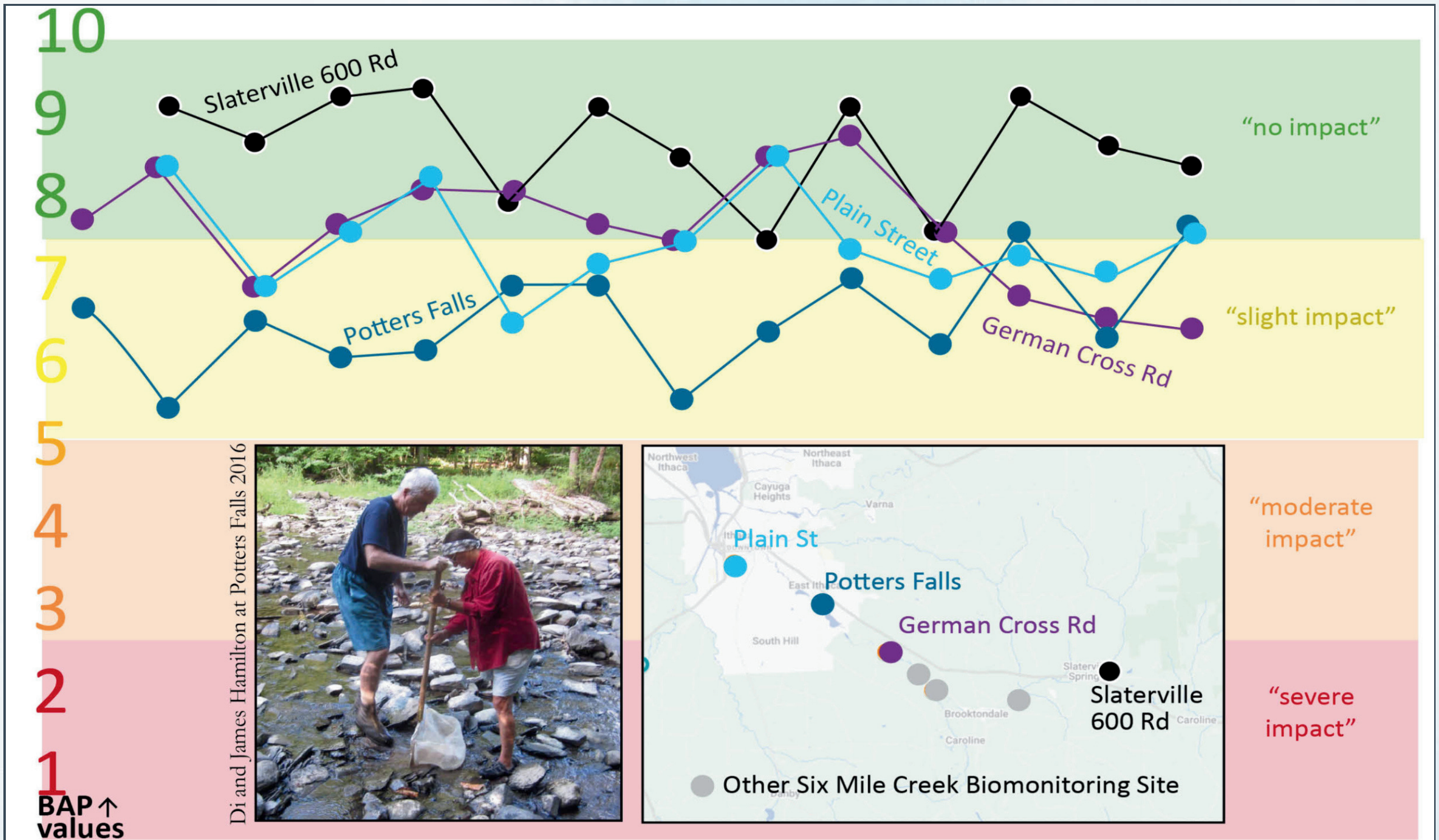
combines state-level rigor (using the same sampling protocols and metric structure as the New York State Department of Environmental Conservation (NYSDEC) with the accessibility of a local volunteer effort by using family-level rather than genus- and species-level taxonomy. It has been shown that 92% of the time, family-level identification produces the same water quality rating as higher-resolution taxonomy[6]. In recent years CSI has also occasionally used the NYSDEC's rapid assessment protocols for doing a quick overall survey of stream health (this is what kids help with during *Biomonitoring Fun!* programs).

