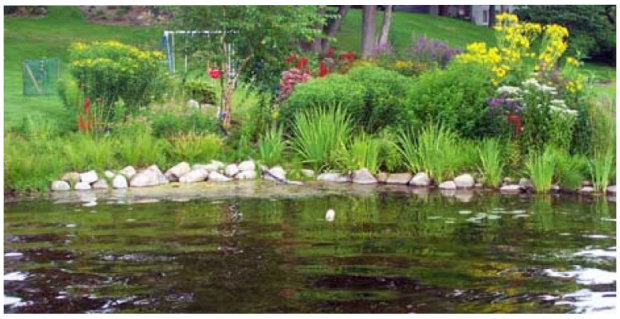
SLPID
2019 NEWSLETTER

SLPID, PO Box 2551, Malta, NY 12020 | www.SLPID.org



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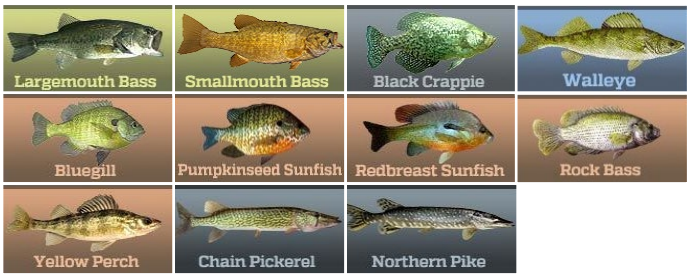
FISHING
on Saratoga Lake

by Natalia N. Romanzo

Saratoga Lake is a top-notch fishery in New York State in quality and quantity of fish. Both competitive and recreational fishing opportunities are available.

What **FISH** can be found in Saratoga Lake?

In the lake there are largemouth bass, smallmouth bass, yellow perch, brown bullhead, northern pike, redbreast sunfish, rock bass, walleye, black crappie, bluegill, chain pickerel, and pumpkinseed sunfish.



Images Sourced: Fish Found in Saratoga Lake, from All About Fishing www.aa-fishing.com

Required fishing license for Saratoga Lake:

TYPE	RESIDENT FEE	NON-RESIDENT FEE
Annual valid one full year (365 days) from the date of purchase	$25 (ages 16-69) $5 (ages 70+)	$50
7-day	$12	$28
1-day	$5	$10

Saratoga County Sporting License Issuing Agents:

www.dec.ny.gov/permits/95700.html

Are there any **SPECIAL FISHING RESTRICTIONS** on Saratoga Lake?

Sunfish:

- Can be caught all year
- Can be caught at any size
- Daily limit is 15
- Ice fishing is the permitted method

Are fish **STOCKED** in Saratoga Lake?

Every year about 8.6 million walleye are stocked in the lake.

Is overfishing a problem on Saratoga Lake?

There have been reports of the average size of fish in the lake shrinking by fishermen who have fished in the lake for decades. However, large bass, up to 21 inches and 5 pounds, can still be found in the lake.

TIPS FOR FISHING ON SARATOGA LAKE:

- Much of the shoreline is privately owner, so fishing off a boat or at the Saratoga Lake State Boat Launch are the best ways to enjoy the lake. There is an $8 fee to park at the Saratoga Lake State Boat Launch.
- Northern pike can be found in the edge of weed beds. Smallmouth bass and walleye can be found in rocky shores.

ALGAL BLOOMS
on Saratoga Lake

by Natalia N. Romanzo

Algal blooms negatively affect New York lakes and now rank with overfishing and habitat loss as major statewide environmental concerns.

Although an algal bloom can be a natural phenomenon that results from seasonal changes in a water body's temperature and nutrient composition, the global problem of harmful algal blooms has expanded in the last several decades. This has resulted in a loss of wildlife and a loss of recreational and commercial opportunities.

In New York State, algal blooms have caused beach closures. The number of beach closures from algal blooms have rapidly increased. In 2010, there were two such closures and in 2018 there were 104. Algal blooms negatively affect New York lakes and now rank with overfishing and habitat loss as major statewide environmental concerns. In 2017 and 2018, Governor Andrew Cuomo started the HABs initiative to review the possible causes on HABs conditions on lakes in NYS. This work was started following persistent HABs on both large and small Finger Lakes including Skaneateles Lake, a part of the City of Syracuse water supply. HABs also repeatedly occur in small lakes in the Hudson River Valley, and urban lakes. There has been a steady increase in the HABs reported and examined by the NYSDEC since 2012 (www. dec. ny. gov/chemical/113733.html).

The New York State Department of Environmental Conservation (NYSDEC) recognizes this issue and has invested over a half a million dollars in algal bloom prevention and cleanup.

The rise in harmful algal blooms is associated with complex interaction of environment and water quality. The HABs Initiative focuses on four criteria that were determined to be strongly related to the presence of HABs:

- Increase in TP above average levels – every 0.01 bbp increase of TP above average increases probability of HABs by 10% to 18%
- Presence of zebra or quagga mussels increases probability by 18%-66%
- Lakes with long fetches – for every mile of increased length, the probability of HABs is increased by 20%
- Lakes with northwest orientation along their longest fetch increases the probability of HABs by 10-56% (www. dec. ny. gov/chemical/113733.html)

When a farmer or homeowner fertilizes his or her land, the nutrients in that fertilizer, specifically nitrogen and phosphorous, can end up in local water bodies. Runoff of nutrients can drain into a water body hundreds of miles away through ground and surface water. In a process called eutrophication, deposited excess nutrients feed the growth of algae that are eaten by bacteria. This decreases oxygen levels and increases carbon dioxide production.

continued...

"Algal Blooms on Saratoga Lake" continued...

If algal blooms occur frequently and are prolonged, they can lead to dead zones in which the water body is hypoxic meaning oxygen levels are too low to support many aquatic organisms. Dead zones greatly affect major fisheries. Studies in South Carolina show that hypoxia accounts for a 13% decline in brown shrimp landings. There, the total benefit from reduced hypoxic conditions is up to $7 million. In another example, a natural experiment in the Black Sea shows that hypoxic zones resulted in a 90% decrease in a $2 billion fishery and a $500 million loss in tourism revenue. Other negative effects of excess nutrient runoff, including air and drinking water pollution, are much harder to quantify but still exist.

