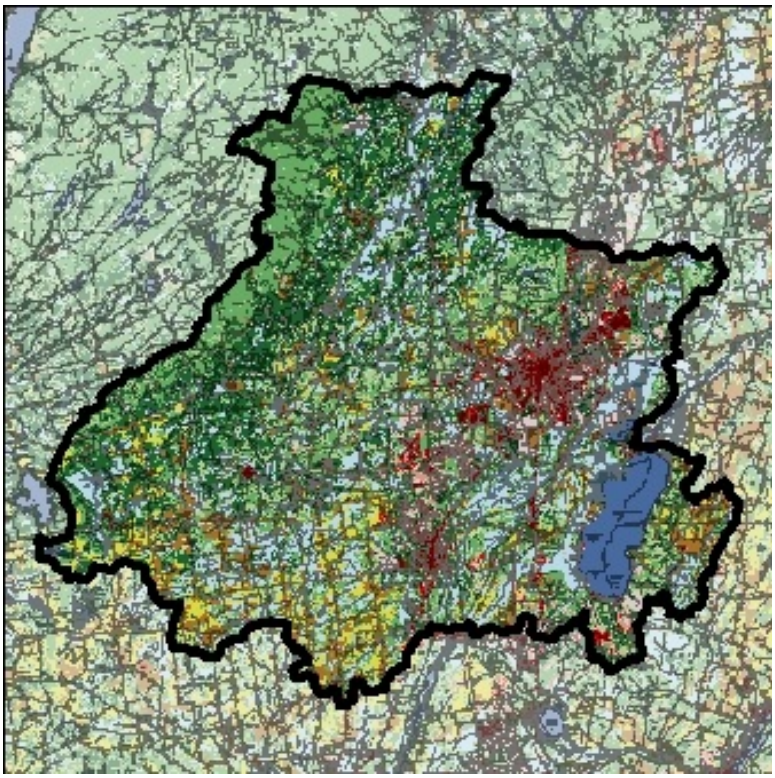
Saratoga Lake

Saratoga Lake Protection and Improvement District

Town(s) of Saratoga, Malta, Stillwater

Saratoga County



Lake Characteristics	
Surface Area (ac/ha)	4032/1632
Max Depth (ft/m)	94.8/28.9
Mean Depth (ft/m)	25.3/7.7
Retention Time (years)	0.4
Lake Classification	A
Dam Classification	A
Watershed Characteristics	
Watershed area (ac/ha)	156174/63200
Watershed/Lake Ratio	39
Lake and Wetlands %	22.49%
Agricultural %	11.48%
Forest, Shrub, Grasses %	50.20%
Residential %	15.26%
Urban %	0.56%
CSLAP Participation	
Years in CSLAP	1993-1997, 2005-2011, 2013, 2015-2020
Volunteers	Karl Hardcastle, Neal Kramer, William LaMay

Trophic State	HABs Susceptibility	Invasive Vulnerability	PWL Assessment
Mesotrophic	No Reported Blooms, Low susceptibility	Invasives present, High vulnerability	Stressed

Saratoga Lake – 2020 Sampling Season Results

“Seasonal change” shows the current year variability. Red shaded results indicate eutrophic water quality conditions. “Season Median” is the middle value (or average of the middle two values) of the current year’s data in order. “Decadal Median” is the median of the most recent ten years of water quality data. “Longterm Median” is the median of all years of water quality data. “Decadal Trend?” and “Longterm Trend?” indicate whether there was a statistically significant change in the water quality data over the most recent ten years and all years, respectively. In these columns, ‘No’ indicates there was no significant trend, ‘↑’ indicates there was a significant positive trend (p<0.05), ‘↑↑’ indicates there was a strong significant positive trend (p<0.01), ‘↓’ indicates there was a significant negative trend (p<0.05), ‘↓↓’ indicates there was a strong significant negative trend (p<0.01), and blank indicates there was insufficient data to identify a trend. In this report, seasonal trend analyses for individual sampling years and long term trend analyses show changes in key water quality indicators over a consistent index period (mid-June thru mid-September).

