2003

Conesus Lake and Watershed Report Card

Technical Version

Assessment of the Conesus Lake Watershed Management Plan in 2003

Conesus Lake Watershed Council

February 10, 2004

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 designed to reduce nonpoint source pollution. In addition, the annual summary provides a forum for tracking water quality conditions in Conesus Lake and highlighting new information. Some material in this technical summary will also appear in a condensed version of the Report Card tailored for the interested public.

PART A: CONESUS LAKE WATER QUALITY STATUS UPDATE

Weed growth

Visual observations and community comments indicate that weed growth continues to be a major issue affecting recreational use of Conesus Lake.

Dr. Sid Bosch and colleagues investigated the biomass of Eurasian watermilfoil in beds adjacent to tributary streams and reported a correlation between rainfall event loading of phosphorus (Oct – Dec 2000) and biomass of the milfoil beds in summer 2000.

Ref: Johnson, D.A., I. Bosch, and M.D. Valentino. 2001. SUNY Geneseo Journal of Science and Mathematics. 2 (1):1-6.

As part of the USDA agricultural Best Management Practices (BMP) evaluations (program led by Dr. Joseph Makarewicz), Dr. Sid Bosch is measuring weed growth adjacent to the "control" and "treatment" subwatersheds. Work is ongoing (no data to report).

SUNY Geneseo biologists reported on experiments demonstrating that growth of the filamentous green alga *Spirogya* is stimulated by phosphorus and nitrogen. This species of macroalgae is common in Conesus Lake and forms green clouds in near-shore areas.

Ref: McKernan, P. and S. Juliano. 2001. SUNY Geneseo Journal of Science and Mathematics. 2(1):19-25.

Algae and loss of clarity

Recent data indicate that summer phosphorus levels, algal abundance, and water clarity continue to be problematic.

The NYSDEC continued to sample Conesus Lake, as well as the other Finger Lakes, to track water quality conditions. The focus of this monitoring is on "trophic state indicators", defined as measurements that help managers interpret the level of nutrients and algal growth. Plots that were included in the Characterization Report and the Management Plan are updated with new data from the various monitoring programs.

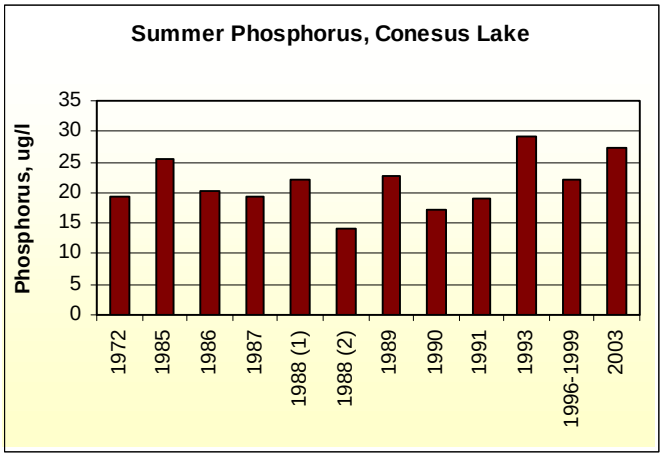


Figure 1. Average total phosphorus measured in summer (June-August) in the upper waters of Conesus Lake.

Phosphorus measurements were obtained in 2003 as part of Livingston County's evaluation of the magnitude and importance of internal (sediment) phosphorus loading. The 2003 summer average concentrations measured in the lake's upper waters are plotted on **Figure 1** with historical summer data collected at comparable depths. Overall, there is no trend evident in phosphorus concentration.

NYSDEC uses 20 µg/l (summer average, upper waters) as the threshold for impaired waters. When phosphorus concentrations exceed this level there is a high risk of algal blooms and unattractive, turbid waters. Phosphorus concentrations over 20 µg/l was the basis for the placement of Conesus Lake on a section of the state's 303(d) list in 2002.

Unfortunately, the 2003 measurement of 27 µg/l continued to be well above this threshold. This result indicates that additional controls on phosphorus loading are needed to improve the lake's attractiveness for recreation and long-term suitability as a high quality water supply.

