Buckingham Lake Questions and Answers, 2014 CSLAP

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

A1. Buckingham Lake continues to be typical of small urban lakes, with low water clarity and elevated algae levels. Open water and shoreline blooms occasionally are comprised of blue green algae. The conditions in 2014 were similar to those in previous years. The lake would not be a good candidate for contact recreation (swimming).

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

A2. The HABs testing includes information about the types of algae found in the water samples. These results showed low algae levels and algae communities that are comprised of a variety of algae types, with an increasing likelihood of blue green algae when overall algae levels rise.

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

A3. Buckingham Lake has lower water clarity, higher algae and nutrient levels, and more frequent blooms, than other nearby lakes. However, these conditions are typical of other small, shallow, urban lakes.

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

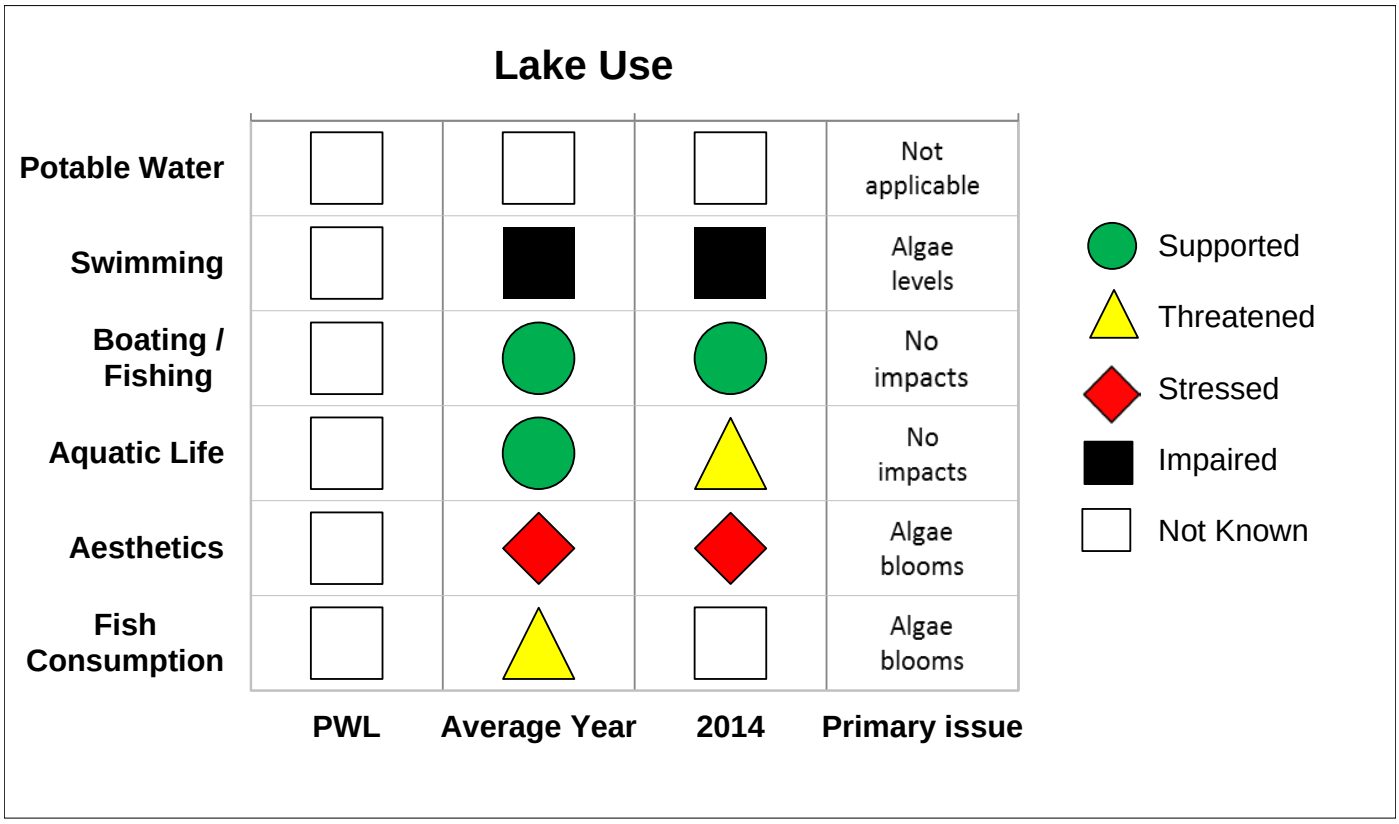
A4. Trends cannot be evaluated with only four years of water quality data. It is likely that the small differences from year to year represent normal variability.

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

A5. Buckingham Lake already exhibits low water clarity with high nutrient and algae levels. It appears to be dominated more by algae than by weeds. A reduction in nutrients is needed to improve lake conditions.

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 will help to restore highly favorable lake conditions by reducing nutrient and sediment loading to the lake.



CSLAP 2014 Lake Water Quality Summary:
Buckingham Pond

General Lake Information

Location	Albany
County	Albany
Basin	Lower Hudson River
Size	1.7 hectares (4.2 acres)
Lake Origins	man made
Watershed Area	135.9 hectares (336.0 acres)
Retention Time	0.1 years
Mean Depth	1.0 meters
Sounding Depth	1.5 meters
Public Access?	yes – playground, walking path, and seasonal ice skating
Major Tributaries	None
Lake Tributary To…	None
WQ Classification	C
Lake Outlet Latitude	42.663880
Lake Outlet Longitude	-73.807712
Sampling Years	2011-2014
2014 Samplers	John Caplis, Felton McLaughlin, Harry Ermides
Main Contact	Harry Ermides

Lake Map

Background

Buckingham Pond is a 4 acre waterbody found in the city of Albany in Albany County, in the Capital District region of New York State. The lake was first sampled as part of CSLAP in 2011.

It is one of 3 CSLAP lakes among the more than 30 lakes found in Albany County, and one of 67 CSLAP lakes among the more than 350 lakes and ponds in the Lower Hudson River drainage basin

Lake Uses

Buckingham Pond is a Class C lake—this means that the best intended use for the lake is for non-contact recreation—boating and fishing, aquatic life, and aesthetics. The lake is used by lake residents and invited guests for a variety of recreational purposes, including ice skating, picnicking, and other passive activities.

Buckingham Pond has not been stocked through any state fisheries stocking programs, but it is not known if any private stocking has occurred.

General statewide fishing regulations are applicable in Buckingham Pond.

There are no lake-specific fish consumption advisories on Buckingham Pond.

Historical Water Quality Data

CSLAP sampling was conducted on Buckingham Pond for the first time in 2011. The CSLAP report and scorecard for the lake can be found on the NYSFOLA website at http://nysfola.mylaketown.com and on the NYSDEC web page at http://www.dec.ny.gov/lands/77821.html.

Darrin Freshwater Institute conducted a brief study of the lake in 1998 to evaluate invasive and nuisance plant populations and provide recommendations about appropriate management actions. No water quality sampling was conducted as part of this study.

The CSLAP volunteers from Buckingham Pond participated in the 2013 DEC-Cornell pesticides study looking at whether lakes and ponds exhibit measurable pesticides levels after storm events. It is anticipated that the results from that study will be available sometime in 2015.

Lake Association and Management History

Buckingham Pond is served by the Buckingham Pond Conservancy, whose mission is “to coordinate existing resources and identify new resources devoted to protecting, preserving, and enhancing Buckingham Pond and its surrounding green space.” The Conservancy works with the City of Albany, Albany County, Siena College and other entities to carry out its mission, and has recently worked on a variety of lake and watershed management actions, including water quality monitoring through CSLAP, purple loosestrife control, lakeside cleanup, shoreline erosion control, and walking path maintenance.

Summary of 2014 CSLAP Sampling Results

Evaluation of 2014 Annual Results Relative to 2011-2013

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 – Buckingham Pond" section in Appendix C.

Evaluation of Eutrophication Indicators

Each of the trophic indicators- Secchi disk transparency, chlorophyll a, and total phosphorus- was close to normal in 2014. Phosphorus readings have decreased slightly over the last four years, but it is premature to identify this as a trend. Nutrient levels are high enough to indicate a susceptibility to open water and shoreline blooms, although many of these blooms are comprised of green algae, particularly in the open water.

Lake productivity increases slightly during most summers, resulting in a decrease in water clarity as nutrient and algae levels increase. This also occurred in 2014, although the change in productivity over the summer is small relative to the overall nutrient and algae levels in the lake.

Algae levels were significantly higher two weeks after the copper sulfate treatment in late June of 2014 (than before the treatment), but algae levels dropped shortly after the late August copper treatment and stayed low throughout the rest of the sampling season. The rise in algae levels after the June treatment corresponded to a big rain event.

