Conesus Lake and Watershed Report Card

Assessment of the Conesus Lake Watershed Management Plan in 2010

Conesus Lake Watershed Council

May 2011

EcoLogic

PURPOSE OF THIS DOCUMENT

One of the recommendations of the Conesus Lake Watershed Management Plan (CLWMP) is to prepare an annual update summarizing the status of activities in the watershed, particularly the ongoing efforts to reduce nonpoint source pollution. This annual summary also provides a forum for tracking conditions in Conesus Lake and highlighting new information.

MAJOR ACCOMPLISHMENTS

Since its formation in 2003, the Conesus Lake Watershed Council (CLWC) has coordinated implementation of the recommendations of the CLWMP. The Watershed Council is an intermunicipal organization with a dual mission: first, to coordinate actions for restoring the health of Conesus Lake and its watershed, and second, to communicate progress to the watershed community and other stakeholders. Restoring the health of the lake and its watershed requires a sustained effort and a focus on many inter-related issues. There was substantial progress in 2010 on several fronts.

- ***Stream testing*** to measure the concentration of nutrients and sediments flowing into Conesus Lake. Sampling the agricultural subwatersheds that were part of the USDA-funded program was led by Dr. Joseph Makarewicz of SUNY Brockport; the 2010 data represent the eighth year of record.
- ***A focused investigation of water quality conditions*** in Cottonwood Gully and two adjacent rivulets was conducted by the Livingston County Department of Health, at the request of the Town of Geneseo.
- ***Mapping the abundance and distribution of macrophytes***. Dr. Sid Bosch of SUNY Geneseo continued his long-term sampling and analysis of Conesus Lake's aquatic plant community.
- ***Streambank remediation***. The Town of Livonia was awarded a grant from the state's Environmental Protection Fund for $358,132 for Phase II of the streambank remediation project. The draft contract is being finalized.
- ***Public education and outreach:***
    - The CLA Water Quality Committee recently initiated the Conesus Lake campaign - a project designed to encourage lakeside residents to be good lake stewards.
    - *Phosphorus (P) Free Lawn Fertilizer Project.* This cooperative demonstration project, led by the CLA in partnership with Cornell Cooperative Extension, Geneseo School District, Planning, and Dept. of Health, measured the phosphorus in near-shore areas of the Lake.
    - Livingston County has contracted with the Town of Livonia for construction of a public education kiosk at Vitale Park.

FINDINGS OF THE 2010 INVESTIGATIONS : WATERSHED MONITORING

During the summer of 2010, SUNY Brockport scientists completed their eighth consecutive year of water quality monitoring of streams flowing into Conesus Lake through agricultural and/or forested areas. The 2010 monitoring program was designed to contribute to the long-term data record, which documents water quality conditions before and after implementation of agricultural best management practices (BMPs).

Trend Analysis

The SUNY Brockport team evaluated three approaches to analysis and interpretation of the long-term stream monitoring data in order to define a robust index of watershed health. This is not a simple task; water quality monitoring in streams is complicated by the significant influence of stream flow (discharge) on transport of particulate and dissolved materials from the watershed. The eight years of stream monitoring in the Conesus Lake watershed encompass periods of wet weather and dry weather. The impact of stream discharge must be considered when comparing conditions before and after BMPs, so that real change can be differentiated from weather-related effects.

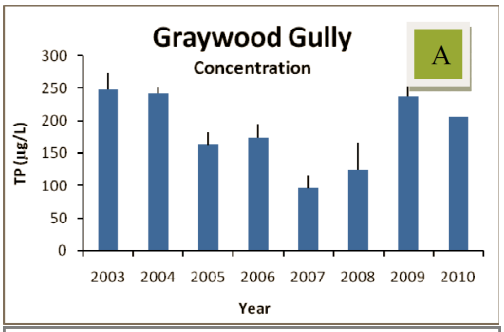
The three approaches to trend analysis are briefly described in this section of the 2010 Report Card.

