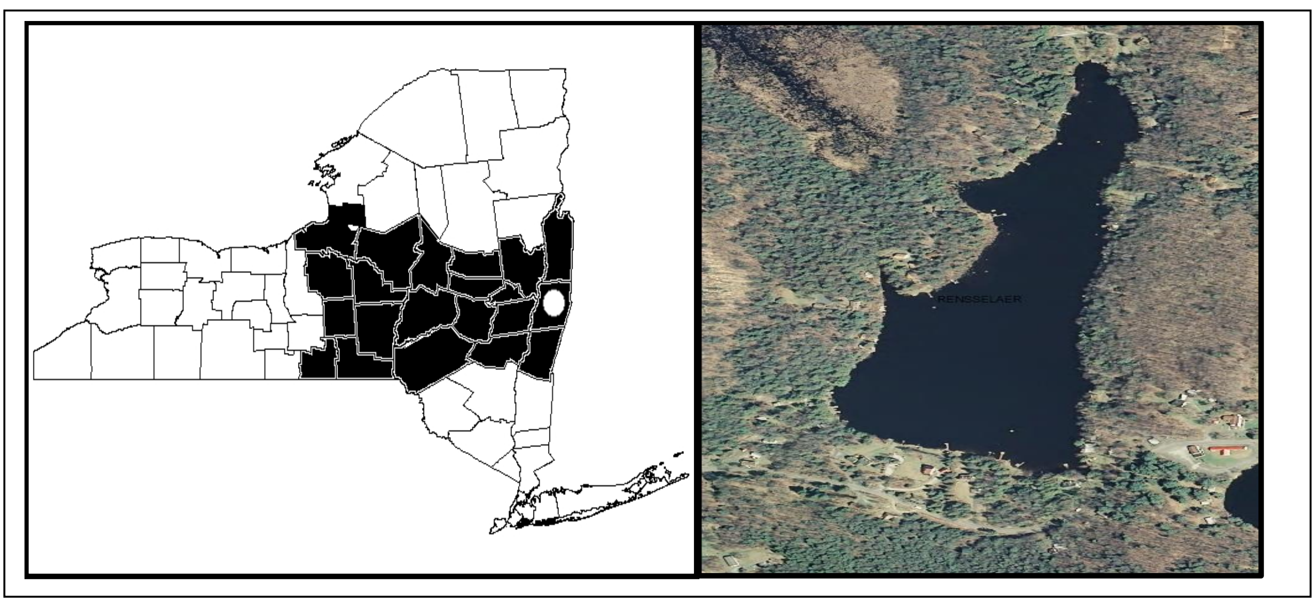
CSLAP 2014 Lake Water Quality Summary:
Big Bowman Lake

General Lake Information

Location	Town of Sand Lake
County	Rensselaer
Basin	Lower Hudson River
Size	13.0 hectares (32 acres)
Lake Origins	Natural?
Watershed Area	235 hectares (580 acres)
Retention Time	0.4 years (estimated)
Mean Depth	4.5 meters (estimated)
Sounding Depth	9.6 meters
Public Access?	none
Major Tributaries	Unnamed ephemeral inlet
Lake Tributary To…	Unnamed outlet to Poesten Kill to (Lower) Hudson River
WQ Classification	B (contact recreation = swimming)
Lake Outlet Latitude	42.650437
Lake Outlet Longitude	- 73.488622
Sampling Years	2013-2014
2014 Samplers	Matt LaFleur, John Walsh, Bruce Sowalski
Main Contact	Bruce Sowalski

Lake Map



Background

Big Bowman Lake is a 32 acre, class B lake found in the Town of Sand Lake in Rensselaer County, just east of the Capital District region of New York State. It was first sampled as part of CSLAP in 2013.

It is one of 11 CSLAP lakes among the more than 55 lakes found in Rensselaer County, and one of 67 CSLAP lakes among the more than 350 lakes and ponds in the Lower Hudson River drainage basin

Lake Uses

Big Bowman Lake is a Class B lake; this means that the best intended use for the lake is for contact recreation—swimming and bathing, non-contact recreation—boating and fishing; aesthetics and aquatic life. Motorized boating is prohibited, as per a 1998 ordinance passed by the town of Sand Lake, consistent with a long-standing informal policy on the lake and in support of swimming and other passive uses of the lake. There is a very small (2 feet long by 0.5 foot high) dam on the west side of the lake. There is no public access to the lake.

It is not known by the report authors if Big Bowman Lake has been stocked as part of any private stocking efforts. It is not stocked by the state of New York.

General statewide fishing regulations are applicable in Big Bowman Lake.

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

Historical Water Quality Data

CSLAP sampling was conducted on Big Bowman Lake for the first time in 2013. The CSLAP reports for the lake can be found on the NYSFOLA website at http://nysfola.mylaketown.com, and the NYSDEC web page at http://www.dec.ny.gov/lands/77846.html.

The lake was sampled as part of the Biological Survey of the Lower Hudson River by the state Conservation Department (predecessor to the NYSDEC) on August 29th, 1934. At that time, the lake was weakly stratified, with an oxygen deficit near the bottom. Water clarity (15 feet) was substantially higher than that measured in CSLAP in 2013. The lake was described as having "abundant vegetation", although specific plant species in the lake were not identified. Bullhead catfish, chain pickerel, common sunfish, large and smallmouth bass, and zebra darter were cited as "common" fish.

Big Bowman Lake was also sampled in 1987 as part of the Adirondack Lake Survey Corporation (ALSC) study of about 1600 high elevation lakes in New York state, including a number in the Lower Hudson River basin. That study evaluated the chemical and biological condition of the lake. The biological monitoring results from this study are discussed below. The ALSC study showed higher water clarity but similar phosphorus readings than in the 2013 CSLAP study of the lake, suggesting only limited water quality changes over the last 15-25 years. The lake was strongly stratified (significant temperature gradient from top to bottom), and deepwater oxygen levels were high, consistently with the deepwater chemistry results. Calcium levels indicate little susceptibility to zebra mussel infestations, although slightly elevated chloride levels indicate some lake impacts associated with road salting operations.

None of the unnamed ephemeral tributaries to the lake, nor the outlet of the lake, have been monitored through the NYSDEC Rotating Intensive Basins (RIBS) or stream biomonitoring programs.

Lake Association and Management History

Big Bowman Lake is represented by the Big Bowman Lake Association. It is not known if the lake association maintains a website, or the extent of their lake management activities.

Summary of 2014 CSLAP Sampling Results

Evaluation of 2014 Annual Results Relative to 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 – Big Bowman Lake" section in Appendix C.

Evaluation of Eutrophication Indicators

It is not yet known if the water quality conditions measured in 2013 and 2014 in Big Bowman Lake are typical of the lake, and if any trends are occurring. Water clarity was slightly higher in 2014 than in 2013, due to slightly lower phosphorus and algae levels in 2014. A shoreline alga bloom sample collected in late July of 2013 and September of 2014 showed slightly elevated algae levels, with the algae community dominated by green algae and diatoms, not blue green algae. Although the lake is deep enough to be thermally stratified, no deepwater samples have been collected in the lake.

Lake productivity varies slightly from week to week during the summer, with no clear seasonal trends. In general, lake productivity was highest in July.