These data indicate that the lake can be characterized as *eutrophic*, or highly productive, based on Secchi disk transparency, chlorophyll *a*, and total phosphorus readings. The trophic state index (TSI) evaluation suggests that algae levels are lower than expected given the water clarity and phosphorus levels in the lake. This indicates that the phosphorus loading to the lake may be comprised of forms not conducive to algae growth, and that water clarity is also affected by sediment or other turbidity. Overall trophic conditions are summarized in the Lake Scorecard and Lake Condition Summary Table.

Evaluation of Potable Water Indicators

Algae levels are high 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 this 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 were higher in 2013 and in 2014 than in previous years, although these readings continue to be indicative of alkaline lakes. Color and total nitrogen readings were lower than normal in 2014, and both have decreased slightly over the last four year. Calcium and conductivity readings have also decreased slightly over this period. However, although trends cannot be well evaluated in four years, it is likely that these small changes are within the normal range of variability for the lake. Overall limnological conditions are summarized in the Lake Scorecard and Lake Condition Summary Table.

Evaluation of Biological Condition

Phytoplankton, zooplankton, and macrophyte data have not been collected through CSLAP at Buckingham Pond. The fluoroprobe screening data analyzed by SUNY ESF in the last four years found low blue green algae levels in most open water samples, even when overall algae levels are high. Most algae samples are comprised of a mix of algae, particularly green algae. Shoreline blooms at times were dominated by blue green algae in each of the last three years, particularly when algae levels are highest. Toxin levels were very low in nearly all samples, although there may remain some risk to pets (as described below).

The limited macrophyte surveys conducted by Darrin Freshwater Institute found only a few aquatic plant species, including two invasive aquatic plants (*Trapa natans*, or water chestnut, and *Potamogeton crispus*, or curly leafed pondweed). The Conservancy also reports the presence of *Lythrum salicaria*, or purple loosestrife. *Lemna minor*, or duckweed, a native nuisance species, is also present. As a result, the modified floristic quality index (FQI) indicates that the quality of the aquatic plant community is "poor".

Fish information cited on the DEC website (http://www.dec.ny.gov/docs/fish_marine_pdf/bckhmlkmap.pdf) indicates the presence of bluegill, largemouth bass, and pumpkinseed sunfish. This suggests that the lake is primarily a warmwater fishery.

The lake was sampled by the NYSDEC in 2012 as part of the state biomonitoring study, evaluating the relationship between benthic macroinvertebrates and lake condition. These results continue to be evaluated. Chinese mystery snail (*Bellamya chinensis*) has also been reported in the lake.

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

Evaluation of Lake Perception

Recreational and water quality assessments were close to normal in 2014, mostly consistent with similar water quality conditions. These assessments did not change in response to the copper sulfate treatments. Many of these least favorable assessments were associated with water quality assessments indicating that the lake "looks bad" or perceived poor water clarity. These assessments varied as plant coverage changed in 2014. Plant coverage was greater in 2014, but were likely dominated by native plants during most of the year. Overall lake perception is summarized in the Lake Scorecard and Lake Condition Summary Table.

Evaluation of Local Climate Change

With so little water temperature readings, local climate change cannot be easily evaluated, and no clear changes were apparent in the four years of CSLAP sampling. Temperature readings were similar in all three CSLAP sampling seasons.

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 readings regularly fall below the levels indicating susceptibility for harmful algal blooms (HABs). However, the fluoroprobe screening data in the last three years indicate occasional algal blooms,

although both open water and shoreline algae communities are usually not associated with blue green algae. The highest algae levels are at times associated with blue green algae. The toxicological analysis of algae samples indicated microcystin levels below the levels needed to support safe swimming in both open water and within shoreline blooms. Highly elevated h-anatoxin in mid June 2013 bloom sample may not be accurate, but serves as a reminder that pets should avoid direct contact with shoreline scums or discolored water.

Lake Condition Summary

Category	Indicator	Min	11-14 Avg	Max	2014 Avg	Classification	2014 Change?	Long-term Change?
Eutrophication Indicators	Water Clarity	0.40	1.19	1.94	1.17	Eutrophic	Within Normal Range	Not yet known
	Chlorophyll *a*	1.20	12.13	29.80	12.90	Eutrophic	Within Normal Range	Not yet known
	Total Phosphorus	0.030	0.073	0.261	0.062	Eutrophic	Within Normal Range	Not yet known
Potable Water Indicators	Hypolimnetic Ammonia							Not known
	Hypolimnetic Arsenic							Not known
	Hypolimnetic Iron							Not known
	Hypolimnetic Manganese							Not known
Limnological Indicators	Hypolimnetic Phosphorus							Not known
	Nitrate + Nitrite	0.00	0.02	0.15	0.01	Low NOx	Within Normal Range	Not yet known
	Ammonia	0.02	0.06	0.32	0.04	Low Ammonia	Within Normal Range	Not yet known
	Total Nitrogen	0.29	0.73	1.56	0.50	Intermediate Total Nitrogen	Lower Than Normal	Not yet known
	pH	7.10	7.57	8.44	7.78	Alkaline	Higher than Normal	Not yet known
	Specific Conductance	353	613	918	634	Hardwater	Within Normal Range	Not yet known
	True Color	8	30	79	17	Intermediate Color	Lower Than Normal	Not yet known
	Calcium	22.7	36.3	46.6		Highly Susceptible to Zebra Mussels		Not yet known
Lake Perception	WQ Assessment	1	2.3	4	2.1	Not Quite Crystal Clear	Within Normal Range	Not yet known
	Aquatic Plant Coverage	1	1.2	2	1.5	Plants Not Visible	Less Favorable than Normal	Not yet known
	Recreational Assessment	1	2.3	3	2.2	Excellent	Within Normal Range	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					Poor quality of the aquatic plant community	Not known	Not known
	Zooplankton					Not measured through CSLAP	Not known	Not known
	Macroinvertebrates					2012 DEC study results not yet available	Not known	Not known
	Fish					Warmwater fishery	Not known	Not known
	Invasive Species					Chinese mystery snail; Water chestnut, curly-leafed pondweed	Not known	Not known
Local Climate Change	Air Temperature	14	22.8	30	26.2		Higher Than Normal	Not yet known
	Water Temperature	14	23.8	29	26.2		Higher Than Normal	Not yet known

Category	Indicator	Min	11-14 Avg	Max	2014 Avg	Classification	2014 Change?	Long-term Change?
Harmful Algal Blooms	Open Water Phycocyanin	1	8	26	4	No readings indicate high risk of BGA	Not known	Not known
	Open Water FP Chl.a	0	35	539	8	Most readings indicate high algae levels	Not known	Not known
	Open Water FP BG Chl.a	0	1	34		Few readings indicate high BGA levels	Not known	Not known
	Open Water Microcystis	<DL	0.2	0.8	<0.30	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
	Shoreline FP Chl.a	4	123	722	111	Most readings indicate high algae levels	Not known	Not known
	Shoreline FP BG Chl.a	0	24	118	22	Most readings indicate high BGA levels	Not known	Not known
	Shoreline Microcystis	<DL	0.6	2.3	<DL	Mostly undetectable 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

Buckingham Pond has not been evaluated as part of the Lower Hudson River basin Priority Waterbody List (PWL) assessments.

Potable Water (Drinking Water)

The CSLAP dataset at Buckingham Pond, 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 moderate to high algae levels indicate than any "unofficial" potable water use would be compromised.

Contact Recreation (Swimming)

The CSLAP dataset at Buckingham Pond, including water chemistry data, physical measurements, and volunteer samplers' perception data, suggests that swimming and contact recreation are *impaired* by low water clarity, elevated algae levels, and elevated nutrient levels. It should be noted that contact recreation use is not presently supported in the lake.

Non-Contact Recreation (Boating and Fishing)

The CSLAP dataset on Buckingham Pond, including water chemistry data, physical measurements, and volunteer samplers' perception data, suggest that non-contact recreation should be fully supported.

Aquatic Life

The CSLAP dataset on Buckingham Pond, including water chemistry data, physical measurements, and volunteer samplers' perception data, suggest that aquatic life may be *threatened* by the presence of invasive aquatic plants and animals. Additional data are needed to evaluate the food and habitat conditions for aquatic organisms in the lake.

Aesthetics

The CSLAP dataset on Brantingham Pond, including water chemistry data, physical measurements, and volunteer samplers' perception data, suggest that aesthetics may be *stressed*

by shoreline algae blooms, although as noted before, these blooms are usually not comprised of blue-green algae.

Fish Consumption

There are no fish consumption advisories posted for Brantingham Pond.

