

Cayuga Lake, Southern End (0705-0040)

Impaired

Waterbody Location Information

Revised: 05/01/2018

Water Index No: Ont 66-12-P296 (portion 4)
Hydro Unit Code: Yawger Creek-Cayuga Lake (0414020112)
Water Type/Size: Lake/Reservoir 968.2 Acres
Description: portion of lake, as described below

Water Class: A
Drainage Basin: Oswego-Seneca-Oneida
Reg/County: 7/Tompkins (55)

Water Quality Problem/Issue Information

Uses Evaluated	Severity	Confidence
Water Supply	Threatened	Known
Public Bathing	Impaired	Known
Recreation	Impaired	Known
Aquatic Life	Fully Supported	Suspected
Fish Consumption	Unassessed	-

Conditions Evaluated

Habitat/Hydrology	Fair
Aesthetics	Poor

Type of Pollutant(s) (CAPS indicate Major Pollutants/Sources that contribute to an Impaired/Precluded Uses)

Known: Algal/Plant Growth, Aquatic Invasive Species (Hydrilla), NUTRIENTS (PHOSPHORUS), SILT/SEDIMENT

Suspected: ---
Unconfirmed: ---

Source(s) of Pollutant(s)

Known: AGRICULTURE, Habitat Alteration, Municipal Discharges, Onsite Septic Systems, Other Source, Roadbank Erosion, Streambank/Ditch Erosion, URBAN/STORM RUNOFF

Suspected: ---
Unconfirmed: ---

Management Information

Management Status: Strategy Implementation Scheduled or Underway
Lead Agency/Office: DOW/BWAM
IR/305(b) Code: Impaired Water Requiring a TMDL (IR Category 5)

Further Details

Overview

This portion of Cayuga Lake is assessed as an impaired waterbody due to primary and secondary recreational uses that are known to be impaired due to excessive nutrients (phosphorus) and silt/sediment loads from various sources throughout the watershed. Aquatic invasive species (Hydrilla) have also been identified in the Southern End of the Lake and its tributaries. Water supply uses are also considered to be threatened.

Use Assessment

This portion of Cayuga Lake is a Class A waterbody required to support and protect the best use as a source of water supply for drinking, culinary or food processing purposes; primary and secondary contact recreation; and for fishing.

Public Water Supply for this portion of Cayuga Lake is assessed as threatened. The NYSDOH Source Water Assessment Program (SWAP) compiles, organizes, and evaluates information regarding possible and actual threats to the quality of public water supply sources. The information contained in SWAP assessment reports assists in the

oversight and protection of public water systems. It is important to note that SWAP reports estimate the potential for untreated drinking water sources to be impacted by contamination. These reports do not address the safety or quality of treated finished potable tap water. Drinking water supplies in this waterbody include the Southern Cayuga Lake Intermunicipal Water Commission water supply. The SWAP assessment found a moderate susceptibility to contamination for this source of drinking water. Some susceptibility associated with other sources, such as salt mines, was also noted. (NYSDOH, Source Water Assessment Program, 2004). Although no active water intakes are located within this segment, water quality data collected through the Lake Source Cooling (LSC) project suggests that ecological processes in the south shelf impact the Bolton Point MWS, which is located approximately one mile north of this segment and has been experiencing problems with DBPs (disinfection by products). In addition, chlorophyll-*a* data collected through the LSC project demonstrates that the algal biomass in this segment both routinely exceeds and shows increasing frequency of exceeding the 6 ug/l threshold associated with impairment of Class A waters. Furthermore, the City of Ithaca has rejected the use of this segment as a potential water supply in recent deliberations.