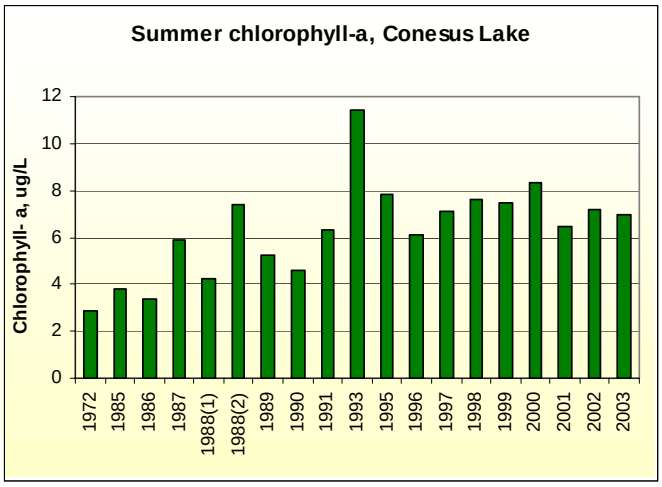


Figure 2. Average chlorophyll-*a* levels measured during summer (June-August) in surface waters of Conesus Lake.

Summer average chlorophyll-a concentrations are a good indicator of the abundance of algae suspended in the open waters; these tiny plants make the water appear green. Region 8 NYSDEC has been measuring chlorophyll-a concentration as part of their zebra mussel program. Data from 2001 – 2003 are displayed in **Figure 2** along with historical data. There is no trend evident in chlorophyll-a data.

Water clarity (as measured by the Secchi disk) remains variable from year to year. The 2003 data (collected by Dr. Sid Bosch and students as part of the alum evaluation) are within the range of measurements in recent years, as displayed in **Figure 3.**

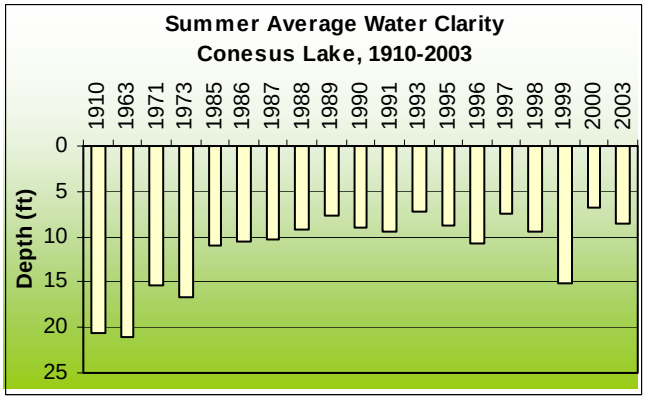


Figure 3. Bars indicate average depth to which Secchi disk was visible during summer months (June-August).

Pathogen indicators (coliform bacteria)

Recent sampling indicates that bacteria levels in the lake are within safe levels for recreation and drinking water supply.

There have been no violations of safe drinking water standards for indicator bacteria levels reported by the water purveyors.

The Watershed Inspector samples for bacteria in nearshore areas of Conesus Lake during the summer to assess whether the waters are safe for recreational use. Results from 2002 and 2003 indicate that bacteria levels were very low, well below levels considered safe (**Figure 4**).
A research project conducted by one of Dr.