Saratoga Lake has not experienced a harmful algal bloom this summer; however, it is important that preventative measures are still taken. In the past three years algal blooms on Saratoga Lake begin in late August and are small. Homeowners and lake users can assist in managing blooms by looking out for blooms and alerting the Saratoga Lake Protection and Improvement District (SLPID) Boat Stewards located at Saratoga Lake State Boat Launch of any blooms. Algal blooms can be recognized by discoloration of the water. Colors observed include red, bright green, yellow and brown.

Below is a photo of an algal bloom on Owasco Lake in Cayuga, NY for reference.

Image Source: Harmful Algal Bloom on Owasco Lake, PostStar.com

Homeowners within the 244 square mile Saratoga Lake Watershed can also help prevent algal blooms by minimizing nutrient runoff.

To promote the health of the lake:

- Leave a buffer of grass, hedges or native flowers between the lakefront and your lawn.
- Reduce impermeable surfaces by using natural walkways and permeable or gravel driveways and patios.
- In accordance with NYS law, if you choose to use fertilizers, get a soil test done at the county's Cooperative Extension office to ensure that you are only using fertilizer that is necessary and safe.
- Mow often enough that no more than ⅓ of the leaf length is removed at one time. This reduces the need for fertilizer.
- Grasscycle – Grass clippings decompose into the grass quickly and return nutrients such as nitrogen to the lawn without the need for fertilizers.
- Don't apply fertilizer within 20 feet of the lake without at least a 10 ft buffer of unfertilized plants separating the fertilized plants from the lake.

Saratoga Lake WATERSHED

by Natalia N. Romanzo

The impact property owners have living within a watershed.

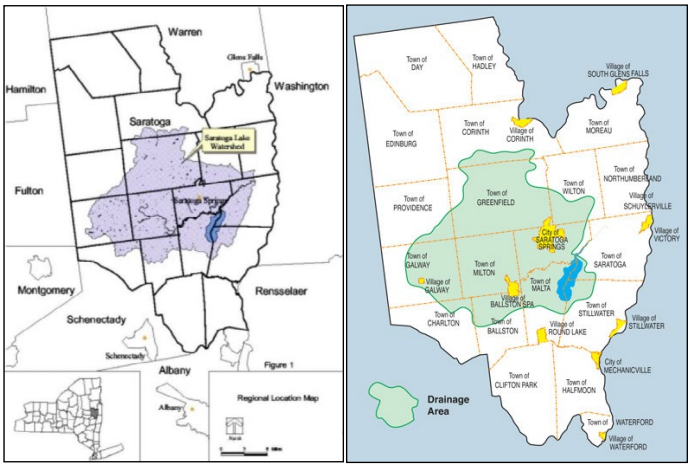
What is a Watershed?

A watershed is an area of land in which all the water that collects in that area eventually drains into a single water body. Saratoga Lake is the place where all water collected in the Saratoga Lake Watershed ends up. On its way to the water body, water flows over different land types within the watershed such as farm fields, forests, suburban lawns and city streets or within the land itself as groundwater. The types of land that the water flows over or within affects the quality of the watershed. **Pollutants picked up** in the watershed can negatively impact the health of the water body. Watersheds can also be harmed if people change **how and where the water flows**, for example, by paving over important areas and by altering the shape and direction of water bodies. To conserve and preserve the water body ecosystem, it is therefore important to maintain a healthy watershed.

The Saratoga Lake Watershed

A little over a quarter of Saratoga County's land area is part of the Saratoga Lake Watershed. This watershed encompasses 244 square miles and drains into the Saratoga Lake primarily as surface water. As shown in images 1 and 2, it stretches into many towns such as Corinth, Wilton, Saratoga, Stillwater, Malta, Ballston, Charlton, Galway and Providence, Greenfield, Milton and the City of Saratoga Springs.

Within the 244 square mile watershed, there are many land types, some of which have been modified by people. The location of these land types is shown in image 3. The watershed is made up of developed land, barren land, deciduous forest, evergreen forest, mixed forest, shrubs, herbaceous plants, pasture, crop land, woody wetlands and emergent herbaceous wetlands. **The watershed is about 70% forest** with 81 conserved parcels.



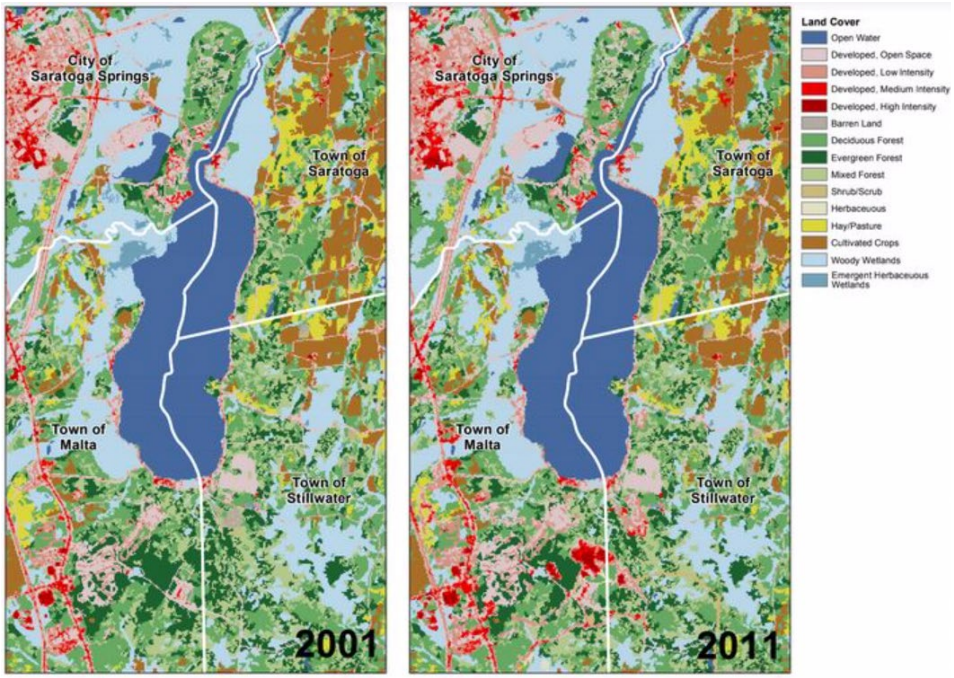
Images 1 and 2. The Saratoga Lake Watershed stretches into many neighboring towns
Images Source: The LA Group and Saratoga Lake Association

continued...

