# Owasco Lake (0706-0009) Impaired Seg

## Waterbody Location Information

Revised: 04/01/2016

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|---|---|---|---|---|---|
| **Water Index No:** | Ont 66-12-43-P212 | | | **Drain Basin:** | Oswego-Seneca-Oneida |
| **Hydro Unit Code:** | 0414020113 | **Class:** | AA(T) | | Seneca/Clyde Rivers |
| **Waterbody Type:** | Lake | 6796.9 Acres | | **Reg/County:** | 7/Cayuga Co. ( 6) |
| **Seg Description:** | entire lake | | | | |

## Water Quality Problem/Issue Information

| Uses Evaluated | Severity | Problem Documentation |
|---|---|---|
| Water Supply | Impaired | Suspected |
| Public Bathing | Impaired | Suspected |
| Recreation | Impaired | Suspected |
| Aquatic Life | Fully Supported | Known |
| Fish Consumption | Fully Supported | Unconfirmed |
| **Conditions Evaluated** | | |
| Habitat/Hydrology | Fair | |
| Aesthetics | Fair | |

**Type of Pollutant(s)** (CAPS indicate MAJOR Use Impacts/Pollutants/Sources)

| | |
|---|---|
| Known: | PATHOGENS, HARMFUL ALGAL BLOOMS, Algal/Plant Growth (native) |
| Suspected: | Nutrients (phosphorus), Silt/Sediment |
| Unconfirmed: | - - - |

**Source(s) of Pollutant(s)**

| | |
|---|---|
| Known: | AGRICULTURE, OTHER SOURCE (waterfowl), Habitat Alteration |
| Suspected: | Hydrologic Alteration, Municipal Discharges, Onsite/Septic Systems |
| Unconfirmed: | - - - |

## Management Information

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|---|---|
| **Management Status:** | Verification of Problem Severity Needed |
| **Lead Agency/Office:** | DOW/BWAM |
| **IR/305(b) Code:** | Impaired Water Requiring a TMDL (IR Category 5) |

## Further Details

Overview

Owasco Lake is currently assessed as impaired due to previously noted impacts to public bathing and recreation from pathogens. More recently, beach closures due to elevated pathogen levels have been reduced. However that may be misleading in that the beaches are now managed using pre-emptive closures due to wet-weather and turbid conditions. Also impacts from nutrients and associated algal blooms are an increasing concern. Although the overall water quality of the Lake is fairly good, in specific areas of the Lake a number of uses – including water supply use, public bathing and recreation – experience impacts that are suspected of being impaired, but have not been fully verified. Nutrient loadings, harmful algal blooms, excessive aquatic plant growth, sediment/clarity and pathogens are the pollutants of primary concern in the Lake. Pollutant sources include runoff from agricultural activities and wastewater discharges within the watershed and waterfowl/wildlife. Onsite/septic systems in close

proximity to the shore may also be contributing to impacts in the Lake, although there is no evidence of system failures.

Use Assessment

Owasco Lake is a Class AA(T) waterbody, suitable for use as a water supply, public bathing beach, for general recreation and support of aquatic life. The lake is also designated as a cold water (trout) fishery.

Regarding water supply use, note that the evaluation of this use focuses on the lake water prior to treatment, and does not necessarily reflect the quality distributed for use after treatment. Monitoring of water quality at the tap is conducted by local water suppliers and public health agencies. That being said, water supply use in Owasco Lake is considered to be stressed – and may be impaired – by elevated nutrient and chlorophyll levels that create the potential for the formation of disinfection by-products (DBPs) in finished potable water and make treatment to meet drinking water standards more difficult. However the severity of impact is not clear and additional evaluation of uses is needed. DBPs are formed when disinfectants such as chlorine used in water treatment plants react with natural organic matter (i.e., decaying vegetation) present in the source water. DBPs in drinking water can include trihalomethanes (TTHMs), haloacetic acids (HAAs), bromate, and chlorite. Currently municipal water systems drawing from the Lake – City of Auburn and Town of Owasco – do not exceed the MCLs for TTHMs or HAAs. However municipal systems that purchase water from these primary suppliers have exceeded the MCL for DBPs periodically over the past few years. The City of Auburn and Town of Owasco also use activated carbon to address taste and odor complaints likely associated with excessive algae. The elevated DBP levels and the use of activated carbon – Class AA waters should be suitable for potable water supply use without treatment beyond disinfection and removal of natural substances – indicate water supply use may be impaired in this portion of the lake, but the temporal and spatial extent of such impairment needs to be evaluated. (Cayuga County Health Department and DEC/DOW, BWAM, October 2014).