Primary and secondary contact recreation are considered to be impaired due to elevated nutrients (phosphorus), excessive algae, and poor water clarity. These uses have not been sustained through public beaches or other designated swimming areas since Stewart Park was closed for swimming more than 50 years ago. Secondary contact recreation is also affected by excessive aquatic vegetation of invasive plant growth (hydrilla). Hydrilla verticillatum (hydrilla, or water thyme) was discovered in Cayuga Inlet in August of 2011 and in the southern end of Cayuga Lake in 2013. Hydrilla restricts recreational activities and has created significant ecological and economic problems throughout the country, and is particularly challenging to control due to abundant and persistent modes of reproduction, spread, and transport. (DOW/DEC, BWAM, March 2018)

Impacts from habitat and hydrologic modification are also thought to contribute to the weed and algal growth and the impact on recreational uses. Zebra mussel infestation of the lake may have increased lake clarity, although this ecological change may have been further altered by elevated algae growth associated with high nutrient levels. 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. In addition to zebra mussels, quagga mussels are now present in the deeper waters of the lake.

Fishing use is considered to be fully supported based on the support of a healthy fishery. The main lake supports warm and cold water species. Gamefish include lake trout, rainbow trout, landlocked salmon, brown trout, northern pike, chain pickerel, largemouth and smallmouth bass. Panfish include crappies, bluegill, pumpkinseed, yellow perch and bullheads. Carp, channel catfish and longnose gar are also found in the lake. The main forage base is alewives, smelt and yellow perch. Cayuga is stocked annually with approximately 60,000 lake trout, 25,000 brown trout and 40,000 landlocked salmon. Cayuga's tributaries are stocked with 50,000 rainbow trout. (DEC/DFWMR, Region 7 Fisheries, December 2014)

Fish Consumption use is considered to be unassessed. There are no health advisories limiting the consumption of fish from this waterbody (beyond the general advice for all waters). However due to the uncertainty as to whether the lack of a waterbody-specific health advisory is based on actual sampling, fish consumption use is noted as unassessed. (NYS DOH Health Advisories and DEC/DOW, BWAM, April 2018)

Water Quality Information

Water quality sampling of Cayuga Lake was conducted through NYSDEC's Citizen Statewide Lake Assessment Program (CSLAP) from 2002 through 2007, and from June through September in 2017; however, no sites in this segment were included in CSLAP in 2017 or in previous years.

Water quality monitoring was conducted from 1998 through 2013 in up to six locations in the Southern End segment (0705-0040) by Upstate Freshwater Institute (UFI) (through 2006) and Cornell University (from 2007 to 2013) as part of the requirements for the Cornell Lake Source Cooling (LSC) facility SPDES permit. This monitoring consisted of approximately biweekly samples collected from the surface waters of the lake from mid-April through late October analyzed for total and soluble reactive phosphorus, chlorophyll *a*, turbidity, and Secchi disk transparency. Water chemistry samples were analyzed by UFI. This is the primary source of data to evaluate water quality changes in this segment, and the primary source of water quality information for this updated assessment.

These data showed that chlorophyll *a* readings in the six Southern End sites averaged 6 ug/l (computed as a weighted

spatial average) in the 2008-2012 period, an increase above the 5 ug/l average from 1998 through 2002. This occurred despite total phosphorus readings in this section that averaged around 18 ug/l from 2008 to 2012 (compared to an average of about 21 ug/l in the period from 1998 to 2002). However, soluble reactive phosphorus levels may have increased over this period (DEC/DOW, BWAM, March 2018).

As part of a more comprehensive effort to address algal growth and other recreational impairments in the South End of the lake, a water quality/modeling study of Cayuga Lake to support the development of a phosphorus TMDL began in 2013. The Cayuga Lake Modeling Project (CLMP) includes considerable lake and watershed monitoring components (completed in 2013), and associated model development efforts that are anticipated to continue through 2018. (DEC/DOW, BWAM and BWP, January 2015).

The lake and watershed has been the focus of on-going monitoring by a number of other groups, including the Community Science Institute. A significant NYSDEC monitoring effort, entitled Water Quality Study of the Finger Lakes (Callinan, NYSDEC, 2002), provides a previous comparison of water quality in all the Finger Lakes. These studies, which included sites within the southern end of the lake, showed water quality conditions that were mostly comparable to those reported in the LSC study (DEC/DOW, BWAM, January 2015)

The NYSDEC HABs Notification Program confirmed the presence of HABs in Cayuga Lake during the recreational seasons of 2013 through 2017. In 2017, Cayuga Lake was on the HABs Notification List for 10 weeks. The blooms observed in 2017 were mostly localized but did become widespread at certain times. Elevated levels of Microcystin were found in some shoreline bloom samples in 2017. The extent of blooms within this segment were not well documented during the summer of 2017, but blooms were reported throughout the southern portion of the lake at times. (DEC/DOW, BWAM, March 2018).

