



Onondaga Lake: Progress Report 2009

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Onondaga County Ambient Monitoring Program

Onondaga Lake is on the road to recovery

Multiple efforts are underway to restore Onondaga Lake, and the lake is responding with greatly improved water quality and habitat conditions. These efforts include major improvements to the wastewater collection and treatment system, reductions in stormwater runoff and remediation of industrial wastes. Nutrient concentrations are in steep decline, algal blooms have essentially disappeared, and oxygen levels are greatly improved. Interest in the lake as a recreational resource has surged.

For decades, Onondaga County Department of Water Environment Protection has monitored lake conditions. The Ambient Monitoring Program (AMP) provides a scientific basis for answering important questions about the lake.

- How have the remedial efforts affected the lake?
- Is the lake suitable for recreational uses?
- Does the lake support a healthy aquatic community?

This progress report describes 2009 conditions and compares recent data with historical data to track improvements.



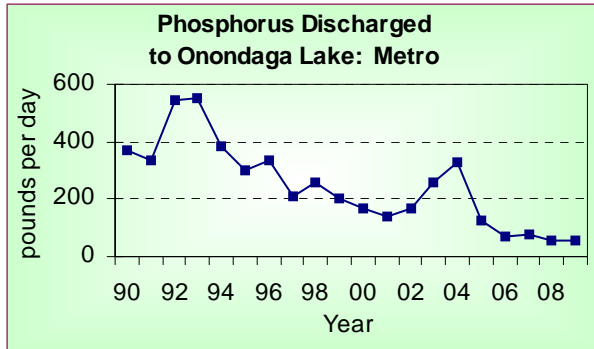
Measures of Progress

The 2009 results document the significant improvements realized by improved treatment at the Metropolitan Syracuse Wastewater Treatment Plant (Metro), continued progress toward abatement of combined sewer overflows (CSOs), and reductions in nonpoint source pollution from the watershed's urban and agricultural areas. Onondaga Lake continues to exhibit the dramatic improvements we first described in 2008. Phosphorus and ammonia concentrations are reduced, dissolved oxygen levels continue to rise, and water clarity has improved with the decline in algal abundance. Clearer water improves light penetration, allowing expansion of aquatic plants and improving habitat conditions for gamefish such as bass.

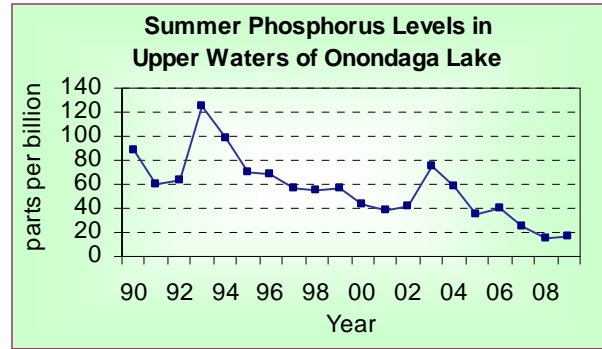


How have improvements in wastewater treatment affected phosphorus, algal blooms and dissolved oxygen levels ?

Phosphorus is the limiting nutrient for algal growth. Too much phosphorus causes excessive algae, which make the water appear green and cloudy, and contributes to low oxygen levels. The summer of 2009 marked the second consecutive year that the total phosphorus concentration in Onondaga Lake complied with New York State’s guidance value of 20 parts per billion (ppb). The state selected 20 ppb based on user perception survey data indicating whether lakes are attractive for recreational use. Onondaga Lake now meets the state’s guidance value for phosphorus in lakes, and is consequently considered suitable for recreation.