The recently implemented Safe Drinking Water Act Stage 2 Disinfection/DBP Rule imposes several additional measures for the protection of water supplies by public health agencies. These measures include the comparison of finished water quality monitoring data against Operational Evaluation Levels (OEL) regarding the formation of TTHMs and HAAs. If the OEL is triggered the operational evaluation must include an examination of system treatment and distribution operational practices that may contribute to TTHM and HAA formation, including sources of supply and source water quality. This evaluation must also identify what steps are needed to minimize future exceedences of the OEL. (USEPA Stage 2 DBPR OEL Guidance Manual, 2008).

A Source Water Assessment by the NYSDOH conducted in the early 2000s found “moderate” susceptibility (on scale of “very high,” “high,” “moderate,” and “low) to contamination from pesticides and other contaminants due to the level of row crop agriculture and the number of point sources (permitted municipal wastewater discharges) in the watershed. However this assessment is more than 10 years old and may not be fully representative of current conditions. (NYSDOH, Source Water Assessment Program, 2005)

Concern for the water supply use of the lake is increased due to its AA(T) drinking water supply classification. This classification means the quality of the water is to be maintained to allow its use as a drinking water source with disinfection and additional treatment only to remove naturally present impurities. Water from Owasco Lake is used for human consumption and limited irrigation. The City of Auburn, the Town of Owasco, and some lakefront property owners draw water from the lake. In total approximately 55% of Cayuga County's population obtain their drinking water from the lake. In 2013, the combined users drew more than 1.6 billion gallons of water from the lake, serving more than 44,000 residents of Cayuga County. (Cayuga County WQMA, January 2000).

Public bathing and recreational uses are known to be stressed and impacts may rise to the level of being impaired due to occasional occurrence of elevated pathogen indicators and the increasing frequency of algal blooms. Previous assessment of the Lake cited impairment due to periodic elevated fecal coliform levels in the north end of the lake that resulted in closures of the public beach at Emerson Park. That assessment noted that 36% of samples

collected at the beach between 1993 and 1998 were above the geometric mean standard of 200 /100ml for fecal coliform. More recently the Cayuga County Health Department moved to statewide accepted use of a single sample E.coli value of 235 /100ml to manage the beach. In 2013 there was one single-day closure and in 2014 there were two separate one-day beach closures due to sample values above 235. However the beach is also closed proactively when lake turbidity is high and following rain events. The beaches at Emerson Park and the Yacht Club were also closed for a number of days in 2014 due to HAB events; similar closures occurred in many other central New York waterbodies during 2014. A previous (1998) study used DNA ribotyping techniques to determine the sources of fecal contamination. This study found that the major source of contamination at the Emerson Park beaches was from waterfowl, while agriculture was an intermediate source; humans and pets were deemed minor sources. (Cayuga County Health Department and DEC/DOW, LMAS, October 2014).

While reports of algal blooms in Owasco Lake go back many years, the occurrence of harmful algal blooms (HABs) have been reported at an increasing frequency in recent years. However it is worth noting that some of this increase coincides with the recent establishing of a NYSDEC HABs surveillance and notification program. Algae sampling was conducted in late summer to early fall of 2014, confirming the presence of blue green algae blooms in the lake, particularly along the northern and northeastern shorelines. Some of these blooms covered much of the northern portion of the lake, extending into the open water, and several late summer samples contained algal toxin (microcystin-LR) levels exceeding the World Health Organization (WHO) guidelines for protection of swimming. Blooms were also reported in other portions of the lake, but the temporal and spatial extent of blooms outside the northern end of the Lake have not been well documented. (DEC/DOW, LMAS, October 2014).