"Saratoga Lake Watershed" continued...

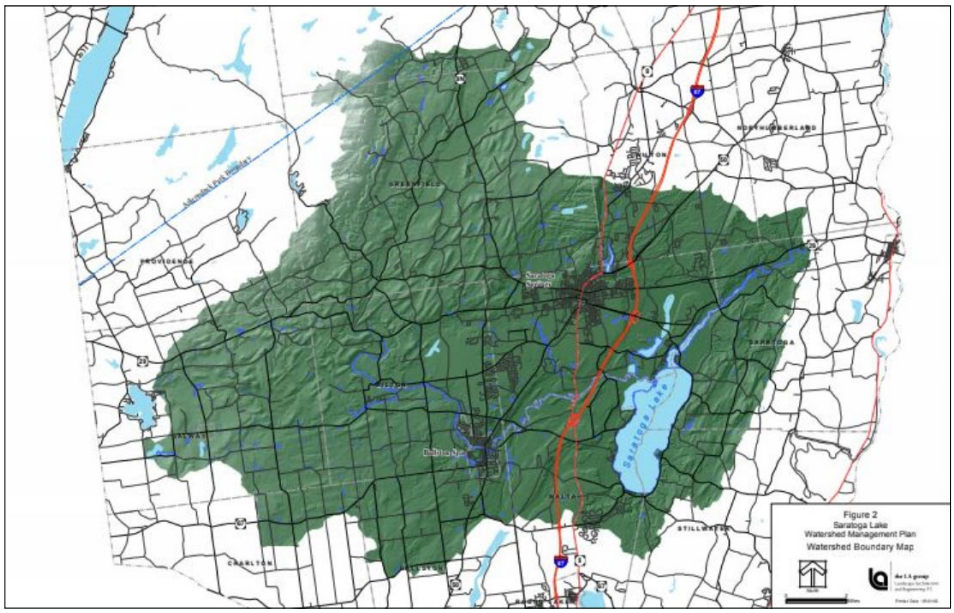
Health of the Saratoga Lake Watershed

Because Saratoga Lake is mostly fed by surface waters, **the lake is vulnerable to land modifications within the watershed**. Agricultural as well as urban and suburban development activities lead to nutrient runoff that causes algal blooms and dominance of invasive species within the lake. These developments also increase stormwater runoff which causes pesticides, road salts and heavy metals to enter the lake. These pollutants result in water quality decline and consequently a loss of fish and wildlife habitat, recreational activities, property values and aesthetic enjoyment. As shown in image 4, many roads, including an interstate highway, run through the Saratoga Lake Watershed. Maintenance and development of these roads contribute to nutrient and stormwater runoff.



Images 3. Land types found within the Saratoga Lake Watershed in 2001 and 2011 – Image Source: The LA Group

To maintain good water quality, it is recommended that a watershed contain **30% or more of forested land**. Since 70% of the Saratoga Lake Watershed is forested land, the watershed is not currently in danger of degradation. However, this watershed contains some of the **fastest growing regions** in Saratoga County. This is shown in image 3. Image 3 shows how land use has changed between 2001 and 2011. Over this period of time, there hasn't been a large change in land use; however, intensely developed areas have increased in some places such as in the City of Saratoga Springs. Furthermore, only about **2% of the forested land is protected by conservation efforts**.



Images 4. Watershed Boundary Map including roads – Image Source: The LA Group

Forested land that is not protected may be developed in the future posing risks to the long term health of the lake. Thus, to maintain the resilience and integrity of the lake, development must be properly managed. In this way, the plants and animals who rely on the lake as well as the people who live within the lake's watershed and enjoy the lake can prosper side-by-side.

IMPACTS PROPERTY OWNERS HAVE LIVING Within a Watershed

Event: Property Owner Information Session for Saratoga Lake.

Held on: Sunday, June 2

At: Brown's Beach Bar Tent

The Saratoga Lake Protection and Improvement District (SLPID), hosted an information session geared toward watershed property owners and the public. Considering the weather, there was a fair turnout and it was very well received. Tracey Clothier and Dean Long, SLPID lake managers presented along with Gwendolyn Grace Temple from the Capital-Mohawk Partnership for Regional Invasive Species Management (PRISM).

Gwendolyn Temple gave an informal presentation on the invasive species typically found within Saratoga Lake and the native species that are desired in the lake. Samples of the plants found in the lake were provided on display.

Tracey Clothier presented on actions property owners can undertake that inhibit invasive species, prevent erosion and manage stormwater. Examples given for property owners to help manage water quality and storm water runoff were:

- Using pervious surfaces instead of hard asphalt driveways and concrete patios.
- Planting a rain garden.
- Planting a native plant shoreline buffer or simply leaving a foot or two between the lake and lawn to grow up.
- Refrain from using chemicals such as: fertilizers, weed killers, and insecticides on your lawn.
- Refrain from raking, leaf blowing or throwing any lawn clippings, animal feces, etc. into the lake.

Tracey Clothier also emphasized the importance of property owners to consider taking the SLPID pledge with copies of the pledge provided.

Dean Long gave a very thorough understanding of the current water quality status of Saratoga Lake, a progress report on treatment of invasive species, the importance having native aquatic species, and the balance between humans living on a watershed and a healthy ecosystem. Dean explained the weed harvesting operation on Saratoga Lake is only for access with pathways, and stay 6 feet out from docks for protection of aquatic life.

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There was a lengthy **Q** and **A** session answered by Dean Long

Q I watch the weed harvesters on the lake and they do a terrific job. However, wondering if there is another way to catch any weeds the harvester does not pick up and floaters.

