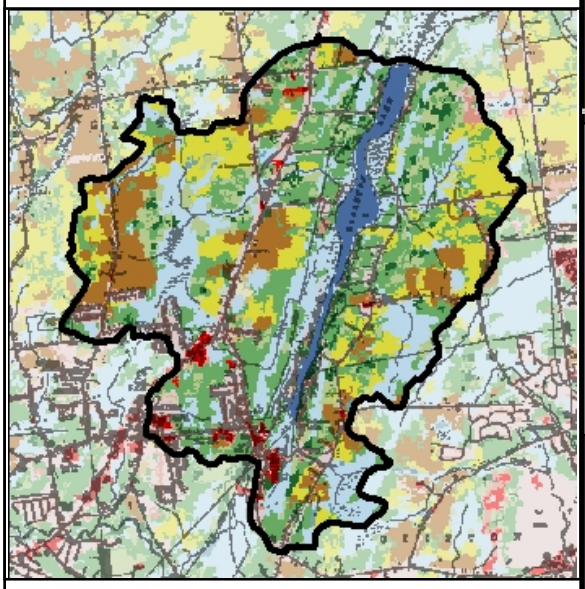
Ballston Lake, Saratoga Co., Ballston Lake Improvement Association

NEW YORK STATE OF OPPORTUNITY | Department of Environmental Conservation



Lake Characteristics	Surface Area (ac/ha)	278	112
	Max Depth (ft/m)	116	35
	Mean Depth (ft/m)	22	7
	Retention Time (years)	0.80	
	Water Class	A	
	Dam Class		
Watershed Characteristics	Watershed Area(ac/ha)	6662	2696
	Watershed/Lake Ratio	24	
	Lake and Wetlands	26.3%	
	Agricultural	23.6%	
	Forests, shrubs, grasses	34.9%	
	Residential	14.9%	
	Urban	0.4%	
CSLAP Participation	Years	1991-2017	
	Volunteers	David Pierce, Peter Herman	

Trophic State	HABs Susceptibility	Invasive Vulnerability	PWL Assessment
Eutrophic	Moderate	High	Impaired

Open Water Indicators	2017 Sampling Results								Seasonal Change	Long Term Avg.
	6/11	6/25	7/10	7/24	8/6	8/20	9/4	9/17		
Chl.a (µg/L)	7.5	13.8	34.5	52	68.2	22.1	17.8	12.6		20.0
BG Chl.a (µg/L)	1.1	0		26	4.5	3.8	3.2	4.6		9.8
Clarity (m)	2	1.5	1.9	1.1	1.6	1.5	1.8	1.8		2.0
pH	7.5	6.4	7.8	7.6	7.9	7.9	7.6	7.8		7.7
Cond (µmho/cm)	395.2	401.7	400.9	362.9	368.3	358.8	363.5	236.2		329
Surf Temp (°C)	19	25	23	24	26	24	20	22		23
Bott Temp (degC)										10
TN (mg/L)	.427	.514	.531	.874	.556	.534	.483	.543		0.640
TP (mg/L)	.028	.036	.048	.061	.044	.03	.027	.022		0.032
Deep TP (mg/L)										0.133
Surface N:P Ratio	15	14	11	14	13	18	18	25		

Shoreline bloom and HABs notifications

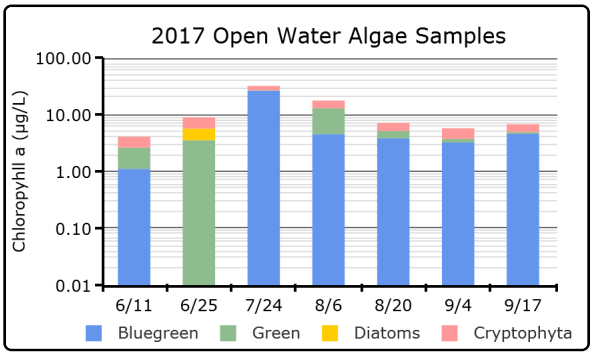
Date of first listing	Date of last listing	# of weeks on DEC notification list	# of weeks with updates
7/21/2017	9/22/2017	9	3

