

Saratoga Lake Questions and Answers, 2015 CSLAP

Q1. What is the condition of our lake this year?

A1. Water clarity in Saratoga Lake was slightly higher than usual, consistent with lower algae levels. Nutrient levels were higher than usual, although these readings may not have been representative of conditions in the lake. Shoreline blue green algae blooms were documented in mid- and late-summer.

Q2. Is there anything new that showed up in the testing this year?

A2. Chloride sampling results were typical of lakes with high levels of road salt runoff, although no biological impacts were reported or measured.

Q3. How does the condition of our lake this year compare with other lakes in the area?

A3. Saratoga Lake has slightly higher water clarity, and lower open water algae levels, than other nearby lakes, although shoreline blooms were reported.

Q4. Are there any trends in our lake's condition?

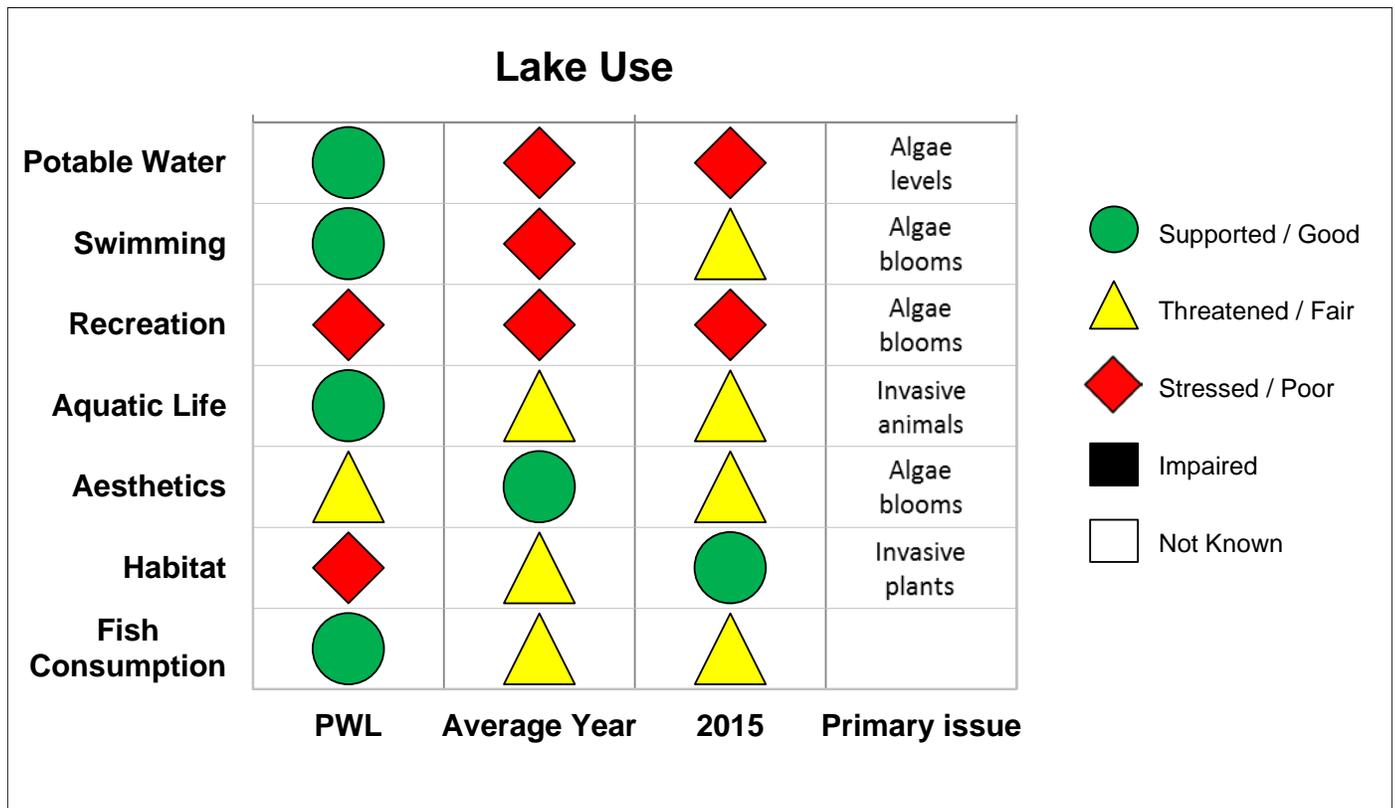
A4. pH has decreased significantly over the last two decades, coincident with lower algae levels over the same timeframe. Water temperatures have also increased slightly.

Q5. Should we be concerned about the condition of our lake? Are we close to a tipping point?

A5. Saratoga Lake has exhibited some shoreline blue green algae blooms and, elevated open water blue green algae levels at times. It is likely that reductions in nutrient loading to the lake will reduce the likelihood of these blooms.

Q6. Are any actions indicated, based on the trends and this year's results?

A6. 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 are needed to reduce nutrient and sediment loading to the lake. Visiting boats should be inspected to reduce the risk of new invasive species, since the lake is at risk for new invaders given the heavy use of the lake.

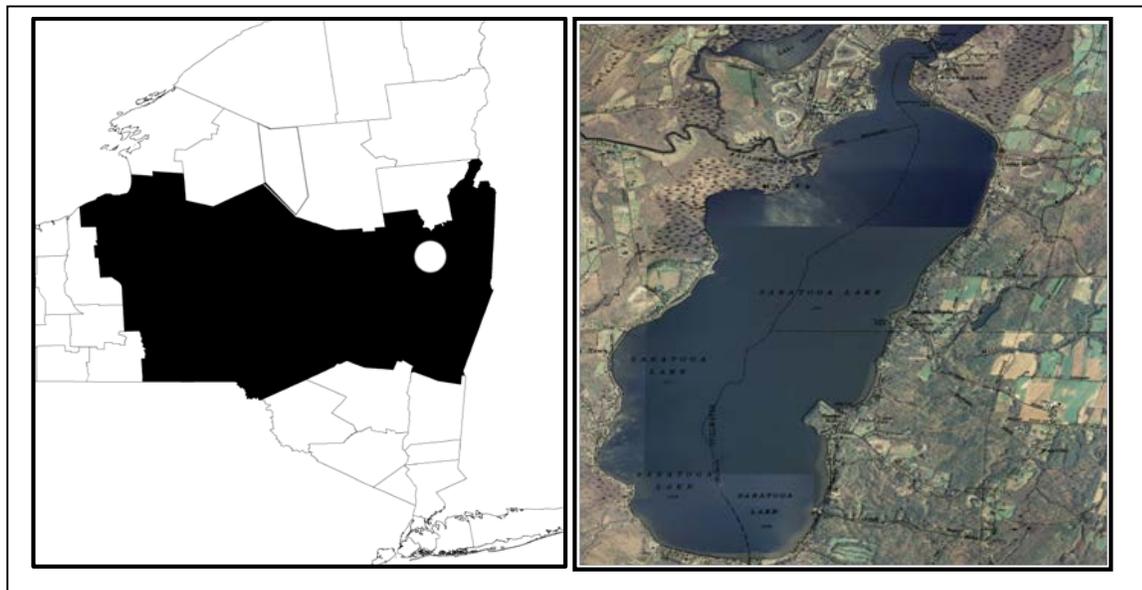


CSLAP 2015 Lake Water Quality Summary: Saratoga Lake

General Lake Information

Location	Town of Saratoga Springs
County	Saratoga
Basin	Upper Hudson River
Size	1,632 hectares (4,030 acres)
Lake Origins	Natural
Watershed Area	63,200 hectares (156,104 acres)
Retention Time	0.4 years
Mean Depth	7.7 meters
Sounding Depth	28.9 meters
Public Access?	DEC/private launches
Major Tributaries	Drummond Creek, Kayaderoseras Creek
Lake Tributary To...	Fish Creek to Hudson River
WQ Classification	A (potable water)
Lake Outlet Latitude	43.103
Lake Outlet Longitude	-73.637
Sampling Years	1993-1997, 2005-2011, 2013, 2015
2015 Samplers	Bill Lamay, Edward Dweck, Karl Hardcastle, and Neal Kramer
Main Contact	Karl Hardcastle

Lake Map



Background

Saratoga Lake is a 4030 acre, class A lake found in the Towns of Malta, Saratoga, and Stillwater in Saratoga County, just north of the Capital District region of New York State. It was first sampled as part of CSLAP in 1988.

It is one of seven CSLAP lakes among the more than 380 lakes and ponds found in Saratoga County, and one of 32 CSLAP lakes among the more than 1370 lakes and ponds in the Upper Hudson River drainage basin.

Lake Uses

Saratoga Lake is a Class A lake; this means that the best intended use for the lake is for potable water—drinking, contact recreation—swimming and bathing, non-contact recreation—boating and aesthetics, aquatic life, and aesthetics. The lake is used by lake residents and visitors for power boating and swimming; the lake has multiple public access locations. The lake does not presently serve as a municipal water supply.

8.7 million ½ inch walleye are stocked by the state each year in Saratoga Lake. Fish species on the lake include black crappie, bluegill, brown bullhead, chain pickerel, largemouth bass, northern pike, pumpkinseed sunfish, redbreast sunfish, rock bass, smallmouth bass, walleye, and yellow perch.

General statewide fishing regulations are applicable in Saratoga Lake. In addition, open season for chain pickerel lasts from 1st Saturday May-March 15th, with no size limit, with a daily take limit of five fish. Open season for sunfish lasts all year, with no size limit, but a daily take limit of 15. Ice fishing is permitted.

There are no lake-specific fish consumption advisories on Saratoga Lake.

Historical Water Quality Data

CSLAP sampling was conducted on Saratoga Lake from 1993 to 1997, 2005 to 2011, 2013, and 2015. The CSLAP reports for each of the past several years can be found on the NYSFOLA website at <http://nysfola.mylaketown.com>. The most recent CSLAP reports for Saratoga Lake can also be found on the NYSDEC web page at <http://www.dec.ny.gov/lands/77843.html>.

Saratoga Lake was sampled through a variety of other programs, including several conducted as part of the US EPA Clean Lakes program and grants awarded in the 1970s and 1980s. The results from these survey efforts have been reported elsewhere.

Saratoga Lake was sampled by the Conservation Department (the predecessor to the NYSDEC) as part of the Biological Survey of the Upper Hudson River basin in 1932. This program was intended to evaluate water quality conditions as they relate to fisheries management, so much of the information collected cannot be easily compared to the CSLAP dataset. The overall summary for Saratoga Lake was as follows:

“Temperature and oxygen relationships suitable for lake trout and whitefish obtain everywhere below the 40 foot contour.... The many weed beds furnish shelter and food for the minnows and young”

"It has very regular, and for the most part, sandy shores, which are quite free from vegetation except in a few protected bays. The principal weed areas... were observed in the northeast corner and along both sides of the outlet for about 3 miles. In some places, the vegetation extends almost to the middle of the outlet.

The limited monitoring did show that pH readings (= 8.2) were mostly comparable to those measured in contemporary monitoring programs, higher water clarity than in most contemporary sampling seasons (at least prior to the introduction of zebra mussels). These data also showed that the lake was both thermally stratified and fully oxygenated in all but the extreme bottom waters.

Kayaderosseras Creek (in Ballston Spa) and Fish Creek in Saratoga have been monitored through the NYSDEC Rotating Intensive Basins (RIBS). These data are summarized at http://www.dec.ny.gov/docs/water_pdf/pwluhud07.pdf. The Kayaderosseras has been sampled through the state biomonitoring program; the sampling results were summarized as follows:

"Current water quality in Kayaderosseras Creek is mostly assessed as non-impacted, with a small reach of slight impact. A 1997 sampling of 4 sites from Porter Corners to Ballston Spa found possible slight impacts near the headwaters and near the mouth. The headwater location at Porter Corners was determined to be due to headwater effect, and the assessment was upgraded to non-impacted. The site near the mouth at Ballston Spa was re-sampled in 2001, and was assessed as non-impacted. All four sites show some indications of nutrient enrichment, and the stream was described as being potentially vulnerable to additional nonpoint sources, as these would likely to result in substantial changes in the stream ecosystem. Sampling in 2002 at a site in Ballston Spa showed slight impact from nutrient enrichment."

Lake Association and Management History

Saratoga Lake is served by the Saratoga Lake Association and the Saratoga Lake Protection and Improvement District. Both organizations work together to conduct a wide variety of lake management activities, including aquatic plant management on the lake, using mechanical harvesting and aquatic herbicides (and experimental herbivorous insect stocking). The management of the lake is summarized in the Saratoga Lake Watershed Management Plan, which can be viewed at <http://www.sara-lake.org/>.

The lake association maintains a web site at <http://www.saratogalake.org/>.

Summary of 2015 CSLAP Sampling Results

Evaluation of 2015 Annual and Monthly Results Relative to 2006-2013

The summer (mid-June through mid-September) average readings are compared to historical averages for all CSLAP sampling seasons in the "Lake Condition Summary" table, and are compared to individual historical CSLAP sampling seasons in the "Long Term Data Plots – Saratoga Lake" section in Appendix C.

Evaluation of Eutrophication Indicators

Water clarity readings were slightly higher than usual in 2015, consistent with lower algae levels. Phosphorus readings were also slightly higher than usual, but these data may not be

representative due to a possible bottle contamination issue. Phosphorus readings have increased over the last several years, coincident with a drop in water clarity (until 2015) and variable algae levels.

Lake productivity typically increases during the summer, as manifested in decreasing water clarity and increasing nutrient and algae levels. In 2015, water clarity decreased in late summer, consistent with an increase in nutrient levels over the same period. Algae levels were variable during the summer, and shoreline blue green algae blooms were apparent in mid- and late-summer.

