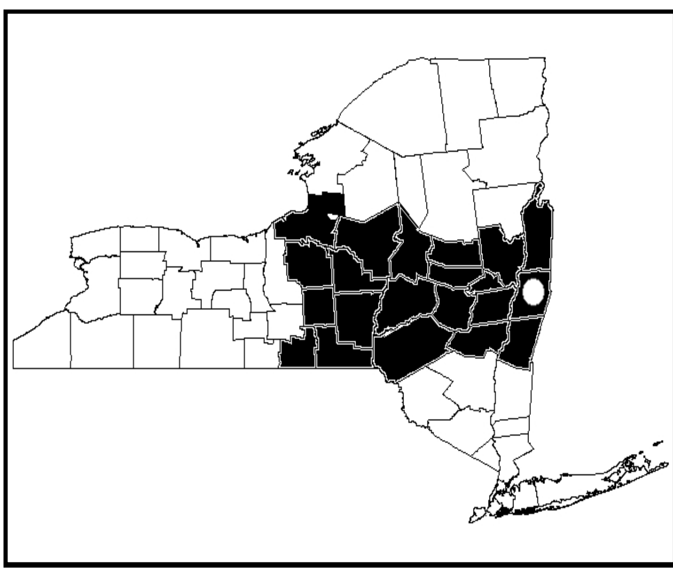
CSLAP 2015 Lake Water Quality Summary:
Big Bowman Lake

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	2013-2015
2015 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 15 CSLAP lakes among the more than 370 lakes and ponds found in Rensselaer County, and one of 67 CSLAP lakes among the more than 3650 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 2015 CSLAP Sampling Results

Evaluation of 2015 Annual Results Relative to 2014

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

Water clarity has increased slightly over the last three years, although nutrient (phosphorus) and algae (chlorophyll *a*) levels were close to normal in 2015. A shoreline algae bloom sample collected in late July of 2013 and September of 2014 and 2015 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 (despite higher algae levels in September of the last two years). 2015 sampling results showed a similar lack of strong seasonal trend, although slightly higher nutrient and algae levels were seen later in the summer.

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 higher than expected given the algae levels (as measured by chlorophyll *a*), and water transparency (as measured by the Secchi disk). 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 classified for use as a drinking water supply. 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 levels were slightly lower than usual in 2015, but these readings have varied from year to year. Ammonia readings were slightly higher than usual in 2015, and both ammonia and nitrogen-to-phosphorus ratios have increased slightly in the last few years, while conductivity has decreased slightly. However, most of the other limnological indicators have varied little (or unpredictably) over the last few years. Overall limnological conditions are summarized in the Lake Scorecard and Lake Condition Summary Table.

Chloride levels in the 2015 samples, conducted for the first time through CSLAP and cited in Appendix A, ranged from 37 to 40 mg/l. These values fall just above the "moderate road salt" runoff levels cited by the New Hampshire DES, although they are well below the state potable water quality standard of 250 mg/l and are in the range of values found in a number of NYS lakes, including those in the Finger Lakes region. Additional data will help to determine if these represent normal readings for the lake.

Evaluation of Biological Condition

The 2013 through 2015 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, and these blooms and most open water samples are more likely to be associated with green algae and diatoms than by more harmful algae.

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 2015 than in 2014, which were more favorable than in 2013, consistent with slightly increasing water clarity over this period. However, water quality assessments were similar in the last three years and were mostly favorable. Aquatic plant coverage was slightly greater in 2015, perhaps due to clearer water. 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. Water temperatures were slightly higher than usual in 2015.

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. The 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 from 2013 through 2015. 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. Most water samples in the open water and along the shoreline have been comprised primarily of green algae and diatoms.

Lake Condition Summary

Category	Indicator	Min	Overall Avg	Max	2015 Avg	Classification	2015 Change?	Long-term Change?
Eutrophication Indicators	Water Clarity	1.35	2.03	3.00	2.24	Mesotrophic	Higher Than Normal	Not yet known
	Chlorophyll *a*	1.70	7.62	19.20	7.85	Mesotrophic	Within Normal Range	Not yet known
	Total Phosphorus	0.009	0.015	0.022	0.014	Mesotrophic	Within Normal Range	Not yet known
Potable Water Indicators	Hypolimnetic Ammonia							
	Hypolimnetic Arsenic							
	Hypolimnetic Iron							
	Hypolimnetic Manganese							
Limnological Indicators	Hypolimnetic Phosphorus							
	Nitrate + Nitrite	0.00	0.01	0.01	0.01	Low NOx	Within Normal Range	Not yet known
	Ammonia	0.01	0.02	0.05	0.03	Low Ammonia	Higher than Normal	Not yet known
	Total Nitrogen	0.19	0.34	0.49	0.31	Low Total Nitrogen	Lower Than Normal	Not yet known
	pH	6.44	7.40	8.61	7.87	Circumneutral	Within Normal Range	Not yet known
	Specific Conductance	68	121	172	142	Softwater	Within Normal Range	Not yet known
	True Color	14	25	53	19	Intermediate Color	Lower Than Normal	Not yet known
	Calcium	6.6	6.7	6.8	6.7	Not Susceptible to Zebra Mussels	Within Normal Range	Not yet known
Lake Perception	WQ Assessment	2	2.1	3	2.1	Not Quite Crystal Clear	Within Normal Range	Not yet known
	Aquatic Plant Coverage	2	3.0	3	3.0	Surface Plant Growth	Less Favorable than Normal	Not yet known
	Recreational Assessment	1	2.0	3	1.6	Excellent	More Favorable Than Normal	Not yet known
Biological Condition	Phytoplankton					Open water-low blue green algae biomass; Shoreline-high blue green algae in bloom	Not known	Not known
	Macrophytes					Fair quality of the aquatic plant community	Not known	Not known
	Zooplankton					Not measured through CSLAP	Not known	Not known
	Macroinvertebrates					Favorable benthic community	Not known	Not known
	Fish					Good quality	Not known	Not known
	Invasive Species					Potamogeton crispus?	Not known	Not known
Local Climate Change	Air Temperature	12	23.7	33	25.8		Within Normal Range	Not yet known
	Water Temperature	14	21.6	27	23.5		Higher Than Normal	Not yet known

Category	Indicator	Min	Overall Avg	Max	2015 Avg	Classification	2015 Change?	Long-term Change?
Harmful Algal Blooms	Open Water Phycocyanin	0	3	9	4	No readings indicate high risk of BGA	Not known	Not known
	Open Water FP Chl.a	0	3	8	3	No readings indicate high algae levels	Not known	Not known
	Open Water FP BG Chl.a	0	0	0	0	No readings indicate high BGA levels	Not known	Not known
	Open Water Microcystis	<DL	0.2	0.4	<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					No shoreline blooms sampled for PC	Not known	Not known
	Screening FP Chl.a	109.1	133.0	156.9		All readings indicate very high algae levels	Not known	Not known
	Screening FP BG Chl.a	10.1	17.3	24.4		Some readings indicate high BGA levels	Not known	Not known
	Shoreline Microcystis	<DL	0.5	0.7		Mostly undetectable shoreline bloom MC-LR	Not known	Not known
	Shoreline Anatoxin a	<DL	0.5	8.2		Shoreline bloom Anatoxin-a at times detectable	Not known	Not 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.