	2020 Sampling Results													
Open Water Indicators	06-09	06-16	07-07	07-21	08-11	08-25	09-08	09-14	Seasonal Change	Season Median	Decadal Median	Decadal Trend?	Longterm Median	Longterm Trend?
Clarity (m)	3.3	5.5	3.7	3.5	3.5	3.5	3.1	3		3.5	3.1	no	3.1	↑↑
Surface TP (mg/L)	0.011	0.01	0.01	0.012	0.015	0.02	0.016	0.018		0.014	0.017	no	0.018	no
Surface TDP (mg/L)	0.005	0.005	0.006	0.006	0.008	0.014	0.005	0.009		0.006	0.004	↑↑	0.004	↑↑
Deep TP (mg/L)	0.016	0.04	0.09	0.104	0.317	0.532	0.713	0.034		0.097	0.122	↑↑	0.028	↑↑
Deep TDP (mg/L)	0.008	0.015	0.02	0.034	0.014	0.024	0.033	0.012		0.018	0.022	no	0.022	no
TN (mg/L)	0.437	0.496		0.243	0.325		0.344	0.347		0.346	0.424	no	0.369	no
TDN (mg/L)	0.429	0.479		0.294	0.271		0.273	0.268		0.284	0.29	no	0.292	no
TN:TP	38	51		20	21		21	19		21	23	no	20	↓↓
Surface NH3 (mg/L)	0.026	0.049	0.026	0.013	0.013	0.036		0.023		0.026	0.026	no	0.022	↑↑
Deep NH3 (mg/L)	0.099	0.129	0.263	0.262	0.459	0.601	0.669	0.026		0.262	0.356	↑↑	0.183	↑↑
Chl.a (ug/L)	3.1	1.4	3.2	6.3	4.9		5.6			4.1	5	no	5.7	↓↓
pH	7.8	8.2	8.4	8.6	8.8	8.6	7.9	8		8.3	7.7	no	7.8	↓↓
Cond (uS/cm)	426	432	429	441	442	436	444	448		439	383	↑↑	296	↑↑
Surface Calcium (mg/L)	28				21					24	28		28	
Surface Chloride (mg/L)		67		69		69		70		69	66	no	66	no
Deep Chloride (mg/L)		68		66		66		71		67	65	no	65	no
True Color (ptu)	8	7	9	7	9	12	12	10		9	13	↓↓	14	no
Upper Temp (degC)	22	22	26	27	27	26	23	22		24	25	no	24	↑↑
Deep Temp (degC)	11	12	12	13	14	13	14	20		13	14	no	14	↑↑
FP BG Chl.a (ug/L)	0	0.1	0.3	1.1	3.4	2.5	2.1	1.4		1.2	1.4	no	1.4	no

Saratoga Lake – Lake Scorecard

Water Quality Indicators	Average Year	2020
Phosphorus	Mesotrophic	Mesotrophic
Chlorophyll A	Mesotrophic	Mesotrophic
Secchi	Mesotrophic	Mesotrophic
Lake Perception	Fair	Good
Harmful Algal Blooms	Poor	Good
Open Water Algae Levels	Poor	Good
Aquatic Invasive Species	Present	

Saratoga Lake – 2020 Lake Summary

Q. What is the condition of the lake?

A. Saratoga Lake continues to be mesotrophic, or moderately productive, based on moderate water clarity, moderate algae levels (chlorophyll a), and moderate nutrient (phosphorous) levels. Soluble nutrients were analyzed in 2020. Most of the phosphorus in the lake is soluble, indicating a high potential for more algae growth. Most of the nitrogen in the lake is soluble. The waterbody is highly alkaline or basic, with extremely hard water, low water color, and moderately low nitrogen levels.

Q. How did this year compare to previous years?

A. Compared to previous years, pH, conductivity and chloride were higher in 2020. Compared to previous years, color was lower in 2020. Water clarity (secchi), total phosphorous, extracted chlorophyll a, total nitrogen, surface water temperature, deep water temperature, water quality evaluation, aquatic plant coverage and recreational evaluation in 2020 were similar to previous years.

Q. How does this lake compare to other New York lakes?

A. Compared to other New York Lakes, this waterbody usually has higher pH, conductivity and chloride. Compared to other New York Lakes, this waterbody usually has lower color and more favorable aquatic plant coverage. Compared to other New York Lakes, this waterbody usually has similar water clarity (secchi), total phosphorous, extracted chlorophyll a, total nitrogen, surface water temperature, deep water temperature, water quality evaluation and recreational evaluation.