The lake can be characterized as *mesoeutrophic,* or moderately to highly productive, based on total phosphorus and chlorophyll *a* readings (typical of *mesotrophic* lakes) and water clarity readings (typical of *eutrophic* lakes). Water transparency is also influenced by the natural color of the water. However, the trophic state indices (TSI) evaluation suggests that phosphorus readings are slightly lower than expected given the algae levels (as measured by chlorophyll *a*), and water transparency (as measured by the Secchi disk). This indicates that small changes in phosphorus levels in the lake may result in a substantial increase in algae levels, which in turn could result in significant decreases in water clarity. These phenomena were apparent in both 2013 and 2014. Overall trophic conditions are summarized on the Lake Scorecard and Lake Condition Summary Table.

Evaluation of Potable Water Indicators

Algae levels at times may be 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 used for drinking water. Potable water conditions, at least as measurable through CSLAP, are summarized in the Lake Scorecard and Lake Condition Summary Table.

Evaluation of Limnological Indicators

Total nitrogen readings were lower in 2014 than in 2013, but all forms of nitrogen in Big Bowman Lake have been low in nearly all samples. pH and conductivity readings are typical of slightly alkaline lakes with soft water, similar to other lakes on the plateau in Rensselaer County. These readings were slightly lower in 2014 than in 2013. Color readings may be high enough to be apparent to the casual observer- a slight brown color may be apparent (but lower in 2014). Calcium levels are below the threshold associated with susceptibility to zebra mussels. Zebra mussels have not been reported in the lake, although they are found in other lakes in the region. Nitrogen to phosphorus ratios show that algae growth is more likely to be controlled by phosphorus than nitrogen. In general, most of these indicators were similar in 2014 and 2013. Overall limnological conditions are summarized in the Lake Scorecard and Lake Condition Summary Table.

Evaluation of Biological Condition

The 2013 and 2014 fluoroprobe data indicates moderate to low algae levels and very low blue green algae levels in most open water (away from the shoreline) samples, suggesting a low susceptibility to harmful algal blooms in the open water. The reported shoreline blooms in late August of 2013 and early September of 2014 was comprised of non-blue green algae species.

The ALSC study in 1987 found a fisheries community dominated by yellow perch and rock bass. Using a fish index for biotic integrity (IBI) developed by the state of Minnesota, the quality of the fish community in 1987 would have been identified as “good”, based on the high percentage of intolerant fish species.

There were at least 12 plant species (6 submergent, 3 floating leaf, and 3 emergent species) found in the lake in 1987, including curly-leafed pondweed (*Potamogeton crispus*), an invasive submergent plant species. Recent reports indicate that the plant community is dominated by bladderwort, an occasionally nuisance native plant common to other lakes on the Rensselaer plateau. The overall quality of the aquatic plant community was probably “fair”.

An evaluation of the benthic macroinvertebrate community from that study suggests that macroinvertebrates are “favorable”, consistently with the favorable water quality conditions. It is not known if these assessments remain accurate at this time.

Biological conditions in the lake are summarized in the Lake Scorecard and Lake Condition Summary Table.

Evaluation of Lake Perception

Recreational assessments were slightly more favorable in 2014 than in 2013, consistent with slightly higher water clarity. However, water quality assessments were similar in 2013 and 2014 and were mostly favorable. The lake is most frequently described as having “slightly impaired” for most recreational uses, due to water with “definite algae greenness” and plant growth at the surface of the lake (but not growing densely). Recreational impacts were more likely to be associated with “excessive weeds” than “poor water clarity” or “excessive algae”. Overall lake perception is summarized on the Lake Scorecard and Lake Condition Summary Table.

Evaluation of Local Climate Change

It is not yet known if air or water temperature readings have exhibited any clear long-term changes, if these readings could indicate local climate change or if any changes can be 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. Phycocyanin and fluoroprobe algae levels have been well below the levels indicating susceptibility for harmful algal blooms (HABs) in the main body of the lake, and open water microcystis (algae toxin) levels have been well below the thresholds for safe swimming in both 2013 and 2014. The single shoreline bloom sample in late August of 2013 and early September of 2014 showed high algae but low blue green algae levels, and as a result, toxin levels were low.

Lake Condition Summary

Category	Indicator	Min	Overall Avg	Max	2014 Avg	Classification	2014 Change?	Long-term Change?
Eutrophication Indicators	Water Clarity	1.35	1.92	2.65	2.02	Eutrophic	Not yet known	Not yet known
	Chlorophyll *a*	1.70	7.50	16.30	7.20	Mesotrophic	Not yet known	Not yet known
	Total Phosphorus	0.011	0.015	0.022	0.014	Mesotrophic	Not yet known	Not yet known
Potable Water Indicators	Hypolimnetic Ammonia							
	Hypolimnetic Arsenic							
	Hypolimnetic Iron							
	Hypolimnetic Manganese							
Limnological Indicators	Hypolimnetic Phosphorus							
	Nitrate + Nitrite	0.00	0.00	0.01	0.00	Low NOx	Not yet known	Not yet known
	Ammonia	0.01	0.02	0.05	0.03	Low Ammonia	Not yet known	Not yet known
	Total Nitrogen	0.19	0.36	0.49	0.30	Low Total Nitrogen	Not yet known	Not yet known
	pH	6.44	7.17	7.84	6.96	Circumneutral	Not yet known	Not yet known
	Specific Conductance	68	111	163	101	Softwater	Not yet known	Not yet known
	True Color	16	29	53	23	Intermediate Color	Not yet known	Not yet known
	Calcium	6.6	6.6	6.6	6.6	Not Susceptible to Zebra Mussels	Not yet known	Not yet known
Lake Perception	WQ Assessment	2	2.1	3	2.0	Not Quite Crystal Clear	Not yet known	Not yet known
	Aquatic Plant Coverage	2	2.9	3	2.9	Surface Plant Growth	Not yet known	Not yet known
	Recreational Assessment	1	2.1	3	1.8	Excellent	Not yet known	Not yet known
Biological Condition	Phytoplankton					Open water-low blue green algae biomass; Shoreline-low blue green algae in bloom		
	Macrophytes					Fair quality of the aquatic plant community		
	Zooplankton					Not measured through CSLAP		
	Macroinvertebrates					Favorable benthic community		
	Fish					Good quality of the fish community		
	Invasive Species					Potamogeton crispus?		
Local Climate Change	Air Temperature	12	22.6	33	22.8		Not yet known	Not yet known
	Water Temperature	14	20.6	26	21.9		Not yet known	Not yet known

Category	Indicator	Min	Overall Avg	Max	2014 Avg	Classification	2014 Change?	Long-term Change?
Harmful Algal Blooms	Open Water Phycocyanin	0	3	5	2	No readings indicate high risk of BGA	Not yet known	Not yet known
	Open Water FP Chl.a	0	4	8	2	No readings indicate high algae levels	Not yet known	Not yet known
	Open Water FP BG Chl.a	0	2	24	2	Few readings indicate high BGA levels	Not yet known	Not yet known
	Open Water Microcystis	<DL	0.2	0.4	<0.30	Mostly undetectable open water MC-LR	Not yet known	Not yet known
	Open Water Anatoxin a	<DL	<DL	<DL	<DL	Open water Anatoxin-a consistently not detectable	Not yet known	Not yet known
	Shoreline Phycocyanin					No shoreline blooms sampled for PC	Not yet known	Not yet known
	Screening FP Chl.a	0.0	17.9	156.9	17.9	Some readings indicate high algae levels	Not yet known	Not yet known
	Screening FP BG Chl.a	0.0	0.0	0.0	0.0	No readings indicate high BGA levels	Not yet known	Not yet known
	Shoreline Microcystis	0.7	0.7	0.7		Mostly undetectable shoreline bloom MC-LR	Not yet known	Not yet known
	Shoreline Anatoxin a	8.2	8.2	8.2		Shoreline bloom Anatoxin-a at times detectable	Not yet known	Not yet known

Evaluation of Lake Condition Impacts to Lake Uses

Big Bowman Lake is not presently among the lakes listed on the Lower Hudson River drainage basin Priority Waterbody List (PWL).

