

Onondaga Lake: Progress Report 2011

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www.savetherain.us
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Onondaga County Ambient Monitoring Program

Remarkable Improvements in Onondaga Lake

Multiple projects have been completed to restore water quality and habitat conditions in Onondaga Lake, and the lake has responded positively. Wastewater collection and treatment systems have received major upgrades and industrial wastes are being remediated. More than 70 green infrastructure projects have been completed as part of the "Save the Rain" initiative, reducing the amount of stormwater runoff that reaches the lake.

The County's 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 dramatically reduced, nuisance algal blooms no longer occur, and oxygen levels are greatly improved. The lake supports a healthy balance of plants and animals, and interest in the lake as a recreational resource has surged.

This progress report describes 2011 conditions and compares recent data with historical data to track improvements.



Connective Corridor Project

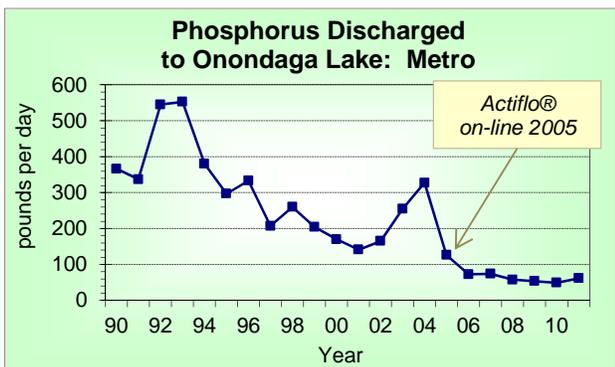
Measures of Progress

The 2011 results document the continued substantial 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.



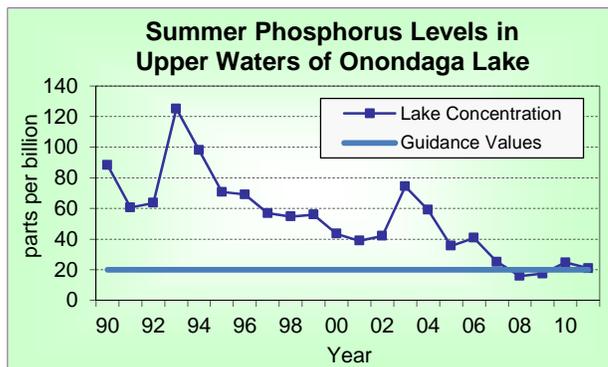
OnCenter Green Roof

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 2011, total phosphorus concentrations in the lake averaged 20 parts per billion (ppb) in upper waters. Since 2007, summer average total phosphorus has been close to 20 ppb, which New York State has established as a guidance value for determining a lake's suitability for recreational uses.

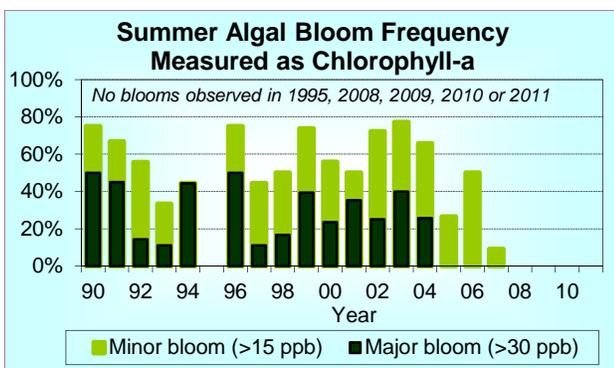
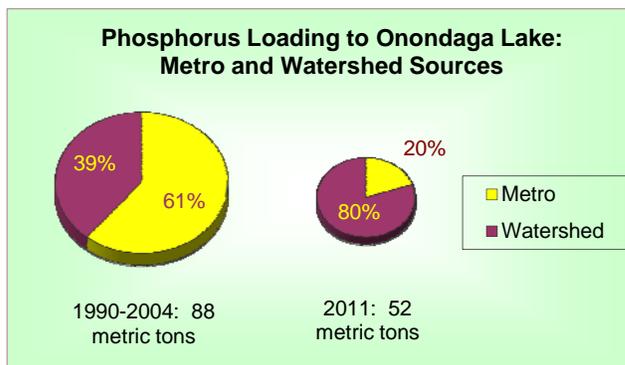


Phosphorus discharges to the lake from Metro have decreased by more than 80% since the advanced treatment (ActiFlo) was completed in 2005.

