



# TOMPKINS COUNTY HARMFUL ALGAL BLOOM STRATEGY

June 2021

Tompkins County Water Resources Council

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## INTRODUCTION

With an increase in harmful algal blooms (HABs, cyanobacteria) across New York, in 2018 Governor Cuomo allocated \$65 million to address the issue. New York State HABs Action Plans were drafted for 12 priority waterbodies, including Cayuga and Owasco Lakes. The challenge for agencies, municipalities, and watershed partners is to implement the priority projects in a meaningful way that safeguards water quality and reduces HABs; it's a goal not easily met as the lists are extensive and some action items are quite broadly defined.

In late 2019, Tompkins County added several new action items to the 2015 Comprehensive Plan as part of its five-year review. One of those actions is to “Establish a detailed countywide Harmful Algal Blooms (HABs) Strategy based on the Cayuga Lake and Owasco Lake HABs Action Plans and identify the actions, and the appropriate lead agencies, to be taken in Tompkins County that would most effectively reduce HABs.”

This strategy focuses on actions to be undertaken in the next three years by Tompkins County departments and partners/agencies working in the county.

## CURRENT PLANS AND PENDING ACTIVITIES

### CURRENT PLANS THAT GUIDE THIS STRATEGY

The [Cayuga Lake](#) and [Owasco Lake](#) HABs Action Plans provide extensive detail on each lake's characteristics, designated uses, water quality conditions, and sources of pollutants. The Cayuga Lake and Owasco Lake Plans also include priority projects lists with different timescales for implementation (found in Section 13.3 of each plan). These plans provide the foundation for this HABs Strategy, and the actions contained within them serve as a springboard for developing more targeted local actions.

The [Tompkins County Agricultural Environmental Management \(AEM\) Strategic Plan 2021-2025](#) helps guide the Soil and Water Conservation District's implementation of the AEM program, which focuses on improving environmental stewardship on farms. The document provides statistics on land use and agriculture, describes water and soil resources, details the priority watersheds (Fall Creek, Salmon Creek, Owasco Inlet, Cayuga Inlet, and Taughannock Creek), and includes objectives and tasks for each watershed.

### PENDING ACTIVITIES FOR FUTURE REVIEW AND INCORPORATION OF DATA AND RECOMMENDATIONS

Several activities are in progress that if completed will greatly inform and enhance this strategy. These include:

- Owasco Lake Nine Element (9E) Plan; the Owasco Lake HABs Action Plan notes that it will be updated based on additional information from the 9E Plan
- Owasco Lake Watershed Rules and Regulations; submitted for state review in December 2020
- [Total Maximum Daily Load](#) (TMDL) for Phosphorus in Cayuga Lake; the Cayuga Lake HABs Action Plan states that it will need to be refined based on the TMDL; [Draft](#) released April 7, 2021
- [Drinking Water Source Protection Programs](#)
- Updated New York State Municipal Separate Storm Sewer Systems General Permit
- Tompkins County Water Quality Strategy update

When any of these are finalized, the actions below will be reviewed and revised for consistency.

## HABS-CORRELATED CRITICAL CONDITION – PHOSPHORUS LOADING

Research on the causes of HABs has been ongoing and continues to expand as more waterbodies experience increased frequency, duration, and toxicity of HABs. According to the Cayuga Lake HABs Action Plan, a study of New York waterbodies determined that four factors are most closely correlated with the occurrence of cyanobacteria: namely, longer than average fetch length (the maximum length of open water wind can travel); fetch direction (the compass direction by which the wind blows over that maximum length); the presence of dreissenid mussels; and higher than average phosphorus levels. For Cayuga Lake, the HABs Action Plan also noted a correlation with warmer air temperatures on the day of a bloom and increased rainfall in the preceding days leading up to a bloom. The Owasco Lake HABs Action Plan found decreased wave height was correlated with blooms.

The physical and meteorological conditions are difficult to control. More research is needed to understand how dreissenid mussels' grazing impacts cyanobacteria and how the mussels can increase the bioavailable phosphorus needed for cyanobacteria growth. Researchers are looking into chemical and biological controls for dreissenid mussels, but at this point such mechanisms are impractical and may be cost prohibitive.