Volunteers at all levels of expertise are essential to CSI's Biomonitoring program and all learn something valuable through being involved. As the program matures, it is inspiring to have conversations about what is being noticed- or not noticed- streamside or in samples back at the lab. Within this diverse community of people paying attention lie some of CSI's greatest contributions to protecting water quality in our area. Answers to questions about water quality might be right under the feet of our biomonitoring volunteers, but these answers also take a diverse community of water science-passionate people to decipher, bring attention to, and take action on what is learned. Now that we have some great biomonitoring baseline data for our area and are starting to see some anomalies in expected results, hopefully we can start shifting more attention to what it all means in terms of water quality in our region so that appropriate actions might be taken. Perhaps we might even be able to use this developing wealth of hyper-local biomonitoring data to come up with even better ways of monitoring water quality based on BMI that are specific to our locally-adapted BMI communities.

None of this work would be possible without CSI's amazing Biomonitoring volunteers. We thank them for their time and dedication to our local creeks and the tiny beings that inhabit them.

Note: CSI is upgrading its biomonitoring data storage and processing systems, and some attentive volunteers may notice slight shifts in BAP values. In the past, metrics were calculated from a randomly selected subsample of 100 organisms (to align with NYSDEC methods), some variation was previously expected. The new system will reduce this and allow easier comparison. As this upgrade continues, any needed corrections will be posted on the CSI website.

–**Adrianna Hirtler**, *Biomonitoring Coordinator*



2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	
	9.1	8.6	9.2	9.3	8.0	9.1	8.5	7.5	9.1	7.6	9.2	8.6	8.3	Slaterville 600 Rd
7.8	8.4	6.9	7.7	8.1	8.1	7.7	7.5	8.4	8.7	7.6	6.8	6.6	6.5	German Cross Rd
6.6	5.4	6.5	6.0	6.1	6.9	6.9	5.5	6.4	7.0	6.2	7.6	6.3	7.7	Potters Falls
	8.4	6.9	7.6	8.2	6.5	7.2	7.5	8.4	7.4	7.0	7.3	7.0	7.6	Plain Street

Figure 3. CSI Biomonitoring results for four sites along Six Mile Creek 2011-2024: Biological Assessment Profiles (BAP) by year for all regularly sampled sites.

Illuminating Water Toxicity with the Bioluminescence Inhibition Assay

This year, CSI's lab introduced a new test method developed for collaborations with the Friends of the Upper Delaware River (FUDR), the Sciencenter, and the Al Hazzard Chapter of Trout Unlimited. All three collaborations were linked by the need for a cost-effective tool to assess toxicity.

FUDR approached CSI with questions about potential pollutants—particularly pesticides and herbicides—impacting trout streams in the upper Delaware River basin. Students in the Sciencenter's Future Science Leaders Program wanted to explore water quality in main creeks flowing through downtown Ithaca (Box 1). In addition, the Al Hazzard Chapter of Trout Unlimited sought CSI's help in evaluating whether sediments accumulating behind the Upper Candor Dam (situated on Catatonk Creek, a tributary of Owego Creek) might pose an environmental health risk if the dam were to be removed.

To meet these needs, we landed on performing what's called a Bioluminescence Inhibition Assay (BIA). In the lab, traditional chemical analyses detect specific contaminants (such as heavy metals) but they may not capture the effects of untested substances or complex pollutant mixtures. A BIA measures overall biological toxicity, reflecting the cumulative impact of all pollutants present in a water sample, including those not routinely monitored. This assay is certified by the International Organization of Standardization (ISO 11348-3:2007) and is recognized by regulatory agencies worldwide. It is particularly valuable for prioritizing highly toxic samples for more detailed chemical analysis or serving as a rapid screening tool for hazardous spills.

