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Onondaga County Department of
Water Environment Protection



Onondaga Lake: Progress Report 2010

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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. 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?

The answers to these questions are now evident. Nutrient concentrations are in steep decline, algal blooms have essentially disappeared, and oxygen levels are greatly improved. The lake supports a healthy balance of plants and animals. Interest in the lake as a recreational resource has surged.

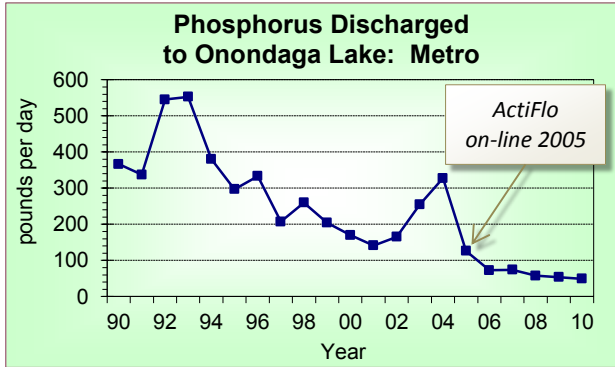
This progress report describes 2010 conditions and compares recent data with historical data to track improvements.



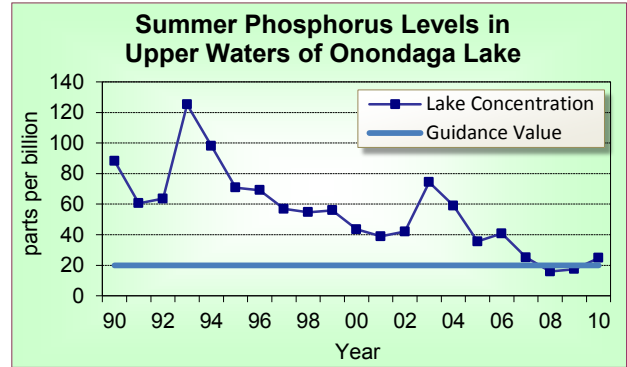
Measures of Progress

The 2010 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 water quality improvements first noted in 2006. 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 fish habitat.

How have improvements in wastewater treatment affected phosphorus, algal blooms, and dissolved oxygen levels? Phosphorus is the limiting nutrient for algal growth in Onondaga Lake. Too much phosphorus causes excessive algae, which in turn makes the water appear green and cloudy, and contributes to low oxygen levels in the deep water. During the summer of 2010, total phosphorus concentrations in the lake averaged 25 parts per billion (ppb) in upper waters. Since 2008, summer TP have been close to 20 ppb, which New York State has selected as a guidance value for determining a lake's suitability for recreational uses.

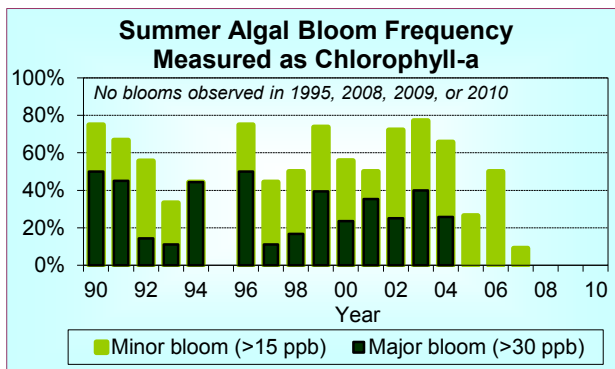
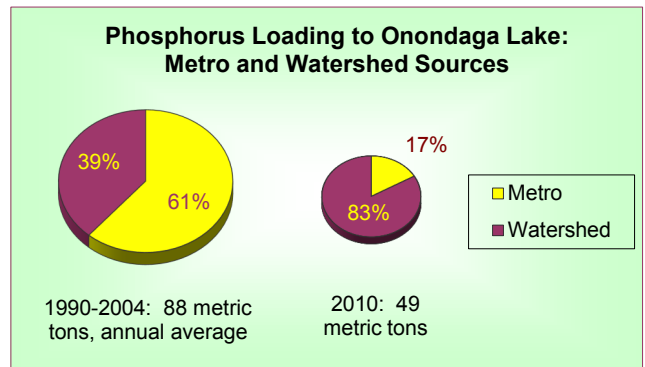


Improvements at Metro have reduced phosphorus discharges to the lake from the treatment plant by more than 80%. Since the advanced treatment (ActiFlo) was completed in 2005, loading has been less than 100 lbs per day.

