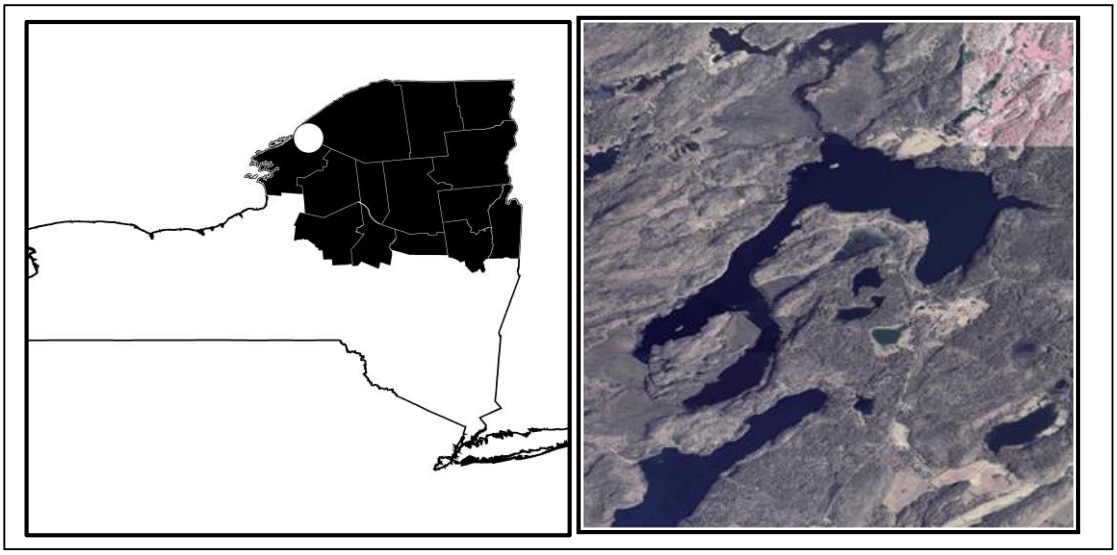
CSLAP 2015 Lake Water Quality Summary:
Grass Lake

General Lake Information

Location	Town of Rossie
County	St. Lawrence
Basin	St. Lawrence River
Size	129.5 hectares (319.9 acres)
Lake Origins	Natural
Watershed Area	955.3 hectares (2,359.6 acres)
Retention Time	2.1 years
Mean Depth	7.2 meters
Sounding Depth	15.4 meters
Public Access?	boat ramp
Major Tributaries	no named tribs
Lake Tributary To…	Grass Creek to Black Lake to Oswegatchie River to St. Lawrence River
WQ Classification	C (non-contact recreation = boating, angling)
Lake Outlet Latitude	44.344
Lake Outlet Longitude	-75.716
Sampling Years	2004-2011, 2013-2015
2015 Samplers	Jim Ninos and Gerald Cole
Main Contact	Gerald Cole

Lake Map



Background

Grass Lake is a 320 acre, class C lake found in the Town of Rossi in St. Lawrence County and the town of Alexandria in Jefferson County, in the southwestern St. Lawrence River region of New York State. It was first sampled as part of CSLAP in 2004.

It is one of eight CSLAP lakes among the more than 140 lakes and ponds found in Jefferson County, one of six lakes among the more than 760 lakes and ponds found in St. Lawrence County, and one of 26 CSLAP lakes among the more than 1650 lakes and ponds in the St. Lawrence River drainage basin.

Lake Uses

Grass Lake is a Class C lake; this means that the best intended use for the lake is for non-contact recreation—boating and angling, aquatic life, and aesthetics, although the lake also supports contact recreation—swimming and bathing. The lake is used by lake residents for swimming, boating and other recreation via shoreline properties; the public can access the lake via a ramped launch.

Grass Lake is stocked by the state; 600-700 nine inch tiger muskellunge are stocked annually in the lake. It is not known by the report authors if private stocking occurs in Grass Lake. Fish species in the lake include bluegill, brown bullhead, largemouth bass, northern pike, smallmouth bass, tiger muskellunge, walleye and yellow perch.