The lake can be characterized as *mesoeutrophic*, or moderately to highly productive, based on water clarity, total phosphorus (both indicative of *mesotrophic* lakes) and chlorophyll *a* readings (typical of *eutrophic* lakes), although phosphorus readings in 2015 may have been indicative of *eutrophic* conditions. The trophic state index (TSI) evaluation suggests that water clarity is normally higher than expected given the nutrient and algae levels in the lake, suggesting patchy algae growth. The latter may be consistent with periodic algae blooms. Overall trophic conditions are summarized on the Lake Scorecard and Lake Condition Summary Table.

Evaluation of Potable Water Indicators

Algae levels are at times high enough to render the lake susceptible to taste and odor compounds or elevated DBP (disinfection by product) compounds that could affect the potability of the water, but the lake is not presently used for drinking water. Deepwater phosphorus, ammonia, iron, manganese and arsenic readings are usually not significantly elevated (although both were higher than usual in 2015), so deepwater intakes may at times support “unofficial” potable water use. Potable water conditions, at least as measurable through CSLAP, are summarized in the Lake Scorecard and Lake Condition Summary Table.

Evaluation of Limnological Indicators

pH readings have decreased significantly since the mid-1990s, although the lake can still be identified as alkaline (and pH readings were close to normal in 2015). Color readings have been higher since the 2002 change in laboratories, but these higher readings may be indicative of different lab tests, and color was lower than usual in 2015. Conductivity and ammonia readings were slightly higher than usual in 2015, and both indicators have increased slightly in the last decade. It is likely that the small changes in most of the limnological indicators have been within the normal range of variability in the lake.

Chloride levels in the 2015 samples, collected for the first time through CSLAP and cited in Appendix A, ranged from 62 to 68 mg/l. These values fall within the “major” road salt runoff levels cited by the New Hampshire DES. These readings are well below the state potable water quality standard of 250 mg/l but above the range of values found in most NYS lakes. These readings suggest a moderate to high likelihood of biological impacts from road salt. Additional data will help to determine if these represent normal readings for the lake.

Overall limnological conditions are summarized in the Lake Scorecard and Lake Condition Summary Table.

Evaluation of Biological Condition

Macrophyte surveys have been conducted through CSLAP and the LCI study of Saratoga Lake. At least 38 aquatic plant species have been found, including at least three exotic plant species (*Myriophyllum spicatum*, Eurasian watermilfoil, *Potamogeton crispus*, curly-leafed pondweed, and *Trapa natans*, water chestnut). The modified floristic quality index (FQI) for the lake indicates that the quality of the aquatic plant community is “good”.

The composition of the fish community is comprised of at least eight warmwater fish species, and at least five coolwater fish species. This suggests that the lake can most likely be characterized as a coolwater fishery.

Zooplankton, and macroinvertebrates have not been evaluated through CSLAP in Saratoga Lake. The fluoroprobe analyses conducted by SUNY ESF on raw water samples in 2013 showed slightly elevated overall and blue green algae levels in early fall, with samples dominated by *Microcystis*, *Anabaena* (two blue green algae species capable of producing algal toxins) and green algae. The shoreline scum samples from mid fall showed much higher blue green algae levels dominated by *Lyngbya*, *Microcystis*, *Anabaena*, *Woronichinia*, and *Aphanizomenon* (all blue green algae species). Shoreline samples collected earlier in the summer were also comprised of *Lyngbya*, although both total and blue green algae densities were much lower. In 2015, shoreline bloom samples were dominated by *Microcystis*, *Anabaena* and *Lyngbya*, although other algae species have been found.

Evaluation of Lake Perception

Water quality assessments, aquatic plant coverage, and recreational conditions were close to normal in 2013 and 2015, despite the blue green algae blooms in mid- and late-summer, and none of these assessments has exhibited any clear long-term trends. This might reflect both stable conditions and active management of aquatic plants. These assessments degrade slightly during the typical summer, consistent with a seasonal increase in lake productivity, but no clear trends in recreational assessments were apparent in 2015. Aquatic plant coverage increased after July in 2015, but plant coverage continues to be influenced by seasonal changes in active management (harvesting and/or herbicides). Overall lake perception is summarized on the Lake Scorecard and Lake Condition Summary Table.

Evaluation of Local Climate Change

Water temperature readings in the summer index period were close to normal in 2011, 2013, and 2015, but both air and water temperature readings has increased since first evaluated in 1993. It is not known if this is an indication of local climate change or if these changes can be well evaluated through CSLAP.

Evaluation of Algal Toxins

Algal toxin levels can vary significantly within blooms and from shoreline to lake, and the absence of toxins in a sample does not indicate safe swimming conditions. Fluoroprobe readings at times approach the threshold for harmful algal blooms (HABs) in the open water, and periodically exceed these thresholds in shoreline blooms. An analysis of algae samples indicates microcystin readings below the levels needed to support safe swimming in the open water, but much higher readings in some shoreline blooms (including those in 2015) exceed the recreational criteria established by the World Health Organization. Regardless of whether elevated algal toxin

levels are detected, lake residents and recreational users are advised to avoid contact with shoreline blooms.

Lake Condition Summary

Category	Indicator	Min	Annual Avg	Max	2015 Avg	Classification	2015 Change?	Long-term Change?
Eutrophication Indicators	Water Clarity	1.20	3.22	7.05	3.71	Mesotrophic	Within Normal Range	No Change
	Chlorophyll <i>a</i>	1.43	8.78	34.40	7.23	Eutrophic	Within Normal Range	Decreasing Slightly
	Total Phosphorus	0.006	0.019	0.051	0.026	Mesotrophic	Higher than Normal	No Change
Potable Water Indicators	Hypolimnetic Ammonia	0.01	0.11	1.40	0.64	Close to Surface NH4 Readings	Higher than Normal	Not known
	Hypolimnetic Arsenic	0.34	0.48	0.90		Low Deepwater Arsenic Levels		Not known
	Hypolimnetic Iron	0.01	0.10	0.47		Low Iron Levels		Not known
	Hypolimnetic Manganese	0.01	0.21	0.38		Low Manganese Levels		Not known
Limnological Indicators	Hypolimnetic Phosphorus	0.000	0.074	1.380	0.475	Close to Surface TP Readings	Higher than Normal	Not known
	Nitrate + Nitrite	0.00	0.04	0.36	0.05	Low NOx	Within Normal Range	No Change
	Ammonia	0.01	0.03	0.12	0.04	Low Ammonia	Higher than Normal	Increasing Slightly
	Total Nitrogen	0.10	0.39	0.89	0.44	Low Total Nitrogen	Within Normal Range	No Change
	pH	6.14	7.90	8.82	7.77	Alkaline	Within Normal Range	Decreasing Significantly
	Specific Conductance	101	272	435	339	Hardwater	Higher than Normal	No Change
	True Color	4	16	36	9	Intermediate Color	Lower Than Normal	Increasing Slightly
	Calcium	25.4	28.0	32.4	28.2	Highly Susceptible to Zebra Mussels	Within Normal Range	No Change
Lake Perception	WQ Assessment	1	2.0	4	1.8	Not Quite Crystal Clear	More Favorable Than Normal	No Change
	Aquatic Plant Coverage	1	1.5	4	1.6	Plants Not Visible	Within Normal Range	No Change
	Recreational Assessment	1	1.8	4	1.8	Excellent	Within Normal Range	No Change
Biological Condition	Phytoplankton					Open water-low blue green algae biomass	Not known	Not known
	Macrophytes					Good quality of the aquatic plant community	Not known	Not known
	Zooplankton					Not measured through CSLAP	Not known	Not known
	Macroinvertebrates					Not measured through CSLAP	Not known	Not known
	Fish					Coolwater fishery?	Not known	Not known
	Invasive Species					Zebra mussels, common carp, goldfish, alewife, Eurasian watermilfoil, Curly-leaved pondweed, Water chestnut	Not known	Not known
Local Climate Change	Air Temperature	11	24.4	39	26.6		Within Normal Range	Increasing Slightly
	Water Temperature	14	23.4	29	24.0		Within Normal Range	Increasing Slightly

Category	Indicator	Min	Annual Avg	Max	2015 Avg	Classification	2015 Change?	Long-term Change?
Harmful Algal Blooms	Open Water Phycocyanin	5	44	380	11	Most readings indicate low risk of BGA	Not known	Not known
	Open Water FP Chl.a	1	4	12	2	Few readings indicate high algae levels	Not known	Not known
	Open Water FP BG Chl.a	0	2	10	1	No readings indicate high BGA levels	Not known	Not known
	Open Water Microcystis	<DL	0.4	2.7	<DL	Mostly undetectable open water MC-LR	Not known	Not known
	Open Water Anatoxin a	<DL	<DL	<DL	<DL	Open water Anatoxin-a consistently not detectable	Not known	Not known
	Shoreline Phycocyanin	583.0	1364.5	2146.0		All readings indicate high risk of BGA	Not known	Not known
	Shoreline FP Chl.a	1.9	325.3	1425.8	244.9	Most readings indicate high algae levels	Not known	Not known
	Shoreline FP BG Chl.a	0.8	278.3	1213.0	212.4	Most readings indicate high BGA levels	Not known	Not known
	Shoreline Microcystis	<DL	50.2	389.4	67.6	Very high shoreline bloom MC-LR	Not known	Not known
	Shoreline Anatoxin a	<DL	<DL	<DL	<DL	Shoreline bloom Anatoxin-a consistently not detectable	Not known	Not known

Evaluation of Lake Condition Impacts to Lake Uses

Saratoga Lake is presently among the lakes listed on the 2007 Upper Hudson River Basin PWL, with recreation and habitat listed as *stressed* due to excessive algae and weeds. The PWL listing for Saratoga Lake is listed in Appendix B.

Potable Water (Drinking Water)

The CSLAP dataset at Saratoga Lake, including water chemistry data, physical measurements, and volunteer samplers' perception data, is inadequate to evaluate the use of the lake for potable water, and the lake is not used for this purpose. These data suggest that any "unofficial" potable water use from the surface waters of the lake may be impacted by excessive algae, particularly in association with shoreline or more extensive open water algae blooms.

Public Bathing

The CSLAP dataset at Saratoga Lake, including water chemistry data, physical measurements, and volunteer samplers' perception data, suggests that public bathing, if conducted at a public swimming beach, may be *stressed* by shoreline algae blooms and elevated algal toxins, although these impacts vary from year to year and may not be present in some parts of the lake. Additional information about bacterial levels is needed to evaluate the safety of the water for swimming.

Recreation (Swimming and Non-Contact Uses)

The CSLAP dataset on Saratoga Lake, including water chemistry data, physical measurements, and volunteer samplers' perception data, suggest that recreation is *stressed* by periodic shoreline algae blooms and *threatened* by excessive weeds, particularly Eurasian watermilfoil. This use may be sustained (and threats minimized) by the active management of surface growth of weeds, native and exotic.

Aquatic Life

The CSLAP dataset on Saratoga Lake, including water chemistry data, physical measurements, and volunteer samplers' perception data, suggest that aquatic life may be *threatened* by hypolimnetic hypoxia (slightly depressed deepwater oxygen readings), road salt runoff, and

zebra mussels and exotic plants. Additional data are needed to evaluate the food and habitat conditions for aquatic organisms in the lake.

Aesthetics and Habitat

The CSLAP dataset on Saratoga Lake, including water chemistry data, physical measurements, and volunteer samplers' perception data, suggest that aesthetics may be *fair* due to excessive native plants and shoreline algal blooms, and habitat may be *fair* due to excessive invasive weeds. These threats may have been minimized by the aquatic plant control activities conducted at the lake.

Fish Consumption

There are no fish consumption advisories posted for Saratoga Lake.

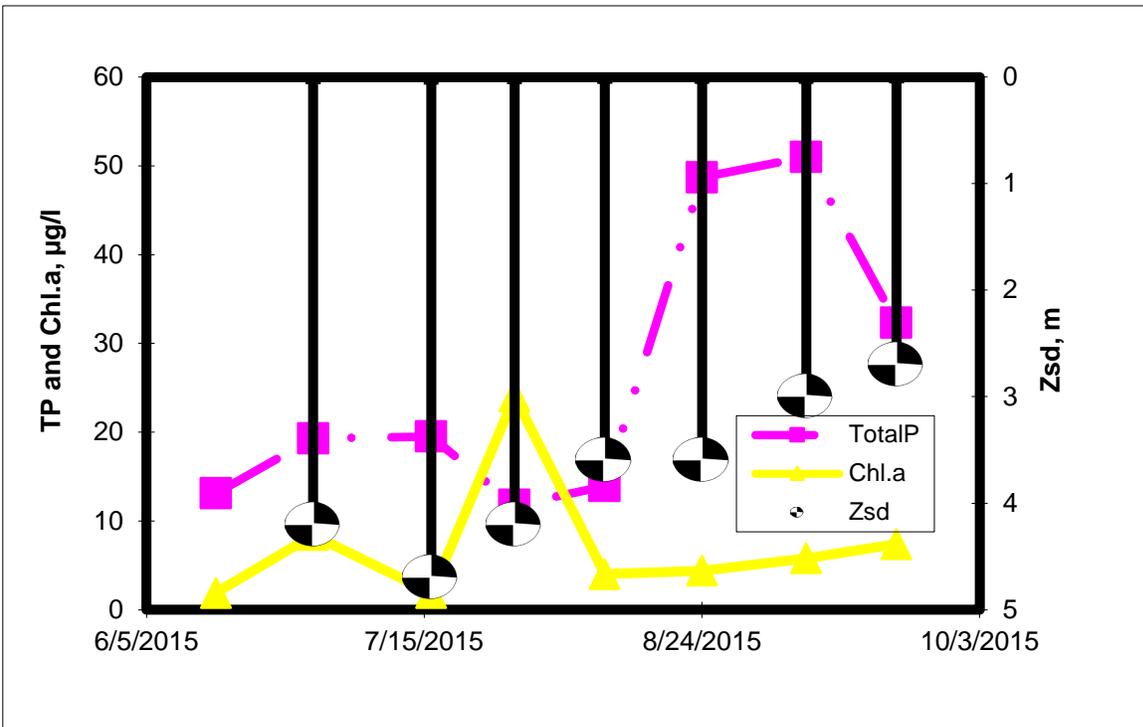
Additional Comments and Recommendations

Additional aquatic plant survey data (or a detailed evaluation of the Darrin Freshwater Institute data) may help to determine if the aquatic plant community is dominated by exotic plants, or if the occasional management of the nuisance weed problems in the lake has resulted in a shift to dominance by native plant species. Lake residents should continue to report and avoid exposure to any surface scums or heavily discolored water.