Public Bathing

The CSLAP dataset at Big Bowman Lake, including water chemistry data, physical measurements, and volunteer samplers' perception data, suggests that public bathing, if established at a swimming beach, would be *fully supported*. However, 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 Big Bowman Lake, including water chemistry data, physical measurements, and volunteer samplers' perception data, suggest that swimming, boating, fishing and other non-contact recreation may be *threatened* by nuisance weeds and occasional shoreline blooms associated with elevated nutrients. 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 should be fully supported, although this use may be *threatened* by occasionally elevated pH. Additional data are needed to evaluate the food and habitat conditions for aquatic organisms in the lake.

Aesthetics and Habitat

The CSLAP dataset on Big Bowman Lake, including water chemistry data, physical measurements, and volunteer samplers' perception data, suggest that aesthetics may be *threatened* by occasional shoreline blooms and excessive weed growth, and habitat may be *threatened* by curly-leafed pondweed.

Fish Consumption

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

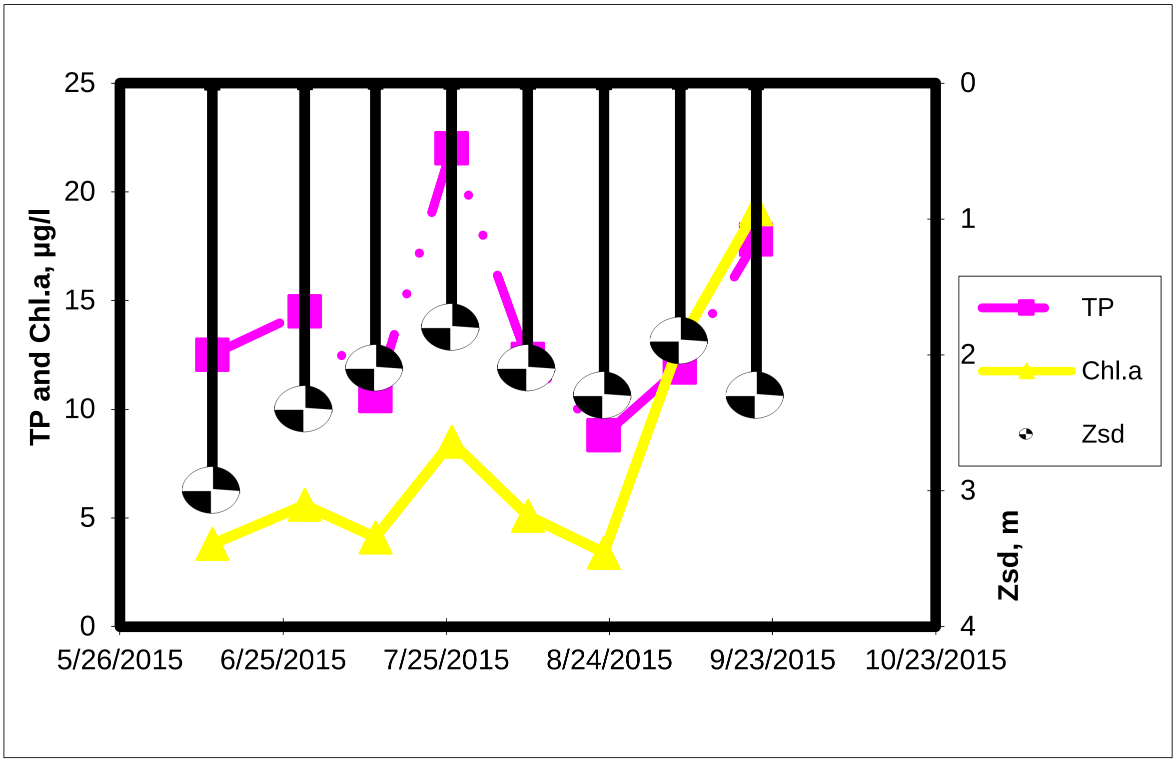
Additional Comments and Recommendations

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). This would include an evaluation about whether curly-leafed pondweed is present.