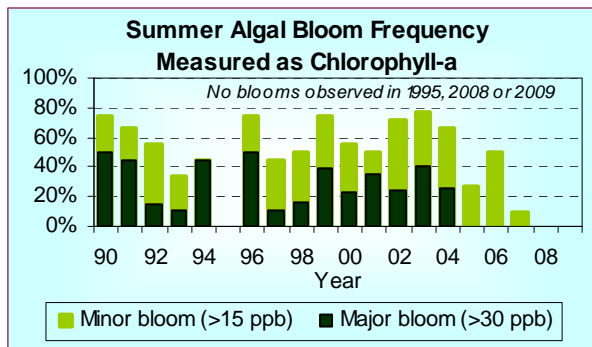
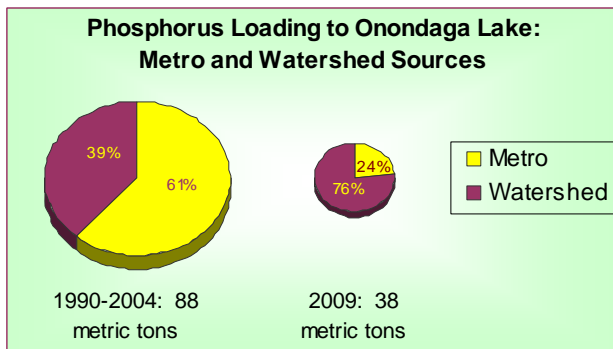


Improvements at Metro have reduced phosphorus discharges to the lake from the treatment plant by more than 80%. Since the advanced treatment system was completed in 2005, loading has been less than 100 lbs per day.

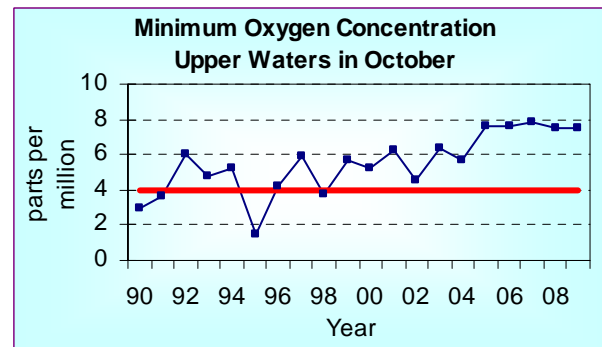


Reductions in phosphorus discharges from the Metro plant have resulted in substantially lower phosphorus concentrations in the lake water in recent years, down to 17 ppb in 2009, below the levels measured in Oneida Lake.

With the recent improvements to the Metro plant, runoff from the watershed contributes the majority of phosphorus to Onondaga Lake. Prior to 2005, Metro contributed approximately 60% of the annual phosphorus load. The total phosphorus load to the lake has declined substantially; for the period 1990-2004, phosphorus loading averaged 88 metric tons per year; in 2009, less than half that amount (38 metric tons) entered the lake.



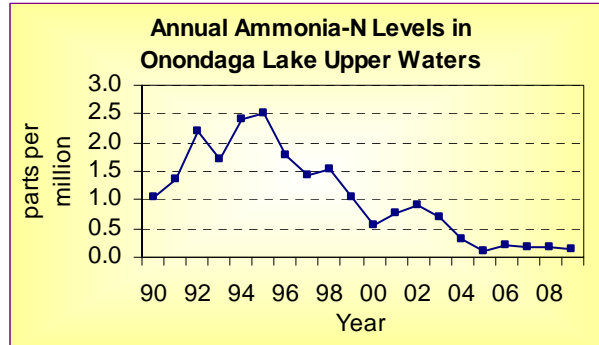
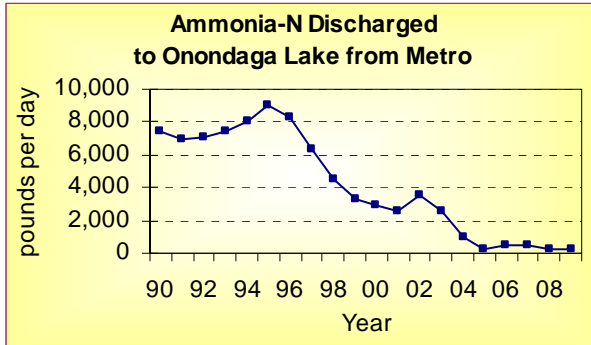
Less phosphorus in the lake has resulted in fewer and less severe algal blooms. No algal blooms have been measured in Onondaga Lake in the past two summers. Less algae also means clearer water and more oxygen for aquatic life.



