

Beaver Lake Questions and Answers, 2015 CSLAP

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

A1. Lake conditions in 2015 were probably “better” in Beaver Lake- water clarity was slightly higher due to lower nutrient and algae levels. While shoreline blooms were still common and comprised primarily of blue green algae, toxin levels in these samples were lower than in most years.

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

A2. Chloride testing results were typical of lakes with no to low impact from road salt runoff, and biological impacts were not reported or measured.

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

A3. Beaver Lake had less favorable water quality- lower water clarity and higher algae levels, including more extensive blooms- than many other nearby lakes. However, these conditions are common to other shallow lakes in the area.

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

A4. Water temperature readings have increased since the early 1990s. Water clarity increased from the early 1990s to the late 2000s, but nutrient and algae levels have varied in shorter (4-6 year) cycles. pH and conductivity increased from the early 2000s to the present.

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

A5. The lake presently suffers from algae blooms and at times reduced water clarity. Reducing nutrient levels, as discussed below, may reduce the intensity and frequency of future shoreline and open water 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 will help to reduce nutrient loading to the lake and therefore improve water quality. Lake residents should continue to keep outside boats from entering the lake to reduce the risk of new invasive species, since nearby lakes harbor several invasive plants not found in the lake.

Lake Use				
	PWL	Average Year	2015	Primary issue
Potable Water				Not applicable
Swimming				Not applicable
Recreation				Algae levels
Aquatic Life				High pH
Aesthetics				Algae blooms
Habitat				No impacts
Fish Consumption				

Supported / Good
 Threatened / Fair
 Stressed / Poor
 Impaired
 Not Known

CSLAP 2015 Lake Water Quality Summary: Beaver Lake

General Lake Information

Location	Town of Windsor
County	Broome
Basin	Susquehanna River
Size	15.5 hectares (38.3 acres)
Lake Origins	Augmented by dam (8ft tall by 68ft long)
Watershed Area	136.0 hectares (335.9 acres)
Retention Time	0.6 years
Mean Depth	2.3 meters
Sounding Depth	5.5 meters
Public Access?	no
Major Tributaries	no named tribs
Lake Tributary To...	unnamed outlet to unnamed stream to Susquehanna River
WQ Classification	C (non-contact recreation = boating, angling)
Lake Outlet Latitude	42.043
Lake Outlet Longitude	-75.663
Sampling Years	1991-1994, 2002-2010, 2012-2015
2015 Samplers	Susan and Lawrence Paul
Main Contact	Susan and Lawrence Paul

Lake Map



Background

Beaver Lake is a 38 acre, class C lake found in the Town of Windsor in Broome County, in the Southern Tier region of New York State. The lake was first sampled through CSLAP in 1991.

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 River drainage basin.

Lake Uses

Beaver Lake is a Class C lake; this means that the best intended use for the lake is for non-contact recreation—boating, aquatic life, and aesthetics. However, the lake is used by lake residents and invited guests for swimming and non-power boating (motorized boats are not allowed on the lake). There is no public access to the lake.

It is not known by the report authors if Beaver Lake has been stocked by lake residents or municipal officials.

General statewide fishing regulations are applicable in Beaver Lake. In addition, the open season on trout runs from April 1st—October 15th, with no size limit and a daily take limit of five fish, with no more than two fish greater than 12 inches and five brook trout under eight inches.

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

Historical Water Quality Data

CSLAP sampling was conducted on Beaver Lake from 1991 to 1994, 2002 to 2010, and 2012 to 2015. The CSLAP reports for Beaver Lake for several years are posted on the NYSFOLA website at www.nysfola.org, under NYS Lake Association Lake List. The most recent CSLAP report for Beaver Lake can also be found on the NYSDEC web page at <http://www.dec.ny.gov/lands/77884.html>

Beaver Lake was sampled as part of the DEC Lake Biomonitoring study in 2008. These data showed water quality conditions nearly identical to those measured through CSLAP, confirming the validity of the data collected by the CSLAP sampling volunteers at the lake. The biomonitoring analyses are discussed below. The temperature and oxygen data show that the lake is thermally stratified only at the extreme bottom (depth of about five meters), resulting in a very small zone of hypoxic (oxygen reduced) water. It is not likely that this creates any significant water quality or ecological impacts.

There are no named Beaver Lake tributary sites, and none of the unnamed ephemeral tributaries have been monitored through the NYSDEC Rotating Intensive Basins (RIBS) or biological screening program. The lake has also not been sampled through any of the state fisheries monitoring programs.

Lake Association and Management History

Beaver Lake is served by the Beaver Lake Association. Management activities at and background information for the lake include:

- Private, small lake association
- Removed from federal 303d list in 2010

- Limnology study conducted by Northeastern Biologists (John Grim) in 1996
- Association funds road repairs, coordinates community management of nuisance weeds (lilies), stray dock removal, septic and invasives education, and runs social events

Additional information about Beaver Lake can be found at <http://www.beaverlakewindsor.com/>.

Summary of 2015 CSLAP Sampling Results

Evaluation of 2015 Annual Results Relative to 1991-2014

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 – Beaver Lake” section in Appendix C.

Evaluation of Eutrophication Indicators

Lake productivity in Beaver Lake was high again in 2015, with some shoreline green and blue green algae blooms observed. This is similar to 2014, but water clarity was higher and nutrient and algae levels were lower than usual. The lake has exhibited cyclical changes in nutrient and algae readings since the mid-1990s, while water clarity increased from the mid-1990s to the late 2000s. It is likely that the lake routinely changes slightly from year to year due to weather or natural variability.

In the typical summer, phosphorus levels increase during the summer, resulting in a seasonal increase in algae levels and a decrease in water clarity. This was not apparent in 2015; these trophic indicators did not exhibit any clear seasonal trends.

The lake is usually characterized as *mesoeutrophic*, or moderately to highly productive, based on water clarity (typical of *mesotrophic* to *eutrophic* lakes), chlorophyll *a*, and total phosphorus readings (both typical of *eutrophic* lakes). However, these trophic indicators were more typical of *eutrophic* lakes in the last three years. The trophic state indices (TSI) evaluation suggests that chlorophyll *a* readings are higher than expected given the phosphorus readings in the lake. This suggests that Beaver Lake may be susceptible to a large rise in algae levels with small increases in phosphorus inputs to the lake, consistent with the high frequency of shoreline blooms in the lake. Overall trophic conditions are summarized on the Lake Scorecard and Lake Condition Summary Table.

Evaluation of Potable Water Indicators

Algae levels are 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, although the lake is not used for drinking water. Phosphorus readings collected from near the bottom of the lake are similar to those measured at the lake surface, as expected given the lack of thermal stratification in the lake. This suggests that deeper intakes cannot be used to offset surface water impacts for any “unofficial” potable water use. Potable water conditions, at least as measurable through CSLAP, are summarized in the Lake Scorecard and Lake Condition Summary Table.

Evaluation of Limnological Indicators

pH readings were higher than usual in 2015, despite lower algae levels (pH often increases due to excessive algae growth). This has been part of a long term increase in pH (and conductivity) over the last 10-15 years. Total nitrogen (TN) readings have increased and color has decreased over the same period, but both of these indicators were close to normal in 2015. It is likely that the small changes in each 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, averaged 5 mg/l. These values fall below the “minor” 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 and below the range of values found in most NYS lakes. These readings suggest a low 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

The fluoroprobe screening data analyzed by SUNY ESF in the last several years indicated that most of the largest shoreline algae blooms and the highest open water algal communities were dominated by blue green algae, although non-blue green forms were also apparent during at least part of the summer. The 2014 and 2015 sampling indicated that blue green algae levels were low in most open water samples, although shoreline blooms in 2015 were again dominated by blue green algae.

Macrophyte surveys have been conducted through CSLAP (via the 2008 biomonitoring survey and individual CSLAP sampling sessions) in Beaver Lake. At least 19 aquatic plant species have been found, including at least three protected plant species (*Potamogeton diversifolius*, water thread pondweed; *Potamogeton strictifolius*, blunt-leafed pondweed; and *Utricularia minor*, lesser bladderwort) have been found in the lake. The modified floristic quality index (FQI) for the lake indicates that the quality of the aquatic plant community is “excellent.”

The results from the macroinvertebrate survey conducted in 2008 have not yet been fully analyzed. The preliminary results indicate a large number of macroinvertebrate taxa and a low percentage of any single taxa (indicating high macroinvertebrate diversity), a large number of organisms associated with good water quality, but a relatively high tolerance for pollution. A more detailed analysis of these results will be forthcoming once all of the macroinvertebrate data have been fully analyzed.

Zooplankton surveys have not been conducted through CSLAP at Beaver Lake. The iMap invasives web page cites the presence of Banded mystery snail, *Viviparus georgianus*, an exotic animal.

The composition of the fish community has not been reported, although it is likely that the lake supports a warmwater fishery.

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 and aquatic plant coverage were close to normal in 2015, despite the significant blooms reported during the year. These assessments are most closely linked to changes in algae (than in weeds). Aquatic plant coverage has increased over the last twenty years, and water quality assessments have degraded slightly over the last 10-15 years, resulting in less favorable recreational assessments.

Slight seasonal degradation in recreational and water quality assessments largely mirrors seasonal changes in lake productivity (decreasing water clarity and increasing algae levels). While water quality assessments degraded during the summer of 2015, this did not result in clear seasonal changes in recreational assessments. Overall lake perception is summarized on the Lake Scorecard and Lake Condition Summary Table.

Evaluation of Local Climate Change

Air and water temperature readings in the summer index period were higher than normal in 2015, and water temperatures have increased slightly since CSLAP sampling began in Beaver Lake in 1991. It is not known if this is an indication of local climate change or 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 periodically exceed the threshold for harmful algal blooms (HABs) in the open water, and frequently exceed this threshold along the shoreline. Open water toxin measurements suggest a much lower risk away from these (visibly apparent) shoreline blue green algae blooms. Shoreline toxin levels were highest in 2013, but lower in 2014 and 2015. At times, these readings exceed the World Health Organization (WHO) criteria for higher risk for swimmers. Despite lower toxin levels in most samples, lake residents and visitors should avoid exposure to any surface scums or highly discolored water.

Lake Condition Summary

Category	Indicator	Min	Annual Avg	Max	2015 Avg	Classification	2015 Change?	Long-term Change?
Eutrophication Indicators	Water Clarity	0.57	2.02	3.94	2.55	Mesotrophic	Within Normal Range	No Change
	Chlorophyll <i>a</i>	0.40	24.06	347.40	11.38	Eutrophic	Within Normal Range	No Change
	Total Phosphorus	0.007	0.028	0.073	0.022	Eutrophic	Within Normal Range	No Change
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	0.26	0.01	Low NOx	Within Normal Range	No Change
	Ammonia	0.00	0.04	0.39	0.05	Low Ammonia	Within Normal Range	No Change
	Total Nitrogen	0.01	0.46	1.44	0.49	Low Total Nitrogen	Within Normal Range	No Change
	pH	5.32	7.32	9.55	7.57	Circumneutral	Within Normal Range	No Change
	Specific Conductance	28	46	65	48	Softwater	Within Normal Range	No Change
	True Color	3	15	90	12	Intermediate Color	Within Normal Range	No Change
	Calcium	2.2	3.7	5.4	2.4	Not Susceptible to Zebra Mussels	Within Normal Range	No Change
Lake Perception	WQ Assessment	1	2.4	5	2.3	Not Quite Crystal Clear	Within Normal Range	No Change
	Aquatic Plant Coverage	1	3.0	4	2.9	Surface Plant Growth	Within Normal Range	No Change
	Recreational Assessment	1	2.5	4	2.5	Slightly Impaired	Within Normal Range	No Change
Biological Condition	Phytoplankton					Open water-high blue green algae biomass; Shoreline-high blue green algae in bloom	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					High diversity, good quality, but pollution insensitive organisms	Not known	Not known
	Fish					Warmwater fishery?	Not known	Not known
	Invasive Species					Banded mystery snail	Not known	Not known
Local Climate Change	Air Temperature	3	21.5	33	24.6		Higher Than Normal	No Change
	Water Temperature	11	22.1	28	24.1		Higher Than Normal	Increasing Slightly

Category	Indicator	Min	Annual Avg	Max	2015 Avg	Classification	2015 Change?	Long-term Change?
Harmful Algal Blooms	Open Water Phycocyanin	1	57	373	22	Some readings indicate high risk of BGA	Not known	Not known
	Open Water FP Chl.a	0	38	821	5	Most readings indicate high algae levels	Not known	Not known
	Open Water FP BG Chl.a	0	8	89	2	Few readings indicate high BGA levels	Not known	Not known
	Open Water Microcystis	<DL	<DL	0.9	<DL	Low to 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	6504	6504	6504		All readings indicate high risk of BGA	Not known	Not known
	Shoreline FP Chl.a	15	5253	67890	496	Most readings indicate high algae levels	Not known	Not known
	Shoreline FP BG Chl.a	0	4991	67890	416	Most readings indicate high BGA levels	Not known	Not known
	Shoreline Microcystis	<DL	20.7	546.9	<DL	Occasionally very high shoreline bloom MC-LR	Not known	Not known
	Shoreline Anatoxin a	<DL	<DL	2.0	<DL	Shoreline bloom Anatoxin-a at times detectable	Not known	Not known

Evaluation of Lake Condition Impacts to Lake Uses

Beaver Lake is among the lakes listed on the Susquehanna River Basin Priority Waterbody List (PWL) (2009), with recreation is *stressed* by high nutrient levels and algal blooms and excessive weeds. The PWL listing for Beaver Lake is listed in Appendix B.

