

Executive Summary

The Conesus Lake watershed encompasses 70 square miles and includes all or part of seven municipalities within Livingston County. The Towns of Conesus, Geneseo, Groveland, Livonia, Springwater, and Sparta and the Village of Livonia are all or partially located within the watershed. The watershed is home to approximately 9,800 people and supplies water for approximately 18,000 Livingston County residents. More than 18 streams flow through the Conesus Lake watershed, although three of them – North and South McMillan Creeks and Conesus Inlet – contribute up to 70% of the flow into Conesus Lake. The watershed is part of the 2,500 square mile Genesee River Basin that flows into Lake Ontario.

The State of Conesus Lake: Watershed Characterization Report, completed in May 2002, provided the technical foundation for the 2003 Conesus Lake Watershed Management Plan (CLWMP). Taken together, these two documents inform an understanding of the issues affecting Conesus Lake and its watershed and provide a framework for making effective management decisions. Guided by the Management Plan's recommendations, local, state and federal partners have made a substantial investment in the watershed. Since 2002, more than



*South end of Conesus Lake from the NYSDEC
Conesus Inlet Fish and Wildlife Management Area.*

six million dollars from federal, state and local sources have been directed toward efforts to restore and protect Conesus Lake and its watershed, monitor the effectiveness of these efforts, and communicate the findings to the public. This total does not include the countless hours of time expended by dedicated community leaders, public agency representatives, and municipal employees and volunteers.

This ten-year update to the Characterization Report describes the many projects and activities that have been implemented to mitigate the inflow of pollutants, such as nutrients and sediment from the landscape to the lake, and evaluates the impact of these projects. More broadly, the effectiveness of the Management Plan is examined in terms of collaboration among the project partners, reduction in pollutant inflows, and changes in the lake's water quality and aquatic habitat.

Collaboration

One major success to report is the collaborative approach to lake and watershed management. Among the recommendations of the CLWMP was creation of the Conesus Lake Watershed Council (CLWC); this intermunicipal organization was formed in 2003 to oversee implementation of the Plan's priority actions. The Watershed Council was created by an Intermunicipal Agreement among Livingston County, the watershed municipalities and the water purveyors. By signing an intermunicipal agreement, each party committed to financially supporting the Watershed Council. The Council's budget helps support the Conesus Lake Watershed Inspection Program and the Conesus Lake Watershed Manager position. Livingston County Planning Department and Department of Health provide the staff and technical support to the Watershed Council. The Conesus Lake Association is an active participant in Council meetings and plays a key role in keeping the lake community engaged with local government.

The activities of the Watershed Council reflect the principles of adaptive management; as recommendations of the Management Plan are implemented, there is a parallel commitment to monitoring the lake and watershed to track improvements. One reason this "build and measure" approach is so effective in the Conesus Lake watershed is the successful long-term partnership between Livingston County and the State University of New York (SUNY) aquatic sciences programs at Brockport and Geneseo. SUNY Brockport and SUNY Geneseo researchers have guided the design and implementation of the monitoring program and mentored students as they learn about how human activities affect the ecosystem.

The success of this institutional framework for lake and watershed management was celebrated in 2011, when the Conesus Lake Watershed Council received the Planning Excellence Award from the New York Upstate Chapter of the American Planning Association (APA) for Planning Excellence in



Maxwell Farm on the western slope of Conesus Lake.

Implementation. As the APA noted in the award citation: "The level of cooperation within and partnerships among the Watershed Management Plan committees and between agencies has been heralded as a successful example of how the process should work."

Watershed Measures to Reduce Contaminants

Agricultural Practices

Many recommendations of the 2003 Management Plan focused on mitigating nutrient and sediment inflows to the lake from its watershed. Agriculture is an important land use within the Conesus Lake watershed and is a foundation of the area's economy, traditions, and visual character. Streams draining subwatershed areas with a significant portion of lands in active agriculture exhibited elevated levels of nutrients and sediment, two important pollutants. Consequently, reducing the environmental impact of active agriculture was a priority. Almost two million dollars of federal, state and local funds were directed toward agricultural best management practices (BMPs) within the watershed.

