Deer Lake Questions and Answers, 2015 CSLAP

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

A1. Water quality conditions in Deer Lake in 2015 were more favorable than usual. Water clarity was higher, due to lower nutrient and algae levels, resulting in more favorable water quality and recreational assessments. Plant coverage may have been reduced by the grass carp stocking.

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

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

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

A3. Deer Lake has lower water clarity, and higher nutrient levels, than other nearby lakes, although overall algae levels were lower and shoreline blooms were not reported. Although water chestnut has recently been discovered, this invasive plant does not (yet) appear to have impacted recreational uses (perhaps due to grass carp grazing, although this is generally not a preferred species by this herbivorous fish).

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

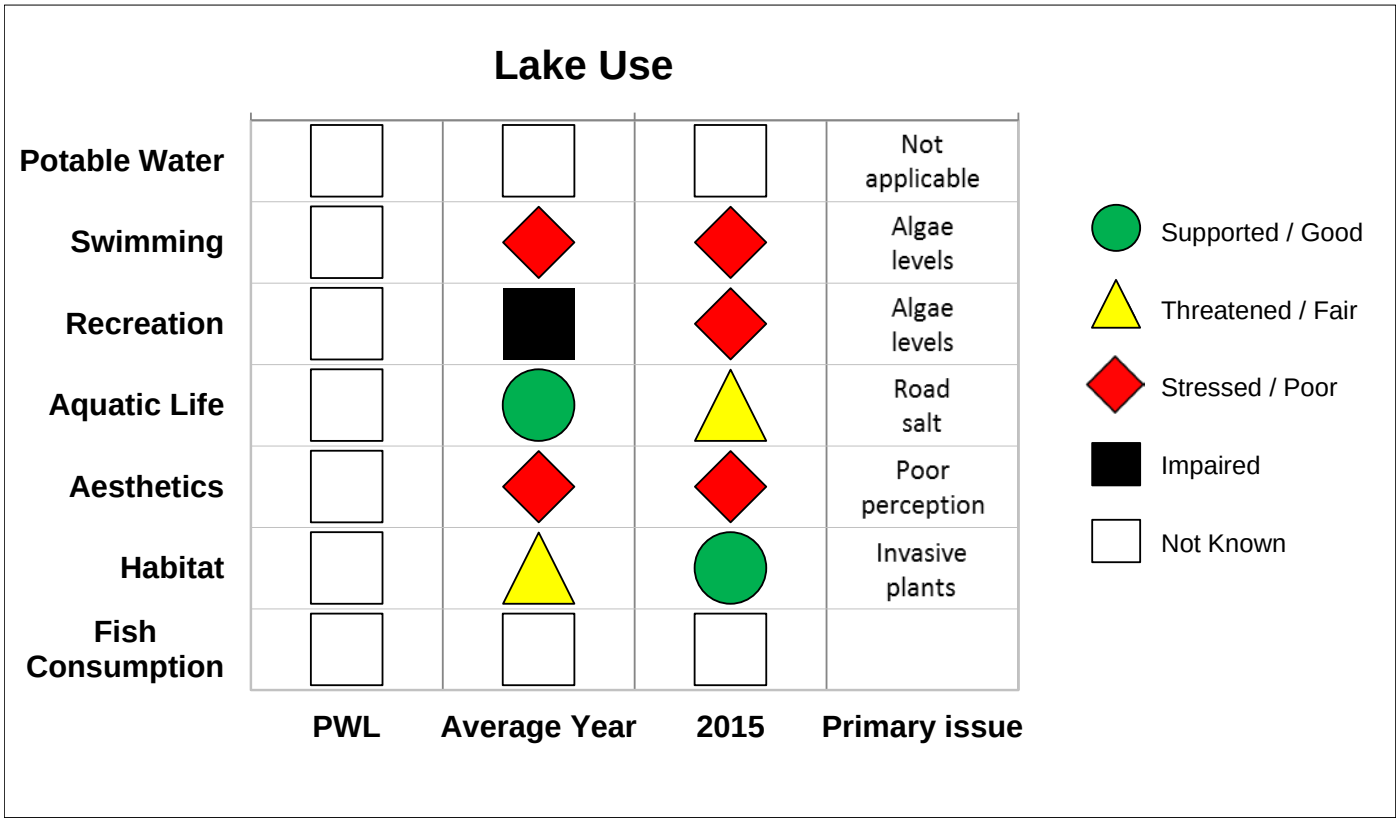
A4. Algae levels have decreased over most of the last decade, resulting in improved water quality and recreational assessments. This may have triggered more growth of aquatic plants.

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

A5. Deer Lake has not exhibited extensive shoreline and open water blue green algae blooms, although algae levels are high enough to trigger blooms. It is not known if the reduction in overall algae levels has further decreased the susceptibility of the lake to these blooms.

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

A6. Individual stewardship activities such as pumping your septic system, growing a buffer of native plants next to the water bodies, and reducing erosion from shoreline properties and runoff into the lake are needed to reduce nutrient and sediment loading to the lake. Visiting boats should be inspected to reduce the risk of new invasive species, since nearby lakes harbor several invasive plants not presently found in the lake.



CSLAP 2015 Lake Water Quality Summary:
Deer Lake

General Lake Information

Location	Town of Sanford
County	Broome
Basin	Delaware River
Size	7.8 hectares (19.3 acres)
Lake Origins	Augmented by 10ft by 125ft earthen dam
Watershed Area	131 hectares (323.6 acres)
Retention Time	0.2 years
Mean Depth	1.5 meters
Sounding Depth	3.1 meters
Public Access?	no
Major Tributaries	no named tribs
Lake Tributary To…	no named outlets
WQ Classification	B (contact recreation = swimming)
Lake Outlet Latitude	42.057
Lake Outlet Longitude	-75.554
Sampling Years	2004-2010, 2013-2015
2015 Samplers	Gary A. Williams
Main Contact	Gary A. Williams

Lake Map

Background

Deer Lake is a 32 acre, class B lake found in the Town of Sanford in Broome County in the Southern Tier region of New York State. It was first sampled as part of CSLAP in 2004.

It is one of five CSLAP lakes among the nearly 200 lakes and ponds found in Broome County, and one of 15 CSLAP lakes among the nearly 1000 lakes and ponds in the Delaware drainage basin.

Lake Uses

Deer 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, aquatic life, and aesthetics. The lake is used by lake residents for swimming, non power boating and other recreation via shoreline properties; the public does not have access to the lake.

It is not known by the report authors if Deer Lake has been stocked as part of any private stocking efforts.

General statewide fishing regulations are applicable in Deer Lake. In addition, open season for trout runs from April 1st to October 15th. While there is no minimum take length, there is a take limit of five fish, with no more than two fish longer than 12 inches and no more than five brook trout under eight inches.

Historical Water Quality Data

CSLAP sampling was conducted on Deer Lake from 2004 to 2010 and in 2013 to 2015. The CSLAP reports for each of the past several years can be found on the NYSFOLA website at http://nysfola.mylaketown.com. The most recent CSLAP report and scorecard for Deer Lake can also be found on the NYSDEC web page at http://www.dec.ny.gov/lands/77884.html.

Deer Lake has not been sampled by New York State as part of any of the major regional or statewide monitoring programs. The lake may have been sampled as part of a local monitoring effort and/or in support of fisheries management activities on the lake, but these data have not been provided through CSLAP.

None of the unnamed ephemeral tributaries, nor the main inlet to the lake (Fly Creek) have been monitored through the NYSDEC Rotating Intensive Basins (RIBS) program or the state stream macroinvertebrate monitoring program, at least in the area near the lake. Fly Creek was sampled as part of the macroinvertebrate monitoring program in McClure, below the Route 41 bridge, in 1999. The data from this survey was summarized as follows:

"Water quality is assessed as non-impacted for this tributary of Oquaga Creek, sampled at McClure in 1999. The sample was field-assessed as passing screening criteria, and was not laboratory-processed. No prior data were available for the stream."

The lake has not been sampled by DEC fisheries staff in support of fish stocking activities or any other statewide monitoring programs. The lake was stocked with sterile grass carp in 2015 to manage nuisance weeds.

Lake Association and Management History

Deer Lake is served by the Deer Lake Association. It is not known to what extent the lake association is involved in lake management, or if the Deer Lake Association maintains a website. As noted above, the lake was stocked with grass carp, presumably by the lake association.

Summary of 2015 CSLAP Sampling Results

Evaluation of 2015 Annual Results Relative to 2004-2014

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 – Deer Lake" section in Appendix C.

Evaluation of Eutrophication Indicators

Deer Lake was less productive than usual in 2015, as exhibited by lower nutrient and algae levels, and higher water clarity. Algae levels have decreased significantly since the early 2000s, consistent with lower nutrient levels since about 2010, and resulting in higher water clarity over the last three years.

Lake productivity generally increases from spring thru mid-summer (clarity decreases as nutrient and algae levels rise), coincident with increasing temperatures, but then varies or decreases through the fall. In 2015, water clarity rose through late summer, despite a rise in algae levels in early summer (nutrient readings varied during the summer).

The lake can be characterized as *eutrophic,* or highly productive, based on total phosphorus, chlorophyll *a*, and water clarity readings (indicative of *eutrophic* lakes), although algae levels (chlorophyll *a*) were more typical of *mesotrophic,* or moderately productive lakes, in 2015. The trophic state indices (TSI) evaluation suggests that algae levels are slightly lower than expected given the nutrient levels and water clarity. This suggests that the lake may not be susceptible to small changes in nutrient loading. Overall trophic conditions are summarized on the Lake Scorecard and Lake Condition Summary Table.