Potable Water (Drinking Water)

The CSLAP dataset at Big Bowman 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. The occasionally elevated shoreline algae levels indicate a threat to any "unofficial" potable water use.

Contact Recreation (Swimming)

The CSLAP dataset at Big Bowman Lake, including water chemistry data, physical measurements, and volunteer samplers' perception data, suggests that swimming and contact recreation is *fully supported*, although this use may be threatened by nuisance weeds and occasional shoreline blooms. Additional information about bacterial levels is needed to evaluate the safety of the water for swimming.

Non-Contact Recreation (Boating and Fishing)

The CSLAP dataset on Big Bowman Lake, including water chemistry data, physical measurements, and volunteer samplers' perception data, suggest that non-contact recreation may be *stressed* by excessive weeds. However, these impacts are reported to be associated with bladderwort, a native plant species.

Aquatic Life

The CSLAP dataset on Big Bowman Lake, including water chemistry data, physical measurements, and volunteer samplers' perception data, suggest that aquatic life may be *threatened* by invasive plants (curly leafed pondweed). Additional data are needed to evaluate the food and habitat conditions for aquatic organisms in the lake.

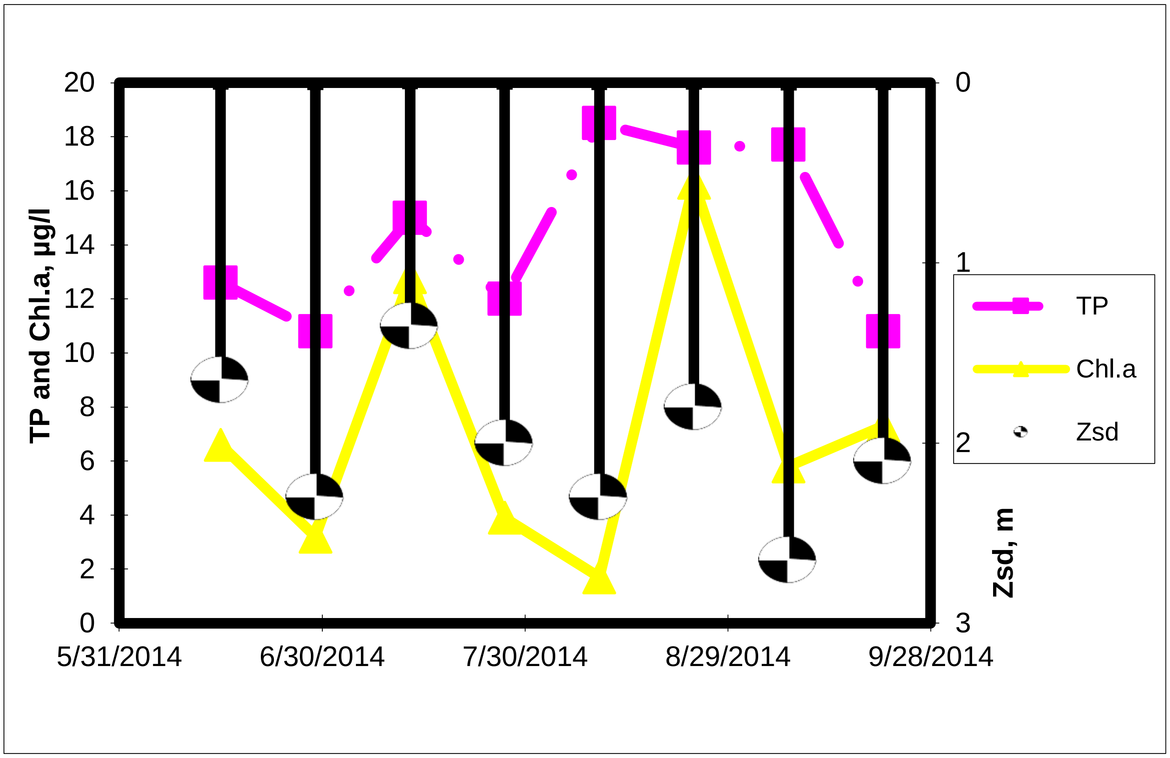
Aesthetics
The CSLAP dataset on Big Bowman Lake, including water chemistry data, physical measurements, and volunteer samplers' perception data, suggest that aesthetics may be *stressed* by occasional shoreline blooms and excessive weed growth, and *threatened* by invasive plants.

Fish Consumption
There are no fish consumption advisories posted for Big Bowman Lake.

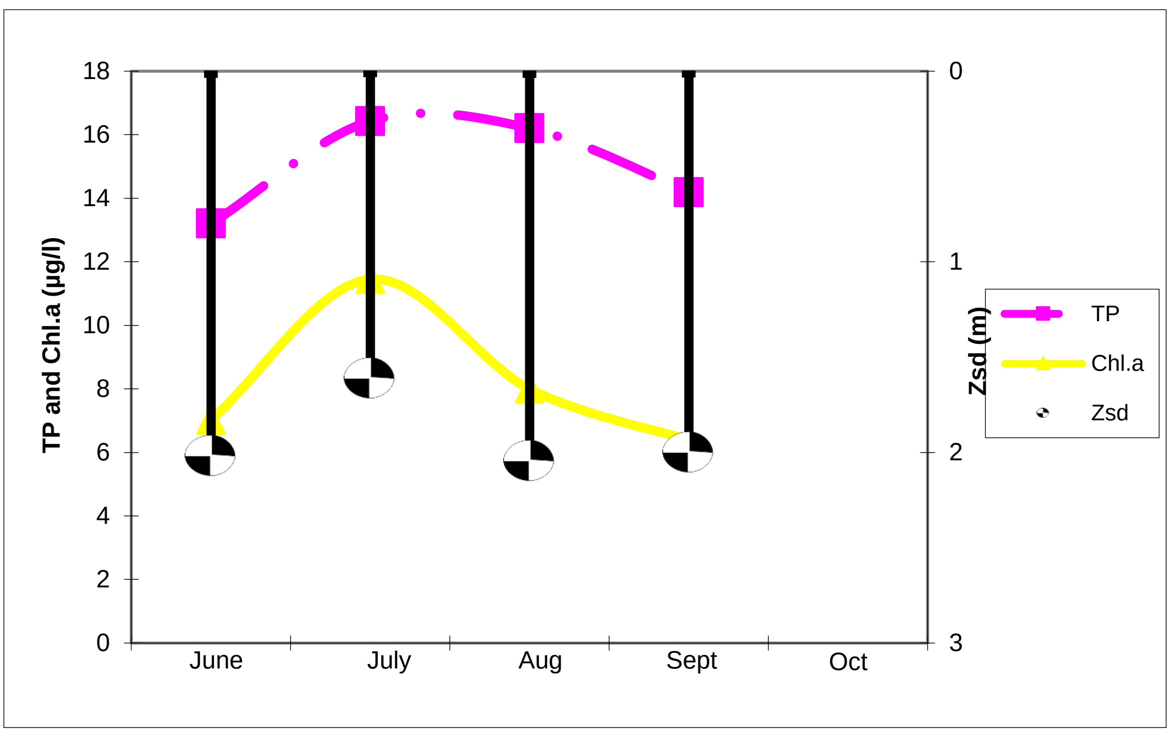
Additional Comments and Recommendations
The lake association should conduct aquatic plant surveys to identify any invasive plants that, in addition to bladderwort, may be contributing to excessive weed growth (or may grow more invasively if bladderwort is selectively removed from the lake).