Potable Water (Drinking Water)

The CSLAP dataset at Beaver 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 periodic algal blooms would probably impact any "unofficial" potable water use of the lake.

Public Bathing

The CSLAP dataset at Beaver Lake, including water chemistry data, physical measurements, and volunteer samplers' perception data, suggests that public bathing, if conducted at a public swimming beach, would be *impaired* by excessive algae and poor water clarity, and by blue green algae blooms. However, the lake is not classified for this use. 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 Beaver Lake, including water chemistry data, physical measurements, and volunteer samplers' perception data, suggest that recreation may be *impaired* by shoreline algae blooms and overall elevated algae levels. These impacts are greater at some times and in some locations.

Aquatic Life

The CSLAP dataset on Beaver Lake, including water chemistry data, physical measurements, and volunteer samplers' perception data, suggest that aquatic life may be *stressed* by elevated pH (perhaps associated with algae blooms) and *threatened* by the presence of Banded mystery snail, an exotic species. However, additional data are needed to evaluate the food and habitat conditions for aquatic organisms in the lake.

Aesthetics and Habitat

The CSLAP dataset on Beaver Lake, including water chemistry data, physical measurements, and volunteer samplers' perception data, suggest that aesthetics are *poor* due to excessive algae and algal blooms. Habitat should be *good*.

Fish Consumption

There are no fish consumption advisories posted for Beaver Lake.

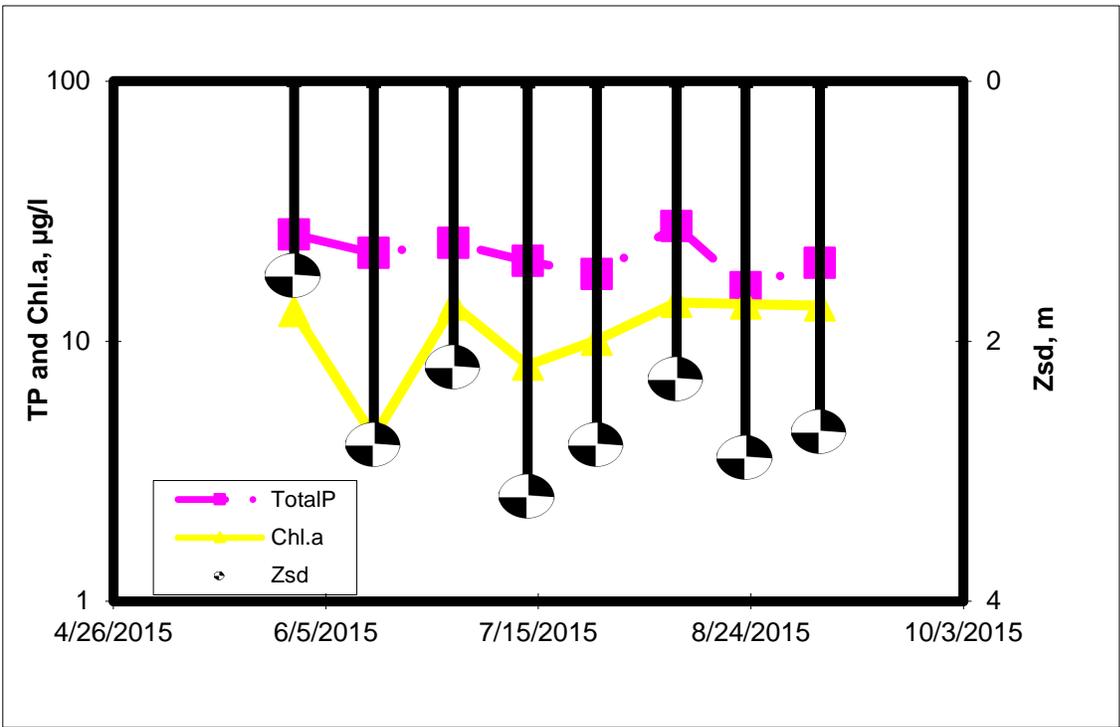
Additional Comments and Recommendations

Lake residents are also advised to avoid exposure to any shoreline algae bloom or discolored water, and to identify any potential sources of nutrients entering the lake.

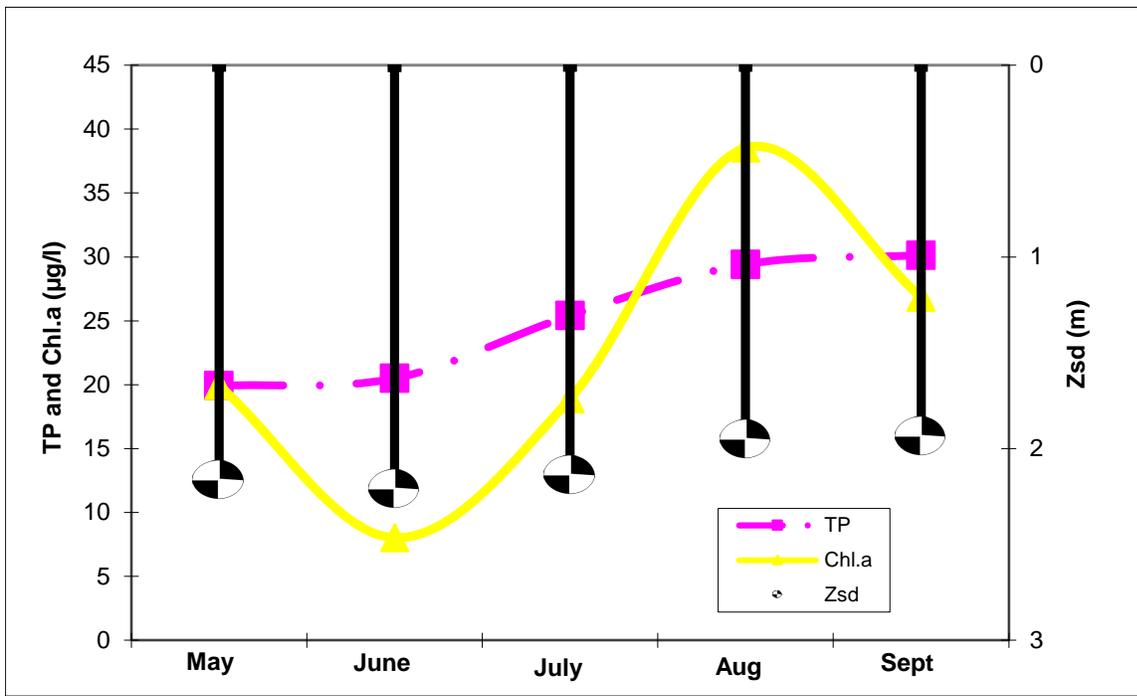
Aquatic Plant IDs-2015

None submitted for identification.