Until recently, low dissolved oxygen (DO) in October was one of the most significant water quality impairments in Onondaga Lake. Recent improvements in DO mean better habitat for aquatic life. The NYSDEC minimum standard for DO is 4 ppm.

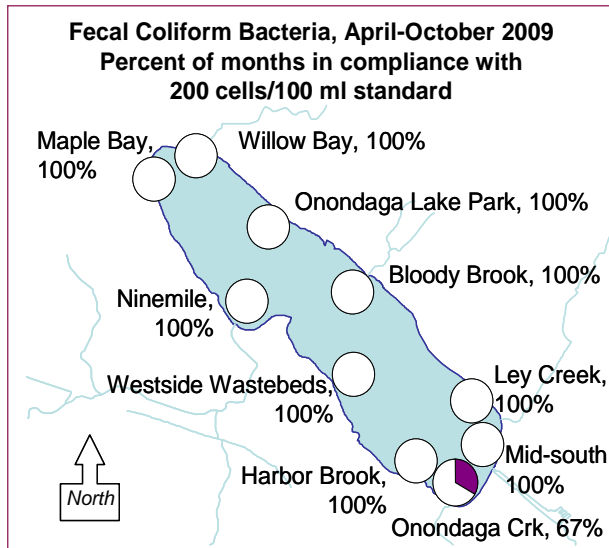
How have improvements in wastewater treatment affected ammonia levels in Onondaga Lake?

High concentrations of ammonia can be harmful to sensitive aquatic life, such as young fish. Onondaga County has completed major upgrades at the Metro plant that reduced the amount of ammonia-N discharged to the lake from the treatment plant by 98%. An advanced treatment system came on-line in 2004; as a result, ammonia-N concentrations in the lake have declined and meet state standards developed for protection of aquatic life.

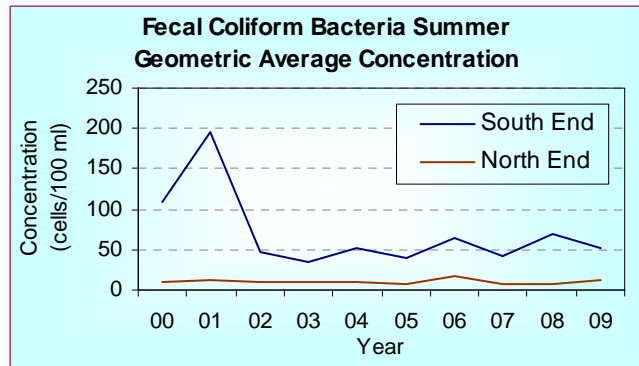


How have improvements in wastewater collection and treatment affected bacteria levels in the lake?

Areas of Syracuse are served by combined sewer systems (CSOs) which carry both sewage and storm runoff. These pipes can overflow during periods of heavy rain and snowmelt, allowing a mixture of stormwater and raw sewage to flow into creeks and ultimately reach Onondaga Lake. During 2009, the County continued work on separating sewers, planning for new approaches to reduce CSOs, capturing floatable materials and maximizing system storage capacity. Onondaga County facilities and other urban areas began to implement green infrastructure solutions to help manage urban storm runoff. Green infrastructure encourages infiltration, capture and reuse of storm runoff before it enters the sewer system. By preventing storm water runoff from entering the combined sewers, more capacity is available for sanitary sewage flow to reach Metro for treatment. A “Save the Rain” initiative is underway to educate watershed residents about ways to capture and use rain water.