Q. Are there any (statistically significant) trends?

A. Over the past 28 years, clarity, conductivity, deep NH3, deep total phosphorus, deep water temperature, surface NH3, surface total dissolved phosphorus and surface water temperature have increased significantly. Over the past 28 years, chlorophyll a and pH have decreased significantly. Over the past ten years, conductivity, deep ammonia, deep total phosphorus and surface total dissolved phosphorus have increased significantly.

Q. Has the lake experienced harmful algal blooms (HABs)?

A. Water quality conditions generally indicate a low susceptibility to blooms, with frequent blooms along the shoreline or in the open water.

The open water algal community in the lake is usually comprised of intermediate cyanobacteria levels. This community is dominated by Dolichospermum. Typically, overall open water algae levels are intermediate. Overall open water toxin levels are consistently below recreational levels of concern.

This year, overall algae levels were intermediate, with cyanobacteria the most common taxa in open water samples, and with intermediate cyanobacteria levels. Open water toxin levels were not analyzed due to low probability of detection based on low chlorophyll values this year.

Shoreline blooms were not reported and/or sampled this year.

Q. Have any aquatic invasive species (AIS) been reported?

A. Invasive species have been reported in this waterbody. Aquatic invasive plant and/or animal species reported include: zebra mussels, common carp, goldfish, Eurasian watermilfoil, Curly leafed pondweed, water chestnut. This waterbody has high vulnerability for introduction of new invasive species due to invasive species already being present. This waterbody has moderate vulnerability for establishment of invasive bivalves based on calcium levels. For more information about invasive species in the area, or to report an invasive species observation, visit NY iMapInvasives at https://www.nyimapinvasives.org/ (https://www.nyimapinvasives.org/).

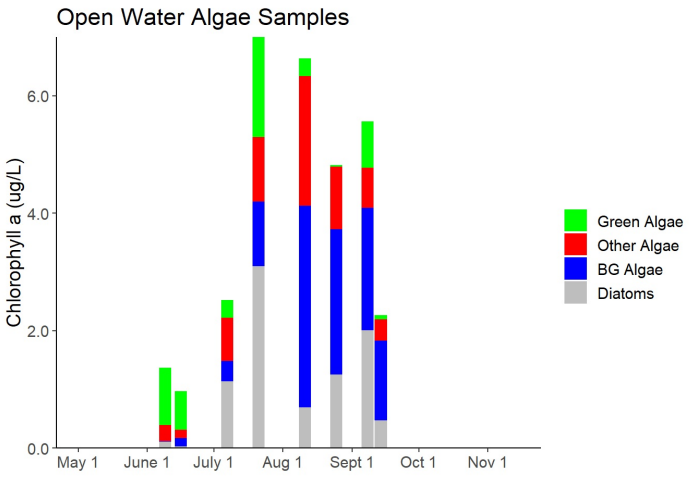
NYHABs notifications

Were there any reported HABs this season? **No.**

Shoreline HAB Sample Dates 2020

There were no shoreline HAB samples taken this season.