Aquatic Life is fully supported in Owasco Lake. The lake supports an excellent fishery with a variety of species, including lake trout, walleye, northern pike, smallmouth bass and panfish. The lake is actively managed for sport fishing. (DEC/DFWMR, Region 7, October 2014)

There are no health advisories in place regarding the consumption of fish from this waterbody beyond the general statewide advisory. Fish consumption is considered to be fully supported based on the absence of any waterbody-specific advisory, but this evaluation is noted as unconfirmed reflecting that there is no routine monitoring of contaminants in fish. People are also generally advised not to eat fish taken from waters experiencing harmful algal blooms, but such temporary conditions do not equate to fish consumption use impact. (DEC/DOW, BWAM, November 2014)

Habitat and hydrologic impacts are also thought to contribute to the weed and algal growth and the impact on recreational uses. Zebra mussel infestation of the lake has increased lake clarity. The increased clarity allows for greater penetration of light which supports plant growth into the lake. In addition mussels filter particulate-bound phosphorus and release soluble phosphorus that is more readily available for plant growth. Hydrologic modification of the inlet in 1948 and 1961 by the Army Corps of Engineers to bypass the Owasco Flats wetland complex at the southern end of the lake is also likely contributing to the water quality impacts on the lake. The value of wetlands in providing a buffer to reduce the runoff of pollutants into waters is well established. Conversely the loss of these wetlands results in increased loads, particularly during wet-weather high flow events. (Finger Lakes Institute, January 2006)

Aesthetics in the Lake are affected by algal growth, turbid plumes during wet-weather events and rooted plant growth. (DEC/DOW, BWAM and Region 7, October 2014)

Water Quality Information

Owasco Lake has been sampled by a number of agencies and investigators over recent years. NYSDEC issued a report on a synoptic study of the Finger Lakes, including Owasco Lake, in June 2001; additional data were collected by the NYSDEC from 2002 to 2005, and in 2007 and 2012 through other NYDEC monitoring programs. Researchers from the Finger Lakes Institute of Hobart and William Smith College have regularly monitored the lake since 2005. (DECDOW, BWAM, October 2014)

These studies indicate that the open water conditions in the Lake continue to be best characterized as mesoligotrophic, or moderately unproductive. Phosphorus, chlorophyll and clarity measurements are somewhat elevated but typically fall below levels that would suggest impacts to recreational uses. Reports of HABs in portions of the Lake have increased in recent years, though algal blooms in the Lake have long been noted and the increased reports may be at least partially the result of increased awareness. Due to a HAB that lasted two months in 2014, two public bathing beaches were closed and warnings to avoid recreational contact with the water in the lake were issued by the Cayuga County Health Department in 2014. Pathogen indicator monitoring at the public beach in Emerson Park at the north end of the Lake is conducted by the Cayuga County Health Department. Pathogens indicators and impacts have decreased since the Lake was first listed as being impaired by pathogens in 1998, but remain a concern in the north end of the Lake. (DEC/DOW, BWAM, October 2014)

Annual Water Quality Report (AWQR) data are also available to evaluate treated water conditions from water drawn from Owasco Lake for the city of Auburn and the town of Owasco, as well as for purchase water systems for the towns of Sennett, Throop, Brutus, Metz, Aurelius, Springport, Fleming and Montazuma, the Villages of Weedsport, Port Byron and Cayuga, and the Cayuga County Water and Sewer Authority which purchase treated water from the two primary sources.

