

# Conesus Lake Annual Report Card



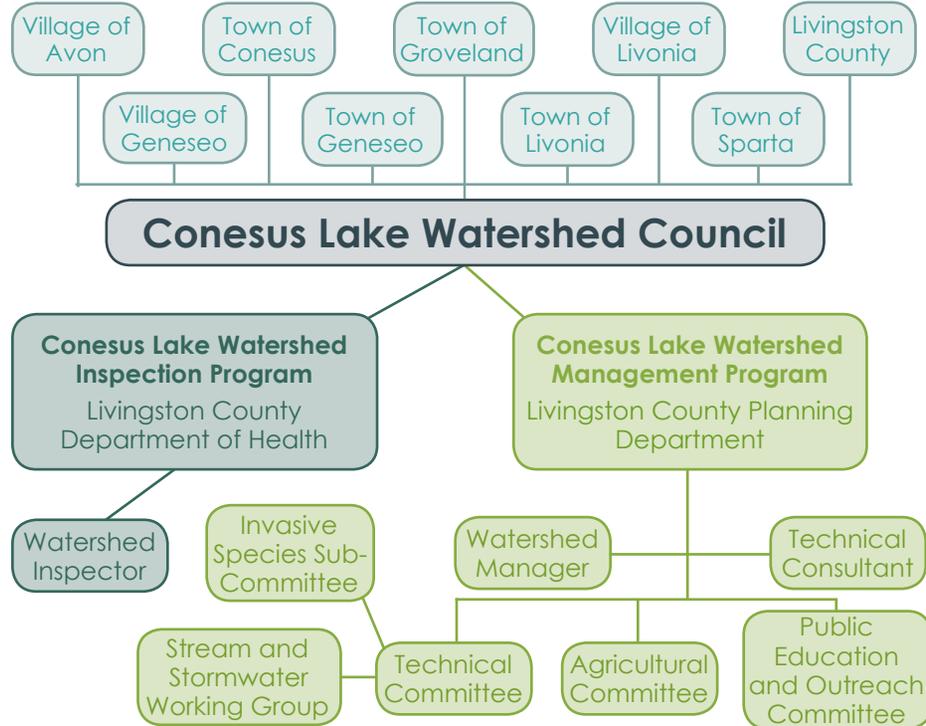
Conesus Lake Watershed Council

2018



# About the Conesus Lake Watershed Council

The Conesus Lake Watershed Council is an inter-municipal organization established in 2003 to govern the implementation of the Conesus Lake Watershed Management Plan. Council membership is composed of towns and villages with land within the watershed boundaries and water purveyors who use Conesus Lake as a public water supply. The Council oversees the Conesus Lake Watershed Management Program and the Conesus Lake Watershed Inspection Program. Important partners include, but are not limited to, the Conesus Lake Association, SUNY Brockport & Geneseo, Livingston County SWCD and WSA, CCE Livingston, Finger Lakes Institute, NRCS, and NYSDEC.

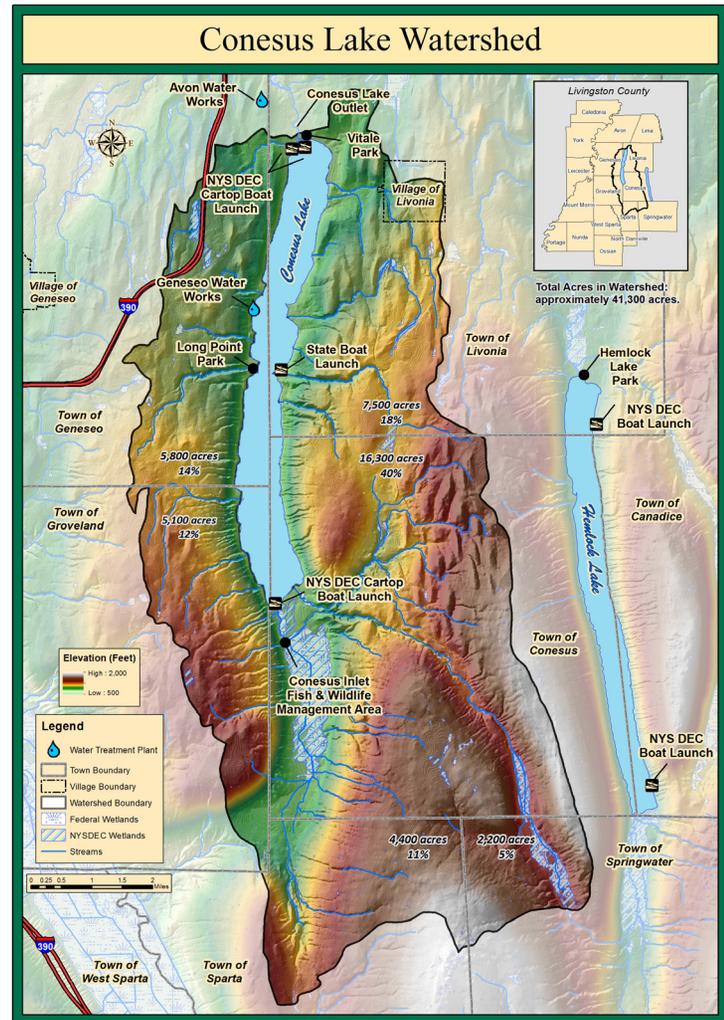


Conesus Lake Watershed Council governing structure

Conesus Lake Association (CLA), Livingston County Soil & Water Conservation District (SWCD), Livingston County Water & Sewer Authority (WSA), Cornell Cooperative Extension-Livingston County (CCE), Finger Lakes Institute (FLI), Natural Resources Conservation Service (NRCS) and NYS Department of Environmental Conservation (DEC).

# Purpose of this Document

Recommendation H-2 in the Conesus Lake Watershed Management Plan (2003) is to prepare an annual update summarizing the status of activities in the watershed, particularly the ongoing efforts to reduce nonpoint source pollution. The Annual Report Card provides a forum for tracking water quality conditions in Conesus Lake and highlighting implementation projects and new developments.



## Summary of Major Accomplishments

*Since its formation in 2003, the Conesus Lake Watershed Council has coordinated implementation of the recommendations of the Conesus Lake Watershed Management Plan. Restoring the health of the lake and its watershed requires a sustained effort across multiple partnerships and a focus on many deeply interconnected issues. Progress in implementation of the Conesus Lake Watershed Management Plan continued in 2018. Highlights include:*

### Water Quality Monitoring

- SUNY Geneseo investigated internal phosphorus dynamics, species composition and abundance of cyanobacteria in response to water column mixing events, and the dreissenid (zebra and quagga) mussel community.
- In 2017, the Citizen Statewide Lake Assessment Program (CSLAP), a volunteer monitoring effort of lakes across the state, returned to Conesus Lake and continued throughout 2018. The NYS Department of Environmental Conservation (NYSDEC) Finger Lakes Water Hub has two active monitoring sites on Conesus Lake.
- Water quality conditions continue to support human uses for recreation and drinking water supply (after treatment), and sustain a healthy aquatic ecosystem.
- The CLA continued to install instrumentation capable of monitoring lake temperature profiles and to provide research quality weather data. The existing thermocline sensors in the Lake were upgraded, and plans to install two weather stations were initiated.