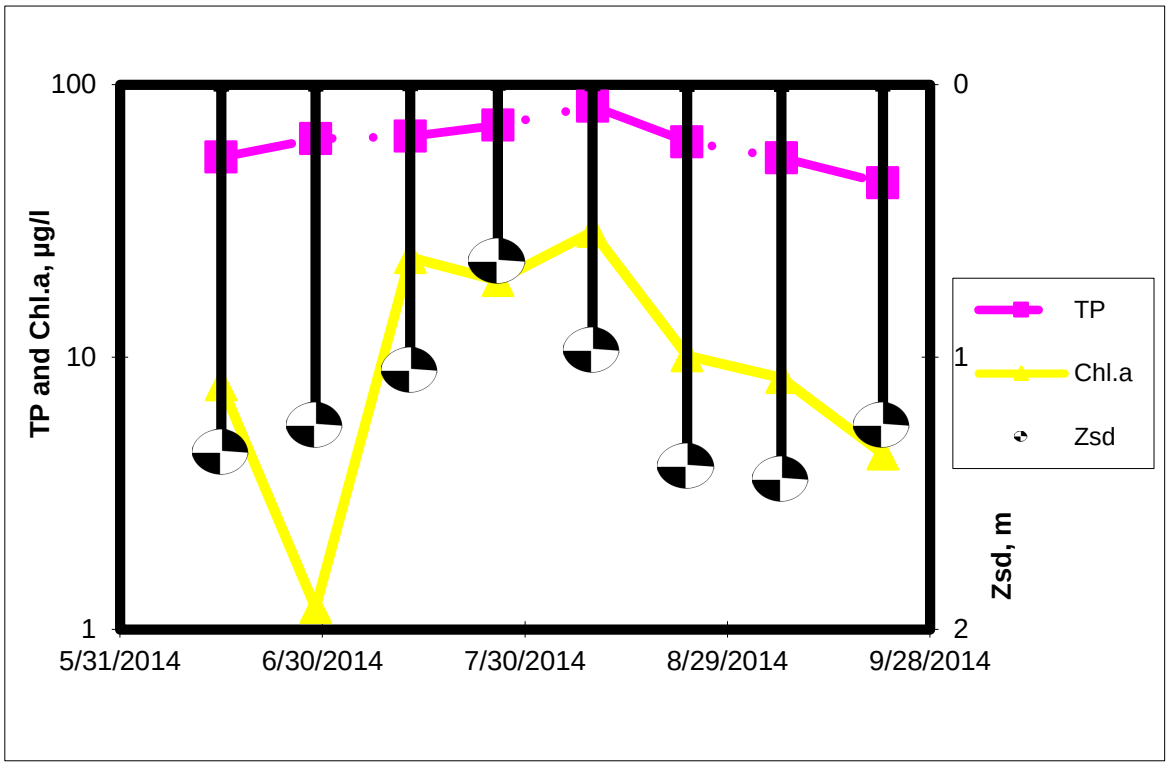
Additional Comments and Recommendations

Additional CSLAP data and information from other sources may help to determine if the evaluations associated with the first three years of CSLAP data are representative of normal conditions in the lake. An evaluation of the DEC biomonitoring data will provide some additional information about the biological health of the lake. Lake residents, visitors and pets should continue to avoid direct exposure to shoreline blooms or discolored water.

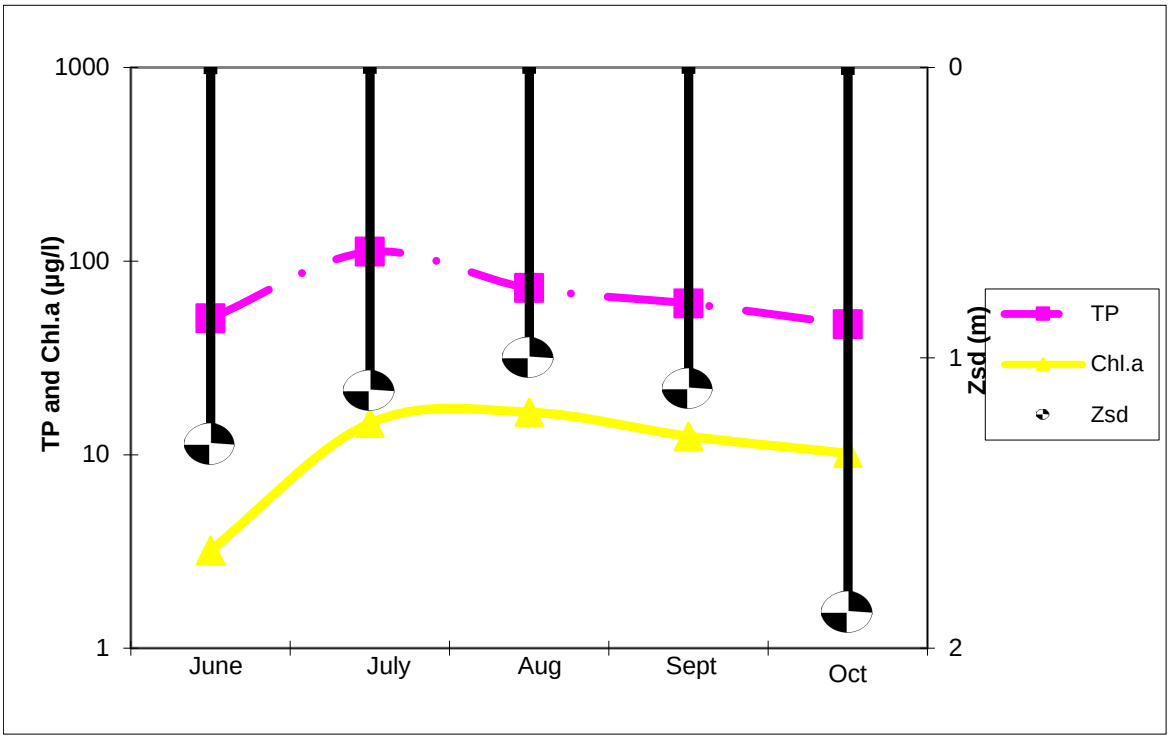
Aquatic Plant IDs-2014

No aquatic plants submitted for identification in 2014.