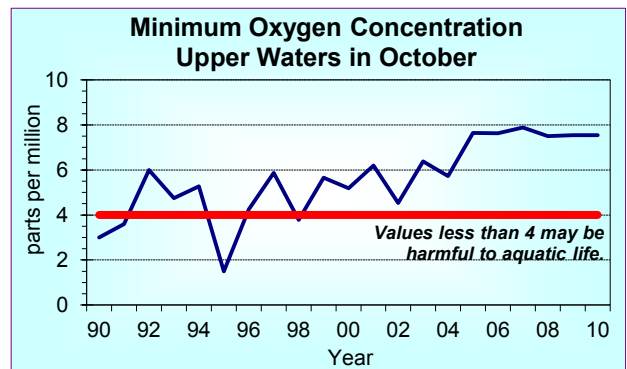


Reductions in phosphorus discharges from the Metro plant have resulted in substantially lower phosphorus concentrations in the lake water in recent years, down to 25 ppb in 2010, comparable to levels measured in Oneida Lake.

With the recent upgrades to the Metro plant, runoff from the watershed is now the major source of phosphorus to Onondaga Lake. Prior to 2005, Metro contributed approximately 60% of the annual phosphorus load. Phosphorus load from Metro has dropped substantially, while the watershed load has remained relatively constant. As a consequence, the watershed's proportional contribution to the annual phosphorus load has increased from 39% to 83%.

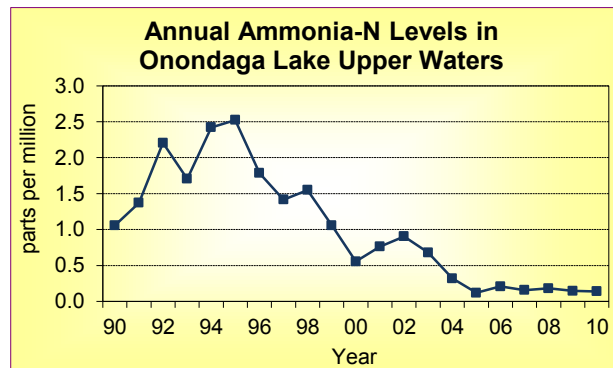
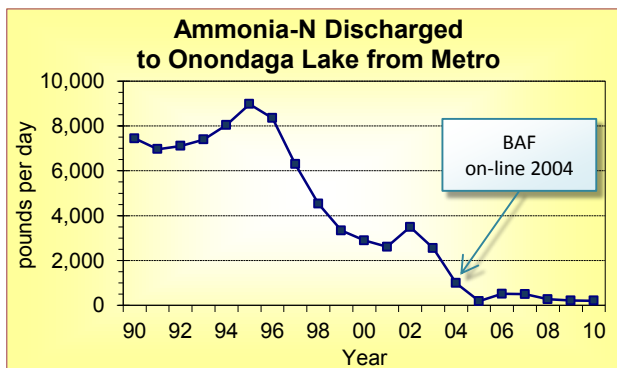


Less phosphorus in the lake has resulted in fewer and less severe algal blooms. No algal blooms have been measured in Onondaga Lake in the past three summers. Less algae also means clearer water and more oxygen for aquatic life.



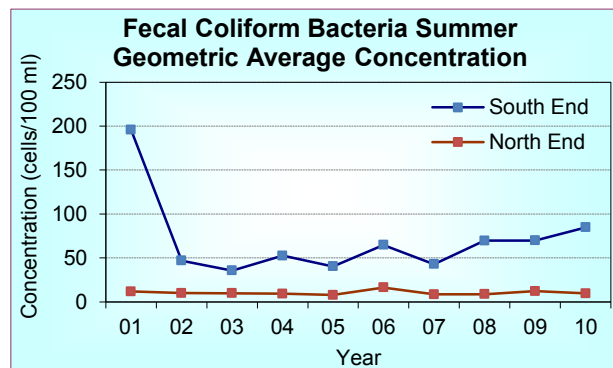
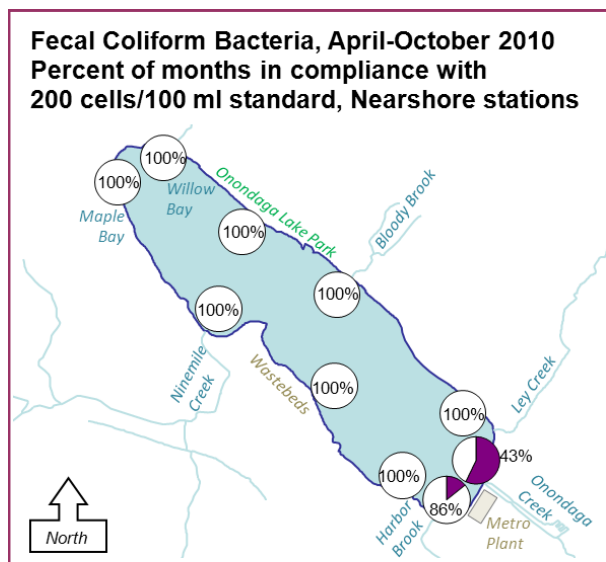
Low dissolved oxygen (DO) in October was one of the lake's most significant water quality impairments. The major improvement in DO has led to better habitat for aquatic life. The NYSDEC minimum standard for DO is 4 ppm; current conditions are well above this level.