The assay assesses acute toxicity by measuring how the bioluminescence of the bacterium, *Aliivibrio fischeri* (formerly *Vibrio fischeri*) responds to pollutants[7] (Figure 1). Healthy *A. fischeri* bacteria naturally emit a steady light output, while exposure to toxic substances hinders this output, leading to a reduction in luminescence. An instrument called a photometer allows us to quantify how much light is emitted by the bacteria (Figure 2). The change in light output after exposure of the bacteria to the sample enables us to calculate the toxicity level of the sample. The assay reacts to over 2,700 simple and complex compounds and is used in a wide range of applications[7].

There are some drawbacks to the test. As with any analytical method, whether the target pollutant can be detected depends on its concentration. If the pollutant is present at very low levels, the test might

Figure 1. Bioluminescent gram negative bacterium, *Aliivibrio fischeri*.
Photo Credit: Environmental Bio-Detection Products Inc.

not register a reduction in luminescence. Conversely, a highly concentrated pollutant may trigger a response in the assay, but additional analytical methods are required to identify the specific contaminant(s) responsible for the change in luminescence seen in the test. Additionally, toxic effects observed in *A. fischeri* reflect species-specific sensitivity to what's in the sample and cannot be extrapolated to human health risk without further evaluation and analysis.

With three projects completed in 2025, CSI looks to further explore other applications with the Biolumenescence Inhibition Assay and its potential to support our community's water-testing needs.

–**Noah Mark**, *Laboratory Director*

Figure 2. Light output of the luminescent bacteria (*Aliivibrio fischeri*) is read in the photometer before and after adding the sample to determine changes in light output in response to harmful compounds found in the sample. *Photo Credit: Noah Mark*

Sciencenter Ithaca, New York

Box 1. Exploring New Ways of Looking at Water Quality: A Collaboration with Sciencenter Future Science Leaders

ASTC ASSOCIATION OF SCIENCE-TECHNOLOGY CENTERS

Thanks to a grant from the Association of Science and Technology Centers (ASTC), the Sciencenter teamed up with CSI to engage middle school–aged participants in the Future Science Leaders Program in hands-on water quality monitoring this past summer. With support from CSI volunteers and staff, the students designed their own water quality-related research project (Figure 1), inspired by their interest in how pollutants might affect biological life in local waterways. After exploring past CSI data and participating in biomonitoring activities on Cascadilla Creek, the students decided to investigate whether untested-for pollutants might be impacting some of the grungier sections of downtown creeks and wastewater treatment outfalls. They leveraged CSI's new Bioluminescence Inhibition Assay to analyze samples collected from several creeks, a discharge pipe, an artesian spring near a retired Ithaca dump, and from the Ithaca and Cayuga Heights wastewater treatment outfalls aboard Discover Cayuga Lake's MV Teal Floating Classroom. None of the eight sites showed significant changes in luminescence—good news for overall water quality.

This project served as a valuable pilot for potential future use of the BIA by community volunteers. Biomonitoring Coordinator, Adrianna Hirtler, presented the project and its results at the 2025 ASTC Annual Conference in San Francisco, where attendees from science museums and organizations worldwide were impressed by this community science collaboration rooted in the Finger Lakes region. Many thanks to our partners at the Sciencenter, the Future Science Leaders participants, and the CSI volunteers who contributed to this project.

–**Adrianna Hirtler**, *Biomonitoring Coordinator*

Figure 1. Seasoned volunteer Andy Yale (left) mentored local Future Science Leaders as they developed water quality research projects, sharing expertise from his long-time work with CSI's Synoptic Sampling and HABs Monitoring programs. *Photo Credit: Adrianna Hirtler*

Science and Community Meet in the Owego Creek Watershed

In the spring of 2024, a ripple of hope and collaboration began with a simple invitation. Allen Peterson of the Al Hazzard Chapter of Trout Unlimited (TU) reached out to Community Science Institute (CSI) with an idea: work together to monitor tributaries of Owego Creek, one of central New York's most valuable native brook trout habitats.