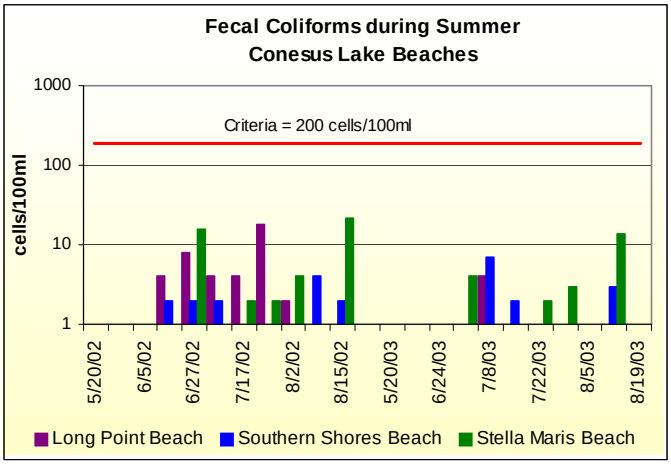
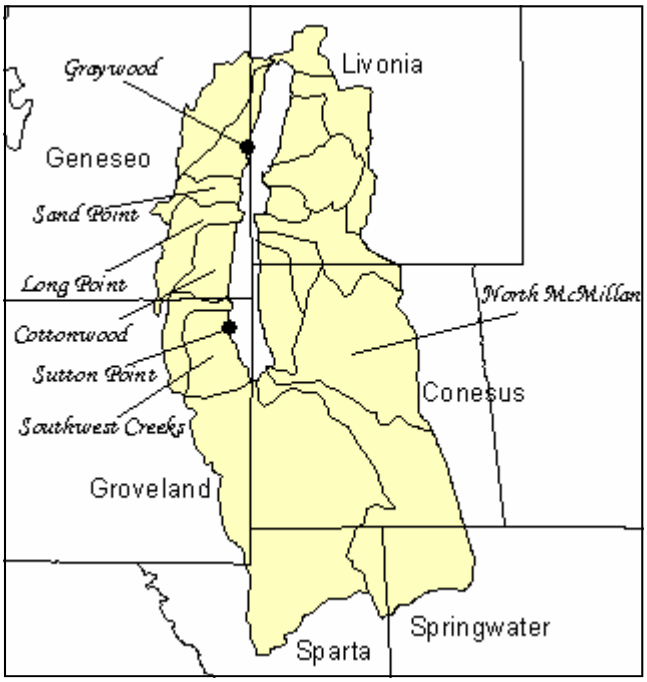


Figure 4. Plot shows count of fecal coliforms sampled in public beaches along Conesus Lake shore, May—August 2002 and 2003. Notice values are plotted using a logarithmic scale.

Makarewicz's graduate students is creating a DNA library of coliform bacteria for use in identifying the source of bacteria. Once complete, this library will help investigators pinpoint whether bacteria are from waterfowl, cattle, domestic pets, or wildlife such as deer and raccoons. With source identification, appropriate management measures can be selected.



Sedimentation

Since August 2002, investigators have made weekly measurements of streamflow and the loss of nutrients and sediment at seven locations around Conesus Lake. This comprehensive program is part of the USDA research program led by Dr. Makarewicz. The monitoring program continues to highlight geographical areas of concern around the lake. In addition to monitoring, program includes implementation of agricultural Best Management Practices.

Lakeshore Towns have taken action to control erosion and sedimentation associated with development areas by adopting local laws based on the CLWMP Model Erosion and Sedimentation Control Law.

Sites used in the USDA research program include: Graywood Gully, Sand Point, Cottonwood, Long Point, North McMillan, Sutton Point, Southwest Creeks. Data are posted weekly to the project web site (http://www.envsci.brockport.edu/Conesus_Project/Hydrologic_Data.htm).

Data analysis is likely to include both "before and after" analysis on treatment subwatersheds (where agricultural BMPs have been installed) and treatment vs. control areas.

Figures 5 and 6 show area loading for the seven subwaterseds in the USDA study. It is important to notice that both figures are based on preliminary data and may be subject to revision. (Data source: SUNY Brockport project web site http://www.envsci.brockport.edu/Conesus_Project/Hydrologic_Data.htm).

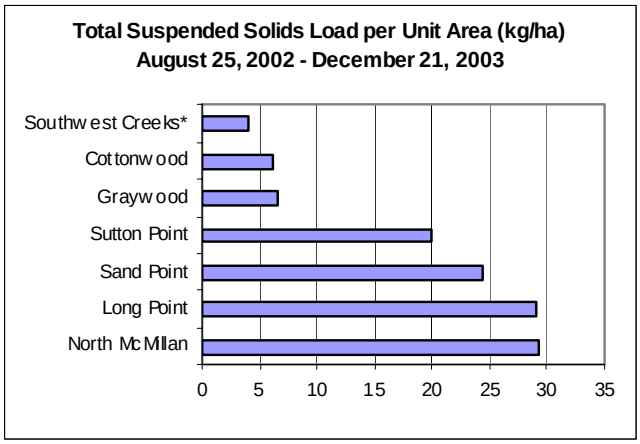


Figure 5. PRELIMINARY DATA SUBJECT TO REVISION..