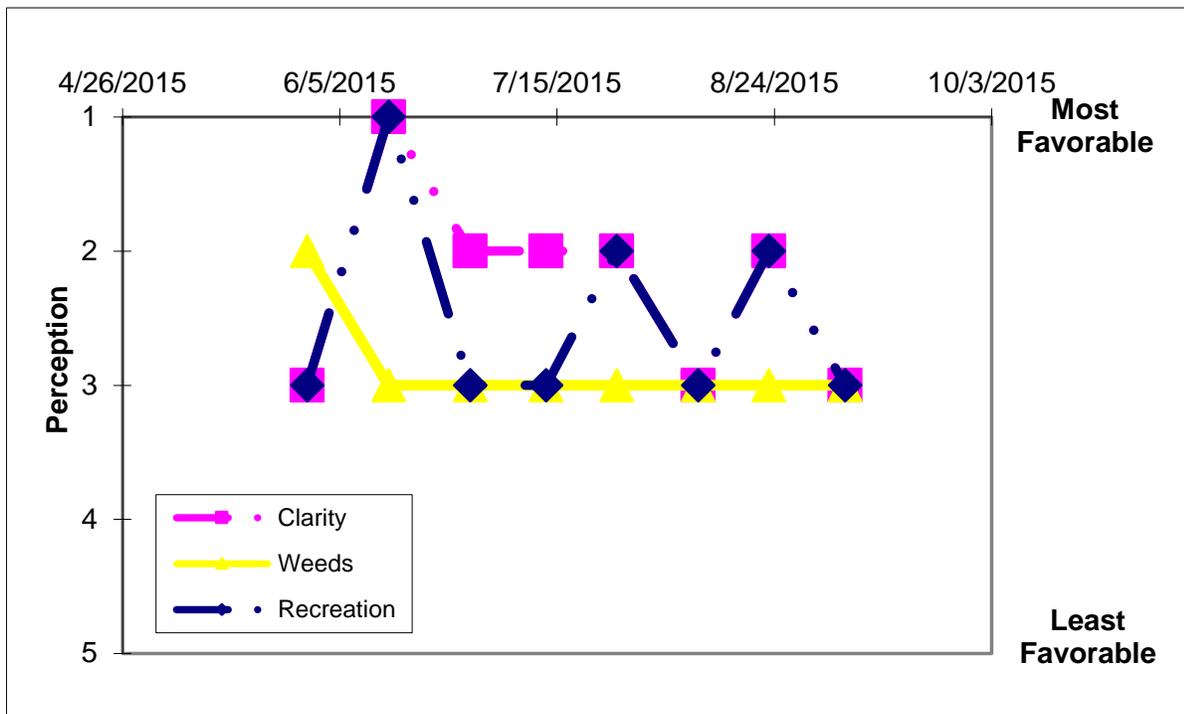
Time Series: Trophic Indicators, 2015



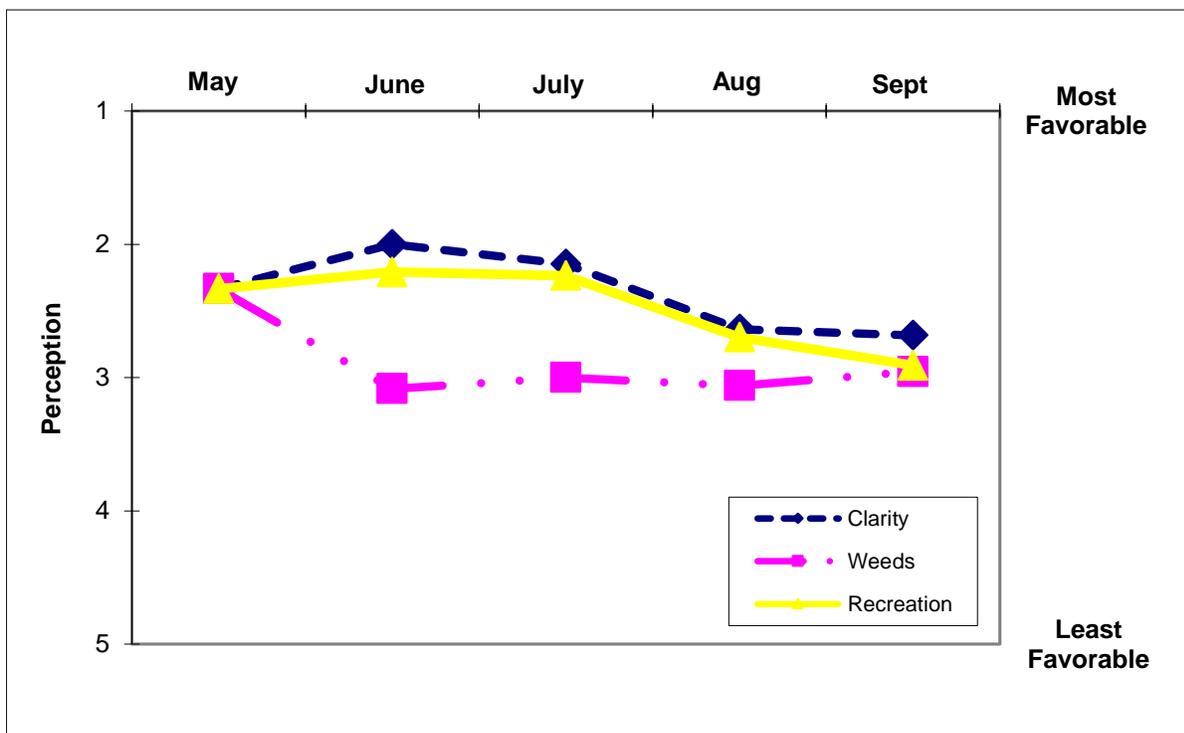
Time Series: Trophic Indicators, Typical Year (1991-2015)



Time Series: Lake Perception Indicators, 2015



Time Series: Lake Perception Indicators, Typical Year (1991-2015)



Appendix A- CSLAP Water Quality Sampling Results for Beaver Lake

LNum	PName	Date	Zbot	Zsd	Zsamp	Tot.P	NO3	NH4	TDN	TN/TP	TColor	pH	Cond25	Ca	Chl.a	Cl
78	Beaver L	6/30/1991	5.0	1.20	1.5	0.029	0.01				18	7.52	54		26.40	
78	Beaver L	7/14/1991	5.0	1.00	1.5	0.068	0.01				15	7.12	59		58.60	
78	Beaver L	7/28/1991	5.0	0.75	1.5	0.045	0.01				19	7.52	53		123.00	
78	Beaver L	8/11/1991	5.0	0.85	1.5	0.046	0.01					7.62	58		92.10	
78	Beaver L	8/25/1991	5.0	0.80	1.5	0.034	0.01				16	7.64	56		69.80	
78	Beaver L	9/14/1991	5.0	0.90	1.5	0.069	0.01				13	7.31	56		84.10	
78	Beaver L	9/28/1991	5.0	1.00	1.5	0.030	0.01				21	7.05	56		56.70	
78	Beaver L	6/14/1992	7.0	1.60	1.5	0.018	0.01				17	7.68	48		9.30	
78	Beaver L	6/28/1992	7.0	1.70	1.5	0.025					9	7.60	53		8.70	
78	Beaver L	7/12/1992	5.2	1.45	1.5	0.036	0.01				15	7.78	53		19.80	
78	Beaver L	7/27/1992		1.75	1.5	0.021					16	7.64	48		19.50	
78	Beaver L	8/10/1992	7.0	1.05	1.5	0.031	0.01				16	7.43	51		62.60	
78	Beaver L	8/23/1992	1.5	0.66	1.5	0.052					17	7.56	54		108.00	
78	Beaver L	9/6/1992	6.0	1.35	1.5	0.039	0.01					7.21	51		42.10	
78	Beaver L	10/3/1992	6.0	1.00	1.5	0.037					29	7.53	62		32.40	
78	Beaver L	7/7/1993	5.7		1.5	0.022	0.02				7	7.66	46		5.47	
78	Beaver L	7/18/1993	5.7	2.21	1.5	0.024					8	6.68	48		7.69	
78	Beaver L	7/18/1993	5.7	2.25	1.5	0.026					7	7.02	48		9.62	
78	Beaver L	7/25/1993	5.7	2.52	1.5	0.020	0.01					7.16	49		7.16	
78	Beaver L	8/1/1993	5.5	2.16	1.5	0.027					10	7.62	48		29.30	
78	Beaver L	8/8/1993	5.7	2.04	1.5	0.036	0.01				12	7.48	49		10.90	
78	Beaver L	8/22/1993	5.7	2.10	1.5	0.032					8	7.56	48		16.60	
78	Beaver L	9/5/1993	5.7	1.20	1.5	0.039	0.01				14	7.65	50		38.70	
78	Beaver L	10/2/1993	5.5	0.90	1.5	0.055					8	7.54	51		38.70	
78	Beaver L	6/5/1994	4.5	1.55	1.5	0.017	0.01				4	7.46	45		8.32	
78	Beaver L	6/19/1994	4.5	1.50	2.5	0.025					4	7.03	47		14.90	
78	Beaver L	7/3/1994	4.5	2.90	2.5	0.012	0.01				8	8.30	44		28.30	
78	Beaver L	7/17/1994	4.5	1.00	2.5	0.034					8	9.44	51		58.90	
78	Beaver L	7/31/1994	4.5	1.50	1.5	0.038	0.01				7	9.06	47		38.20	
78	Beaver L	8/25/1994	4.8	0.79	1.5	0.024	0.01				8	7.36	41		19.10	
78	Beaver L	05/26/02		1.53		0.022	0.01	0.06	0.48	48.52	8	6.83	43		5.00	
78	Beaver L	06/09/02		1.60	2.0	0.026	0.00	0.01	0.43	36.84	16				0.91	
78	Beaver L	06/22/02		1.85	2.0	0.022	0.02	0.12	0.46	47.20	10	6.63			4.42	
78	Beaver L	07/14/02		1.60	2.0	0.020	0.02	0.08	0.39	42.69	48	6.77	40		5.29	
78	Beaver L	07/27/02		2.15	2.0	0.032	0.01	0.03	0.40	26.82	16	6.79	40		18.56	
78	Beaver L	08/11/02		1.65	2.0		0.00	0.08	0.38		5	6.59	40			
78	Beaver L	08/25/02		1.80	2.0	0.030	0.01	0.01	0.52	38.13	31	6.86	40		20.59	
78	Beaver L	09/14/02		1.63	2.0	0.012	0.00	0.02	0.47	84.79	46	7.14	46		2.52	
78	Beaver L	6/28/2003		2.10	2.0	0.022	0.00	0.02	0.19	19.24	10	6.88	42	3.4	2.49	
78	Beaver L	7/13/2003		2.45	2.0	0.020	0.01	0.02	0.19	20.51	14	7.02	40		8.10	
78	Beaver L	7/27/2003		1.95	2.0	0.023	0.02	0.03	0.11	10.50	9	6.87	39		4.98	
78	Beaver L	8/8/2003		2.08	2.0	0.021	0.00	0.04	0.25	25.89	13	6.76	39		13.86	
78	Beaver L	8/24/2003		1.50	2.0	0.020	0.00	0.03	0.33	36.44	18	6.65	40	3.0	28.52	
78	Beaver L	9/7/2003		1.58	2.0	0.027	0.03	0.08			18	6.80	41		22.47	
78	Beaver L	9/21/2003		1.38	2.0	0.038	0.26	0.03	0.28	16.34	13	6.52	40		30.70	
78	Beaver L	10/5/2003		1.33		0.064	0.00	0.11	0.46	15.89	35	6.49	40		32.17	
78	Beaver L	6/5/2004		1.60	2.0	0.020	0.01	0.01			9	6.03	45		0.52	
78	Beaver L	6/20/2004		2.80	2.0	0.007	0.01	0.01	0.01	1.48	13	5.32	44		5.42	
78	Beaver L	7/6/2004		2.30	2.0	0.013	0.02	0.01	0.26	45.27	12	6.99	45		2.80	
78	Beaver L	7/18/2004		1.90	2.0	0.009	0.01	0.01	0.31	76.93	12	6.45	41		14.50	
78	Beaver L	8/1/2004	7.5	5.90	1.5	0.033	0.01	0.01	0.18	11.89		6.89	36		32.10	
78	Beaver L	8/15/2004	4.4	2.00	1.5	0.022	0.03	0.02	0.34	34.21	13	6.55	43		13.00	
78	Beaver L	8/28/2004	4.7	3.00	1.5	0.011	0.01	0.01	0.71	138.19	12	6.51	30		12.30	
78	Beaver L	9/12/2004	4.5	2.10	1.5	0.025	0.02	0.01	0.47	41.40	90	7.51	31		3.70	
78	Beaver L	6/5/2005	5.4	1.88	1.5	0.013	0.01	0.01	0.12	20.04	16	7.69	39	3.6	11.12	
78	Beaver L	6/20/2005	5.5	3.20	1.5	0.016	0.06	0.04	0.28	39.34	12	7.30	39		11.29	
78	Beaver L	7/4/2005	5.5	2.89	1.5	0.020	0.01	0.01	0.27	29.72	12	6.25	38		1.35	
78	Beaver L	7/18/2005	5.6	2.48	1.5	0.016	0.03	0.02	0.27	37.66	24	7.30	39		9.11	
78	Beaver L	8/1/2005	5.4	2.71	1.5	0.026	0.03	0.01	0.47	39.81	13	7.40	41	3.1	18.94	
78	Beaver L	8/15/2005	5.5	1.98	1.5	0.021	0.08	0.01	0.27	27.90	9	7.08	43		1.27	
78	Beaver L	9/5/2005	5.2	2.39	1.5	0.054	0.01	0.01	0.41	16.51	15	7.11	38		53.70	
78	Beaver L	9/18/2005	5.4	3.23	1.5	0.036	0.01	0.01	0.17	10.49	13	6.70	38		19.99	
78	Beaver L	6/5/2006	5.5	1.85	1.5	0.020	0.04	0.03	0.48	53.06	19			3.9	13.29	