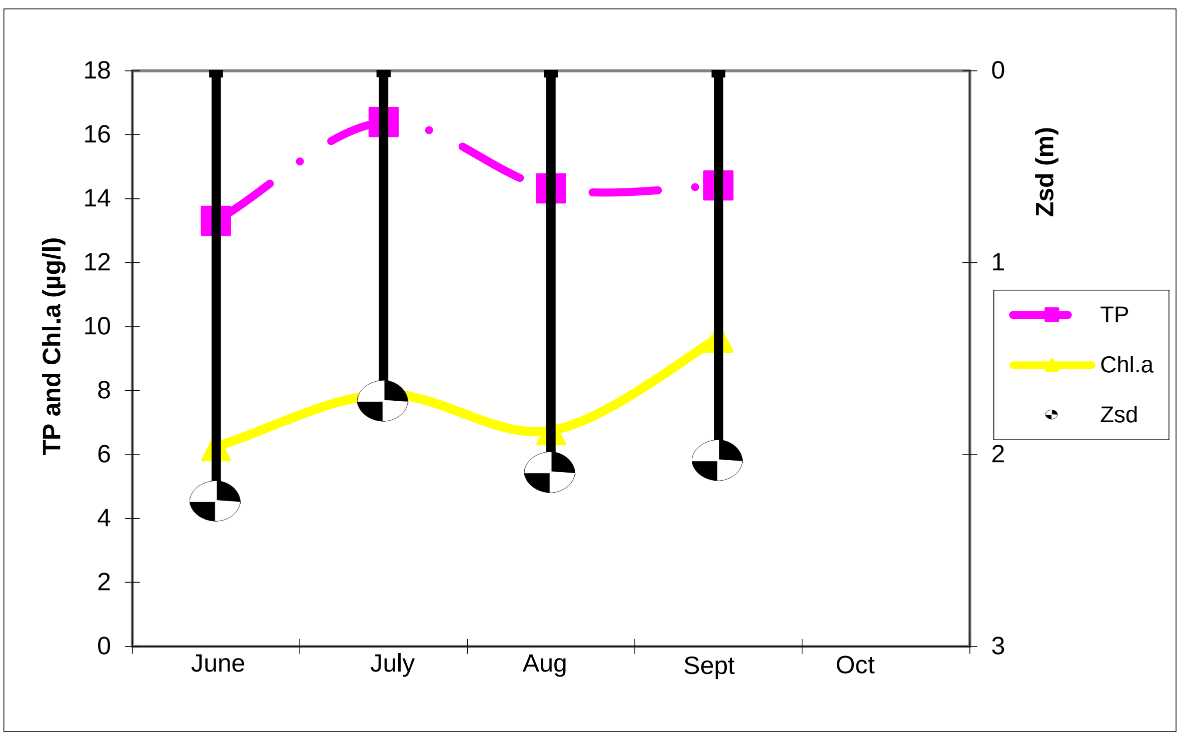
Aquatic Plant IDs-2015

None submitted for identification.

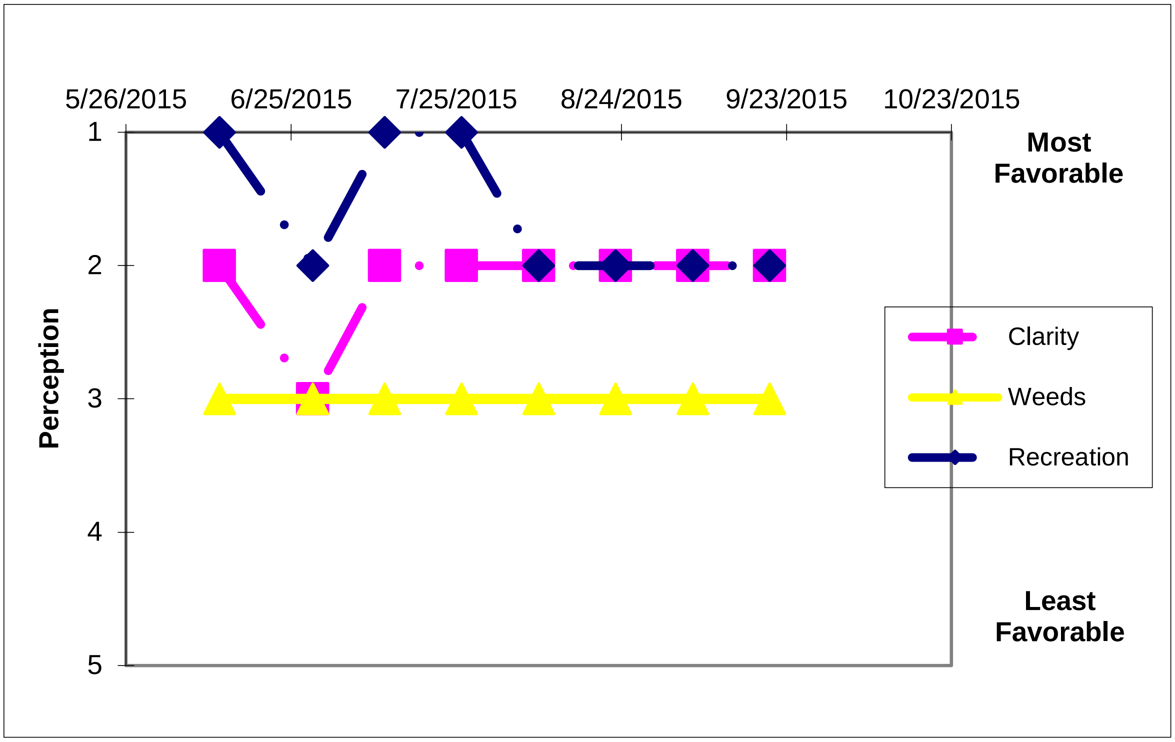
Time Series: Trophic Indicators, 2015



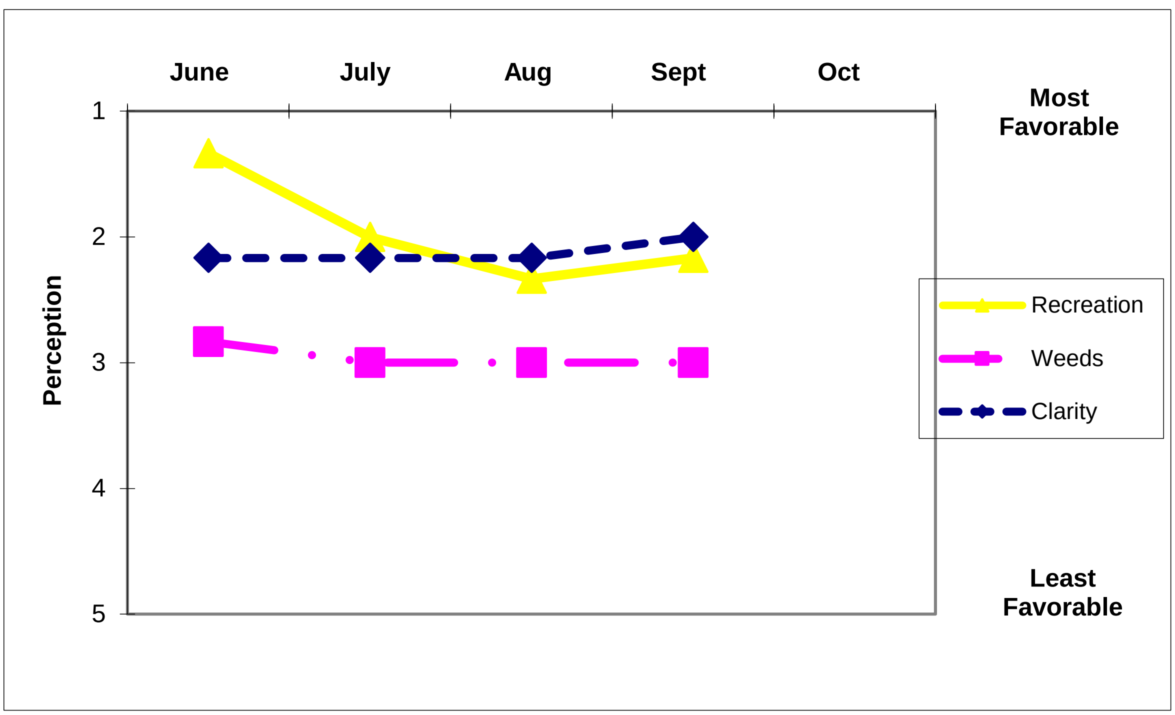
Time Series: Trophic Indicators, Typical Year (2013-2015)