### Invasive Species

- Continued implementation of the Conesus Lake Watershed Council's Invasive Species Prevention and Response Plan. Two new aquatic invasive species were discovered in 2018: water lettuce and brittle naiad.
- NYSDEC released the Harmful Algal Bloom (HAB) Action Plan for Conesus Lake. Town of Livonia and Livingston County applied for three Water Quality Improvement Program (WQIP) grants for HABs projects.
- The Watercraft Steward Program inspected 6,423 boats in Conesus Lake and intercepted 4 boats arriving with contaminants. The boat decontamination station was operational for the full season.
- Mile-a-minute is a highly invasive terrestrial plant. NYSDEC coordinated eradication/vine pulling activities in 2018.



NYSDEC sponsored Mile-a-minute pull.

## Watershed Inspection Program

- The Watershed Inspector responded to 21 complaints, monitored 28 construction sites and issued 8 violations to help improve environmental protection.
- The Department of Health continued its public bathing beach program at Long Point Park, Camp Stella Maris, and Southern Shores Beach through 2018.

## Harmful Algal Blooms

- HAB identification and notification efforts continued from June through October.

## Education

- Construction of the Watershed Education Center (WEC) was completed; the center officially opened in June 2018. A year-round series of public presentations was offered on important topics for watershed residents and lake users.



WEC Program: Student Water Quality Testing Results, SUNY Brockport

## Stream Restoration and Stormwater Management

- The Planning Department contracted with Barton and Loguidice and CC Environment & Planning to develop a regulatory toolkit that addresses stormwater management needs. The toolkit reference and summary documents are

nearing completion.

- Work on the Wilkins Creek Subwatershed Stormwater Study commenced, and the final report was available by the end of 2018.
- Vitale Park Green Infrastructure Project began; resulting in the installation of a rain garden, and the creation of interpretive signage and a lake friendly landscaping guide.



Lake looking south from Vitale Park

## Agricultural Best Management Practices

- In 2018, the Natural Resources Conservation Service (NRCS) supported projects including waste storage systems, forest management, cover and strip crops, erosion control systems, water and sediment control basins, and grazing systems. The NRCS has completed conservation plans to be implemented in 2019 on additional acres.
- The Livingston County Soil and Water Conservation District (SWCD) installed a stormwater detention basin on Reservoir Road and a water & sediment control basin and terracing on Stone Hill Road. SWCD is also working with a large Concentrated Animal Feed Operation (CAFO) dairy in the watershed to install two ag waste storage systems via NYS grants obtained.

**Partnerships Protect Water Quality**

## Water Quality Monitoring

Researchers from SUNY Brockport, SUNY Geneseo, and NYSDEC regularly monitor Conesus Lake to assess long-term trends in water quality and trophic status, evaluate the food web and plankton community, survey the species diversity and relative abundance, and study other emerging issues.

### 2018 Highlights: Enhanced Monitoring

Multiple research and monitoring efforts designed to enhance our understanding of lake management options were underway in 2018. Water quality monitoring was the focus of NYS Department of Environmental Conservation (NYSDEC) and SUNY projects. The NYSDEC continued the Citizen Statewide Lake Assessment Program (CSLAP) in November 2018, February 2019, and April 2019. Very little data are available to characterize winter conditions; additional data collection during the winter months may provide additional information on overall water quality and potential for HABs formation during the growing season. The winter sampling



SUNY Brockport limnology students Ryan Biel, Lillian Denecke, and Hannah Shervin (right to left) processing Conesus Lake water quality samples.

measured temperature, conductivity, pH, dissolved oxygen and chlorophyll-a. Water sample analysis of the standard CSLAP parameters was completed.

SUNY researchers Dr. Sid Bosch (Geneseo) and Dr. Mike Chislock (Brockport) continued the long-standing institutional collaboration on Conesus Lake and watershed issues in 2018. Three areas of focus were pursued with the able assistance of students Katelyn Warner, Emelyn Bell, Paige Buchholz, Dan Beers and Conesus Lake Association (CLA) volunteer Karl Hanafin: (1) internal phosphorus dynamics, (2) species composition and abundance of cyanobacteria in response to water column mixing events, and (3) the dreissenid (zebra and quagga) mussel community.

The Conesus Lake Association (CLA) initiated a project to install two nearshore weather stations on Conesus Lake.

This project will provide comprehensive research-quality weather data, including precipitation, wind speed and direction, air temperature, atmospheric pressure, humidity, solar radiation, and photosynthetically active radiation. Both real-time and archived data in an online database will be available at no cost. Funding for the project was provided by Livingston County Soil & Water Conservation District (SWCD) and a private CLA donor. The project will be completed in 2019.

Finally, CLA member Karl Hanafin continued



2018 CLA Project - weather monitoring stations proposed for Conesus Lake.

his successful efforts to install instrumentation capable of monitoring lake temperature profiles in real time. In 2018, the thermistor arrays (thermocline temperature sensor arrays) were upgraded to increase reliability, reduce manufacturing cost, and incorporate more flexible data communication platforms. Data from the in-lake sensors will be integrated with other meteorological data at the Network for Environmental and Weather Applications (NEWA) in a format that is widely used for integrated pest management. Plans were established to install the thermistor arrays in three other lakes.

### CSLAP and Trophic State

Summer 2018 data from CSLAP and winter data from the Finger Lakes Hub confirm the stability of Conesus Lake's trophic state condition. Phosphorus, water clarity, and chlorophyll-a concentrations were consistent with data collected over the past decade and more. The lake remains mesotrophic (containing a moderate amount of dissolved nutrients), with summer oxygen depletion in the hypolimnion

(bottom or deeper waters), the winter data revealed moderate abundance of diatoms, a phytoplankton group adapted to cold, turbulent, and low light conditions. Microcystin and anatoxin (toxins produced by certain species of cyanobacteria) were not detected in any samples. Conesus Lake was well oxygenated, even under ice, and water clarity was generally high.



NYSDEC Staff conducting winter water quality sampling on Conesus Lake.