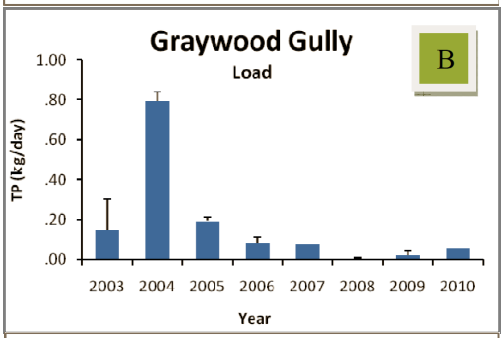
Method 1 - Stream Concentration Approach

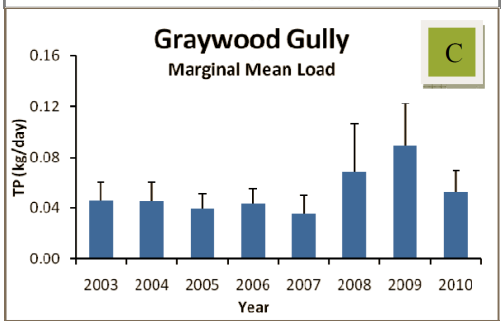
Prior to 2009, concentrations of nutrients and sediment in streams were generally decreasing. However, concentrations increased in 2009 (Figure A). Was this a result of some change in land use or management practices? No changes were observed during a visual inspection of the watershed. Concentration is a function of stream discharge; that is, as discharge increases, concentrations tend to increase because more material is washed from the land. There was a lot of rain during the spring of 2009 which increased runoff, resulting in higher concentrations measured in the streams. Since concentration data alone do not account for changes in stream discharge, using concentration data to assess trends in land management may be misleading.

Method 2 - Simple Loading Calculation

To refine the data assessment, a simple loading calculation (concentration times discharge = loading per unit time) is used to account for stream discharge (Figure B). This calculation is a function of discharge and will increase with increasing rainfall and discharge. In contrast to the findings using concentration data, there has been a steady decrease in the amount of phosphorus loss since 2004 that is directly correlated with summer stream discharge.







FINDINGS OF THE 2010 INVESTIGATIONS : WATERSHED MONITORING (CONTINUED)

Method 3 - Marginal Mean Load Approach

In Figure C, the effect of discharge is considered using a statistical process called *Analysis of Covariance (ANCOVA)*. This process adjusts (weights) the mean concentration and load by discharge and produces an adjusted average loss from the watershed (the *marginal mean load*). An increase in marginal mean load in 2008 and 2009 was not statistically significant, suggesting that agricultural BMPs are being maintained.

Findings and Recommendation– Watershed Health Index

Method 3, the marginal mean load approach, provides a more robust tool for evaluating the effects of land use practices, compared with the concentration method and the simple load calculation. This assessment method could be further improved by collecting data early in the season and during hydrologic events. Summer monitoring is less likely to capture declines in loading resulting from watershed BMPs. The management plans implemented as part of the USDA project were designed to reduce nutrient and soil transport from the watershed by reducing overland flow of water. Consequently, the impact of these practices are most pronounced during wet weather, which tends to occur in winter and spring. Summer low flows are less susceptible to overland flow conditions. In addition, vegetation is actively taking up nutrients, intercepting rainfall, and serving to retain soil on the land during the summer. It appears that monitoring in the spring and early summer (March-June) would provide the most robust watershed health index to detect trends and evaluate the effectiveness of BMPs. This is the season when the agricultural community is actively tilling the lands and planting crops.

Nutrient and Sediment Monitoring, 2010

In 2010, four of the USDA streams (Graywood Gully, Long Point Gully, Cottonwood Gully, and North McMillan Creek) were monitored to determine if management practices were maintained after the USDA project ended, and to determine if new land use practices that may be affecting water quality have been adopted.

The historical data, re-evaluated in the context of marginal mean loads, indicate that since the implementation BMPs adjusted losses from the USDA watersheds have generally not changed. However, there are some notable exceptions. At Cottonwood Gully, a significant increase in nitrate export was observed from 2008 to 2010. Also, a trend of increasing soluble reactive phosphorus and total Kjeldahl nitrogen was observed from 2007 to 2010. At Long Point Gully, a trend of increased losses of total phosphorus and soluble reactive phosphorus was observed in the summers of 2008 through 2010. At Graywood Gully in 2009, there was an increase in phosphorus export; however this increase at Graywood Gully was not statistically significant. While the agricultural BMPs are being maintained, the increased amount and intensity of rainfall are apparently increasing the loss of nutrients and sediment from the watershed.