Time Series: Lake Perception Indicators, 2015



Time Series: Lake Perception Indicators, Typical Year (2013-2015)



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	Cl
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	
235	Bowman Lake	6/12/2015	8.0	3.0	1.5	0.013	0.00	0.03	0.21	16.80	15	7.29	160	6.8	3.8	
235	Bowman Lake	6/29/2015	7.2	2.4	1.5	0.015			0.27	18.83	15	8.22	159		5.6	
235	Bowman Lake	7/12/2015	8.0	2.1	1.5	0.011	0.00	0.02	0.33	31.51	17	7.96	135		4.1	39.8
235	Bowman Lake	7/26/2015	8.0	1.8	1.5	0.022			0.36	16.50	27	7.85	152		8.5	
235	Bowman Lake	8/9/2015	7.9	2.1	1.5	0.012	0.01	0.03	0.42	33.74	22	8.31	101	6.7	5.1	
235	Bowman Lake	8/23/2015	7.6	2.3	1.5	0.009			0.41	46.70	25	7.41	172		3.4	
235	Bowman Lake	9/6/2015	7.8	1.9	1.5	0.012	0.00	0.04	0.23	19.08	17	8.61	131		13.1	37.4
235	Bowman Lake	9/20/2015	7.6	2.3	1.5	0.018			0.28	15.51	14	7.29	130		19.2	

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
235	Bowman Lake	6/12/2015	epi	30	25	2	3	1	0	0	0	3.7	0.6	<0.86	<0.027	<0.318	1.5	0.0	I	I
235	Bowman Lake	6/29/2015	epi	23	21	3	3	2	0	0	0	8.6	0.9	<1.01	<0.007	<0.040	3.5	0.0	I	I
235	Bowman Lake	7/12/2015	epi	29	25	2	3	1	0	4	4	9.2	0.6	<0.76	<0.005	<0.028	1.7	0.0	I	I
235	Bowman Lake	7/26/2015	epi	26	25	2	3	1	0	0	0	6.3	1.7	<0.30	<0.002	<0.014	1.3	0.0	I	I
235	Bowman Lake	8/9/2015	epi	23	23	2	3	2	0	0	0	0.1	0.9	<1.13	<0.003	<0.013	2.4	0.0	I	I
235	Bowman Lake	8/23/2015	epi	32	27	2	3	2	0	0	0	0.6	0.3	<0.28	<0.008	<0.021	2.4	0.1	I	I
235	Bowman Lake	9/6/2015	epi	26	24	2	3	2	0	4	0	2.3	1.4				4.2	0.0	I	I
235	Bowman Lake	9/20/2015	epi	17	18	2	3	2	0	0	0	0.1	1.5	<0.30	0.001	<0.035	6.6	0.0	I	I

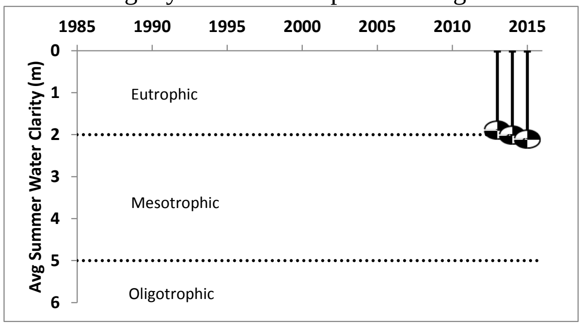
Legend Information

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, 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/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

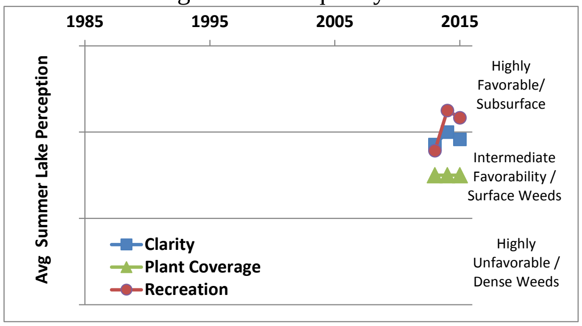
Long Term Trends: Water Clarity

- Too early to detect trends, but slight ↓13-15
- Most readings typical of *eutrophic* lakes, slightly lower than expected w/algae and TP



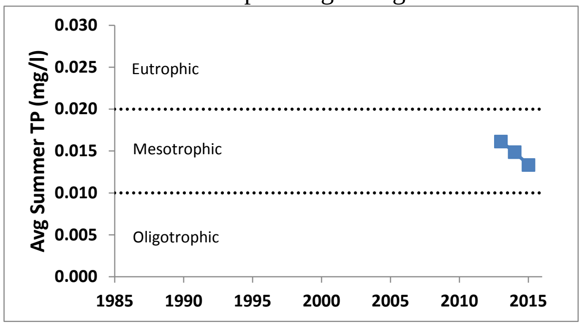
Long Term Trends: Lake Perception

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



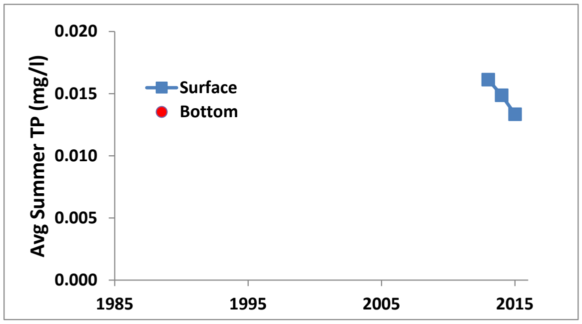
Long Term Trends: Phosphorus

- Too early to detect trends, but slight ↓13-15
- Most readings typical of *mesotrophic* lakes, lower than expected give algae levels