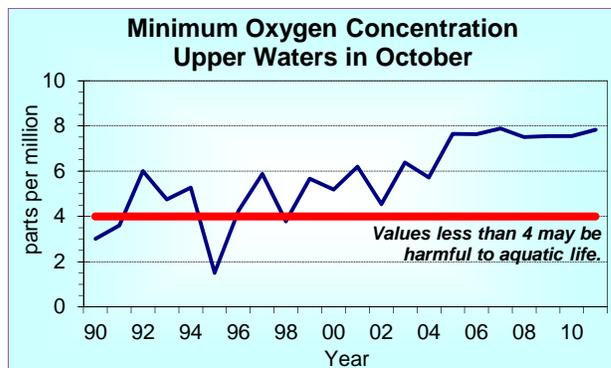
With the recent upgrades to the Metro plant, runoff from the watershed is now the major source of phosphorus to Onondaga Lake. Prior to 2005, Metro contributed approximately 60% of the annual phosphorus load. Phosphorus loading from Metro has dropped substantially, while the watershed load has remained relatively unchanged. As a consequence, the watershed's contribution to the annual phosphorus load has increased from 39% to 80%.



Reductions in phosphorus discharges from Metro have resulted in substantially lower phosphorus concentrations in the lake water in recent years. Since 2007, phosphorus concentrations have been comparable to levels measured in Oneida Lake.

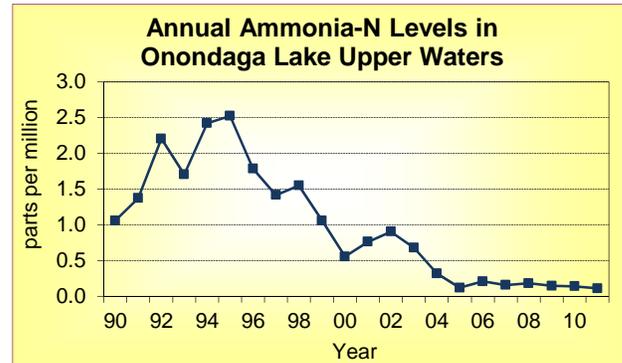
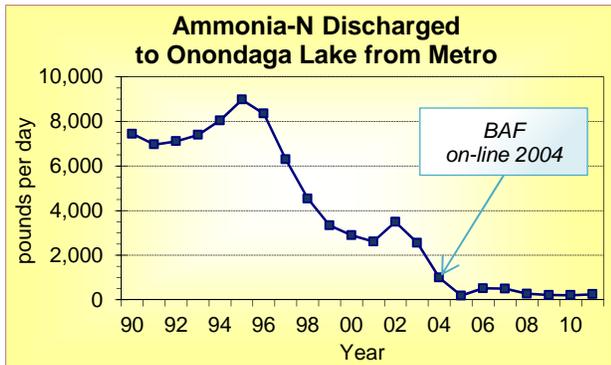


Less phosphorus in the lake has resulted in fewer and less severe algal blooms. No algal blooms have been measured in Onondaga Lake in the past four summers (June—September). Less algae also means clearer water and more oxygen for aquatic life.



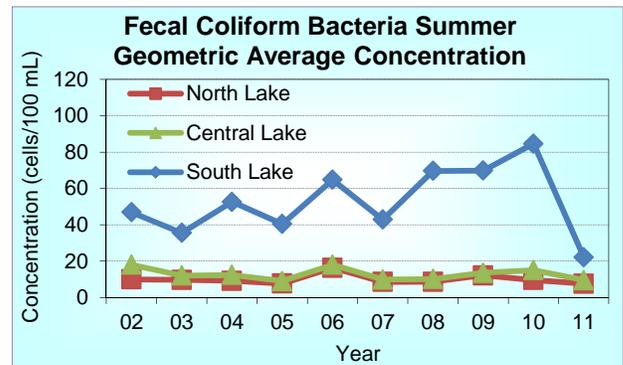
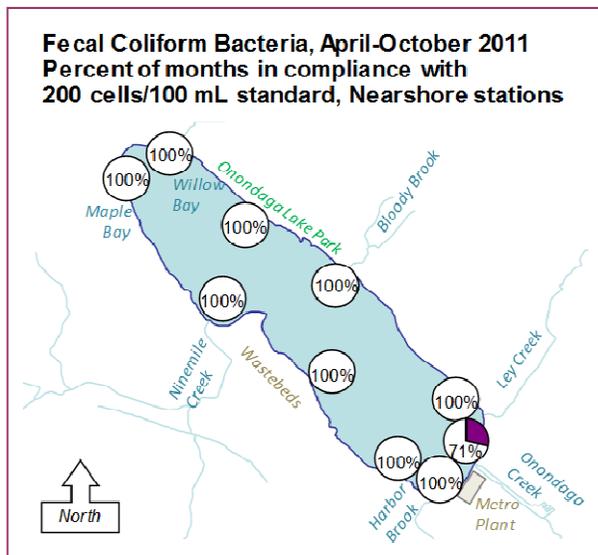
Low dissolved oxygen (DO) in the upper waters during October was one of the lake's most severe water quality impairments. The major improvement in DO has led to better habitat for aquatic life. The NYSDEC minimum standard for DO is 4 ppm; DO in the upper waters has remained above this level since 1999.