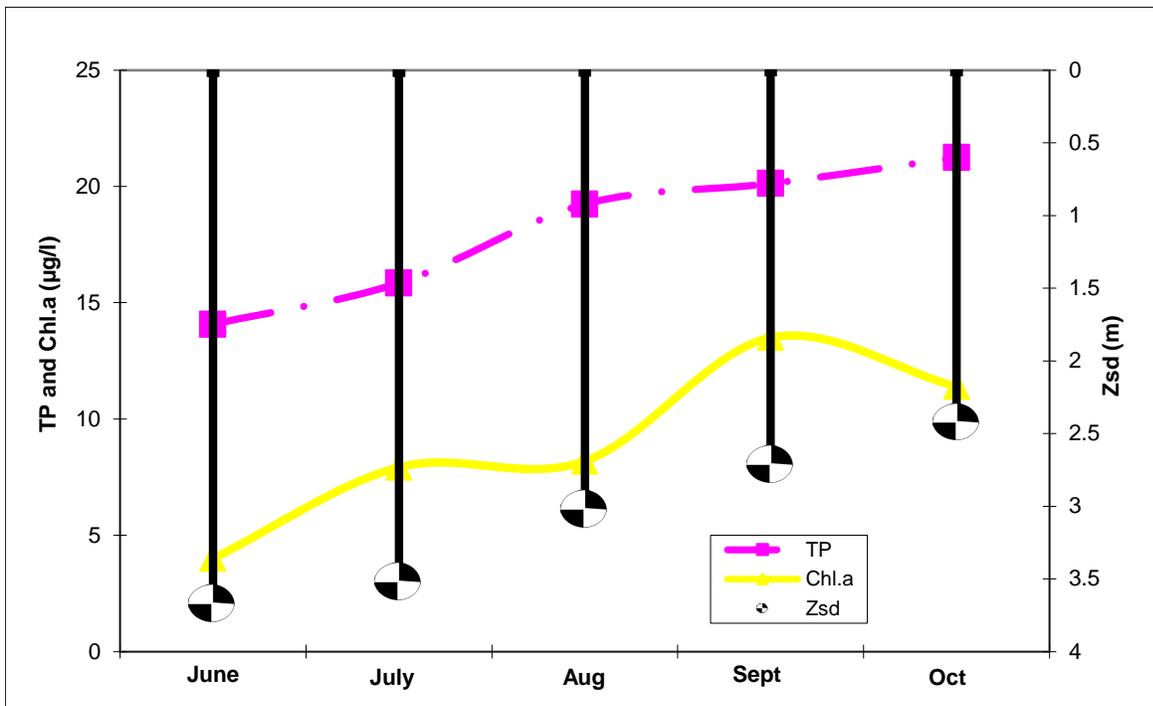
Aquatic Plant IDs-2015

None submitted for identification in 2015.

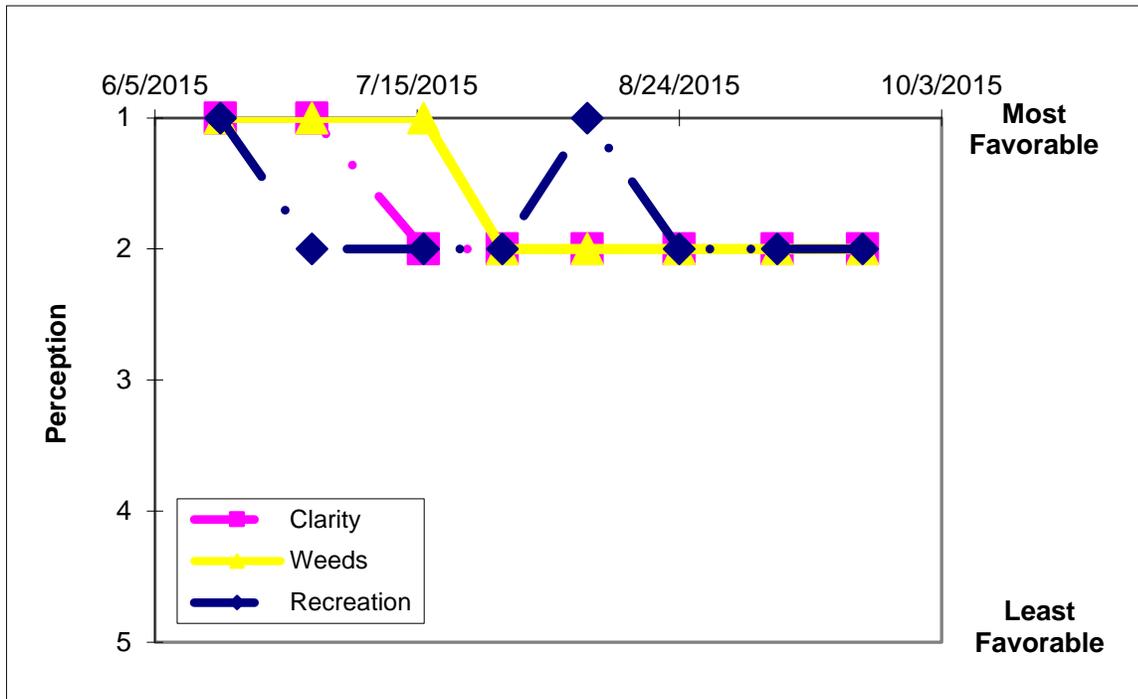
Time Series: Trophic Indicators, 2015



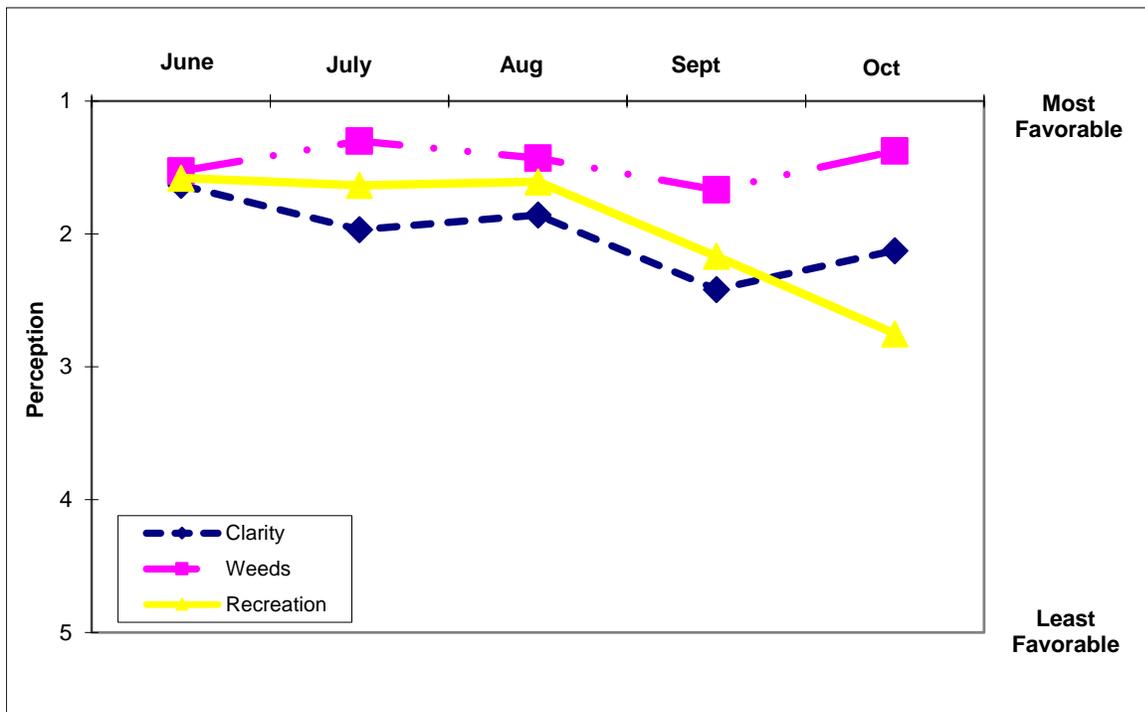
Time Series: Trophic Indicators, Typical Year (1994-2015)



Time Series: Lake Perception Indicators, 2015



Time Series: Lake Perception Indicators, Typical Year (1994-2015)



Appendix A- CSLAP Water Quality Sampling Results for Saratoga Lake

LNum	PName	Date	Zbot	Zsd	Zsamp	Tot.P	NO3	NH4	TDN	TN/TP	TColor	pH	Cond25	Ca	Chl.a	Cl
104	Saratoga L	6/26/1993	27.7	2.58	1.5	0.019	0.10				13	8.12	273		5.27	
104	Saratoga L	7/10/1993	27.7	3.01	1.5	0.013	0.01				8	7.58	279		3.90	
104	Saratoga L	7/25/1993	29.6	5.28	1.5	0.013	0.01				7	8.30	274		23.80	
104	Saratoga L	8/7/1993	27.0	3.55	1.5	0.014	0.01				7	8.30	285		8.30	
104	Saratoga L	8/21/1993	28.0	2.55	1.5	0.014	0.01				4	8.29	286		10.40	
104	Saratoga L	9/5/1993	28.0	1.75	1.5	0.020	0.01				9	8.19	293		29.30	
104	Saratoga L	9/20/1993	28.0	1.20	1.5	0.023	0.01				9	8.34	292		34.40	
104	Saratoga L	10/2/1993	28.0	1.65	1.5	0.019	0.01				6	8.33	297		27.60	
104	Saratoga L	6/5/1994	28.9	2.61	1.5	0.008	0.14				8	7.77	272		7.74	
104	Saratoga L	6/18/1994	27.4	2.74	1.5	0.015	0.10				13	8.18	286		4.09	
104	Saratoga L	7/5/1994	28.9	2.60	1.5	0.011					7	8.38	282		10.50	
104	Saratoga L	7/18/1994	28.9	2.50	1.5	0.010	0.01				7	8.46	289		11.20	
104	Saratoga L	7/30/1994	28.9	2.89	1.5	0.017					4	8.27	279		5.44	
104	Saratoga L	8/15/1994	27.4	2.23	1.5	0.019	0.01				18	8.24	292		15.80	
104	Saratoga L	8/29/1994	29.0	1.69	1.5	0.022	0.01				15	8.19	291		27.00	
104	Saratoga L	9/10/1994	28.0	1.63	1.5	0.018	0.01				14	8.24	299		20.90	
104	Saratoga L	6/25/1995	27.4	4.77	1.5	0.008	0.01				10	8.28	313		3.94	
104	Saratoga L	7/9/1995	27.4	3.33	1.5	0.013	0.01				5	8.15	322		6.02	
104	Saratoga L	7/22/1995	27.4	3.35	1.5	0.010	0.01				5	8.36	323		12.20	
104	Saratoga L	8/5/1995	27.4	3.05	1.5	0.025	0.01				5	8.23	325		10.70	
104	Saratoga L	8/19/1995	28.9				0.01				5	8.46	322		15.10	
104	Saratoga L	9/5/1995	28.9	1.91	1.5	0.016	0.01					8.23	331		25.50	
104	Saratoga L	9/16/1995	28.9	1.84	1.5	0.020	0.01				5	8.26	333		22.90	
104	Saratoga L	10/14/1995	28.9	2.01	1.5	0.019	0.01				7	8.56	332		24.40	
104	Saratoga L	6/16/1996	29.0	2.75	1.5	0.010	0.13				15	8.20	288		8.20	
104	Saratoga L	7/7/1996	29.0	2.60	1.5	0.038	0.05				10	8.16	296		16.20	
104	Saratoga L	7/20/1996	29.0	2.15	1.5	0.015	0.01				15	8.31	293		15.00	
104	Saratoga L	8/2/1996	29.0	2.60	1.5	0.007	0.02				15	8.18	296		5.60	
104	Saratoga L	8/17/1996	29.0	1.80	1.5	0.019	0.01				15	8.18	296		15.10	
104	Saratoga L	9/2/1996	29.0	1.80	1.5	0.020	0.01				15	8.46	303		18.80	
104	Saratoga L	9/15/1996	29.0	1.80	1.5	0.023	0.01				10	8.35	302		21.00	
104	Saratoga L	10/1/1996	29.0	2.07	1.5	0.024	0.01				15	6.14	309		13.00	
104	Saratoga L	6/20/1997	28.9	3.15	1.5	0.008	0.17				15	8.20	288		1.43	
104	Saratoga L	6/28/1997	28.9	6.45	1.5	0.008	0.12				10	8.23	291		2.54	
104	Saratoga L	7/12/1997	28.9	7.05	1.5	0.007	0.07				10	8.17	295		2.37	
104	Saratoga L	7/26/1997	28.9	6.28	1.5	0.013	0.06				10	8.36	301		3.81	
104	Saratoga L	8/9/1997	28.9	6.11	1.5	0.006	0.01				8	8.34	301		3.43	
104	Saratoga L	8/30/1997	28.9	4.26	1.5	0.012					8	8.28	300		7.14	
104	Saratoga L	9/30/1997	28.9	5.84	1.5	0.017					6	8.07	297		5.50	
104	Saratoga L	06/25/05		3.60	2.5	0.010	0.01	0.03	0.10	21.54	15	7.69	208	28.2	3.12	
104	Saratoga L	07/11/05	29.0	2.70	1.5	0.034	0.01	0.02	0.20	13.03	36	8.30			9.06	
104	Saratoga L	07/18/05	25.0	2.90	1.5	0.026	0.01	0.02	0.32	26.56	13	7.30	273		5.47	
104	Saratoga L	07/31/05	29.0	2.85		0.019	0.01	0.02	0.19	22.32	14	7.60	275		8.36	
104	Saratoga L	08/07/05	29.0	4.30		0.025	0.01	0.01	0.14	12.30	27	7.85	201	26.7	6.26	
104	Saratoga L	08/23/05		3.35		0.032	0.01	0.01	0.10	6.90	13	7.62	231		9.34	
104	Saratoga L	09/12/05	25.0	3.50		0.030	0.01	0.01	0.16	12.01	17	7.94	256		7.65	
104	Saratoga L	09/24/05	27.8	2.55		0.011	0.01	0.01	0.16	31.23	10	7.58	237		12.04	
104	Saratoga L	6/15/2006		3.20		0.019	0.16	0.06	0.64	74.45	22	8.31	218	26.4	2.99	
104	Saratoga L	7/4/2006	25.9	2.25	1.5	0.024	0.04	0.03	0.49	44.35	25	7.57	210		15.51	
104	Saratoga L	7/17/2006	26.0	2.30		0.037	0.01	0.02	0.58	34.22	19	8.82	271		10.56	
104	Saratoga L	7/31/2006	24.5	3.40		0.035	0.01	0.01	0.41	26.03	8	8.27	164		7.24	
104	Saratoga L	8/16/2006	26.6	2.40		0.037	0.00	0.01	0.61	36.03	23	8.00	253	29.1	8.15	
104	Saratoga L	9/6/2006	27.3	2.75		0.026	0.01	0.01	0.41	34.33	17	7.99	179		10.54	
104	Saratoga L	9/18/2006	27.7	3.20		0.023			0.37	36.47	15	7.86	101		6.81	
104	Saratoga L	10/4/2006	27.0	3.50		0.018	0.02	0.01	0.29	35.53	28	7.79	296		6.49	
104	Saratoga L	6/27/2007	25.6	4.38		0.016	0.08	0.02	0.34	46.97	22	8.01	176	25.4	2.95	
104	Saratoga L	7/16/2007		3.75	1.5	0.025	0.03	0.02	0.27	23.84	23	7.56	255		6.75	
104	Saratoga L	7/21/2007	27.6	3.60	1.5	0.020	0.04	0.02	0.31	34.94	24	8.35	130		7.54	
104	Saratoga L	8/1/2007	27.1	3.85	1.5	0.016	0.00	0.01	0.50	69.54	20	7.93	289		2.28	
104	Saratoga L	8/12/2007	29.1	3.35	1.5	0.021	0.01	0.01	0.57	60.96	18	7.47	249	27.4	2.58	
104	Saratoga L	8/24/2007	27.4	2.75	1.5	0.018	0.36	0.03	0.89	110.95	14	7.70	192		4.69	
104	Saratoga L	9/8/2007	28.7	2.65	1.5	0.018	0.02	0.02	0.47	57.48	15	7.83	195		13.90	
104	Saratoga L	9/17/2007	29.0	3.35	1.5	0.019	0.01	0.01	0.37	43.98	15	7.76	304		6.82	