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 completed major upgrades to the Metro plant that reduced the facility's discharge of ammonia-N by 98%. This advanced treatment system (Biological Aerated Filter, or BAF) came on-line in 2004; as a result, ammonia-N concentrations in the lake have declined. Since 2007, the lake's upper and lower waters have met state standards developed for protection of aquatic life.



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

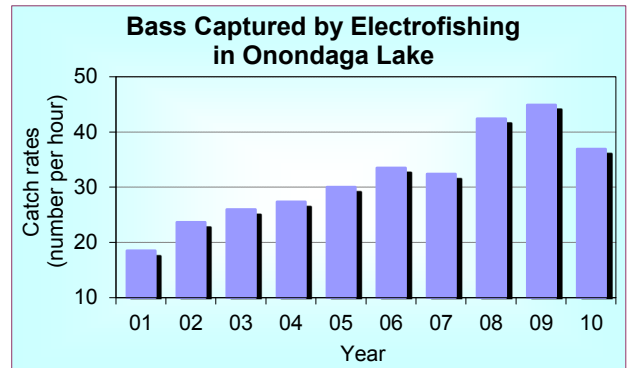
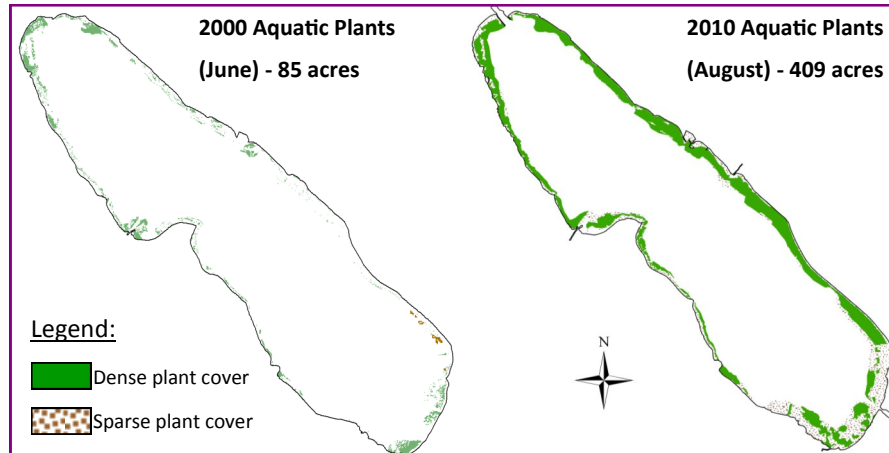
County Executive Joanne Mahoney is championing a “Save the Rain” initiative to educate residents about storm water management. The campaign raises awareness of effective ways to improve the environment by using rain barrels, rain gardens, porous pavement, green roofs, cisterns, and other green technologies. 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. Reducing the amount of storm water entering the sewers will improve lake quality, and may reduce the need to construct traditional facilities. During 2010, the County continued to separate sewers, plan new approaches to reduce CSOs, improve the capture of floatable materials, and maximize system storage capacity. These initiatives are reducing the risk of elevated bacteria counts in the lake water. As illustrated below, bacteria counts are low except for a limited area of the southern shoreline following storms.



The 2010 data indicate that the lake waters met bacteria standards for contact recreation, except along the southern shoreline. The fecal coliform bacteria standard is used by the NYSDEC to evaluate water quality and by the NYS Department of Health to evaluate suitability for swimming at designated beaches.

Bacterial abundance during the summer months, the period of major recreational use, is graphed for the previous ten years. Bacteria counts are consistently higher in the southern region of Onondaga Lake, close to the major inflows, as compared to the northern region. The good news is that bacteria levels at the northern stations and the lake outlet are very low. As in previous years, the 2010 data confirm that bacteria levels increased following significant storm events. This effect was limited to the southeastern portion of the lake shoreline.

How has aquatic life in Onondaga Lake changed? Aquatic plants provide spawning and nursery habitat for 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. Based on annual surveys, the aquatic plant cover exhibited greater than a four-fold increase from 2000 to 2010.



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

Summary and a Look Ahead

Visit Our Web Site
www.ongov.net/wep

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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 warmwater aquatic community. Phosphorus, water clarity and algal abundance are now comparable to other regional lakes, including Oneida Lake. Onondaga Lake is a recreational asset to the entire community. We will continue to evaluate Onondaga Lake's response to wastewater improvements, reductions in stormwater runoff, and the ongoing remediation of legacy industrial pollution.