A The harvesters go in a clockwise rotation in 7 sections. They harvest in a rotating pattern starting in the north near the launch site and moving around the lake in a clock wise direction. During the first harvesting session the harvesters work in deeper water to reduce disturbance of the nesting bass. SLPID has been looking into other options of possibly purchasing a skimmer to help with weed harvesting.

Q Please explain different algal blooms, the process which a person would find out if there is a toxic algal bloom and what can people do to help prevent one or report one.

A There are many types of algal blooms. Algal blooms are not new, mid-August through the end of September are typical period when blooms occur. Accumulation of the blue green algae driven by wind currents and water temperature promote the growth of these algae. Last year at that time we had very warm and windy weather. Saratoga Lake algal blooms have had a very low toxin rate. In the last five years has exceeded the World Health Organization (WHO) criteria once. The procedure of an algal bloom is if a person sees an algal bloom regardless if it is an actual bloom, stay away and be safe. Other lakes such as Skaneateles Lake that are drinking water reservoirs have a much stricter standard. Where Saratoga Lake participates in the Citizen Statewide Lake Assessment Program (CSLAP) water testing that includes both testing for blue green algae and toxins. Property owners can have an impact by making choices such as landscaping properties with shoreline buffers to help prevent runoff.

ENCOURAGE YOUR NEIGHBORS!

Like us on Facebook and send a message...

THE GOAL OF TAKE THE PLEDGE is to encourage property owners within the Saratoga Lake watershed to commit to a few sustainable actions and demonstrate that small efforts on your part have a significant reaction on the biodiversity and health of the lake.

As a property owner within the watershed, your direct and indirect actions have the most impact on algal growth, sediment run-off, bacteria, pathogens, and poisoning aquatic life and wildlife.

PLEDGE HERE!

Yes, I/we agree to take the Saratoga Lake Protection Pledge.

Name _____

Signature _____

Email _____

I TOOK THE PLEDGE
SARATOGA LAKE
SLPID
PROTECTION & IMPROVEMENT DISTRICT
SLPID.org

SARATOGA LAKE
SLPID
PROTECTION & IMPROVEMENT DISTRICT

TAKE THE PLEDGE!

You can make a difference...

I PLEDGE...

TO MINIMIZE RUNOFF

Use "soft-scaping" and buffers around the lakefront and any slope or hillside that has a chance to runoff into the watershed.

TIP: *Leave a buffer of grass, hedges or native flowers between the lakefront and lawn. You can reduce impermeable surfaces with natural walkways, patios and permeable or gravel driveways. Instead of concrete patios, use natural permeable materials with native plants integrated.*

TO SAY NO TO FERTILIZERS

Most lawns naturally have adequate phosphorous for a healthy lawn and fertilizer is not needed. In accordance with NYS law, if you must use fertilizers, get a soil test done at the county Cooperative Extension office to ensure that you are only using the fertilizer that is needed.

DO NOT apply lawn fertilizer within 20 feet of any water body unless...

- There is at least a 10-foot buffer of shrubs, trees or other plants between the area you are fertilizing and the water OR
- Fertilizer can be applied no closer than 3 feet from the water using a device with a spreader guard, deflector shield or drop spreader.

TIP: *Look for alternatives to fertilizers and if you do use them – never before a storm!*

TO STOP THE POLLUTION

Do not throw leaves, lawn debris/clippings, or animal feces into the lake. All of these are high in phosphorous that can contribute to algal growth.

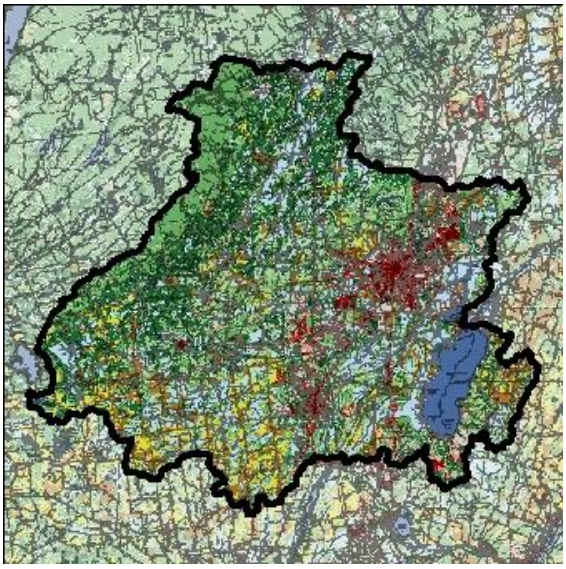
TIP: *Always bag lawn debris for disposal or better yet, compost!*

TO SAY NO TO PESTICIDES

As well as harmful cleaning agents and other chemicals. The bugs you see in and around the lake are also an important part of the ecosystem. Dangerous pesticides and lawn chemicals can be toxic to aquatic life and promote the growth of algae and weeds.

TIP: *Avoid all chemicals; they are also bad for you and your pets' health. Wash cars and boats away from the lake.*

Saratoga Lake	Saratoga Lake Protection and Improvement District	Towns of Saratoga, Malta, and Stillwater	Saratoga County



Lake Characteristics	Surface area (ac/ha)	4032/1632
	Max depth (ft/m)	95 / 29
	Mean depth (ft/m)	25 / 8
	Retention time (years)	0.4
	Lake Classification	A
	Dam Classification	A
Watershed Characteristics	Watershed area (ac /ha)	156174 / 63200
	Watershed / Lake ratio	39
	Lake & wetlands %	23%
	Agricultural %	12%
	Forest, shrub, grasses %	50%
	Residential	15%
	Urban	<1%
CSLAP Participation	Years	1993-1997, 2005-2011, 2013, 2015-2018
	Volunteers	Karl Hardcastle, Neal Kramer, William LaMay

Trophic state	HABs Susceptibility	Invasive Vulnerability	PWL Assessment
Mesoeutrophic	Frequent blooms, Low susceptibility	Invasives present, High Vulnerability	Stressed

Water quality values for Saratoga Lake for the 2018 sampling season. “Seasonal change” shows current year variability. Light red color indicates eutrophic conditions in top table and bloom conditions in bottom table. Summer averages for each of the CSLAP years and long term trend analyses show trends in key water quality indicators over a consistent index period (mid-June thru mid-September).