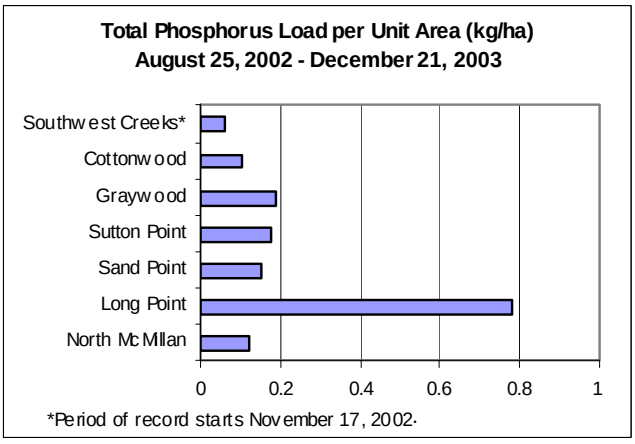


Figure 6. PRELIMINARY DATA SUBJECT TO REVISION.

Pesticides

The open waters of Conesus Lake continue to have detectable concentrations of pesticides and their breakdown products. Concentrations have remained relatively constant (neither increased nor decreased) since the initial sampling in 1997-1998. No pesticides exceeded health-based water quality standards.

The USGS sampled the Village of Avon water intake in Conesus Lake on ten occasions between May 16, 2000 and January 29, 2002 to test for pesticides and metabolites. Specialized analytical techniques were used to test for the presence of these chemicals at trace concentrations. According to David Eckhardt of USGS the program will not continue due to budget cuts.

Results indicate that the suite of pesticides present at the water intakes has remained constant (no new chemicals detected) and that concentrations have remained comparable over the 5 years of monitoring. A summary table from the Characterization Report has been updated to present the new USGS data. As evident from comparing the column "maximum concentration detected" with the column "criteria or standard", concentrations remain well below levels considered safe for human and environmental health.

Compound Detected	Percent of Observations with Detectable Concentration	Maximum Concentration Detected (µg/l)	Criteria or Standard (µg/l)
Simazine	100	0.058	0.5
Prometon	70	0.036	50
De-ethyl atrazine	90	0.041	50
Cyanazine	70	0.01	1
Metalochlor	100	0.034	50
Atrazine	100	0.114	3
Alachlor ESA	90	0.22	50
Alachlor OXA	20	0.06	50
Metalochlor ESA	100	0.34	50

Source: http://nwis.waterdata.usgs.gov/usa/nwis/qwdata/?site_no=424937077422101

Zebra mussels

The invasive species, the zebra mussel, continues to be an important component of the benthic community of Conesus Lake.

Increasing chloride (salt) concentrations

As noted in the Watershed Characterization Report, chloride concentrations in Conesus Lake have steadily increased as the watershed became more developed. No recent lake-wide data is available to report on whether this trend has slowed or been reversed. However, efforts are underway to control chloride inputs to the lake. As an example, the Town of Conesus is planning to complete construction of their salt storage structure by the end of 2004.

NEW INVESTIGATIONS—2003

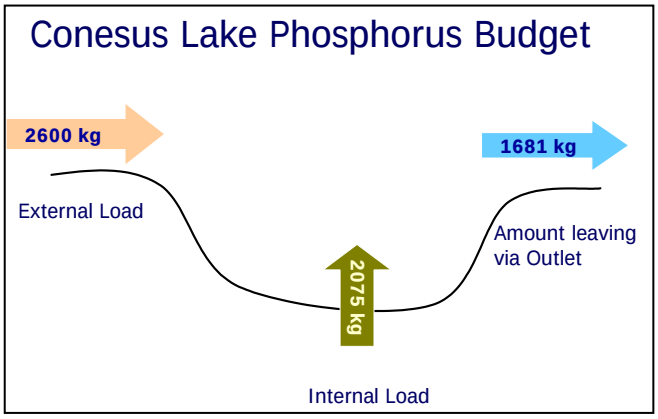
Sampling and analysis in support of the alum evaluation

The CLWMP included a recommendation to investigate the feasibility of nutrient inactivation using alum to control algae and improve water clarity. Sampling and analysis during 2003 were conducted to help define the magnitude and importance of internal phosphorus loading. Results indicate that phosphorus release from the sediments (estimated at 2100 kg per year) is comparable to phosphorus coming in from the watershed (estimated at 2600 kg/yr).