LNum	PName	Date	Zbot	Zsd	Zsamp	Tot.P	NO3	NH4	TDN	TN/TP	TColor	pH	Cond25	Ca	Chl.a	Cl
104	Saratoga L	6/12/2008	26.5	3.15		0.027	0.07	0.02	0.50	39.91	16	7.70	299	27.7	3.88	
104	Saratoga L	6/21/2008	22.5	3.15		0.026	0.08	0.02	0.35	29.61	15	7.67	175		4.40	
104	Saratoga L	7/7/2008	27.6	2.95		0.018	0.01	0.02	0.29	35.00	16	7.71	309		1.59	
104	Saratoga L	7/21/2008	28.9	3.50	1.5	0.018	0.01	0.12	0.23	27.87	21	7.76	248		4.02	
104	Saratoga L	8/6/2008	26.3	2.70	1.5	0.034	0.01	0.01	0.26	16.73	20	8.03	182	26.1	12.37	
104	Saratoga L	8/20/2008	25.0	2.35	1.5	0.018	0.00	0.02	0.25	29.35	31	7.95	218		11.45	
104	Saratoga L	9/11/2008	28.5	2.95	1.5	0.021	0.01	0.01	0.24	25.53	25	7.94	204		9.96	
104	Saratoga L	9/17/2008	28.4	3.05	1.5	0.016	0.01	0.03	0.24	33.35	22	7.67	254		10.89	
104	Saratoga L	06/29/2009	25.0	5.35		0.026	0.15	0.03	0.43	37.21	16	7.74	212	27.0	3.77	
104	Saratoga L	07/06/2009	22.7	3.90		0.019	0.19	0.03	0.43	50.67	22	7.38	314		2.93	
104	Saratoga L	07/17/2009	25.0	5.50		0.018	0.10	0.02	0.36	44.74	30	7.37	226		3.61	
104	Saratoga L	07/27/2009	24.0	3.55		0.016	0.06	0.03	0.36	48.59	30	6.87	233		4.41	
104	Saratoga L	08/09/2009	19.9	3.15	2	0.015	0.02	0.02	0.25	35.89	21	8.07	193	31.4	4.30	
104	Saratoga L	08/24/2009	25.2	3.60	2	0.013	0.03	0.01	0.28	47.22	35	7.57	248		3.80	
104	Saratoga L	09/14/2009	28.5	4.20	2	0.017	0.01	0.01	0.30	38.44	25	7.45	218		5.20	
104	Saratoga L	09/21/2009														
104	Saratoga L	10/03/2009	25.7	4.00	2	0.015	0.03	0.02	0.24	33.71	31	7.08	211		2.14	
104	Saratoga L	6/14/2010	27.5	3.90	1.5	0.015	0.16	0.05	0.35	50.00	11	7.94	258	32.4	2.60	
104	Saratoga L	7/5/2010	27.4	4.15	1.5	0.013	0.02	0.05	0.74	#####	31	8.48	241		3.00	
104	Saratoga L	7/30/2010	17.5	3.85	1.5	0.011	0.02	0.04	0.28	56.80	23	8.39	217		4.40	
104	Saratoga L	8/9/2010	22.5	3.45	1.5	0.017	0.06	0.02	0.33	43.60	33	7.71	284		4.00	
104	Saratoga L	8/19/2010	22.9	3.85	1.5	0.015	0.03	0.03	0.50	76.47	10	7.77	373	27.8	3.00	
104	Saratoga L	8/29/2010	2.0	3.00	1.5	0.014	0.03	0.02	0.41	65.21	7	8.16	345		5.60	
104	Saratoga L	9/10/2010	21.2	2.70	1.5	0.018	0.02	0.08	0.35	41.60	11	7.67	286		8.10	
104	Saratoga L	10/11/2010	28.0	3.85	1.5	0.023	0.11	0.07	0.34	32.10	15	7.55	313		3.40	
104	Saratoga L	10/13/2010	grab	bloom												
104	Saratoga L	6/7/2011	24.3	3.60	1.5	0.010	0.09	0.03	0.45	101.69	21	7.51	315	28.4	3.50	
104	Saratoga L	6/21/2011	23.1	3.90	1.5	0.015	0.02	0.04	0.35	51.97	27	7.43	320		3.20	
104	Saratoga L	7/15/2011	24.7	2.60	1.5	0.020	0.01	0.02	0.34	37.70	17	7.30	347		3.50	
104	Saratoga L	8/2/2011			1.5	0.021	0.02	0.02	0.49	52.08	33	7.57	291		3.60	
104	Saratoga L	8/23/2011	24.9	2.35	1.5	0.016	0.03	0.02	0.54	71.77	19	7.30	268	27.9	10.40	
104	Saratoga L	8/23/2011			Bloom											
104	Saratoga L	9/23/2011		3.20		0.021	0.03	0.03	0.46	47.98	27	7.51	299		5.50	
104	Saratoga L	10/4/2011	23.9	2.30	1.5	0.027	0.10	0.04	0.55	44.08	27	7.53	265		5.70	
104	Saratoga L	6/30/2013	24.1	2.60	1.5	0.012	0.05	0.03	0.34	63.18	20	7.72	310		2.10	
104	Saratoga L	7/12/2013	20.3	2.90	1.5	0.018			0.42	53.30	23	8.07	222		3.40	
104	Saratoga L	7/26/2013	21.3	2.55	1.5	0.016	0.01	0.02	0.36	49.47	21	7.41	228			
104	Saratoga L	8/8/2013	23.9	2.40	1.5	0.024			0.64	59.36	23	7.30	262		5.30	
104	Saratoga L	8/30/2013	23.7	2.80	1.5	0.016	0.01	0.03	0.46	61.66	23	7.64	245		13.20	
104	Saratoga L	9/6/2013	22.0	2.60	1.5	0.025			0.57	49.97	23	7.38	257		8.90	
104	Saratoga L	7/27/2013			Bloom											
104	Saratoga L	9/6/2013			Bloom											
104	Saratoga L	9/11/2013			bloom											
104	Saratoga L	9/11/2013	22.9	2.50	1.5	0.028	0.01	0.02	0.44	35.51	18	8.36	162		21.50	
104	Saratoga L	9/20/2013	22.8	2.50	1.5	0.015			0.43	61.47	23	7.35	315		4.70	
104	Saratoga L	6/15/2015			1.5	0.013	0.13	0.06	0.55	41.68	8	7.53	416	29.3	1.90	
104	Saratoga L	6/29/2015		4.20	1.5	0.019			0.61	31.66	13	8.11	254		8.40	
104	Saratoga L	7/16/2015	15.8	4.70	1.5	0.020	0.07	0.05	0.50	25.64	13	7.83	220		1.90	62.4
104	Saratoga L	7/28/2015	15.7	4.20	1.5	0.012			0.31	26.44	11	7.75	380		24.00	
104	Saratoga L	8/10/2015		3.60	1.5	0.014	0.01	0.04	0.57	40.79	11	7.70	435	27.0	4.00	
104	Saratoga L	8/24/2015	15.8	3.60	1.5	0.049			0.37	7.64	7	7.58	386		4.40	
104	Saratoga L	9/8/2015	15.8	3.00	1.5	0.051	0.01	0.02	0.19	3.63	5	7.84	369		5.80	68.0
104	Saratoga L	7/16/2015			bloom											
104	Saratoga L	7/28/2015			Bloom											
104	Saratoga L	8/10/2015			Bloom											
104	Saratoga L	8/24/2015			Bloom											
104	Saratoga L	9/8/2015			Bloom											
104	Saratoga L	9/21/2015			Bloom											
104	Saratoga L	9/21/2015		2.70	1.5	0.032			0.42	13.10	5	7.80	249		7.40	
104	Saratoga L	07/11/05	29.0		27.5	0.035										
104	Saratoga L	07/18/05	25.0		25.0	0.029										
104	Saratoga L	07/31/05	29.0		29.0	0.021										
104	Saratoga L	08/07/05	29.0		29.0	0.027										
104	Saratoga L	08/23/05				0.035										
104	Saratoga L	09/12/05	25.0		15.0	0.028										
104	Saratoga L	09/24/05	27.8		25.0	0.011										