Aquatic Plant IDs-2014
None submitted for identification.

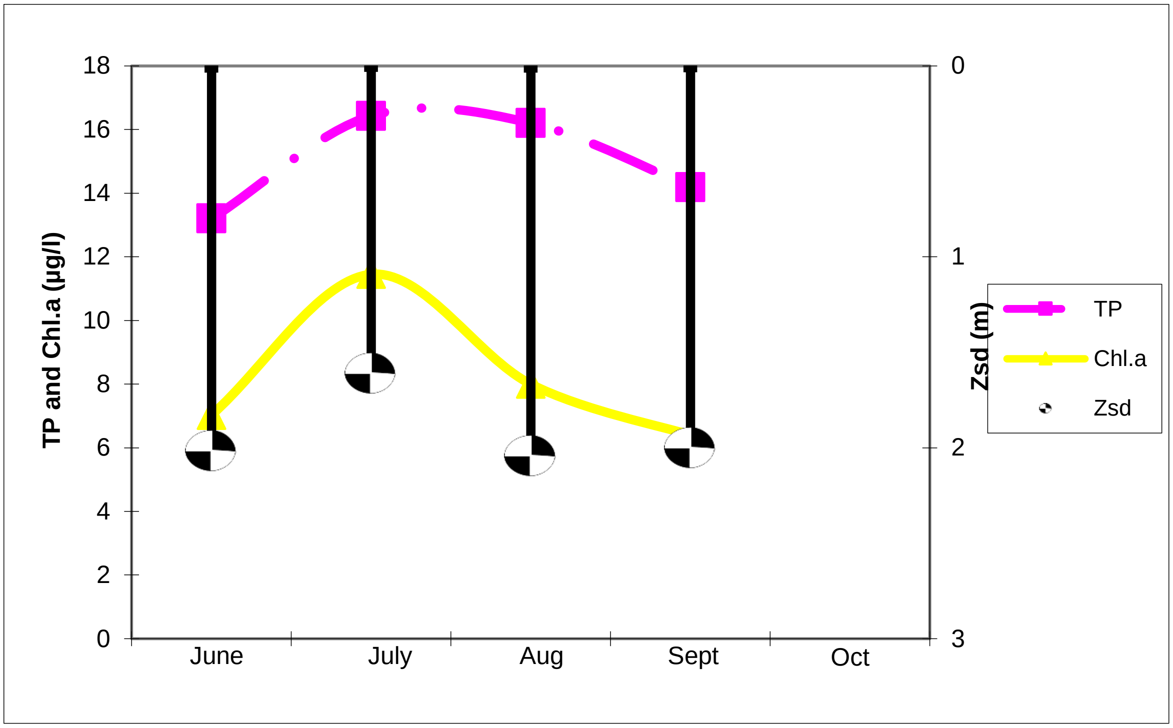
Time Series: Trophic Indicators, 2014



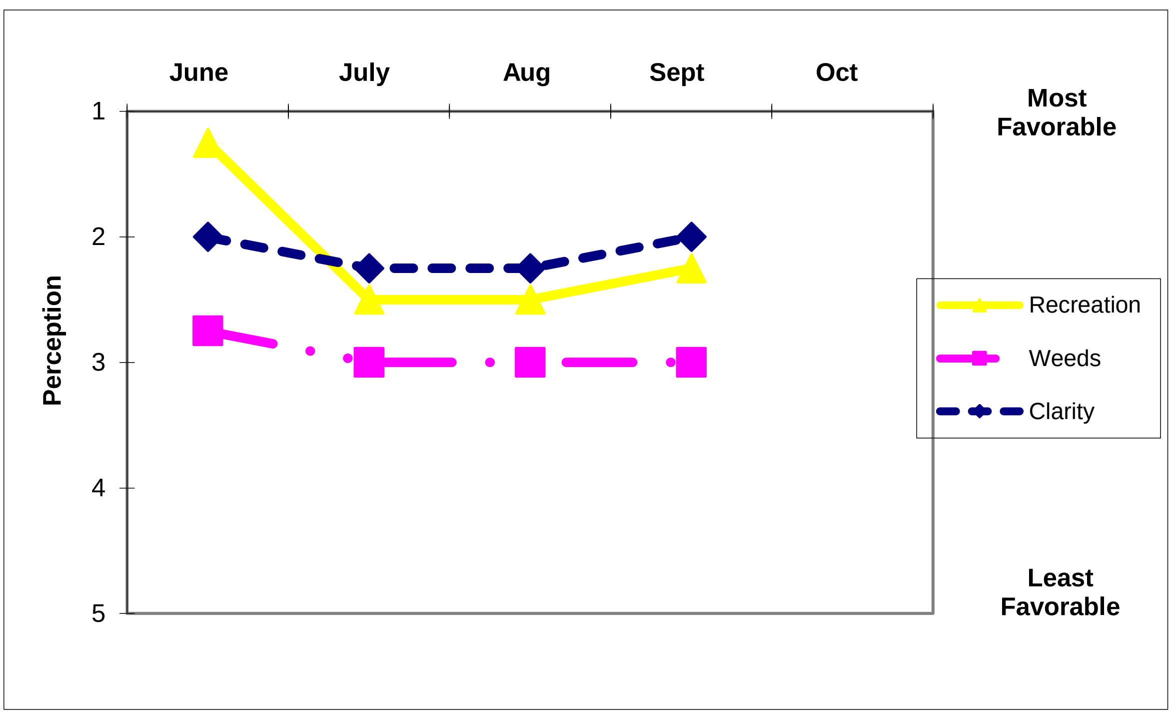
Time Series: Trophic Indicators, Typical Year (2013-2014)



Time Series: Lake Perception Indicators, 2014



Time Series: Lake Perception Indicators, Typical Year (2013-2014)