There are, however, meaningful steps that can be taken to address phosphorus levels. Many of the actions included in this plan focus on reducing phosphorus loading.

It should be noted, however, that actions taken now may be slow to show results because of legacy land use impacts on phosphorus in lake sediments. As stated in the Cayuga Lake HABs Action Plan (p 56):

*Ecosystems often exhibit a resistance to change that can delay outcomes associated with HABs management. This system resilience demands that prevention and management of these triggers be viewed long-term through a lens of both watershed and in-lake action. It may take significant time following implementation of recommended actions for the frequency, duration, and intensity of HABs to be reduced.*

This is all the more reason to initiate actions as soon as possible to address these longstanding concerns. Phosphorous reduction strategies are critical for tackling the one HABs-correlated condition that local efforts can influence. In Cayuga Lake watershed, 91% of the total phosphorus loading comes from nonpoint sources and 9% comes from point sources; in Owasco Lake watershed, 95% of the total phosphorus loading comes from nonpoint sources and 5% comes from point sources. In both watershed, approximately 80% of the nonpoint source total phosphorus loading comes from agricultural land. However, solely focusing actions on the agricultural sector is unlikely to achieve practical phosphorous reductions of an adequate scale to reduce HABs. Therefore, the actions in this strategy address phosphorus reductions across the landscape, thereby bringing down the total loading of phosphorus into the lakes.

## HARMFUL ALGAL BLOOMS AND WATER QUALITY MONITORING

Monitoring of HABs and water quality in Cayuga Lake, Owasco Lake, and their tributaries is vital to understanding HABs patterns and environmental influences. Monitoring is performed by New York State as well as regional and local organizations. The information below is not an exhaustive list of all monitoring efforts but noted as important resources to understanding local water quality conditions that may contribute to HABs. Actions identified in this plan work to address efficiency and coordination among the collecting and monitoring entities.

### HABS MONITORING PROGRAMS

**Statewide HABs Reporting Map:** New York State Department of Environmental Conservation (DEC) maintains a [HABs reporting map](#) during the monitoring season (May-October) and compiles an archive summary at the [end of the season](#). DEC receives and reviews reports directly from the public or from trained volunteers for inclusion on the map. Cayuga Lake HABs Harriers (described below) reports are processed by the Community Science Institute and shared with DEC for inclusion on the NYHABS map.

**Cayuga Lake HABs Harriers:** A locally led partnership of the Community Science Institute (CSI), Cayuga Lake Watershed Network (CLWN), and Discover Cayuga Lake began a Cayuga Lake HABs monitoring [program](#) in 2018. This very successful program covered

53% of the Cayuga Lake shoreline in 2020 through a network of trained volunteer “HABs Harriers” who conduct weekly patrols of their designated shoreline. If a suspicious bloom is observed, the Harrier collects a sample that is analyzed at the CSI lab for the presence of cyanobacteria, chlorophyll a, and microcystin (a toxin produced by certain cyanobacteria). In addition to reports of trained HABs Harriers, anyone who observes a suspicious bloom can report it to the [Cayuga Lake HABs Hotline](#). All cyanobacteria blooms are shown on the [Cayuga Lake Cyanobacteria Reporting Map](#) maintained by CSI. The results of this monitoring program are [published and shared](#) annually. Given the breadth of this partnership, this program is critical to understanding the timing and toxicity of blooms. The results can be correlated with water quality and weather conditions to develop predictions for future outbreaks. Funding for this monitoring program comes from local governments (including Tompkins County) and private donations and should be continued so that the health and safety of lake users is protected, and the lake ecosystem and watershed inputs are better understood.

## WATER QUALITY MONITORING PROGRAMS

### New York State

- [Citizens Statewide Lake Assessment Program](#), or CSLAP, is a volunteer lake monitoring program managed by DEC and the New York State Federation of Lake Associations. Trained volunteers collect water samples every other week for 15 weeks at five sites in Cayuga Lake and two sites in Owasco Lake. Field sheets are used to collect information on weather, water temperature, water transparency, lake depth, and “recreation quality of the lake and algal conditions based on the user’s perception.”
- [Rotating Integrated Basin Studies](#) are implemented by DEC and assess the water quality in all waterbodies on a five-year rotating cycle. The goal is to document water quality problems and track long-term trends.