Open Water Indicators	2018 Sampling Results								Seasonal change	Long Term Avg	Long Term Trend?	18 Diff from Avg
	6/12	6/28	7/9	7/24	8/16	8/21	9/6	9/14				
Clarity (m)	5.2	5.3	5.0	3.7	2.7	2.3	3.7	2.9		3.2	no	no
Surface TP (mg/l)	0.010	0.011	0.010	0.014	0.017	0.019	0.016	0.031		0.019	no	no
Surface TDP (mg/l)	0.004	0.002	0.002	0.002	0.004	0.001	0.002	0.004		0.859	no	
Deep TP (mg/l)	0.042	0.211	0.320	0.337	0.635	0.934	0.942	1.190		0.201	↑↑	
Deep/Surface TP	4	19	31	24	38	49	58	38		10		
TN (mg/l)	0.490	0.178	0.490	0.292	0.253	0.353	0.425	0.301		0.384	no	no
TDN (mg/l)	0.474	0.194	0.525	0.266	0.217	0.289	0.459	0.251				
N:P Ratio	48	16	47	21	15	18	26	10		19		
Deep/Surface NH4	5	14	15	13	234	122	148	119		84		
Chl.a (ug/l)	3.6	1.8	2.2	6.2	6.5	8.8	5.0	7.8		8.1	↓	no
pH	7.6	8.2	7.6	7.7	7.7	7.7	7.1	7.8		7.9	↓↓	no
Cond (umho/cm)	425	477	462	319	331	457	449	424		293	no	↑
Upper Temp (degC)	22	28	27	26	26	25	26	23		23	no	no
Deep Temp (degC)	12	12	13	14	14	14	15	14		10	↑	no
FP BG Chl.a (ug/l)	0	1	3	3	3		3	6		2	no	no
HABs reported?	shore	shore	shore	shore	shore	shore	shore	shore				

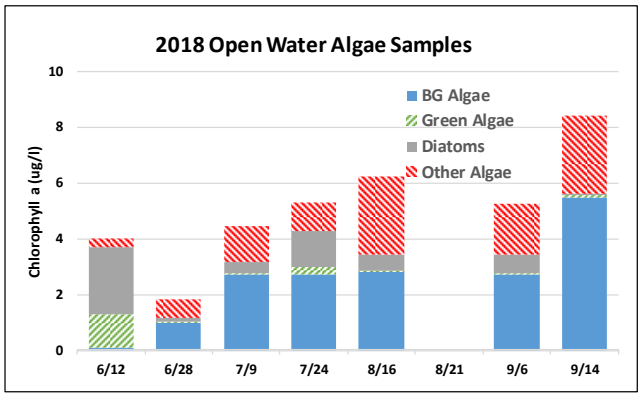
Shoreline bloom and HABs notifications

Date of first listing	Date of last listing	# weeks on the DEC notification list	# Weeks with updates
8/24/2018	10/19/2018	9	3

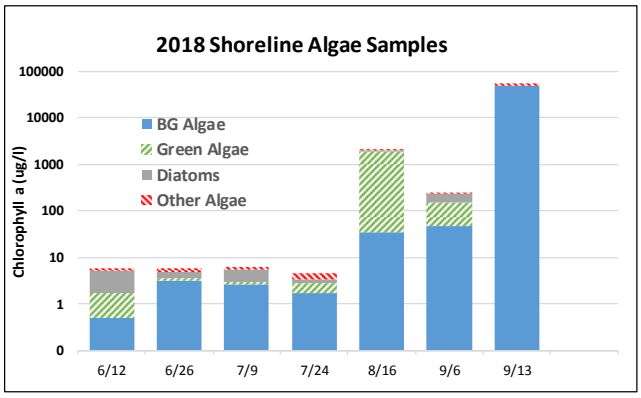
Shoreline HAB Sample Dates 2018

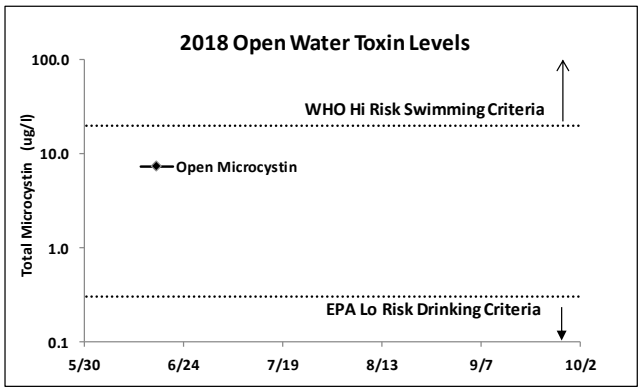
HAB Indicators	HAB criteria	6/12/2018	6/26/2018	7/9/2018	7/24/2018	8/16/2018	9/6/2018	9/13/2018
BGA	25 - 30 ug/L	0.5	3.1	2.6	1.7	35.3	47.3	49536.0
microcystin	20 ug/L	ND	3.1	ND	1.0	2.3	6.4	2400.0
anatoxin - a	4 ug/L							