Evaluation of Potable Water Indicators

Despite the long-term decrease in chlorophyll *a* readings, algae levels are frequently 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. However, the lake is not used for drinking water. Hypolimnetic phosphorus readings are similar to those measured at the lake surface, perhaps as expected given the weak thermal stratification in the lake. Potable water conditions, at least as measurable through CSLAP, are summarized in the Lake Scorecard and Lake Condition Summary Table.

Evaluation of Limnological Indicators

Several of the limnological indicators (NOx, color, conductivity and calcium) were below normal in 2015, although only the latter two changes (NOx and calcium) seemed to be part of a longer trend. pH readings were higher than usual in 2015, despite lower algae levels. It is likely that the small changes in pH and most of the other limnological indicators have been within the normal range of variability in the lake.

Chloride levels in the 2015 samples, collected for the first time through CSLAP and cited in Appendix A, ranged from 32 to 35 mg/l. These values fall within the range for "moderate" to "major" road salt runoff levels cited by the New Hampshire DES. These readings are well below the state potable water quality standard of 250 mg/l, but within the typical range of values found in most NYS lakes. These readings suggest a moderate likelihood of biological impacts from road salt. Additional data will help to determine if these represent normal readings for the lake.

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

Evaluation of Biological Condition

Phytoplankton, macrophyte, and zooplankton surveys have not been conducted through CSLAP at Deer Lake, and the makeup of the fish community has not been reported.

The fluoroprobe screening samples analyzed by SUNY ESF indicated low levels of algae and blue green algae in most of 2013 and in 2015, while total (diatom, not blue green) algae levels in 2014 were moderately high during much of the summer. It is not known if shoreline blooms occur and if blue green algae dominate these shoreline blooms - shoreline blooms have not been reported even in years when overall algae levels are elevated.

Deer Lake was sampled by the NYSDEC as part of the lake biomonitoring survey in 2010. The macroinvertebrate analyses have not yet been completed. The limited macrophyte survey found at least 10 aquatic plant species in the lake, all of which are native plants. The modified floristic quality index (FQI) for the lake indicates that the quality of the aquatic plant community is "excellent."

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

Evaluation of Lake Perception

Water quality assessments were more favorable than normal in 2014 and 2015; the improved assessments in 2015 were consistent with higher than usual water clarity and lower algae levels. This led to improved recreational assessments in 2015. Recreational conditions have improved in the last few years, despite more extensive aquatic plant coverage.

Recreational assessments generally follow the seasonal pattern exhibited by water quality assessments- they are least favorable in mid-summer. Plant coverage increased during the summer of 2015, but water quality and recreational assessments did not show strong seasonal patterns. Overall lake perception is summarized on the Lake Scorecard and Lake Condition Summary Table.

Evaluation of Local Climate Change

Water temperature readings in the summer index period were close to normal in 2015, despite slightly higher air temperatures, and have not exhibited any clear long-term trends. It is not known if this is an indication of local climate change or represents normal variability.

Evaluation of Algal Toxins

Algal toxin levels can vary significantly within blooms and from shoreline to lake, and the absence of toxins in a sample does not indicate safe swimming conditions. Fluoroprobe readings are well below the threshold for harmful algal blooms (HABs), although some elevated algae (diatom) levels have been apparent. No shoreline blooms have been reported in the last few years, and algal toxin levels are consistently low.

Lake Condition Summary

Category	Indicator	Min	Annual Avg	Max	2015 Avg	Classification	2015 Change?	Long-term Change?
Eutrophication Indicators	Water Clarity	0.45	1.28	2.60	1.46	Eutrophic	Within Normal Range	No Change
	Chlorophyll *a*	0.90	14.10	99.50	4.71	Eutrophic	Lower Than Normal	Decreasing Significantly
	Total Phosphorus	0.013	0.037	0.116	0.027	Eutrophic	Lower Than Normal	No Change
Potable Water Indicators	Hypolimnetic Ammonia							
	Hypolimnetic Arsenic							
	Hypolimnetic Iron							
	Hypolimnetic Manganese							
Limnological Indicators	Hypolimnetic Phosphorus							
	Nitrate + Nitrite	0.00	0.03	0.18	0.01	Low NOx	Lower Than Normal	No Change
	Ammonia	0.00	0.04	0.30	0.03	Low Ammonia	Within Normal Range	No Change
	Total Nitrogen	0.05	0.46	1.03	0.40	Low Total Nitrogen	Within Normal Range	No Change
	pH	6.22	7.50	9.15	8.16	Circumneutral	Higher than Normal	No Change
	Specific Conductance	54	143	266	129	Intermediate Hardness	Within Normal Range	No Change
	True Color	5	25	78	15	Intermediate Color	Lower Than Normal	No Change
	Calcium	2.9	7.7	10.8	6.2	Not Susceptible to Zebra Mussels	Within Normal Range	Decreasing Significantly
Lake Perception	WQ Assessment	1	2.6	4	1.9	Definite Algal Greenness	More Favorable Than Normal	Highly Improving
	Aquatic Plant Coverage	1	2.7	4	2.9	Surface Plant Growth	Within Normal Range	Highly Degrading
	Recreational Assessment	1	2.4	4	1.4	Excellent	More Favorable Than Normal	Slightly Improving
Biological Condition	Phytoplankton					Open water-low blue green algae biomass	Not known	Not known
	Macrophytes					Excellent quality of the aquatic plant community	Not known	Not known
	Zooplankton					Not measured through CSLAP	Not known	Not known
	Macroinvertebrates					2009 results not yet available	Not known	Not known
	Fish					Warmwater fishery	Not known	Not known
	Invasive Species					Water chestnut	Not known	Not known
Local Climate Change	Air Temperature	12	25.9	40	24.8		Within Normal Range	No Change
	Water Temperature	15	22.9	34	23.0		Within Normal Range	No Change

Category	Indicator	Min	Annual Avg	Max	2015 Avg	Classification	2015 Change?	Long-term Change?
Harmful Algal Blooms	Open Water Phycocyanin	1	17	127	13	Most readings indicate low risk of BGA	Not known	Not known
	Open Water FP Chl.a	1	7	20	3	Few readings indicate high algae levels	Not known	Not known
	Open Water FP BG Chl.a	0	2	15	1	Few readings indicate high BGA levels	Not known	Not known
	Open Water Microcystis	<DL	<DL	0.9	<DL	Low to undetectable open water microcystins	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					No shoreline blooms sampled for FP	Not known	Not known
	Screening FP BG Chl.a					No shoreline blooms sampled for FP	Not known	Not known
	Shoreline Microcystis					No shoreline bloom MC-LR data	Not known	Not known
	Shoreline Anatoxin a					No shoreline bloom anatoxin data	Not known	Not known

Evaluation of Lake Condition Impacts to Lake Uses

The 2008 NYSDEC Priority Waterbody Listings (PWL) for the Delaware River drainage basin indicated that Deer Lake is *unassessed*.

Potable Water (Drinking Water)

The CSLAP dataset at Deer 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 limited data from the lake indicate that algae levels may at times be too high to support potable water use.

Public Bathing

The CSLAP dataset at Deer Lake, including water chemistry data, physical measurements, and volunteer samplers' perception data, suggests that public bathing, if conducted at a public swimming beach, may be *stressed* by excessive algae and poor water clarity. 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 Deer Lake, including water chemistry data, physical measurements, and volunteer samplers' perception data, suggest that recreation may be *impaired* by excessive algae, although these impacts were not apparent in 2015 due to lower algae levels, although this use at times may be *threatened* by excessive weeds.

Aquatic Life

The CSLAP dataset on Deer Lake, including water chemistry data, physical measurements, and volunteer samplers' perception data, suggest that aquatic life may be *threatened* by road salt runoff and water chestnut. Additional data are needed to evaluate the food and habitat conditions for aquatic organisms in the lake.

Aesthetics and Habitat

The CSLAP dataset on Deer Lake, including water chemistry data, physical measurements, and volunteer samplers' perception data, suggest that aesthetics may be *poor* due to poor recreational

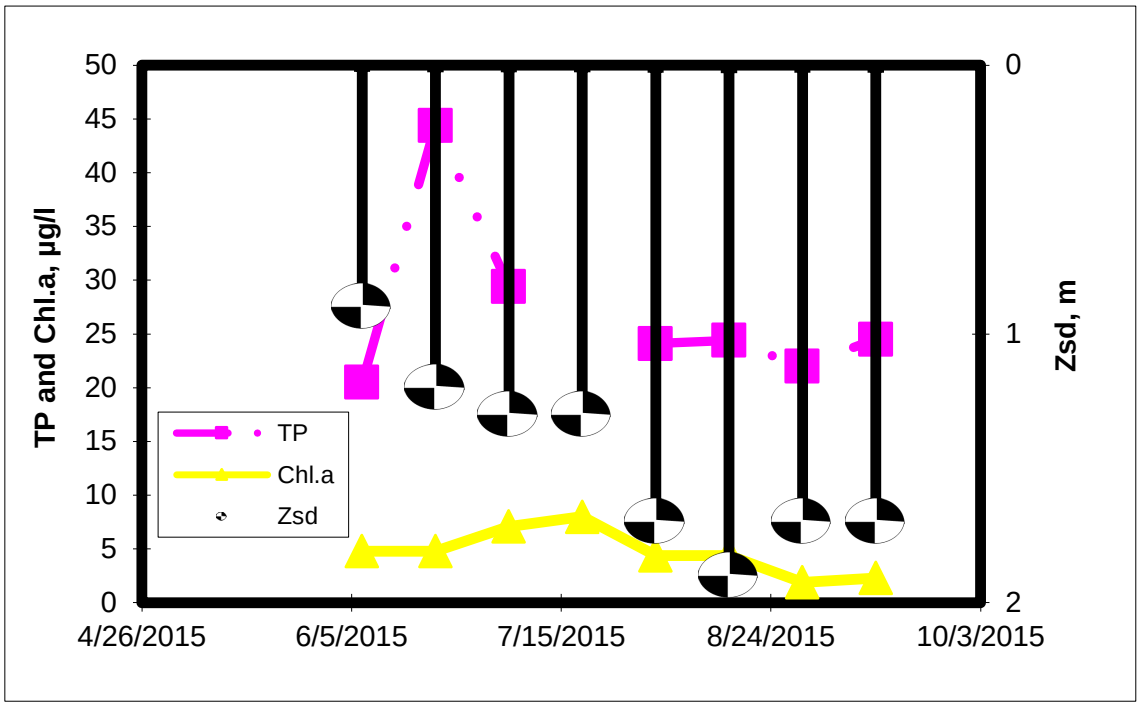
perception associated with excessive algae in some years. Habitat may be only *fair* due to excessive weeds (particularly water chestnut), as indicated by the need for the stocking of grass carp for weed control.