TU, a national nonprofit committed to preserving wild trout and salmon streams—completed a strategic action plan for the Owego Creek watershed, part of the Upper Susquehanna River Watershed, in 2024 (Figure 1). The plan identified this cold, forest-fed creek system as the largest, most intact brook trout habitat in central New York[8]. Yet five of its smaller tributaries in Tompkins and Tioga Counties have not seen brook trout in decades. TU wanted to know whether these streams could support wild brook trout today and needed water quality data to answer that question.

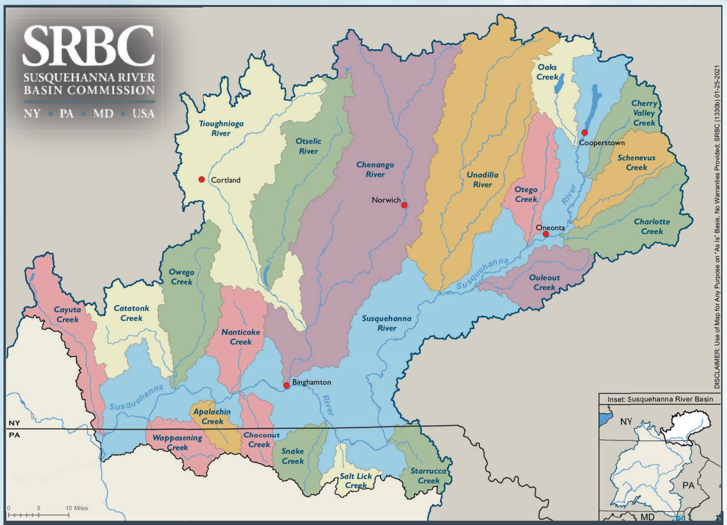


Figure 1. Major watersheds in the Upper Susquehanna Subbasin. *Map credit: Susquehanna River Basin Commission*

This was the kind of opportunity CSI was made for. With deep roots in community-based environmental science and over two decades of experience training volunteers to monitor water quality, we saw an immediate connection to CSI's mission. The collaboration was timely, too. We were retiring CSI's long-running Red Flag Monitoring Program in which volunteers used streamside testing kits to build a baseline of water quality data in the event that hydraulic fracturing (i.e. fracking) for natural gas came to New York. Although that threat has largely subsided, the program's techniques and spirit found new life in the Owego Creek Tributary Monitoring Project. Data from the Red Flag program even supplemented TU's Owego Creek Watershed Action Plan[8].

Figure 2. Volunteers participated in a workshop to learn about the Owego Creek Tributary Monitoring Project, April 2025. *Photo credit: Anne Klingensmith*

After about a year of planning, Allen and CSI's Executive Director, Grascen Shidemantle, agreed on key water quality indicators to monitor: temperature, pH, dissolved oxygen, and conductivity—parameters crucial for trout health. Grascen began recruiting community scientists, and within minutes of sending an email call-to-action, a volunteer, Brad Rauch, responded: "I'm in!" Brad ultimately recruited nearly half of the 15 volunteers who would form the backbone of the project. Four former Red Flag volunteers also joined, bringing valuable experience to the project.

On April 12, 2025, the project officially launched with a community workshop at the Danby Town Hall. Volunteer Anne Klingensmith helped secure the meeting space and captured the day through her camera lens (Figure 2). Allen spoke about preserving trout habitats for future generations, while Grascen guided volunteers through training: choosing sample sites, learning testing protocols, and forming small teams that would carry out monitoring.

Two weeks later, on April 26, volunteers collected data from 10 locations on Willseyville, Danby, Sulphur Springs, Miller, and Michigan Creeks (Figure 3). Grascen joined the Michigan Creek team in the lush Michigan Hollow State Forest. Together they tested water quality and shared conversations about what it means to protect a place you love (Figure 4). Later that day, when two volunteers needed help with the dissolved oxygen test, Grascen met them in a volunteer's kitchen, where science and community came together over a tabletop experiment.