The Livingston County Soil and Water Conservation District (LC-SWCD) and Natural Resources Conservation Service (NRCS) provided critical support to agricultural producers for the implementation of BMPs. Both structural and cultural BMPs were implemented on the lands of the agricultural producers who volunteered to participate. Examples of these management practices include: no manure spreading during the winter, reduction in fertilizer application rates, installation of subsurface drain tiles, use of grass filter strips, contour tillage, separation of roof runoff, fencing to keep cattle from streams, manure injection, gully plugs, rotational grazing, Whole Farm Nutrient Management Plans, and changes in crop rotation.



An example of BMP's, including grassed waterways, and contour and riparian buffering on a watershed farm.

The SUNY Brockport and SUNY Geneseo researchers monitored the impact of the BMPs on the export of nutrients, sediment and other materials to Conesus Lake, by sampling at the base of the subwatershed streams (near the confluence with Conesus Lake) over a multiple-year program. This project provided a direct assessment of the effectiveness of agricultural BMPs at the watershed scale. In addition to tracking changes in tributary export, the research team looked downstream to evaluate how the water quality and nearshore habitat of Conesus Lake were affected by implementing BMPs to reduce nonpoint sources of nutrients and sediment from the landscape. The initial results are encouraging.

Streambank Stabilization

Following a detailed feasibility study, projections of water quality improvements, and cost-benefit calculations, seven stream segments located within the Towns of Conesus, Geneseo and Livonia and the Village of Livonia were identified as priority areas for remediation. In 2008 and 2009, the New York State Environmental Protection Fund (EPF) program awarded funding to the Town of Livonia on behalf of the affected municipalities to stabilize these areas. The streambank remediation project has entered the Engineering Phase, and construction on the seven streambank segments is anticipated to continue through the summers of 2013 and 2014.

Road Ditches

Extensive road ditch stabilization programs have been implemented throughout the watershed, preventing tons of sediment and nutrients from reaching Conesus Lake each year. The Town of Groveland was awarded \$359,085 and the Town of Conesus was awarded \$1.2 million from the state's Environmental Protection Fund (EPF) for road ditch remediation. These funds were used to implement structural erosion control measures at roadside drainage ditches along several road segments in the Conesus Lake watershed.



Before (left) and after (right) photos of a ditch adjacent to East Lake Road in the town of Livonia.

Residential Development

The 2010 population census data reveal that the population of Conesus Lake watershed has declined slightly over the last decade. The real property tax rolls indicate that the agricultural acreage in the watershed decreased by 8.9%, acreage classified as vacant increased by 6.8%, and residential acreage increased by 3.7%. Many of the watershed municipalities have updated and revised their Comprehensive Plans and associated zoning codes over the past decade, and have incorporated water quality-related provisions into their local codes. In addition, watershed municipalities have adopted local laws to address Sediment and Erosion Control, in a coordinated effort to mitigate the potential for substantial sediment loss during construction.

New York State has also addressed the potential for adverse water quality impacts of residential land use, through the statewide stormwater management regulations and ban on phosphorus in lawn fertilizers. The State's Dishwasher Detergent and Nutrient Runoff Law was designed to improve water quality by reducing phosphorus runoff. The law is intended to reduce costs associated with removing phosphorus from stormwater and wastewater, and to improve recreational and other uses of the waterways.



Residential development affecting stormwater management along the shore of the lake.

Public Education and Awareness

Public education and awareness are a critical component of watershed management, as residential land uses have a direct impact on the health of the lake. Over the last decade, many