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

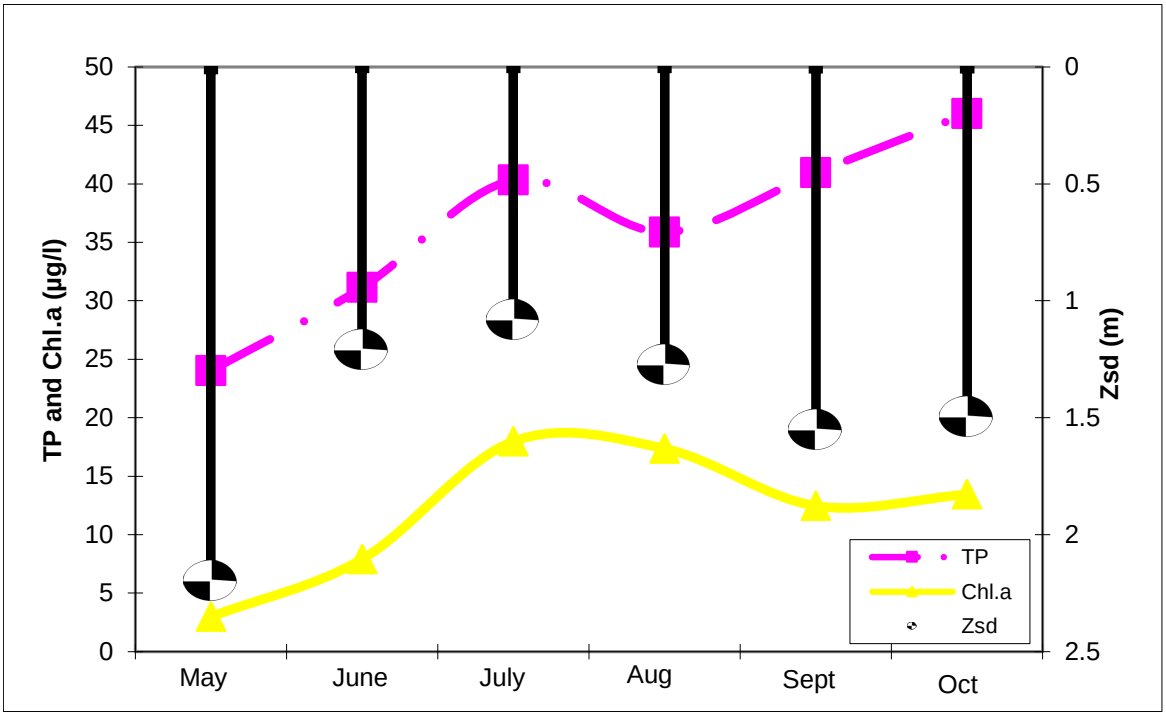
Additional Comments and Recommendations
Lake residents should be on the lookout for and avoid exposure to shoreline algae blooms, given relatively high open water algae levels.

Aquatic Plant IDs-2015
None submitted for identification.

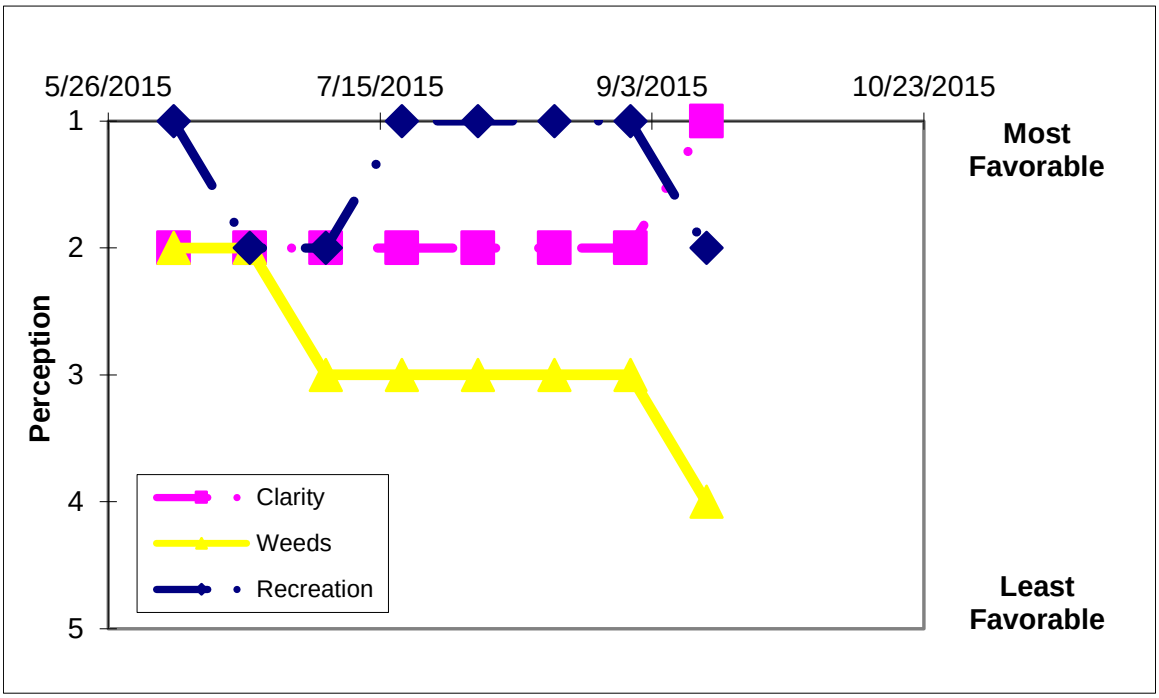
Time Series: Trophic Indicators, 2015



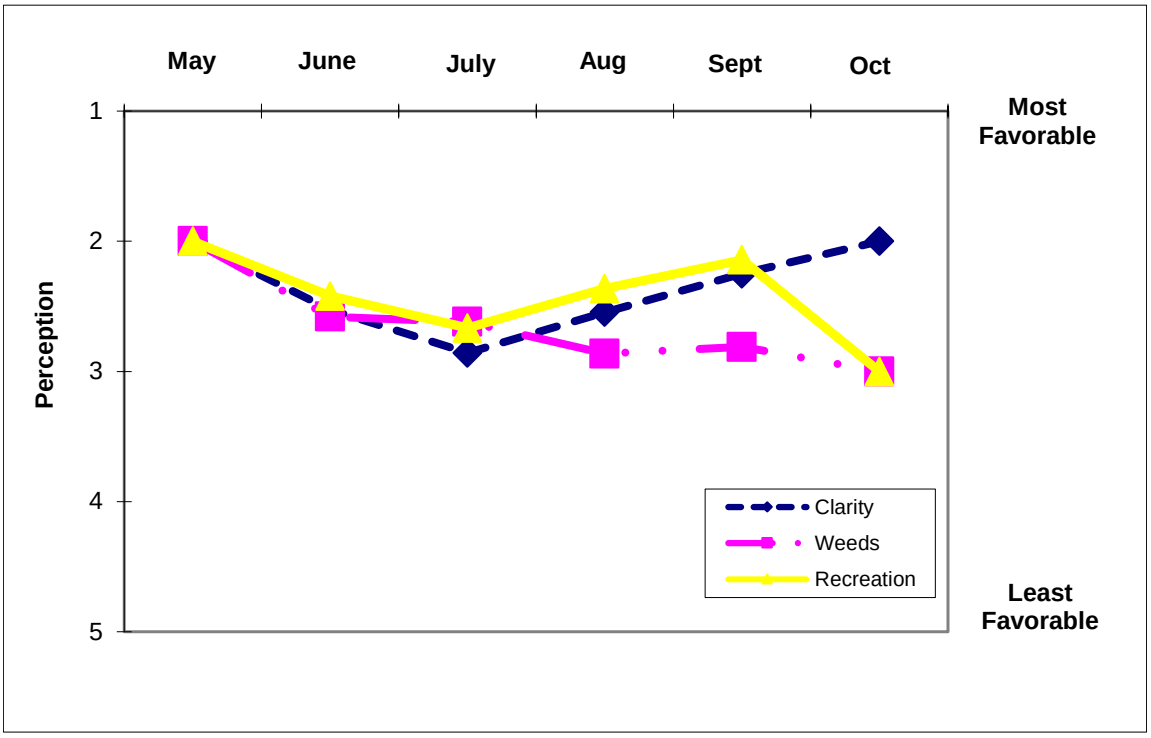
Time Series: Trophic Indicators, Typical Year (2004-2015)



Time Series: Lake Perception Indicators, 2015



Time Series: Lake Perception Indicators, Typical Year (2004-2015)