LNum	PName	Date	Zbot	Zsd	Zsamp	Tot.P	NO3	NH4	TDN	TN/TP	TColor	pH	Cond25	Ca	Chl.a	Cl
78	Beaver L	6/18/2006	5.5	3.39	1.5	0.018	0.01	0.03	0.44	52.81	11	7.38	40		1.75	
78	Beaver L	7/2/2006	5.5	0.65	1.5	0.062			0.66	23.45	19	7.62	33		48.84	
78	Beaver L	7/16/2006	5.6	1.72	1.5	0.032	0.01	0.15	0.55	37.54	24	7.96	30		19.20	
78	Beaver L	7/30/2006	5.5	1.73	1.5											
78	Beaver L	8/14/2006	5.1	2.38	1.5	0.024	0.01	0.01			8	7.22	28		7.84	
78	Beaver L	9/9/2006	5.5	3.24	1.5	0.017	0.01	0.01	0.47	62.15	11	6.42	33		11.76	
78	Beaver L	9/23/2006	5.2	2.44	1.5	0.031			0.47	33.98	21	7.17	36		24.22	
78	Beaver L	7/22/2007	6.0	2.58	1.5	0.022	0.01	0.01	0.46	44.79	13	7.48	36	4.6	23.46	
78	Beaver L	8/5/2007	5.2	2.80	1.5	0.015	0.00	0.01	0.64	93.15	14	7.90	56		9.69	
78	Beaver L	8/18/2007	5.2	2.20	1.5	0.022	0.01	0.01	0.45	45.17	11	7.82	35		14.99	
78	Beaver L	9/3/2007	4.6	1.84	1.5	0.026	0.02	0.02	1.26	108.41	12	8.01	31		23.86	
78	Beaver L	9/16/2007	5.3	2.03	1.5	0.033	0.00	0.02	0.63	41.98	50	8.31	44	5.4	35.70	
78	Beaver L	9/30/2007	5.0	2.18	1.5	0.036	0.06	0.07	0.78	47.40	44	6.95	45		26.92	
78	Beaver L	10/13/2007	5.1	2.82	1.5	0.035	0.02	0.10	0.68	42.08	26	6.63			7.42	
78	Beaver L	10/28/2007	5.2	2.20	1.5	0.036	0.07	0.09	0.44	26.93	36	6.54	43		18.93	
78	Beaver L	6/10/2008	5.3	2.16	1.5	0.013	0.00	0.03	0.36	61.81	14	6.75	50	3.5	2.70	
78	Beaver L	6/23/2008	5.4	3.94	1.5	0.011	0.01	0.02	0.17	36.08		7.71	34		5.51	
78	Beaver L	7/7/2008	5.1	3.88	1.5	0.014	0.00	0.02	0.13	19.99	13	7.96	45		4.68	
78	Beaver L	7/29/2008	4.7	2.56	1.5	0.020	0.01	0.01	0.27	29.92	9	8.20	28		5.09	
78	Beaver L	8/17/2008	5.5	2.53	1.5	0.019	0.00	0.02	0.27	31.44	13	6.45	35	2.8	6.97	
78	Beaver L	9/2/2008	5.0	2.33	1.5	0.028	0.01	0.00	0.35	27.43	9	8.13	39		12.37	
78	Beaver L	9/16/2008	5.3	2.13	1.5	0.035	0.01	0.02	0.57	36.23	11	6.21	46		26.18	
78	Beaver L	9/28/2008	5.4	2.06	1.5	0.036	0.01	0.02	0.39	23.86	19	6.54	37		40.98	
78	Beaver L	06/07/2009	5.4	1.93	1.5	0.020	0.09	0.03	0.39	43.83	6	7.73	49	3.5	4.70	
78	Beaver L	06/21/2009	5.3	1.47	1.5	0.025	0.02	0.02	0.28	24.87	40	6.00	42		16.90	
78	Beaver L	07/19/2009	5.4	2.90	1.5	0.019	0.00	0.01	0.28	33.00	16	6.50	43		7.96	
78	Beaver L	08/03/2009	5.0	2.74	1.5	0.023	0.01	0.01	0.28	27.21	16	6.65	36		23.93	
78	Beaver L	08/17/2009	5.3	2.80	1.5	0.016	0.01	0.01	0.25	33.67	13	8.10	43	3.6	5.90	
78	Beaver L	08/31/2009	5.3	2.10	1.5	0.021	0.01	0.01	0.33	34.08	21	7.03	50		19.10	
78	Beaver L	09/14/2009	5.4	2.14	1.5	0.023	0.01	0.03	0.42	39.73	19	7.10	43		19.10	
78	Beaver L	10/04/2009	5.3	3.07	1.5	0.026	0.02	0.08	0.39	33.73	29	6.67	46		13.74	
78	Beaver L	5/31/2010	5.4	3.48	1.5	0.013	0.02	0.16			3	7.51	60	4.8	2.80	
78	Beaver L	6/14/2010	5.5	3.71	1.5	0.021	0.05	0.03			8	7.15	57		0.40	
78	Beaver L	7/5/2010	5.3	3.83	1.5	0.013	0.03	0.02	0.22	36.95	4	7.53	58		1.80	
78	Beaver L	7/12/2010	5.4	3.58	1.5	0.014	0.03	0.02	0.36	57.81	9	7.14	65		2.10	
78	Beaver L	8/1/2010	5.3	1.69	1.5	0.023	0.01	0.03	0.56	54.66	9	7.12	58	4.0	24.50	
78	Beaver L	8/16/2010	5.5	2.15	1.5	0.036	0.03	0.03	0.26	15.62	14	7.40	65		23.70	
78	Beaver L	8/29/2010	5.5	2.28	1.5	0.030	0.01	0.02	0.45	32.89	12	6.84	64		14.90	
78	Beaver L	9/16/2010	5.5	2.18	1.5	0.031	0.01	0.03	0.44	31.07	20	6.84	63		16.60	
78	Beaver L	6/17/2012	5.1	2.23	1.5	0.019	0.01	0.03	0.21	24.44	9	6.92	59	4.0	4.60	
78	Beaver L	6/17/2012	bloom													
78	Beaver L	7/1/2012	5.4	2.79	1.5	0.016	0.01	0.01	0.23	31.35	10	7.61	49		1.90	
78	Beaver L	7/15/2012	5.4	1.00	1.5	0.028	0.01	0.03	0.69	54.92	10	7.80	47		29.90	
78	Beaver L	7/30/2012	5.1	1.66	1.5	0.029	0.01	0.02	0.69	52.56	25	6.73	46		29.40	
78	Beaver L	8/12/2012	5.1	0.57	1.5	0.055	0.03	0.04	1.37	55.38	10	9.26	48	3.8	115.20	
78	Beaver L	8/12/2012	bloom													
78	Beaver L	8/26/2012	4.9	0.70	1.5	0.067	0.01	0.07	1.44	47.44	7	8.67	48		347.40	
78	Beaver L	8/26/2012	bloom													
78	Beaver L	9/2/2012	bloom													
78	Beaver L	9/23/2012	4.8	1.39	1.5	0.045	0.01	0.17	0.93	45.87	18	7.59	53		29.40	
78	Beaver L	10/7/2012	bloom													
78	Beaver L	10/7/2012	5.4	1.77	1.5	0.024	0.02	0.39	1.16	106.33	26	6.47	58		23.10	
78	Beaver L	6/2/2013	5.3	2.75	1.5	0.024	0.02	0.01	0.23	21.34	8	7.92	57	4.8	7.50	
78	Beaver L	6/2/2013	bloom		bloom											
78	Beaver L	6/16/2013	5.3	3.47	1.5	0.018			0.37	46.25		7.21	52		8.20	
78	Beaver L	6/16/2013	bloom		bloom											
78	Beaver L	6/30/2013	5.5	1.78	1.5	0.025	0.02	0.04	0.37	31.87	20	7.64	49		11.90	
78	Beaver L	6/30/2013	bloom		bloom											
78	Beaver L	7/15/2013	5.3	1.44	1.5	0.025			0.55	47.93	16	8.85	48		27.60	
78	Beaver L	7/15/2013	bloom		bloom											
78	Beaver L	7/28/2013	5.3	0.61	1.5	0.054	0.01	0.01	1.10	44.81	15	9.55	53			
78	Beaver L	7/28/2013	bloom		bloom											
78	Beaver L	8/17/2013	5.5	1.04	1.5	0.073			0.92	27.82	13	9.30	51		73.80	
78	Beaver L	8/17/2013	bloom		bloom											
78	Beaver L	8/30/2013	5.0	1.14	1.5	0.037	0.01	0.02	0.59	35.39	11	9.32	49		13.80	
78	Beaver L	8/30/2013	bloom		bloom											

LNum	PName	Date	Zbot	Zsd	Zsamp	Tot.P	NO3	NH4	TDN	TN/TP	TColor	pH	Cond25	Ca	Chl.a	Cl
78	Beaver L	9/17/2013	5.4	2.45	1.5	0.038			0.63	36.94	13	6.63	49		34.50	
78	Beaver L	6/8/2014	5.5	1.1	1.5	0.030	0.01	0.02	0.28	21.11	8	6.88	52	3.9	10.0	
78	Beaver L	6/22/2014	5.4	2.4	1.5	0.027			0.34	27.66	8	6.85	50		7.5	
78	Beaver L	7/7/2014	5.3	2.6	1.5	0.027	0.01	0.01	0.45	36.26	8	7.85	48		10.9	
78	Beaver L	7/21/2014	5.3	2.4	1.5	0.023			0.39	38.52	7	6.66	47		10.7	
78	Beaver L	7/21/2014			Bloom											
78	Beaver L	8/3/2014	5.2	1.4	1.5	0.028	0.01	0.01	0.64	50.41	6	8.11	48	3.1	22.5	
78	Beaver L	8/3/2014			Bloom											
78	Beaver L	8/17/2014	5.4	1.6	1.5	0.035			0.73	45.95	16	6.74	50		12.5	
78	Beaver L	8/17/2014			Bloom											
78	Beaver L	9/14/2014	5.5	1.3	1.5	0.033	0.01	0.05	0.93	61.55	7	8.01	65		50.8	
78	Beaver L	9/28/2014			bloom											
78	Beaver L	9/28/2014	5.4	1.4	1.5	0.042			0.54	28.36	8	7.27	47		31.0	
78	Beaver L	5/30/2015	5.4	1.5	1.5	0.026	0.02	0.09	0.42	16.23	12	7.27	52	2.7	13.0	
78	Beaver L	6/14/2015	5.6	2.8	1.5	0.022			0.40	18.35	8	6.67	50		4.3	
78	Beaver L	6/29/2015	5.7	2.2	1.5	0.024	0.01	0.02	0.36	14.96	13	7.63	48		13.8	5.0
78	Beaver L	7/13/2015	5.4	3.2	1.5	0.020			0.42	20.59	14	6.87	42		8.1	
78	Beaver L	7/26/2015	5.1	2.8	1.5	0.018	0.01	0.03	0.58	32.15	10	6.94	46	2.2	10.1	
78	Beaver L	8/10/2015	5.2	2.3	1.5	0.028			0.81	29.06	15	8.68	49		14.1	
78	Beaver L	8/23/2015	5.3	2.9	1.5	0.016	0.01	0.04	0.54	33.42	13	7.3	53		13.9	5.0
78	Beaver L	7/13/2015			bloom											
78	Beaver L	7/26/2015			bloom											
78	Beaver L	8/10/2015			bloom											
78	Beaver L	8/23/2015			bloom											
78	Beaver L	8/23/2015			bloom											
78	Beaver L	9/6/2015			bloom											
78	Beaver L	9/26/2015			bloom											
78	Beaver L	9/6/2015	5.3	2.7	1.5	0.020			0.43	21.35	11	9.22	43		13.7	
78	Beaver L	6/20/2005			3.0	0.026										
78	Beaver L	7/4/2005			2.5	0.014										
78	Beaver L	7/18/2005			3.0	0.049										
78	Beaver L	8/1/2005			2.5	0.016										
78	Beaver L	8/15/2005			2.5	0.046										
78	Beaver L	9/5/2005			2.0	0.031										
78	Beaver L	9/18/2005			2.5	0.018										
78	Beaver L	6/20/2005			3.0	0.026										

LNum	PName	Date	Type	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
78	Beaver L	6/30/1991	epi	21	22															
78	Beaver L	7/14/1991	epi	22	23															
78	Beaver L	7/28/1991	epi	18	24															
78	Beaver L	8/11/1991	epi	21	22															
78	Beaver L	8/25/1991	epi	20	23															
78	Beaver L	9/14/1991	epi	20	22															
78	Beaver L	9/28/1991	epi	16	15															
78	Beaver L	6/14/1992	epi	29	26															
78	Beaver L	6/28/1992	epi	24	20															
78	Beaver L	7/12/1992	epi	25	23	2	1	2												
78	Beaver L	7/27/1992	epi	21	22	2	3	2												
78	Beaver L	8/10/1992	epi	22	21	4	3	3	13											
78	Beaver L	8/23/1992	epi	18	20	3	3	3	14											
78	Beaver L	9/6/1992	epi	21	21	3	3	2	5											
78	Beaver L	10/3/1992	epi	14	16	3	2	3	3											
78	Beaver L	7/7/1993	epi			2	3	2												
78	Beaver L	7/18/1993	epi	20	23	2	3	2												
78	Beaver L	7/18/1993	epi	20	22	1	3	2												
78	Beaver L	7/25/1993	epi	25	24	2	3	2												
78	Beaver L	8/1/1993	epi	21	24	2	2	2												
78	Beaver L	8/8/1993	epi	22	25	2	3	2												
78	Beaver L	8/22/1993	epi	25	21	3	3	3	3											
78	Beaver L	9/5/1993	epi	19	21	4	3	3	34											
78	Beaver L	10/2/1993	epi	16	11	3	3	3	5											