Nutrient Loss from Inlet and South McMillan Creeks

It has been generally assumed that the Inlet and South McMillan Creek subwatersheds do not represent a significant fraction of the total load of nutrients and sediment to Conesus Lake, since these watersheds are primarily forested and have limited agricultural development. However, there were no recent monitoring data to quantify the nutrient and sediment export from these two large subwatersheds. The 2010 program

FINDINGS OF THE 2010 INVESTIGATIONS : WATERSHED MONITORING (CONTINUED)

included monitoring the water quality conditions of these two streams, and developing rating curves to support discharge estimates.

The 2010 results are very interesting. The concentrations of phosphorus and soil in water from the Inlet and South McMillan Creeks were lower than concentrations measured in watersheds with more land area in active agriculture, and slightly higher than the concentrations from North McMillan Creek (Figure D). Despite the relatively low concentrations of nutrients and sediment, the load of phosphorus from the forested watersheds was higher than from the agricultural watersheds (Figure E).

Image courtesy: Livingston County Planning Department

Although losses from the forested subwatersheds to the lake (loading) were high, concentrations were low. The elevated loads are due to the high discharge of water, rather than from land use practices. The relatively undisturbed forested landscape offers few opportunities to implement best management practices, as compared with the agricultural subwatersheds. In the Inlet and South McMillan Creek watersheds, which are dominated by forest, it is unlikely that any improvements in water quality would be realized by management.

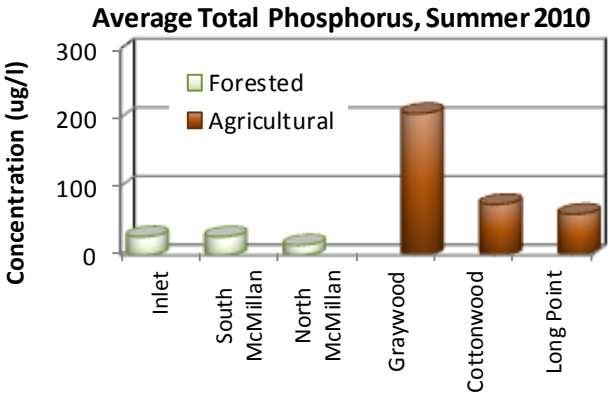


Figure D. *Concentrations of total phosphorus were lower in streams from forested watersheds than from streams with predominantly agricultural watersheds.*

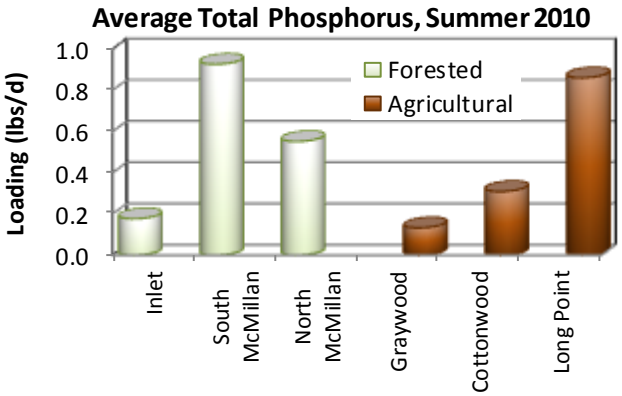


Figure E. *Due to larger volume of water discharged from South and North McMillan Creeks, loading of phosphorus is elevated compared with other watersheds.*

FINDINGS OF THE 2010 INVESTIGATIONS : MACROPHYTE BEDS AND FILAMENTOUS ALGAE

Scientists and students from SUNY Geneseo sampled several macrophyte beds in Conesus Lake during 2010, in an effort to determine whether the northward diversion of North Gully had brought about decreases in the biomass of macrophytes and filamentous algae in North Gully Cove. The study was designed to compare North Gully conditions with reference locations in Conesus Lake nearshore regions in 2010, and also with historic data. The rerouting of the North Gully outflow presents an opportunity to test this particular management practice and to examine the influence of streams on local plant growth.

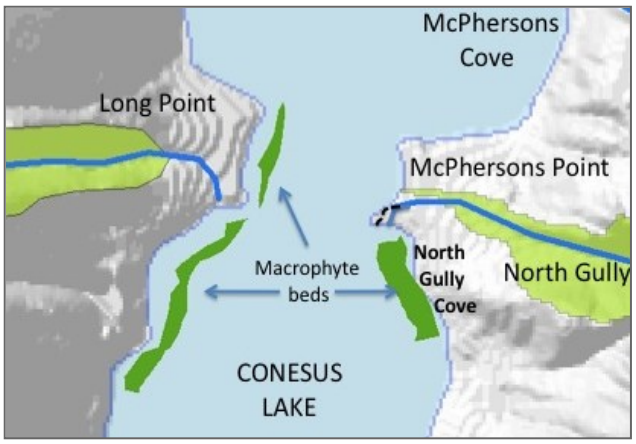


Image courtesy: SUNY-Geneseo.