Table 1. 2018 CSLAP results, North and South Basin

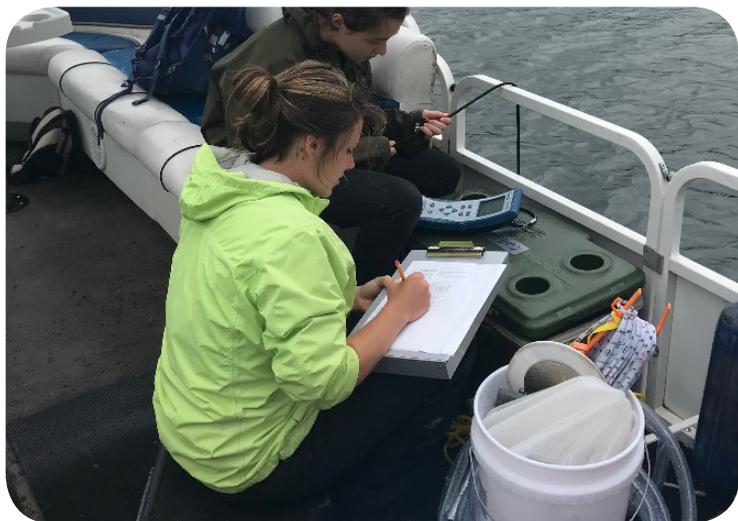
Trophic State Indicator	Oligotrophic	Mesotrophic	Eutrophic	Conesus - North 2017-2018	Conesus - South Average (St. Dev.) 1972-2017	Conesus - South 2018
Summer average total phosphorus, (ug/L)	<10	10 - 35	35 - 100	20.1	22.4 (3.8)	20.6
Summer average chlorophyll-a (ug/L)	<2.5	2.5 - 8	8 - 25	9.9	6.3 (1.95)	8.6
Peak chlorophyll-a (ug/L)	<8	8 - 25	25 - 75	21.0	10 (3.3)	14.4
Summer average Secchi disk (meters)	>6	6 - 3	3 - 1.5	2.5	3.1 (0.9)	2.8
Minimum Secchi disk (meters)	>3	3 - 1.5	1.5 - 0.7	1.5	1.5 (0.2)	1.2
Minimum Dissolved Oxygen in lower waters (% saturation)	80 - 100	10 - 80	Less than 10	Less than 10	Less than 10	Less than 10

South Basin data, intermittent from 1972 to present. North Basin data, 2017-2018.

## Internal Phosphorus Dynamics and Impact on Cyanobacteria

The SUNY program measured the magnitude of phosphorus released from bottom sediments during summer oxygen depletion (anoxia) and the extent to which this legacy phosphorus mixes into the upper sunlit layer to support blooms of phytoplankton (algae and cyanobacteria). Water quality sampling was conducted in the deep south basin and the shallower central basin. The 2018 program was informed by data from thermistor arrays deployed in each basin; this high frequency water temperature data enabled researchers to identify changes in stratification and mixing in response to high wind events.

Results indicate that the lake's southern basin is the major source of internal phosphorus loading, with the highest peak deep-water phosphorus concentrations and largest volume of hypolimnion. Data from the thermistor arrays demonstrate the complex hydrodynamics of the lake water column; wind events disturbed the thermal layering to depths more than 12m below the surface. The biological impacts of



SUNY Brockport Aquatic Ecology students conducting water quality sampling on Conesus Lake.

nutrient pulses into the upper waters were clear. The biomass of cyanobacteria and algae spiked in response.

Results of the 2018 Conesus Lake field and laboratory monitoring program clearly documented the relationship between water column stability, phosphorus transfer from deep water to the photic zone, and the immediate response of the cyanobacterial community to the nutrient pulse. Major wind-driven mixing events on June 28, July 31 and August 28 - September 1 were followed by cyanobacterial blooms. As the stratified period progressed, legacy phosphorus was released from the sediments and accumulated in the overlying water. The researchers noted that the mass of cyanobacteria during the September bloom was a hundred-fold higher than measured in June. They attributed the huge increase to wind-induced mixing of deep water enriched in phosphorus into the upper sun-lit layer, and noted that the deep water phosphorus concentrations typically peak in the fall.

## Exotic Mussels

Emerging data from the Great Lakes and the Finger Lakes implicate the abundance of zebra mussels (*Dreissena polymorpha*) and quagga mussels (*Dreissena bugensis*) among the factors affecting the risk of cyanobacterial blooms. These invasive mussel species are now established in most regional waters including the entire Lake Ontario basin, and in many of those waters, the dominant dreissenid species has shifted from zebra mussels to quagga mussels. Prior surveys of Conesus Lake documented that the freshwater mussel community was comprised of zebra mussels (no quaggas detected) and extended to an overlying water depth of 8 - 9m. The 2018 field investigation was designed to see if the regional shift to quagga mussels was evident in Conesus. Results indicate that zebra mussels continue to comprise 100% of the dreissenid community and that the population remains relatively small. This finding offers an interesting contrast to other Finger Lakes affected by cyanobacterial blooms.

## Invasive Species

*Invasive species, by definition, are non-native, introduced species that cause harm to the environment, human health, and/or economy. Humans have dramatically increased the rate of spread of new species through international trade and travel. Invasives out-compete and displace native species in their new environment. In the absence of natural predators, invasive species can grow relatively unchecked and disrupt the native ecosystem. In response to the discovery of highly invasive Hydrilla verticillata in nearby Cayuga Lake Inlet in 2011, the Conesus Lake Watershed Council (CLWC) established an Invasive Species Sub-Committee tasked with drafting and implementing the Invasive Species Prevention and Response Plan (2013). Implementation efforts continued in 2018.*

### Education and Monitoring

#### Water Lettuce (*Pistia stratiotes*)

Water lettuce is a free-floating aquatic perennial plant; an invasive species that was positively identified in Conesus Lake in 2018. Water lettuce will inhabit ponds, lakes,



A. Murray, U. of Florida

Water Lettuce

swamps, canals and slow-moving waters in streams and rivers. Forming thick impenetrable floating mats, water lettuce can obstruct waterways, impact recreation uses, reduce flood control and water flows/levels, and crowd out native plant and animal species.

It also provides ideal habitat for disease-carrying mosquitoes. All observable water lettuce plants in Conesus Lake were removed in 2018. Although plants are cold sensitive and may die out with

freezing temperatures, seeds have the potential to overwinter. Surveying for the invasive species will continue.

How can you help? Practice Clean-Drain-Dry. Report it. Contact the Conesus Lake Watershed Manager at 585-243-7550. Pull it, and dispose of it. Look for floating pale-green rosettes, long feathery roots below, and green runner stems. Plants can be hand-picked and disposed of on land.

#### Brittle Naiad (*Najas minor*)

Brittle naiad is a submersed annual that grows in dense clusters; an invasive species that was positively identified in Conesus Lake in 2018. It is likely that this was a new discovery of a species that had existed in Conesus Lake for some time. Brittle naiad will inhabit ponds, lakes, reservoirs and slow-moving streams.



G. Lovell, Alabama DNR Bugwood.org

Brittle Naiad (water nymph)

Thick infestations impair fishing, boating and swimming and displace native aquatic vegetation. This plant is extremely brittle, and fragments break off easily, increasing the spread by boats, waterfowl and water currents. The CLWC Invasive Species Subcommittee, in consultation with Finger Lakes Partnership for Regional Invasive Species Management (PRISM), determined that since brittle naiad did not have a high NYS Invasive Species ranking and there are limited management options for this species, no further action was recommended at this time.