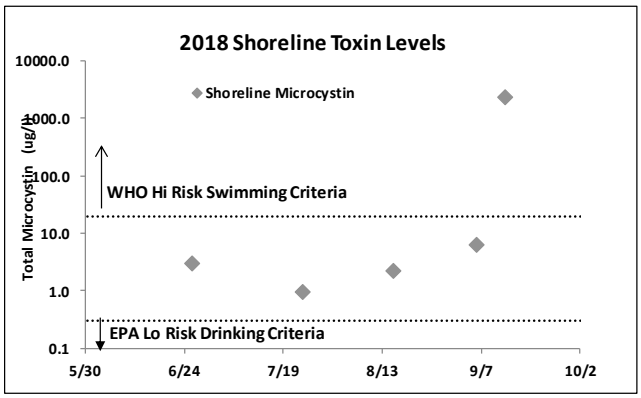
HABs Status Open water Algae



Shoreline Algae

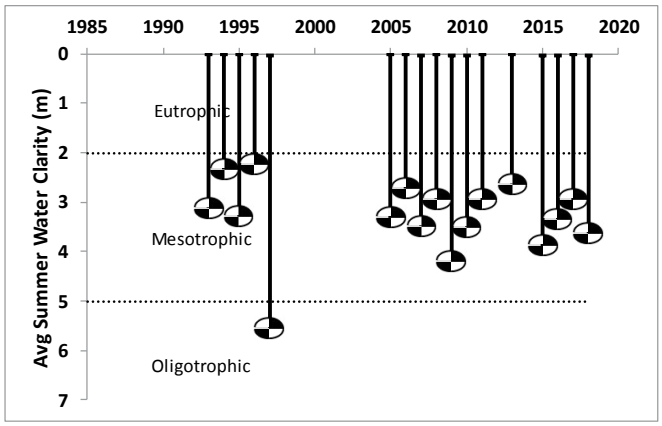




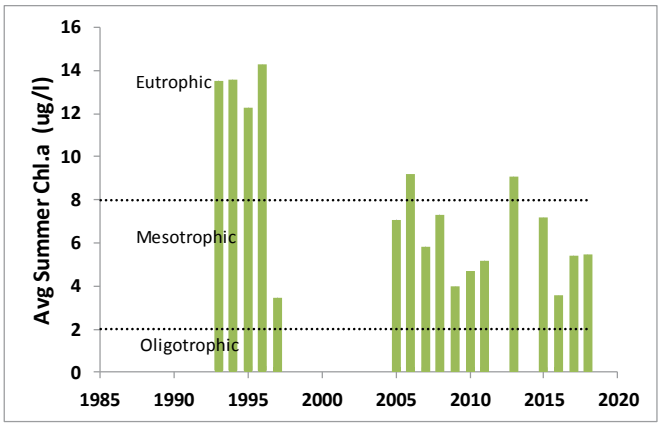


Saratoga Lake Long Term Trend Analysis

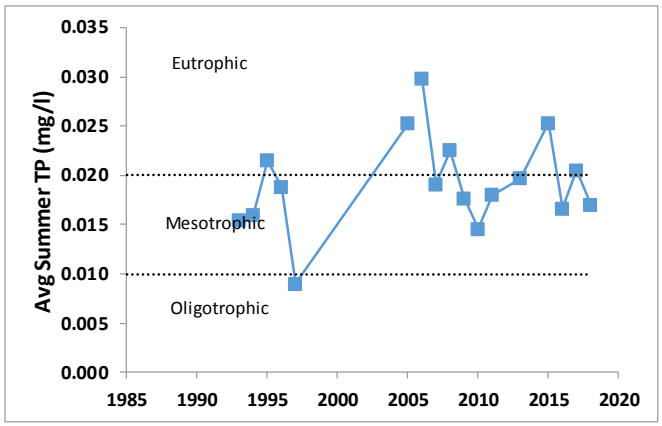
Clarity



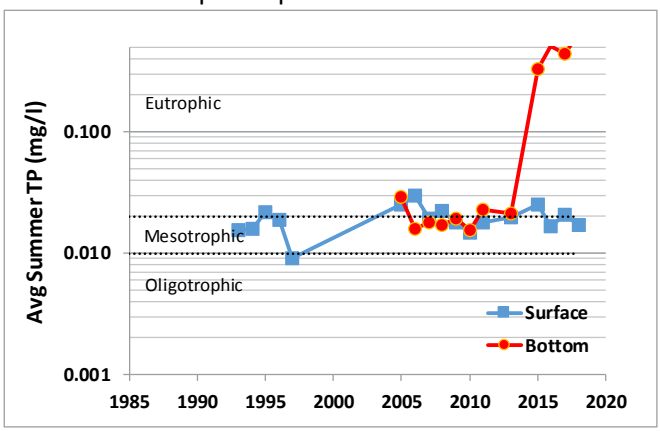
Chlorophyll *a*



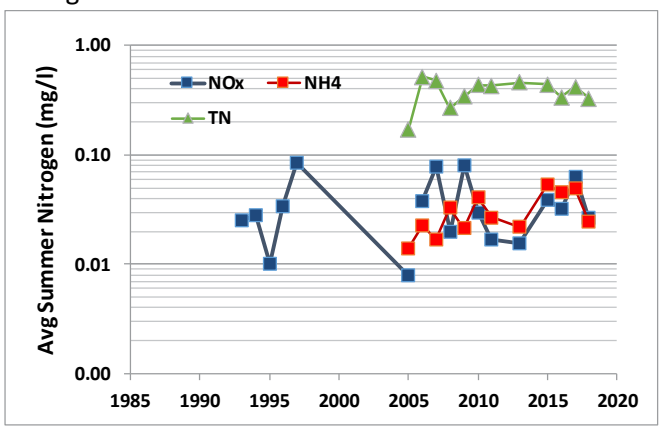
Surface Phosphorus



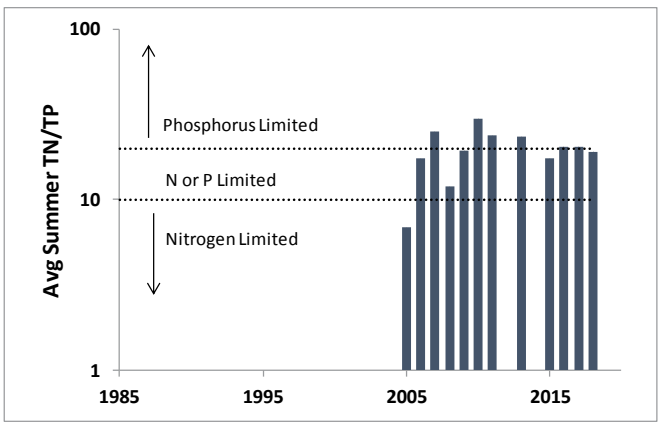
Surface and Deep Phosphorus



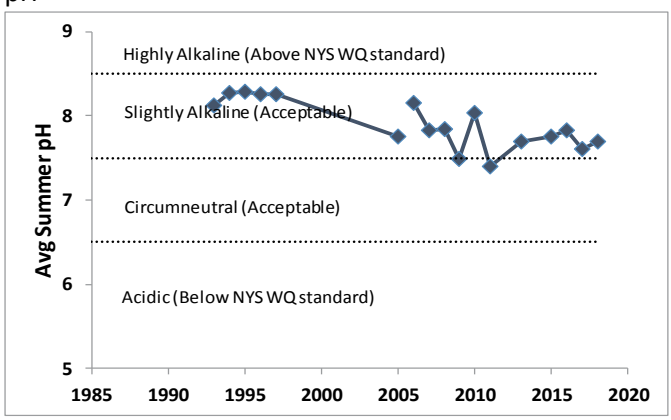
Nitrogen



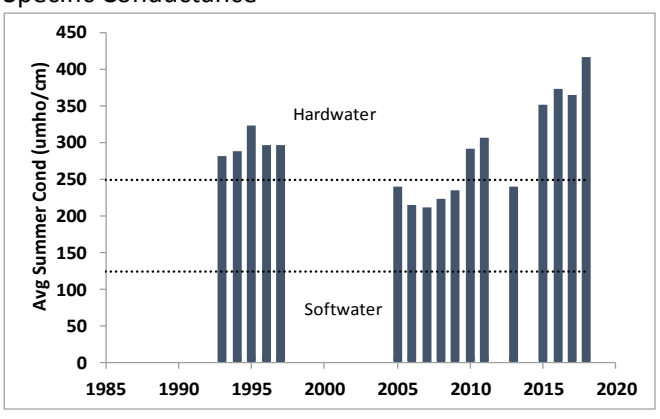
TN : TP



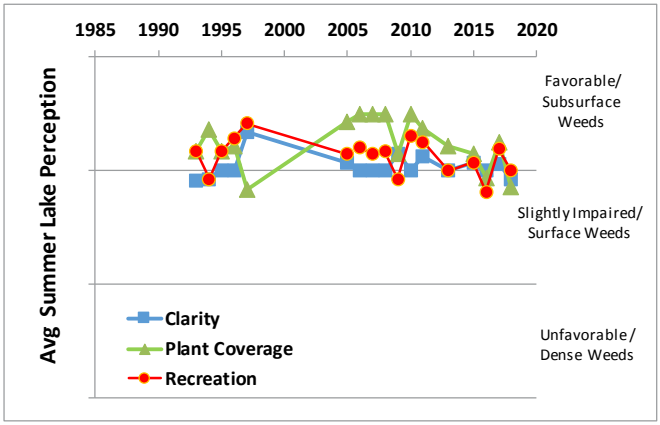
pH



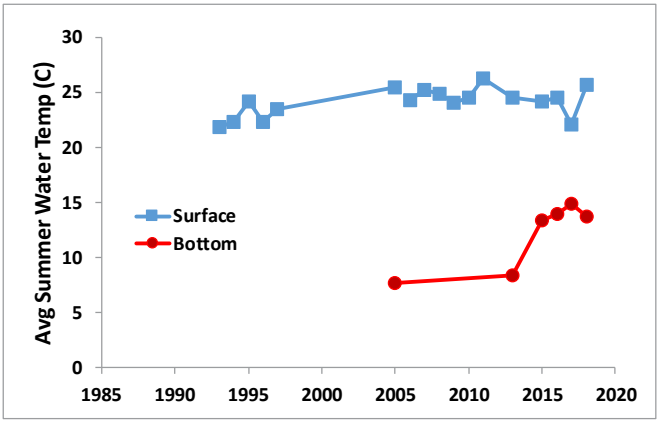
Specific Conductance



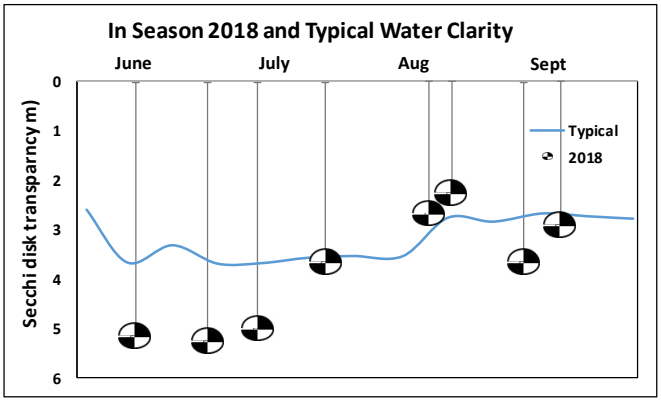
Lake Perception



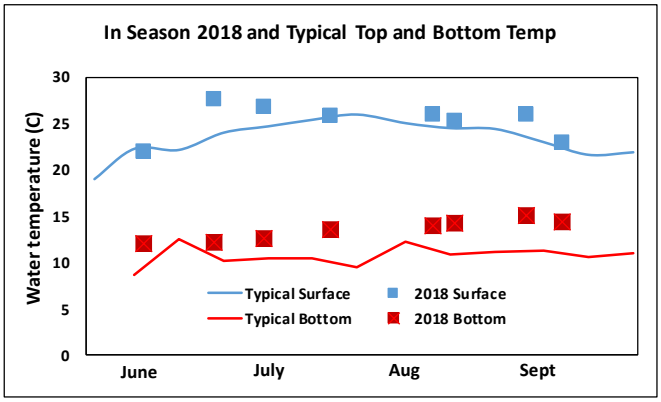
Surface and Deep Temperature



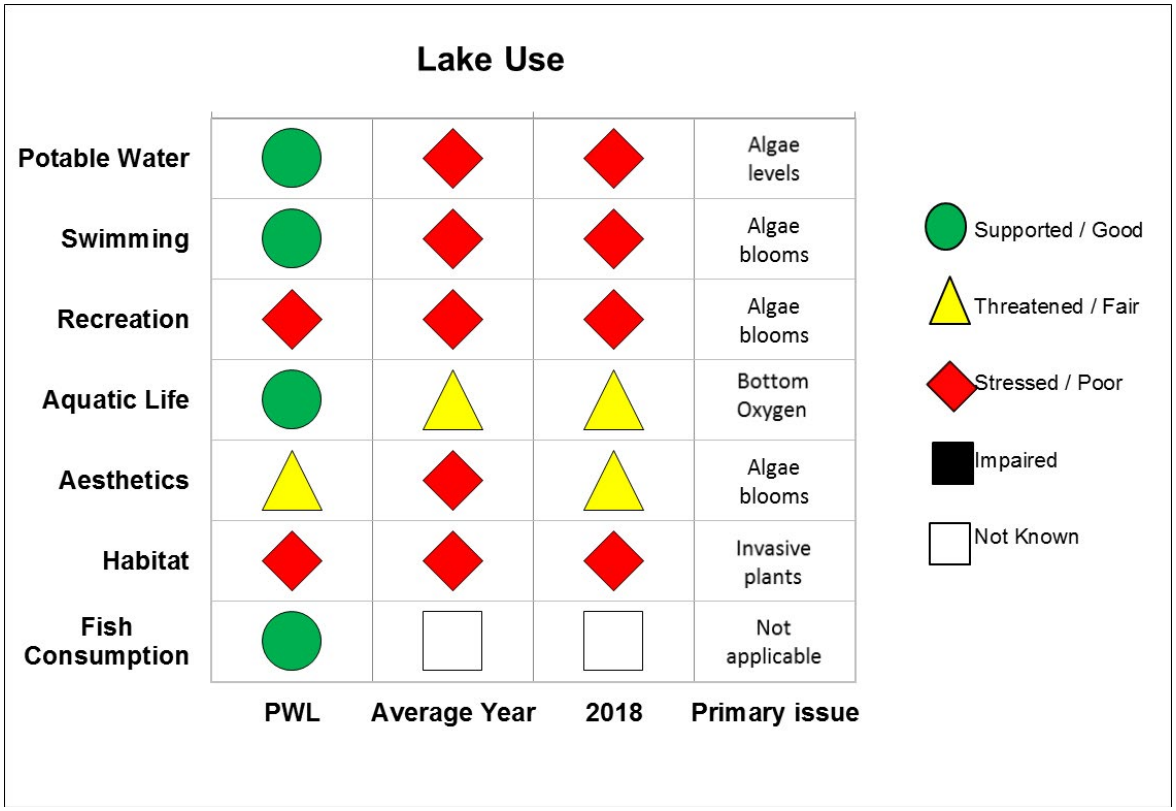
In Season Water Clarity



In Season Water Temperature



Scorecard



CSLAP sampling summary- Saratoga Lake, 2018

Q. What is the condition of the lake?
A. Saratoga Lake continues to be mesoeutrophic, or moderately to highly productive, based on moderate water clarity, high algae levels (chlorophyll a), and moderate nutrient (phosphorus) levels. Soluble nutrients were analyzed for the first time in 2018. Most of the phosphorus in the lake is not soluble, indicating a low potential for additional algae growth. Most of the nitrogen in the lake is soluble. The lake has slightly alkaline, extremely hard water, low water color, and moderately low nitrogen levels.

Q. How did 2018 compare to previous years?
A. Deep phosphorus and specific conductance readings were higher than normal in 2018. Each of the other water quality indicators was close to normal in 2018.

Q. How does this lake compare to other nearby lakes?