The results of the 2010 monitoring study confounded interpretation of the post-stream diversion trends. Filamentous algal cover was at a record high in the North Gully Cove. Cover was also very high in the three reference beds, indicating this was a lake-wide problem in 2010. A major delivery of sediments and nutrients from South Gully (450 meters to the south of North Gully Cove) may also have contributed to the algal bloom at North Gully Cove.

The trends in macrophyte biomass at North Gully Cove are more encouraging. While total bed area and standing crop were comparable to previous years, there has been a major decrease of Eurasian watermilfoil in the community. This was evident in terms of total milfoil coverage, biomass, and reduction of milfoil abundance within the areas where the species was still dominant. The same pattern of milfoil loss was seen to varying degrees at Sutton Point (large losses) and Sand Point (moderate losses).

Clumps and clouds of filamentous algae as well as macrophytes (eelgrass and Sago pondweed) can be seen in the photograph.

Image courtesy: SUNY Geneseo.

Cottonwood Gully, however, experienced substantial increases in milfoil biomass, consistent with recent increases in nitrogen loading reported for Cottonwood Gully by Makarewicz and Lewis (2010). This reverses a trend of milfoil reductions at Cottonwood Gully that began in 2004 after management practices were implemented in the watershed as part of the USDA project.

We cannot conclude that the reduced milfoil biomass in North Gully Cove in two of the previous three years was caused solely by reduced nutrient input from North Gully stream. Nevertheless, there are indications that some improvement has taken place in North Gully Cove and it may be useful to continue occasional monitoring of this site to document any additional improvement as funding allows.

FINDINGS OF THE 2010 INVESTIGATIONS : STATUS OF CONESUS LAKE ECOSYSTEM HEALTH

Bacteriological Monitoring The Livingston County Department of Health samples nearshore waters at designated bathing beaches in Conesus Lake each summer for the presence of fecal coliform bacteria. This class of bacteria is used to indicate the potential presence of pathogenic (disease-causing) microorganisms. In 2010, samples were collected at three sites: Long Point Beach, Southern Shores Beach and Camp Stella Maris. Results are compared to the state ambient water quality standard for bacteria, which is used by the Department of Environmental Conservation to evaluate water quality and by the Department of Health to evaluate suitability for swimming at designated beaches.

Image courtesy: Livingston County Planning Department

The state's ambient water quality standard for fecal coliform bacteria standard, 200 colony forming units per 100 ml of lake water, is calculated as the geometric average of at least five samples per month. The 2010 results for the three Conesus Lake beaches indicate consistent compliance with the standard.

NYSDEC Fisheries Monitoring During 2010, the New York State Department of Environmental Conservation (NYSDEC) aged the fish collected in 2009 using both fish scales and *otoliths* (fish ear bones). Fish scales and otoliths form yearly rings, much like those on a tree, which can be counted to get the age of the fish. Once the data analysis is complete, NYSDEC will prepare a comprehensive report on the Conesus Lake fish community from 2000-2009.

In October 2010, Dr. Lars Rudstam of the Cornell University Biological Field Station supported the work of Region 8 biologists with a hydroacoustical survey of Conesus Lake's alewife population. Dr. Rudstam is one of the Cornell biologists investigating walleye as a tool to manage alewife populations in Cayuta and Canadarago Lakes. This research, funded by NYSDEC, is designed to investigate the compensatory responses of alewife to walleye predation, the effects on the Canadarago Lake ecosystem and sportfish from increasing alewife populations, and the possibility of using walleye stocking as a management tool to control alewife in Cayuta Lake. Initial findings suggest that, although alewife abundance declined following walleye stocking in Cayuta Lake, the adult walleye population could not maintain a level that would permanently decrease alewife abundance.

Walleye. Image Courtesy: U.S. Fish and Wildlife Service

Comparison of walleye population and stocking rates in two lakes.