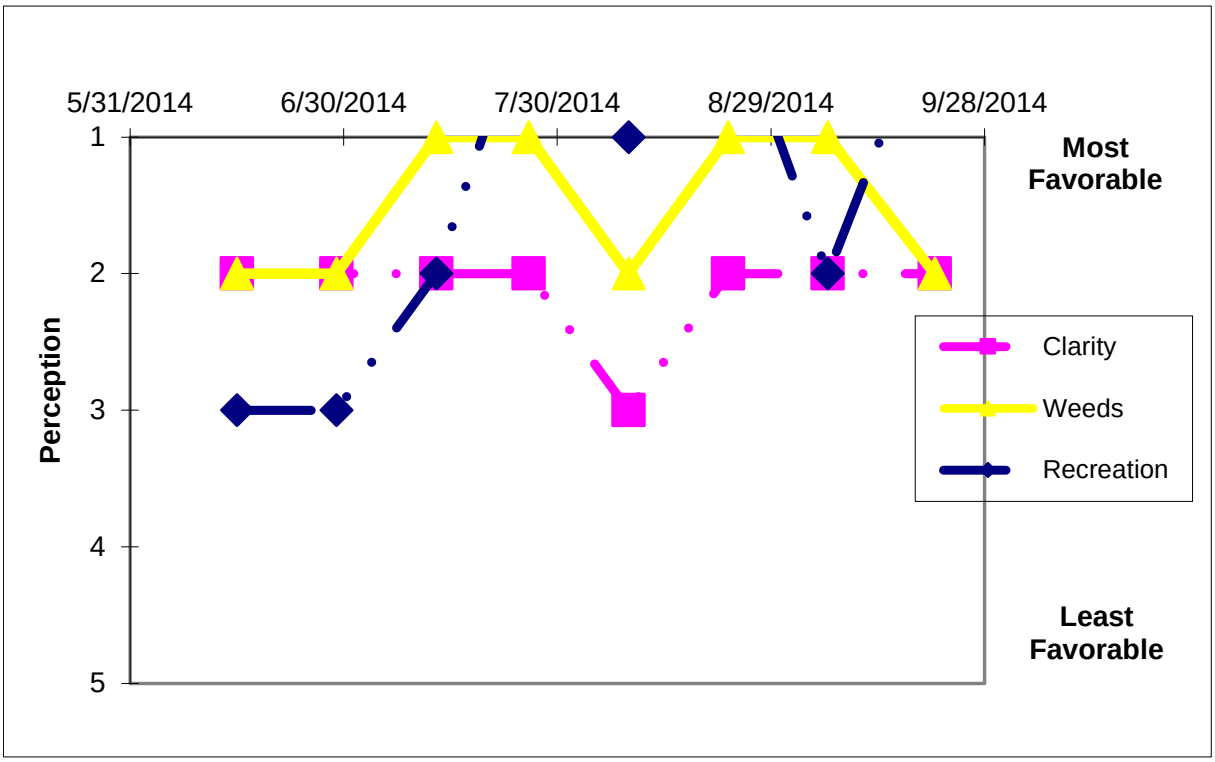
Time Series: Trophic Indicators, 2014



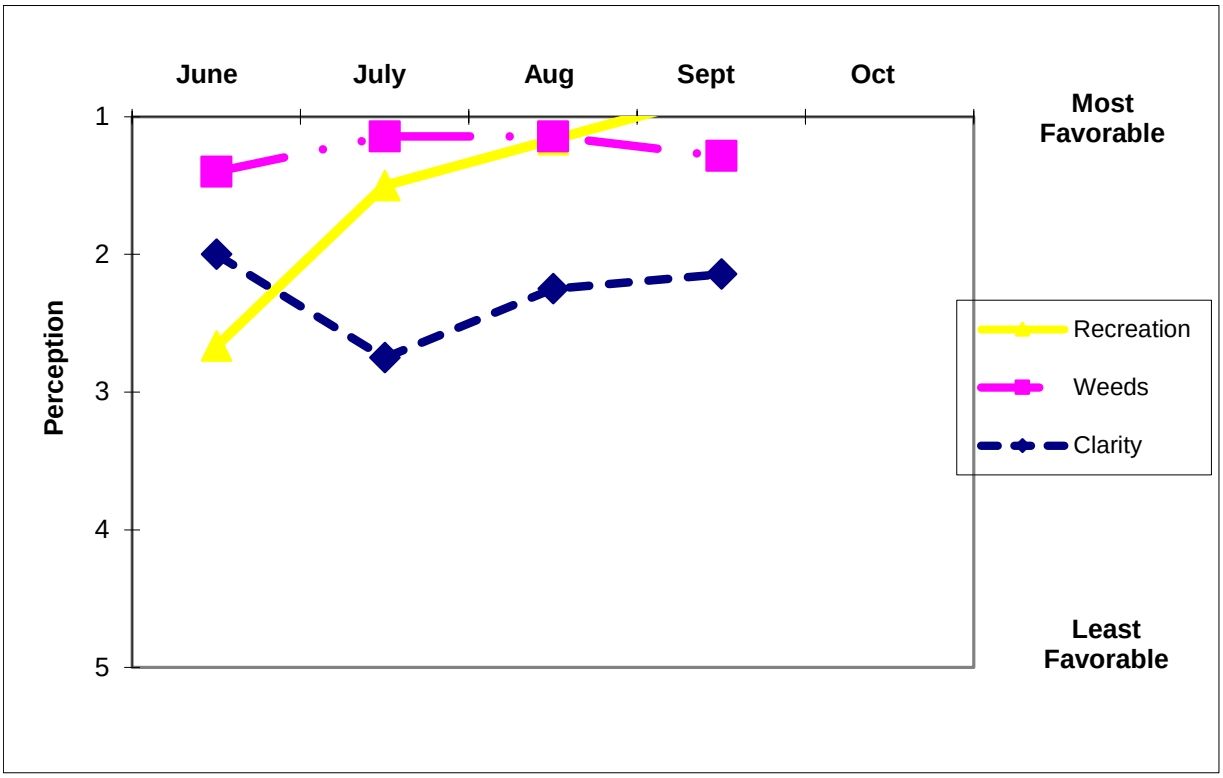
Time Series: Trophic Indicators, Typical Year (2011-2014)



Time Series: Lake Perception Indicators, 2014



Time Series: Lake Perception Indicators, Typical Year (2011-2014)



Appendix A- CSLAP Water Quality Sampling Results for Buckingham Lake

LNum	PName	Date	Zbot	Zsd	Zsamp	Tot.P	NO3	NH4	TDN	TN/TP	TColor	pH	Cond25	Ca	Chl.a
231	Buckingham Pond	6/25/2011	1.8	0.87	1.5	0.063	0.03	0.02	0.49	17.07	61	7.19	918	46.6	1.60
231	Buckingham Pond	7/9/2011	1.7	1.65	1.5	0.261	0.04	0.03	1.56	13.15	24	7.35	678		4.80
231	Buckingham Pond	7/22/2011	1.7	1.45		0.043	0.03	0.11	0.68	35.00	25	7.18	785		2.80
231	Buckingham Pond	7/22/2011	grab		Bloom										
231	Buckingham Pond	8/6/2011	1.9	1.20	1.5	0.055	0.15	0.04	0.64	25.63	26	7.35	899		10.00
231	Buckingham Pond	8/20/2011	1.9	1.20	1.5	0.054	0.01	0.02	0.85	34.99	31	7.13	665	44.9	18.80
231	Buckingham Pond	9/10/2011	2.0	1.53		0.049	0.11	0.14	0.52	23.49	23	7.46	380		1.70
231	Buckingham Pond	9/14/2011	2.0	1.63	1.5	0.036	0.06	0.06	0.49	29.93	50	7.41	411		11.50
231	Buckingham Pond	9/14/2011	grab		bloom										
231	Buckingham Pond	10/8/2011	2.0	1.94		0.031	0.01	0.03	0.51	35.91	24	7.11	473		6.00
231	Buckingham Pond	7/14/2012	1.8	1.65	1.5	0.119	0.01	0.03	1.25	23.21	67	7.34	675.5	34.2	22.00
231	Buckingham Pond	7/28/2012	1.9	0.90	1.7	0.122	0.01	0.02	0.99	17.91	28	7.35	617.6		18.20
231	Buckingham Pond	8/11/2012	1.8	0.50	1.5	0.121	0.01	0.03	0.93	16.91	16	7.6	544.1		9.10
231	Buckingham Pond	8/25/2012	1.9	1.73		0.087	0.01	0.03	0.93	23.67	79	7.22	490.1		28.40
231	Buckingham Pond	9/8/2012	2.0	0.40	1.5	0.098	0.01	0.03	0.82	18.38	31	7.92	822.9	36.4	17.70
231	Buckingham Pond	9/22/2012	2.0	1.30	1.5	0.065	0.01	0.05	1.29	43.73	35	7.74	352.5		14.40
231	Buckingham Pond	10/6/2012	2.0	1.75	1.5	0.060	0.01	0.03	0.77	28.30	40	7.18	636		17.30
231	Buckingham Pond	10/20/2012	2.0	1.94	1.5	0.050	0.03	0.08	0.76	33.33	16	7.41	462.7		7.20
231	Buckingham Pond	7/14/2012			bloom										
231	Buckingham Pond	7/28/2012			bloom										
231	Buckingham Pond	8/25/2012													
231	Buckingham Pond	6/15/2013	1.8	1.75	1.5	0.031	0.03	0.32	0.87	62.26		7.67	774.1		3.70
231	Buckingham Pond	6/29/2013	1.9	1.28	1.5	0.041			0.49	26.02	61	8.04	802.2		1.60
231	Buckingham Pond	7/13/2013	0.5		0.3	0.128	0.01	0.02	0.74	12.75	18	7.71	628.5		11.60
231	Buckingham Pond	7/27/2013	1.9	0.45	1.5	0.083			0.74	19.58	26	7.95	561.6		
231	Buckingham Pond	8/10/2013	1.9	0.55	1.5	0.030	0.02	0.04	0.88	64.38	37	7.57	449.2		
231	Buckingham Pond	8/24/2013	1.9	0.45	1.5	0.087			0.83	21.09	21	7.63	468.5		10.80
231	Buckingham Pond	9/7/2013	1.9	0.55	1.5	0.087	0.01	0.03	0.62	15.56	30	7.78	625		29.80
231	Buckingham Pond	6/15/2013			bloom										
231	Buckingham Pond	6/30/2013			bloom										
231	Buckingham Pond	7/13/2013			bloom										
231	Buckingham Pond	7/27/2013			bloom										
231	Buckingham Pond	8/24/2013			bloom										
231	Buckingham Pond	9/7/2013			bloom										
231	Buckingham Pond	9/21/2013			bloom										
231	Buckingham Pond	9/21/2013	1.9	0.75	1.5	0.050			0.65	28.77	26	7.55	436.8		11.80
231	Buckingham Pond	6/15/2014	1.9	1.35	1.5	0.054	0.0045	0.018	0.466	18.915129	15	7.1	625.4	33.2	7.9
231	Buckingham Pond	6/29/2014	1.8	1.25	1.5	0.063			0.485	16.829653	45	8.16	855.4		1.2
231	Buckingham Pond	6/29/2014			bloom										
231	Buckingham Pond	7/13/2014	1.9	1.05	1.5	0.065	0.016	0.093	0.703	23.904173	17	7.23	726.3		23.2
231	Buckingham Pond	7/13/2014			bloom										
231	Buckingham Pond	7/26/2014	1.9	0.65	1.5	0.071			0.545	16.887324	10	8.44	723.7		19.1
231	Buckingham Pond	7/26/2014			bloom										
231	Buckingham Pond	8/9/2014	2.4	0.98	1.5	0.083	0.005	0.025	0.56	14.772182	13	7.87	395.6	22.7	28.9
231	Buckingham Pond	8/9/2014			bloom										
231	Buckingham Pond	8/23/2014	2.0	1.40	1.5	0.062			0.292	10.411669	8	7.34	355.6		10.1
231	Buckingham Pond	8/23/2014			bloom										
231	Buckingham Pond	9/6/2014	1.9	1.45	1.5	0.054	0.005	0.031	0.329	13.428571	13	7.78	688.2		8.4
231	Buckingham Pond	9/21/2014			bloom										
231	Buckingham Pond	9/21/2014	1.7	1.25	1.5	0.044			0.629	31.738532	17	8.32	703.9		4.4