Appendix A- CSLAP Water Quality Sampling Results for Big Bowman Lake

LNum	PName	Date	Zbot	Zsd	Zsamp	Tot.P	NO3	NH4	TDN	TN/TP	TColor	pH	Cond25	Ca	Chl.a
235	Bowman Lake	6/15/2013	8.70	2.08	1.50	0.015		0.02	0.43	63.07		7.08	132		11.50
235	Bowman Lake	6/30/2013	6.10	2.05	1.50	0.014					36	7.71	121		6.80
235	Bowman Lake	7/14/2013		1.40	1.50	0.016					28	7.35	128		10.10
235	Bowman Lake	7/28/2013	5.50	1.70	1.50	0.022					53	7.39	107		
235	Bowman Lake	7/28/2013			bloom										
235	Bowman Lake	8/11/2013	9.60	1.70	1.50	0.016		0.03			26	7.31	88		11.90
235	Bowman Lake	8/25/2013	5.00	2.38	1.00	0.013					33	7.32	110		2.10
235	Bowman Lake	9/8/2013	7.80	1.50	1.50	0.013			0.38	67.38	42	7.03	110		9.40
235	Bowman Lake	9/22/2013	8.90	1.75	1.50	0.014					27	7.84	163		3.10
235	Bowman Lake	6/15/2014	7.4	1.7	1.5	0.013	0.00	0.02	0.19	33.70	22	7.29	107	6.6	6.6
235	Bowman Lake	6/29/2014	7.7	2.3	1.5	0.011			0.29	59.28	18	6.44	112		3.2
235	Bowman Lake	7/13/2014	7.1	1.4	1.5	0.015	0.01	0.05	0.31	46.05	21	7.40	96		12.8
235	Bowman Lake	7/27/2014	5.1	2.0	1.5	0.012			0.36	65.82	28	7.02	139		3.9
235	Bowman Lake	8/10/2014	8.2	2.3	1.5	0.019	0.01	0.02	0.35	41.03	33	6.99	116	6.6	1.7
235	Bowman Lake	8/24/2014	8.4	1.8	1.5	0.018			0.41	50.63	31	6.67	68		16.3
235	Bowman Lake	9/7/2014	8.2	2.7	1.5	0.018	0.01	0.04	0.27	32.94	18	7.22	86		5.8
235	Bowman Lake	9/7/2014													
235	Bowman Lake	9/21/2014	6.8	2.1	1.5	0.011			0.24	49.09	16	6.66	86		7.3

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
235	Bowman Lake	6/15/2013	epi	22	18	2	3	1	6	0	0	3.20	4.70	<0.30	<0.440		4.30	0.00	I	I
235	Bowman Lake	6/30/2013	epi	27	22	2	3	1	0	4	0	2.30	3.90	<0.30	<0.650		3.60	0.00	I	I
235	Bowman Lake	7/14/2013	epi	33	25	3	3	3	12	0	0	1.50	5.40	<0.30	<0.490		5.50	0.00	EFGH	
235	Bowman Lake	7/28/2013	bloom	22	21	2	3	3	25	0	0	3.20	9.50	<0.30	<0.400		7.50	0.00	I	I
235	Bowman Lake	7/28/2013	epi											0.68	8.24		109.10	10.10		
235	Bowman Lake	8/11/2013	epi	23	18	3	3	3	2	0	0	1.80	8.70	<0.30	<0.340		7.70	0.00	I	I
235	Bowman Lake	8/25/2013	epi	24	21	2	3	3	2	5		3.60	3.60	<0.30	<0.390		2.70	0.00	I	I
235	Bowman Lake	9/8/2013	epi	17	16	2	3	3	25	0	0	2.80	5.80	0.38	<1.240		4.70	0.00	HI	
235	Bowman Lake	9/22/2013	epi	12	14	2	3	3	25	0	0	4.00	4.80	<0.30	<19.130		3.50	0.00	I	I
235	Bowman Lake	6/15/2014	epi	19	18	2	2	1	0	0	0	0.3	1.4	<0.61	<0.080	<0.002	2.5	0.0	i	
235	Bowman Lake	6/29/2014	epi	20	24	2	3	2	0	0	0	3.0	0.5	<0.48	<0.480	<0.002	1.2	0.0	i	
235	Bowman Lake	7/13/2014	epi	21	22	2	3	2	1	0	0	5.1	0.7	<0.40	<0.210	<0.003	2.0	0.0	i	
235	Bowman Lake	7/27/2014	epi	26	24	2	3	2	0	0	0	2.3	0.4	<0.60	<0.030	<0.001	1.3	0.0	i	i
235	Bowman Lake	8/10/2014	epi	30	26	2	3	2	0	0	0	1.4	0.8	<0.28	<0.050	<0.001	2.2	0.0	i	h
235	Bowman Lake	8/24/2014	epi	24	22	2	3	2	2	0	0	3.4	0.7	<0.26	<0.100	<0.002	0.0	0.0	i	i
235	Bowman Lake	9/7/2014	epi	17	22	2	3	1	0	0	0	1.3	0.90	<0.28	<0.140	<0.002	3.3	0.0	b	b
235	Bowman Lake	9/7/2014	bloom											<0.58	<0.280	<0.003	156.9	24.4		b
235	Bowman Lake	9/21/2014	epi	25	17	2	3	2	0	0	0	2.5	1.0	<0.48	<0.040	<0.001	4.9	0.0	i	i

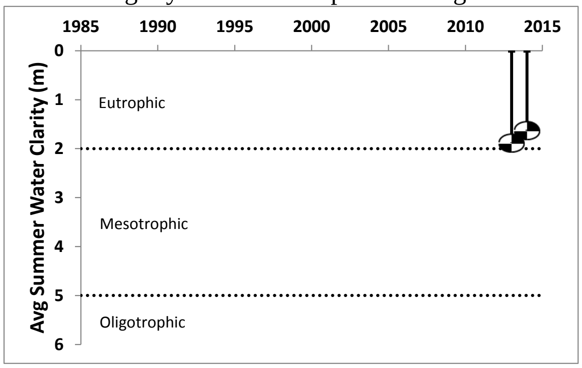
Legend Information

Indicator	*Description*	*Detection Limit*	*Standard (S) / Criteria (C)*
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	calcium (mg/l)	1 mg/l	none
Chl.a	chlorophyll a (ug/l)	0.01 ug/l	none
Fe	iron (mg/l)	0.1 mg/1	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 (aquaflor) (unitless)	1 unit	none
AQ-Chl	Chlorophyll *a* (aquaflor) (ug/l)	1 ug/l	none
MC-LR	Microcystis-LR (ug/l)	0.01 ug/l to 0.6 ug/l	1 ug/l potable (C) 20 ug/l swimming (C)
Ana	Anatoxin-a (ug/l)	variable	none
Cyl	Cylindrospermposin (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 C- Long Term Trends: Big Bowman Lake

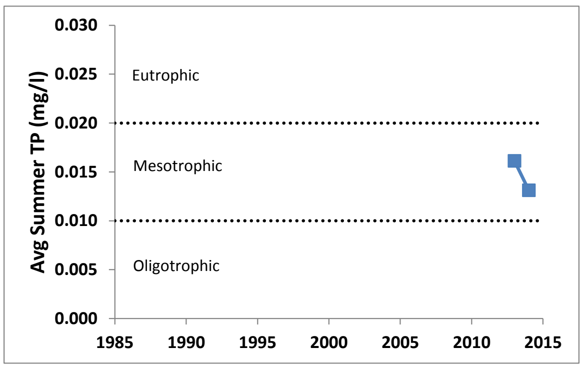
Long Term Trends: Water Clarity

- Too early to detect any trends
- Most readings typical of *eutrophic* lakes, slightly lower than expected w/algae and TP