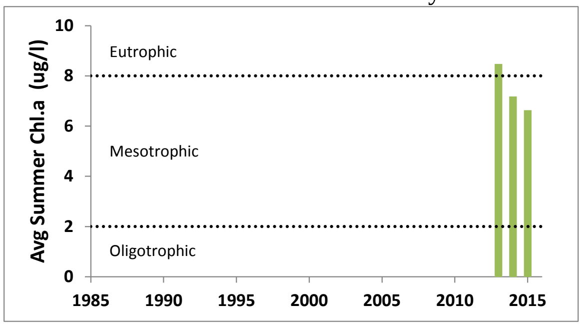
Long Term Trends: Bottom Phosphorus

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



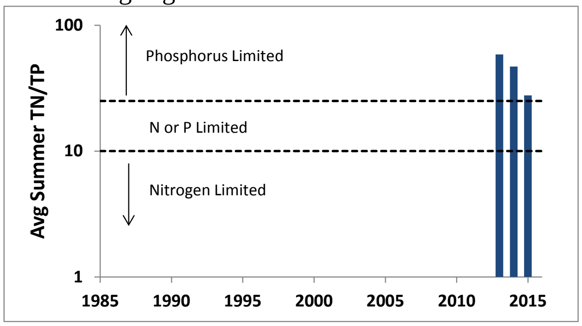
Long Term Trends: Chlorophyll a

- Too early to detect trends, but slight ↓13-15
- Most readings typical of *mesotrophic* lakes, and more consistent with clarity than TP



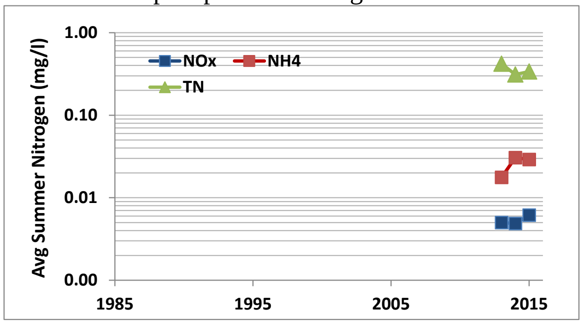
Long Term Trends: N:P Ratio

- Too early to detect trends, but slight ↓13-15
- Most readings indicate phosphorus limits algae growth



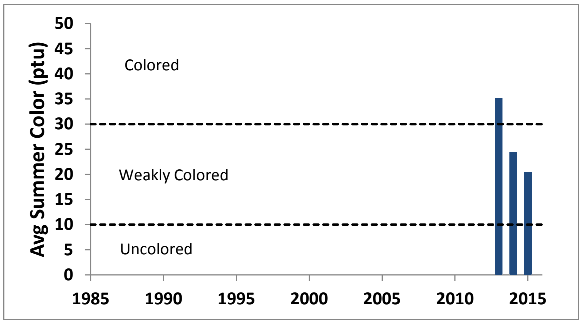
Long Term Trends: Nitrogen

- Too early to detect any trends
- All readings relatively low and consistent with phosphorus readings



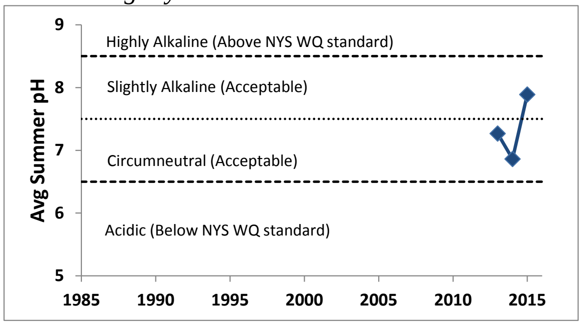
Long Term Trends: Color

- Too early to detect trends, but slight ↓13-15
- Most readings typical of *weakly colored* lakes



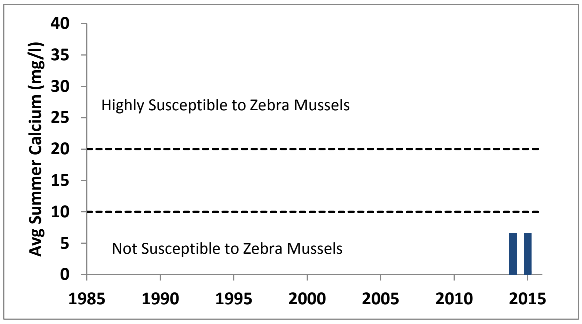
Long Term Trends: pH

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



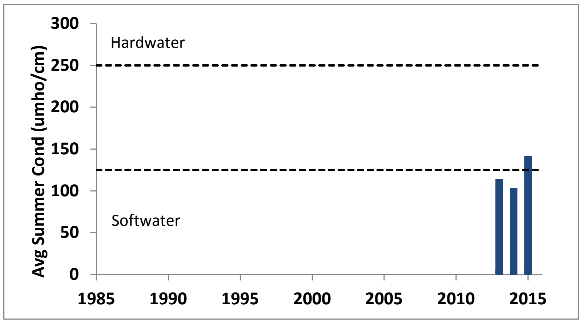
Long Term Trends: Calcium

- Too early to detect any trends
- Readings indicate low susceptibility to zebra mussels



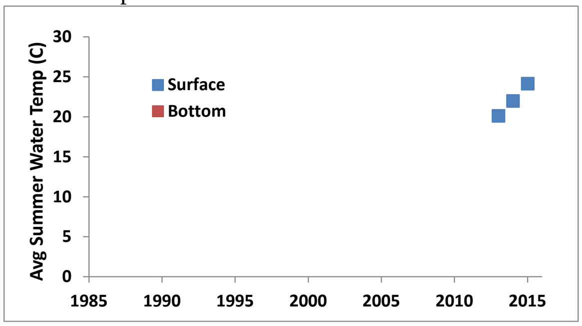
Long Term Trends: Conductivity

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



Long Term Trends: Water Temperature

- Too early to detect trends, but slight ↑13-15
- Water temperatures likely consistent from top to bottom



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.