Lake	Estimated Population (per hectare)	Fingerling Stocking Rate (per acre)
Cayuta (2002-2006)	12-14	250
Conesus (2002)	15	20

Despite higher stocking rate in Cayuta Lake over 5 years, the population of walleye was essentially the same as Conesus Lake.
(Conesus Lake population estimate courtesy Matt Sanderson, Region 8 biologist).

2010 FOCUS ON PUBLIC INFORMATION

Phosphorus (P) Free Lawn Fertilizer Project. Runoff from fertilized lawns has been cited as a potential source of phosphorus, and thus a factor promoting the growth of weeds and algae, in lakes throughout New York State. A cooperative demonstration project, led by the Conesus Lake Association in partnership with Cornell Cooperative Extension, Geneseo School District, Livingston County Planning Department, and the Livingston County Department of Health, measured phosphorus in near-shore areas of the Lake. In August 2010, New York State passed a law effectively eliminating phosphorus in dishwasher detergents (effective immediately) and in lawn fertilizers (effective in 2012).

Public education kiosk at Vitale Park. The Planning Department issued a request for proposals for construction of a kiosk at Vitale Park. Three proposals were received, and all exceeded the budgeted funds. The Town of Livonia considered other options, and decided to partner with the Boy Scouts and a local business and construct the sign as an Eagle Scout project. Planning Staff have met with the Eagle Scout, his parents, and a local contractor to discuss the design. Construction and installation of the kiosk will be completed in May 2011.

Outreach. The Watershed Manager, Watershed Inspector and Planning Assistant participated in the "Forgotten 4 Festival" at the Chip Holt Nature Center in June. In July, the Watershed Manager participated in the CLA Arts & Craft Show.

Invasive Species. Livingston County continues to participate in the Finger Lakes PRISM, an information-sharing group that was created by New York State to foster a regional approach to managing invasive species, both aquatic and terrestrial. The recent discovery of the Emerald Ash Borer (EAB) in Caledonia has prompted the Planning Department and the Department of Health to issue joint public education materials.

Image courtesy: Livingston County Planning Department

# in Plan	Recommendation	Priority	Action Taken
A-1	Review and amend zoning regulations to improve consistency in near-lake areas.	High	Planning Dept. continued working with Town of Conesus on their zoning update. Technical assistance was provided as needed to all watershed towns.
A-3	Develop public education campaigns on BMPs for lake and watershed residents.	Medium	• *Phosphorus (P) Free Lawn Fertilizer Project.* NYS recently adopted a law prohibiting the use of phosphorus-containing lawn fertilizers. This cooperative demonstration project, led by the CLA in partnership with Cornell Cooperative Extension, Geneseo School District, Planning, and Dept. of Health, measured the phosphorus in near-shore areas of the Lake. • Livingston County has contracted with the Town of Livonia on construction of a public education kiosk at Vitale Park. Planning. Construction/installation to be completed May 2011. • The Watershed Manager, Watershed Inspector and Planning Assistant participated in the "Forgotten 4 Festival" at the Chip Holt Nature Center in June. • The Watershed Manager participated in the CLA Arts & Craft Show in July.
B-1	Secure funding to help mitigate the financial impacts of changes in agricultural practices on the producers.	High	In progress. Agencies will continue these activities annually as part of their existing programs.
B-2	Implement practices that will reduce non-point source pollution from farms.	High	• Nutrient Trap technology was studied by the Ag and Tech committees at the December 11, 2009 joint meeting. No further action was recommended. • Agricultural BMPs continue to be implemented by watershed farmers, the Livingston County SWCD, and the USDA NRCS.
B-3	Develop and implement programs and partnerships to facilitate removal of waste materials from farms.	High	• There are no existing GLOW programs. GLOW is willing to participate in new program development. • The impact on the new NYSDEC regulation on open burning was discussed with the Agriculture Committee at the 12/11/2009 meeting.
B-4	Develop programs for public education and outreach for both the agricultural and the non-agricultural community.	High	• Creation of a photo album of before/after agricultural BMP installation is in progress; photos have been provided by NRCS to the PE&O Committee.