General statewide fishing regulations are applicable in Grass Lake. In addition, the open season for walleye is between the first Saturday in May and March 15th, with a daily limit of three fish and a minimum length of 18 inches. Ice fishing is permitted. The open season for sunfish and yellow perch lasts all year, with no size or take limits.

Small boats (less than 10hp motor size) are allowed on the lake.

Statewide fish consumption advisories apply to Grass Lake—no site-specific advisories have been issued for the lake.

Historical Water Quality Data

CSLAP sampling was conducted on Grass Lake from 2004 to 2011, and 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 reports for Grass Lake can also be found on the NYSDEC web page at http://www.dec.ny.gov/lands/77837.html.

Grass Lake was sampled by the NYSDEC as part of their ambient lake monitoring program in 1979. These results indicate that water clarity was slightly lower in 1979, due to higher phosphorus concentrations and algae levels. It is not known if these 1979 results were representative of conditions at that time, or were unduly influenced by unusual weather or other short-term phenomena.

The lake is also presently being studied by SUNY Oneonta as part of their Masters of Lake Management program. These results will be summarized elsewhere.

None of the unnamed ephemeral tributaries, nor the outlet of the lake (Grass Lake outlet) have been monitored through the NYSDEC Rotating Intensive Basins (RIBS) program or the state stream macroinvertebrate monitoring program. The lake was sampled by DEC fisheries staff in support of fish stocking activities in 1998 and 2005. The limited "comparison" data indicates conditions comparable to those measured through CSLAP.

Lake Association and Management History

Grass Lake is served by the Grass Lake Association. The lake association maintains a website at http://www.grasslakeassociation.org/. The majority of the web page is accessible to members only.

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 –Grass Lake" section in Appendix C.

Evaluation of Eutrophication Indicators

Algae levels (as measured by chlorophyll *a*) were higher than normal in 2015, while phosphorus and water clarity readings were lower than normal. However, none of these trophic indicators has exhibited any significant long-term trends, although phosphorus readings have decreased slightly since the late 2000s.

Lake productivity usually increases slightly during mid- to late summer - water clarity decreases in response to increases in nutrient and algae levels. This was also apparent in 2015, and is consistent with fall blooms reported in many recent years.

The lake is usually characterized as *mesotrophic*, based on water clarity, chlorophyll *a*, and total phosphorus readings (all typical of *mesotrophic* lakes). The trophic state indices (TSI) evaluation suggests that algae levels are lower than expected given the water clarity and phosphorus readings; it is not known if the lower chlorophyll *a* readings reflect suppressed algae growth or if other forms of algae (including benthic algae) grew more abundantly. Despite lower than expected algae levels in the open water, the lake does appear to be susceptible to nearshore and shoreline algae blooms. Overall trophic conditions are summarized on the Lake Scorecard and Lake Condition Summary Table.

Evaluation of Potable Water Indicators

Algae levels are not 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, at least in the open water, and the lake is not classified for use for potable water. Hypolimnetic ammonia and phosphorus readings are higher than those measured at the lake surface, and were higher than normal in 2015, but it is not known if deepwater intakes support "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

NOx readings have decreased since the late 2000s, although these readings were close to normal in 2015. Ammonia and calcium readings were higher than usual in 2015, while color readings were lower than normal. However, none of these limnological indicators has exhibited any clear long-term trends.

Chloride levels in the 2015 samples, collected for the first time through CSLAP and cited in Appendix A, ranged from 8 to 18 mg/l. These values fall within the "minor" to "moderate" 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 generally lower than 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 fish community in the lake is comprised of a mix of coolwater (at least four species) and warmwater (at least five species) fish. This suggests that the lake supports a coolwater fishery. However, deepwater oxygen was depleted during at least part of 2015; this may affect fisheries habitat.

Phytoplankton, macrophyte, zooplankton and macroinvertebrate surveys have not been conducted through CSLAP at Grass Lake. The fluoroprobe results from SUNY ESF usually show low overall algae levels and a relatively low percentage of blue green algae in the open water. However, fall shoreline blooms showed very high blue green algae levels, dominated by *Anabaena* in 2013 and *Microcystis* in 2014- both of which are toxin producing algae. Fortunately, low toxin levels were measured in these samples, and open water toxin levels have not been detectable.