Appendix A- CSLAP Water Quality Sampling Results for Deer Lake

LNum	PName	Date	Zbot	Zsd	Zsamp	Tot.P	NO3	NH4	TDN	TN/TP	TColor	pH	Cond25	Ca	Chl.a	Cl
195	Deer L	5/31/2004	3.0	2.20	2.0	0.024	0.03	0.02			27	6.99	143		3.0	
195	Deer L	6/13/2004	3.0	1.05	1.5	0.015	0.08	0.01			22	6.29	135		9.0	
195	Deer L	6/28/2004	3.0	0.95	1.5	0.037	0.01	0.02	0.30	17.53	37	6.55	146		9.5	
195	Deer L	7/11/2004	2.8	1.35	1.5	0.033	0.01	0.02	0.51	34.20	32	6.87	165		5.3	
195	Deer L	7/25/2004	3.0	0.95	3.0	0.029	0.02	0.01	0.23	17.42	46	7.75	151	10.3	42.6	
195	Deer L	8/7/2004	3.0	1.00	1.0	0.032	0.01	0.01	0.05	3.66	60	6.91	93		28.3	
195	Deer L	8/22/2004	2.8	1.38	1.0	0.040	0.02	0.01	0.31	17.11	78	7.20	120		99.5	
195	Deer L	9/5/2004	2.9	1.15	1.0	0.116	0.01	0.01	0.29	5.57	52	6.97	89		19.3	
195	Deer L	6/12/2005	3.0	1.05	1.0	0.013	0.07	0.04	0.64	104.86	15	7.41	171	8.1		
195	Deer L	6/26/2005		1.25	1.0	0.021	0.01	0.01	0.62	65.16	10	7.33	184		11.2	
195	Deer L	7/10/2005	2.9	0.85	1.0	0.046	0.07	0.04	0.31	14.48	7	7.30	172		15.6	
195	Deer L	7/25/2005	2.7	0.75	1.0	0.043	0.13	0.01	0.46	23.28	18	7.77	174		31.5	
195	Deer L	8/7/2005	2.7	0.55	1.0	0.040	0.06	0.01	0.46	24.89	15	7.28	218	10.5	27.1	
195	Deer L	8/21/2005	2.6	0.65	1.0	0.050	0.17	0.01	0.28	12.10	23	7.54	189		16.7	
195	Deer L	9/5/2005	2.7	0.45	1.0	0.051	0.01	0.01	0.46	19.83	5	7.79			29.8	
195	Deer L	9/18/2005	2.9	1.95		0.026	0.18	0.01	0.29	24.01	15	7.54	266		4.9	
195	Deer L	6/18/2006	2.8	1.25	1.0	0.037	0.01	0.01	0.49	29.25	12	7.24	121	6.1	31.02	
195	Deer L	7/2/2006	3.0	0.75	1.0	0.036	0.01	0.02	0.44	26.99	27	6.88	64		11.69	
195	Deer L	7/16/2006	2.8	1.25	1.0	0.041	0.01	0.02	0.54	29.05	31	7.54	74		21.24	
195	Deer L	7/30/2006	2.8	1.25	1.0	0.040	0.02	0.05	0.90	50.02	22	8.37	97		13.26	
195	Deer L	8/14/2006	2.7	0.75	1.0	0.040	0.01	0.06	0.69	37.82	31	7.68	104	6.6	14.11	
195	Deer L	8/29/2006		1.05	1.0	0.031	0.04	0.03	0.65	45.85	16	7.46	111		9.53	
195	Deer L	9/11/2006	2.9	1.80	1.0	0.020	0.03	0.02	0.47	52.29	13	7.78	92		12.86	
195	Deer L	9/24/2006	2.9	1.95	1.0	0.028	0.01	0.01	0.38	30.24	22	7.41	108		15.33	
195	Deer L	7/9/2007	2.9	1.25	1.0	0.041	0.01	0.05	0.53	29.03	15	7.75	142	8.3	17.09	
195	Deer L	7/22/2007	2.8	0.95	1.0	0.044	0.01	0.07	0.45	22.97	16	6.91	142		18.92	
195	Deer L	8/6/2007	2.8	1.15	1.0	0.026	0.00	0.01	0.70	60.03	23	7.86	207		15.99	
195	Deer L	8/20/2007	2.7	1.00	1.0	0.040	0.17	0.15	0.70	39.17	31	7.54	172		26.46	
195	Deer L	9/2/2007	2.8	1.50	1.0	0.040	0.01	0.13	1.03	57.06	35	7.47	193	9.6	10.60	
195	Deer L	9/17/2007	2.9	1.30	1.0	0.045	0.03	0.02	0.59	28.96	45	7.51	221		19.58	
195	Deer L	9/30/2007	2.9	1.70	1.0	0.048	0.02	0.03	0.61	28.43	32	7.63	201		8.20	
195	Deer L	10/15/2007	2.9	1.50	1.0	0.046	0.05	0.08	0.63	30.29	24	6.79	191		13.44	
195	Deer L	6/1/2008	2.8	1.80	1.0	0.020	0.01	0.01	0.20	22.31	8	7.71	172	10.8	3.85	
195	Deer L	6/15/2008	2.9	1.65	1.0	0.021	0.01	0.08	0.37	38.71	12	7.33	197		4.58	
195	Deer L	6/29/2008	2.8	1.45	1.0	0.024	0.00	0.02	0.36	33.34	13	7.95	132		11.85	
195	Deer L	7/14/2008	2.8	1.15	1.0	0.033	0.15	0.08	0.45	29.87	14	7.96	194		21.14	
195	Deer L	7/27/2008	3.1	0.75	1.0	0.035	0.02	0.30	0.64	40.03	20	7.98	103	7.9	38.90	
195	Deer L	8/10/2008	2.9	1.05	1.0	0.040	0.01	0.08	0.41	22.87	19	7.10	139		22.22	
195	Deer L	8/24/2008	2.7	1.70	1.0	0.034	0.00	0.03	0.38	24.24	37	7.37	157		5.87	
195	Deer L	9/5/2008	2.6	1.50		0.040	0.00	0.00	0.34	18.58	25	8.55	167		11.97	
195	Deer L	06/07/2009	2.9	1.90	1.0	0.021	0.02	0.01	0.34	35.81	13	7.91	147	7.1	2.11	
195	Deer L	06/23/2009	3.0	0.95	1.0	0.037	0.02	0.04	0.28	16.97	54	6.22	93		8.45	
195	Deer L	07/06/2009	2.8	1.75	1.0	0.026	0.00	0.00	0.25	21.83	34	7.41	105		5.39	
195	Deer L	07/19/2009	2.9	1.25		0.032	0.03	0.01	0.29	19.79	33	7.41	88		14.72	
195	Deer L	08/03/2009	3.2	0.75	1.0	0.024	0.03	0.07	0.74	68.89	34	7.44	94	6.9	29.76	
195	Deer L	08/16/2009	2.9	1.85	1.0	0.034	0.01	0.02	0.31	20.43	37	7.90	80		12.10	
195	Deer L	08/30/2009	2.9	1.45		0.048	0.01	0.04	0.43	19.50	47	7.30	54		22.70	
195	Deer L	09/13/2009	2.8	1.05	1.0	0.036	0.05	0.05	0.45	27.52	29	6.26	85		12.70	
195	Deer L	6/13/2010	2.9	0.95		0.038	0.05	0.03			13	8.73	172	8.8	0.90	
195	Deer L	6/27/2010	2.0	0.85	1.0	0.063	0.04	0.15	0.90	31.39	26	8.84	184		14.80	
195	Deer L	7/12/2010	2.7	0.95	1.0	0.044	0.01	0.01	0.53	26.53	30	8.25	212		19.50	
195	Deer L	7/25/2010	3.0	1.05	1.0	0.050	0.02	0.04	0.52	22.61	14	7.56	153		8.50	
195	Deer L	8/9/2010	2.8	1.35	1.0	0.045	0.02	0.10	0.61	29.70	19	7.01	139	9.0	6.30	
195	Deer L	8/23/2010	2.9	1.65	1.0	0.048	0.11	0.06	0.45	20.53	39	7.17	220		10.50	
195	Deer L	9/6/2010	2.9	2.60	1.0	0.038	0.03	0.06	0.49	28.54	44	7.40	150		1.90	
195	Deer L	9/19/2010	2.8	2.55	1.0	0.030	0.09	0.04	0.39	29.38	22	7.40	228		4.10	
195	Deer L	6/2/2013	3.2	1.65	1.0	0.023	0.01	0.02	0.24	22.47	14	6.91		3.7	3.00	
195	Deer L	6/16/2013	3.1	1.05	1.0	0.031					22	7.44	166		3.20	
195	Deer L	6/30/2013	4.0	0.45	1.0	0.056	0.09	0.08			39	6.87	58		5.30	
195	Deer L	7/14/2013	2.9	0.78	1.0	0.045			0.66	32.24	32	7.55	73		22.10	
195	Deer L	7/28/2013	2.8	0.95	1.0	0.062	0.01	0.03	0.76	27.15	23	7.05	79			
195	Deer L	8/11/2013	2.8	1.15	1.0	0.044			0.54	27.03	25	8.57	142		4.70	
195	Deer L	8/25/2013	2.7	1.65	1.0	0.028	0.02	0.08	0.54	42.97	42	7.08	138		3.90	