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
231	Buckingham Pond	6/25/2011	epi	19	22	3	1			4		5.90	2.90							
231	Buckingham Pond	7/9/2011	epi	26	26	4	1		136	4	14	20.70	5.80							
231	Buckingham Pond	7/22/2011	epi	27	29	3	2	3	38	4	4	13.40	3.66	0.29	<0.500	<0.1				
231	Buckingham Pond	7/22/2011	bloom																	
231	Buckingham Pond	8/6/2011	epi	25	25	2	1			4	4	20.60	11.30	0.60	<0.500	<0.1				
231	Buckingham Pond	8/20/2011	epi	21	24	2	1	2				26.00	11.20							
231	Buckingham Pond	9/10/2011	epi	22	20	2	1		0	0	0	11.50	4.50							
231	Buckingham Pond	9/14/2011	epi	25	21	2	1	1	0	0	0	12.50	3.50	<0.30	<0.500	<0.1				
231	Buckingham Pond	9/14/2011	bloom																	
231	Buckingham Pond	10/8/2011	epi	14	16					14	1	11.80	6.50							
231	Buckingham Pond	7/14/2012	epi	23	27	3	1		1	0	0	7.50	11.80	<0.30	<0.423		36.30	0.00		
231	Buckingham Pond	7/28/2012	epi	25	25	3	1		13	4	4			<0.30	<0.292		539.00	33.50		
231	Buckingham Pond	8/11/2012	epi	24	26	3	1		1	0	0	13.60	14.90	<0.30	<0.537		78.99	0.47	F	
231	Buckingham Pond	8/25/2012	epi	25	25	3	1		13	4	4			0.77	<1.450		11.12	0.39	BCDED	
231	Buckingham Pond	9/8/2012	epi	23	25	3	1		13	0	0	6.80	5.90	<0.30	<0.725		21.76	0.00		
231	Buckingham Pond	9/22/2012	epi	18	20	2	1		0	0	0	3.50	1.80	<0.30	<3.299		4.86	0.21	I	
231	Buckingham Pond	10/6/2012	epi	18	19	2	1		0	0	0	17.50	1.80	<0.30	<3.205		3.86	0.00	I	
231	Buckingham Pond	10/20/2012	epi	15	14	3	1	1	0	0	0	2.00	0.40	<0.30	<3.205		0.58	0.10	I	
231	Buckingham Pond	7/14/2012	bloom	17	21									1.17	<0.784		178.96	71.06	D	
231	Buckingham Pond	7/28/2012	bloom	22	27									2.33	<0.657		56.71	0.00		
231	Buckingham Pond	8/25/2012	bloom	28	27									<0.60	<1.038		70.25	57.50		
231	Buckingham Pond	6/15/2013	epi	22	25	1	1	2	0	0	0	2.10	1.50	<0.30	<0.440		1.40	0.00		E
231	Buckingham Pond	6/29/2013	epi	24	25	2	1			4	4	1.00	0.80	<0.30	<0.510		0.40	0.00	A	
231	Buckingham Pond	7/13/2013	epi	26	25	2			0	0	0	5.40	5.10	<0.30	<0.490		8.60	0.00	C	C
231	Buckingham Pond	7/27/2013	epi	17	20	3	1	4	4	4	46	19.40	27.40	<0.30	<0.400		35.30	0.80	C	
231	Buckingham Pond	8/10/2013	epi			1			1	0	0	5.60	15.30	<0.30	<0.380		8.10	0.00	I	I
231	Buckingham Pond	8/24/2013	epi			2	1	4	148	4	4	4.10	7.30	0.36	<0.390		7.10	0.00	C	
231	Buckingham Pond	9/7/2013	epi			2	2	2	1	0	0	3.70	13.40	0.41	<1.240	hAtx	11.20	0.00	DG	D
231	Buckingham Pond	6/15/2013	bloom											<0.60	<0.870	19.86	120.60	46.00		
231	Buckingham Pond	6/30/2013	bloom											<0.60	<1.010		96.80	28.20		a
231	Buckingham Pond	7/13/2013	bloom											1.47	<0.750		28.50	0.00		c
231	Buckingham Pond	7/27/2013	bloom											<0.60	<0.760		722.00	49.80		c
231	Buckingham Pond	8/24/2013	bloom	17	19									<0.60	<0.770		12.30	2.00		c
231	Buckingham Pond	9/7/2013	bloom	17	21									<0.60	<1.150		4.00	0.30		dg
231	Buckingham Pond	9/21/2013	bloom	22	27									1.22	<38.260		18.00	0.00		f
231	Buckingham Pond	9/21/2013	epi	28	27	2	1	2	1	0	0	5.30	9.00	<0.30	<19.130		6.90	0.00	F	
231	Buckingham Pond	6/15/2014	epi	22	22	2	1	2	1	0	0	1.7	0.4	<0.53	<0.08		1.6	0.0	g	
231	Buckingham Pond	6/29/2014	epi	29	28	2	2	3	12	4	4	2.1	0.3	<0.48	<0.48		1.0	0.0	e	e
231	Buckingham Pond	6/29/2014				2	2	3	1	7	7			<3.20	<0.96		38.5	1.9		
231	Buckingham Pond	7/13/2014	epi	27	28							4.4	1.2	<0.40	<0.21		8.3	0.0	d	d
231	Buckingham Pond	7/13/2014				2	1	2	1	4	4			<0.81	<0.96		416.5	118.3		d
231	Buckingham Pond	7/26/2014	epi	30	29							9.7	5.0	<0.31	<0.24		23.0	0.0	d	d
231	Buckingham Pond	7/26/2014				2	1		1	4	4			<1.53	<0.07		37.1	6.3		
231	Buckingham Pond	8/9/2014	epi	28	27							2.1	3.4	<0.28	<0.05		16.3	0.0	defg	def
231	Buckingham Pond	8/9/2014				3	2	1	14	46	4			<0.76	<0.09		56.3	0.3		
231	Buckingham Pond	8/23/2014	epi	25	26							2.2	1.3	<0.26	<0.10		7.1	0.0	befg	befg
231	Buckingham Pond	8/23/2014				2	1		1	4	4			<0.78	<0.19		82.5	0.0		
231	Buckingham Pond	9/6/2014	epi	28	29							4.1	0.90	<0.29	<0.14		6.0	0.0	f	g
231	Buckingham Pond	9/21/2014				2	1	2	1	0	0			<0.97	<0.08		36.7	7.7		e
231	Buckingham Pond	9/21/2014	epi	21	21							2.0	1.0	<0.48	<0.04		3.9	0.0	ef	ef

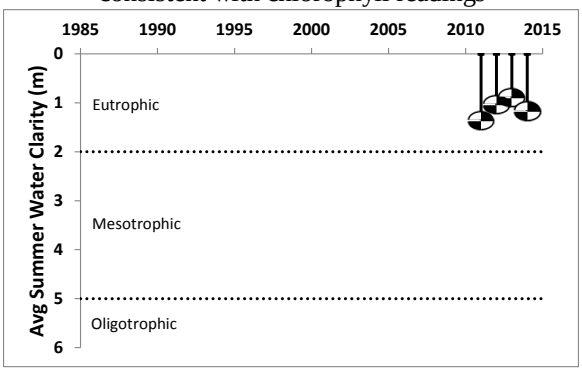
Legend Information

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	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: Buckingham Pond

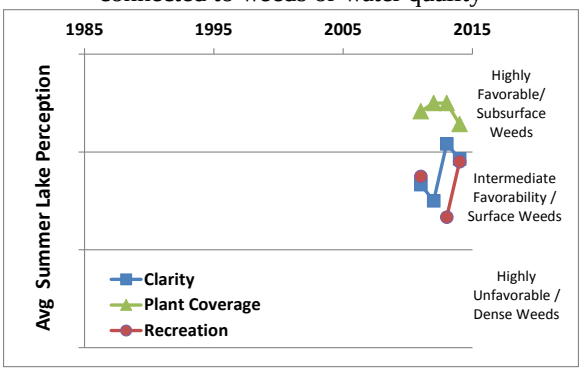
Long Term Trends: Water Clarity

- No trends (yet) apparent
- Most readings typical of *eutrophic* lakes, consistent with chlorophyll readings