LNum	PName	Date	Type	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
78	Beaver L	6/5/1994	epi	20	19	2	2	2												
78	Beaver L	6/19/1994	epi	24	25	2	3	2	6											
78	Beaver L	7/3/1994	epi	18	20	2	3	2	2											
78	Beaver L	7/17/1994	epi	20	21	2	3	2	1											
78	Beaver L	7/31/1994	epi	21	20	3	3	2	15											
78	Beaver L	8/25/1994	epi	23	20	3	3	3	1											
78	Beaver L	05/26/02	epi		19	2	2	2	5											
78	Beaver L	06/09/02	epi	21	21	2	3	2	8											
78	Beaver L	06/22/02	epi	26	24	1	3	2	8											
78	Beaver L	07/14/02	epi	24	25	2	3	2	8											
78	Beaver L	07/27/02	epi	24	24	2	3	2	8											
78	Beaver L	08/11/02	epi	27	24	3	3	3	8											
78	Beaver L	08/25/02	epi	21	24	2	3	2	58											
78	Beaver L	09/14/02	epi	22	20															
78	Beaver L	6/28/2003	epi	23	24	2	3	2	8											
78	Beaver L	7/13/2003	epi	18	23	1	2	2	8											
78	Beaver L	7/27/2003	epi	21	25	2	3	2	8											
78	Beaver L	8/8/2003	epi	17	25	2	3	2	8											
78	Beaver L	8/24/2003	epi	10	24	2	3	2	8											
78	Beaver L	9/7/2003	epi	14	20	2	3	2	5											
78	Beaver L	9/21/2003	epi	14	20	2	3	2	5											
78	Beaver L	10/5/2003	epi	3	13	3	3	2	13458											
78	Beaver L	6/5/2004	epi	14	18	1	3	2	5											
78	Beaver L	6/20/2004	epi	10	21	2	3	2	8											
78	Beaver L	7/6/2004	epi	16	23	2	3	2	5											
78	Beaver L	7/18/2004	epi	18	22	2	3	3	5											
78	Beaver L	8/1/2004	epi	22	23	2	3	3	5											
78	Beaver L	8/15/2004	epi	19	23	2	3	3	5											
78	Beaver L	8/28/2004	epi	27	23	2	3	2	8											
78	Beaver L	9/12/2004	epi	22	21	3	3	3	8											
78	Beaver L	6/5/2005	epi	25	22	2	3	1	0											
78	Beaver L	6/20/2005	epi	22	23	2	4	2	8											
78	Beaver L	7/4/2005	epi	25	25	2	3	2	8											
78	Beaver L	7/18/2005	epi	33	28															
78	Beaver L	8/1/2005	epi	24	25	2	3	2	8											
78	Beaver L	8/15/2005	epi	25	26	2	3	2	8											
78	Beaver L	9/5/2005	epi	20	22	2	3	2	8											
78	Beaver L	9/18/2005	epi	20	23	2	3	3	25											
78	Beaver L	6/5/2006	epi	15	16	2	3	2	5											
78	Beaver L	6/18/2006	epi	27	22	2	3	2	0											
78	Beaver L	7/2/2006	epi	24	22	3	3	4	145											
78	Beaver L	7/16/2006	epi	25	25	2	3	3	1											
78	Beaver L	7/30/2006	epi	26	26	2	3	2	0											
78	Beaver L	8/14/2006	epi	20	24	2	3	2	0											
78	Beaver L	9/9/2006	epi	23	20	2	3	2	5											
78	Beaver L	9/23/2006	epi	20	18	2	3	3	5											
78	Beaver L	7/22/2007	epi	22	23	2	3	1	0											
78	Beaver L	8/5/2007	epi	24	25	2	3	1	8											
78	Beaver L	8/18/2007	epi	17	23	2	3	3	5											
78	Beaver L	9/3/2007	epi	22	23	2	3	2	8											
78	Beaver L	9/16/2007	epi	11	18	3	3	4	5											
78	Beaver L	9/30/2007	epi	19	19	2	3	3	5											
78	Beaver L	10/13/2007	epi	13	17	3	3	4	5											
78	Beaver L	10/28/2007	epi	9	13	3	2	4	5											
78	Beaver L	6/10/2008	epi	29	26	2	3	2	6											
78	Beaver L	6/23/2008	epi	24	24	2	3	1	8											
78	Beaver L	7/7/2008	epi	31	25	2	3	1	0											
78	Beaver L	7/29/2008	epi	25	25	3	3	3	3											
78	Beaver L	8/17/2008	epi	23	24	3	3	3	2											
78	Beaver L	9/2/2008	epi	25	22	3	3	3	2											
78	Beaver L	9/16/2008	epi	18	21	3	4	3	2											

LNum	PName	Date	Type	TAir	TH20	QA	QB	QC	QD	QF	QG	AQ-PC	AQ-Chla	MC-LR	Ana-a	h-Atx	FP-Chl	FP-BG	HAB form	Shore HAB
78	Beaver L	9/28/2008	epi	20	19	3	3	4	5											
78	Beaver L	06/07/2009	epi	27	20	2	3	3	56											
78	Beaver L	06/21/2009	epi	20	19	2	3	4	5											
78	Beaver L	07/19/2009	epi	22	23	2	3	3	35											
78	Beaver L	08/03/2009	epi	23	25	3	3	2												
78	Beaver L	08/17/2009	epi	31	27	3	3	2	3					0.00						
78	Beaver L	08/17/2009	bloom											0.02						
78	Beaver L	08/17/2009	bloom											0.08						
78	Beaver L	08/31/2009	epi	19	23	3	4	4	5											
78	Beaver L	09/14/2009	epi	19	20	3	3	2	5			183.90		0.00						
78	Beaver L	10/04/2009	epi	17	15	2	3	3	5			65.85		0.00						
78	Beaver L	10/04/2009	bloom											0.00						
78	Beaver L	10/04/2009	bloom											0.08						
78	Beaver L	5/31/2010	epi	27	24	2	3	2	6	0	0									
78	Beaver L	6/14/2010	epi	22	22	2	3	3	5	4	0									
78	Beaver L	7/5/2010	epi	29	25	2	3	1	8	0	0									
78	Beaver L	7/12/2010	epi	25	27	2	3	2	6	0	4									
78	Beaver L	8/1/2010	epi	24	25	3	3	4	3	4	4	211.0		0.00						
78	Beaver L	8/1/2010	bloom											0.20						
78	Beaver L	8/1/2010	bloom											0.02						
78	Beaver L	8/16/2010	epi	26	24	3	3	3	5	4	4									
78	Beaver L	8/29/2010	epi	25	22	2	3	2	5	0	4									
78	Beaver L	9/16/2010	epi	18	18	3	3	3	5	4	4	57.00		0.00						
78	Beaver L	6/17/2012	epi	25	24	3	4	3	3	4	4	1.40	1.60	<0.30	<0.417		0.45	0.00	I	
78	Beaver L	6/17/2012	bloom											1.29	<0.715		469	71.0	E	
78	Beaver L	7/1/2012	epi	28	26	2	4	2	8	5	45	2.10	0.40	<0.30	<0.423		1.84	0.00	I	
78	Beaver L	7/15/2012	epi	28	27	3	4	3	1	4	4	56.80	1.20	<0.30	<0.423		15.24	13.14	F	
78	Beaver L	7/30/2012	epi	25	26	3	4	3	2	4	4	51.40	1.10	<0.30	<0.292		15.57	13.52	F	
78	Beaver L	8/12/2012	epi	23	25	3	4	4	124	46	6	373.0	4.00	<0.30	<0.537		96.95	88.77	F	
78	Beaver L	8/12/2012	bloom											<0.60	<1.074		15034	15034		
78	Beaver L	8/26/2012	epi	24	24	5	4	4	1345	4	4	89.70	2.00	0.33	<0.519		2.50	1.19	F	
78	Beaver L	8/26/2012	bloom											0.68	<0.001		67890	67890	ABCFH	
78	Beaver L	9/2/2012	bloom											<0.60	<1.038		1075	1074		
78	Beaver L	9/23/2012	epi	17	18	3	4	3	5	4	4	43.40	1.40	<0.30	<3.299		821	7.89	F	
78	Beaver L	10/7/2012	bloom											5.93	<2.681		2836	2836	e	
78	Beaver L	6/2/2013	epi	32	24	2	3	2	8	0	0	6.30	2.40	<0.30	<0.6300		3.90	0.00	I	E
78	Beaver L	6/2/2013	bloom											<0.60	<1.270		1604.80	58.30		
78	Beaver L	6/16/2013	epi	15	20	2	4	3	5	4	4	10.50	2.10	<0.30	<0.700		3.20	0.50	I	E
78	Beaver L	6/16/2013	bloom											<0.60	<1.200	15.15	1688.50	322.50		
78	Beaver L	6/30/2013	epi	24	23	3	3	3	1	4	4	37.00	2.30	<0.30	<0.650		4.80	2.10	I	E
78	Beaver L	6/30/2013	bloom											3.70	2.00		585.50	89.30		e
78	Beaver L	7/15/2013	epi	28	27	3	3	3	13	4	4	172.80	4.10	<0.30	<0.490		25.50	22.70	F	CEF
78	Beaver L	7/15/2013	bloom											<1.20	<1.500		2810.00	2642.00		cef
78	Beaver L	7/28/2013	epi	22	25	3	3	4	15	4	4	211.20	11.80	0.42	<0.400		66.60	57.60	F	CDF
78	Beaver L	7/28/2013	bloom											20.61	1.50		2052.00	1933.00		cdef
78	Beaver L	8/17/2013	epi	21	22	3	3	3	3	4	4	37.30	19.40	0.46	<0.390		29.60	0.00	F	H
78	Beaver L	8/17/2013	bloom											14.67	<1.020		301.30	147.00		h
78	Beaver L	8/30/2013	epi	23	24	3	3	3	1	4	4	6.90	16.90	0.76	<0.570		19.50	0.00	F	H
78	Beaver L	8/30/2013	bloom											546.89	<1.150	15.56	379.00	35.00		g
78	Beaver L	9/17/2013	epi	13	17	2	3	4	5	0	0	11.30	9.50	0.41	<19.130		11.60	0.00	I	
78	Beaver L	6/8/2014	epi	26	23	3	3	2	16	0	0	0.6	3.7	<1.83	<0.170		3.2	0.0	F	F
78	Beaver L	6/22/2014	epi	23	23	2	3	2	8	0	0	5.2	0.7	<0.58	<0.440		3.3	0.3	I	I
78	Beaver L	7/7/2014	epi	24	25	2	3	1	0	0	4	4.1	0.5	<0.40	<2.880		2.3	0.2	I	I
78	Beaver L	7/21/2014	epi	25	25	2	3	2	8	4	4	6.1	0.6	<1.02			4.50	1.5	H	D
78	Beaver L	7/21/2014	bloom											<1.80			2175.00	1906.3		d
78	Beaver L	8/3/2014	epi	25	24	3	3	4	13	4	4	124.7	0.8	<0.30			20.70	19.5	D	deh
78	Beaver L	8/3/2014	bloom											<0.60			15143.80	14543.8	d	eh
78	Beaver L	8/17/2014	epi	19	21	3	3	3	5	4	4	35.3	0.9				0.60	0.2	H	H
78	Beaver L	8/17/2014	bloom											<0.80			66.50	66.5		adh
78	Beaver L	9/14/2014	epi	14	19	3	2	4	5	4	0	17.8	0.4	<0.50			6.80	2.7	F	F
78	Beaver L	9/28/2014	bloom											<1.40			3226.00	3226.0		