LNum	PName	Date	Zbot	Zsd	Zsamp	Tot.P	NO3	NH4	TDN	TN/TP	TColor	pH	Cond25	Ca	Chl.a	Cl
104	Saratoga L	6/15/2006			26.5	0.019										
104	Saratoga L	7/4/2006	25.9		24.0	0.025										
104	Saratoga L	7/17/2006	26.0		22.0	0.015										
104	Saratoga L	7/31/2006	24.5		22.0	0.020										
104	Saratoga L	8/16/2006	26.6		25.0	0.007										
104	Saratoga L	9/6/2006	27.3		26.0	0.010										
104	Saratoga L	9/18/2006	27.7		26.0	0.009										
104	Saratoga L	10/4/2006	27.0		25.0	0.024										
104	Saratoga L	6/27/2007	25.6			0.016										
104	Saratoga L	7/16/2007			26.0	0.015										
104	Saratoga L	7/21/2007	27.6		26.0	0.017										
104	Saratoga L	8/1/2007	27.1		26.0	0.020										
104	Saratoga L	8/12/2007	29.1		27.0	0.009										
104	Saratoga L	8/24/2007	27.4		26.0	0.040										
104	Saratoga L	9/8/2007	28.7		27.0	0.007										
104	Saratoga L	9/17/2007	29.0		27.0	0.000										
104	Saratoga L	6/12/2008	26.5		26.0	0.003										
104	Saratoga L	6/21/2008	22.5		20.0	0.015										
104	Saratoga L	7/7/2008	27.6		26.0	0.012										
104	Saratoga L	7/21/2008	28.9		27.0	0.013										
104	Saratoga L	8/6/2008	26.3		24.0	0.015										
104	Saratoga L	8/20/2008	25.0		23.0	0.028										
104	Saratoga L	9/11/2008	28.5		27.0	0.018										
104	Saratoga L	9/17/2008	28.4		28.4	0.029										
104	Saratoga L	06/29/2009	25.0		18	0.017		0.05								
104	Saratoga L	07/06/2009	22.7		21	0.013		0.01								
104	Saratoga L	07/17/2009	25.0		23	0.019		0.04								
104	Saratoga L	07/27/2009	24.0			0.034		0.01								
104	Saratoga L	08/09/2009	19.9		18	0.019		0.01				0.12	0.32	0.34		
104	Saratoga L	08/24/2009	25.2		23	0.013		0.02								
104	Saratoga L	09/14/2009	28.5		20	0.021	0.36	0.02				0.47	0.16	0.34		
104	Saratoga L	10/03/2009	25.7		24	0.018		0.01								
104	Saratoga L	6/14/2010	27.5			0.018		0.18				0.03	0.19			
104	Saratoga L	7/30/2010	17.5		16.0	0.018		0.06				0.09	0.38			
104	Saratoga L	8/9/2010	22.5												0.34	
104	Saratoga L	8/19/2010	22.9		21.0	0.015		0.04				0.03	0.24	0.90		
104	Saratoga L	9/10/2010	21.2		20.0	0.014		0.07				0.14	0.18			
104	Saratoga L	6/7/2011	24.3	3.60	23.0	0.012		0.04				0.01	0.01			
104	Saratoga L	7/15/2011	24.7	2.60	23.0	0.021		0.02								
104	Saratoga L	8/23/2011	24.9	2.35	23.0	0.024		0.03				0.01	0.37	0.50		
104	Saratoga L	10/4/2011	23.9	2.30	22.0	0.029		0.05				0.01	0.04			
104	Saratoga L	6/30/2013			21.0	0.017		0.03								
104	Saratoga L	7/12/2013			19.0											
104	Saratoga L	7/26/2013			18.0	0.026		0.01								
104	Saratoga L	8/8/2013			22.0											
104	Saratoga L	8/30/2013			22.0	0.016		0.01								
104	Saratoga L	9/6/2013			20.0											
104	Saratoga L	9/11/2013			21.0	0.027		0.01								
104	Saratoga L	9/20/2013			21.0											
104	Saratoga L	6/15/2015				0.029										
104	Saratoga L	6/29/2015			15.0	0.065		0.49								
104	Saratoga L	7/16/2015			14.0	0.258										
104	Saratoga L	7/28/2015			14.2	0.016		0.03								
104	Saratoga L	8/10/2015			14.3	0.367										
104	Saratoga L	8/24/2015			14.2	1.209		1.40								
104	Saratoga L	9/8/2015			14.3	1.380										
104.1	Saratoga L-Kaya.Creek	10/30/1994				0.007										
104.1	Saratoga L-Kaya.Creek	10/31/1994				0.160										
104.1	Saratoga L-Kaya.Creek	10/22/1995				0.170										
104.1	Saratoga L-Kaya.Creek	10/22/1995				0.042										
104.1	Saratoga L-Kaya.Creek	10/27/1995				0.035										
104.1	Saratoga L-Kaya.Creek	10/28/1995				0.038										
104.1	Saratoga L-Kaya.Creek	10/29/1995				0.036										
104.1	Saratoga L-Kaya.Creek	11/2/1995				0.021										
104.1	Saratoga L-Kaya.Creek	11/11/1995				0.017										
104.1	Saratoga L-Kaya.Creek	11/12/1995				0.120										

LNum	PName	Date	Site	TAir	TH20	QA	QB	QC	QD	QF	QG	AQ-PC	AQ-Chla	MC-LR	Ana-a	Cylin	FP-Chl	FP-BG	HABform	ShoreHAB
104	Saratoga L	6/26/1993	epi	26	22	2	3	2	6											
104	Saratoga L	7/10/1993	epi	24	21	1	1	1												
104	Saratoga L	7/25/1993	epi	28	23	3	2	2	123											
104	Saratoga L	8/7/1993	epi	15	22	2	1	1	56											
104	Saratoga L	8/21/1993	epi	14	20	2	1	1	5											
104	Saratoga L	9/5/1993	epi	21	23	3	2	3	13											
104	Saratoga L	9/20/1993	epi	13	20	3	2	3	5											
104	Saratoga L	10/2/1993	epi	12	14	1	1	2	5											
104	Saratoga L	6/5/1994	epi	23	19	2	2	1	6											
104	Saratoga L	6/18/1994	epi	23	25	1	1	1												
104	Saratoga L	7/5/1994	epi	22	24	2	1	1	6											
104	Saratoga L	7/18/1994	epi			2	1	3	5											
104	Saratoga L	7/30/1994	epi	19	25	2	1	2												
104	Saratoga L	8/15/1994	epi	17	21	2	1	2	5											
104	Saratoga L	8/29/1994	epi	18	22	3	2	4	15											
104	Saratoga L	9/10/1994	epi	11	17	3	2	2	1											
104	Saratoga L	6/25/1995	epi	29	25	2	1	1	6											
104	Saratoga L	7/9/1995	epi	20	22	2	2	1	6											
104	Saratoga L	7/22/1995	epi	20	24	1	1	1												
104	Saratoga L	8/5/1995	epi	28	24	1	1	2												
104	Saratoga L	8/19/1995	epi	25	25	3	2	1	6											
104	Saratoga L	9/5/1995	epi	23	25	3	3	4	12											
104	Saratoga L	9/16/1995	epi	15	20	4	2	1	136											
104	Saratoga L	10/14/1995	epi	12	17	3	2	1	13											
104	Saratoga L	6/16/1996	epi	22		1	2	1	6											
104	Saratoga L	7/7/1996	epi	29	25	3	2	1	6											
104	Saratoga L	7/20/1996	epi	20		2	1	1	5											
104	Saratoga L	8/2/1996	epi	26		2	1	2												
104	Saratoga L	8/17/1996	epi	17		2	1	1												
104	Saratoga L	9/2/1996	epi	25	22	2	3	2	2											
104	Saratoga L	9/15/1996	epi	22	20	2	1	2	5											
104	Saratoga L	10/1/1996	epi	15	16	3	2	4	5											
104	Saratoga L	6/20/1997	epi	21	19	1	4	2	2											
104	Saratoga L	6/28/1997	epi	20	23	1	2	1	6											
104	Saratoga L	7/12/1997	epi	23	23	1	2	1	6											
104	Saratoga L	7/26/1997	epi	22	23	1	2	1	6											
104	Saratoga L	8/9/1997	epi	30	25	3	2	1	6											
104	Saratoga L	8/30/1997	epi	25	28	1	2	1	6											
104	Saratoga L	9/30/1997	epi	22	28	2	2	1	6											
104	Saratoga L	06/25/05	epi	39	24	1	1	1	0											
104	Saratoga L	07/11/05	epi	32	26	2	1	1	0											
104	Saratoga L	07/18/05	epi	30	26	2	1	2	1											
104	Saratoga L	07/31/05	epi	26	27	2	1	2	8											
104	Saratoga L	08/07/05	epi	24	27	2	1	1	0											
104	Saratoga L	08/23/05	epi	23		1	2	2	6											
104	Saratoga L	09/12/05	epi	30	23	3	1	3	13											
104	Saratoga L	09/24/05	epi	27		3	1	2	13											
104	Saratoga L	6/15/2006	epi	27	19	1	1	2	5											
104	Saratoga L	7/4/2006	epi	25	24															
104	Saratoga L	7/17/2006	epi	33	28	2	1	2	5											
104	Saratoga L	7/31/2006	epi	32	28	2	1	1	0											
104	Saratoga L	8/16/2006	epi	31	25	2	1	1	0											
104	Saratoga L	9/6/2006	epi	20	22	3	1	2	3											
104	Saratoga L	9/18/2006	epi	23	21	2	1	2	0											
104	Saratoga L	10/4/2006	epi	22	19	2	1	2	0											
104	Saratoga L	6/27/2007	epi	35	26	2	1	2	25											
104	Saratoga L	7/16/2007	epi	29	25	2	1	2	8											
104	Saratoga L	7/21/2007	epi	26	25	2	1	1	8											
104	Saratoga L	8/1/2007	epi	30	29	2	1	1	8											

LNum	PName	Date	Site	TAir	TH20	QA	QB	QC	QD	QF	QG	AQ-PC	AQ-Chla	MC-LR	Ana-a	Cylin	FP-Chl	FP-BG	HAB form	Shore HAB
104	Saratoga L	8/12/2007	epi	32	26	2	1	1	5											
104	Saratoga L	8/24/2007	epi	27	23	2	1	2	5											
104	Saratoga L	9/8/2007	epi	28	24	2	1	3	5											
104	Saratoga L	9/17/2007	epi	20	21	2	1	2	5											
104	Saratoga L	6/12/2008	epi	25	27	2	3	1	2											
104	Saratoga L	6/21/2008	epi	25	23	2	1	1	5											
104	Saratoga L	7/7/2008	epi	34	28	2	1	1	0											
104	Saratoga L	7/21/2008	epi	24	26	2	1	4	5											
104	Saratoga L	8/6/2008	epi	26	25	2	1	2	5											
104	Saratoga L	8/20/2008	epi	23	25	2	1	1	0											
104	Saratoga L	9/11/2008	epi	23	24	2	1	1	0											
104	Saratoga L	9/17/2008	epi	18	28	2	1	3	5											
104	Saratoga L	06/29/2009	epi	25	24	1	1	2	5											
104	Saratoga L	07/06/2009	epi	26	24	2	3	2	0											
104	Saratoga L	07/17/2009	epi	26	23	2	1	2	0											
104	Saratoga L	07/27/2009	epi	29	25	2	2	2	5											
104	Saratoga L	08/09/2009	epi	22	24	2	1	4	5											
104	Saratoga L	08/24/2009	epi	30	27	1	1	1	0					0.22						
104	Saratoga L	09/14/2009	epi	25	22	2	3	2	0			40.51								
104	Saratoga L	09/21/2009	epi			2	1	3	5					0.07						
104	Saratoga L	10/03/2009	epi	20	17	2	1	4	5			21.4		0.05						
104	Saratoga L	6/14/2010	epi	25	21	1	1	2	5											
104	Saratoga L	7/5/2010	epi	32	26	2	3	2	0											
104	Saratoga L	7/30/2010	epi	22		2	1	2	0			40.00		0.20						
104	Saratoga L	8/9/2010	epi	31	26	2	2	2	5											
104	Saratoga L	8/19/2010	epi	26	26	2	1	4	5											
104	Saratoga L	8/29/2010	epi	26	24	1	1	1	0											
104	Saratoga L	9/10/2010	epi	22	22	2	3	2	0			380.00		0.49						
104	Saratoga L	10/11/2010	epi	20	16							27.00		0.26						
104	Saratoga L	10/13/2010	epi			2	1	3	5			583.00		3.74						
104	Saratoga L	6/7/2011	epi	32	25	2	1	4	5	5	5	7.00	2.40							
104	Saratoga L	6/21/2011	epi	32	25	3	1	1	0	5	5	16.40	3.90							
104	Saratoga L	7/15/2011	epi	30	27	2	1	2	5	5	5	7.40	3.40							
104	Saratoga L	8/2/2011	epi	30	29					5	4	156.70	2.80							
104	Saratoga L	8/23/2011	epi	27	24	2	1	1	0	45	5	91.20	4.00							
104	Saratoga L	8/23/2011	epi			1	1	1	0	5	5									
104	Saratoga L	9/23/2011	epi	23	21	2	1	2	0	0	0	34.50	4.80							
104	Saratoga L	10/4/2011	epi	18	18	2	1	2	5	0	0	57.40	4.40							
104	Saratoga L	10/18/2011	epi	19	17							30.30	4.50							
104	Saratoga L	6/30/2013	epi	22	24	2	1	2	0	0	0	5.10	1.10	<0.30	<0.650		1.50	1.00	I	
104	Saratoga L	7/12/2013	epi	25	25	2	1	2	0	0	0	9.00	1.60	<0.30	<0.380		1.70	0.60	I	
104	Saratoga L	7/26/2013	epi	21	25	2	1	2	0	0	5	10.80	1.90	<0.30	<0.380		4.40	3.20	I	
104	Saratoga L	8/8/2013	epi	27	25	1	4	2	2	0	0	10.50	2.10	<0.30	<0.390		3.20	0.60		
104	Saratoga L	8/30/2013	epi	29	26	2	2	2	0	0	5			<0.30	<1.100		2.70	0.90		
104	Saratoga L	9/6/2013	epi	21	24	3	1	2	0	0	0	20.30	1.90	0.62	<19.130		9.20	7.30	F	
104	Saratoga L	7/27/2013	epi											<0.60	<0.760		27.10	13.90		
104	Saratoga L	9/6/2013	epi											1.63	<38.260		5.40	3.20		
104	Saratoga L	9/11/2013	epi											220.39	<38.260		1426	1213		
104	Saratoga L	9/11/2013	epi	30	24	2	1	2	3	4	0	50.90	2.30	2.06	<19.130		12.40	9.50	B	D
104	Saratoga L	9/20/2013	epi	19	21	2	3	1	0	0	0			<0.30	<0.100		1.90	0.50	D	I
104	Saratoga L	6/15/2015	epi	22	23	1	1	1	0	0	0	50.90	2.30	2.06	<19.130		12.40	9.50	B	D
104	Saratoga L	6/29/2015	epi	24	20	1	1	2	0					<0.30	<0.100		1.90	0.50	D	I
104	Saratoga L	7/16/2015	epi	23	21	2	1	2	8	5	0			<0.65	<0.004	<0.001	1.34	0.00		
104	Saratoga L	7/28/2015	epi	32	28	2	2	2	0	0	0			<0.41	<0.010	<0.000	1.99	0.01		
104	Saratoga L	8/10/2015	epi	28	26	2	2	1	0	0	0			<0.36	<0.009	<0.049	1.49	0.00		
104	Saratoga L	8/24/2015	epi	30	26	2	2	2	0	0	0			<0.25	<0.002	<0.014	1.34	0.00		
104	Saratoga L	9/8/2015	epi	33	26	2	2	2	0	0	0	6.60	0.50	<1.13	<0.002	<0.014	2.62	0.47	D	
104	Saratoga L	7/16/2015	bloom									11.70	0.90	<0.21	<0.003	<0.010	3.05	1.10	BD	D
104	Saratoga L	7/28/2015	bloom											<0.39	<0.004	<0.012	3.78	2.02	D	D
104	Saratoga L	8/10/2015	bloom											389.38	<0.019	<0.098	1037	966		
104	Saratoga L	8/24/2015	bloom											<0.60	<0.004	<0.028	8.38	4.48		