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

Evaluation of Lake Perception

Aquatic plant coverage was lower than normal in 2014 and 2015, and these readings have decreased over time. Water quality and recreational assessments were close to usual in 2015, but both have improved slightly in recent years. Water quality and recreational assessments degraded slightly during the summer in 2015, consistent with the slight seasonal decrease in water clarity. No clear long-term seasonal changes are apparent in recreational assessments and plant coverage, although water quality assessments become less favorable during the typical summer. 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 close to normal in the last several years, and neither air nor water temperatures has changed significantly since CSLAP

sampling began in the lake. It is not likely that any of the small changes in air or water temperature readings are indicative of local climate change in the lake.

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 have usually been below the levels indicating susceptibility for harmful algal blooms (HABs) in the open water. Shoreline blooms have occurred in the fall in recent years; however, toxin levels have been low in these samples (and in all open water samples). Lake residents and pets should still be advised to avoid exposure to surface scums or heavily discolored water.

Lake Condition Summary

Category	Indicator	Min	Overall Avg	Max	2015 Avg	Classification	2015 Change?	Long-term Change?
Eutrophication Indicators	Water Clarity	1.80	3.45	7.50	3.19	Mesotrophic	Within Normal Range	No Change
	Chlorophyll *a*	0.05	2.77	17.27	4.88	Mesotrophic	Higher than Normal	No Change
	Total Phosphorus	0.002	0.018	0.072	0.025	Mesotrophic	Higher than Normal	No Change
Potable Water Indicators	Hypolimnetic Ammonia	0.01	0.42	1.30		Elevated Deepwater NH4	Higher than Normal	Not known
	Hypolimnetic Arsenic							Not known
	Hypolimnetic Iron	0.00	0.00	0.00	0.00	Low Iron Levels	Within Normal Range	Not known
	Hypolimnetic Manganese							Not known
Limnological Indicators	Hypolimnetic Phosphorus	0.000	0.085	0.328		Close to Surface TP Readings	Higher than Normal	Not known
	Nitrate + Nitrite	0.00	0.03	0.25	0.02	Low NOx	Within Normal Range	Decreasing Slightly
	Ammonia	0.00	0.04	0.38	0.07	Low Ammonia	Higher than Normal	No Change
	Total Nitrogen	0.19	0.60	2.58	0.62	Intermediate Total Nitrogen	Within Normal Range	No Change
	pH	6.03	7.99	9.51	8.25	Alkaline	Within Normal Range	No Change
	Specific Conductance	52	75	130	74	Softwater	Within Normal Range	No Change
	True Color	1	18	64	13	Intermediate Color	Lower Than Normal	No Change
	Calcium	6.7	11.4	18.1	13.0	May be Susceptible to Zebra Mussels	Higher than Normal	No Change
Lake Perception	WQ Assessment	1	2.4	4	2.3	Not Quite Crystal Clear	Within Normal Range	No Change
	Aquatic Plant Coverage	1	2.5	3	1.7	Surface Plant Growth	More Favorable Than Normal	Highly Improving
	Recreational Assessment	1	2.0	3	2.0	Excellent	Within Normal Range	No Change
Biological Condition	Phytoplankton					Open water-moderate blue algae biomass	Not known	Not known
	Macrophytes					Not measured through CSLAP	Not known	Not known
	Zooplankton					Not measured through CSLAP	Not known	Not known
	Macroinvertebrates					Not measured through CSLAP	Not known	Not known
	Fish					Coolwater fishery?	Not known	Not known
	Invasive Species					None observed	Not known	Not known
Local Climate Change	Air Temperature	2	19.7	31	21.5		Within Normal Range	No Change
	Water Temperature	11	21.7	27	22.4		Within Normal Range	No Change