LNum	PName	Date	Type	TAir	TH20	QA	QB	QC	QD	QF	QG	AQ-PC	AQ-Chla	MC-LR	Ana-a	h-Atx	FP-Chl	FP-BG	HAB form	Shore HAB
78	Beaver L	9/28/2014	epi	22	19	4	1	4	35	4	4	26.3	0.9	<0.50			13.20	4.2	D	fd
78	Beaver L	5/30/2015	epi	25	23	3	2	3	168	0	4	10.2	1.9	<0.45	<0.089	<0.199		6.11	F	I
78	Beaver L	6/14/2015	epi	27	24	1	3	1	0	0	4	8.4	0.6	<0.55	<0.027	<0.318		3.24	I	I
78	Beaver L	6/29/2015	epi	20	21	2	3	3	5	0	4	19.3	0.9	<1.01	<0.007	<0.000		6.19	I	I
78	Beaver L	7/13/2015	epi	25	25	2	3	3	3	4	4	12.7	0.7	<0.76	<0.005	<0.028		3.67	D	DE
78	Beaver L	7/26/2015	epi	27	25	2	3	2	8	4	4	38.0	0.6	<0.30	<0.002	<0.014		6.29	D	D
78	Beaver L	8/10/2015	epi	24	25	3	3	3	5	4	4	21.1	0.7	<1.13	<0.003	<0.013		4.54	D	DEF
78	Beaver L	8/23/2015	epi	25	25	2	3	2	8	4	4	8.2	0.9	<0.28	<0.008	<0.021		2.94	I	EH
78	Beaver L	7/13/2015	bloom											<2.02	<0.005	<0.021		870.00		
78	Beaver L	7/26/2015	bloom											<0.60	<0.009	<0.040		486.00		
78	Beaver L	8/10/2015	bloom											<3.39	<0.010	<0.038		599.25		
78	Beaver L	8/23/2015	bloom											<0.57	<0.017	<0.042		15.00		
78	Beaver L	8/23/2015	bloom											<0.57	<0.017	<0.042		182.11		
78	Beaver L	9/6/2015	bloom											<0.43	0.354	<0.058		23.50		
78	Beaver L	9/26/2015	bloom											0.9	<0.036	<0.049		1297.50		
78	Beaver L	9/6/2015	epi	24	25	3	3	3	68	4	4	61.7	0.5	<0.37	<0.031	<0.028		8.81	H	EH
78	Beaver L	6/20/2005	hypo		21															
78	Beaver L	7/4/2005	hypo		25															
78	Beaver L	7/18/2005	hypo		27															
78	Beaver L	8/1/2005	hypo		25															
78	Beaver L	8/15/2005	hypo		25															
78	Beaver L	9/5/2005	hypo		22															
78	Beaver L	9/18/2005	hypo		22															

Legend Information

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

Appendix B: Priority Waterbody Listing for Beaver Lake

Beaver Lake (0601-0066)

MinorImpacts

Waterbody Location Information

Revised: 07/07/2009

Water Index No:	SR- 99- 1-P174	Drain Basin:	Susquehanna River
Hydro Unit Code:	02050101/220	Str Class:	C
Waterbody Type:	Lake (Eutrophic)	Reg/County:	7/Broome Co. (4)
Waterbody Size:	35.9 Acres	Quad Map:	WINDSOR (M-18-4)
Seg Description:	entire lake		

Water Quality Problem/Issue Information

(CAPS indicate MAJOR Use Impacts/Pollutants/Sources)

Use(s) Impacted	Severity	Problem Documentation
Recreation	Stressed	Suspected

Type of Pollutant(s)

Known: ALGAL/WEED GROWTH (algal blooms, clarity), NUTRIENTS (phosphorus)
 Suspected: ---
 Possible: ---

Source(s) of Pollutant(s)

Known: ---
 Suspected: HABITAT MODIFICATION, ON-SITE/SEPTIC SYST
 Possible: ---

Resolution/Management Information

Issue Resolvability:	1 (Needs Verification/Study (see STATUS))	
Verification Status:	3 (Cause Identified, Source Unknown)	
Lead Agency/Office:	ext/WQCC	Resolution Potential: Medium
TMDL/303d Status:	3a->n/a	

Further Details

Overview

Recreational uses (swimming, fishing, boating) in Beaver Lake are thought to experience minor impacts due to algal and aquatic weed growth and elevated nutrients levels in the lake. Inadequate on-site septic systems serving lakeshore residences are a possible source of these impacts. More recent sampling indicates steadily improving water quality.

Water Quality Sampling

Beaver Lake has been sampled as part of the NYSDEC Citizen Statewide Lake Assessment Program (CSLAP) beginning in 1992 through 1994 and from 2002 through 2006. An Interpretive Summary report of the findings of this sampling was published in 2007. These data indicate that the lake continues to be best characterized as eutrophic, or highly productive. However in recent years productivity in the lake has steadily decreased. Phosphorus levels in the lake are regularly above the state guidance values indicating impacted/stressed recreational uses, though less so in recent years. Corresponding transparency measurements have typically met the recommended minimum for swimming beaches since 2002; clarity readings fell below this threshold in 2006 but this is thought to be the result of heavy flooding at the time. Measurements of pH typically fall within the state water quality range of 6.5 to 8.5. The lake water is weakly to moderately colored. (DEC/DOW, BWAM/CSLAP, august 2007)

Recreational Assessment

Public perception of the lake and its uses is also evaluated as part of the CSLAP program. This assessment indicates recreational suitability of the lake to be favorable. The recreational suitability of the lake is described most frequently as "excellent" to "slightly" impacted. The lake itself is most often described as "not quite crystal clear," an assessment that is somewhat more favorable than expected based on measured water quality characteristics but is perhaps reflective on improving water quality in recent years. Assessments have noted that aquatic plants typically grow to the lake surface, but weed growth is not cited as limiting recreational uses. Aquatic plants are dominated by a mix of native species. (DEC/DOW, BWAM/CSLAP, August 2007)

Lake Uses

This lake waterbody is designated class C, suitable for use as a general recreation and aquatic life support, but not for drinking water supply or public bathing beach. Water quality monitoring by NYSDEC focuses primarily on support of general recreation and aquatic life. Samples to evaluate the bacteriological condition and bathing use of the lake or to evaluate contamination from organic compounds, metals or other inorganic pollutants have not been collected as part of the CSLAP monitoring program. Monitoring to assess potable water supply and public bathing use is generally the responsibility of state and/or local health departments.

Section 303d Listing

Beaver Lake is currently included on the NYS 2008 Section 303(d) List of Impaired Waters. The lake is included on Part 3a of the List as a Water Requiring Verification of Impairment, however this updated assessment suggests that the suspected impacts to water quality and uses are not sufficient to warrant continued listing. This lake will be considered for delisting during the development of the 2010 Section 303(d) List. (DEC/DOW, BWAM/WQAS, June 2009)

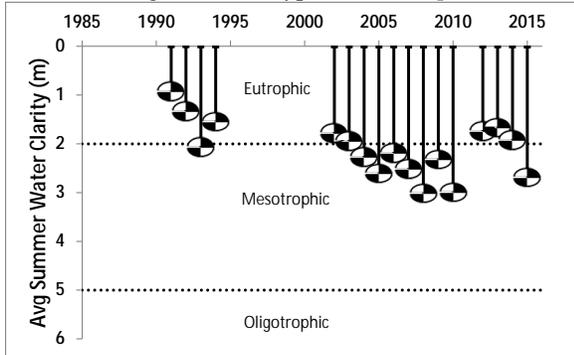
Segment Description

This segment includes the total area of the entire lake.

Appendix C: Long Term Trends: Beaver Lake

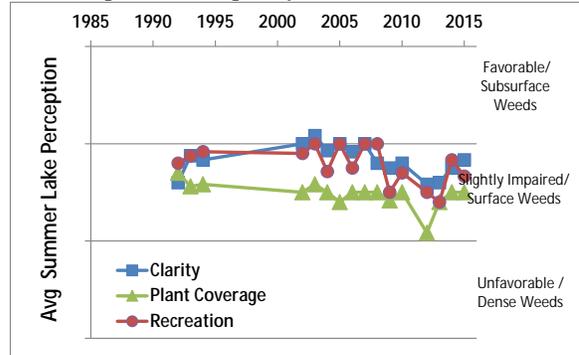
Long Term Trends: Water Clarity

- Mostly higher since early 1990s
- Most readings typical of *mesotrophic* lakes, though 2012-14 typical of *eutrophic* lakes



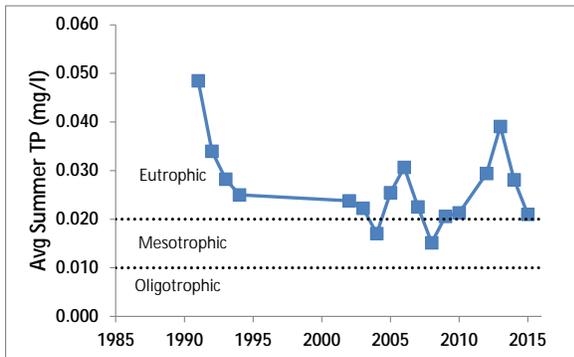
Long Term Trends: Lake Perception

- Most assessments degrading last few years
- Recreational perception connected more to poor water quality than excessive weeds



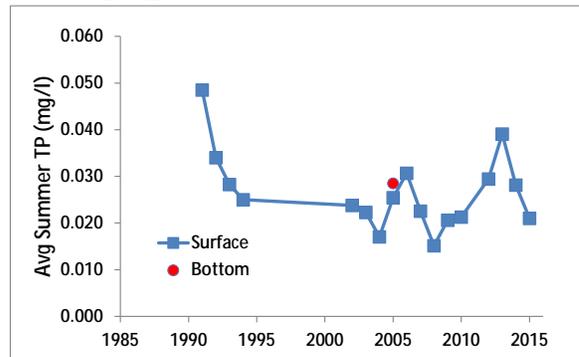
Long Term Trends: Phosphorus

- No long term trend; may exhibit cycles
- Most readings typical of *eutrophic* lakes



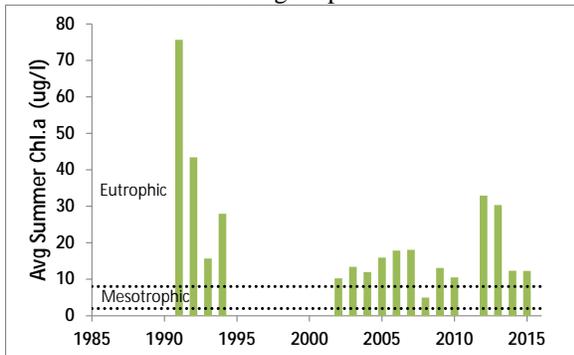
Long Term Trends: Bottom Phosphorus

- Beaver Lake not thermally stratified
- Deepwater TP levels similar to surface TP levels



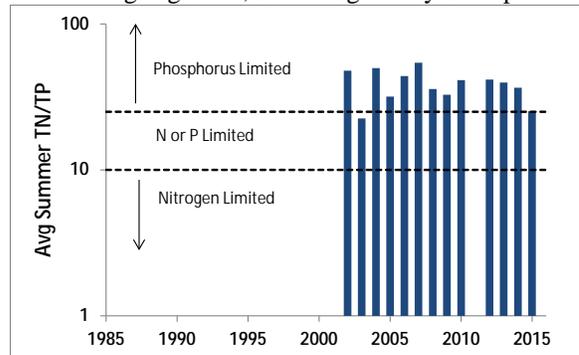
Long Term Trends: Chlorophyll a

- No long term trend; variable last 10-15 yrs
- Most readings typical of *eutrophic* lakes with some extreme algae spikes



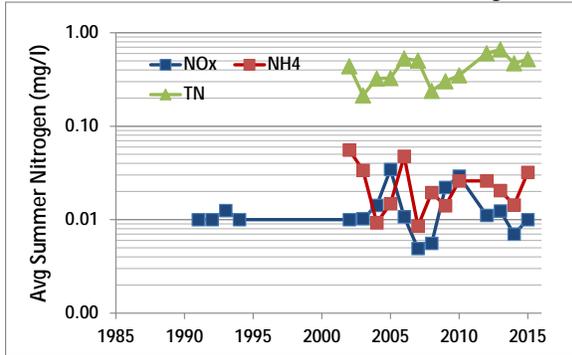
Long Term Trends: N:P Ratio

- No long term trend
- Most readings indicate phosphorus limits algae growth, but nitrogen may be important