Open Water Algae

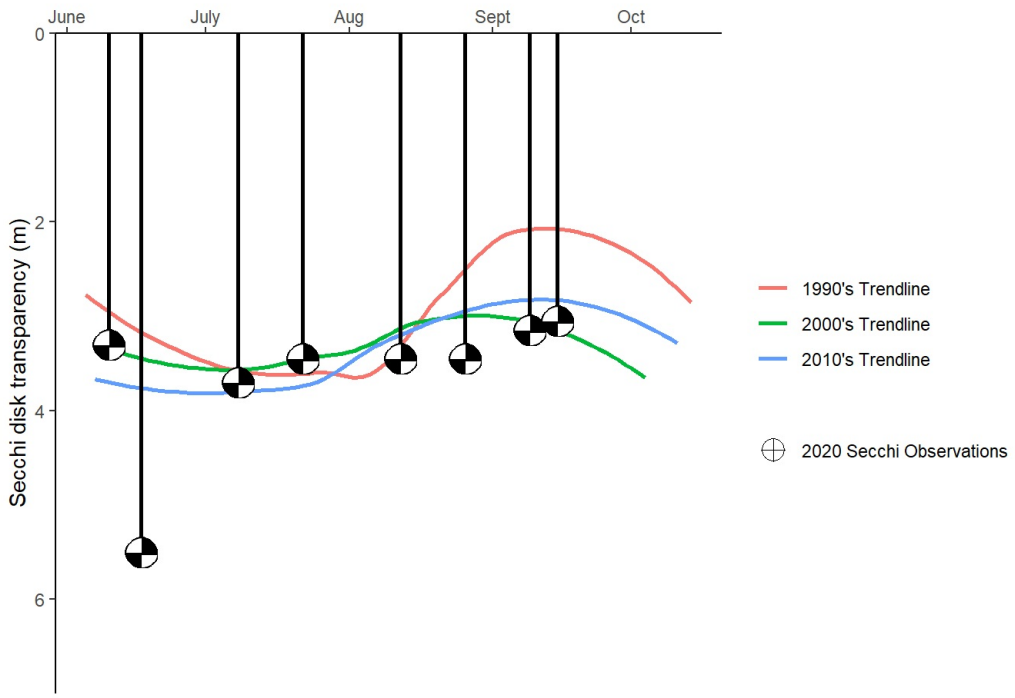


Shoreline Algae

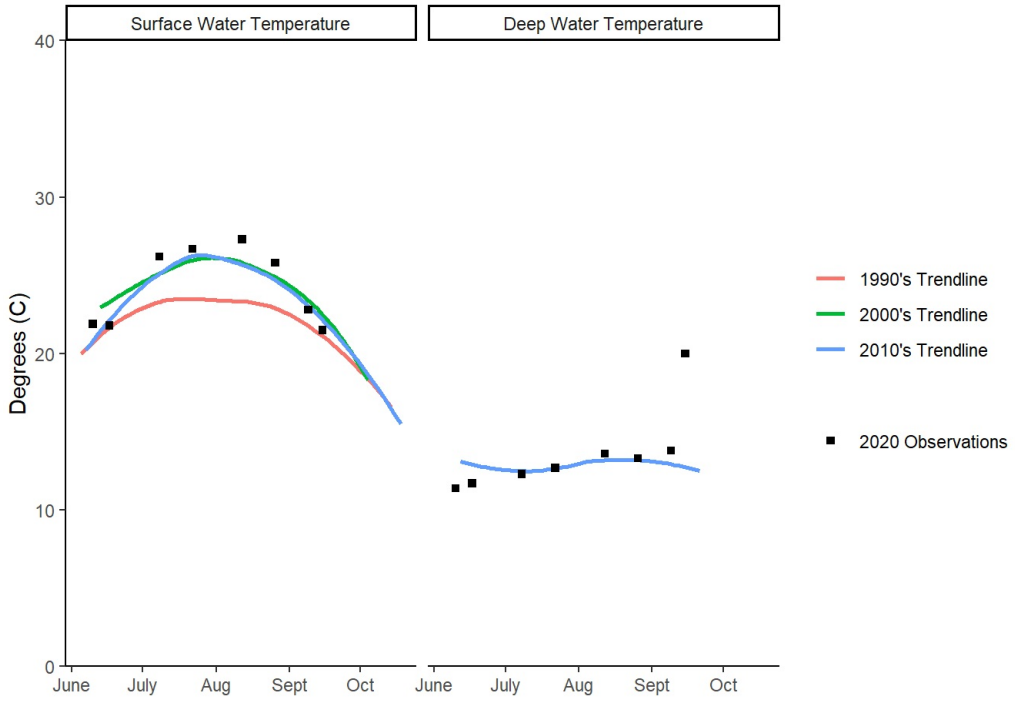
There is no shoreline algae or shoreline microcystin data to display from this year.