One recommendation of the Conesus Lake Watershed Management Plan was to evaluate the potential effectiveness of an alum application. This evaluation was completed in 2003 and has provided new insights into the magnitude and importance of the two sources of phosphorus to the lake: external (from the watershed) and internal (from the sediments). Alum application is directed at controlling phosphorus recycled from the lake sediments.

Surface runoff (which includes streamflow and stormwater runoff) is the primary external source of phosphorus to Conesus Lake. Monitoring data suggest that the external phosphorus load is on the order of 2600 kg/yr. The external loading varies each year depending on the amount of rainfall and extent of land disturbance in the watershed.

For the first time, detailed monitoring was completed in summer 2003 to quantify the magnitude of internal phosphorus loading to Conesus Lake water quality. Results indicated that the sediment contribution of phosphorus is approximately 2100 kg/yr, an amount comparable to the external loading.



Because internal phosphorus loading is significant in Conesus Lake, controlling this source with an alum application would effectively reduce the amount of phosphorus available for algal growth. This is expected to measurably improve water quality and result in improved water clarity and reduced frequency of algal blooms. The alum dose being proposed for Conesus Lake is based on an expected useful life of approximately 10 years. The useful life will depend on a number of factors including how effectively external phosphorus loading is controlled.

Analysis of calcium carbonate levels in lake water and sediment

Recent investigations of the geochemistry of the Finger Lakes indicate that the surface waters of many lakes, including Conesus, are now supersaturated with calcium carbonate (calcite) during the summer. This appears to be a direct result of acid precipitation. In 1972, Conesus Lake was undersaturated with calcite; by 1999 the lake waters had become supersaturated. This finding has implications on the lake's water clarity. The excess calcite can precipitate as the lake waters warm and pH increases with photosynthetic activity. Algal cells may act as nucleation sites for precipitation of the calcite. This leads to cloudy, turbid water.

Based on recent lake water quality data, the surface waters of many of the Finger Lakes are now supersaturated with calcium during the summer. According to researchers, the elevated concentrations of calcium carbonate present in many of the Finger Lakes are a result of the region's geology. A recent publication presents compelling data that the calcium concentrations in the lakes' waters are increasing as a result of acid precipitation (Lajewski et al. 2003).

During most of the year, calcium carbonate remains dissolved in the cold water of the Finger Lakes, but as the lakes warm up, the solubility of calcium carbonate is lowered. As a result, the calcium carbonate may precipitate out of the water, forming clouds of very small solid particles. These are referred to as "whiting events".

Algal cells may trigger whiting events, along with increased calcium concentrations and higher water temperatures. In addition, pH increases during photosynthesis can cause precipitation of dissolved calcium. Because of the relationship between warm temperatures, algal cells, and pH increases during photosynthesis, whiting events are typically seen during the summer.

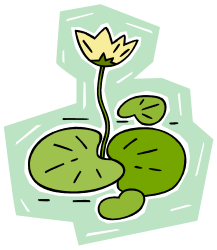
Source: Lajewski, C.K., H.T. Mullins, W.P. Patterson, and C.W. Callinan. 2003. Historic calcite record from the Finger Lakes, New York: Impact of acid rain on a buffered terrane. GSA Bulletin:115 (3) p. 373-384.