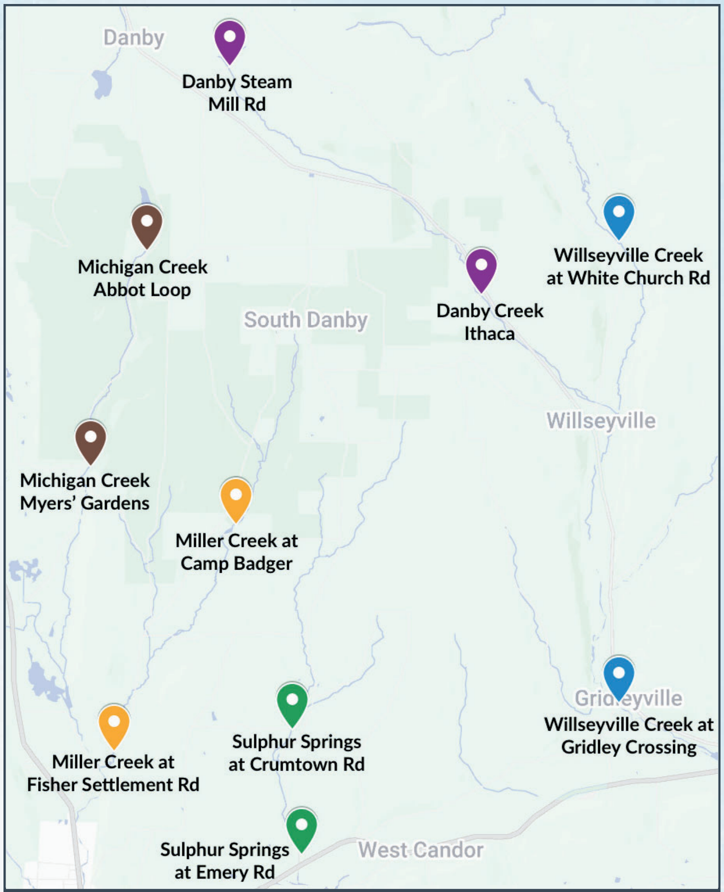


Figure 3. Map of sample collection sites in the Owego Creek Watershed.

Following the April event, the teams conducted two additional monitoring events—July 27 and October 5—capturing varied seasonal conditions (Figure 5). The results of these three events are detailed on the next page (Figure 6A-D).

Temperature is one of the most important determinants of brook trout habitat[9,10]. Brook trout generally thrive between 11–16°C, though they can tolerate up to 24°C for short periods[11,12]. Temperatures rose during the July event but none exceeded 24°C (Figure 6A). Temperatures were lower on average at the two Sulphur Springs Creek locations as well as at Michigan Creek Myers Gardens and Miller Creek at Camp Badger.

Dissolved oxygen, which decreases as temperature rises, is also critical[12]. Brook trout require levels above 5 mg/L[12,13]. Most locations met this threshold across all events; however, three—Danby Steam Mill, Michigan Creek Abbot Loop, and Willseyville Creek at White Church Rd—dropped below 5 mg/L in July (Figure 6B).

Yearling brook trout (trout in their first or second year of life, Figure 7) prefer conductivity below 500–550 µS/cm[14], and all sites remained under this range during each event (Figure 6C). In October, Willseyville Creek at Gridely Crossing recorded the highest value at 447 µS/cm. Conductivity was lowest on average at the two Sulphur Springs and two Miller Creek sites.

Figure 4. Volunteers Scott Davis, Daniel Weitosh, and Scott Foti on 4/26/25 at Michigan Creek. *Photo credit: Grascen Shidemantle*

Brook trout tolerate a relatively wide pH range but are generally found in waters between 6.5–8.0[10]. Results in 2025 ranged from 6.75–8.5 (Figure 6D). It is not unusual for pH to exceed 8.0 in our region due to naturally hard water[15].