Saratoga Lake - In-Season Trend Analysis

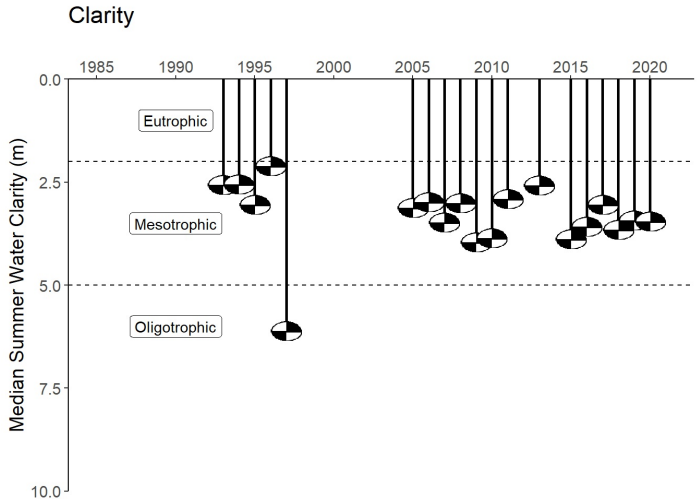
In Season Water Clarity

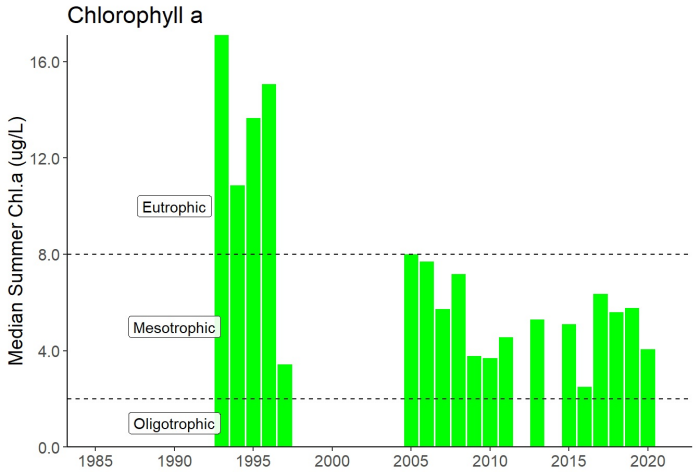


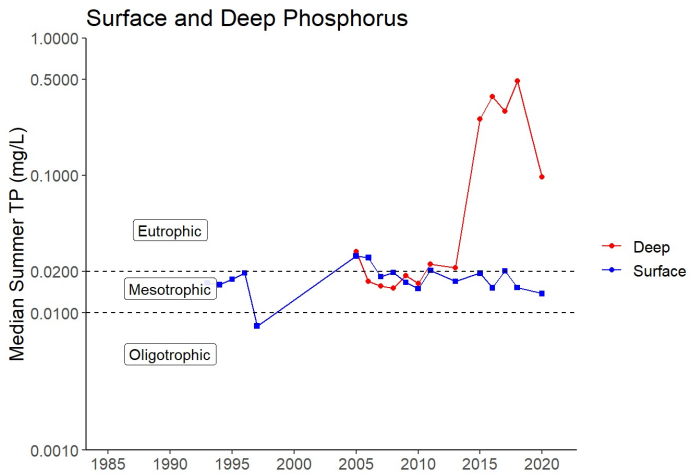
In Season Water Temperature

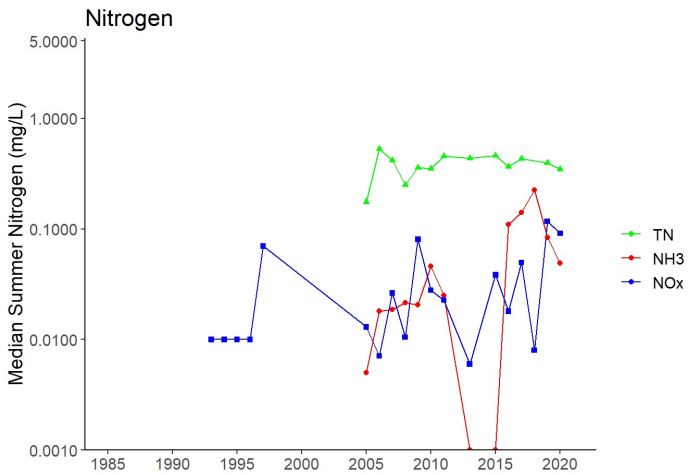