Shoreline HAB Sample Dates 2017

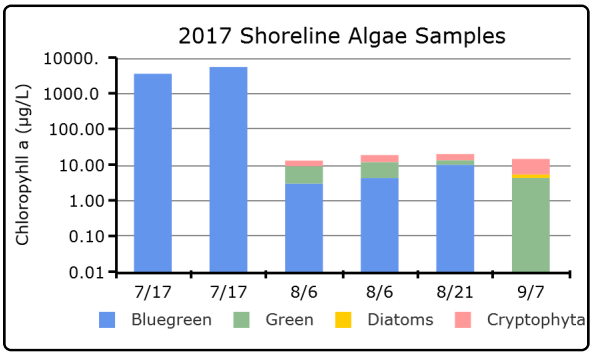
HAB Indicators	HAB Criteria	7/17	7/17	8/6	8/6	8/21	9/7				
BGA	25 µg/L	3517	5438.3	2.9	4.2	9.8	0.0				
Microcystin	20 µg/L	ND	ND	ND	ND	ND	ND				
Anatoxin-a		ND	ND	.06	ND	ND	ND				

HAB Status

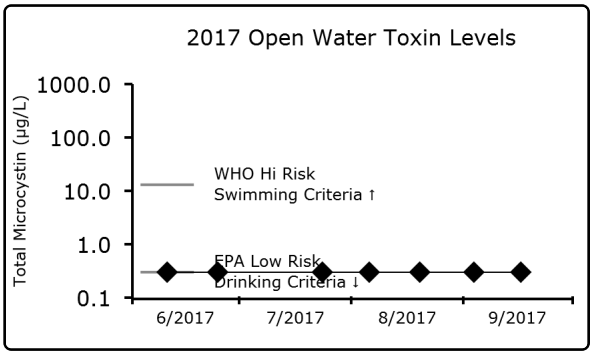
2017 Open Water Algae Samples



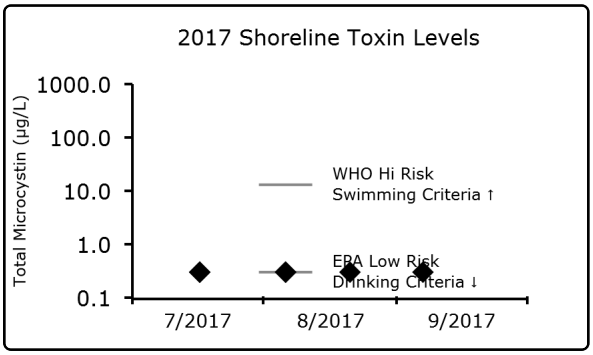
2017 Shoreline Algae Samples



2017 Open Water Toxin Levels

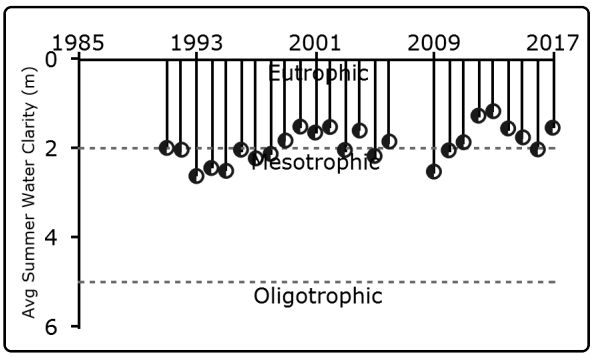


2017 Shoreline Toxin Levels

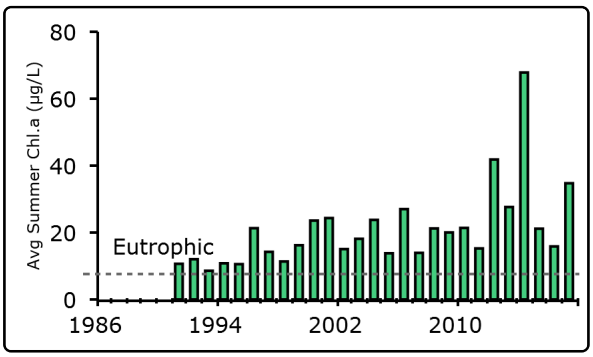


Ballston Lake Long Term Trend Analysis

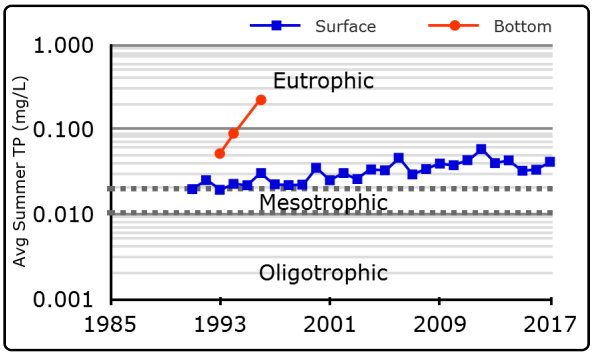
Clarity



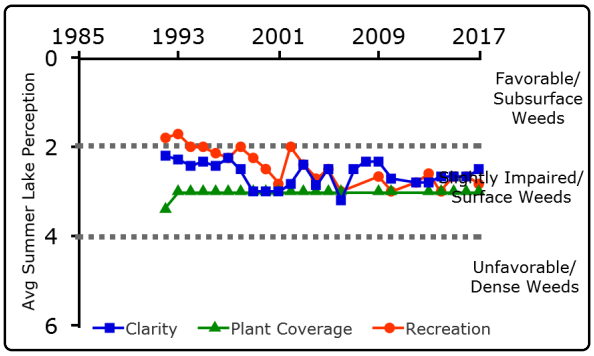
Chlorophyll a



Surface and Deep Phosphorus

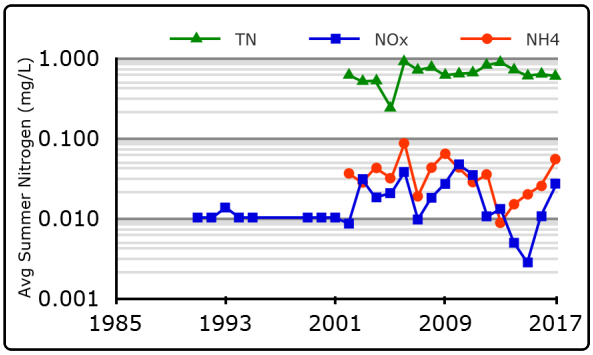


Lake Perception

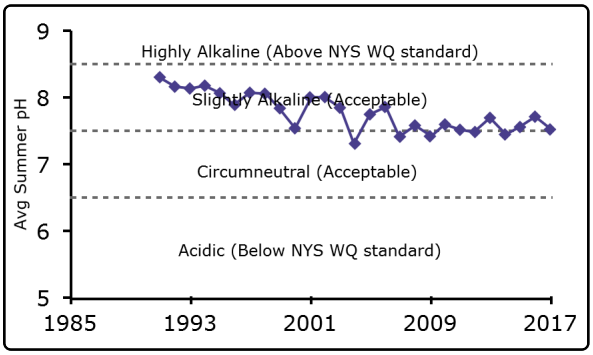


Ballston Lake Long Term Trend Analysis

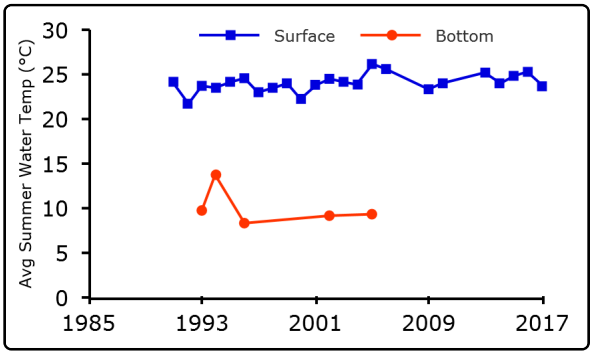
Nitrogen



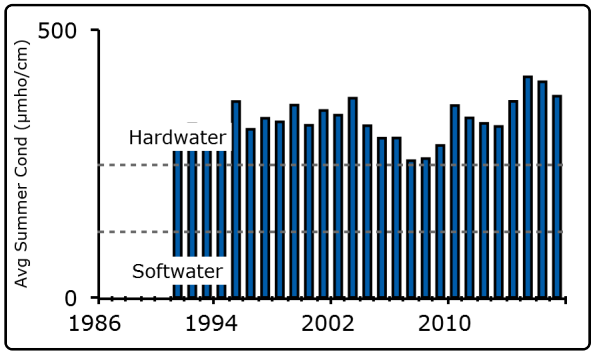
pH



Temperature

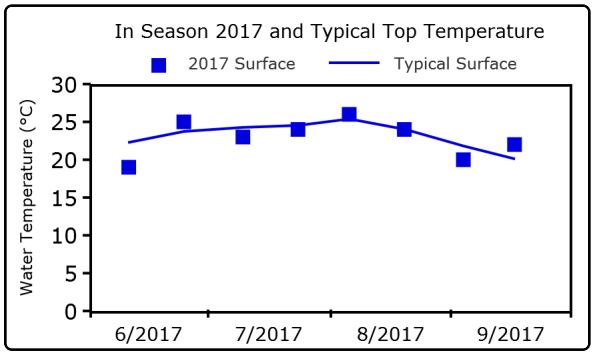


Specific Conductance

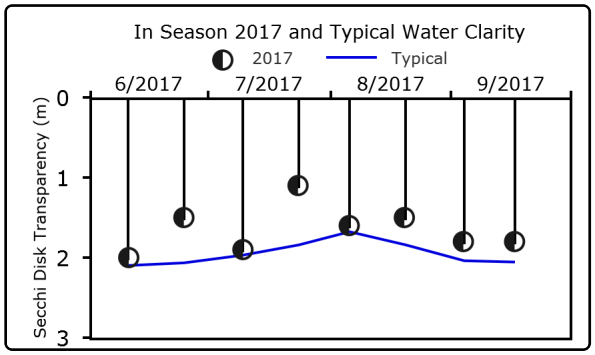


Ballston Lake In-Season Analysis

In Season Temperature

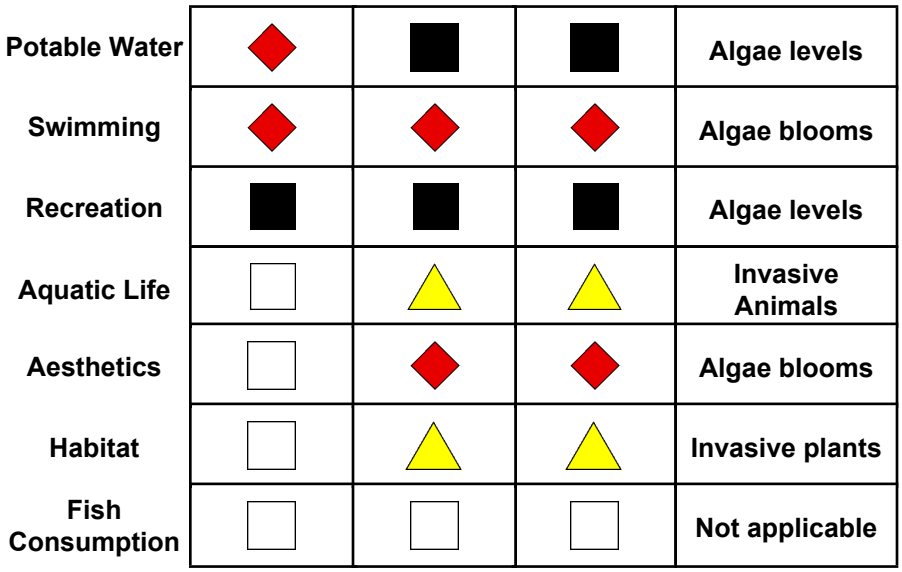


In Season Water Clarity



Scorecard

Lake Use



Summary