How can you help? Practice Clean-Drain-Dry to limit the spread. Report it. Contact the Conesus Lake Watershed

Manager at 585-243-7550. Due to fragmentation, raking and pulling is not recommended. Look for bushy, highly branched stems on rooted or floating plants submerged 2-15 feet deep. Leaves are stiff, curled, and have spines along the leaf margins.

### Hemlock Woolly Adelgid (*Adelges tsugae*)

In 2017, Hemlock woolly adelgid was positively identified in the Conesus Lake watershed. Hemlock woolly adelgid (HWA) is a small aphid-like insect that feeds on hemlock trees. HWA causes extensive tree decline and mortality within 4-10 years of initial infestation. Eastern Hemlock trees are found along creeks and in steep ravines in the southern portion of the watershed. They serve an important role in stabilizing streambanks, preventing erosion, cooling streams, and maintaining the lake ecosystem.

According to NYSDEC, a biological control program has released several predatory beetles that feed upon HWA at various locations in the Finger Lakes region with promising results, though more controls are needed to stop HWA. Chemical controls using insecticides are not practical or economical in a forest setting. For more information and what you can do to help, go to: [www.dec.ny.gov/docs/lands\\_forests\\_pdf/hwafactsheet.pdf](http://www.dec.ny.gov/docs/lands_forests_pdf/hwafactsheet.pdf)



*Hemlock Woolly Adelgid*



L. J. Mehrhoff, U. of Connecticut, Bugwood.org

*Mile-a-minute close-up*

### Mile-a-Minute Vine (*Persicaria perfoliata*)

Mile-a-minute vine (MAM) was confirmed in the Conesus Lake watershed in the Town of Geneseo in 2017. The invasive annual vine grows along hedgerows, roadsides, and other disturbed areas with ample sunlight. Mile-a-minute vine smothers and often kills other vegetation. It can grow up to 6 inches a day forming dense mats. The occurrence in the Town of Geneseo is new to this region.

The Finger Lakes PRISM and NYSDEC are leading the coordinated response, with support from Livingston County, the Conesus Lake Watershed Council, CLA and local partners. Work continued in 2018, including landowner notifications, surveying additional acres, and holding vine pulling events. As seeds from past years can survive in the soil for up to seven years, seed and plant harvesting needs to take place in successive years. The response team noted a significant reduction in plants in two years of pulling. For more information and what you can do to help, go to: [www.fingerlakesinvasives.org](http://www.fingerlakesinvasives.org)

## Watercraft Steward Program

The primary pathway by which hydrilla and other aquatic invasive species reach inland waterways is by “hitchhiking” on recreational boats and trailers or in the live wells of fishing boats. Hydrilla (*Hydrilla verticillata*) is a very aggressive aquatic invasive plant that roots in the sediment and forms dense mats at the surface of the water that block sunlight to native plants below, crowd out native fish habitat, and impede swimming and boating. Hydrilla is on the watch list for Conesus Lake.

Watercraft Steward Programs educate the community on the risk of spreading invasive species via recreational boating and assist boaters in performing inspections and invasive species decontamination. The Watercraft Steward Program was continued in 2018 through an effective collaboration among the Livingston County Cornell Cooperative Extension (CCE), the Conesus Lake Association (CLA), the Finger

Lakes Institute (FLI), and the Livingston County Planning Department.

Livingston County CCE provided in-kind services to house and supervise three stewards for Conesus, Hemlock and Canadice Lakes. Steward salaries were funded by the CLA and NYSDEC grant funds.

In 2018, the Watercraft Stewards staffed the Conesus Lake boat launch from Memorial Day through Labor Day providing a total of 1,280 hours of coverage. A total of 6,423 boats were inspected, and over 14,000 boaters were reached with information about invasive species prevention.

Total traffic significantly decreased at all three boat launches in 2018. Despite this decline in inspections, the program still inspected 7,134 boats for all three lakes, almost 50% more than the 2013-2016 programs (4,819 average). In addition, the percent of contaminated inspections still remains far below

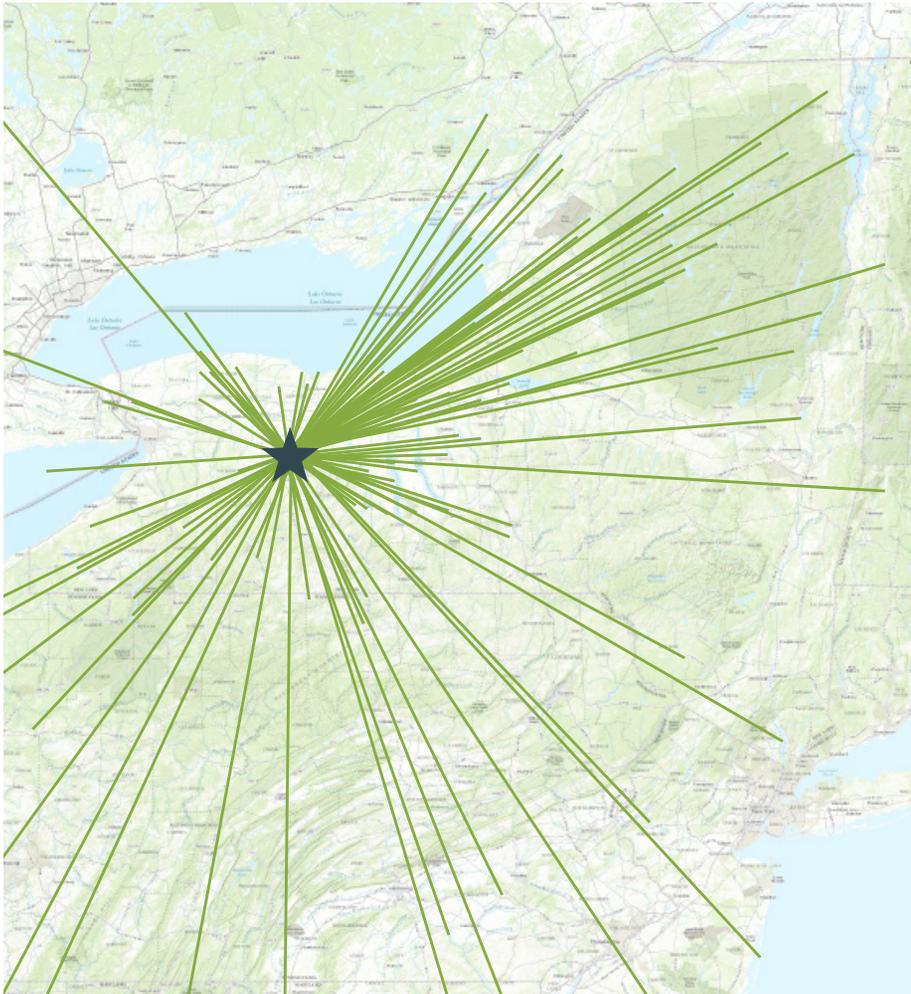
**Watercraft Steward Program Data, Conesus Lake**

	2018	2017	2016
Boats recorded	6423	8439	4491
Non risk boats (last launch Conesus)	5651	6715	2176
Risk boats (last launch other)	772	1724	1445
% of boats non risk	88%	80%	68%
% of boats risk	12%	21%	32%
Boats found with organisms attached	4	12	13
Percent of total boats	.06%	0.14%	0.29%
Percent of risk launches	.52%	0.70%	0.90%
Prior contact with a Steward	98%	96%	93%
Prevention steps taken prior to launch	97%	90%	25%
Total Steward hours	1280	1255	1172

earlier years. This reduction in contaminations could partially be explained by increased awareness of NYS regulations and clean boat best practices conveyed by the Conesus Lake stewards and other similar programs across the State.