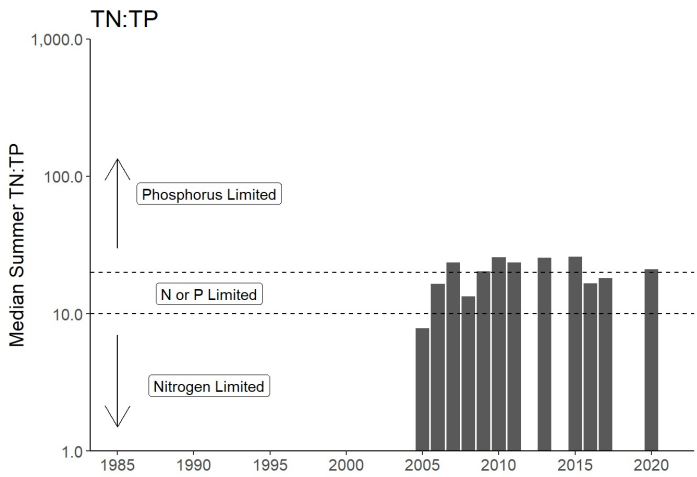
Saratoga Lake Long-Term Trend Analysis

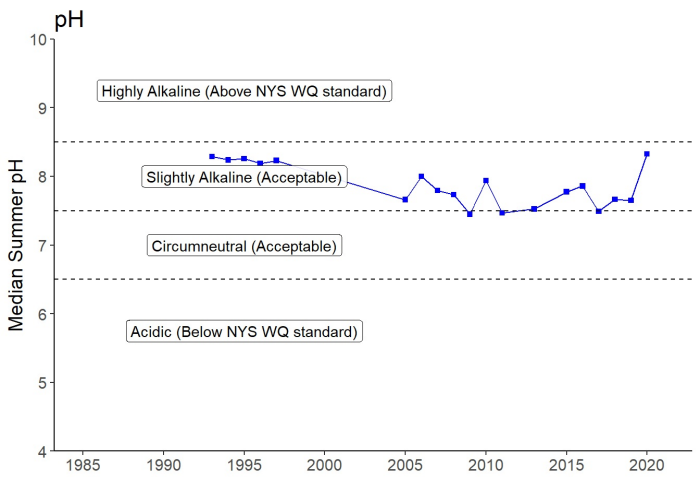


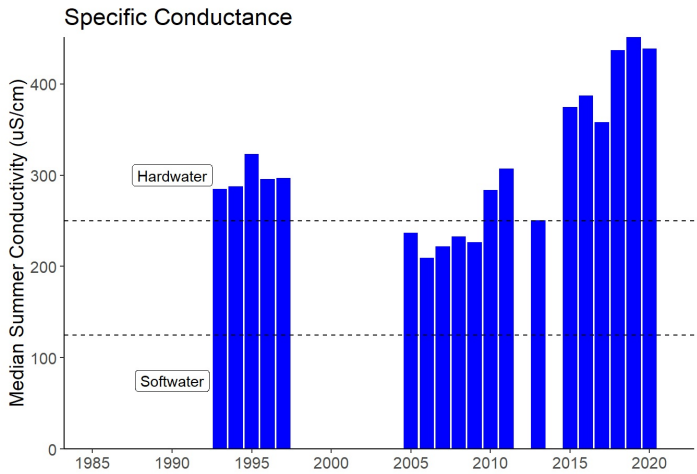


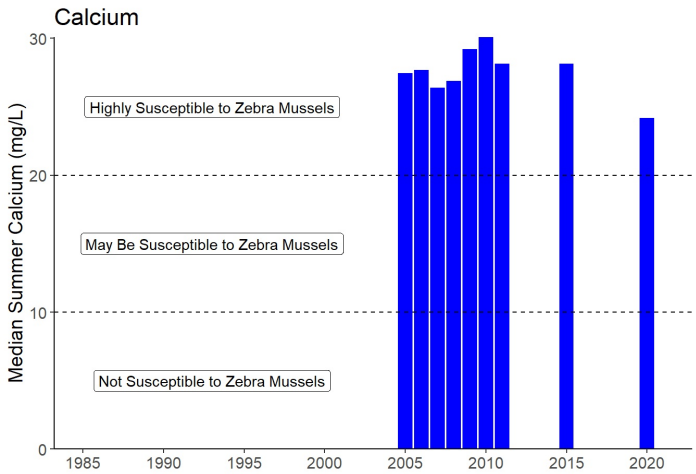


