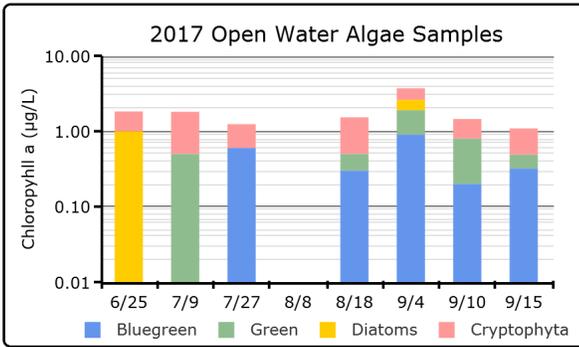


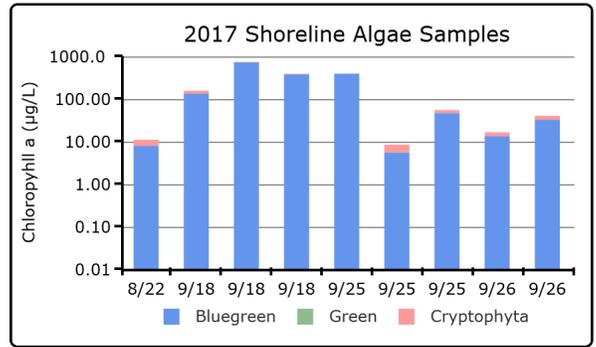


# HAB Status

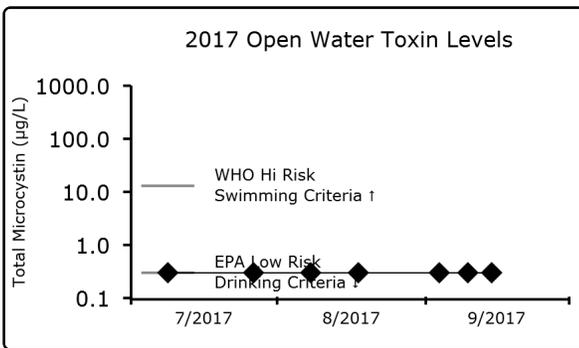
## 2017 Open Water Algae Samples



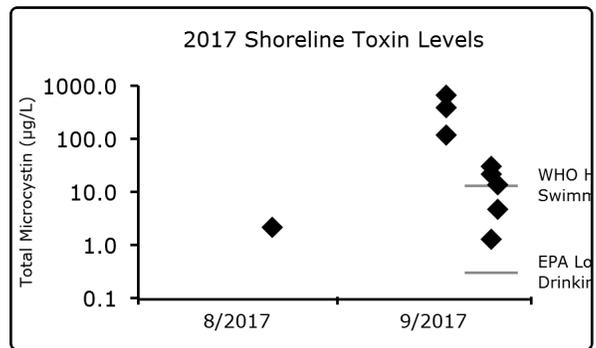
## 2017 Shoreline Algae Samples



## 2017 Open Water Toxin Levels

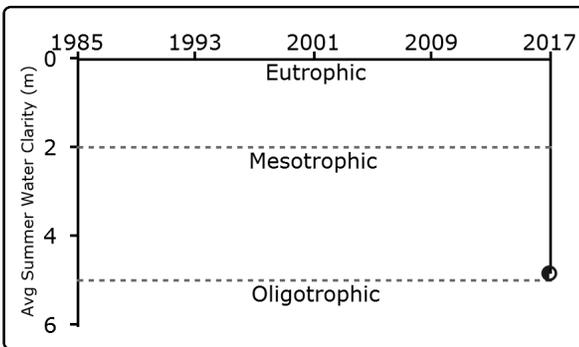


## 2017 Shoreline Toxin Levels

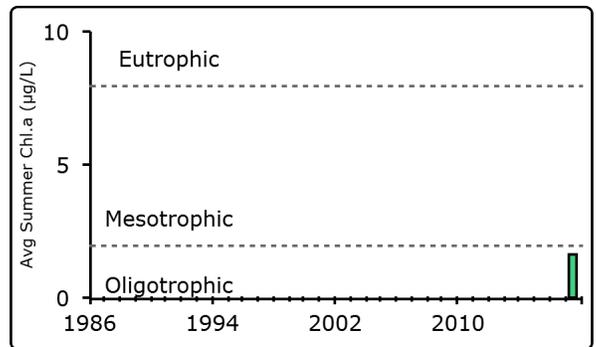


# Canandaigua Lake Long Term Trend Analysis

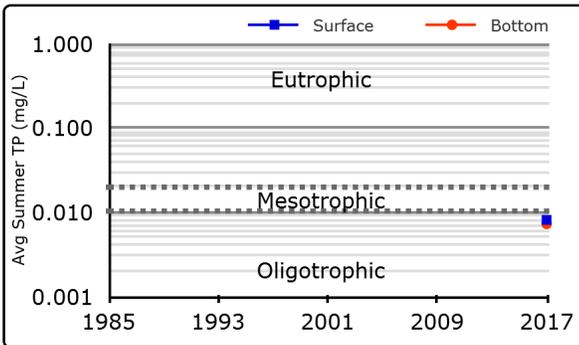
## Clarity



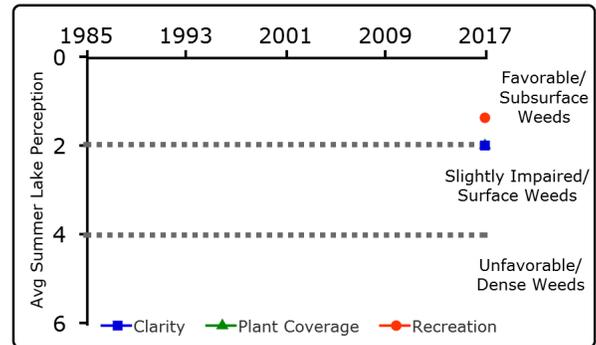
## Chlorophyll a



## Surface and Deep Phosphorus

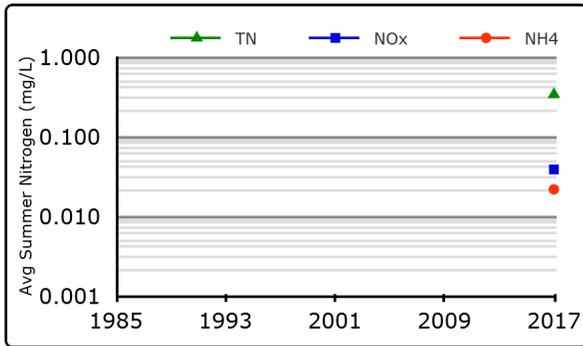


## Lake Perception

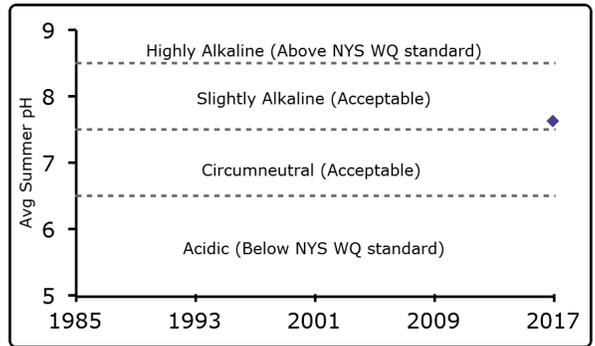


# Canandaigua Lake Long Term Trend Analysis

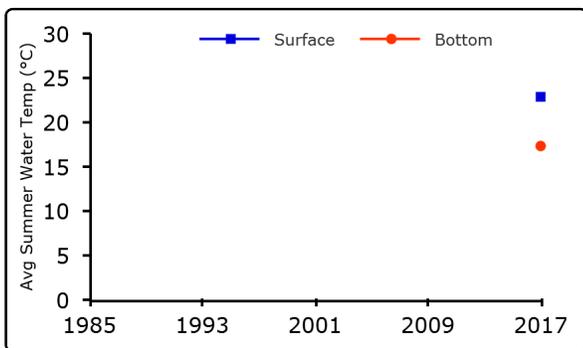
## Nitrogen



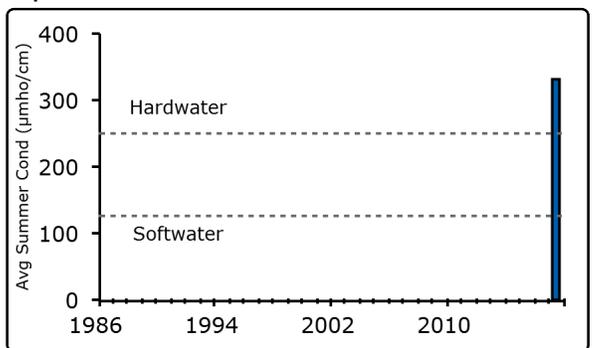
## pH



## Temperature

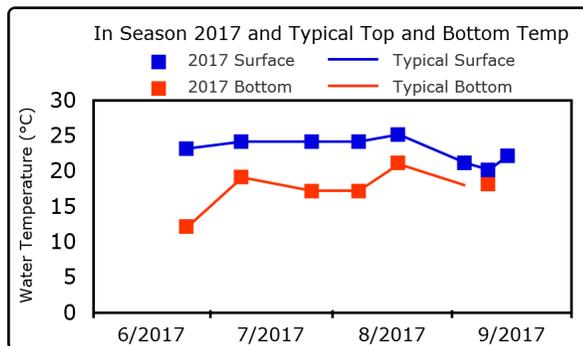


## Specific Conductance

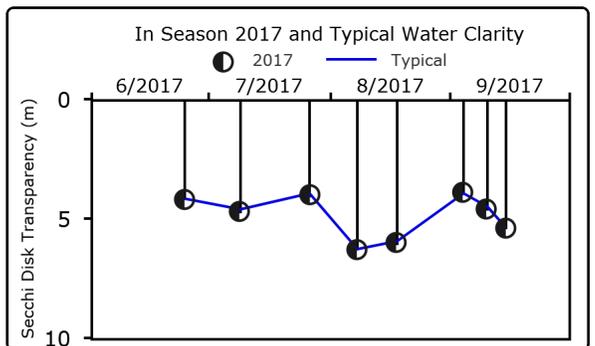


# Canandaigua Lake In-Season Analysis

## In Season Temperature



## In Season Water Clarity



# Scorecard

## Lake Use

	PWL	Average Year	2017	Primary Issue
Potable Water				Algae blooms
Swimming				Algae blooms