LNum	PName	Date	Zbot	Zsd	Zsamp	Tot.P	NO3	NH4	TDN	TN/TP	TColor	pH	Cond25	Ca	Chl.a	Cl
195	Deer L	9/9/2013	2.8	1.45	1.0	0.035			0.42	26.91	36	6.88	97		6.30	
195	Deer L	6/8/2014	2.8	1.35	1.5	0.027	0.01	0.03	0.38	30.77	12	7.01	110	4.8	3.70	
195	Deer L	6/22/2014		1.35	1.5	0.043			0.27	14.18	11	6.85	133		10.30	
195	Deer L	7/6/2014		1.05	1.5	0.037	0.01	0.03	0.51	30.67	43	7.91	140		6.20	
195	Deer L	7/20/2014	2.9	1.15	1.5	0.061			0.61	22.07	16	6.49	131		30.70	
195	Deer L	8/6/2014	2.8	1.45	1.5	0.039	0.01	0.03	0.43	24.26	10	7.75	179	7.7	8.00	
195	Deer L	8/17/2014	2.9	1.20	1.5	0.034			0.35	22.65	11	7.20	182		7.40	
195	Deer L	9/1/2014	2.9	1.20	1.5	0.044	0.01	0.03	0.31	15.49	15	8.06	183		15.60	
195	Deer L	9/14/2014		1.05	1.5	0.034			0.48	30.85	13	7.43	216		24.00	
195	Deer L	6/7/2015	2.9	0.90	1.5	0.021	0.01	0.03	0.35	16.83	10	7.20	243	9.5	4.80	
195	Deer L	6/21/2015	4.0	1.20	1.5	0.044			0.35	7.82	16	7.58	111		4.80	
195	Deer L	7/5/2015	4.0	1.30	1.5	0.029	0.01	0.04	0.32	10.85	14	8.11	131		7.10	32.8
195	Deer L	7/19/2015	3.2	1.30	1.5				0.49		19	8.32	101		8.00	
195	Deer L	8/2/2015		1.70	1.5	0.024	0.01	0.01	0.28	11.74	17	9.12	92	2.9	4.40	
195	Deer L	8/16/2015	2.9	1.90	1.5	0.024			0.65	26.56	14	9.15	94		4.40	
195	Deer L	8/30/2015	2.9	1.70	1.5	0.022	0.01	0.03	0.43	19.68	11	7.96	89		1.90	34.5
195	Deer L	9/13/2015	2.7	1.70	1.5	0.025			0.33	13.39	15	7.84	170		2.30	
195	Deer L	6/12/2005	3.0			0.026										
195	Deer L	6/26/2005				0.025										
195	Deer L	7/10/2005	2.9			0.044										
195	Deer L	7/25/2005	2.7			0.045										
195	Deer L	8/7/2005	2.7			0.038										
195	Deer L	8/21/2005	2.6			0.053										
195	Deer L	9/5/2005	2.7			0.058										
195	Deer L	9/18/2005	2.9			0.028										

LNum	PName	Date	Site	TAir	TH20	QA	QB	QC	QD	QF	QG	AQ-PC	AQ-Chla	MC-LR	Ana-a	Cyl	FP-Chl	FP-BG	HAB form	Shore HAB
195	Deer L	5/31/2004	epi	22	20	2	2	2	8											
195	Deer L	6/13/2004	epi	28	21	3	2	2	5											
195	Deer L	6/28/2004	epi	25	23	3	3	2	1											
195	Deer L	7/11/2004	epi	29	24	3	3	3	1											
195	Deer L	7/25/2004	epi	30	23	3	2	3	1											
195	Deer L	8/7/2004	epi	19	20	2	2	3	5											
195	Deer L	8/22/2004	epi	23	21	2	3	2	1											
195	Deer L	9/5/2004	epi	35	24	3	3	2	1											
195	Deer L	6/12/2005	epi	33	26	3	2	3	14											
195	Deer L	6/26/2005	epi	40	29	3	2	3	18											
195	Deer L	7/10/2005	epi	30	24	3	2	3	145											
195	Deer L	7/25/2005	epi	38	26	4	2	4	134											
195	Deer L	8/7/2005	epi	28	26	4	2	4	1348											
195	Deer L	8/21/2005	epi	33	23	4	3	3	148											
195	Deer L	9/5/2005	epi	25		3	3	3	134											
195	Deer L	9/18/2005	epi	22	21	2	2	1	8											
195	Deer L	6/18/2006	epi	31	22	3	2	3	0											
195	Deer L	7/2/2006	epi	29	20	3	2	3	14											
195	Deer L	7/16/2006	epi	34	26	3	3	3	6											
195	Deer L	7/30/2006	epi	35	27	3	3	3	1											
195	Deer L	8/14/2006	epi	29	23	4	2	3	14											
195	Deer L	8/29/2006	epi	21	21	3	2	3	15											
195	Deer L	9/11/2006	epi	23	20	2	2	2	5											
195	Deer L	9/24/2006	epi	20	18	2	2	1	5											
195	Deer L	7/9/2007	epi	26	23	3	2	3	8											
195	Deer L	7/22/2007	epi	18	21	3	3	3	15											
195	Deer L	8/6/2007	epi	30	28	3	3	3	14											
195	Deer L	8/20/2007	epi	20	22	4	3	4	145											
195	Deer L	9/2/2007	epi	27	23	3	3	3	8											
195	Deer L	9/17/2007	epi	15	19	3	3	3	15											
195	Deer L	9/30/2007	epi	21	19	2	3	2	8											
195	Deer L	10/15/2007	epi	12	15	2	3	3	5											
195	Deer L	6/1/2008	epi	20	19	2	3	2	58											
195	Deer L	6/15/2008	epi	28	26	3	2	3	8											
195	Deer L	6/29/2008	epi	23	25	2	3	3	8											

LNum	PName	Date	Site	TAir	TH20	QA	QB	QC	QD	QF	QG	AQ-PC	AQ-Chla	MC-LR	Ana-a	Cyl	FP-Chl	FP-BG	HAB form	Shore HAB
195	Deer L	7/14/2008	epi	25	25	3	3	3	1											
195	Deer L	7/27/2008	epi	27	25	4	1	4	134											
195	Deer L	8/10/2008	epi	22	23	3	3	3	158											
195	Deer L	8/24/2008	epi	29	24	2	3	2	8											
195	Deer L	9/5/2008	epi	30	34	3	3	2	8											
195	Deer L	06/07/2009	epi	28	22	1	3	2	8											
195	Deer L	06/23/2009	epi	23	20	3	3	3	24											
195	Deer L	07/06/2009	epi	27	24	2	2	1	0											
195	Deer L	07/19/2009	epi	24	22	3	3	3	158											
195	Deer L	08/03/2009	epi	27	23	4	3	4	13											
195	Deer L	08/16/2009	epi	37	26	1	3	1	0											
195	Deer L	08/30/2009	epi	25	22	2	3	2	0											
195	Deer L	09/13/2009	epi	21	21	3	3	3	1											
195	Deer L	6/13/2010	epi	26	24	3	3	2	15											
195	Deer L	6/27/2010	epi	31	25	3	3	2	18											
195	Deer L	7/12/2010	epi	34	27	3	3	3	2											
195	Deer L	7/25/2010	epi	24	26	3	3	3	25											
195	Deer L	8/9/2010	epi	30	26	2	4	2	2											
195	Deer L	8/23/2010	epi	18	23	2	3	3	25											
195	Deer L	9/6/2010	epi	26	22	1	3	2	2											
195	Deer L	9/19/2010	epi	21	20	1	3		8											
195	Deer L	6/2/2013	epi	20	23	2	3	2	0	0	0	3.10	1.10	<0.30	<0.630		1.50	0.70	I	
195	Deer L	6/16/2013	epi	20	18	3	3	3	15	4	0	7.20	1.50	<0.30	<0.440		1.80	0.00	I	I
195	Deer L	6/30/2013	epi	27	21	3	3	4	148	4	0	3.80	1.50	<0.30	<0.510		2.70	0.00	H	I
195	Deer L	7/14/2013	epi	34	25	3	3	3	18	0	7	126.80	5.70	<0.30	<0.910		19.80	15.00	I	I
195	Deer L	7/28/2013	epi	22	21	3	3	3	0	0	0	34.80	7.30	<0.30	<0.380		9.70	0.00	F	I
195	Deer L	8/11/2013	epi	25	22	2	3	2	0	0	0	8.10	4.00	<0.30	<0.380		9.10	0.90	I	I
195	Deer L	8/25/2013	epi	27	24	2	3	1	0	0	0	4.80	2.50	0.41	<0.570		1.10	0.00	F	I
195	Deer L	9/9/2013	epi	21	20	2	3		0	0	4	7.90	3.90	0.36	<19.130		4.80	0.20	I	I
195	Deer L	6/8/2014	epi	21	23	2	2	2	5	0	0	1.20	4.90	<1.83	<0.17	<0.001	5.30	0.90	i	f
195	Deer L	6/22/2014	epi	25	23	2	3	2	0	0	0	15.00	0.90	<0.58	<0.44	<0.002	7.60	2.30	i	i
195	Deer L	7/6/2014	epi	30	24	2	3	1	0	0	4	22.50	1.10	<0.62	<0.03	<0.002	9.20	3.70	f	i
195	Deer L	7/20/2014	epi	28	25	2	3	1	0	0	0	24.10	2.00	<0.39	<0.24	<0.002	16.70	3.80	i	i
195	Deer L	8/6/2014	epi	30	25	2	3	2	0	4	4	13.80	1.70	<0.38	<0.05	<0.001	13.40	1.80	e	e
195	Deer L	8/17/2014	epi	21	23	2	3	2	0	0	0	7.00	0.90	<0.35	<0.03	<0.001	3.70	0.20	f	e
195	Deer L	9/1/2014	epi	26	23	2	3	2	0	0	0	6.60	1.20	<0.29	<0.14	<0.002	9.60	0.50	e	ef
195	Deer L	9/14/2014	epi	21	17	3	2	2	0	0	4	5.30	2.40	<0.70	<0.03	<0.001	17.60	0.60	ef	ef
195	Deer L	6/7/2015	epi	22	21	2	2	1	0	0	0	8.60	0.80	<0.77	<0.126	<1.739	2.90	0.30	I	I
195	Deer L	6/21/2015	epi	25	21	2	2	2	5	0	0	9.90	0.80	<0.59	<0.004	<0.001	3.83	0.83	I	I
195	Deer L	7/5/2015	epi	27	21	2	3	2	5	0	0	7.30	1.30	<0.86	<0.008	<0.046	4.06	0.12	F	F
195	Deer L	7/19/2015	epi	28	25	2	3	1	0	0	0	33.40	0.70	<0.36	<0.003	<0.018	6.84	4.76	F	F
195	Deer L	8/2/2015	epi	27	26	2	3	1	0	0	0	16.74	0.67	<0.25	<0.004	<0.015	3.73	2.18	F	F
195	Deer L	8/16/2015	epi	27	26	2	3	1	0	0	0	7.00	0.60	<0.28	<0.008	<0.021	2.19	1.00	EF	EF
195	Deer L	8/30/2015	epi	27	24	2	3	1	0	0	0			<0.49	<0.003	<0.014	1.87	0.69	EF	E
195	Deer L	9/13/2015	epi	15	20	1	4	2	2	0	0	6.30	0.40	<0.27	<0.009	<0.022	1.68	0.52	EF	E