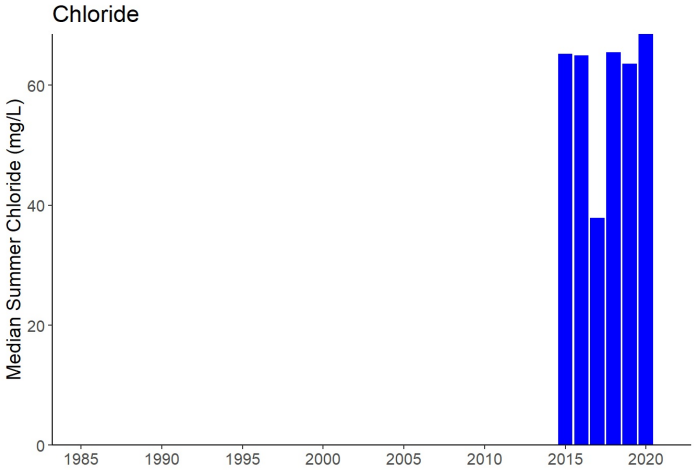


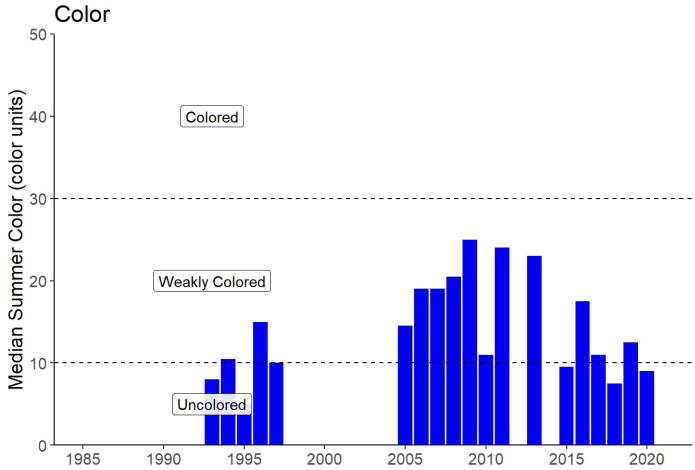


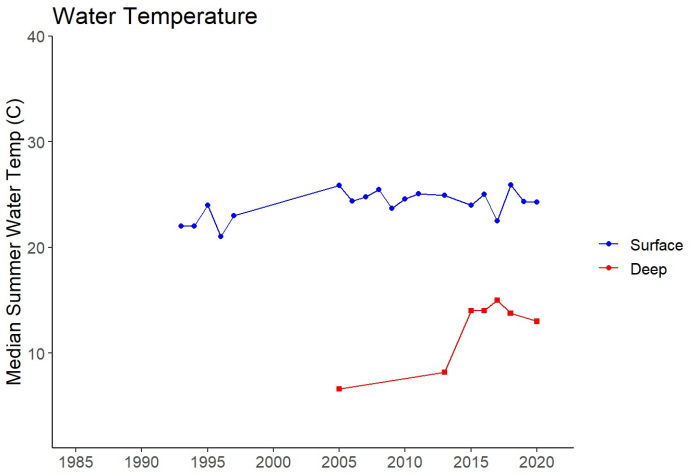


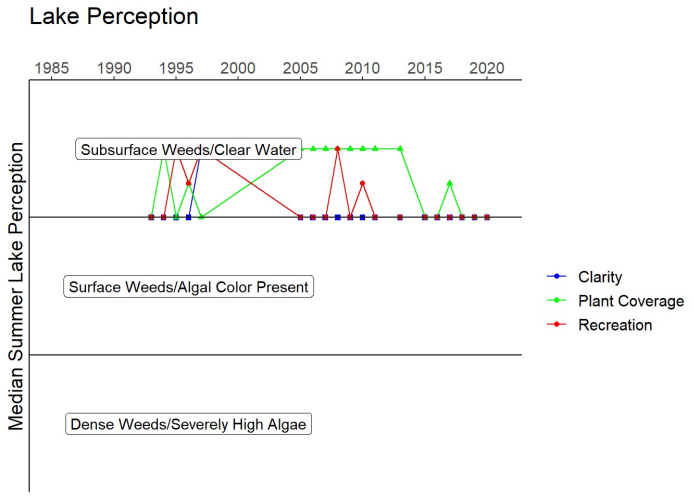





Chloride
Median Summer Chloride (mg/L)
0
20
40
60
1985
1990
1995
2000
2005
2010
2015
2020