A. Compared to other nearby lakes, Saratoga Lake usually has higher pH, conductivity, calcium levels, and chloride levels. The lake usually has similar water quality and recreational assessments, and less extensive aquatic plant coverage.

Q. Are there any (statistically significant) trends?
A. Since 1993, deep phosphorus has increased significantly. Bottom water temperatures have increased slightly. pH has decreased significantly. Chlorophyll *a* has decreased slightly. None of the other water quality indicators have exhibited any clear long-term trends.

Q. Has the lake experienced harmful algal blooms (HABs)?
A. Water quality conditions 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 a mix of taxa, low to intermediate cyanobacteria levels. This community is comprised of *Microcystis, Anabaena*, and *Planktothrix*. Overall open water algae levels are low to intermediate. Open water toxin levels are consistently below recreational levels of concern. Shoreline blooms have been documented in the lake, comprised of a mix of algae, with the cyanobacteria primarily associated with *Microcystis*, with lesser amounts of *Anabaena* and *Lyngbya*. The shoreline algal community exhibits periodically high toxin levels.

In 2018, overall algae levels were low to intermediate, with cyanobacteria the most common taxa in open water samples, and with low to intermediate cyanobacteria levels. Open water toxin levels were undetectable. Shoreline blooms in 2018 were documented

in the lake, comprised primarily of cyanobacteria with high toxin levels. The most common taxa were comprised of *Gloeotrichia, Lyngbya,* and *Microcystis*, in addition to green algae and diatoms.

Q. Have any aquatic invasive species (AIS) been reported?
A. There are invasive plants reported or present at Saratoga Lake, and invasives have been reported in nearby waterbodies. Invasive species reported in the lake include Eurasian watermilfoil, curly leafed pondweed, and water chestnut. Zebra mussels, common carp, and goldfish have also been reported in Saratoga Lake. Saratoga Lake has high vulnerability for new invasives, based on calcium levels, public access, and the presence of several AIS.

Q. Are any lake uses likely to be affected by these conditions?
A. Saratoga Lake supports recreation and public bathing use. Public water supply is stressed by high frequency of algae levels above criteria protecting potable water use, and impacted by raw water cyanotoxins, deepwater metals and other contaminants. Public bathing is stressed by HABs, and impacted by shoreline cyanotoxins and shoreline HABs. Recreation is stressed by HABs, and impacted by shoreline HABs and associated cyanotoxins, and excessive phosphorus levels. Aquatic life is threatened by deepwater sampling data indicating anoxia. Aesthetics are poor due to HABs, and impacted by excessive phosphorus levels, and the presence of invasive aquatic plants. Habitat is fair due to the need for aquatic plant (weed) management, and impacted by the presence of invasive aquatic plants. 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 lack of actual fish sampling data, fish consumption use is noted as unassessed, rather than fully supported but unconfirmed.

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, including comparisons to historical data from this lake, and results from nearby lakes.

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. TSP, or total soluble phosphorus, was collected in 2018 and discussed in the lake narrative section.

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. 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.

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. This is an "unextracted" estimate using a fluoroprobe. This result is not as accurate as 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 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.