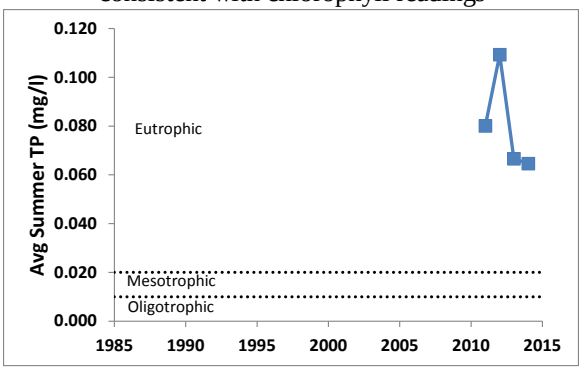
Long Term Trends: Lake Perception

- No trends (yet) apparent
- Recreational perception not closely connected to weeds or water quality



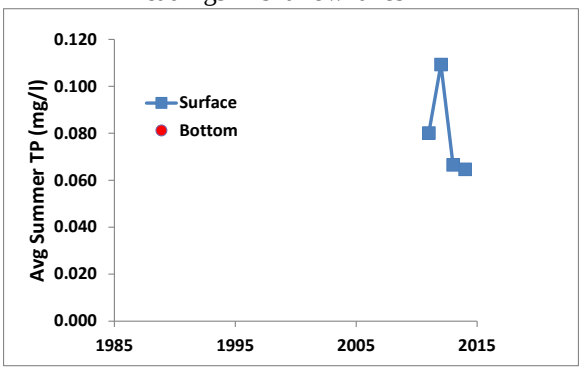
Long Term Trends: Phosphorus

- May be decreasing, but still very high
- Most readings typical of *eutrophic* lakes, consistent with chlorophyll readings



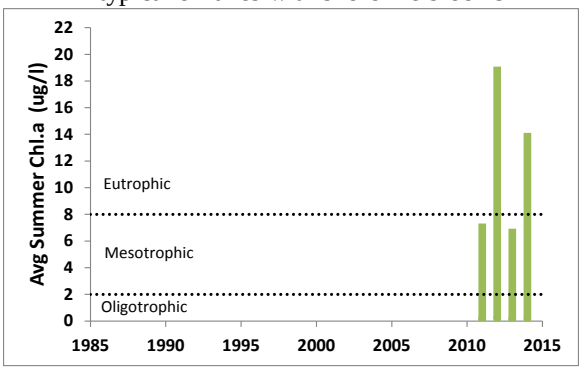
Long Term Trends: Bottom Phosphorus

- No deepwater data due to shallow depth
- Probably no difference in surface and bottom TP readings in shallow lakes



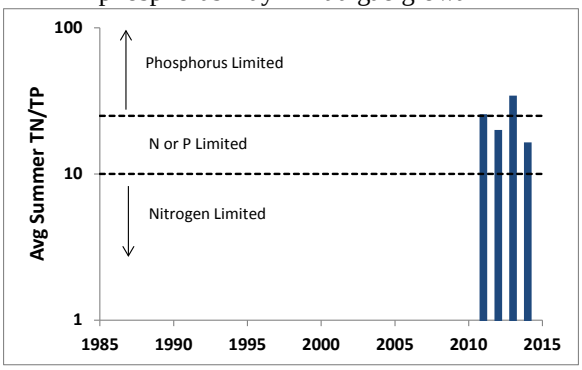
Long Term Trends: Chlorophyll a

- Variable from year to year with no trends
- Most readings typical of *eutrophic* lakes, and typical of lakes with shoreline blooms



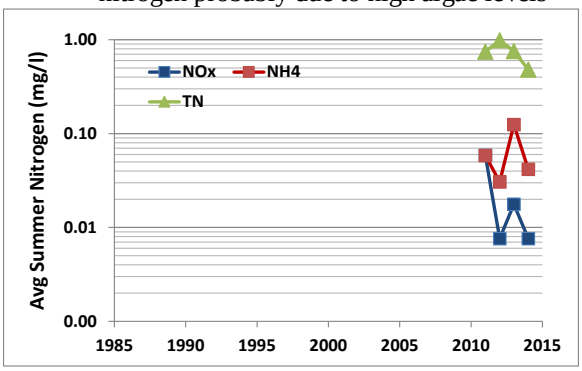
Long Term Trends: N:P Ratio

- May be decreasing
- Most readings indicate nitrogen or phosphorus may limit algae growth



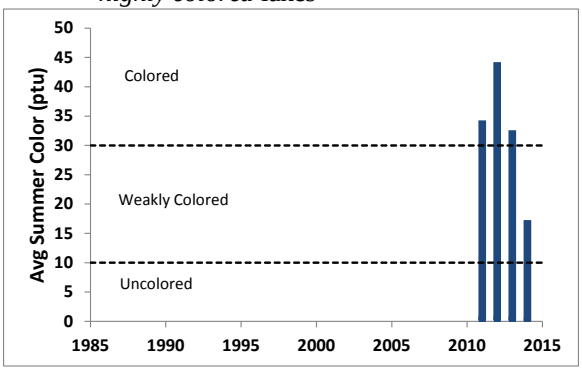
Long Term Trends: Nitrogen

- NOx and NH4 appear to change in sync
- Low NOx and ammonia, but higher total nitrogen probably due to high algae levels



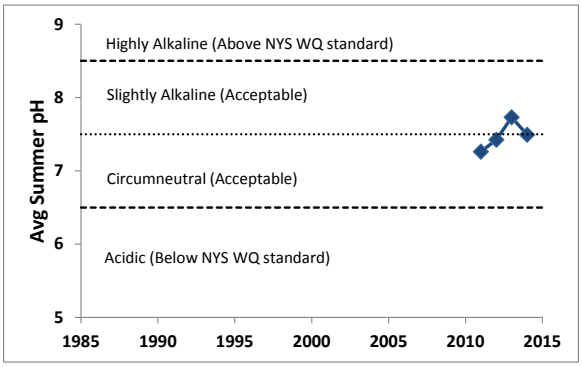
Long Term Trends: Color

- May be decreasing but too early for trends
- Most readings typical of *moderately* to *highly colored* lakes



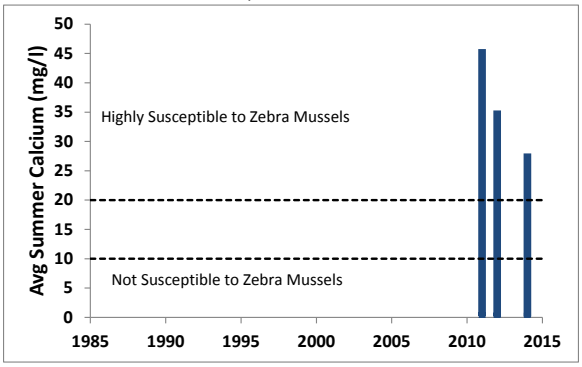
Long Term Trends: pH

- Increasing but premature to evaluate trends
- Most readings typical of *slightly alkaline* to *circumneutral* lakes



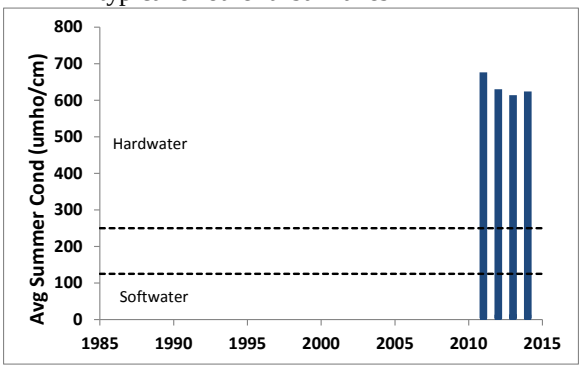
Long Term Trends: Calcium

- May be decreasing but too early for trends
- Most readings indicate high susceptibility to zebra mussels, but these not found in lake



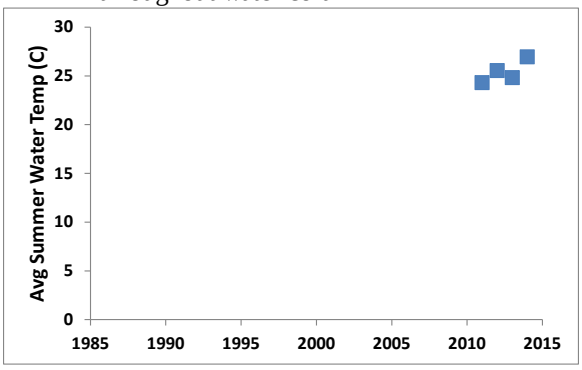
Long Term Trends: Conductivity

- Decreasing but premature to evaluate trends
- Most readings typical of *hardwater* lakes, typical of other urban lakes



Long Term Trends: Water Temperature

- Increasing? Too early to evaluate trends
- Temperature readings probably consistent throughout water column



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.