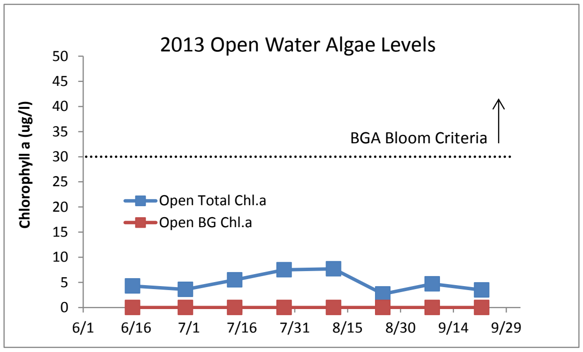


Figure D1:
2013 Open Water Total and BGA Chl.a

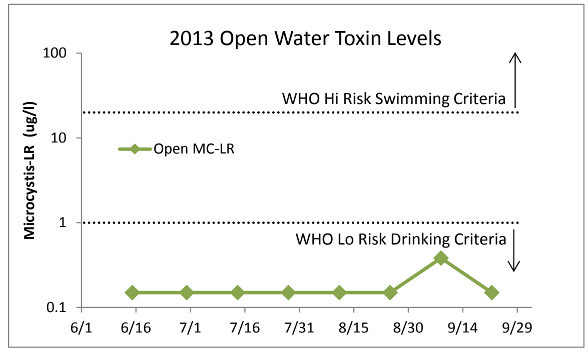


Figure D2:
2013 Open Water Microcystin-LR

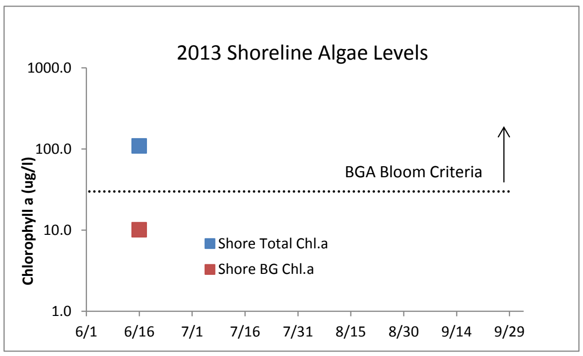


Figure D3:
2013 Shoreline Total and BGA Chl.a

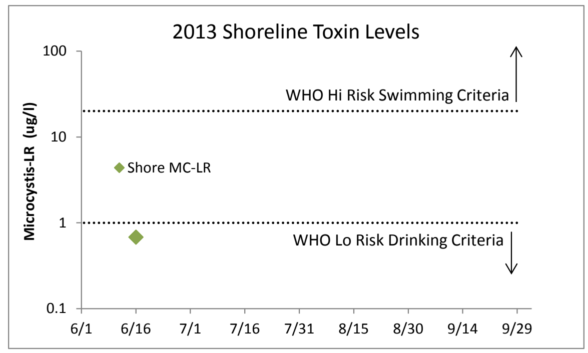


Figure D4:
2013 Shoreline Microcystin-LR

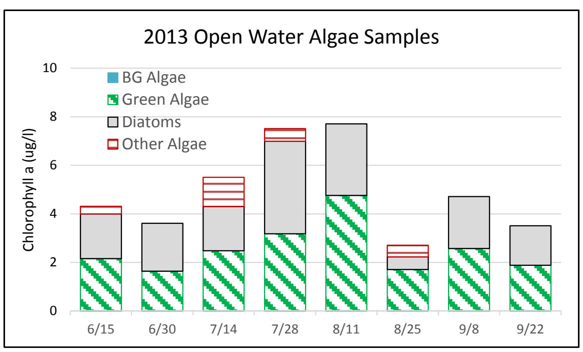


Figure D5:
2013 Open Water Algae Types

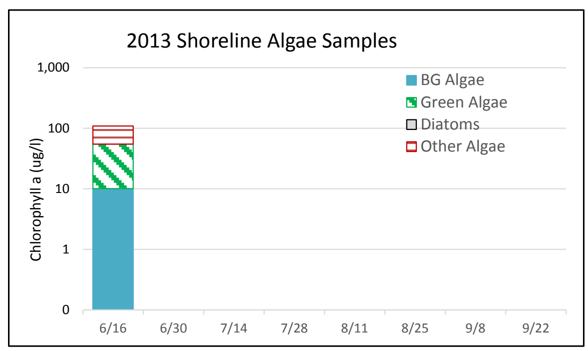


Figure D6:
2013 Shoreline Algae Types

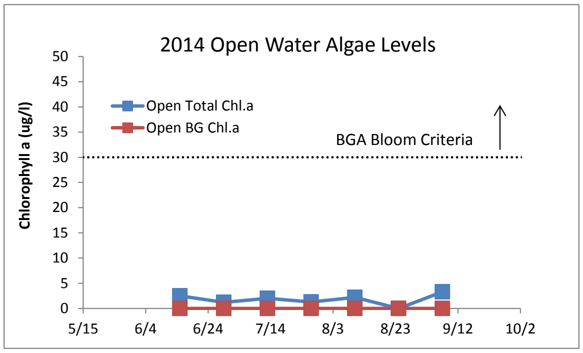


Figure D7:
2014 Open Water Total and BGA Chl.a

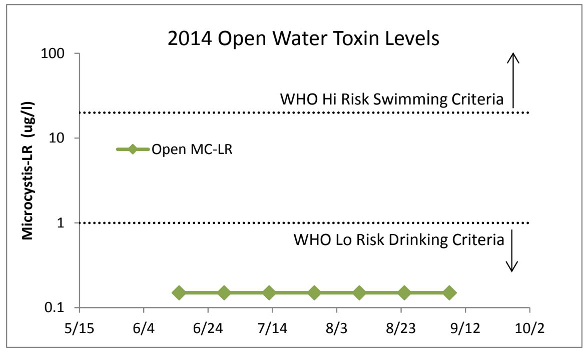


Figure D8:
2014 Open Water Microcystin-LR

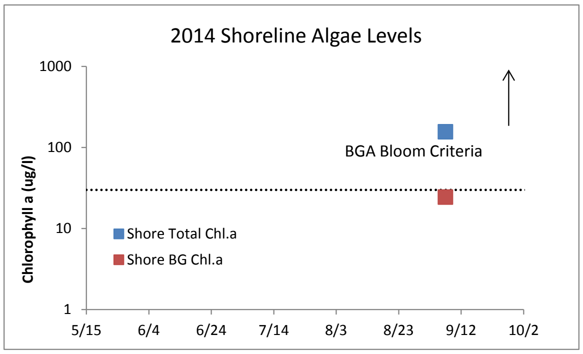


Figure D9:
2014 Shoreline Total and BGA Chl.a

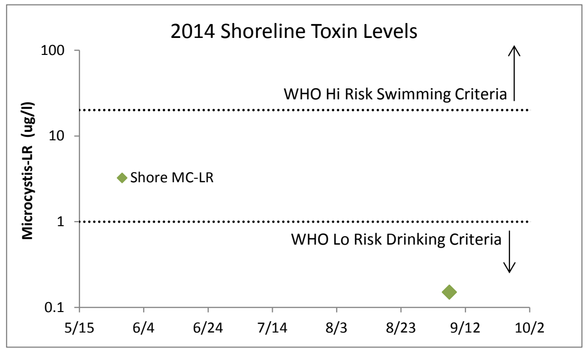