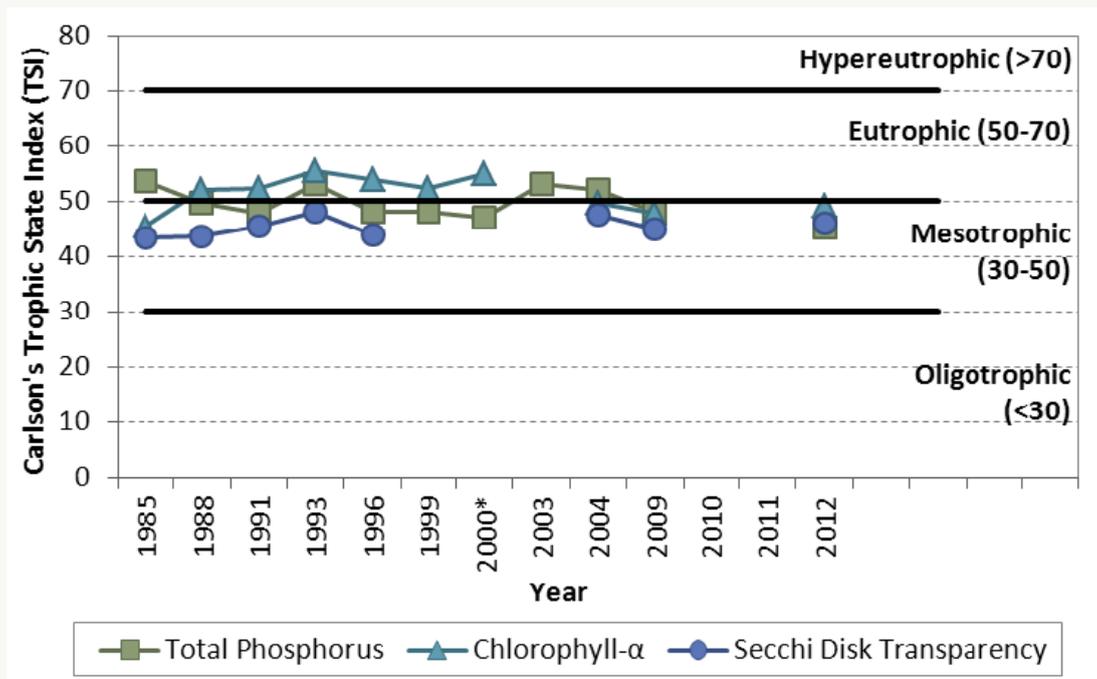
At an outdoor public outreach event, Barb Rogers (Co -Watershed Inspector) demonstrates the concepts of watershed runoff to children using EnviroScape®, an environmental education model.

types of educational materials, including pamphlets, reports, articles, and kiosks have been developed to keep the community engaged with efforts to improve the quality of Conesus Lake. The Conesus Lake Association (CLA) has staffed booths at numerous events including DEC Days, CLA Youth Days, and the CLA Arts and Crafts Festival. The ConesUs Stewardship Initiative is a direct effort by the CLA to engage all watershed residents with the health of the lake through encouraging watershed residents to engage in lake-friendly activities at home.

Conesus Lake Response

Trophic State

Water resource managers rely on three key indicator parameters to evaluate the trophic state (degree of nutrient enrichment) of lakes. Periodic measurements of three key water quality variables are used to track changes over time and compare trophic state condition between lakes. The three parameters are chlorophyll-a (an indicator of algal abundance), total phosphorus (the key nutrient affecting algal productivity), and Secchi disk transparency (a measure of water clarity). These parameters have been measured in Conesus Lake and the trend is toward improving water quality conditions. That is, total phosphorus and chlorophyll-a are declining or stable, and Secchi disk transparency is increasing. This positive development is likely the result of the suite of BMPs implemented across the watershed.



Carlson's Trophic State Index for Conesus Lake, 1985 – 2012.

Sodium and Chloride

The 2002 Watershed Characterization Report recognized that dissolved salts are of concern; sodium and chloride concentrations in Conesus Lake have steadily increased as the watershed became more developed. Monitoring data from 2012 indicate that sodium and chloride concentrations continue to increase, despite completion of salt storage facilities within the watershed. Current levels are above guidelines for safe drinking water for individuals on a salt-restricted diet.

Macrophytes

In Conesus Lake, the largest and most dense Eurasian watermilfoil-dominated macrophyte beds are located near the mouths of streams that drained primarily agricultural watersheds. This observation was part of the rationale for the federally-funded watershed management project, which (among other questions) tested the hypothesis that nutrient management at the



An Eurasian watermilfoil bed in Conesus Lake.

watershed level could reduce Eurasian watermilfoil biomass adjacent to stream inflows. The project demonstrated the benefits of agricultural management on stream water quality and reduced plant abundance in nearshore areas. Lakewide, the macrophyte community appears to be trending toward improvement, with a diminished importance of Eurasian watermilfoil.

Food Web

The Conesus Lake food web appears to have remained stable over the past decade, as indicated by the plankton and fish communities. The walleye stocking initiative may have improved the catch of adult fish, based on preliminary NYSDEC data, but does not appear to have affected alewife abundance. Related to the continued presence of the alewife, the lake's zooplankton community continues to be dominated by smaller-sized species; alewives preferentially graze on the larger-sized zooplankton.