Category	Indicator	Min	Overall Avg	Max	2015 Avg	Classification	2015 Change?	Long-term Change?
Harmful Algal Blooms	Open Water Phycocyanin	3	51	163	82	Some readings indicate high risk of BGA	Not known	Not known
	Open Water FP Chl.a	1	10	43	10	Few readings indicate high algae levels	Not known	Not known
	Open Water FP BG Chl.a	0	6	30	8	Few readings indicate high BGA levels	Not known	Not known
	Open Water Microcystis	<DL	0.2	0.5	<DL	Mostly undetectable open water MC-LR	Not known	Not known
	Open Water Anatoxin a	<DL	<DL	<DL	<DL	Open water Anatoxin-a consistently not detectable	Not known	Not known
	Shoreline Phycocyanin					No shoreline blooms sampled for PC	Not known	Not known
	Shoreline FP Chl.a	182.6	1129	2075		All readings indicate very high algae levels	Not known	Not known
	Shoreline FP BG Chl.a	176.0	1126	2075		All readings indicate very high BGA levels	Not known	Not known
	Shoreline Microcystis	<DL	0.2	0.5		Mostly undetectable shoreline bloom MC-LR	Not known	Not known
	Shoreline Anatoxin a	<DL	<DL	<DL		Shoreline bloom Anatoxin-a consistently not detectable	Not known	Not known

Evaluation of Lake Condition Impacts to Lake Uses

The 2008 NYSDEC Priority Waterbody Listings (PWL) for the St. Lawrence River drainage basin indicate that recreation and aquatic life in Grass Lake are *stressed* by excessive nutrients. The PWL listing for Grass Lake is shown in Appendix B.

Potable Water (Drinking Water)

The CSLAP dataset at Grass 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 CSLAP data suggest that there would be no impacts to this "unofficial" use of the lake.

Public Bathing

The CSLAP dataset at Grass 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 *stressed* by periodic shoreline blue green algae blooms, although additional information about bacterial levels is needed to evaluate the safety of the water for swimming. It should be noted that Grass Lake is not classified for public bathing.

Recreation (Swimming and Non-Contact Uses)

The CSLAP dataset on Grass Lake, including water chemistry data, physical measurements, and volunteer samplers' perception data, suggest that contact recreation may be *stressed* by shoreline blooms and elevated nutrient levels.

Aquatic Life

The CSLAP dataset on Grass Lake, including water chemistry data, physical measurements, and volunteer samplers' perception data, suggest that aquatic life may be *stressed* by elevated pH and hypolimnetic anoxia (lack of oxygen). Additional data are needed to evaluate the food and habitat conditions for aquatic organisms in the lake.

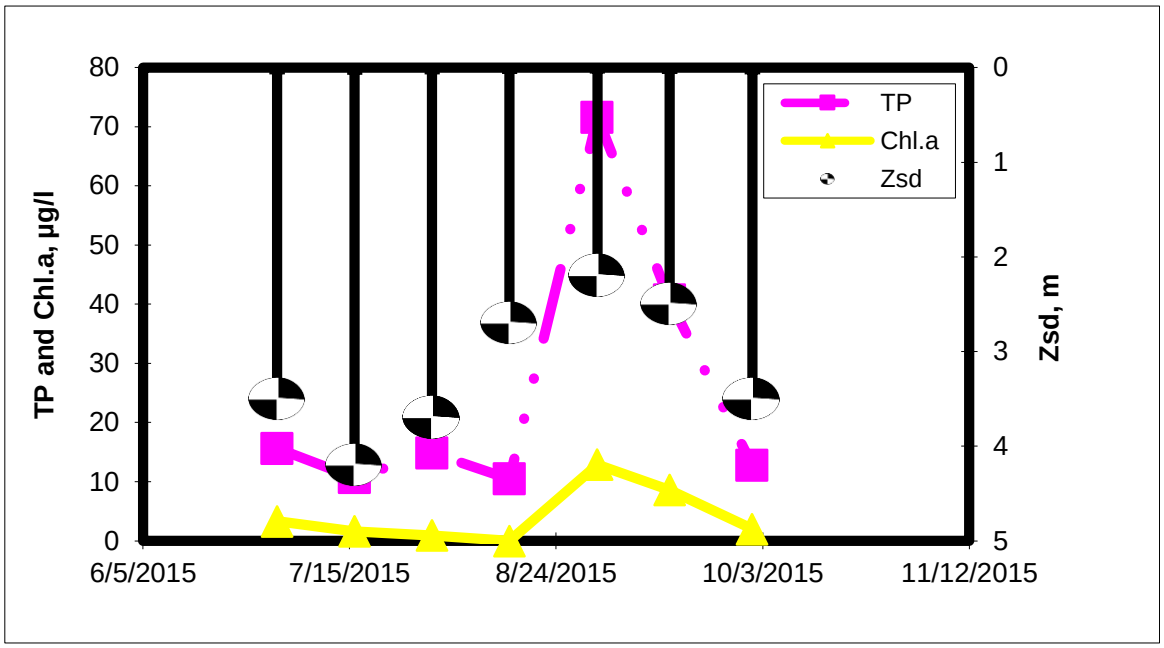
Aesthetics and Habitat
The CSLAP dataset on Grass Lake, including water chemistry data, physical measurements, and volunteer samplers' perception data, suggest that aesthetics may be *threatened* (and at times *stressed*) by shoreline blue green algae blooms. Habitat appears to be good.