Figure D10:
2014 Shoreline Microcystin-LR

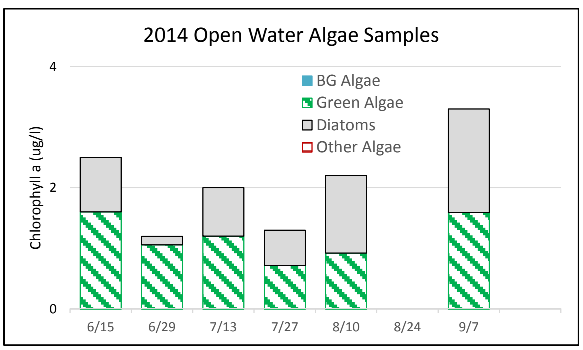


Figure D11:
2014 Open Water Algae Types

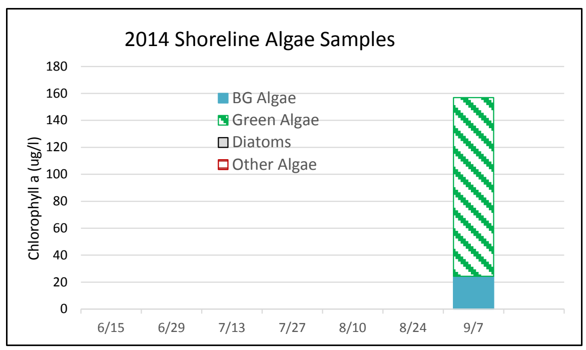


Figure D12:
2014 Shoreline Algae Types

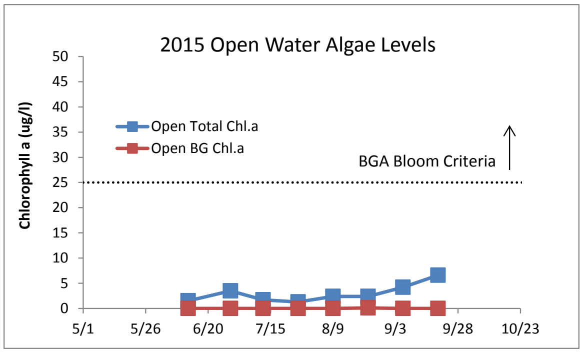


Figure D13:
2015 Open Water Total and BGA Chl.a

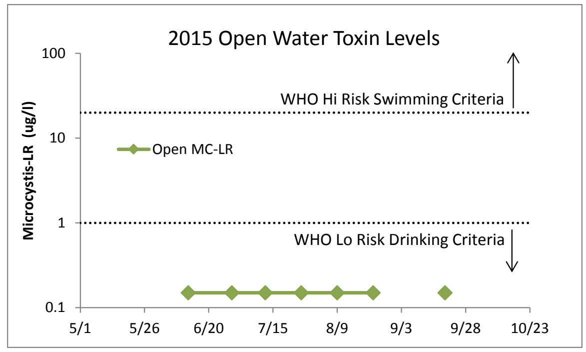


Figure D14:
2015 Open Water Microcystin-LR

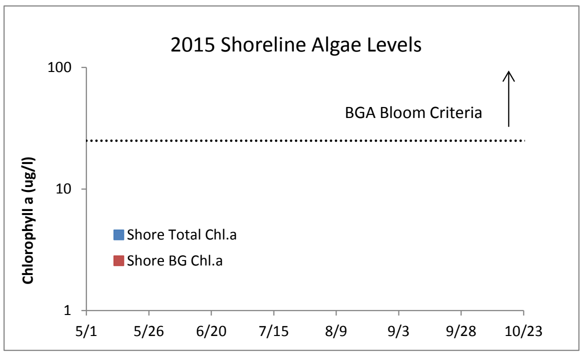


Figure D15:
2015 Shoreline Total and BGA Chl.a

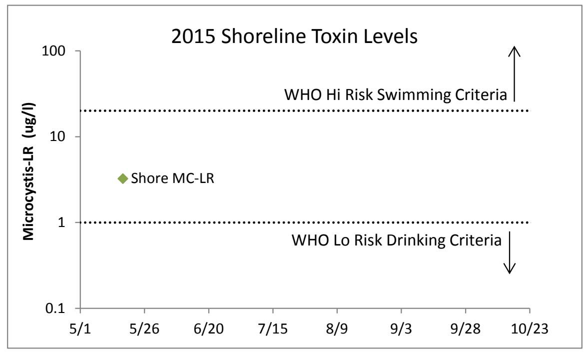


Figure D16:
2015 Shoreline Microcystin-LR

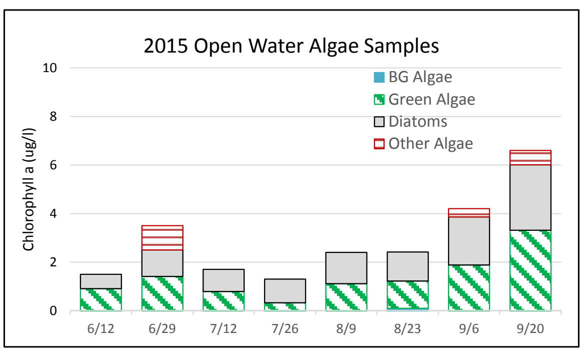


Figure D17:
2015 Open Water Algae Types

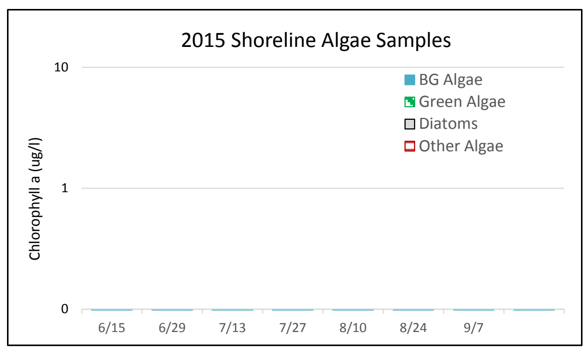


Figure D18:
2015 Shoreline Algae Types

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).