Recreation				Algae blooms
Aquatic Life				Invasive animals
Aesthetics				Algae blooms
Habitat				Invasive plants
Fish Consumption				Not applicable

- Supported/Good
- Threatened/Fair
- Stressed/Poor
- Impaired
- Not Known

## Summary

This narrative is a concise summary of 2017 results from Canandaigua Lake, Northern Site. A more detailed evaluation of Canandaigua Lake and the 2017 Finger Lakes CSLAP program, including available historical NYSDEC data will be presented in a larger NYSDEC Finger Lakes report to be released in April 2018. This report will include an enhanced discussion of: (1) spatial differences in water quality, (2) seasonal patterns in key indicators, (3) differences in vertical water quality, (4) comparisons with the other Finger Lakes and all 2017 CSLAP lakes, and (5) water quality trends over time.

2017 is the first year of CSLAP sampling on Canandaigua Lake, including the sampling at the north site. The 2017 data suggests that the north site of Canandaigua Lake is mesoligotrophic (moderately unproductive) based on intermediate to high water clarity (Secchi disk generally greater than 5 m), low nutrient levels (TP less than 0.01 mg/L), and low to intermediate algae levels (Chl-a generally less than 2 µg/L). The lake also has slightly alkaline pH (above 7) consistent with hard water, relatively low color and calcium levels more than high enough to support dreissenid mussels (2017 calcium average was 33 mg/L). This site has strong thermal stratification, and deepwater oxygen levels are high. Aquatic plants do not grow to the lake surface in most nearby locations, and “recreational” assessments are favorable due to high water clarity and the lack of significant surface weed growth. Total nitrogen (TN) appeared to decrease during the summer, but otherwise no clear seasonal trends were apparent.

The 2017 data from the north site indicated slightly higher productivity- slightly lower water clarity in response to slightly higher nutrient and algae levels- than in the DEC dataset for Canandaigua Lake in the late 1990s. There did not appear to be a significant threat for disinfection-by-product (DBP) formation. It is not known if the ephemeral shoreline and occasionally open water cyanobacteria (HAB) blooms on the lake in the last few years represent an ecological change in the lake or more consistent bloom surveillance.