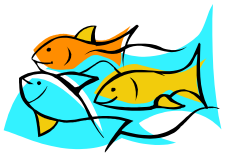
PART B: CLWMP RECOMMENDATIONS STATUS UPDATE

No.	Recommendation	Priority	% Completed	Comments
	Creation of a Conesus Lake Watershed Council and its Committees.	High	100%	
A-1	Review and amend zoning regulation.	High	10%	In progress as part of G/FLRPC local laws project
A-2	Adopt local sediment and erosion control laws based on the CLWMP Model Erosion and Sediment Control Law	Medium	100% (lakeshore Towns)	
A-3	Develop public education campaigns: • Encourage planting and protection of streamside vegetation • Discourage use of herbicides, pesticides, and fertilizers on shoreline properties • Erosion control and lake-friendly landscaping	Medium	5%	
B-1	Secure funding to help mitigate the financial impacts of changes in agricultural practices on the producers.	High	15%	USDA grants, SWCD, and FSA programs
B-1, B-2	Implement practices that will reduce nonpoint source pollution from farms.	High	10%	
B-3*	Develop & implement programs for waste removal from farms	High	0*	
B-4	Develop programs for public education and outreach for both the agricultural and the non-agricultural community.	High	0%	
B-5	Recruit additional agricultural producers to serve on advisory committee during implementation phase of watershed management plan	High	25%	
C-1	Develop and implement program to restore and stabilize streambanks in the watershed.	High	0%	
C-2*	Identify & develop sites for regional stormwater treatment areas	Low	0*	

No.	Recommendation	Priority	% Completed	Comments
D-1	Provide training on erosion control practices for Municipal Highway Departments	High	100%	On-going annually
D-2	Implement best management practices, such as hydroseeding or other approved methods, as soon as possible after road construction or maintenance activities occur in the watershed.	Medium	15%	
D-3	Municipal Highway Departments should develop a plan, subject to available funding, to remediate ditches in poor condition.	Medium	5%	
D-4*	Develop plan to phase-in computer controlled spreaders on trucks used for winter de-icing	Low	0*	
D-5	Develop public education campaigns: • Sensible winter driving • Why and when are road ditches cleaned • Need to keep yard debris and trash out of road ditches	Low	0%	
E-1, E-6	Revise Watershed Rules and Regulations	High	100%	Sent to NYSDOH for approval
E-2	Develop a public education campaign: • Effect of boat speed on weeds (creates weed-chop) • Precautions to follow when discarding unused bait or transporting bait from one waterbody to another (exotic species introduction) • Need to clean and inspect boat (body, bilge, coolant system, etc.) and trailer when transporting from one waterbody to another (exotic species introduction) • Existing boat and personal watercraft laws	High	15%	
E-3	Continued enforcement of existing boat and personal watercraft laws	High	100%	On-going annually
E-4	Amend Town dock laws to add the provision of 24-hour access to toilet facilities to the list of requirements for granting a Special Use Permit.	Medium	0%	Part of G/FLRPC local laws project
E-5*	Winterize toilet facilities at State Boat Launch and Long Point Park.	Medium	0*	

No.	Recommendation	Priority	% Completed	Comments
F-1	Request NYSDEC to review and update safe water yield calculations for Conesus Lake.	High	0%	
F-2	Extend sewer system	Medium	15%	
F-3	Control sanitary sewer overflows within the collection system.	Medium	15%	On-going
F-4*	Develop protocol and timeline to inventory septic/sanitary systems in watershed.	Low	0*	
G-1	Investigate and implement effective methods to control the spread of non-native (exotic) organisms.	High	5%	
G-2	Develop and implement a program for cleaning accumulated aquatic plants and algae along the shoreline of Conesus Lake.	High	0%	
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	10%	
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	20%	
G-5	Initiate an experimental program for control of aquatic weeds using the aquatic moth and/or weevil.	Medium	0%	
G-6*	Develop program for suctioning weeds from shallow public areas	Low	0*	
G-7*	Develop weed harvesting program	Low	0*	
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	100%	On-going annually
H-2	Prepare and distribute an annual Conesus Lake and Watershed Report Card	High	100%	





*These recommendations were not targeted for work in 2003.

Key to Acronyms

CLWMP—Conesus Lake Watershed Management Plan
FSA—Farm Services Agency
G/FLRPC—Genesee/Finger Lakes Regional Planning Council
NYSDEC—New York State Department of Environmental Conservation
NYSDOH—New York State Department of Health
SWCD—Soil and Water Conservation District
USDA—United States Department of Agriculture

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