While these initial results hint at which streams may be good candidates for wild brook trout reintroduction, more data are needed before drawing conclusions. That's why our dedicated volunteers will return for three more monitoring events in 2026. Their efforts will inform TU's plans for potentially reintroducing brook trout to streams where they have long been absent. More than that, the project has become a vivid example of what can happen when science, nature, and people come together.

From a simple email to a full-fledged community science initiative, the Owego Creek Tributaries Monitoring Project shows that environmental

Figure 5. Volunteers Lou Church, Anne Johnson, Robert Johnson, and Jan Glover while collecting samples on 7/27/25. *Photo Credit: Jan Glover*

Science and Community Meet
Continued

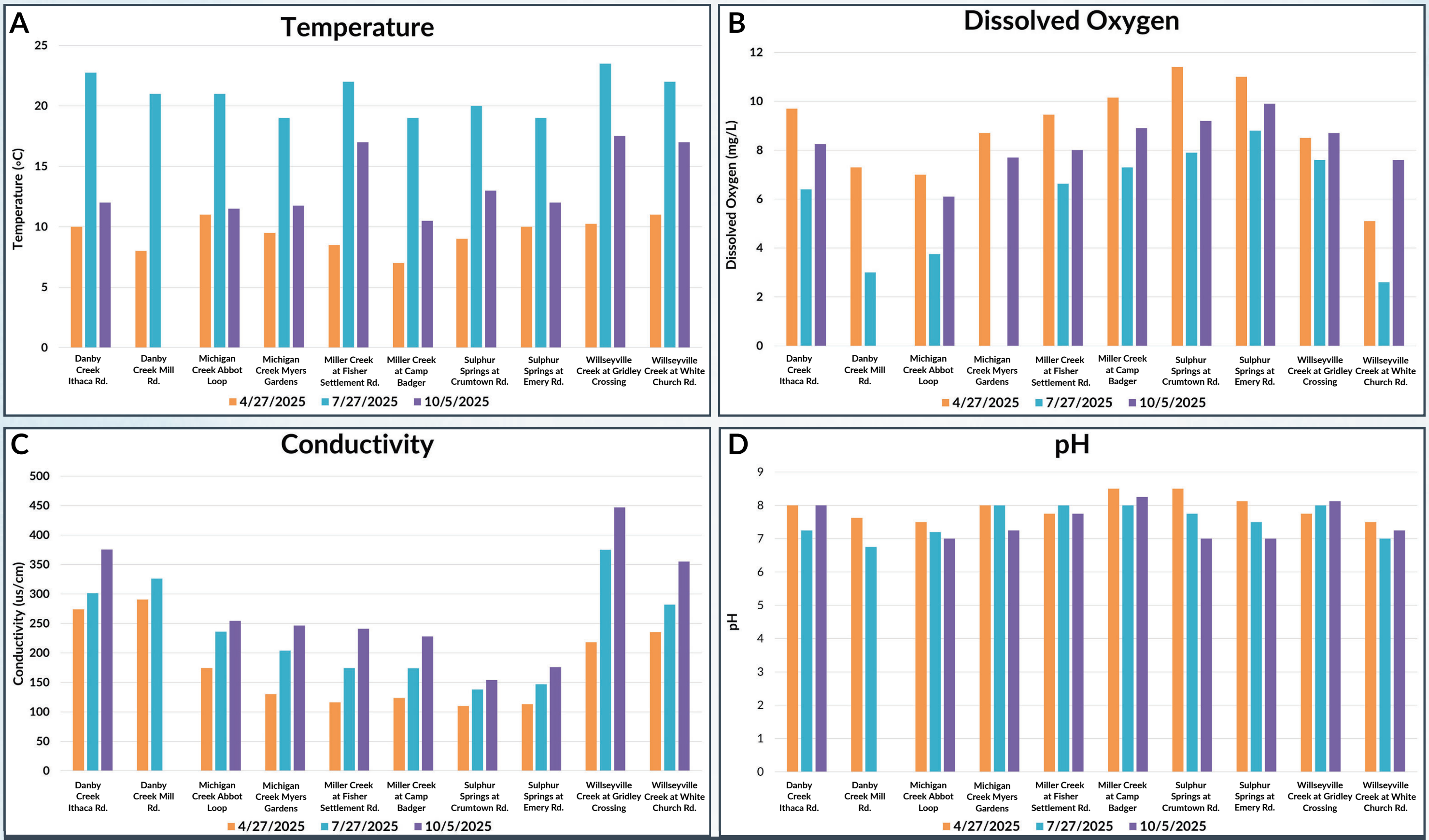


Figure 6: Water quality results for A) Temperature, B) Dissolved Oxygen, C) Conductivity, and D) pH from three monitoring events at ten locations included in the Owego Creek Tributaries Monitoring Project in 2025. All samples were analyzed by volunteers in the field. Testing was not performed at Danby Steam Mill Rd on 10/5/2025 due to dry conditions. No dissolved oxygen data is reported for Michigan Creek Myers Gardens on 7/27/25 due to a testing error.

protection doesn't happen only in labs or policy offices. It happens when neighbors roll up their sleeves, wade into cold creeks, ask good questions, and keep showing up. In every dissolved oxygen test, every shared story, and every mile driven to a remote stream, a community is rediscovering its connection to water—and to each other.

In the end, this isn't just a story about trout. It's a story about people—people who believe that clean water, thriving ecosystems, and future generations are worth working for, together.

Our deepest thanks to the new and returning volunteers contributing to this project: Daniel Weitosh, Scott Davis, Scott Foti, Steve Meyer, Anne Klingensmith, Brad Rauch, Brian Moffitt, Jamie Bobnick, Carrie Lamontagne, Matt Savage, Anne Johnson, Robert Johnson, Janice Glover, Lou Church, and Jim Luschwitz. Thank you also to our partners at the Al Hazzard Trout Unlimited Chapter, especially Allen Peterson.

–**Grascen Shidemantle**, PhD, *Executive Director*