LNum	PName	Date	Site	TAir	TH20	QA	QB	QC	QD	QF	QG	AQ-PC	AQ-Chla	MC-LR	Ana-a	Cylin	FP-Chl	FP-BG	HAB form	Shore HAB
104	Saratoga L	9/8/2015	bloom											<2.26	<0.007	<0.025	1.88	0.75		
104	Saratoga L	9/21/2015	bloom											15.03	<0.017	<0.042	379.53	295.85		
104	Saratoga L	9/21/2015	epi	21	22	2	2	2	0	0	0			<0.54	<0.008	<0.024	30.76	2.88		
104	Saratoga L	06/25/05	hypo		11															
104	Saratoga L	07/11/05	hypo		7															
104	Saratoga L	07/18/05	hypo		7															
104	Saratoga L	08/23/05	hypo		7															
104	Saratoga L	6/30/2013	hypo		8															
104	Saratoga L	7/12/2013	hypo		9															
104	Saratoga L	7/26/2013	hypo		9															
104	Saratoga L	8/8/2013	hypo		8															
104	Saratoga L	8/30/2013	hypo		8															
104	Saratoga L	9/6/2013	hypo		9															
104	Saratoga L	9/11/2013	hypo		8															
104	Saratoga L	9/20/2013	hypo		8															
104	Saratoga L	6/15/2015	hypo																	
104	Saratoga L	6/29/2015	hypo		12															
104	Saratoga L	7/16/2015	hypo		13															
104	Saratoga L	7/28/2015	hypo		14															
104	Saratoga L	8/10/2015	hypo		12															
104	Saratoga L	8/24/2015	hypo		15															
104	Saratoga L	9/8/2015	hypo		14															
104	Saratoga L	9/21/2015	hypo		15															

Legend Information

<i>Indicator</i>	<i>Description</i>	<i>Detection Limit</i>	<i>Standard (S) / Criteria (C)</i>
General Information			
Lnum	lake number (unique to CSLAP)		
Lname	name of lake (as it appears in the Gazetteer of NYS Lakes)		
Date	sampling date		
Field Parameters			
Zbot	lake depth at sampling point, meters (m)		
Zsd	Secchi disk transparency or clarity	0.1m	1.2m (C)
Zsamp	water sample depth (m) (epi = epilimnion or surface; bot = bottom)	0.1m	none
Tair	air temperature (C)	-10C	none
TH20	water temperature (C)	-10C	none
Laboratory Parameters			
Tot.P	total phosphorus (mg/l)	0.003 mg/l	0.020 mg/l (C)
NOx	nitrate + nitrite (mg/l)	0.01 mg/l	10 mg/l NO3 (S), 2 mg/l NO2 (S)
NH4	total ammonia (mg/l)	0.01 mg/l	2 mg/l NH4 (S)
TN	total nitrogen (mg/l)	0.01 mg/l	none
TN/TP	nitrogen to phosphorus (molar) ratio, = (TKN + NOx)*2.2/TP		none
TCOLOR	true (filtered) color (ptu, platinum color units)	1 ptu	none
pH	powers of hydrogen (S.U., standard pH units)	0.1 S.U.	6.5, 8.5 S.U. (S)
Cond25	specific conductance, corrected to 25C (umho/cm)	1 umho/cm	none
Ca, Cl	calcium, chloride (mg/l)	1 mg/l	none
Chl.a	chlorophyll a (ug/l)	0.01 ug/l	none
Fe	iron (mg/l)	0.1 mg/l	1.0 mg/l (S)
Mn	manganese (mg/l)	0.01 mg/l	0.3 mg/l (S)
As	arsenic (ug/l)	1 ug/l	10 ug/l (S)
AQ-PC	Phycocyanin (aquafior) (unitless)	1 unit	none
AQ-Chl	Chlorophyll a (aquafior) (ug/l)	1 ug/l	none
MC-LR	Microcystis-LR (ug/l)	0.01 ug/l	1 ug/l potable (C) 20 ug/l swimming (C)
Ana	Anatoxin-a (ug/l)	variable	none
Cyl	Cylindrospermopsis (ug/l)	0.1 ug/l	none
FP-Chl, FP-BG	Fluoroprobe total chlorophyll, fluoroprobe blue-green chlorophyll (ug/l)	0.1 ug/l	none
Lake Assessment			
QA	water quality assessment; 1 = crystal clear, 2 = not quite crystal clear, 3 = definite algae greenness, 4 = high algae levels, 5 = severely high algae levels		
QB	aquatic plant assessment; 1 = no plants visible, 2 = plants below surface, 3 = plants at surface, 4 = plants dense at surface, 5 = surface plant coverage		
QC	recreational assessment; 1 = could not be nicer, 2 = excellent, 3 = slightly impaired, 4 = substantially impaired, 5 = lake not usable		
QD	reasons for recreational assessment; 1 = poor water clarity, 2 = excessive weeds, 3 = too much algae, 4 = lake looks bad, 5 = poor weather, 6 = litter/surface debris, 7 = too many lake users, 8 = other		
QF, QG	Health and safety issues today (QF) and past week (QG); 0 = none, 1 = taste/odor, 2 = GI illness humans/animals, 3 = swimmers itch, 4 = algae blooms, 5 = dead fish, 6 = unusual animals, 7 = other		
HAB form, Shore HAB	HAB evaluation; A = spilled paint, B = pea soup, C = streaks, D = green dots, E = bubbling scum, F = green/brown tint, G = duckweed, H = other, I = no bloom		

Appendix B- Priority Waterbody Listing for Saratoga Lake

Saratoga Lake (1101-0012)

Minor Impacts

Waterbody Location Information

Revised: 12/06/2006

Water Index No: H-299-P27
Hydro Unit Code: 02020003/090 **Str Class:** A
Waterbody Type: Lake
Waterbody Size: 4031.9 Acres
Seg Description: entire lake

Drain Basin: Upper Hudson River
Upper Hudson-Hoosic
Reg/County: 5/Saratoga Co. (46)
Quad Map: QUAKER SPRINGS (I-26-4)

Water Quality Problem/Issue Information (CAPS indicate MAJOR Use Impacts/Pollutants/Sources)

Use(s) Impacted	Severity	Problem Documentation
Recreation	Stressed	Known
Habitat/Hydrology	Stressed	Known

Type of Pollutant(s)

Known: ALGAL/WEED GROWTH, PROBLEM SPECIES (Eurasian milfoil)
Suspected: Nutrients (phosphorus)
Possible: - - -

Source(s) of Pollutant(s)

Known: HABITAT MODIFICATION
Suspected: Urban Runoff
Possible: Agriculture

Resolution/Management Information

Issue Resolvability: 3 (Strategy Being Implemented)
Verification Status: 5 (Management Strategy has been Developed)
Lead Agency/Office: ext/WQCC
TMDL/303d Status: n/a ()

Resolution Potential: Medium

Further Details

Recreational uses (swimming, fishing, boating) in Saratoga Lake are known to experience minor impacts to water quality due to aquatic weed growth, including invasives (Eurasian milfoil). Slightly elevated nutrient (phosphorus) levels and algal readings have also be noted in this mesoeutrophic lake. The primary source of these impacts are habitat modification (related to the invasive species) and nonpoint runoff of nutrients and sediment from the lake watershed. The current assessment is that uses continue to be fully supported in the lake, in spite of minor impacts.

Saratoga Lake has been sampled as part of the NYSDEC Citizen Statewide Lake Assessment Program (CSLAP) beginning in 1988 and has continued through 2005. An Interpretive Summary report of the findings of this sampling was published in 2006. These data indicate that the lake continues to be best characterized as meso-eutrophic, or moderately to highly productive. Phosphorus levels in the lake suggest a highly productive lake, while clarity and algae measurements indicate moderate productivity. Levels of total phosphorus in the shallow water zones of the lake have decreased ove the last 20 years, and internal recycling of phosphorus has become a more significant factor in the annual phosphorus cycle. More recent (and future) water transparency and algae levels be be influenced by zebra mussels, which have been documented in the lake. (DEC/DOW, BWAM/CSLAP, May 2006)

Public perception of the lake and its uses is also evaluated as part of the CSLAP program. These assessment also show the lake to be supportive of recreational uses, with the lake most often described as "could not be nicer" to "excellent" for most uses. Algae is cited more often than nuisance weed growth as having an impact on recreational uses, but this is likely due to an aggressive aquatic plant management program in the lake. (DEC/DOW, BWAM/CSLAP, February 2006)

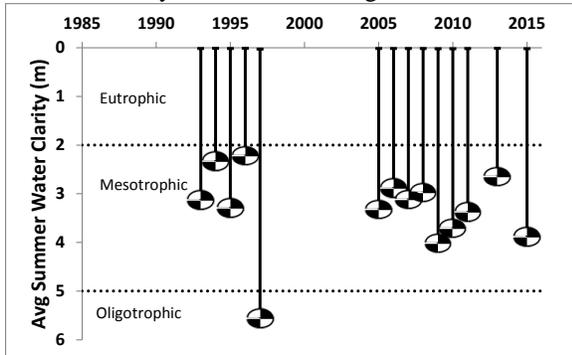
Higher aquatic plant populations in some areas of the lake are managed by mechanical harvesting. Experimental projects associated with the use of aquatic herbicides (Fluridone) and herbivorous aquatic insects have been conducted in recent years. A Long-Term Aquatic Vegetation Management Plan was prepared for the lake in 2004 by the Saratoga Lake Protection and Improvement District. The plan characterizes the scope of the impacts and proposes that a program integrating lake drawdown, mechanical harvesting of weeds and herbicide treatments is needed in order to achieve significant improvements in the management of nuisance weed growth in the lake. Winter drawdowns and harvesting are currently being conducted; a proposal to treat the entire lake with an herbicide is currently under consideration. (Saratoga Lake Long-Term Aquatic Vegetation Management Plan, Saratoga Lake Protection and Improvement District, 2004)

There is currently a proposal by the City of Saratoga Springs to use the lake as a public water supply. An initial Environmental Impact Statement was prepared. A number of issues were identified through the SEQR process and those are being addressed in the EIS. As of now, the permit application for this proposal is incomplete. (DEC/DOW, Reg 5, December 2006)

Appendix C- Long Term Trends: Saratoga Lake

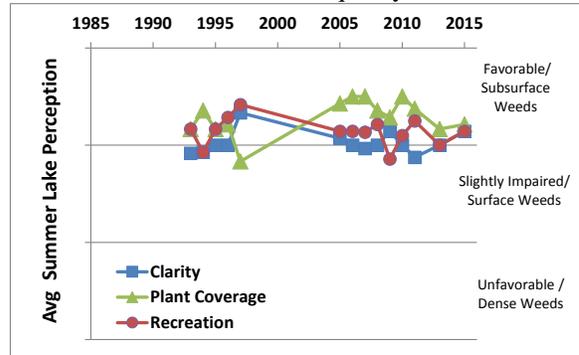
Long Term Trends: Water Clarity

- No trends apparent; mostly higher 2015
- Most readings typical of *mesotrophic* lakes, mostly consistent with algae and TP levels



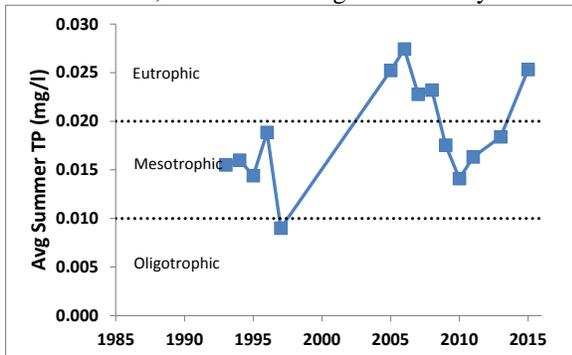
Long Term Trends: Lake Perception

- Rec assessments variable/mostly favorable
- Small changes in recreational perception more linked to water quality than weeds



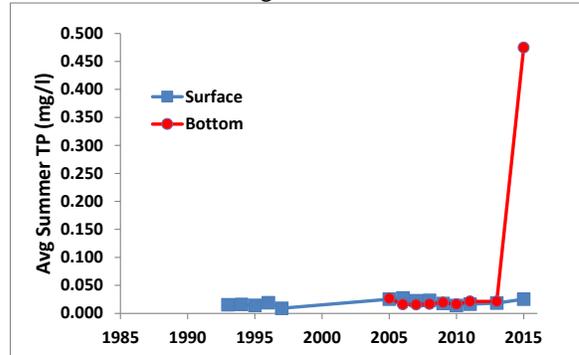
Long Term Trends: Phosphorus

- Significant variability; recent increase
- Most readings typical of *mesoeutrophic* lakes, consistent w/ algae and clarity levels