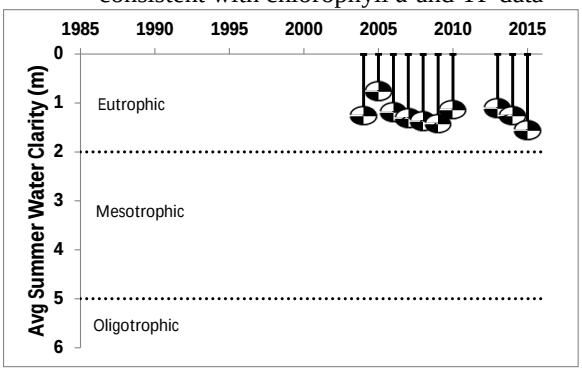
Legend Information

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 = surface, hypo = 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	1 ug/l potable (C) 20 ug/l swimming (C)
Ana	Anatoxin-a (ug/l)	0.3 ug/l	none
Cyl	Cylindrospermposin (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: Deer Lake

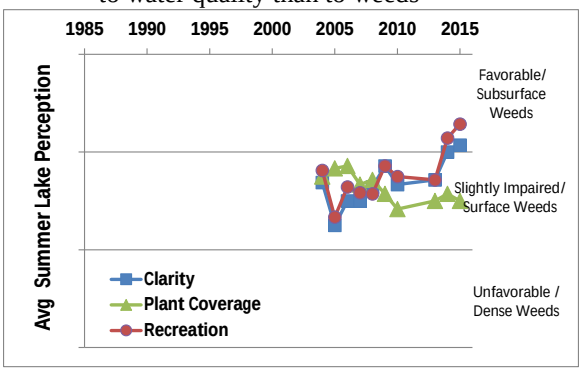
Long Term Trends: Water Clarity

- Slight increase, particularly last three years
- Most readings typical of *eutrophic* lakes, consistent with chlorophyll *a* and TP data



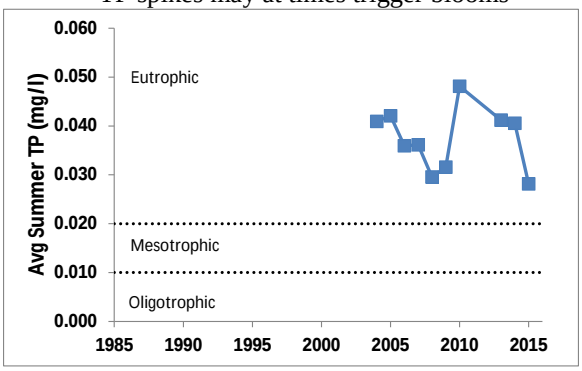
Long Term Trends: Lake Perception

- Plants increasing, WQ assess. improving
- Recreational perception usually more linked to water quality than to weeds



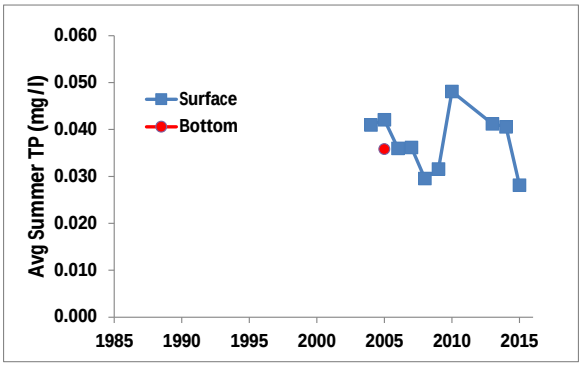
Long Term Trends: Phosphorus

- No long term trends, but ↓ last few years
- Most readings typical of *eutrophic* lakes, but TP spikes may at times trigger blooms



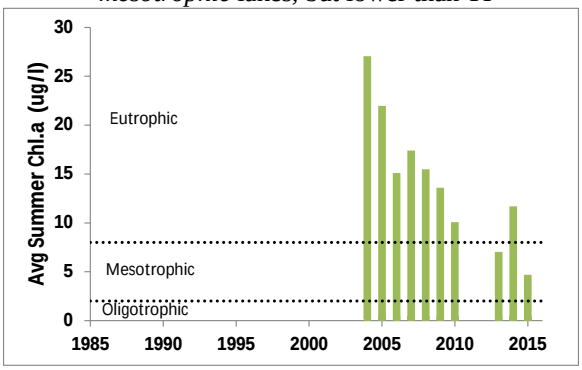
Long Term Trends: Bottom Phosphorus

- Deepwater TP similar to surface readings
- Indicates the lack of any thermal layering or nutrient stratification



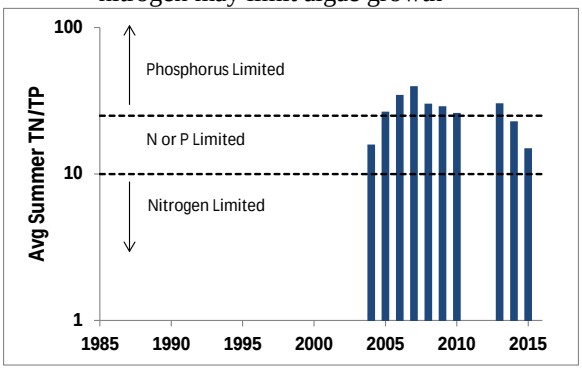
Long Term Trends: Chlorophyll a

- Algae levels steadily decreasing
- Most readings mostly still typical of *mesotrophic* lakes, but lower than TP



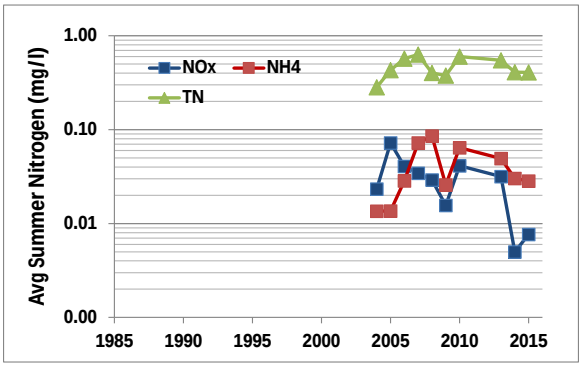
Long Term Trends: N:P Ratio

- No long term trends apparent
- Most readings indicate phosphorus or nitrogen may limit algae growth



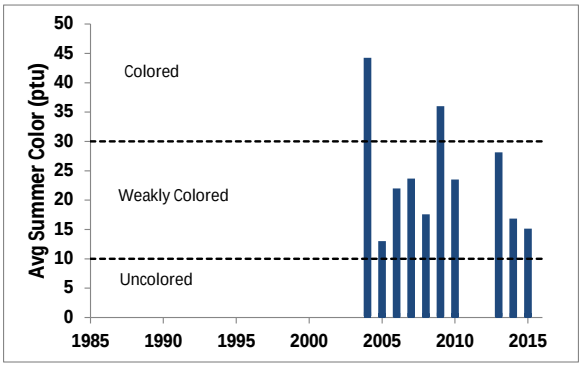
Long Term Trends: Nitrogen

- NOx may be decreasing; TN/NH4 variable
- Most nitrogen readings low; TN generally varied with NH4



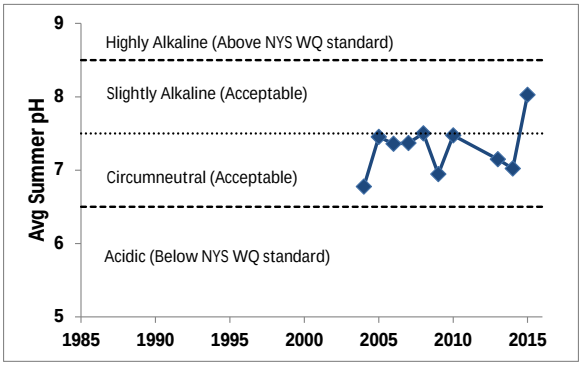
Long Term Trends: Color

- Highly variable year to year
- Most readings typical of *weakly colored* to *colored* lakes



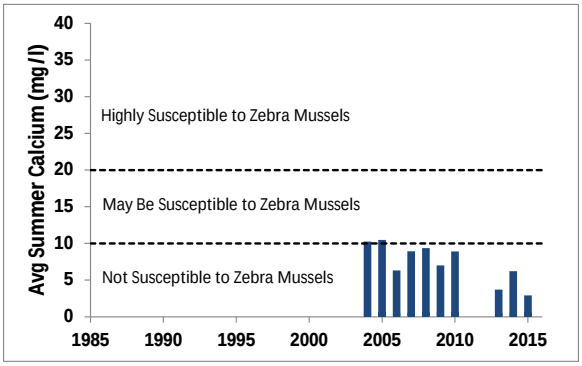
Long Term Trends: pH

- No long term trends; much higher pH 2015
- Most readings typical of *slightly alkaline* to *circumneutral* lakes