**Compared to nearby lakes:** Canandaigua Lake has higher water clarity, due to lower nutrient and algae levels, than most other lakes in Seneca-Oneida-Oswego River basin, including the other large Finger Lakes. Chloride levels are above the 50th percentile of New York lakes, but these levels are far below drinking water standards (2017 chloride average was 46 mg/L).

**Compared to other sites on the lake:** Water clarity was slightly higher in the southern Canandaigua Lake site than in the northern site, due to slightly lower algae and nutrient levels. It is likely that each of the other water quality indicators measured through CSLAP were similar on both sites.

**Trends:** Water quality trends cannot be evaluated with such limited water quality data, and it is not yet known if the differences between the 2017 CSLAP dataset and the DEC data from the 1990s (collecting using the same sampling protocols and laboratory) represent a long-term trend.

**Algal blooms and HABS:** Water quality conditions indicated a low susceptibility to blooms, although blooms have been periodically reported in the north end of the lake in 2015 and in 2017. It is not yet known if these water quality conditions, and the unexpected susceptibility to blooms, are representative of normal bloom conditions in the lake, and if these conditions are stable. The cause of these blooms continues to be actively investigated.

**Aquatic invasive species:** AIS plants reported in the lake include Eurasian watermilfoil, water chestnut, and curly leafed pondweed. In addition, zebra and quagga mussels, fishhook waterflea, Chinese mystery

snail, Asian clam, common carp and scud have also been documented in the lake. The large number of access points and proximity to other infested lakes includes a high vulnerability to new AIS introductions.

Indicated Actions: The Canandaigua Lake Watershed Council, Canandaigua Lake Watershed Association, and many other local partners have initiated many actions to monitor lake water quality, reduce nutrient and sediment loading, AIS introductions, and other lake and watershed management actions. In addition to these actions, continued water quality and invasive species monitoring is warranted. Continued algae bloom education and monitoring for HABs is recommended, although blooms are probably not common in the lake in most years, and the potential impact to drinking water is already closely monitored.

## How to Read the Report

This guide provides a description of the CSLAP report by section and a glossary. The sampling site is indicated in the header for lakes with more than one routine sampling site.

### **Physical Characteristics influence lake quality:**

- Surface area is the lake's surface in acres and hectares.
- Max depth is the water depth measured at the deepest part of the lake in feet and meters.
- Mean depth is either known from lake bathymetry or is 0.46 of the maximum depth.
- Retention time is the time it takes for water to pass through a lake in years. This indicates the influence of the watershed on lake conditions.
- Lake classification describes the “best uses” for this lake. Class AA, AAspec, and A lakes may be used as sources of potable water. Class B lakes are suitable for contact recreational activities, like swimming. Class C lakes are suitable for non-contact recreational activities, including fishing, although they may still support swimming. The addition of a T or TS to any of these classes indicates the ability of a lake to support trout populations and/or trout spawning.
- Dam classification defines the hazard class of a dam. Class A, B, C, and D dams are defined as low, intermediate, high, or negligible/no hazard dams in that order. “0” indicates that no class has been assigned to a particular dam, or that no dam exists.

### **Watershed characteristics influence lake water quality:**

- Watershed area in acres and hectares
- Land use data come from the most recent (2011) US Geological Survey National Land Use Cover dataset

**CSLAP Participation** lists the sampling years and the current year volunteers.

### **Key lake status indicators summarize lake conditions:**

- Trophic state of a lake refers to its nutrient loading and productivity, measured by phosphorus, algae, and clarity. An oligotrophic lake has low nutrient and algae levels (low productivity) and high clarity while a eutrophic lake has high nutrient and algae levels (high productivity) and low clarity. Mesotrophic lakes fall in the middle.
- Harmful algal bloom susceptibility summarizes the available historical HAB data and indicates the potential for future HAB events.
- Invasive vulnerability indicates whether aquatic invasive species are found in this lake or in nearby lakes, indicating the potential for further introductions.
- Priority waterbody list (PWL) assessment is based on the assessment of use categories and summarized as fully supported, threatened, stressed,

impaired, or precluded. Aesthetics and habitat are evaluated as good, fair, or poor. The cited PWL assessment reflects the “worst” assessment for the lake. The full PWL assessment can be found at <http://www.dec.ny.gov/chemical/36730.html#WIPWL>.