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

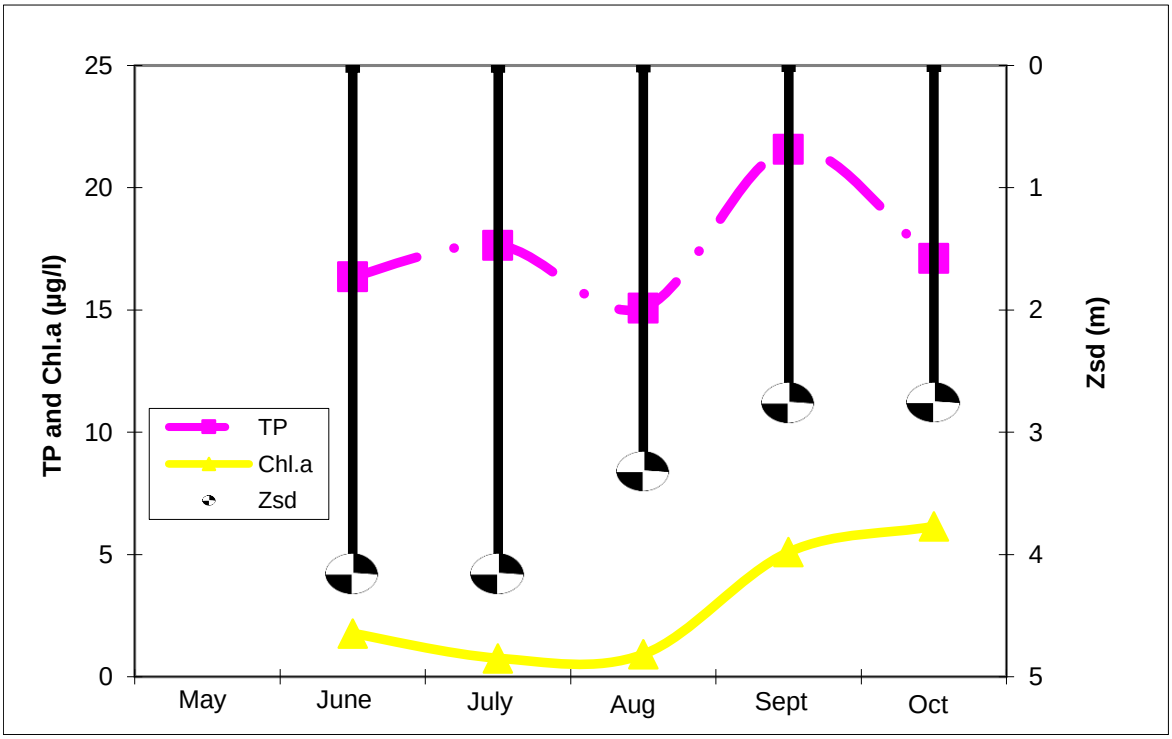
Additional Comments and Recommendations
Additional plant survey data should be collected to determine the extent to which nuisance weeds impact recreational uses of the lake, and if invasive weeds are present. Shoreline algae blooms should continue to be reported. Lake residents and pets should avoid exposure to surface scums or heavily discolored water.