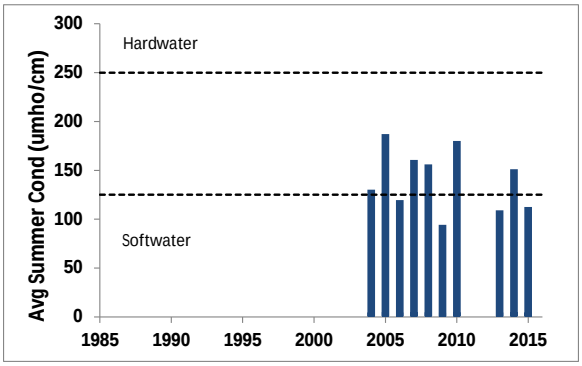
Long Term Trends: Calcium

- Apparent decreasing calcium levels
- Readings indicate low risk for zebra mussels



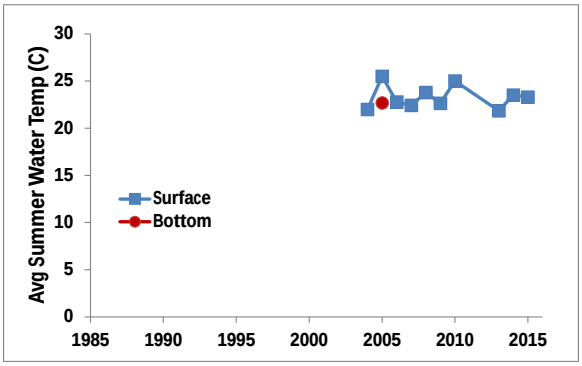
Long Term Trends: Conductivity

- No trends apparent
- Most readings typical of *softwater* to *intermediate hardness* lakes



Long Term Trends: Water Temperature

- No trends apparent in surface temperatures
- Similar bottom temperature readings indicate no thermal stratification