2017 compared to prior years: Ballston Lake at both sites continue to exhibit characteristics of *eutrophic* (highly productive) lakes, based on low water clarity and high nutrient (phosphorus) and algae (chlorophyll *a*) levels. Lake productivity was higher than usual in the main (Deep Water) site- water transparency was lower in response to higher phosphorus and chlorophyll *a* readings, although the alternative (Wide Water) site was close to normal. Conductivity readings were also higher than normal in both sites, and recreational assessments were less favorable throughout the lake, particularly in the Deep Water site. Each of the other CSLAP water quality indicators was close to normal in 2017.

Compared to nearby lakes: Ballston Lake has similar water clarity, nutrient and algae levels, compared to other nearby (Mohawk region) lakes, although these conditions may have become slightly less favorable (relative to the other nearby lakes) in recent years. Aquatic plant coverage is higher than in many of these other lakes, perhaps due to several AIS species. Chloride levels were above the 75th percentile for New York state lakes, indicating an elevated potential for aquatic life impacts from road salt (although no impacts have not been reported).

Trends: Phosphorus readings have increased over the last three decades, triggering an increase in algae levels (chlorophyll *a*) and a degradation in recreational perception. pH has also dropped over the same period. There may have also been other changes- increasing conductivity and degrading water clarity and water quality perception- but these changes have not been statistically significant. Water quality changes have been more pronounced in the Deep Water site, although this site has also been sampled much longer than the Wide Water sites.

Algal blooms and HABS: Infrequent *Microcystis* and *Anabaena* blooms have been previously reported in Ballston Lake along the shoreline, and more blooms may have occurred by may not have been reported. Open water conditions have exhibited moderate algae levels occasionally reaching bloom quantity, comprised of the same blue green algae (cyanobacteria) taxa when blue green and overall algae levels are highest. Toxin levels have been low in nearly all samples. An open water bloom was also reported in mid summer in 2017 in the Deep Water site, but this bloom also had low toxin levels.

Aquatic invasive species: Eurasian watermilfoil and water chestnut have been found in Ballston Lake, indicating a high vulnerability to AIS introductions. It is not known if this is exacerbated by the hand carry public boat launch. Zebra mussels have also been reported in the lake, consistent with elevated calcium levels.

Differences Between Deep Water and Wide Water Sites: The Wide Water (shallower northern) sampling site consistently shows lower water clarity, coincident with higher nutrient and algae levels than the Deep Water (deeper southern) site, although the differences between the sites was smaller than usual in 2017. The other water quality indicators (measured through CSLAP) are similar in the Wide Water and Deep Water sampling sites.

Indicated Actions: Individual stewardship activities such as pumping your septic system, growing a buffer of native plants next to the water bodies, and reducing erosion from shoreline properties and runoff into the lake will help to improve lake health by reducing nutrient and sediment loading to the lake. Visiting boats should be inspected to reduce the risk of new invasive species, and continued monitoring for invasive species is warranted. Continued algae bloom education and monitoring is recommended, and shoreline blooms should be avoided. This is particularly important in Ballston Lake, where both shoreline and open water blooms have been at least periodically documented.

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 **NOx** (nitrite and nitrate) and **NH_4** (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.