### **Current year sampling results**

- Results for each of the sampling sessions in the year are in tabular form. The seasonal change graphically shows the current year results. Red shading indicates eutrophic readings.
- HAB notification periods on the DEC website, updated weekly <http://www.dec.ny.gov/chemical/83310.html>
- Shoreline HAB sample dates and results. Samples are collected from the area that appears to have the worst bloom. Red shading indicates a confirmed HAB.
- HAB sample algae analysis. Algae types typically change during the season. These charts show the amount of the different types of algae found in each mid-lake or shoreline sample. Samples with high levels of BGA are HABs. The second set of charts show the level of toxins found in open water and shoreline samples compared to the World Health Organization (WHO) guidelines.
- If there are more than ten shoreline bloom samples collected in a year, bloom sample information is instead summarized by month (May-Oct.) as minimum, average, and maximum values for blue-green algae and microcystin.

**Long Term Trend Analysis** puts the current year findings in context. Summer averages (mid-June thru mid-September) for each of the CSLAP years show trends in key water quality indicators. The graphs include relevant criteria (trophic categories, water quality standards, etc.) and boundaries separating these criteria.

**In-Season Analysis** shows water temperature and water clarity during the sampling season. These indicate seasonal changes and show the sample year results compared to the typical historical readings for those dates.

**The Lake Use Scorecard** presents the results of the existing Priority Waterbody List assessment for this lake in a graphical form and compares it to information from the current year and average values from CSLAP data and other lake information. Primary issues that could impact specific use categories are identified, although more issues could also affect each designated use.

**The Lake Summary** reviews and encapsulates the data in the lake report, and provides suggested actions for lake management.

## Glossary of water quality and HAB indicators

**Clarity (m):** The depth to which a Secchi disk lowered into the water is visible, measured in meters. Water clarity is one of the trophic indicators for each lake.

**TP (mg/L):** Total phosphorus, measured in milligrams per liter at the lake surface (1.5 meters below the surface). TP includes all dissolved and particulate forms of phosphorus.

**Deep TP:** Total phosphorus measured in milligrams per liter at depth (1-2 meters above the lake bottom at the deepest part of the lake)

**TN:** Total nitrogen, measured in milligrams per liter at the lake surface. TN includes all forms of nitrogen, including **NO<sub>x</sub>** (nitrite and nitrate) and **NH<sub>4</sub>** (ammonia).

**N:P Ratio:** The ratio of total nitrogen to total phosphorus, unitless (mass ratio). This ratio helps determine if a lake is phosphorous or nitrogen limited.

**Chl.a (µg/L):** Chlorophyll a, measured in micrograms per liter. Indicates the amount of algae in the water column.

**pH:** A range from 0 to 14, with 0 being the most acidic and 14 being the most basic or alkaline. A healthy lake generally ranges between 6.5 and 8.5.

**Cond (µmho/cm):** Specific conductance is a measure of the conductivity of water. A higher value indicates the presence of more dissolved ions. High ion concentrations indicate hardwater, and low show softwater.

**Upper Temp (°C):** Surface temperature, measured in degrees Celsius

**Deep Temp (°C):** Bottom temperature, measured in degrees Celsius

**BG Chl.a (µg/L):** Chlorophyll a from blue-green algae, measured in micrograms per liter

**HABs: Harmful Algal Blooms.** Algal blooms that have the appearance of cyanobacteria (BGA)

**BGA:** Blue-green algae, also known as cyanobacteria

**Microcystin (µg/L):** The most common HAB liver toxin; total microcystin above 20 micrograms per liter indicates a “high toxin” bloom. However, ALL BGA blooms should be avoided, even if toxin levels are low.

**Anatoxin-a (µg/L):** A toxin that may be produced in a HAB which targets the central nervous system. Neither EPA nor NYS has developed a risk threshold for anatoxin-a, although readings above 4 micrograms per liter are believed to represent an elevated risk.