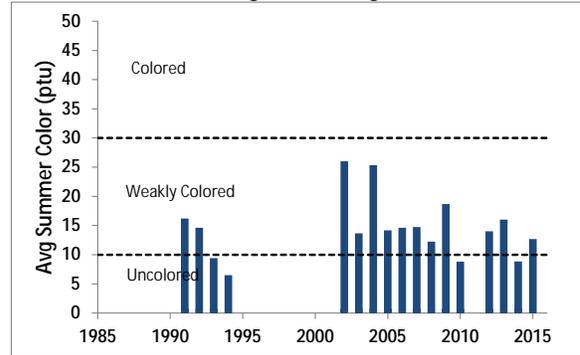
Long Term Trends: Nitrogen

- No long term trend; TN increasing since '07 as algae levels have increased
- Low nitrate, ammonia and total nitrogen



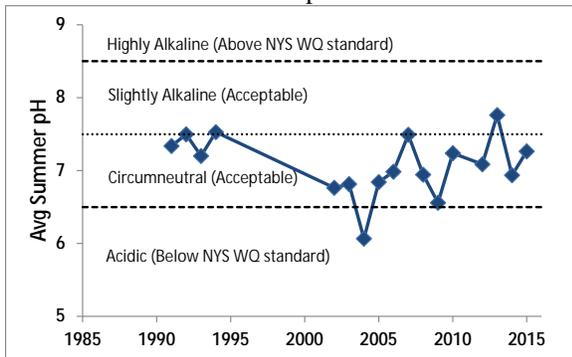
Long Term Trends: Color

- No long term trend; recent decrease
- Most readings typical of *weakly colored* lakes, with higher readings since 2002



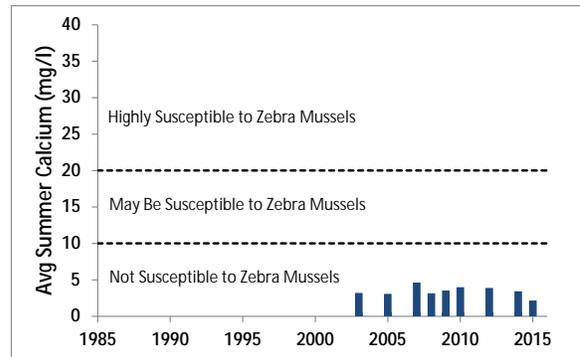
Long Term Trends: pH

- No long term trend; \uparrow since mid-1990s
- Most readings typical of *circumneutral* lakes, but occasional low pH



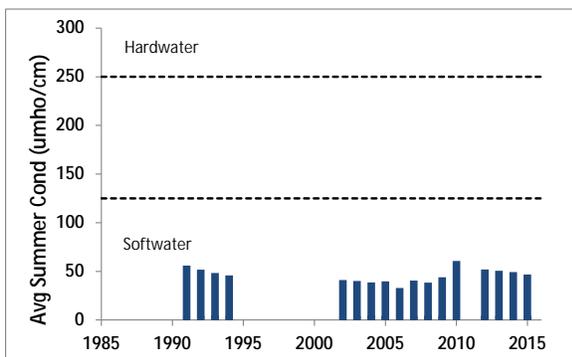
Long Term Trends: Calcium

- No long term trend
- Most readings indicate low susceptibility to zebra mussels



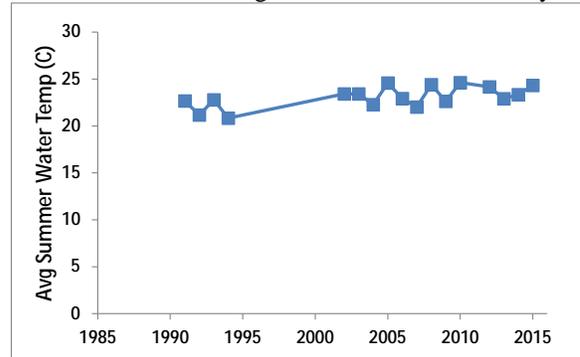
Long Term Trends: Conductivity

- No long term trend
- Most readings typical of *softwater* lakes



Long Term Trends: Water Temperature

- Slight increase over last 20 years?
- Deepwater temperature likely similar to surface readings due to lack of thermal layers



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.