Appendix D:
Algae Testing Results from SUNY ESF Study

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

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

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

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

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

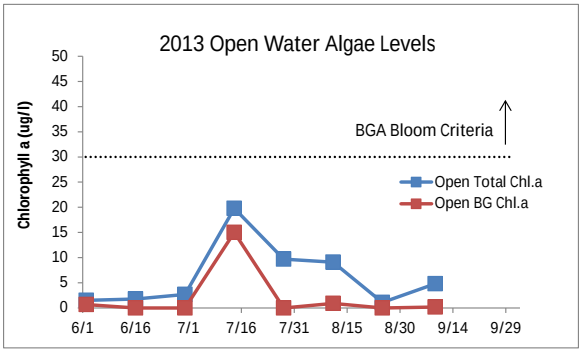


Figure D1:
2013 Open Water Total and BGA Chl.a

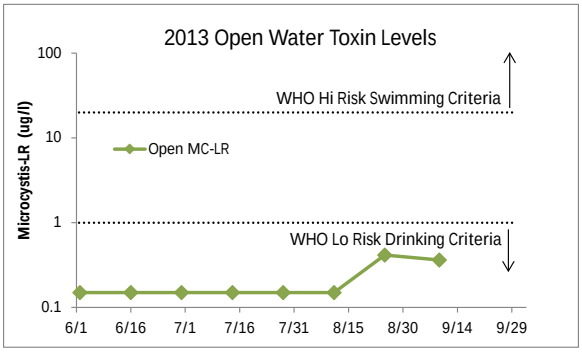


Figure D2:
2013 Open Water Microcystin-LR

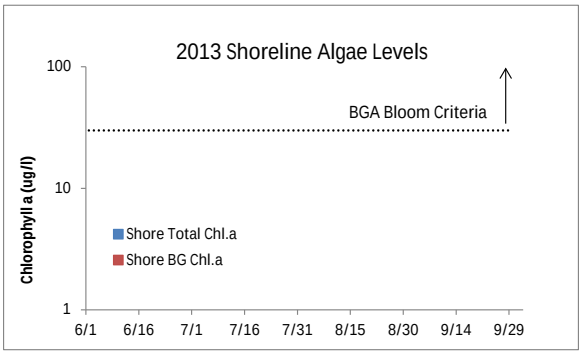


Figure D3:
2013 Shoreline Total and BGA Chl.a

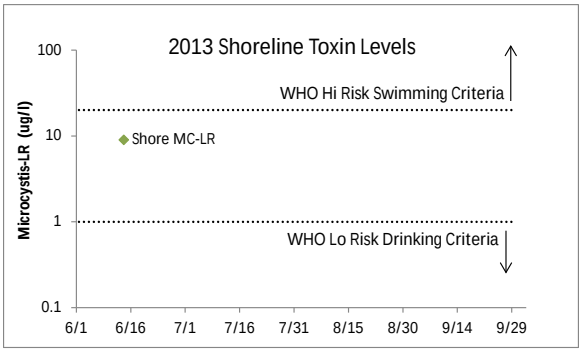


Figure D4:
2013 Shoreline Microcystin-LR

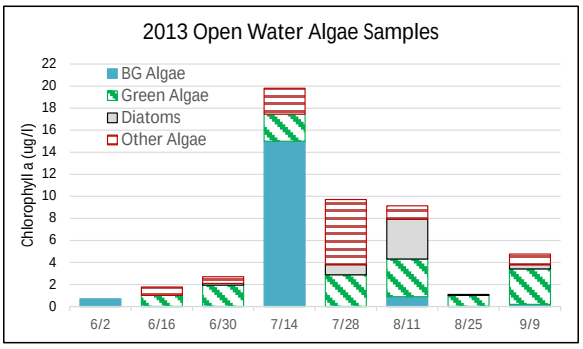


Figure D5:
2013 Open Water Algae Types

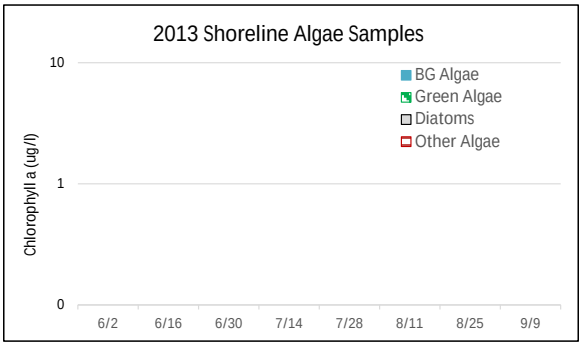


Figure D6:
2013 Shoreline Algae Types

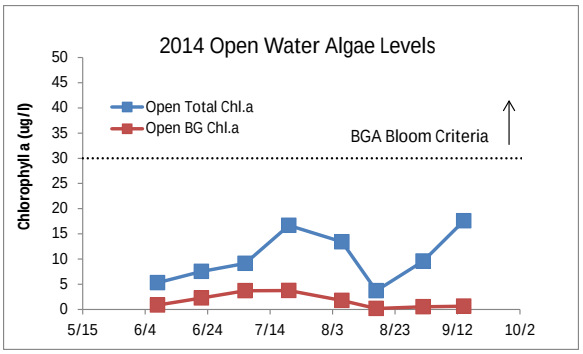


Figure D7:
2014 Open Water Total and BGA Chl.a

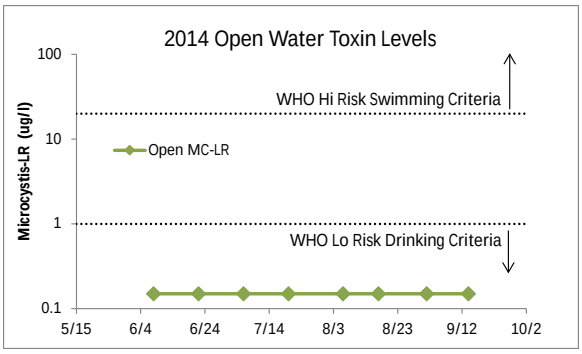


Figure D8:
2014 Open Water Microcystin-LR

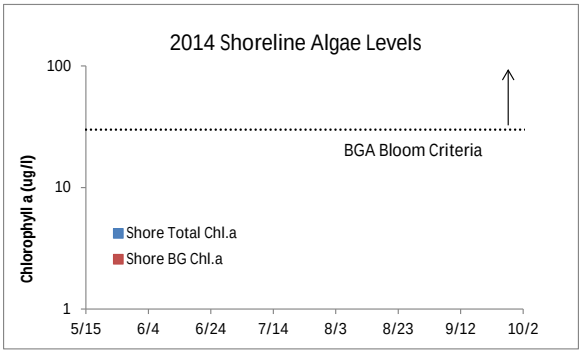


Figure D9:
2014 Shoreline Total and BGA Chl.a

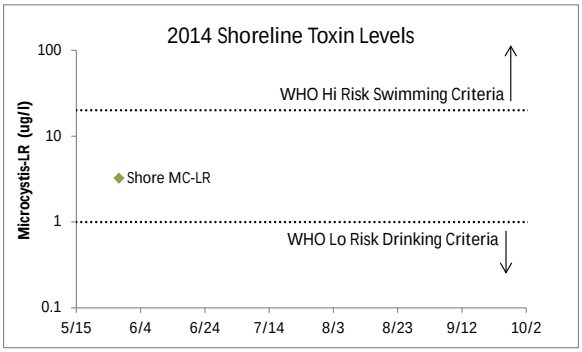


Figure D10:
2014 Shoreline Microcystin-LR

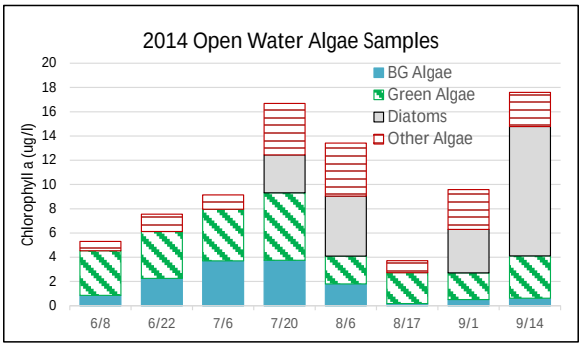


Figure D11:
2014 Open Water Algae Types

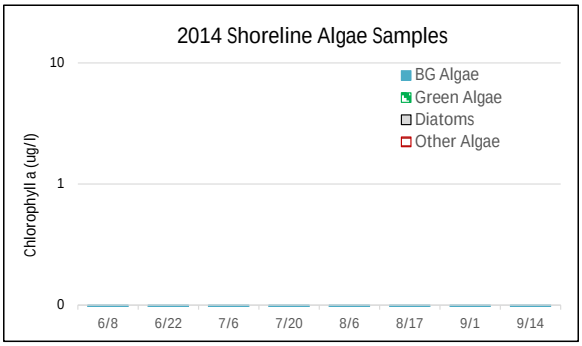


Figure D12:
2014 Shoreline Algae Types

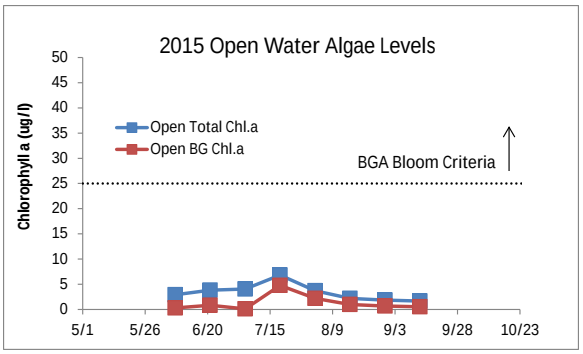


Figure D13:
2015 Open Water Total and BGA Chl.a

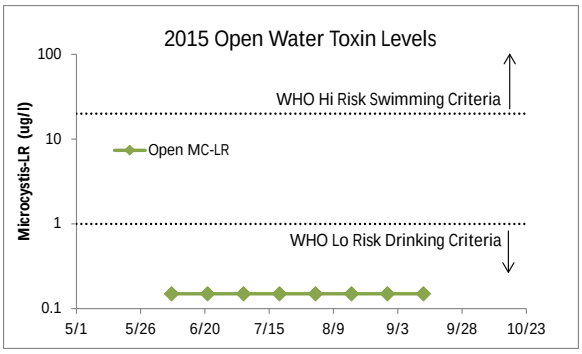


Figure D14:
2015 Open Water Microcystin-LR

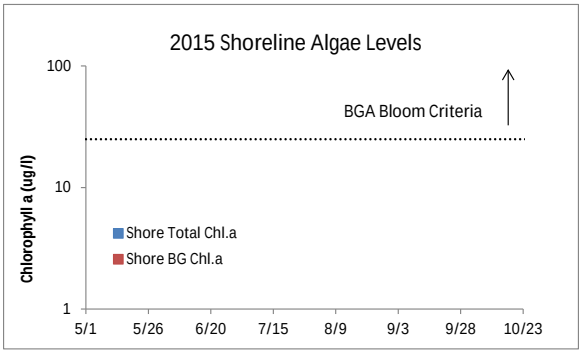


Figure D15:
2015 Shoreline Total and BGA Chl.a

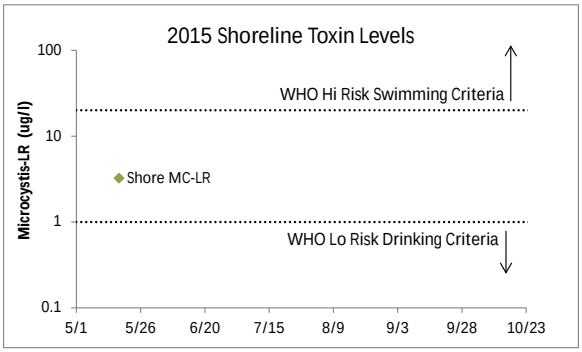


Figure D16:
2015 Shoreline Microcystin-LR

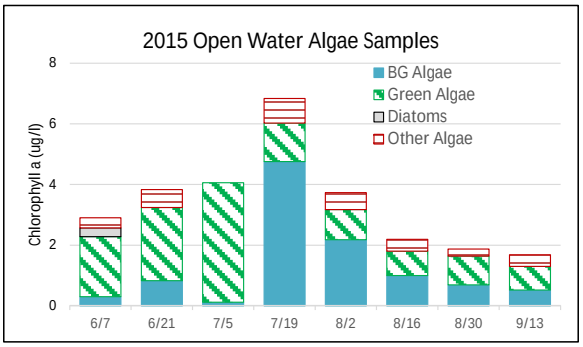


Figure D17:
2015 Open Water Algae Types

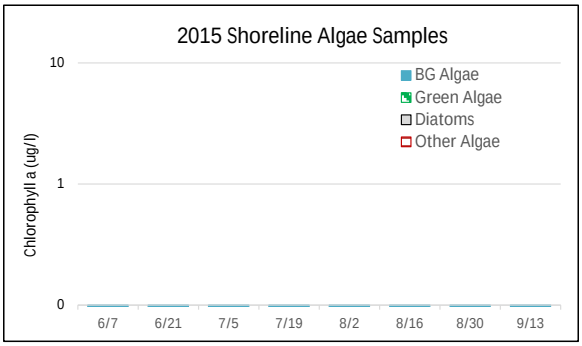


Figure D18:
2015 Shoreline Algae Types

Appendix E:
AIS Species in Broome County

The table below shows the invasive aquatic plants and animals that have been documented in Broome 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.

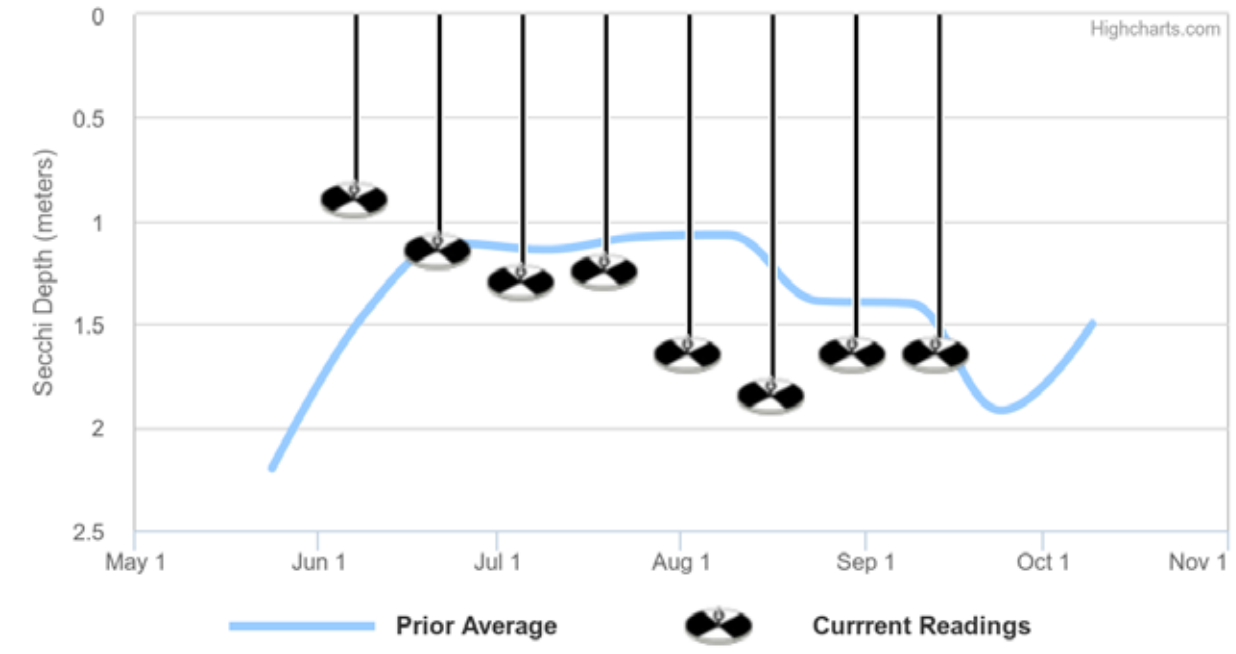
Aquatic Invasive Species – Broome County			
Waterbody	**Kingdom**	**Common name**	**Scientific name**
Arctic Lake	Plant	Eurasian watermilfoil	*Myriophyllum spicatum*
Arctic Lake	**Plant**	**Curly leafed pondweed**	***Potamogeton crispus***
Beaver Lake	Animal	Banded mystery snail	*Viviparus georgianus*
Chenango River	Animal	Asian Clam	*Corbicula fluminea*
Deer Lake	Plant	Water chestnut	*Trapa natans*
Susquehanna River near Binghamton	Animal	Asian Clam	*Corbicula fluminea*
Susquehanna River near Five Mile Pt	Animal	Asian Clam	*Corbicula fluminea*
Susquehanna River near Kirkwood	Animal	Asian Clam	*Corbicula fluminea*
Susquehanna River	Animal	Zebra mussel	*Dreissena polymorpha*
Susquehanna River	Plant	Eurasian watermilfoil	*Myriophyllum spicatum*
Taft Pond	Plant	Eurasian watermilfoil	*Myriophyllum spicatum*
Taft Pond	Plant	Curly leafed pondweed	*Potamogeton crispus*
Unnamed Pond 1	Plant	Hydrilla	*Hydrilla verticillata*
Unnamed Pond 2	Plant	Hydrilla	*Hydrilla verticillata*
Whitney Point Reservoir	Plant	Eurasian watermilfoil	*Myriophyllum spicatum*

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

Current Year Water Temperatures vs. Prior Average

This year's shallow water sample temperatures are about the same as the average of readings collected from 2004 to 2014.

Current Year Secchi Readings vs. Prior Average



This year's session Secchi readings are tending to be higher than normal when compared to the average of readings collected from 2004 to 2014

Appendix G: Watershed and Land Use Map for Deer 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.