By the end of 2018, 98% of boaters entering Conesus Lake launch had previously spoken with a watercraft steward, as opposed to 80% of boaters at the start of the 2015 season. Boaters taking prevention steps prior to launch continues to increase, reaching 97% in 2018.

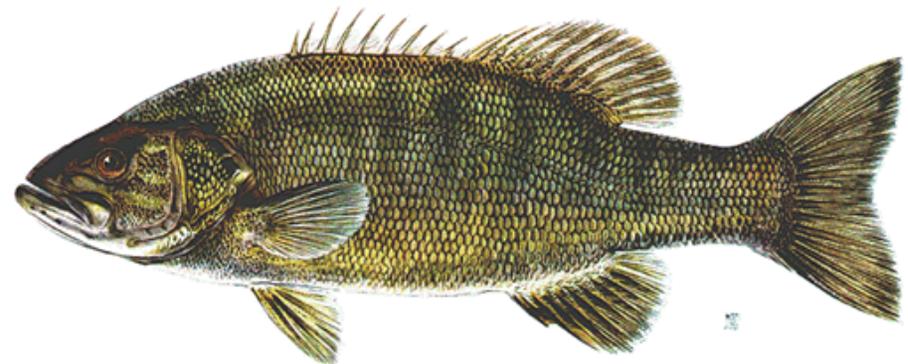
### Last Waterbody Visited



Boats travel to Conesus Lake from across the continent, emphasizing the need for the Watercraft Steward Program. In 2018, boats came as far as Canada and Alaska.

### Fish Stocking Program

The Conesus Lake Association and New York State Department of Environmental Conservation stock young walleye into the Lake to increase the walleye population that was decimated by the introduction of the invasive alewife. In turn, adult walleye prey on alewives, which helps lower the alewife population. In 2018, the NYSDEC stocked 32,500 walleye pond fingerlings (1.5 inch) and 32,500 walleye 50-day fingerlings (2.0 inch). NYSDEC tiger muskellunge stocking did not take place in Conesus due to a shortfall in hatchery productions; stocking is anticipated in 2019.



Walleye population increasing in Conesus Lake due to stocking.

## Watershed Inspection Program

The objective of the Conesus Lake Watershed Inspection Program is to help protect and enhance Conesus Lake as a potable water source. Conesus Lake is a valuable resource for Livingston County; protection of the water supply is important for health of the community. With the cooperation and contributions of the two purveyors of public water (Villages of Avon and Geneseo), the Village of Livonia, Livingston County, and five surrounding towns, the inspection program became a reality on August 31, 1998. The Livingston County Department of Health (LCDOH) provides the Conesus Lake Watershed Inspector who responds to concerns regarding water quality and non-point sources of pollution in the watershed.

### Watershed Inspections

The Conesus Lake Watershed Inspector responds to water quality complaints made by watershed residents and other members of the public. The Inspector also conducts routine watershed surveillance, monitoring construction sites, erosion, sewage overflows, harmful algal blooms, flooding, bathing beaches, and other activities including public education.

#### 2018 Inspection Activities

Complaints	21
Construction Projects	28
Violations	8
New Septic Systems	7
Repaired Septic Systems	8
Sewage Overflows	0
Bacteriological Bathing Beach Water Samples	44
Beach Closures	3
Educational Events	8
Damaging Flooding Events	0

#### 2018 Complaint Breakdown

Sediment and Erosion	9
Drainage	1
Sewage Discharge	2
Agricultural Related	0
Nuisance	7
Weeds/Algae/Odor/HABs Reports	19
Petroleum & Chemical	0

### Drinking Water

The New York State Department of Environmental Conservation classifies Conesus Lake as a Class AA waterbody, designating its best use as a public drinking water supply. One of the goals of both the Watershed Inspection and Management Programs is to ensure this best use. The Villages of Avon and Geneseo both use Conesus Lake as the source for their public water supply. Through these two purveyors, Conesus Lake water supplies 20,000 users and 10 water districts, including the Villages of Avon and Geneseo, and portions of the Towns of Avon, Geneseo, Leicester, and York.

#### Conesus Lake Drinking Water Facts and Figures

	Village of Avon	Village of Geneseo
NYSDEC Allocation	3.5 MGD	3 MGD
Plant Rating	1 MGD	2 MGD
2018 Annual Usage (gallons)	273,000,000	359,000,000

MGD: (million gallons per day)



## Bathing Beach Monitoring

The Livingston County Department of Health (LCDOH) collects nearshore water samples at designated bathing beaches each summer and tests for the presence of fecal coliform bacteria. Fecal coliform bacteria are used as an indicator of recent contamination of water by fecal material. While the coliform bacteria may not be pathogenic (disease-causing), their presence means that other harmful microbes may be in the water. Three bathing beaches: Long Point Beach, Southern Shores Beach, and Camp Stella Maris were routinely monitored throughout the recreational season. One special sample was taken at Sunny Shores Campground this season.

Results are compared to the State ambient water quality standards for bacteria, which are used by the New York State Department of Environmental Conservation (NYSDEC) to evaluate whether a waterbody supports its designated best uses and by the New York State Department of Health (NYSDOH) to evaluate suitability for swimming at designated beaches.

The NYSDEC ambient water quality standard for fecal coliform bacteria is 200 colony forming units per 100 mL of lake water (cfu/100 mL), calculated as the geometric mean of at least five samples per month. A single sample



Water Sampling

maximum count (1000 cfu/100 mL) is also enforced by the NYSDOH for public beaches. The current bathing beach monitoring program collects weekly samples during the summer recreational season.

The summer-averaged results for all beach locations ranged between non-detect (<5 cfu/100mL) and 105 cfu/100mL. There were 44 samples in total. No result exceeded the single sample limit of 1000 cfu/100 mL. The Department of Health is able to report full compliance with fecal coliform bacteria standards at the three monitored bathing beaches. A special sample was taken at Sunny Shores Campground. Results were a count of 105 cfu/100 mL, following a windy rain event.