Aquatic Plant IDs-2015
None submitted for identification.

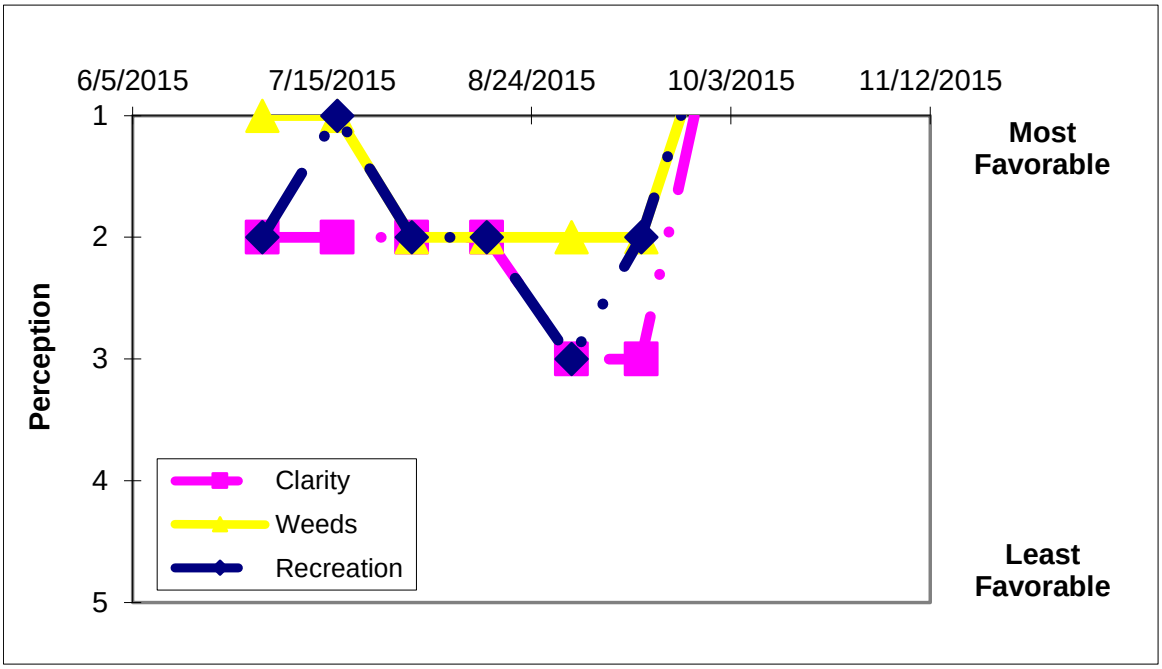
Time Series: Trophic Indicators, 2015



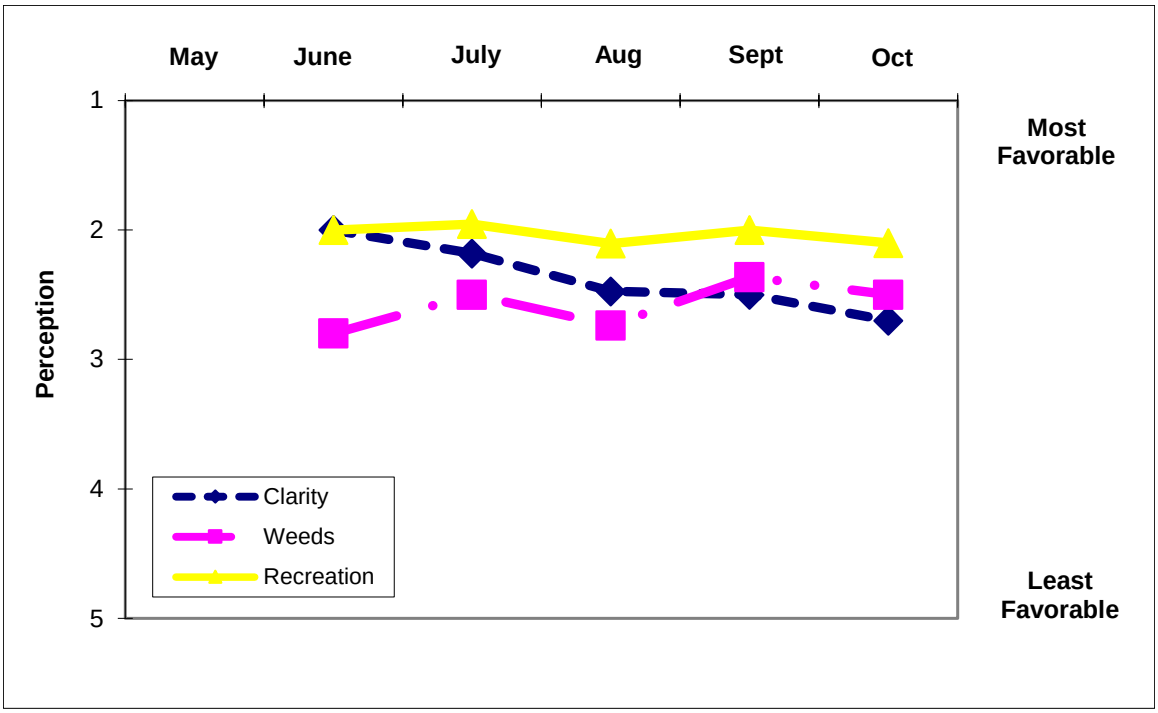
Time Series: Trophic Indicators, Typical Year (2004-2015)