Key to Acronyms:

BMPs - Best Management Practices
CLWC - Conesus Lake Watershed Council
GLOW - Genesee/Livingston/Ontario/Wyoming Counties
GLRI - Great Lakes Restoration Initiative
SWCD - Soil and Water Conservation District
CLA - Conesus Lake Association
EPF - Environmental Protection Fund
NRCS - Natural Resource Conservation Service
PRISM - Partnership for Regional Invasive Species Management
USDA - United States Department of Agriculture

# in Plan	Recommendation	Priority	Action Taken
C-1	Develop and implement program to restore and stabilize stream banks in the watershed.	High	• The draft contract with revised scope from the State for Phase I is undergoing finalization. • The Town of Livonia was awarded an EPF grant for $358,132 for Phase II of the streambank remediation project. The draft contract is undergoing finalization.
C-3	Develop public education campaigns on the impact of human activities on the health of the Lake.	Medium	• The CLA Water Quality Committee recently initiated the Conesus Lake campaign - a project designed to encourage lakeside residents to be good lake stewards. A report on this initiative was given at the August CLWC meeting.
D-3	Municipal Highway Departments should develop a plan, subject to available funding, to remediate ditches in poor condition.	Medium	• EPF Road Ditch Grant: The NYSDOS approved the preliminary plans for road ditch remediation. The first payment request was submitted to the State in September 2010 for work on East Lake Road and Pennemite Road in Livonia, Camel Road in Conesus, David Grey Road and Rosebrugh Road in Groveland, and Conesus Sparta Townline Road in Sparta.
G-1	Investigate and implement effective methods to control the spread of non-native (exotic) organisms.	High	• Livingston County continues to participate in the Finger Lakes PRISM, an information-sharing group that was formally created by New York State to look at the problem of aquatic and terrestrial invasive species on a regional level. • The recent discovery of the Emerald Ash Borer (EAB) in Caledonia has prompted Planning Department and the Department of Health to issue joint public education materials to the public.
G-2	Initiate a leaf cleanup program for lakeside and near shore residents of Conesus Lake	High	• A leaf pick-up program was included in the 2010 GLRI grant application. We received notice that this proposal was not funded.
G-3	Initiate effort to determine if alum treatment to control release of phosphorus from deep lake sediments would be effective in Conesus Lake. Proceed with plans for implementation if effectiveness is warranted and monitor for environmental impacts.	High	• CR Environmental completed a bathymetric survey of the lake in 2009. Presentation of the results was provided to the CLWC at the February 26, 2010 meeting. • Ontario County Planning Department staff and Honeoye Lake Association officials met with the CLWMP Technical Committee on November 19, 2010 to discuss the effectiveness of the alum treatment of Honeoye Lake.

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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	• Results of the 2009 zooplankton monitoring show that the large zooplankton population has not rebounded since the introduction of the alewife. The CLA continues to work on its caged walleye rearing project. • Walleye fingerlings were stocked in the lake in June (65,000 2-inch length) and August (1,500 4- to 6-inch length) of 2010. • NYS DEC/CLA Joint Grant to upgrade the Northern Pike Habitat Area is in progress. This new project, funded through the Great Lakes Restoration Initiative, will improve water control structures that facilitate fish spawning. CLA and DEC officials reported on this project at the August CLWC meeting.
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	Meeting to discuss annual monitoring was held in February 2010. Summer 2010 monitoring and reporting were completed by SUNY Brockport, SUNY Geneseo, and Livingston County Department of Health.
H-2	Prepare and distribute an annual Conesus Lake and Watershed Report Card.	High	2009 Report Card completed and presented to the CLWC.

Image courtesy: Livingston County Planning Department

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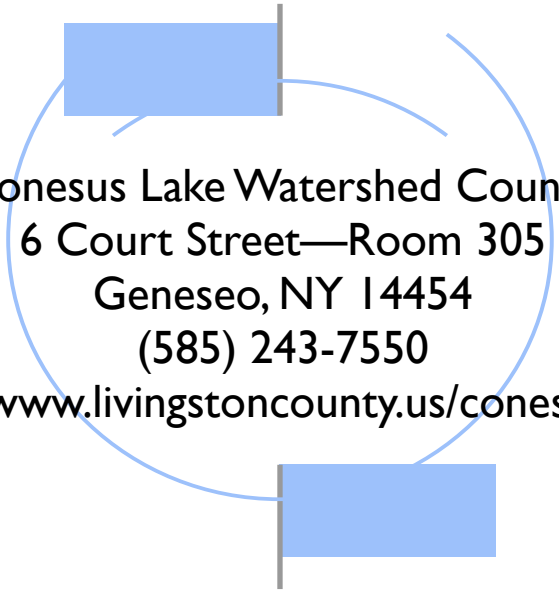

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