How have improvements in wastewater treatment affected ammonia levels in Onondaga Lake? High concentrations of ammonia-nitrogen 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 waters have met NYS water quality standards for ammonia developed for protection of aquatic life.



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

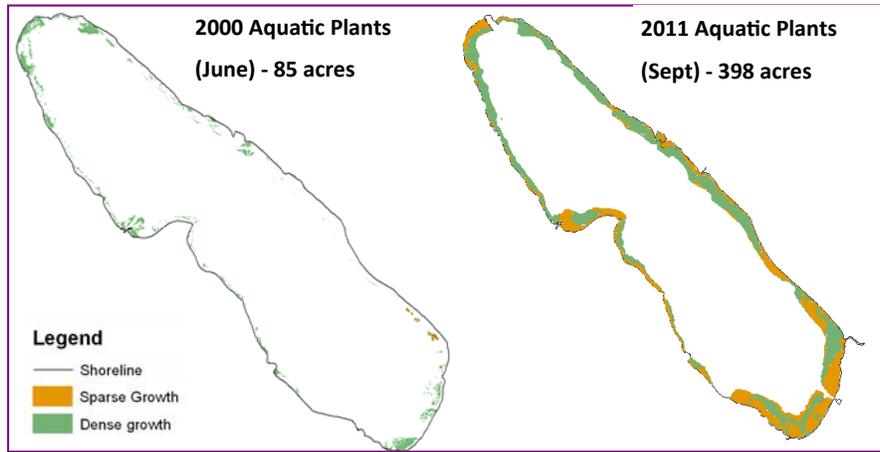
County Executive Joanne Mahoney is championing a “Save the Rain” initiative to educate residents about storm water management. The campaign raises awareness of effective ways to improve the environment by using rain barrels, rain gardens, porous pavement, green roofs, cisterns, and vegetated swales. Areas of Syracuse are served by combined sewer systems that carry both sewage and storm runoff. Combined sewer overflows (CSOs) occur during periods of heavy rain and snowmelt, allowing a mixture of stormwater and raw sewage to flow into creeks that feed 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 2011, the County continued to separate sewers, implement 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. As illustrated below, bacteria counts are low except for a limited area of the southern shoreline following storms.



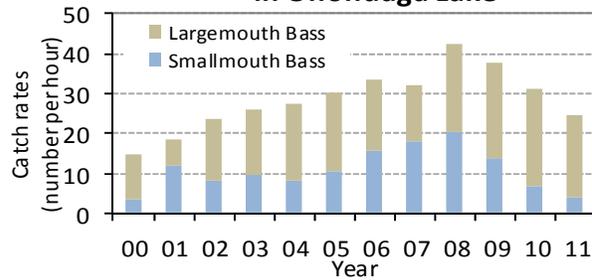
The lake waters met bacteria standards for contact recreation in 2011, except along the southeastern shoreline adjoining Onondaga Creek. The fecal coliform bacteria standard is used by the NYSDEC to evaluate water quality and by the NYS Department of Health to evaluate suitability for swimming at designated beaches.

Bacterial abundance during the June to September period of the previous ten years has been consistently highest in the southern region of Onondaga Lake, adjoining major inflows that drain urban areas. In 2011, bacteria concentrations continued to be very low in the central and northern portions of the lake and dropped to the lowest levels on record in the southern end. As in previous years, the 2011 data confirm that bacteria levels increased along the southeastern portion of the lake shoreline following significant storm events.

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 2011.



Bass Captured by Electrofishing in Onondaga Lake



Onondaga Lake supports a diverse fish community and provides recreational opportunities for our community. Over the last decade, 45 fish species have been documented in the lake. The lake fishery is evolving in response to the marked improvements in water quality and the presence of invasive species. Smallmouth bass numbers have declined recently while largemouth bass numbers have remained relatively steady. Scientists continue to investigate the many factors that affect the lake fishery.

Summary and a Look Ahead

Visit Our Web Sites
www.ongov.net/wep
www.savetherain.us

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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.