### Beach Closure Days

	2018			2017			2016			2015			2014		
	HAB	Bact.	Turb.												
Long Point	1	0	0	0	0	0	0	0	0	0	0	1	2	0	0
Stella Maris	1	0	0	0	0	0	3	0	0	0	0	0	8	0	0
Southern Shores	1	0	0	0	0	0	8	0	0	0	0	0	3	0	0

HAB: Harmful Algal Blooms    Bact: Bacteria    Turb: Turbidity

## Harmful Algal Blooms

Harmful algal blooms, or HABs, generally consist of visible patches of a bacteria called cyanobacteria. Cyanobacteria, also known as blue-green algae (BGA), are naturally present in low concentrations in most lakes and streams. Under certain conditions, cyanobacteria can multiply rapidly, forming blooms that are visible on the waterbody's surface. Some cyanobacteria can produce toxins that are harmful to people and animals, in cases of ingestion, skin contact, or inhalation. During the summer and fall, the Watershed Inspector conducts routine surveillance for HABs and responds to reports of blooms from the Sheriff's Marine Patrol and citizens on the Lake.

### 2018 Bloom Season

Greater numbers of harmful Algal blooms were identified in Conesus Lake in 2018 than in previous years, covering a larger area and persisting for a longer duration. The first HAB blooms were reported on June 20th, and as a result, all three beaches were closed. The blooms dissipated 2-3 days later. On July 13th, a lake-wide bloom was reported lasting approximately 4-5 days. A single celled cyanobacteria was identified in samples collected, different than what was commonly identified in Conesus Lake, yet toxins were not detected in samples collected. On August 31, HABs were



HABs surfacing on the Conesus Lake shoreline.

identified in various locations throughout Conesus Lake, concentrated in the North and North West coved areas. Blooms persisted throughout the fall season. Nine public notices were issued throughout the season.

### Harmful Algal Blooms (HABs) Action Plan

In response to the outbreak of cyanobacterial blooms across the State in 2017, Governor Cuomo authorized the NYS Departments of Environmental Conservation, Health, and Agriculture & Markets to collaborate on a program to identify factors contributing to cyanobacterial blooms, termed HABs. The agencies were tasked with defining and implementing solutions that would address the root causes and protect water quality. Conesus Lake was among the 12 priority lakes selected for development of a HABs Action Plan, due to its importance as a water supply and recreational asset.

NYSDEC released the Conesus Lake HABs Draft Action Plan in June 2018. The Plan describes current conditions and trends and recommends solutions to reduce the risk of cyanobacterial blooms and associated adverse effects on recreational use, potable water supply, and aquatic life protection. Mathematical models of the lake and watershed were applied to identify significant sources of phosphorus affecting lake water quality conditions.

The percent contribution of phosphorus sources to Conesus Lake were consistent with previous estimates from the SUNY research and monitoring efforts that began in the early 2000s. Internal loading from legacy phosphorus is the major source, contributing some 80% of the annual load. Watershed runoff supplies the remaining 20%.

### Key Recommendations of the Plan include:

- Reduce watershed export

- Implement Best Management Practices (BMPs) on croplands to reduce runoff, soil erosion and nutrient loss
- Streambank mitigation
- Mitigate internal phosphorus loading
  - Evaluate oxygenation/aeration systems to prevent development of anoxic conditions
  - Evaluate nutrient inactivation to lock phosphorus in the sediments
- Reduce the risk of HAB development
  - Evaluate options for enhanced water circulation in critical areas
  - Investigate hydrodynamics of the lake outlet to reduce residence time

In response to the Governor’s HABs Initiative, local Conesus Lake stakeholder and steering committees were formed, and comments on the Draft Action Plan were submitted. Following the release of the Action Plan, working groups were formed to address the Plan recommendations, HABs projects were identified and CFA grant applications were submitted. One grant application was deemed ineligible for HABs funding; notification of grant acceptance for the remaining two grants is anticipated in early 2019.

### Total Maximum Daily Load

Typically, the process of developing a Total Maximum Daily Load (TMDL) allocation requires several years. The first step is to construct a mathematical water quality model to link the sources, transport, and impact of phosphorus. NYSDEC then applies the mathematical model to

determine the total amount of phosphorus from all sources that the lake can assimilate and still maintain its designated uses. This calculated acceptable phosphorus load is allocated among all sources including watershed runoff, wastewater treatment plants, and industrial discharges, along with an allowance for future growth and a margin of safety. For Conesus Lake, there are no permitted discharges of domestic or industrial wastewater. All required reductions to meet target in-lake phosphorus levels are allocated to the nonpoint sources, including internal sediment loading.

A draft phosphorus TMDL for Conesus was circulated in late 2017 and revised in late 2018 following completion of the HABs Action Plan. The draft calls for substantial reductions in both external and internal loads, as summarized in the following table.

The TMDL also includes an implementation strategy to guide the actions needed to meet target reductions. For Conesus Lake, these reductions are aligned with the HABs Action Plan. The Final TMDL for Conesus Lake is anticipated in 2019.

**Table 3. Summary of Conesus Lake Phosphorus TMDL**

Phosphorus (P) Source	Current P Load (kg/year)	Target P Load to achieve water quality (kg/year)	Required Reduction
Forest and natural areas	321	321	0%
Agricultural runoff	3,202	2,700	16%
Runoff from developed areas	756	700	7%
Internal-aerobic sediment release	6,288	2,680	57%
Internal-anaerobic sediment release	10,641	4,538	57%
<b>Total</b>	<b>21,208</b>	<b>10,939</b>	<b>48%</b>



## Education

The NEW Watershed Education Center officially opened in Vitale Park, in the Town of Livonia. The Town of Livonia joined with many partners, including the Towns of Conesus, Geneseo & Groveland, the Conesus Lake Association (CLA) and numerous community businesses and volunteers to bring this state-of-the-art facility to life.

The Watershed Education Center (WEC), one of a kind in this region, serves as an educational hub providing information about watershed protection and best management practices. The Town of Livonia worked with the CLA, Livingston County Planning Department, Livingston County Department of Health, Cornell Cooperative Extension of Livingston, and the Chip Holt Nature Center to develop and implement a full year of programming. A robust year of education, with 15 programs reaching 732 participants, was held at the WEC.



*The 2018 WEC program, Livonia High School Student Presentations, was well attended.*



*New Watershed Education Center in Vitale Park, Lakeville*

### 2018 Watershed Education Center Programs

What is a Watershed & Our Impacts on the Lake

Non-native & Native Terrestrial Invaders

Aquatic Invaders/iMap Training

Understanding Federal Flood Insurance & How It Impacts You

Sediment & Erosion Control Workshop

History of Conesus Lake

Citizen Statewide Assessment Program (CSLAP)  
Conesus Lake Results

Conesus Lake HABs Action Plan

Watershed Management Plan "A Year in Review"

Art & Science of Waterfowl Management

Student Water Quality Testing Results, SUNY Brockport

Student Water Quality Testing Results, SUNY Brockport  
& Livonia High School

## Stream Restoration and Stormwater Management

*Climate Change predictions for the Finger Lakes Region forecast an increase in the frequency and intensity of heavy rain events and corresponding streambank erosion and localized flash flooding. In light of increased development pressures in the watershed compounding these issues, focus has rightly turned toward stream system restoration and stormwater management to help alleviate effects on water quality and public and private property.*

### Wilkins Creek Subwatershed Stormwater Study

The Wilkins Creek Subwatershed Stormwater Study, on behalf of the Town and Village of Livonia, continued in 2018. Wilkins Creek is the most developed subwatershed leading into Conesus Lake. The study examined and identified stormwater management practices for Wilkins Creek, and zoning and land use regulations were analyzed to assess potential impact of development on the stormwater system. The study offers recommendations on projects and updates to municipal regulations to improve water quality. The project was well received at the Town and Village public meeting, and the grant will close out in early 2019.