NYSDEC Walleye gill net survey data collection.

Wetlands

The habitat and ecological function of wetlands located along Conesus Lake have been affected



American Bald Eagle in the Conesus Inlet Fish and Wildlife Management Area

by water level regulation to support recreation and manage the risk of flooding. The Lower Great Lakes Fish and Wildlife Conservation Office worked with NYSDEC and the Conesus Lake Association to replace two deteriorated aluminum water control structures with concrete box structures. The new control structures will enhance NYSDEC's ability to restore seasonal water-level fluctuations in 15 acres of emergent wetlands within the Conesus Inlet Fish and Wildlife Management Area.

Emerging Issues

Climate Change

Climate scientists predict that western New York and the Great Lakes Plain region—including the Finger Lakes—will experience increased temperature and precipitation as a result of climate change. Rainfall intensity is projected to increase, as are periods of drought. Overall, extreme events will become more common. This pattern may result in greater risk of flash-flooding and erosion within the Conesus Lake watershed, adding to the nutrient and sediment loading to the lake.

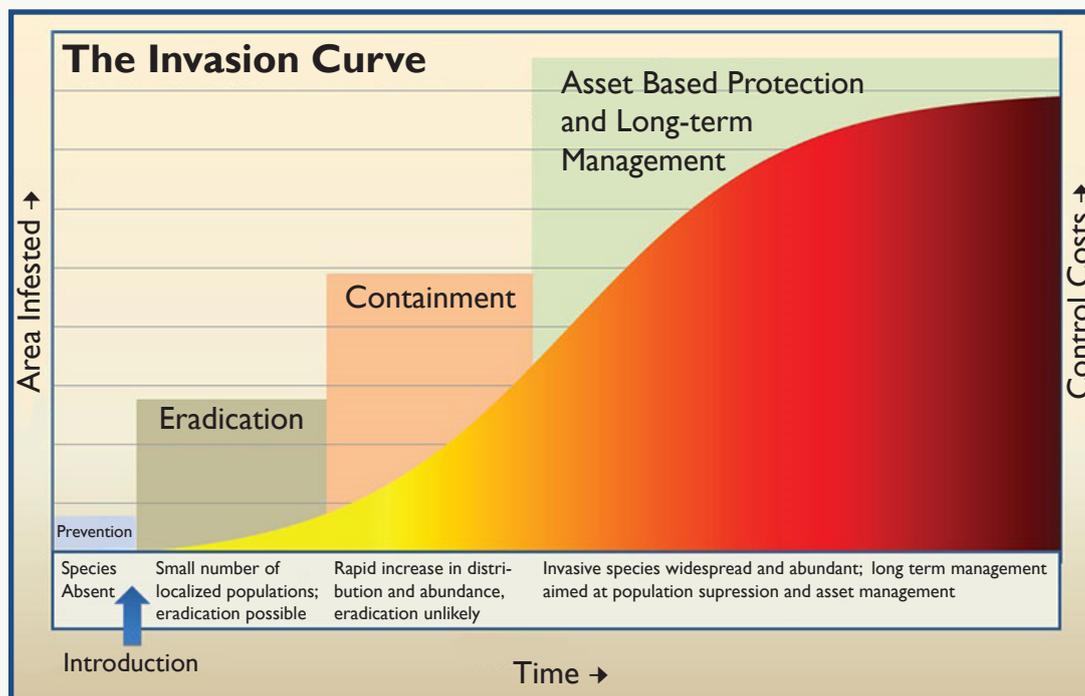


Flood event on North McMillan Creek, Town of Conesus.

Within Conesus Lake, climate change will eventually affect water temperatures. Coupled with increased event-driven nutrient and sediments, the lake will become increasingly susceptible to nuisance and potentially harmful algal blooms. The warmer lake water will continue to sustain the existing productive warmwater fishery for sportfish and panfish, but the coolwater fisheries are likely to decline.