Figure 7. This yearling brook trout (*Salvelinus fontinalis*) is a cold-water fish recognized by its vivid marbled pattern, red spots with blue halos, and reliance on clean, oxygenated, cold streams. *Photo credit: Coast-to-Coast/Getty Images*

CSI'S MISSION:

To inspire and empower communities to safeguard water resources by cultivating scientific literacy through volunteer water quality monitoring, certified laboratory analyses, and education.

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Glossary of Biomonitoring Metric Terms:

After the benthic macroinvertebrates in a stream sample have been picked, sorted and identified under a dissecting microscope to the level of order and family, they can be used to assess the health of the stream as a home for aquatic life. The assessment is based on which orders and families of insects are present and how well they tolerate degraded conditions. There are five main metrics used to evaluate stream health.

- **Total Family Richness**: Counts how many different families of aquatic insects are present. Higher richness reflects a more diverse—and typically healthier—stream community.
- **Family Biotic Index**: Rates macroinvertebrate families by their tolerance to pollution on a 0–10 scale. Lower scores indicate the presence of more pollution-sensitive organisms.
- **EPT Richness**: Tallies the total number of macroinvertebrate families of mayflies (**E**phemeroptera), stoneflies (**P**lecoptera), and caddisflies (**T**richoptera) found in a sample. These orders are strongly associated with good water quality.
- **Percent Model Affinity**: Measures how closely a sample matches the "model" community of a healthy New York stream, based on the relative abundance of seven major macroinvertebrate groups.
- **Biological Assessment Profile**: Combines the four metrics above by converting each to a 0–10 score and averaging them to provide an overall indicator of stream water quality.

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Cover photo: A drone image of Cayuga Lake, captured from the northern end of the lake looking south.
Photo credit: Nicholas Leonard Dronography

Community Science Institute
Partnering with Communities to Protect Water

283 Langmuir Lab
95 Brown Road/Box 1044
Ithaca, NY 14850
Phone: (607) 257-6606
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