Color
Median Summer Color (color units)
0
10
20
30
40
50
Colored
Weakly Colored
Uncolored
1985
1990
1995
2000
2005
2010
2015
2020


Water Temperature
Median Summer Water Temp (C)
10
20
30
40
1985
1990
1995
2000
2005
2010
2015
2020
Surface
Deep


Lake Perception
Median Summer Lake Perception
1985
1990
1995
2000
2005
2010
2015
2020
Subsurface Weeds/Clear Water
Surface Weeds/Algal Color Present
Dense Weeds/Severely High Algae
Clarity
Plant Coverage
Recreation

Water Quality Assessments

The Waterbody Inventory/Priority Waterbodies List (WI/PWL) is a statewide inventory of New York's water resources that is used to track a waters ability to support its' best use(s), identify pollutant(s) causing impairment of best use(s), and follow the status of restoration, protection and other water quality activities and efforts. Data collected through CSLAP contributes to the WI/PWL. In order to be included as an assessment unit in the WI/PWL, a lake, pond, or reservoir must be at least 6.4 acres in size. To view current water quality assessment results:

- Visit https://www.dec.ny.gov/pubs/109457.html (https://www.dec.ny.gov/pubs/109457.html) - follow the link to launch the DECinfo Locator
- Search for waterbody name, address or nearby landmark in the search tool at the top of the left banner
- Click and Expand the 'DEC Information Layers' tab of the left banner
- Click and expand the 'Environmental Monitoring' tab of the left banner
- Check the 'Lakes and Reservoirs' layer
- Click on the waterbody of interest in the map view to display a pop-up with more information about the waterbody
- Follow the 'Fact Sheet' link in the pop-up to learn more about the current use assessment of the waterbody

Lake Stewardship Actions

Individual stewardship activities can help improve water quality: maintain your septic system, reduce fertilizer use, grow a buffer of native plants next to the lake shore, and reduce shoreline erosion and runoff into the lake. Visiting boats should be inspected to prevent the spread of invasive species, and continued community education about and monitoring for invasive species is recommended. Routine education about algae and harmful algal blooms (HABs) within your lake community is recommended; to learn more about HABs and see examples of HABs visit http://www.dec.ny.gov/chemical/81962.html (http://www.dec.ny.gov/chemical/81962.html). Occurrences of HABs can be reported to NYSDEC. For more information on keeping New York waters clean, visit http://www.dec.ny.gov/public/43661.html (http://www.dec.ny.gov/public/43661.html).

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.

Current year sampling results shows 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.

- 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.

The Lake Scorecard represents key water quality indicator results for this lake in an easy-to-read format, comparing information from the current year and historical average of the CSLAP data. Indicators include (1) trophic status of phosphorus, chlorophyll (or algae) and secchi (or clarity); (2) presence or absence of aquatic invasive plants or animals; (3) lake user perception based on perceived physical condition and recreational suitability of the lake; (4) harmful algal bloom samples or reports; and (5) algae levels in the open water of routinely sampled sites.

The Lake Summary reviews and encapsulates the data in the lake report, including comparisons to historical data from this lake, and results from nearby lakes.

Harmful Algal Blooms:

- HAB notification periods on the DEC website http://www.dec.ny.gov/chemical/83310.html (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 NYSDOH and NYSDEC guidelines.

In-Season Trend 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.

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.

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 or a fixed depth in the hypolimnion of very deep lakes).

TN: Total nitrogen, measured in milligrams per liter at the lake surface. TN includes all forms of nitrogen, including NOx (nitrite and nitrate) and NH4 (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. This is an extracted chlorophyll measurement.

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 (> 250) usually indicate hardwater, and low readings (< 125) usually show softwater.

Calcium (mg/L): Calcium, a component of lake buffering capacity (the ability to neutralize acid inputs), as measured in milligrams per liter at the lake surface (1.5 meters below the surface).

Chloride (mg/L): Chloride, or chloride ions, as measured in milligrams per liter at the lake surface (1.5 meters below the surface).

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

Deep Temp (°C): Deep water temperature, measured in degrees Celsius.

BG Chl.a (µg/L): Chlorophyll a from blue-green algae, measured in micrograms per liter. This is an “unextracted” estimate using a fluoroprobe. This result is different from the extracted chlorophyll measurement described above.

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 pose a potential health risk and should be avoided.