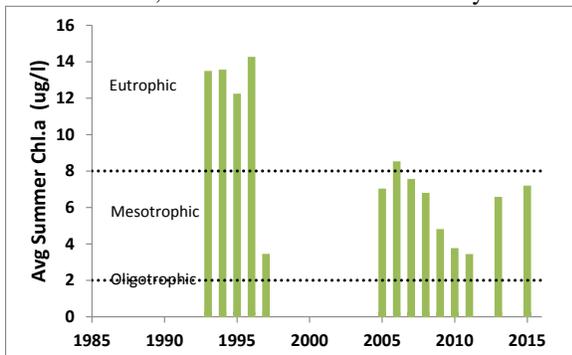
Long Term Trends: Bottom Phosphorus

- Much higher deep TP 2015 may be error
- Deepwater TP data suggests little internal nutrient loading from bottom sediments



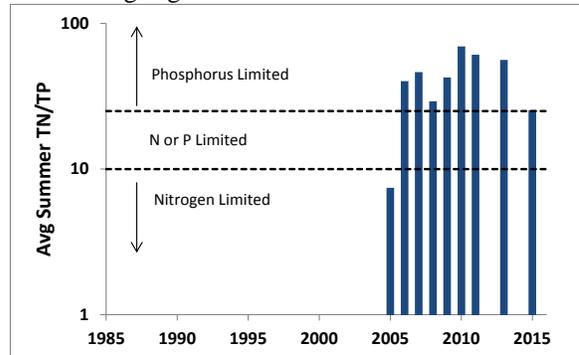
Long Term Trends: Chlorophyll a

- Algae levels decreased 06-'11, ↑ '13, '15
- Most readings typical of *mesoeutrophic* lakes, consistent with TP and clarity



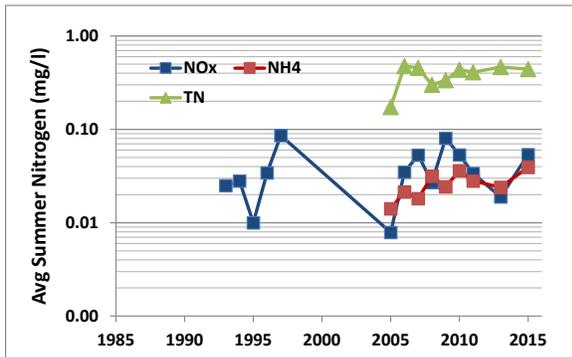
Long Term Trends: N:P Ratio

- No trends yet apparent
- Most readings indicate phosphorus limits algae growth



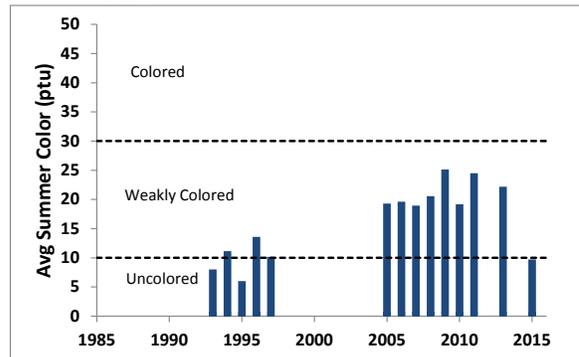
Long Term Trends: Nitrogen

- ↑ TN, NH₄; NO_x variable
- Mostly low NO_x, ammonia and TN



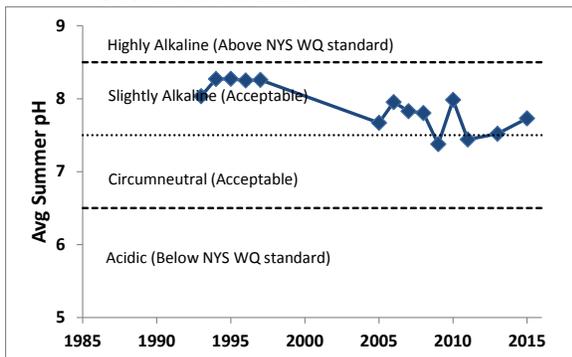
Long Term Trends: Color

- No trends apparent; higher > '02 lab change
- Most readings typical of *weakly colored* lakes



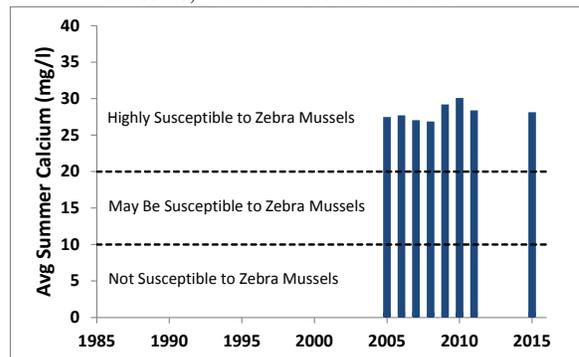
Long Term Trends: pH

- Decreasing since mid-1990s
- Most readings typical of *slightly alkaline* to *circumneutral* lakes



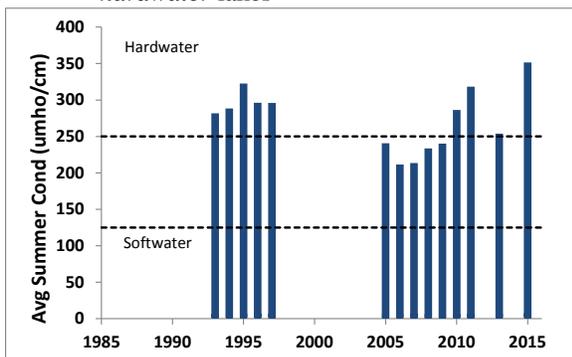
Long Term Trends: Calcium

- No trends yet apparent
- Data indicates high susceptibility to zebra mussels, which are found in lake



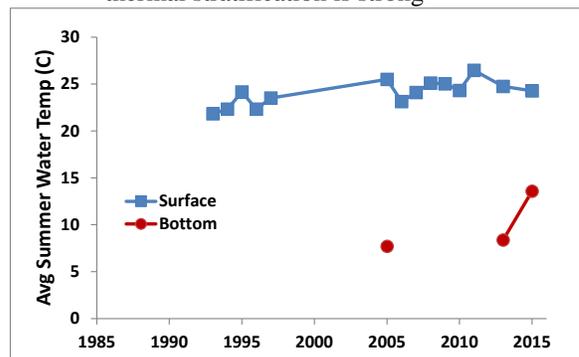
Long Term Trends: Conductivity

- ↑ last decade after drop from previous yrs
- Most readings typical of *moderate* to *hardwater* lakes



Long Term Trends: Water Temperature

- Water temperatures increasing slightly
- Deepwater temperatures demonstrate that thermal stratification is strong



Appendix D: Algae Testing Results from SUNY ESF Study

Most algae are harmless, naturally present, and an important part of the food web. However excessive algae growth can cause health, recreational, and aesthetic problems. Some algae can produce toxins that can be harmful to people and animals. High quantities of these algae are called harmful algal blooms (HABs). CSLAP lakes have been sampled for a variety of HAB indicators since 2008. This was completed on selected lakes as part of a NYS DOH study from 2008-2010. In 2011, enhanced sampling on all CSLAP lakes was initiated through an EPA-funded project that has continued through the current sampling season. This study has evaluated a number of HAB indicators as follows:

- Algae types - blue green, green, diatoms, and "other"
- Algae densities
- Microscopic analysis of bloom samples
- Algal toxin analysis

Some of these results are reported in other portions of these reports. This appendix the seasonal change in blue green algae, other algae types, and the primary algal toxin (microcystin-LR, a liver toxin). Analysis was completed on open water samples and, for some lakes, shoreline samples that were collected when visual evidence of blooms were apparent. Results are compared to the DEC criteria of 25-30 ug/l blue green chlorophyll a and 20 ug/l microcystin-LR (based on the World Health Organization (WHO) threshold for unsafe swimming conditions) and the WHO provisional criteria for long-term protection of treated water supplies (= 1 ug/l microcystin-LR). The data for algae types are drawn from a high end fluorometer used by SUNY ESF. While these results are useful for timely approximation of lake conditions, they are not as accurate as the total chlorophyll results measured as a regular part of CSLAP since 1986 in all open water samples. Therefore these results are used judiciously in the assessment of sampled waterbodies.

Two separate samples are evaluated. A sample is taken at the CSLAP sample point at the deepest point of the lake at every sample session. In addition, shoreline samples can be taken when a bloom is visible. It should be noted that shoreline conditions can vary significantly over time and from one location to another. The shoreline bloom sampling results summarized below are not collected as routinely as open water samples, and therefore represent snapshots in time. It is assumed that sampling results showing high blue green algae and/or toxin levels indicate that algae blooms may be common and/or widespread on these lakes. However, the absence of elevated blue green algae and toxin levels does not assure the lack of shoreline blooms on these lakes. Elevated open water readings may indicate a higher likelihood of shoreline blooms, but in some lakes, these shoreline blooms have not been (well) documented.

The results from these samples are summarized within the CSLAP report for the lake.