### Local efforts – Cayuga Lake

- [Community Science Institute](#) trains volunteers to collect water samples that are then analyzed in a state-certified lab. Beginning in 2002 with monitoring Fall and Virgil Creeks, the program has expanded to cover all Cayuga Lake subwatersheds in Tompkins County with growing interest in adjacent counties. Water quality results are accessed in a publicly available [database](#).
- Cayuga Lake Monitoring Partnership (MP) was formed in 2008 as a collaboration between the Tompkins County Water Resources Council and Cornell University to create a monitoring plan for the southern end of Cayuga Lake. The MP meets monthly and is open to any group monitoring water quality.

### Local efforts – Owasco Lake

- The Finger Lakes Institute and researchers at Hobart and William Smith Colleges have been monitoring Owasco Lake for more than a decade and annually produce an [Owasco Water Quality Monitoring Report](#).
- [Owasco Watershed Lake Association](#) supports water quality monitoring and other programs on a year-to-year basis.

## ACTION TOPICS

This strategy focuses on implementing actions in four topic areas – 1) agriculture, 2) ditch management, 3) stream buffers and wetlands, and 4) collaboration. Each topic area details the action to be undertaken, the timing to begin working on the action, and the lead agency, which include the following:

- Cayuga Lake Watershed Intermunicipal Organization (IO)
- Cayuga Lake Watershed Network (CLWN)
- Cornell Cooperative Extension of Tompkins County (CCE)
- Owasco Lake Watershed Management Council (OLWMC)
- New York State Water Resources Institute (NYSWRI)
- Tompkins County Water Resources Council (WRC)
- Tompkins County Health Department (TCHD)
- Tompkins County Department of Planning and Sustainability (DPS)
- Tompkins County Soil and Water Conservation District (SWCD)

## AGRICULTURE

With a majority of the Tompkins County portions of the Cayuga Lake and Owasco Lake watersheds in agriculture, actions focus on encouraging more farmers to implement best management practices (BMPs).

	ACTION	TIMING	LEAD/others
A	Create and annually update Tompkins County-specific educational materials on the connection between HABs and phosphorus and promote BMPs to control phosphorous leaving agricultural lands. Use existing regional farmer gatherings, such as the winter crop meeting and CCE Ag Summit, to present and disseminate information.	2022 and other opportunities	WRC, <b>SWCD</b>

<b>B</b>	Develop a conservation loan bank account program to cover upfront costs of BMPs where funds are repaid upon reimbursement from state grant programs (expanding on funds already provided by Tompkins County), and to support/augment conservation reserve programs. Determine the mechanics of such a program and proposals for foundations, lake users (recreation, tourism, and property owners), and others to contribute funds to the account.	2022	WRC, <b>SWCD</b>
<b>C</b>	Promote and publicly thank local farmers who implement BMPs as a way to raise awareness and make the connection between HABs and BMPs.	Ongoing	<b>SWCD</b> , CCE, IO, WRC
<b>D</b>	Promote programs (e.g., AEM Tier 3 Plans) that encourage farmers to plant cover crops on cropland that is prone to erosion and nutrient runoff when left unprotected.	Ongoing	SWCD
<b>E</b>	Digitize AEM Tier 1 and 2 worksheets and upgrade the AEM database to make data retrieval and analysis more seamless.  Alternative action: Request that the state AEM upgrade the AEM standard forms and database to be electronic for statewide use.	2022	SWCD

## DITCH MANAGEMENT

Ditches are the conduits that drain surrounding lands and discharge stormwater into streams and lakes. If properly maintained and vegetated, ditches can be a sink, not a source, of nutrients and sediment to downstream waterbodies. Actions in this strategy focus on projects undertaken by all levels of government both in the routine maintenance of ditches and with special projects that may need additional funding.