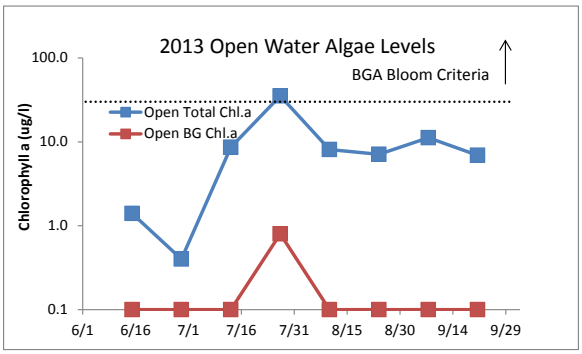


Figure D1:
2013 Open Water Total and BGA Chl.a

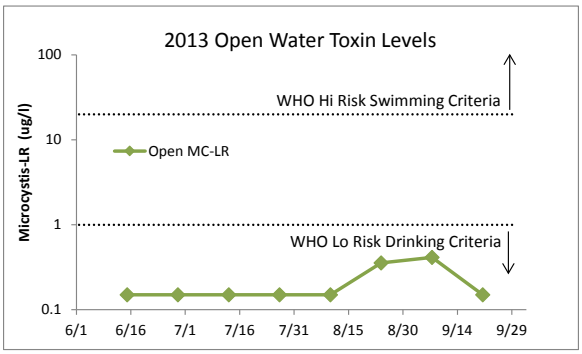


Figure D2:
2013 Open Water Microcystin-LR

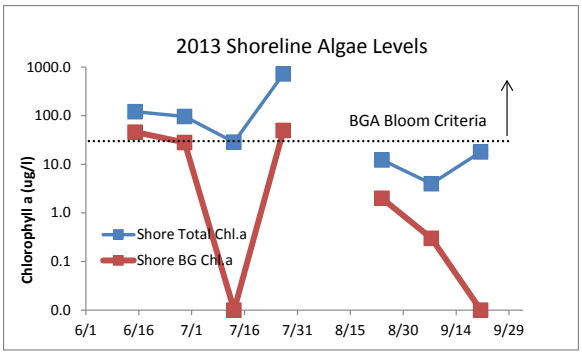


Figure D3:
2013 Shoreline Total and BGA Chl.a

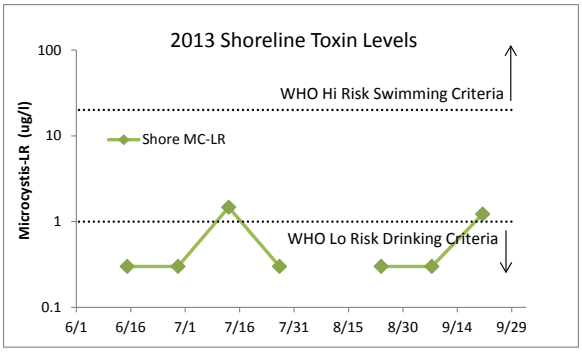


Figure D4:
2013 Shoreline Microcystin-LR

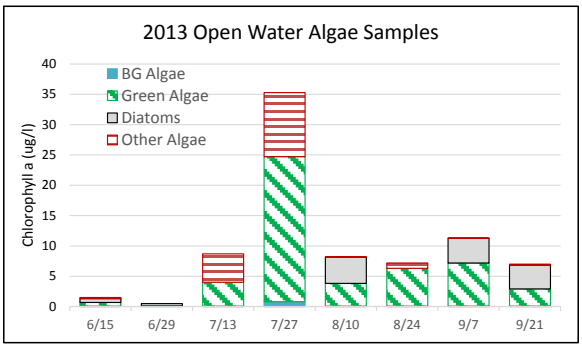


Figure D5:
2013 Open Water Algae Types

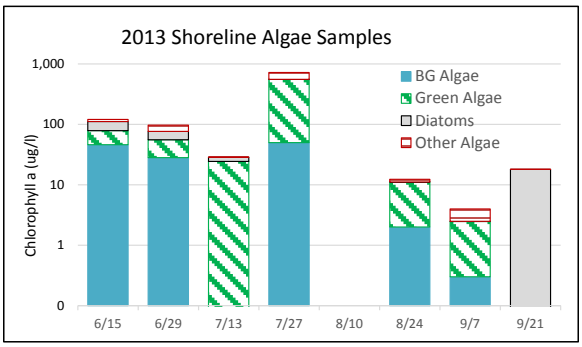


Figure D6:
2013 Shoreline Algae Types

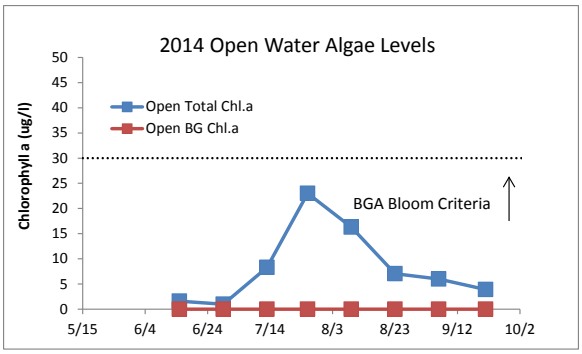


Figure D7:
2014 Open Water Total and BGA Chl.a

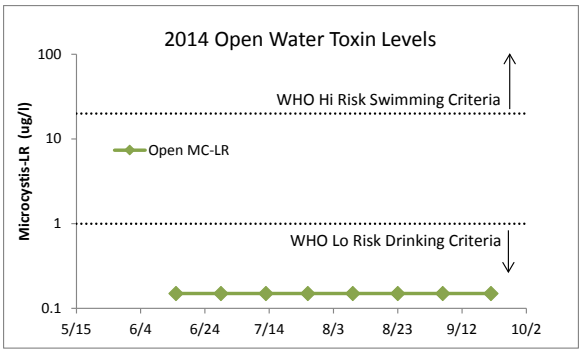


Figure D8:
2014 Open Water Microcystin-LR

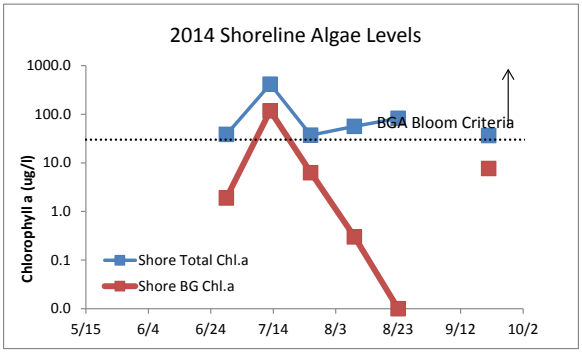


Figure D9:
2014 Shoreline Total and BGA Chl.a

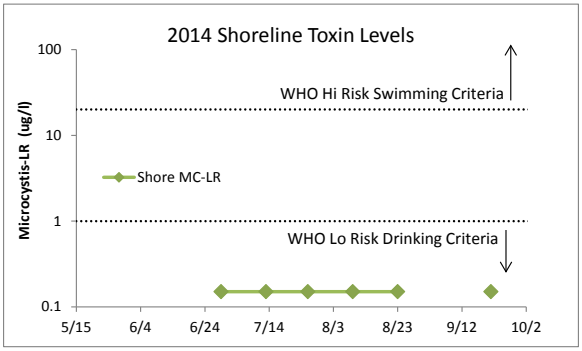


Figure D10:
2014 Shoreline Microcystin-LR

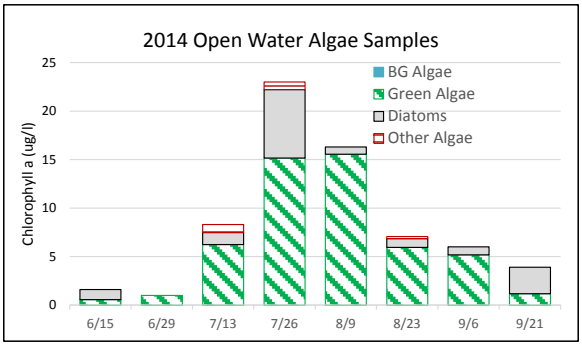


Figure D11:
2013 Open Water Algae Types

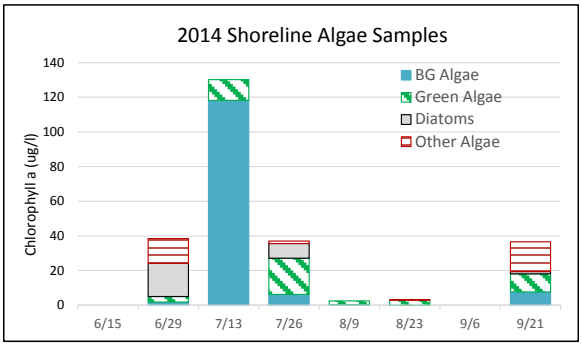


Figure D12:
2014 Shoreline Algae Types

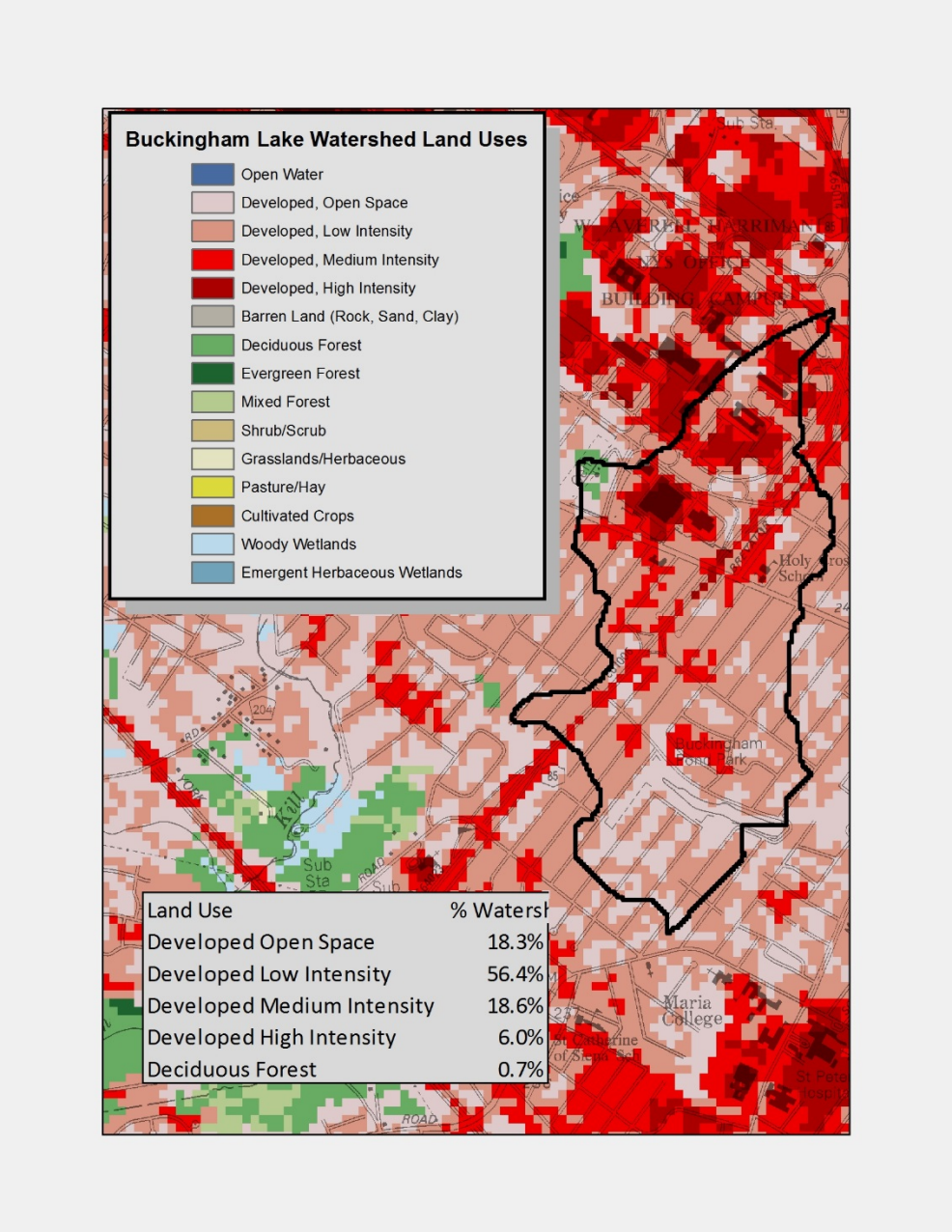
Appendix E:
AIS Species in Albany County

The table below shows the invasive aquatic plants and animals that have been documented in Albany 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 – Albany County			
Waterbody	**Kingdom**	**Common name**	**Scientific name**
Alcove Reservoir	Plant	Eurasian watermilfoil	*Myriophyllum spicatum*
Ann Lee Pond	Plant	Eurasian watermilfoil	*Myriophyllum spicatum*
Ann Lee Pond	Plant	Curly leafed pondweed	*Potamogeton crispus*
Ann Lee Pond	Plant	Water chestnut	*Trapa natans*
Basic Creek Reservoir	Plant	Eurasian watermilfoil	*Myriophyllum spicatum*
Basic Creek Reservoir	Animal	Virile crayfish	*Orconectes virilis*
Basic Creek Reservoir	Plant	Curly leafed pondweed	*Potamogeton crispus*
Beaver Pond (Five Rivers)	Plant	Water chestnut	*Trapa natans*
Buckingham Pond	Plant	Water chestnut	*Trapa natans*
Crystal Lake	Plant	Eurasian watermilfoil	*Myriophyllum spicatum*
Dots Lake	Plant	Curly leafed pondweed	*Potamogeton crispus*
Dots Lake	Plant	Water chestnut	*Trapa natans*
Fawn Lake	Plant	Water chestnut	*Trapa natans*
Five Rivers ornamental pond	Plant	Brazilian elodea	*Egeria densa*