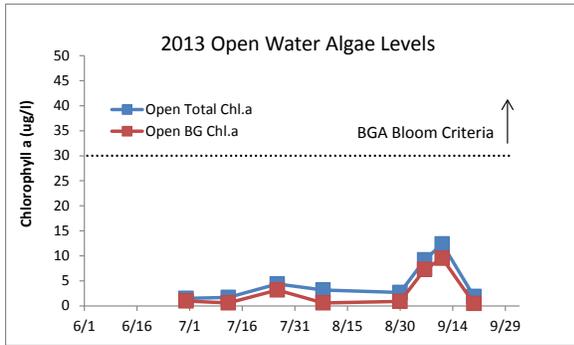


Figure D1:
2013 Open Water Total and BGA Chl.a

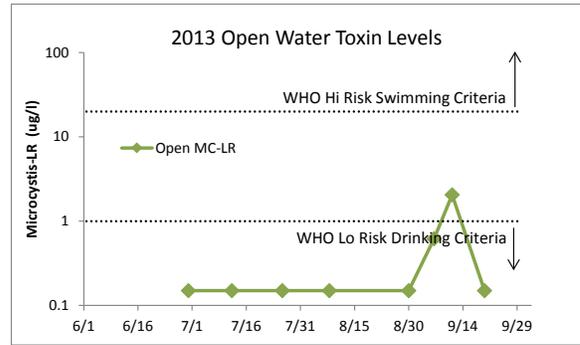


Figure D2:
2013 Open Water Microcystin-LR

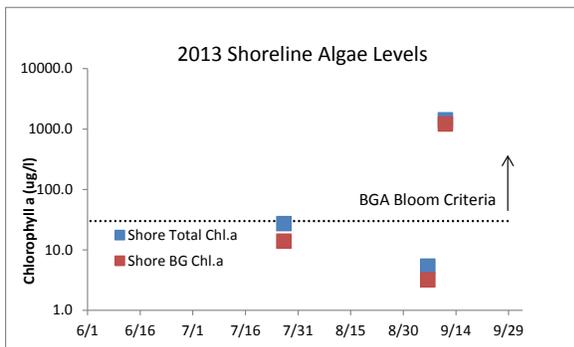


Figure D3:
2013 Shoreline Total and BGA Chl.a

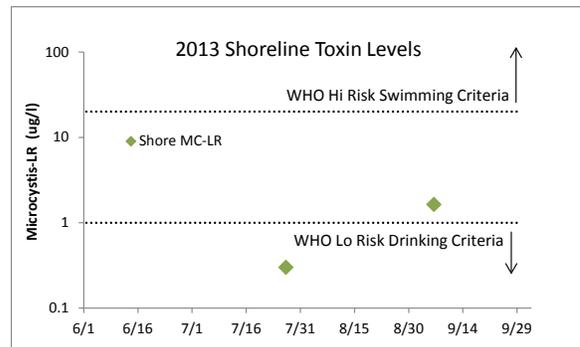


Figure D4:
2013 Shoreline Microcystin-LR

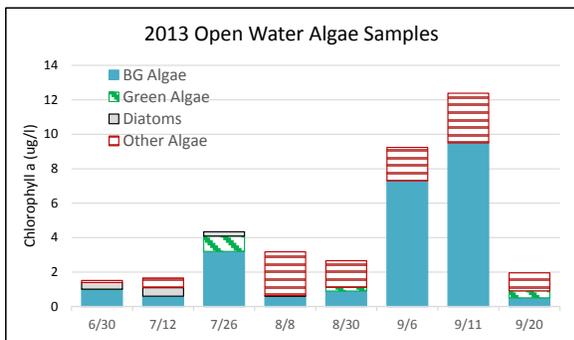


Figure D5:
2013 Open Water Algae Types

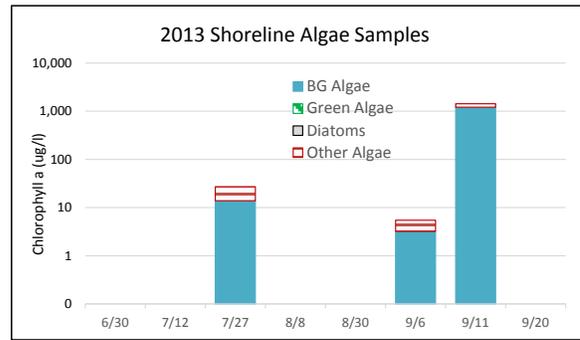


Figure D6:
2013 Shoreline Algae Types

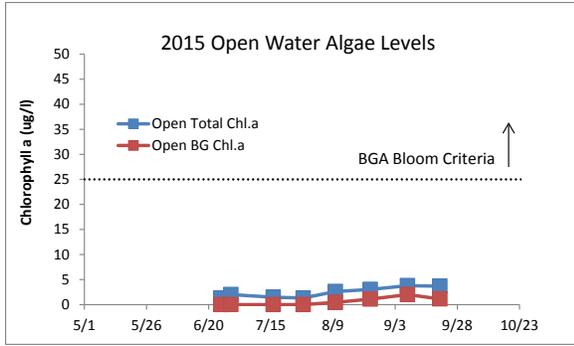


Figure D7:
2015 Open Water Total and BGA Chl.a

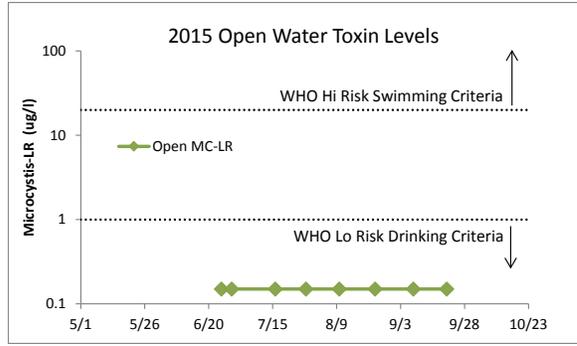


Figure D8:
2015 Open Water Microcystin-LR

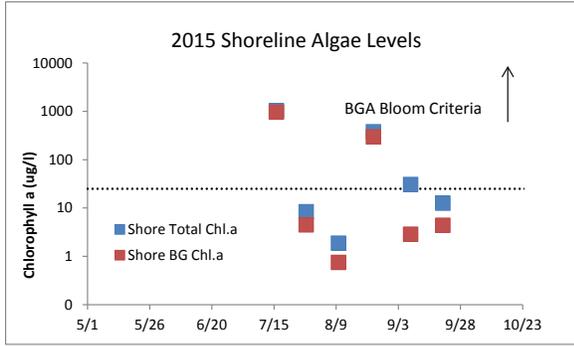


Figure D9:
2015 Shoreline Total and BGA Chl.a

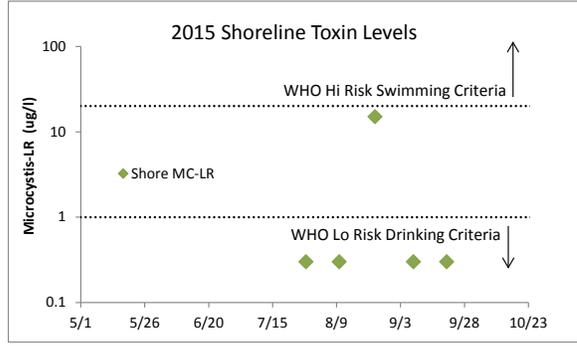


Figure D10:
2015 Shoreline Microcystin-LR

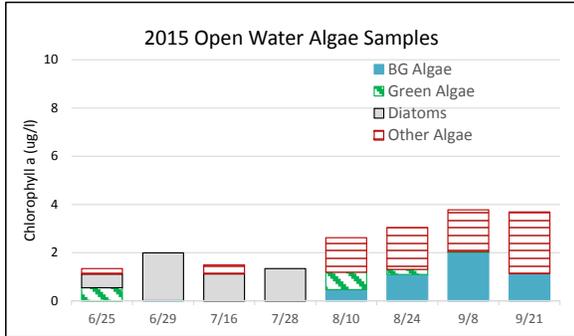


Figure D11:
2015 Open Water Algae Types

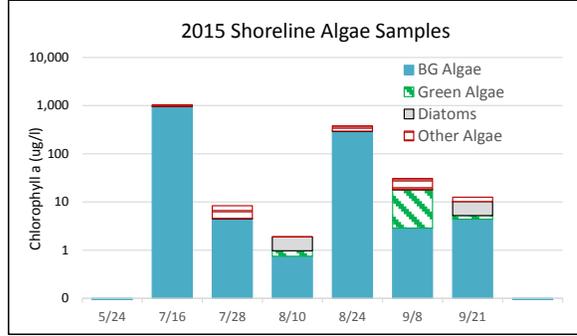


Figure D12:
2015 Shoreline Algae Types

Appendix E: AIS Species in Saratoga County

The table below shows the invasive aquatic plants and animals that have been documented in Saratoga County, as cited in either the iMapInvasives database (<http://www.imapinvasives.org/>) or in the NYSDEC Division of Water database. These databases may include some, but not all, non-native plants or animals that have not been identified as “Prohibited and Regulated Invasive Species” in New York state regulations (6 NYCRR Part 575; http://www.dec.ny.gov/docs/lands_forests_pdf/islist.pdf).

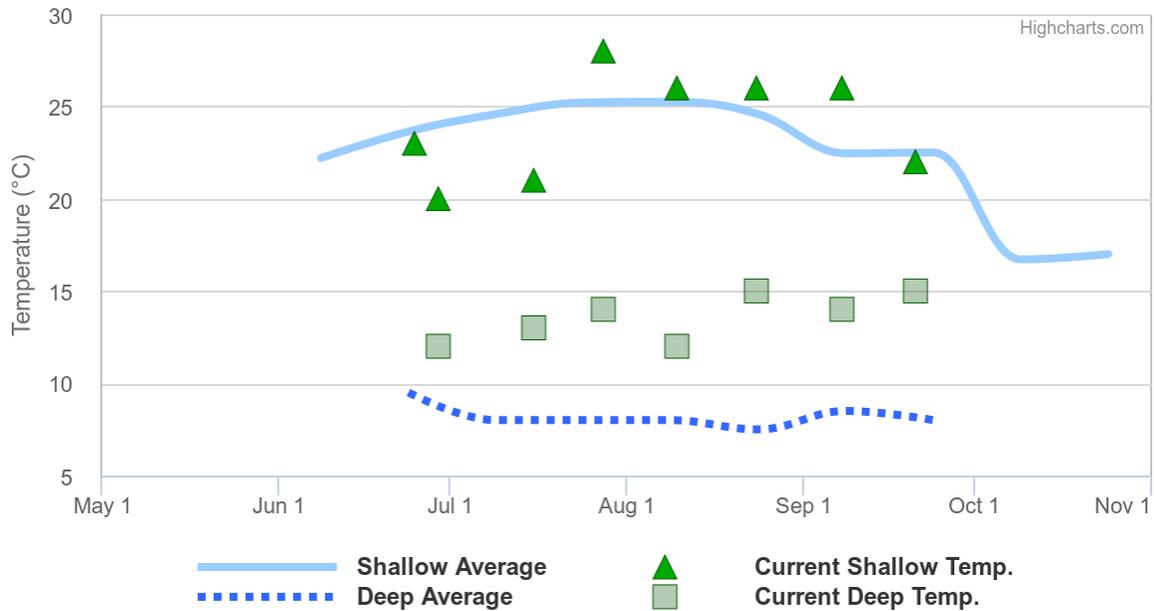
This list is not complete, but instead represents only those species that have been reported and verified within the county. If any additional aquatic invasive species (AIS) are known or suspected in these or other waterbodies in the county, this information should be reported through iMap invasives or by contacting NYSDEC at dowinfo@dec.ny.gov.

Aquatic Invasive Species – Saratoga County			
Waterbody	Kingdom	Common name	Scientific name
Anthony Kill	Plant	Water chestnut	<i>Trapa natans</i>
Ballston Lake	Animal	Zebra mussel	<i>Dreissena polymorpha</i>
Ballston Lake	Plant	Eurasian watermilfoil	<i>Myriophyllum spicatum</i>
Ballston Lake	Plant	Water chestnut	<i>Trapa natans</i>
Efner Lake	Plant	Fanwort	<i>Cabomba caroliniana</i>
Galway Lake	Plant	Eurasian watermilfoil	<i>Myriophyllum spicatum</i>
Galway Lake	Plant	Brittle naiad	<i>Najas minor</i>
Galway Lake	Plant	Water chestnut	<i>Trapa natans</i>
Great Sacandaga Lake	Animal	Spiny waterflea	<i>Bythotrephes longimanus</i>
Great Sacandaga Lake	Plant	Eurasian watermilfoil	<i>Myriophyllum spicatum</i>
Hudson River- Schuylerville	Plant	Eurasian watermilfoil	<i>Myriophyllum spicatum</i>
Hudson River- Schuylerville	Plant	Water chestnut	<i>Trapa natans</i>
Hunt Lake	Plant	Fanwort	<i>Cabomba caroliniana</i>
Jenny Lake	Plant	Fanwort	<i>Cabomba caroliniana</i>
Little Round Lake	Plant	Eurasian watermilfoil	<i>Myriophyllum spicatum</i>
Little Round Lake	Plant	Brittle naiad	<i>Najas minor</i>
Little Round Lake	Plant	Water chestnut	<i>Trapa natans</i>
Mill Pond	Plant	Fanwort	<i>Cabomba caroliniana</i>
Moreau Lake	Plant	Eurasian watermilfoil	<i>Myriophyllum spicatum</i>
Round Lake	Plant	Eurasian watermilfoil	<i>Myriophyllum spicatum</i>
Round Lake	Plant	Brittle naiad	<i>Najas minor</i>
Round Lake	Plant	Water chestnut	<i>Trapa natans</i>
Saratoga Lake	Animal	Goldfish	<i>Carassius auratus</i>
Saratoga Lake	Animal	Common carp	<i>Cyprinus carpio</i>

Waterbody	Kingdom	Common name	Scientific name
Saratoga Lake	Animal	Zebra mussel	<i>Dreissena polymorpha</i>
Saratoga Lake	Plant	Eurasian watermilfoil	<i>Myriophyllum spicatum</i>
Saratoga Lake	Plant	Curly leafed pondweed	<i>Potamogeton crispus</i>
Saratoga Lake	Plant	Water chestnut	<i>Trapa natans</i>
Stoney Creek Reservoir	Plant	Eurasian watermilfoil	<i>Myriophyllum spicatum</i>
Stoney Creek Reservoir	Plant	Water chestnut	<i>Trapa natans</i>
Van Patten's Pond	Plant	Water chestnut	<i>Trapa natans</i>
Woodland Lake	Plant	Curly leafed pondweed	<i>Potamogeton crispus</i>

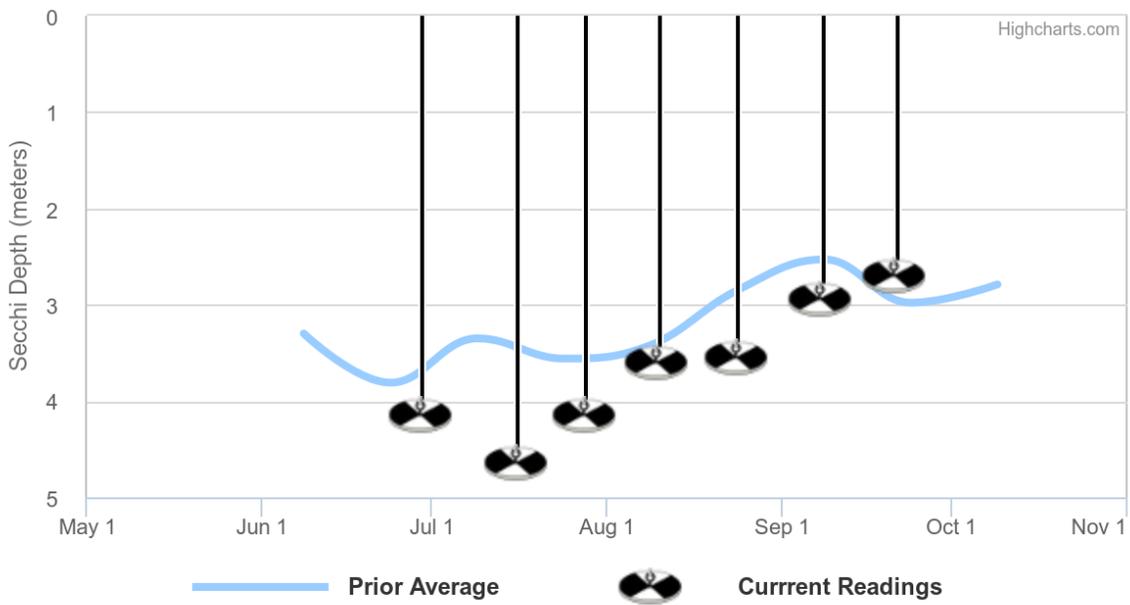
Appendix F: Current Year vs. Prior Averages for Saratoga Lake

Current Year Water Temperatures vs. Prior Average



This year's shallow water sample temperatures are about the same as the average of readings collected from 1993 to 2013. There are not enough deep water sample temperatures to determine a trend for the current year when compared to the average of readings collected from 2005 to 2013.

Current Year Secchi Readings vs. Prior Average



This year's session Secchi readings are about the same as the average of readings collected from 1993 to 2013

Appendix G: Watershed and Land Use Map for Saratoga Lake

This watershed and land use map was developed using USGS StreamStats and ESRI ArcGIS using the 2006 land use satellite imagery. The actual watershed map and present land uses within this watershed may be slightly different due to the age of the underlying data and some limits to the use of these tools in some geographic regions and under varying flow conditions. However, these maps are intended to show the approximate extent of the lake drainage basin and the major land uses found within the boundaries of the basin.