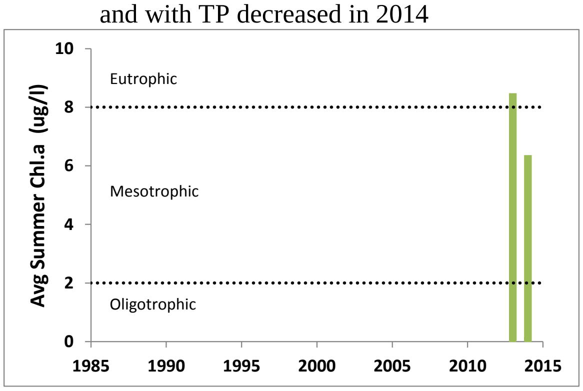
Long Term Trends: Phosphorus

- Too early to detect any trends
- Most readings typical of *mesotrophic* lakes, and were lower in 2014 than in 2013



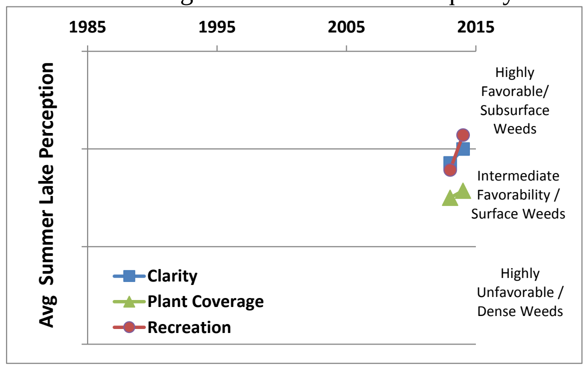
Long Term Trends: Chlorophyll a

- Too early to detect any trends
- Most readings typical of *mesotrophic* lakes, and with TP decreased in 2014



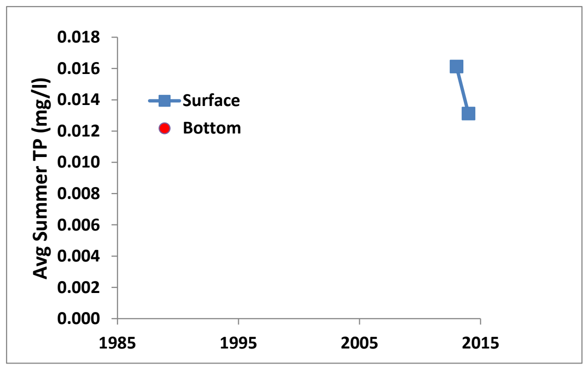
Long Term Trends: Lake Perception

- Too early to detect any trends
- Recreational perception more closely linked to changes in weeds than water quality



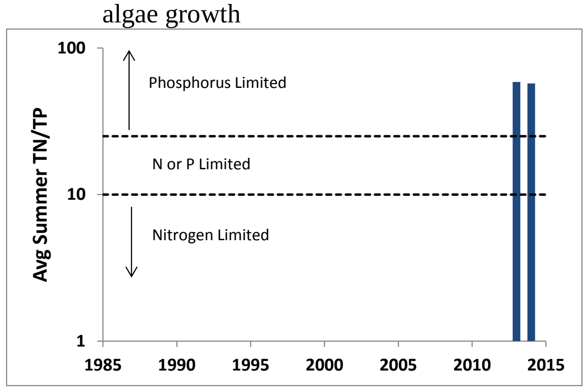
Long Term Trends: Bottom Phosphorus

- Too early to detect any trends
- Bottom TP not (yet) collected through CSLAP



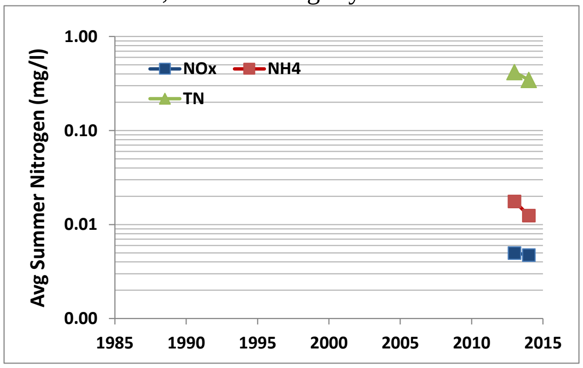
Long Term Trends: N:P Ratio

- Too early to detect any trends
- Most readings indicate phosphorus limits algae growth



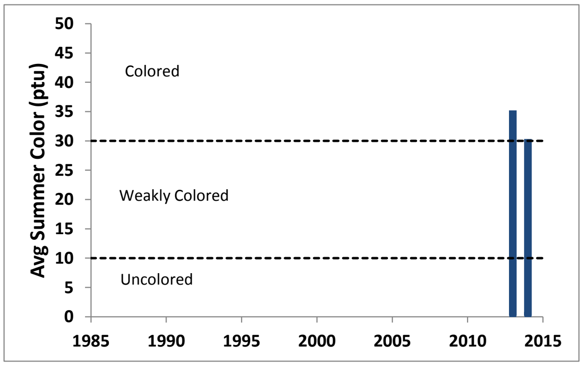
Long Term Trends: Nitrogen

- Too early to detect any trends (no NOx)
- TN elevated, consistent with high algae levels; ammonia slightly elevated



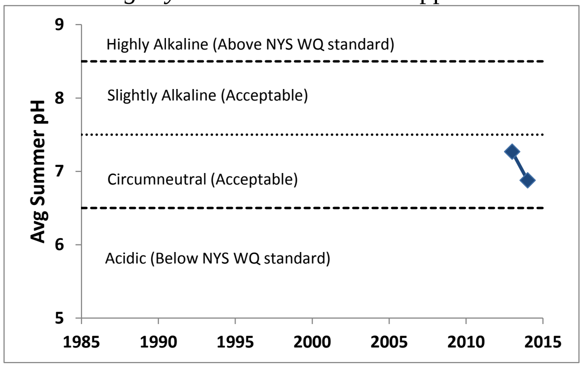
Long Term Trends: Color

- Too early to detect any trends
- Most readings typical of *weakly colored* lakes and decreased in 2014



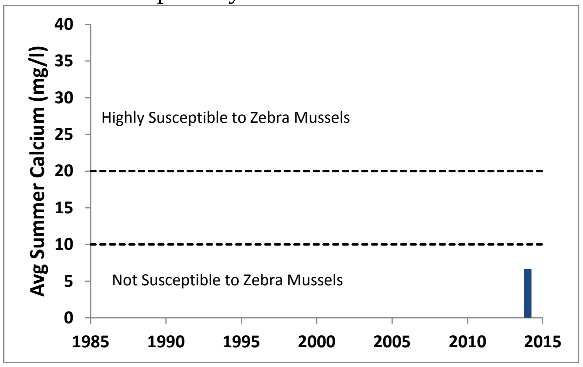
Long Term Trends: pH

- Too early to detect any trends
- Most readings typical of *circumneutral* to *slightly alkaline* lakes and dropped in 2014



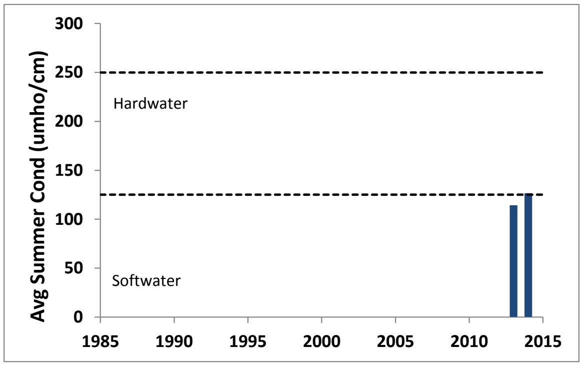
Long Term Trends: Calcium

- No data yet available
- Readings will likely indicate low susceptibility to zebra mussels