Invasive Species

Conesus Lake has been adversely affected by invasive species in the past, including Eurasian watermilfoil, dreissenid mussels, and the alewife, and remains vulnerable to future invasions. However, water resource managers are increasingly collaborating on regional approaches to invasive species management that emphasize early detection and rapid response. In July, 2012, the NYS Legislature passed, and Governor Cuomo signed, legislation to protect New York's waterways and natural habitat from the devastating environmental effects of invasive species. Livingston County continues to participate in the Finger Lakes PRISM (Partnership for Regional Invasive Species Management), an information-sharing group created the state to foster a regional approach to managing invasive species. This program is administered through the Finger Lakes Institute at Hobart William Smith Colleges in Geneva, NY. Support continues for the Conesus Lake Association Aquatic Invasives Monitoring & Response Program. In addition an Invasive Species Subcommittee was created to assist the Conesus Lake Watershed Technical Committee in working on an Invasive Species Management Plan.



The Invasion Curve demonstrates why early action on invasive species is critical.

Recommendations

Update the Conesus Lake Watershed Management Plan

The Conesus Lake Watershed Management Plan recommended specific actions to improve the quality of the Lake by targeting sources of pollution threatening the Lake’s continued use for water supply and recreation. Over the last decade, resources of federal, state, and local government and the watershed community have been invested in implementing many of the recommendations. The Plan was intended to serve as a “living document,” to be updated as existing issues are resolved and new issues are encountered.

This 2013 update to the Watershed Characterization Report provides a foundation for updating the Conesus Lake Watershed Management Plan. As evident from the data presented in the subsequent chapters, the concerted efforts to implement agricultural BMPs, control



Conesus Lake from Stagecoach Road, Town of Conesus

stormwater runoff, and improve the wastewater collection infrastructure have reduced the watershed input of nutrients and sediment. The Lake’s trophic state appears to have stabilized.

However, other metrics of the Lake’s condition are not improving. The concentrations of sodium and chloride continue to increase in the water intakes, and they have reached thresholds where more aggressive control measures and increased

public advisories are warranted. An updated Management Plan can provide the foundation for reviewing what has been done, and what other actions might be done to address this potentially serious issue.

Finally, some of the greatest threats to water quality and aquatic habitat are regional, not specific to Conesus Lake. Harmful algal blooms and invasive species are serious issues that will require collaboration among scientists, lake users, educators and the water resource management agencies. Nearshore water quality and aquatic habitat conditions of great significance to recreational users are changing in Conesus Lake and in many lakes across the entire region. The Watershed Management Plan will incorporate the new findings and evolving partnerships focused on these issues.

Continue the existing institutional framework for managing the lake and its watershed.

The Conesus Lake Watershed Council is an award-winning partnership that has proven to be an effective institutional framework for watershed management over the past decade.

Continue to advocate for support of FLOWPA and other watershed funding programs in the New York State budget.

The monitoring of the lake and watershed that form the basis of this update to the Characterization Report were funded in large part by federal and state sources. The value of a science-based approach to managing our lakes and watersheds cannot be overstated. The Conesus Lake community should continue to advocate for resources to implement BMPs, monitor their effectiveness, and report the findings to the community.

Continue to support the position of Conesus Lake Watershed Manager and the Conesus Lake Watershed Inspection Program.

By its very nature, watershed management involves a myriad of tasks, issues, and interest groups. The positions of Conesus Lake Watershed Manager and Conesus Lake Watershed Inspector have contributed to the success of the program.

Consider requesting that Conesus Lake be formally de-listed from the state and federal 303(d) list, based on the improvements achieved with implementation of the Management Plan.

NYSDEC updates their list of impaired waterbodies every two years; the next version of the state 303(d) list will be issued in draft in early 2014. In light of the improvements to Conesus Lake over the past decade, and the effective institutional structure in place to manage lake and watershed issues, we recommend that the Conesus Lake Watershed Council initiate a discussion of removing Conesus Lake from Part I of the 303(d) list. If approved by NYSDEC, removal of Conesus Lake from Part I of the 303(d) list may obviate the need for a regulatory Total Maximum Daily Load (TMDL) allocation for phosphorus. In addition to reviewing the documentation of improving water quality, the discussions with NYSDEC should highlight the success of locally-driven initiatives to identify measures for phosphorus reduction, and the positive relationships that have been developed among the diverse community of stakeholders.

Celebrate the success of the last decade and share the message.

Conesus Lake Bathymetry

A bathymetric survey is a map of the lake bottom that depicts the depths and contours. The map on the left uses color to illustrate the lake depth. The shallowest areas are shown in red and the deepest in blue. The map on the right uses contour lines to show depth. Each line represents three additional feet in depth. Where the lines are closest together, the slope is the steepest.