Source Assessment

The sources of pollutant loadings to this segment of Cayuga Lake are numerous. Agricultural activity in the Southern Cayuga Lake watershed is significant and includes, dairy farming, poultry farms and cropland. This portion of the lake also receives discharges from three large point sources: The Ithaca Area WWTP, Cayuga Heights WWTP, and the Cornell Lake Source Cooling Facility. In addition, two wastewater treatment facilities (Dryden STP and Freeville STP) discharge to Fall Creek which discharges to this segment. Urban/storm runoff from the City of Ithaca also impacts the lake. Increasing development and stream erosion are also identified as contributors of pollutant loadings to the tribs and to the lake. (Tompkins County Planning Department, 2003).

Management Actions

This waterbody is considered a highly-valued water resource due to its drinking water supply classification and as a multi-use waterbody. On December 21, 2017, New York State Governor Andrew Cuomo announced a \$65 million initiative to combat harmful algal blooms in Upstate New York. Cayuga Lake was identified for inclusion in this initiative as it is vulnerable to HABs and is a critical drinking water source.

An effort to develop a Total Maximum Daily Load (TMDL) plan to address the phosphorus impairment to the southern end of Cayuga Lake is currently underway. The Cayuga Lake Modeling Project (CLMP) represents the first step in this effort. The model development component of the CLMP was completed in 2016, with formal development of a TMDL by NYSDEC underway. (DEC/DOW, BWAM, January 2018)

The CLMP/TMDL effort evolved from negotiations for a final SPDES permit to address water releases from Cornell University's Lake Source Cooling (LSC) facility. The permit includes a limit on the amount of phosphorous the Cornell LSC facility draws from the deeper lake and discharges to the shallower southern shelf. An interim limit holds Cornell's discharge of phosphorus at its then-current levels. Once the TMDL is completed, a final limit will be developed based on the results of the TMDL. The permit includes a requirement outlining Cornell's commitment to fund the water quality/modeling study of Cayuga Lake to assist NYSDEC with the development of the TMDL for the South End of the Lake. (DEC/DOW, BWAM, January 2014)

The discovery of the highly invasive aquatic plant Hydrilla in Cayuga Inlet in 2011 prompted immediate and forceful action, due to the great concern that this plant could move into Cayuga Lake and the Great Lakes ecosystem. A state and local Task Force was quickly established to delineate the hydrilla populations, identify appropriate management actions, and proceed with an aggressive strategy to eradicate the 166 acre infestation found in the Inlet and some

connected waterways, using federal, state, and local resources. Key members of the Task Force include the City of Ithaca, the Tompkins County Soil and Water Conservation District and Department of Health, Racine-Johnson Aquatic Ecologists, NYSDEC, Canal Corps, and other local and state organizations. Recommendations of the Task Force led NYSDEC to conduct emergency rule-making to allow for a Hydrilla infestation treatment effort. Despite these efforts, hydrilla spread to the southern end of the lake and other tributaries, including Cascadilla Creek, Fall Creek, Six Mile Creek, and was also found further north in the lake. The Task Force is presently engaged in a multi-pronged eradication strategy, including the use of aquatic herbicides, hand removal, boat inspections, and extensive public education, outreach and monitoring. (DEC/DOW, BWAM/LMAS, March 2018)

Section 303(d) Listing

The Southern End of Cayuga Lake is included on the current (2016) NYS Section 303(d) List of Impaired Waters. The waterbody is included on Part 1 of the List as a waterbody segment requiring the development of a TMDL or other strategy to attain water quality standards; the segment is listed for phosphorus and silt/sediment. These waterbody/pollutants were first listed on the 2002 List.

Segment Description

This segment includes the portion of the lake south of an east-west line through McKinneys Point in McKinneys.