This figure displays the 2009 data. The fecal coliform bacteria standard of 200 cells per 100 ml of lake water, calculated as a geometric average of at least five samples per month, is used by DEC to evaluate water quality and by DOH to evaluate suitability for swimming at designated beaches.

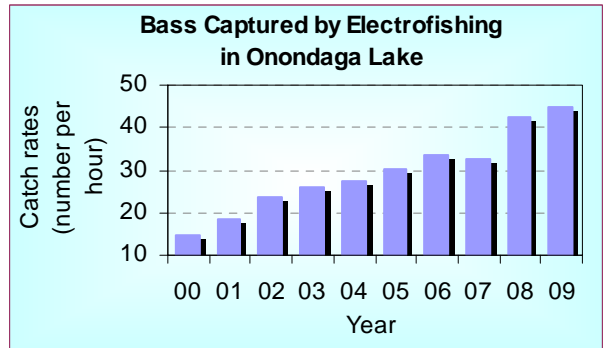
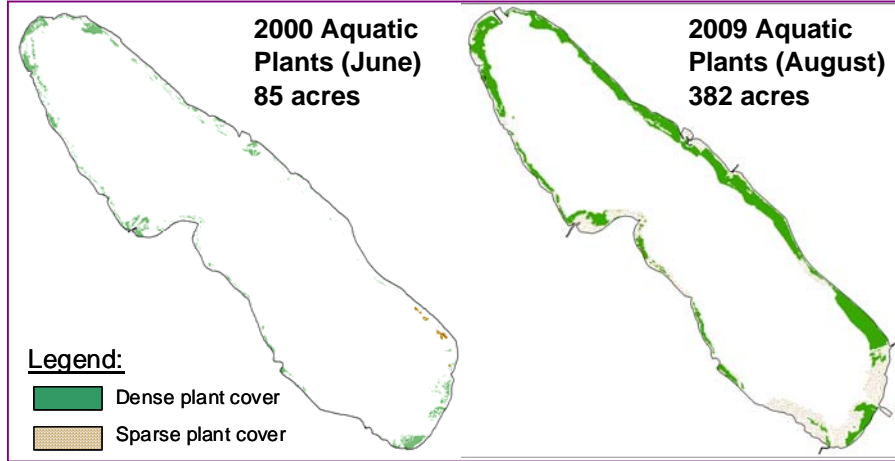


The previous ten years of summer measurements, the period of major recreational use, are displayed above. Bacteria counts are higher in the southern region of Onondaga Lake, close to the major inflows, as compared to the northern regions. The good news is that bacteria levels at the northern stations and the lake outlet are consistently very low.

As in previous years, the 2009 data confirm that bacteria levels increased following significant storm events. This effect was limited to the southeastern portion of the lake shoreline, adjacent to Harbor Brook and Onondaga Creek.

How has aquatic life in Onondaga Lake changed?

Aquatic plants provide vital spawning and nursery habitat for lake fish, as well as food and cover to a variety of other aquatic animals. The shallow areas of the lake are increasingly covered with aquatic plants as water quality improves, and a thriving warmwater fish community is one positive result. A nearly four-fold increase in plant cover was documented from 2000 to 2009.



Onondaga Lake supports a diverse warm-water fish community; there are many species present, and game species such as bass are increasingly abundant. This is a result of improved habitat and better water quality.

Summary and a Look Ahead



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Real progress is being made in Onondaga Lake. The water is clearer, there is less algae, and water quality conditions support a thriving warm water aquatic community. Phosphorus, water clarity and algal abundance are now comparable to other regional lakes such as Oneida Lake and the smaller Finger Lakes Otisco and Owasco. Onondaga Lake is a recreational asset to the entire community. The County's monitoring program will continue to evaluate Onondaga Lake's response to wastewater improvements, and reductions in stormwater runoff and industrial pollution.