### Stormwater and Erosion Control Regulatory Toolkit

The Planning Department contracted with Barton and Loguidice and CC Environment & Planning to develop a new stormwater and erosion control regulatory toolkit. The toolkit will provide local agencies and code enforcement officers with a comprehensive overview of jurisdiction and regulations pertaining to water quality, floodplains, stormwater management, and soil and erosion control.

The project includes a review of local stormwater management regulations and provides development

review flowcharts to assist municipalities when reviewing development applications relative to stormwater and flooding concerns. The project is nearing completion. Final products anticipated are the Stormwater Toolkit reference document, Summary Guide and easy to use Fact Sheets.

### Vitale Park Green Infrastructure Demonstration Project

The Town of Livonia worked with the Livingston County Planning Department, CLA, and local contractors, businesses and volunteers to design and install a rain garden to manage stormwater runoff from the Watershed Education Center. Additional work was completed on rain barrels and stands, educational signage for the project sites and the Guide to Lake-Friendly Landscaping, a shorescaping and green infrastructure guide for landowners interested in implementing green practices on their own properties. Installation of the rain barrels, stands and signage will take place in Spring of 2019. Funding was provided by Finger Lakes-Lake Ontario Watershed Protection Alliance (FLLDWPA), NY Sea Grant and the Town of Livonia.



*Volunteers installing a rain garden at the WEC*

## Agricultural Best Management Practices

*Agricultural Best Management Practices (BMPs) help protect water quality by reducing nonpoint sources of pollution on farms. Nonpoint source pollution occurs when rainfall moves over and through the ground picking up loose soil, nutrients, and other pollutants. BMPs function to keep soil and nutrients on the farm and out of ditches, gullies, and streams that flow into lakes and other waterbodies. The same nutrients that help plants grow in the field can contribute to plant growth in a lake in the form of weeds and algae.*

The Livingston County Soil and Water Conservation District (SWCD) and the USDA Natural Resources Conservation Service (NRCS) conduct an upland watershed protection program for agricultural land uses to reduce nonpoint sources of pollution from entering waterbodies throughout the watershed.

The Livingston County SWCD continued a project on Reservoir Road with the installation of a third terrace basin 500 feet in length, as well as 2 acres of land grading and shaping. These practices complemented a large stormwater detention basin immediately below.

In 2018, the NRCS supported projects including waste storage systems, forest management, cover and strip crops, erosion control systems including 3,100 feet of grass and lined waterways, water and sediment control basins, grazing systems on 41 acres with 9,000 feet of fence, and 2,300 feet of pipeline. Additionally, NRCS completed conservation plans to be implemented in 2019 on approximately 265 acres.



*Installation of grassed or lined waterways in Livingston County. Standpipes placed to get low-flows underground, helps to establish seed.*

## Trends and Recommendations

*Identifying emerging trends and issues and establishing recommendations helps guide the Conesus Lake Watershed Council's yearly Work Plan.*

### Emerging Trends and Issues

- Invasive forest pests including, but not limited to, Hemlock Woolly Adelgid and Emerald Ash Borer affecting forest cover and riparian habitat.
- Nine HAB Health Advisories were issued to the public in 2018. This was an increase from 2017 due to an extended period of HABs identified in 2018.
- New aquatic invaders in Conesus Lake: water lettuce and brittle naiad.
- Changes in weather patterns (National Climate Assessment):
  - Increase in the frequency and duration of droughts leading to low water levels and intermittent streams.
  - More intense rain events and overall precipitation leading to increases in natural and stormwater related high flow events contributing to property and infrastructure damage and increasing water pollutant loads.
  - Less reliable snowpack and spring groundwater recharge.
  - More frequent freeze thaw cycles during winter leading to increased instances of ice jamming and localized flooding.
- Increases in sodium and chloride levels in treated water at both the Village of Avon and Village of Geneseo water treatment plants. Sodium levels exceed the recommended

levels for consumption by individuals on severely restricted sodium diets.

### Recommendations

- Increase public education initiatives related to stream and shoreline restoration and green infrastructure practices.
- Educate municipalities regarding land use practices effect on stormwater, soil erosion, and water quality.
- Continuation of invasive species education and prevention projects including programming at the Watershed Education Center and the Watercraft Steward Program at the East Lake Road Boat Launch.
- Explore Watershed Management Plan update.
- Continue water quality parameter monitoring program.
- Revisit Invasive Species, Harmful Algal Blooms, and Fish Kill Response Plans.
- Pursue additional funding for watershed restoration projects and educational/science equipment for the WEC.
- Further explore relationship between thermocline and wind mixing as a possible tool to predict harmful algal blooms.
- Increase education on awareness of harmful algal blooms and investigate potential mitigation measures.
- Continue implementation of Governor's HAB Initiative and pursue funding to support the recommendations in the Conesus Lake HABs Action Plan.
- Conduct further investigation into potential causes and solutions to help mitigate increases in sodium levels.

#	Recommendation	Priority	Actions
All	Secure funding Outside of the EPF funding source to implement CLWMP activities. Investigate and apply for funds from grants opportunities as they arise.	High	<p>Planning Department and Soil and Water Conservation District assisted the Town of Geneseo on a USDA Forest Service GLRI application for post EAB reforestation and stormwater management at Long Point Park. Grant application was approved.</p> <p>The Planning Department submitted a grant proposal to the Finger Lakes Institute for equipment for an aquatic invasive species education and citizen monitoring program, which was funded in full.</p> <p>The Countywide Water Supply Study has been funded. The County is in the contract execution phase with NYSDOS. The County will be contracting with Clark Patterson Lee for the project.</p>
A-1	Review and amend zoning regulations to improve consistency in near-lake areas.	High	<p>Planning Staff is working with the Town of Sparta on the creation of a new Agriculture and Farmland Protection Plan. Final Draft is under review by the Town.</p> <p>The Draft Conesus Lake Watershed Stormwater Toolkit and ordinance review documents are nearing completion.</p>
A-3	Develop public education campaigns on BMPs for lake and watershed residents.	High	<p>The Town of Livonia is working with the Livingston County Planning Department &amp; Department of Health, Conesus Lake Association, Cornell Cooperative Extension of Livingston County, and the Chip Holt Nature Center on educational programming and equipment at the new Watershed Education Center.</p> <p>A total of 15 educational programs were held at the Watershed Education Center, reaching 732 participants. Planning for the 2019 presentation schedule is in process.</p> <p>The Planning Department contracted with Barton and Loguidice and CC Environment &amp; Planning to develop a stream and stormwater regulatory toolkit for local agencies. Anticipated products, which are nearing completion, will include a reference document, summary guide and fact sheets.</p> <p>Water quality monitoring and Conesus Lake Annual reports were made available on the Planning Department's Conesus Lake webpage.</p> <p>The Watershed Inspector presented on watershed issues to youth audiences at the Wayne County Health Fair and the Chip Holt Nature Center. Several watershed topics were also presented to the public at the WEC.</p>