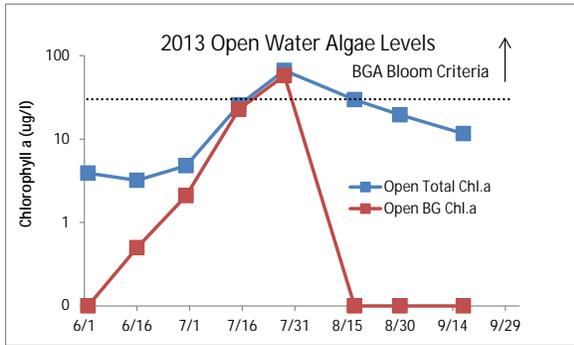


Figure D1:
2013 Open Water Total and BGA Chl.a

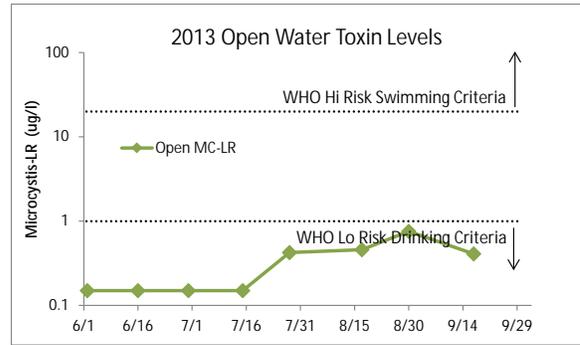


Figure D2:
2013 Open Water Microcystin-LR

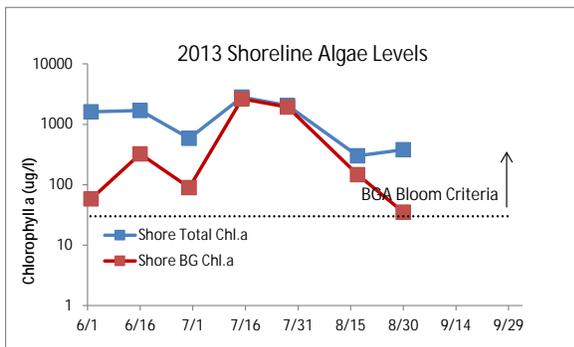


Figure D3:
2013 Shoreline Total and BGA Chl.a

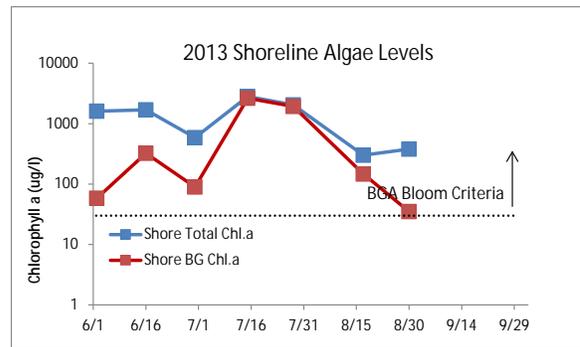


Figure D4:
2013 Shoreline Microcystin-LR

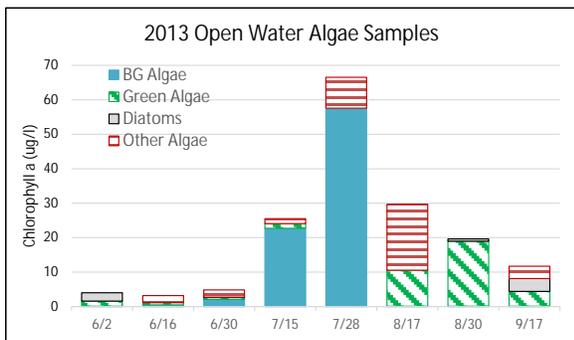


Figure D5:
2013 Open Water Algae Types

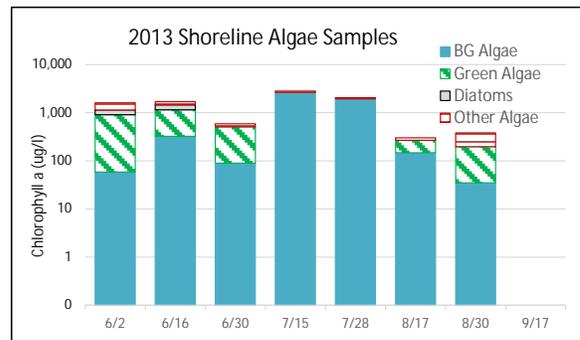


Figure D6:
2013 Shoreline Algae Types

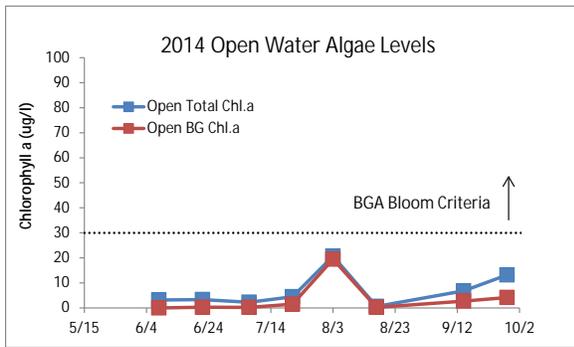


Figure D7:
2014 Open Water Total and BGA Chl.a

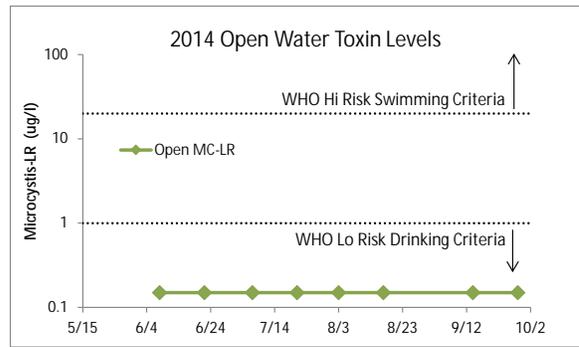


Figure D8:
2014 Open Water Microcystin-LR

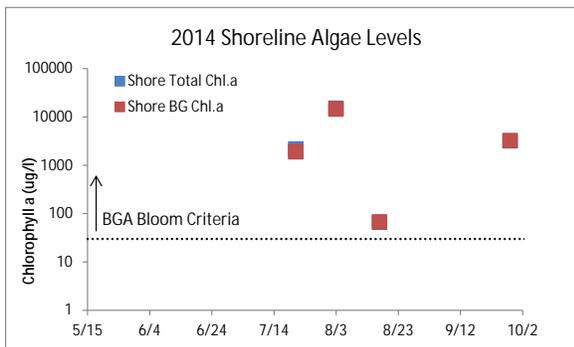


Figure D9:
2014 Shoreline Total and BGA Chl.a

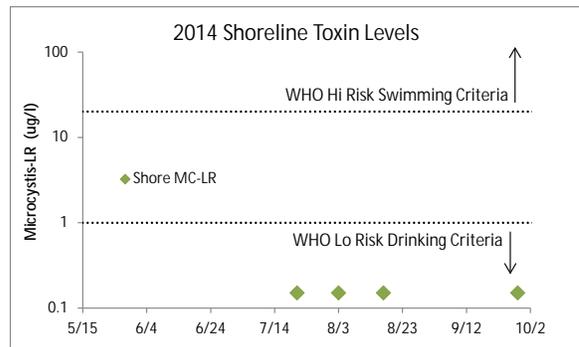


Figure D10:
2014 Shoreline Microcystin-LR

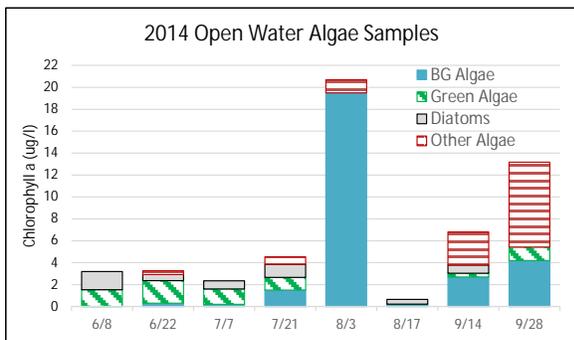


Figure D11:
2014 Open Water Algae Types

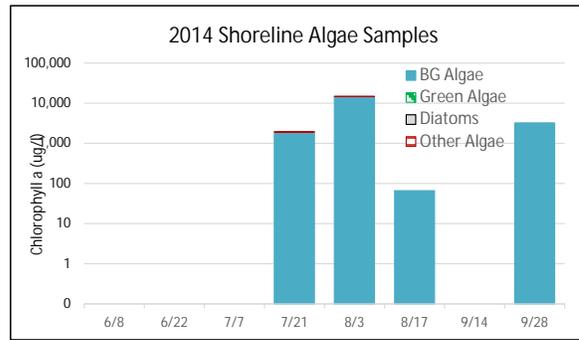


Figure D12:
2014 Shoreline Algae Types

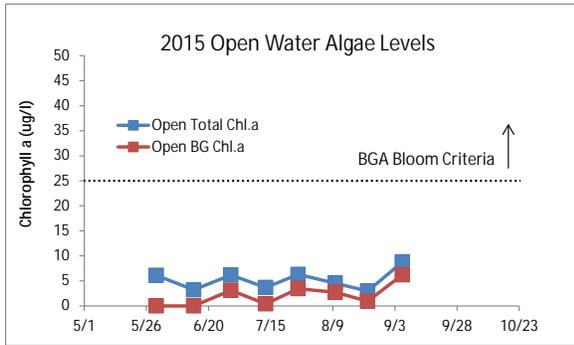


Figure D13:
2015 Open Water Total and BGA Chl.a

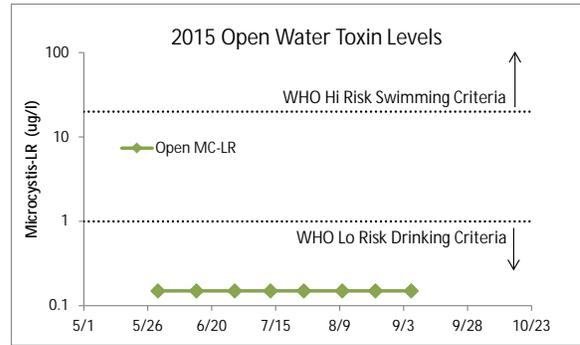


Figure D14:
2015 Open Water Microcystin-LR

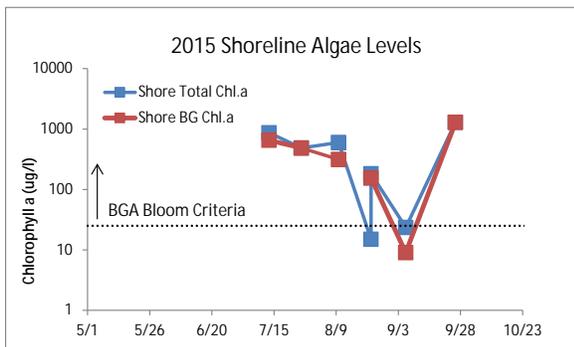


Figure D15:
2015 Shoreline Total and BGA Chl.a

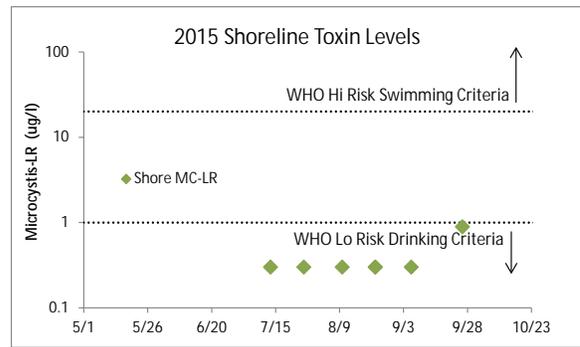


Figure D16:
2015 Shoreline Microcystin-LR

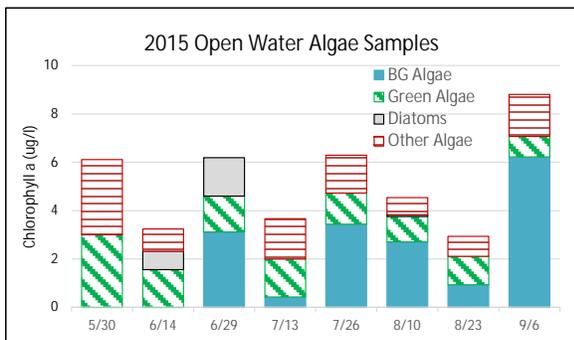


Figure D17:
2015 Open Water Algae Types

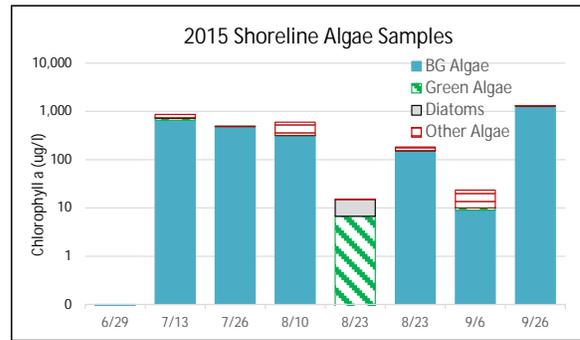


Figure D18:
2015 Shoreline Algae Types

Appendix E: AIS Species in Broome County

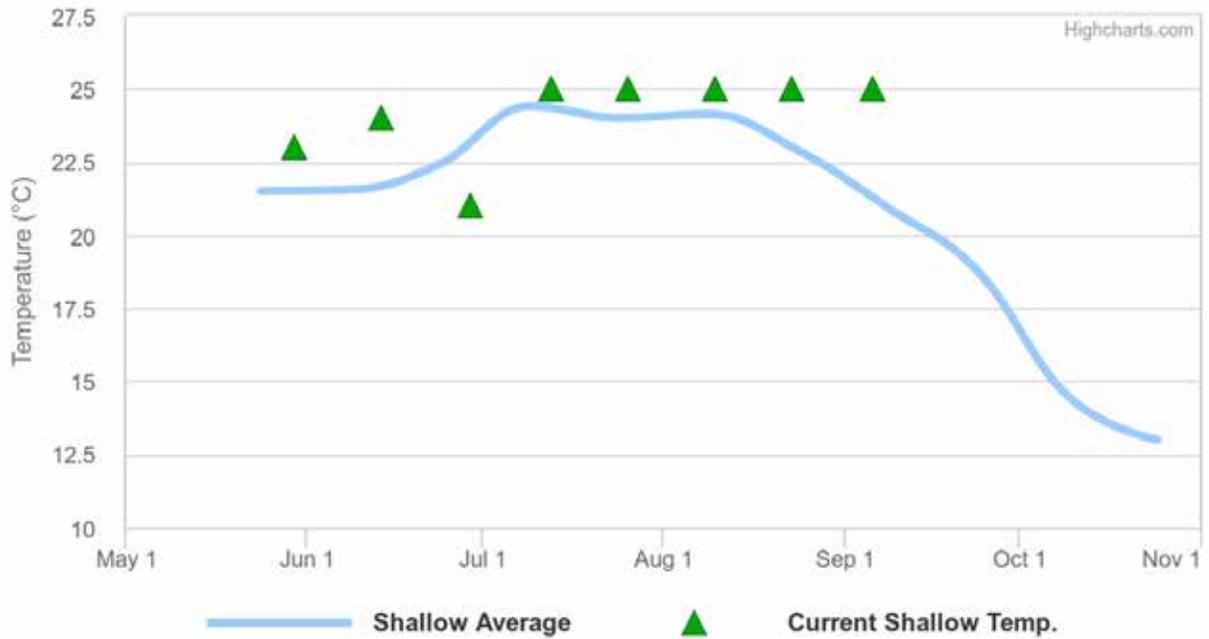
The table below shows the invasive aquatic plants and animals that have been documented in Broome County, as cited in either the iMapInvasives database (<http://www.imapinvasives.org/>) or in the NYSDEC Division of Water database. These databases may include some, but not all, non-native plants or animals 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	<i>Myriophyllum spicatum</i>
Arctic Lake	Plant	Eurasian watermilfoil	<i>Myriophyllum spicatum</i>
Beaver Lake	Animal	Banded mystery snail	<i>Viviparus georgianus</i>
Chenango River	Animal	Asian Clam	<i>Corbicula fluminea</i>
Deer Lake	Plant	Water chestnut	<i>Trapa natans</i>
Susquehanna River near Binghamton	Animal	Asian Clam	<i>Corbicula fluminea</i>
Susquehanna River near Five Mile Pt	Animal	Asian Clam	<i>Corbicula fluminea</i>
Susquehanna River near Kirkwood	Animal	Asian Clam	<i>Corbicula fluminea</i>
Susquehanna River	Animal	Zebra mussel	<i>Dreissena polymorpha</i>
Susquehanna River	Plant	Eurasian watermilfoil	<i>Myriophyllum spicatum</i>
Taft Pond	Plant	Eurasian watermilfoil	<i>Myriophyllum spicatum</i>
Taft Pond	Plant	Curly leafed pondweed	<i>Potamogeton crispus</i>
Unnamed Pond 1	Plant	Hydrilla	<i>Hydrilla verticillata</i>
Unnamed Pond 2	Plant	Hydrilla	<i>Hydrilla verticillata</i>
Whitney Point Reservoir	Plant	Eurasian watermilfoil	<i>Myriophyllum spicatum</i>

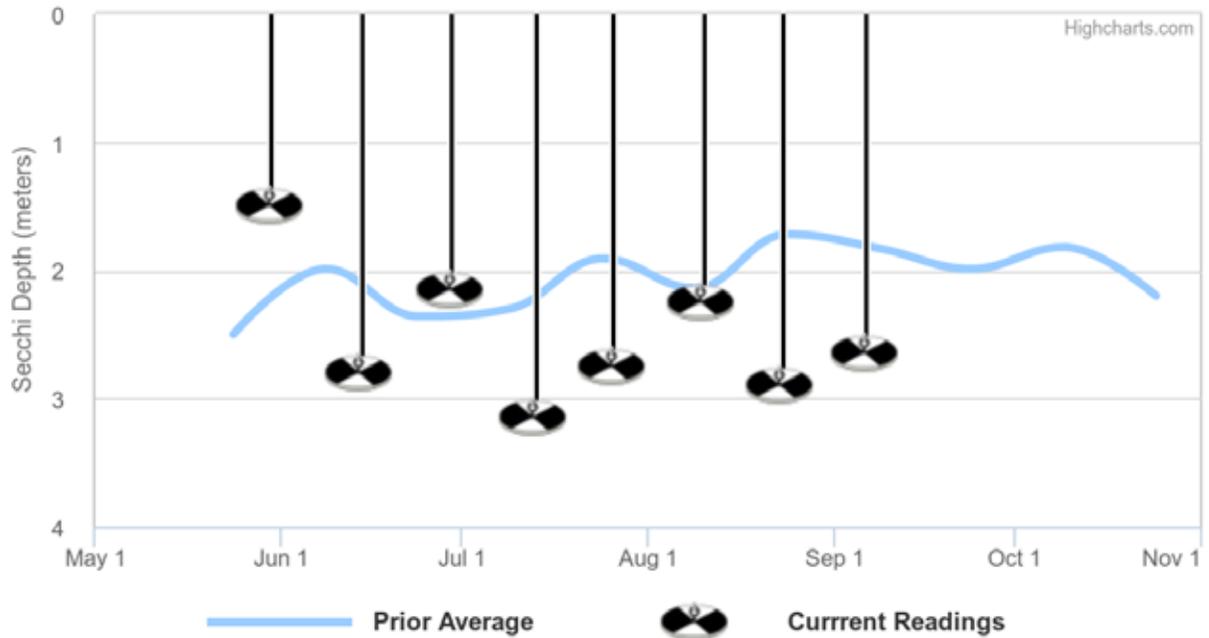
Appendix F: Current Year vs. Prior Averages for Beaver Lake

Current Year Water Temperatures vs. Prior Average



This year's shallow water sample temperatures are tending to be higher than normal when compared to the average of readings collected from 1991 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 1991 to 2014

Appendix G: Watershed and Land Use Map for Beaver 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.