	<b>ACTION</b>	<b>TIMING</b>	<b>LEAD/others</b>
<b>F</b>	Create and share a model policy for municipal governments to adopt best roadside ditch management practices that minimize transport and erosion of sediment and nutrients to surface waters.	2021	<b>NYSWRI</b> , DPS
<b>G</b>	Annually reach out to highway departments with a reminder that SWCD has funding for hydroseeding materials and how to arrange assistance. Share examples of recent project successes and ask highway departments if staff are trained on implementing ditch BMPs.	Annual outreach	SWCD

<b>H</b>	Hold individual or small group trainings targeted at local engineers and highways superintendents on culvert and ditch BMPs.	2021	SWCD
<b>I</b>	Beginning with the Town of Ulysses as a pilot municipality, use existing ditch inventory to evaluate and develop BMPs to reduce flow and prevent erosion in ditches on steep slopes.	2021	<b>SWCD</b> , DPS

## STREAM BUFFERS AND WETLANDS

At the interface of terrestrial land uses and aquatic systems, stream buffers and wetlands play an important role in filtering nutrients and sediment and slowing stormwater runoff. Actions focus on providing education to municipal leaders and landowners and promoting protections measures to reduce nutrients that contribute to HABs.

	<b>ACTION</b>	<b>TIMING</b>	<b>LEAD/others</b>
<b>J</b>	Promote the WRC wetlands map by presenting to TCCOG and at least three municipalities annually.	Annually	WRC
<b>K</b>	Facilitate discussions between elected and appointed municipal officials in the county on stream buffer tools, focusing on what works and what does not work	2021	DPS
<b>L</b>	Encourage landowners to plant and protect stream buffers, especially adjacent to pasture lands; for example: <ul style="list-style-type: none"> <li>• Trees for Tribs Buffer in a Bag initiative – share DEC annual announcement via social media and CLWN, OLWMC, IO, and CCE distribution lists.</li> <li>• Lake Friendly Living – annually contact landowners in Tompkins County and expand pledges.</li> </ul>	Ongoing	<b>CLWN</b> , IO, CCE, OLWMC
<b>M</b>	Host on-the-ground trainings at local stream restoration, buffer planting, and wetland restoration sites around the county for municipal officials, planning, zoning and conservation board members, and interested residents.	Annually	WRC

## COLLABORATION



Collaboration is key to moving this strategy forward and communicating with municipal officials, farmers, and residents within the county and throughout the Cayuga Lake and Owasco Lake watersheds.

	<b>ACTION</b>	<b>TIMING</b>	<b>LEAD/others</b>
<b>N</b>	Annually convene entities within Cayuga Lake and Owasco Lake watersheds to share monitoring and research results, review status of actions and funding recommended in this strategy, evaluate results, and identify next steps.	Ongoing	<b>DPS, WRC</b>
<b>O</b>	Evaluate status of implementing water resource activities based on duties outlined in the water resource coordinator description approved by the WRC in August 2020. If gaps are identified, apply for grant funding to provide at least 0.5FTE of additional staff to advance the actions in this strategy.	Evaluate mid-2021	<b>WRC, DPS, TCHD, SWCD</b>
<b>P</b>	Create, maintain, and, at least twice per year, use a county email outreach platform to share information on water quality, training, funding, and other resources with municipal officials, farmers, and residents.	Ongoing	<b>WRC, DPS, TC Communications Director</b>
<b>Q</b>	Provide updates and education related to HABs to TCCOG and County Legislature, including relevant advancements in novel or innovative technologies for phosphorus or HABs reductions.	Two times annually	<b>WRC</b>
<b>R</b>	Annually identify one to three priority areas for water quality treatment or BMPs, focusing on bioavailable or soluble reactive phosphorus. Evaluate existing water quality data for locations and subwatersheds to prioritize locations.	Ongoing	<b>WRC, SWCD</b>
<b>S</b>	Support development of Cayuga Lake Watershed Rules and Regulations (WRR) 1. Track Owasco Lake WRR through NYS review process. 2. Convene drinking water purveyors, municipalities, county health departments, and county planning departments to discuss options. 3. If step two indicates a need, seek funding for a facilitator to conduct outreach and solicit stakeholder input from public and private entities, urban and rural landowners, tourism-based businesses, etc.	Based on outcome of Owasco WRR review by NYS	<b>IO, TCHD, DPS, WRC, other counties</b>
<b>T</b>	Promote opportunities for septic system users to access funding to replace aging and/or inadequate systems.	Ongoing	<b>TCHD</b>