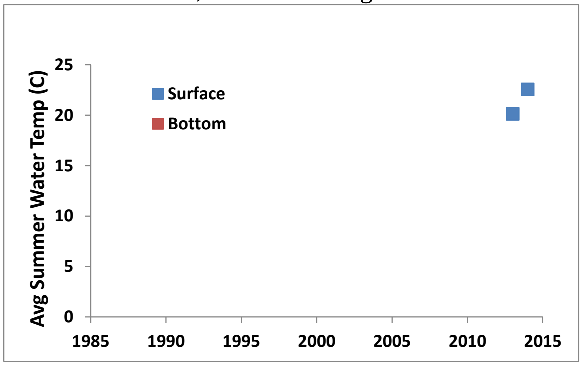
Long Term Trends: Conductivity

- Too early to detect trends
- Most readings typical of lakes with *soft water*



Long Term Trends: Water Temperature

- Too early to detect trends
- No deepwater temperature data (yet) available; surface readings rose in 2014



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 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.

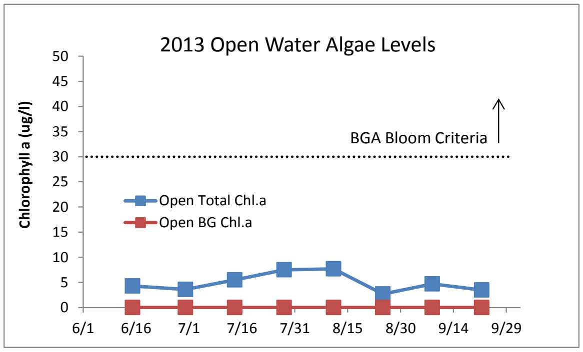


Figure D1:
2013 Open Water Total and BGA Chl.a

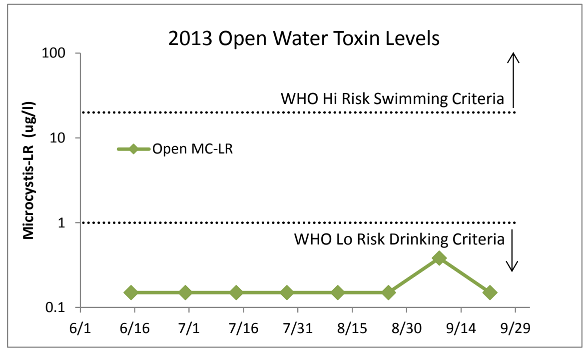


Figure D2:
2013 Open Water Microcystin-LR

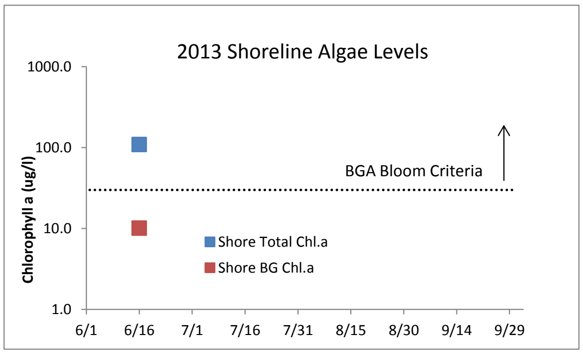


Figure D3:
2013 Shoreline Total and BGA Chl.a

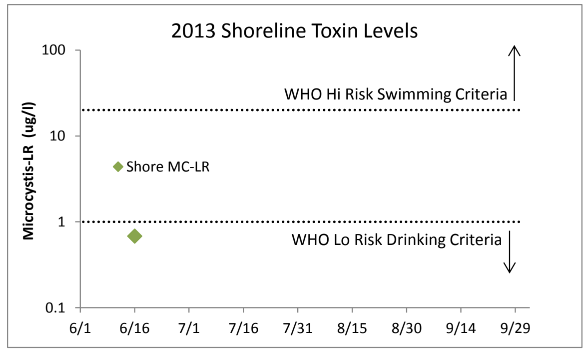


Figure D4:
2013 Shoreline Microcystin-LR

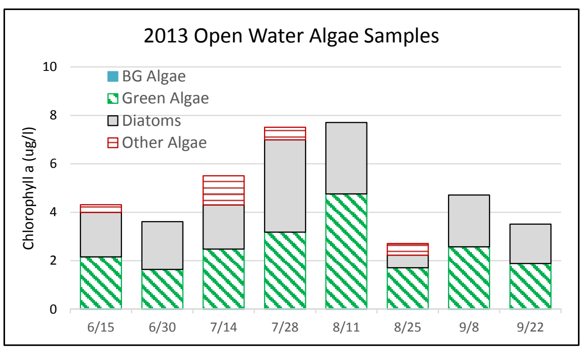


Figure D5:
2013 Open Water Algae Types

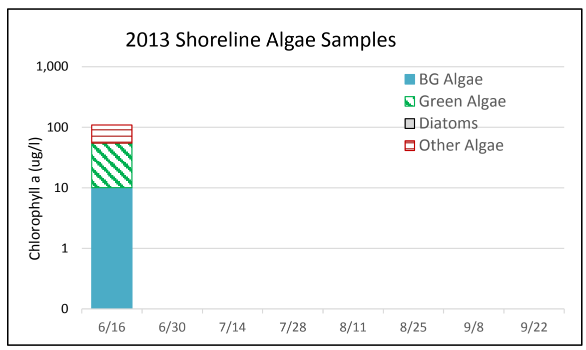


Figure D6:
2013 Shoreline Algae Types

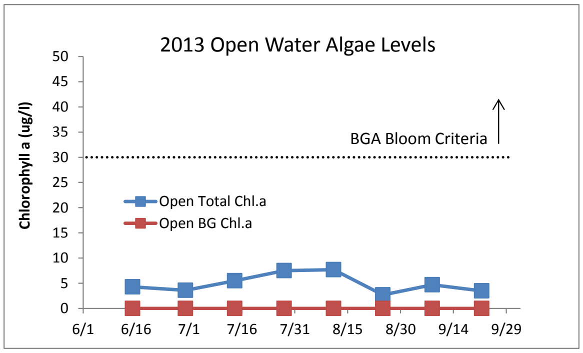


Figure D7:
2014 Open Water Total and BGA Chl.a

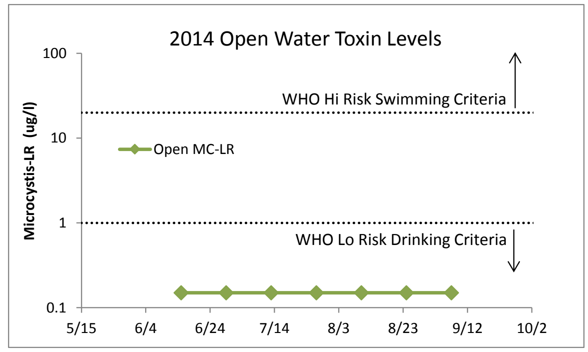


Figure D8:
2014 Open Water Microcystin-LR

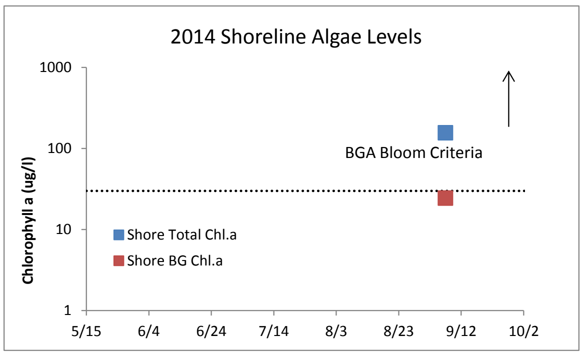


Figure D9:
2014 Shoreline Total and BGA Chl.a

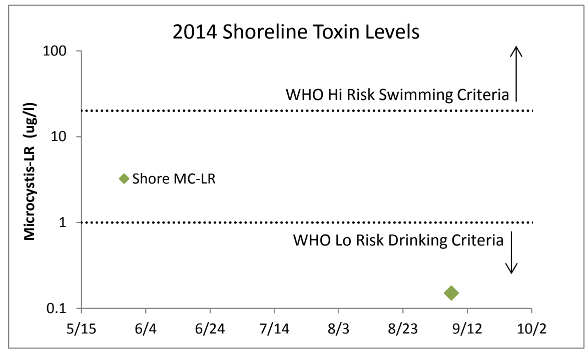


Figure D10:
2014 Shoreline Microcystin-LR

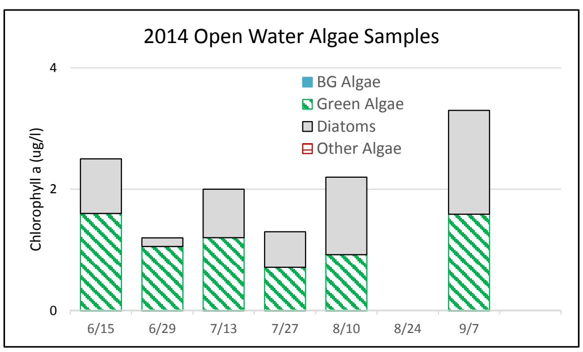


Figure D11:
2014 Open Water Algae Types

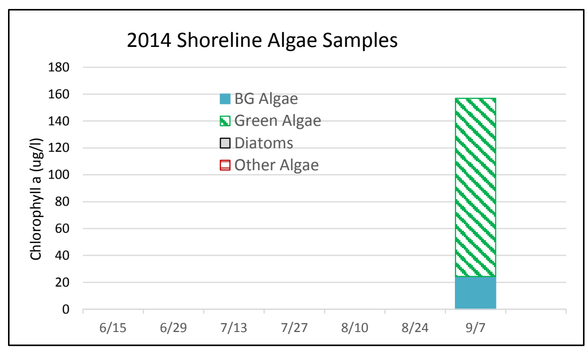


Figure D12:
2014 Shoreline Algae Types

Appendix E:
AIS Species in Rensselaer County

The table below shows the invasive aquatic plants and animals that have been documented in Rensselaer 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 - Rensselaer County			
Waterbody	**Kingdom**	**Common name**	**Scientific name**
Burden Lake	Plant	Eurasian watermilfoil	*Myriophyllum spicatum*
Burden Lake	Animal	Virile crayfish	*Orconectes virilis*
Burden Lake	Plant	Curly leafed pondweed	*Potamogeton crispus*
Burden Lake	Plant	Water chestnut	*Trapa natans*
Burden First Lake	Plant	Eurasian watermilfoil	*Myriophyllum spicatum*
Burden First Lake	Plant	Water chestnut	*Trapa natans*
Burden Second Lake	Plant	Eurasian watermilfoil	*Myriophyllum spicatum*
Burden Second Lake	Plant	Curly leafed pondweed	*Potamogeton crispus*
Burden Third Lake	Plant	Eurasian watermilfoil	*Myriophyllum spicatum*
Burden Third Lake	Plant	Curly leafed pondweed	*Potamogeton crispus*