Source Assessment

Nutrient and sediment sources to the Lake include point sources such as wastewater treatment facilities and non-point sources such as runoff from agricultural activities (both animal and crop agriculture), onsite/septic systems, soil erosion, stream bank erosion, fertilized lawns, roadside ditches and construction activities. Land application of liquid manure and other agricultural practices are suspected of contributing to water quality problems in the lake. A recent (2014) runoff event resulted in the release of liquid manure to a trib of the Lake after it was spread on frozen fields. Similar instances of manure runoff from frozen fields in other areas of the state in 2014 drew considerable attention to this practice. (DEC/DOW, BWAM, October 2014)

Owasco Inlet has been identified as a significant source of nutrients (phosphorus) and sediment to the south end of the Owasco Lake, both of which contribute to aquatic vegetation growth. A 2011 biological assessment of the Inlet revealed elevated nutrient impacts in the stream, though impacts attributed the Groton (V) municipal discharge were shown to be greatly reduced since the plant upgrade to reduce phosphorus. Other nonpoint sources remain as contributing sources. (DEC/DOW, BWAM/SBU and Region 7, December 2014).

Waterfowl (geese and gulls) has been identified as the primary source of pathogen indicators at the north end of the lake. Pathogen indicators from agricultural runoff was noted as a secondary source, while human and pet sources were considered to be minor. (Cayuga County WQMA, January 2000)

Management Action

DEC has worked with municipalities to address phosphorus loads to the southern Lake via Owasco Inlet. In 2008 DEC worked with the Village of Groton to install improved phosphorus treatment at its WWTP. Since then the village has significantly reduced the amount of phosphorous being discharged from its facility. The only other significant point source discharge in the watershed is the Village of Moravia Sewage Treatment Plant which already uses a high level of treatment to reduce phosphorus discharge. (DEC/DOW, Region 7, October 2014)

Owasco Lake benefits from a very engaged network of local stakeholders. This network – which includes the Owasco Lake Watershed Management Council, Owasco Watershed Lake Association, Cayuga County Health and Human Services, Cayuga County Planning and Economic Development, Cayuga County Water Quality Management Agency, the Finger Lakes Institute, Cayuga County Soil and Water District and Cornell Cooperative Extension of Cayuga County – oversees a comprehensive watershed approach necessary to reduce nutrients and other pollutants from various contributors throughout the watershed. Some of the highlights of these efforts include the Cayuga County septic system inspection program, the Owasco Lake Watershed Inspection Program staffed with

a Watershed Specialist and Seasonal Inspectors, the Owasco Flats Project to reconnect the Inlet with its floodplain and wetlands and provide riparian buffer, and an active and concerned lake association led by the Owasco Lake Watershed Management Council. (OLWA and DEC/DOW, Region 7, October 2014)

Section 303(d) Listing

Owasco Lake is included on the current (2014) NYS Section 303(d) List of Impaired/TMDL Waters. The waterbody is included on Part 3a for pathogens and Part 3b for impairments related to HABs. Impacts/impairments due to pathogen levels need to be verified in light of the reduced frequency of pathogen-related beach closures. This Part 3b listing is the result frequent harmful algal blooms (HABs) that impair recreational use (and threaten water supply use) in the Lake. Listings for waterbodies impaired due to HABs are not listed with HABs as the cause/pollutant because HABs is not a pollutant that can be regulated with a TMDL. More typically, listings of waterbodies impaired by HABs identify nutrients as the cause/pollutant however in this case the levels of phosphorus and chlorophyll-*a* in the open lake waters are low and indicate that something other than nutrient eutrophication is driving the occurrence of HABs. Therefore until there is a better understanding of the cause(s) of HABs in this situation, the most appropriate place to list this waterbody is Part 3b with the cause/pollutant noted as Unknown. In addition to these listings, the Lake is also categorized as an IR Category 4c water – Impaired, but for which TMDL development would not be appropriate – for HABs, because HABs is not a pollutant that can be addressed through a TMDL. (DEC/DOW, BWAM, April 2016)

Segment Description

This segment includes the entire area of the Lake.