#	Recommendation	Priority	Actions
B-1	Secure funding to help mitigate the financial impacts of changes in agricultural practices on the producers.	High	Agencies will continue these activities annually as part of their existing programs.
B-2	Implement practices that will reduce nonpoint source pollution from farms.	High	<p>The Natural Resources Conservation District (NRCS) projects included systems for waste storage, erosion control, and grazing; forestry management; cover crops; nutrient management; no-till acreage and pollinator plantings.</p> <p>The Soil and Water Conservation District (SWCD) continued a project on Reservoir Road with the installation of a third terrace basin 500 feet in length, as well as, 2 acres of land grading and shaping. These practices complemented a large stormwater detention basin immediately below. SWCD worked with a large CAFO dairy in the watershed to install two ag waste storage systems.</p>
C-1	Develop and implement program to restore and stabilize streambanks in the watershed.	High	<p>The green infrastructure grant project at Vitale Park moved forward. The Town of Livonia worked with the Livingston County Planning Department, CLA, and local contractors, businesses and volunteers on a rain garden and rain barrels for the WEC. The Planning Department and CC Environment &amp; Planning worked on the creation of a lake friendly landscaping guide and educational signage on green infrastructure best practices.</p> <p>On behalf of the Town and Village of Livonia, the Livingston County Planning Department worked with Barton &amp; Loguidice, CC Environment &amp; Planning and the Conesus Lake Watershed Council Technical Committee on the Wilkins Creek Subwatershed Stormwater Study. The study examined and identified stormwater management practices for Wilkins Creek, zoning and land use regulations were analyzed, and project recommendations were made.</p>
C-3	Develop public education campaigns on the impact of human activities on the health of the Lake.	Med.	The CLA distributed 68 Welcome to the Lake kits to new watershed residents this year. The Conesus campaign staffed an informational booth at the CLA's Arts and Craft Fair and the Livonia Autumn in the Village promoting lake friendly best practices and invasive species awareness.

#	Recommendation	Priority	Actions
E-2	Develop a public education campaign promoting invasive species awareness	High	<p>The CLA staffed an Aquatic Invasive Species education table at the NY Bass Nation Youth Fund Raising Fishing Tournament on Conesus Lake.</p> <p>The Town of Livonia, Livingston County Planning Department &amp; Health Department, CLA, CCE Livingston, and the Chip Holt Nature Center worked on educational programming and equipment at the new Watershed Education Center.</p>
F-4	Develop a protocol and timeline to inventory septic/sanitary systems within the watershed.	Low	<p>LCDOH participated in the DEC Septic System Replacement Program, which provides a source of funding to property owners for replacement of eligible septic systems. Two septic systems in the watershed were identified as potential candidates.</p>
G-1	Investigate and implement effective methods to control the spread of non-native (exotic) organisms	High	<p>2018 Watercraft Stewards started on Memorial Day weekend and finished in early September with 6,432 boats inspected on Conesus Lake (7,134 boats total including Hemlock and Canadice Lakes). At the East Lake Road boat launch on Conesus, 4 boats were found with organisms attached; all four boats were decontaminated. The CLA worked with NYS Parks to secure funding for 2019-2021 seasons.</p> <p>In 2018, the Watershed Manager participated in Finger Lakes Partnership for Regional Invasive Species Management (PRISM) Steering Committee meetings, and CLA Volunteer Mike Parker attended the Aquatic Working Group and Full Partnership meetings.</p> <p>Exploration of legislative support for Invasive Species emergency and control funding continued into 2019.</p> <p>The Planning Department submitted a grant proposal to Finger Lakes Institute for volunteer monitoring equipment. Grant proposal has been approved, and equipment has been purchased and received. Equipment is being stored for future use.</p> <p>CLA Macrophyte survey volunteers conducted several rake toss observations this season. Observations of invasive species brittle naiad in Conesus Lake were made. Several attempts were made to use the ROV to view aquatic plants.</p>
G-2	Develop and implement a program for cleaning accumulated aquatic plants and algae along the shoreline of Conesus Lake	High	<p>The Livingston County Workforce Development crew leader position has been filled. In September, the crew participated in a Rapid Response at the Old Outlet to remove aquatic vegetation, facilitate increased water circulation &amp; reduce active HABs.</p> <p>The Conesus Lake Fish Kill Contingency Plan was activated for a small fish kill in May 2018. Conesus Lake Aquatic Invasive Species Response Plan was activated in August 2018 for brittle naiad.</p>

#	Recommendation	Priority	Actions
G-4	Initiate effort to determine if increased stocking of walleye fingerlings, or other species, would be an effective biological control in Conesus Lake.	High	New York State DEC stocked 32,500 walleye pond fingerlings and 32,500 smaller fingerlings in June. DEC stocking of tiger muskellunge is anticipated in 2019.
H-1	Conduct an annual monitoring program of Conesus Lake and its watershed. An annual monitoring meeting should be held to coordinate the monitoring program.	High	<p>The Livingston County Department of Health continued the public bathing beach monitoring and harmful algal blooms programs during 2018.</p> <p>SUNY Geneseo 2017 Summer Monitoring Study data was analyzed and posted on the Livingston County website. SUNY Geneseo 2018 monitoring concentrated on in-lake water quality parameters and continued its investigation into nutrients, water mixing, and cyanobacteria.</p> <p>The CLA developed a weather reporting system consisting of two monitoring stations on the shoreline, and a free public online database. Funding was provided by the LCSWCD and an anonymous CLA member donor. System will be operational in 2019.</p>
H-2	Prepare and distribute an annual Conesus Lake and Watershed Report Card.	High	<p>The 2017 Annual Report Card was approved by the Watershed Council and provided to NYSDEC/Finger Lakes Hub.</p> <p>Per the NYSDEC, the timeline for the release of the Conesus Lake TMDL has been delayed and the public hearing was postponed until 2019.</p> <p>In 2018, the focus was on HABs initiatives for State funding. Programming/funding opportunities for an update to the Watershed Management Plan will continue to be explored in 2019.</p> <p>In response to the Governor's HABs Initiative, local Conesus Lake stakeholders and steering committees were formed and comments on the Draft Action Plan were submitted. Following the release of the Action Plan, working groups were identified to address the Plan recommendations.</p>

# Conesus Lake Watershed Council

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Document prepared by the  
Livingston County Planning Department  
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*Cover photos provided by Conesus Lake Association, Livingston County Sheriff's Office, and Livingston County Planning Department.*