Time Series: Lake Perception Indicators, 2015



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



Appendix A- CSLAP Water Quality Sampling Results for Grass Lake

LNum	PName	Date	Zbot	Zsd	Zsamp	Tot.P	NO3	NH4	TDN	TN/TP	TColor	pH	Cond25	Ca	Chl.a	Cl
196	Grass L	6/1/2004	15.5	4.88		0.011	0.18	0.02	1.78	347.8	23	6.35	90		2.49	
196	Grass L	6/15/2004	15.2	4.00	1.0	0.004	0.25	0.04	1.30	646.7	21	6.85	77		0.85	
196	Grass L	6/30/2004	15.2	3.00		0.014	0.02	0.02	0.52	79.9	28	6.23	77		1.30	
196	Grass L	7/14/2004	15.2	5.50			0.04	0.01	0.31		30	6.37	78		1.20	
196	Grass L	7/30/2004	15.2	5.75	5.0	0.016	0.01	0.01	0.35	49.6	17	8.91	76		2.30	
196	Grass L	8/15/2004	15.2	3.30		0.015	0.01	0.05	0.42	63.6	14	8.19	81	12.8	2.98	
196	Grass L	9/2/2004		3.20		0.021	0.01	0.01	0.42	43.7	14	7.36	60		1.56	
196	Grass L	9/16/2004		2.40		0.016	0.16	0.02	2.58	348.5	13	7.50	69		4.20	
196	Grass L	6/18/2005	15.0	4.00		0.003	0.02	0.02	0.34	261.3				9.8	0.45	
196	Grass L	7/1/2005	15.0	4.00	4.0	0.008	0.07	0.05	1.86	523.9	13	8.27	87		0.34	
196	Grass L	7/15/2005	14.0	3.00	1.5	0.022	0.04	0.02	0.40	40.2	5	8.40	85		0.63	
196	Grass L	8/1/2005	14.9	2.54	1.0	0.046	0.02	0.01	0.46	22.1	8	8.31	80		1.15	
196	Grass L	8/15/2005	15.0	2.75		0.010	0.10	0.01	0.44	95.0	11	8.47	70	10.9	1.48	
196	Grass L	9/1/2005	14.0	2.00	1.5	0.028	0.01	0.01	0.19	15.2	11	8.03	52		6.54	
196	Grass L	9/15/2005	14.0	1.90	1.5	0.020	0.04	0.01	0.55	60.8	7	8.01	75		17.27	
196	Grass L	5/27/2006	15.3	7.50		0.020	0.02	0.02	0.93	102.63	24	7.39	74	11.3	0.96	
196	Grass L	6/28/2006	15.3	4.55		0.053	0.03	0.04	0.76		64		64		0.32	
196	Grass L	7/16/2006	15.2	4.00		0.025	0.01	0.02	0.77	68.058	20	8.05	87	11.0	0.46	
196	Grass L	8/1/2006	15.2	2.55		0.002	0.02	0.08	1.01	1055.2	1	8.13	70		1.13	
196	Grass L	8/15/2006	14.9	2.10		0.012	0.02	0.03	0.78	142.58	17	8.51	81		2.33	
196	Grass L	9/1/2006	15.2	2.95		0.015	0.03	0.05	0.60	88.712		8.58	83		1.98	