Castleton Reservoir	Plant	Eurasian watermilfoil	*Myriophyllum spicatum*
Coopers Pond	Plant	Curly leafed pondweed	*Potamogeton crispus*
Crooked Lake	Plant	Eurasian watermilfoil	*Myriophyllum spicatum*
Crystal Lake	Plant	Eurasian watermilfoil	*Myriophyllum spicatum*
Crystal Lake	Animal	Virile crayfish	*Orconectes virilis*
Glass Lake	Plant	Eurasian watermilfoil	*Myriophyllum spicatum*
Glass Lake	Animal	Virile crayfish	*Orconectes virilis*
Golden Pond	Plant	Eurasian watermilfoil	*Myriophyllum spicatum*
Golden Pond	Plant	Water chestnut	*Trapa natans*
Hampton Manor Lake	Plant	Eurasian watermilfoil	*Myriophyllum spicatum*
Hampton Manor Lake	Plant	Curly leafed pondweed	*Potamogeton crispus*
Hampton Manor Lake	Plant	Water chestnut	*Trapa natans*
Hudson River	Animal	Zebra mussel	*Dreissena polymorpha*
Hudson River	Plant	Water chestnut	*Trapa natans*

Waterbody	Kingdom	Common name	Scientific name
Hudson River (Schodack Island Park)	Plant	Eurasian watermilfoil	*Myriophyllum spicatum*
Johnsonville Reservoir	Plant	Water chestnut	*Trapa natans*
Links Pond	Plant	Eurasian watermilfoil	*Myriophyllum spicatum*
Links Pond	Plant	Water chestnut	*Trapa natans*
Long Pond	Plant	Eurasian watermilfoil	*Myriophyllum spicatum*
Mill Pond	Plant	Eurasian watermilfoil	*Myriophyllum spicatum*
Nassau Lake	Plant	Curly leafed pondweed	*Potamogeton crispus*
Nassau Lake	Plant	Water chestnut	*Trapa natans*
Pine Lake	Plant	Eurasian watermilfoil	*Myriophyllum spicatum*
Racquet Lake	Plant	Eurasian watermilfoil	*Myriophyllum spicatum*
Red Pond	Animal	Virile crayfish	*Orconectes virilis*
Reichards Lake	Plant	Eurasian watermilfoil	*Myriophyllum spicatum*
Second Lake	Plant	Eurasian watermilfoil	*Myriophyllum spicatum*
Shaver Pond	Plant	Eurasian watermilfoil	*Myriophyllum spicatum*
Snyders Lake	Animal	Zebra mussel	*Dreissena polymorpha*
Snyders Lake	Plant	Eurasian watermilfoil	*Myriophyllum spicatum*
Snyders Lake	Plant	Brittle naiad	*Najas minor*
Snyders Lake	Plant	Curly leafed pondweed	*Potamogeton crispus*
Tamarack Pond	Plant	Water chestnut	*Trapa natans*
Tomhannock Lake	Plant	Eurasian watermilfoil	*Myriophyllum spicatum*
Troy Reservoir	Plant	Eurasian watermilfoil	*Myriophyllum spicatum*
Vanderhyden Reservoir	Plant	Eurasian watermilfoil	*Myriophyllum spicatum*

Appendix F: Watershed and Land Use Map for Big Bowman 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.