Helderberg Lake	Plant	Curly leafed pondweed	*Potamogeton crispus*
Heron Pond (Five Rivers	Plant	Water chestnut	*Trapa natans*
Hudson River	Plant	Eurasian watermilfoil	*Myriophyllum spicatum*
Hudson River	Plant	Water chestnut	*Trapa natans*
Hudson River	Animal	Zebra mussel	*Dreissena polymorpha*
Lawson Lake	Plant	Curly leafed pondweed	*Potamogeton crispus*
Lawson Lake	Plant	Water chestnut	*Trapa natans*
Littles Lake	Plant	Eurasian watermilfoil	*Myriophyllum spicatum*
Littles Lake	Plant	Curly leafed pondweed	*Potamogeton crispus*
Littles Lake	Plant	Water chestnut	*Trapa natans*

Waterbody	Kingdom	Common name	Scientific name
Mohawk River	Plant	Water chestnut	*Trapa natans*
Myosotis Lake	Animal	Rusty crayfish	*Orconectes rusticus*
Onderdonk Lake	Plant	Curly leafed pondweed	*Potamogeton crispus*
Rensselaer Lake	Plant	Eurasian watermilfoil	*Myriophyllum spicatum*
Rensselaer Lake	Plant	Brittle naiad	*Najas minor*
Rensselaer Lake	Plant	Curly leafed pondweed	*Potamogeton crispus*
Rensselaer Lake	Plant	Water chestnut	*Trapa natans*
Sanford (Colonie Library) Pond	Plant	Eurasian watermilfoil	*Myriophyllum spicatum*
Sanford (Colonie Library) Pond	Plant	Water chestnut	*Trapa natans*
SUNY Albany Pond	Plant	Water chestnut	*Trapa natans*
Thompsons Lake	Animal	Zebra mussel	*Dreissena polymorpha*
Thompsons Lake	Plant	Eurasian watermilfoil	*Myriophyllum spicatum*
Thompsons Lake	Animal	Rusty crayfish	*Orconectes rusticus*
Thompsons Lake	Animal	Virile crayfish	*Orconectes virilis*
Thompsons Lake	Plant	Curly leafed pondweed	*Potamogeton crispus*
Vly Creek Reservoir	Plant	Water chestnut	*Trapa natans*
Warners Lake	Plant	Eurasian watermilfoil	*Myriophyllum spicatum*
Warners Lake	Plant	Curly leafed pondweed	*Potamogeton crispus*
Watervliet Reservoir	Plant	Eurasian watermilfoil	*Myriophyllum spicatum*
Watervliet Reservoir	Plant	Curly leafed pondweed	*Potamogeton crispus*
Watervliet Reservoir	Plant	Water chestnut	*Trapa natans*
White Birch Pond	Plant	Water chestnut	*Trapa natans*
Wood Lake Apartments Ponds	Plant	Water chestnut	*Trapa natans*

Appendix F: Watershed and Land Use Map for Buckingham Pond

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.