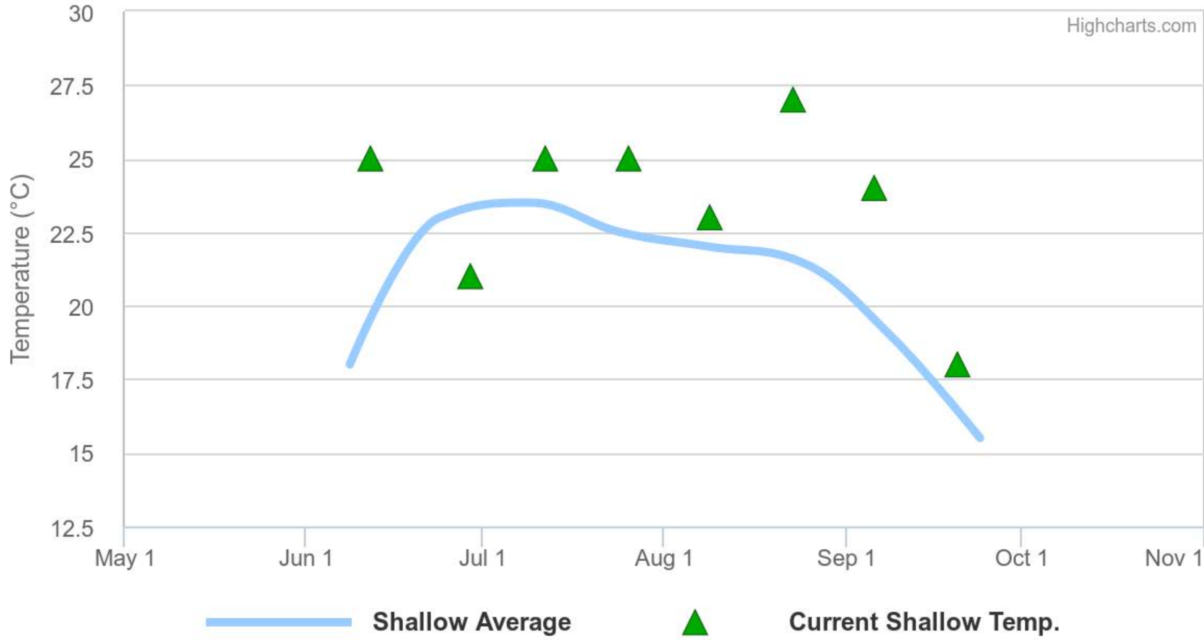
This list is not complete, but instead represents only those species that have been reported and verified within the county. If any additional aquatic invasive species (AIS) are known or suspected in these or other waterbodies in the county, this information should be reported through iMap invasives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

Aquatic Invasive Species - Rensselaer County			
Waterbody	**Kingdom**	**Common name**	**Scientific name**
Big Bowman Pond	Plant?	Curly-leafed pondweed?	*Potamogeton crispus?*
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*

Waterbody	Kingdom	Common name	Scientific name
Hudson River	Plant	Water chestnut	*Trapa natans*
Hudson River (Schodack Island Park)	Plant	Eurasian watermilfoil	*Myriophyllum spicatum*
Johnsonville Reservoir	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*
Pine Lake	Plant	Water chestnut	*Trapa natans*
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*
Tomhannock Lake	Plant	Water chestnut	*Trapa natans*
Troy Reservoir	Plant	Eurasian watermilfoil	*Myriophyllum spicatum*
Vanderhyden Reservoir	Plant	Eurasian watermilfoil	*Myriophyllum spicatum*

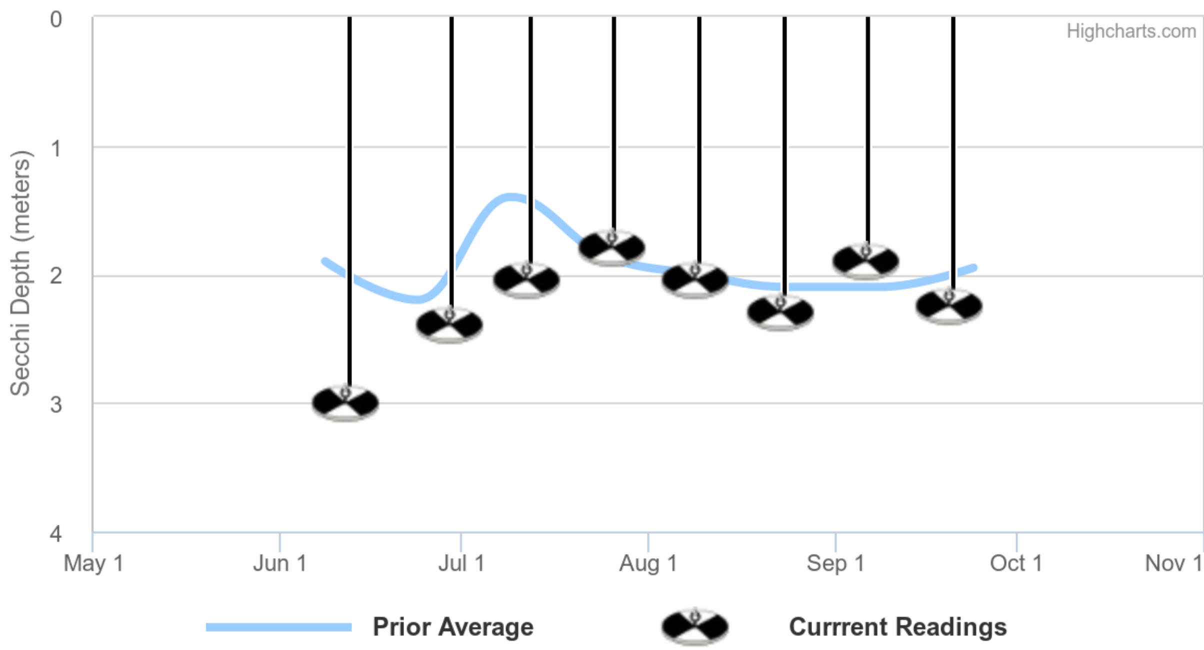
Appendix F: Current Year vs. Prior Averages for Big Bowman Lake

Current Year Water Temperatures vs. Prior Average



There are not enough shallow water sample temperatures to determine a trend for the current year when compared to the average of readings collected from 2013 to 2014.

Current Year Secchi Readings vs. Prior Average



There are not enough session Secchi readings to determine a trend for the current year when compared to the average of readings collected from 2013 to 2014.

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.