196	Grass L	9/15/2006	15.0	3.40	1.5	0.004			0.85	468.72	9	8.29	60	10.5	4.04	
196	Grass L	10/1/2006	15.0	2.05	1.5	0.014	0.02	0.03	0.70	110.87	14	8.00	70		11.80	
196	Grass L	10/14/2006	15.0	2.30	1.5	0.017	0.02	0.05	0.70	91.2	26	7.96	79		12.80	
196	Grass L	7/1/2007	15.9	4.05		0.063	0.00	0.01	0.57	20.1	16	9.10	72	11.7	1.35	
196	Grass L	7/16/2007	15.8	3.73		0.022	0.02	0.02	0.37	37.3	22	8.81	71		0.10	
196	Grass L	8/1/2007		4.35		0.013	0.01	0.03	0.63	104.1	24	8.48	88		0.23	
196	Grass L	8/15/2007	15.2	4.20		0.012	0.01	0.02	0.73	131.9	8	8.25	85		0.22	
196	Grass L	9/2/2007	15.2	3.95	3.0	0.023	0.00	0.07	0.85	81.3	14	8.52	85	12.0	0.74	
196	Grass L	9/16/2007	15.5	3.35	1.0	0.022	0.00	0.03	0.75	75.0	15	8.02	75		8.08	
196	Grass L	9/30/2007	15.2	2.30		0.004	0.01	0.03	0.75	417.2	17	7.32	72		1.13	
196	Grass L	10/15/2007	15.2	2.20	1.5	0.022	0.01	0.02	0.75	76.3	17	7.63	63		5.38	
196	Grass L	7/1/2008	15.4	4.40	1.5	0.013	0.05	0.09	0.39	65.37	22	8.22	64	10.9	0.10	
196	Grass L	7/15/2008	15.0	4.10	1.5	0.020	0.01	0.02	0.46	51.11	25	8.75	71		0.24	
196	Grass L	7/30/2008	15.4	4.50	1.5	0.010	0.01	0.00	0.32	67.90	13	9.10	60		0.20	
196	Grass L	8/16/2008	15.2	3.45	15.2	0.004	0.00	0.02	0.32	165.67	14	8.25	79		0.24	
196	Grass L	9/1/2008	15.0	3.00	1.5	0.014	0.01	0.01			13	8.62	65	10.4	1.53	
196	Grass L	9/15/2008	15.0	2.75	1.5	0.006	0.02	0.03	0.43	146.93	27	7.61	85		1.84	
196	Grass L	10/15/2008	14.5	2.70	1.5	0.017	0.02	0.02	0.47	59.69	20	8.23	61		1.52	
196	Grass L	06/16/2009	15.0	5.10	1.5	0.011	0.03	0.38	0.67	130.88	21	8.19	69	11.5	2.07	
196	Grass L	07/01/2009	15.3	4.55	1.5	0.015	0.05	0.22	0.60	86.84	32	8.16	61		0.70	
196	Grass L	07/15/2009	15.2	3.65		0.017	0.03	0.02	0.40	52.88	36	6.43	74		1.56	
196	Grass L	08/01/2009	15.3	3.20		0.016	0.04	0.03	0.33	44.40	26	8.29	54	13.3	0.44	
196	Grass L	08/15/2009	15.3	3.05		0.011	0.01	0.01	0.43	82.21	34	6.61	69		1.00	
196	Grass L	09/01/2009	15.0	1.80	1.5	0.019	0.01	0.06	0.57	66.94	23	6.03	70		6.80	
196	Grass L	10/01/2009	15.0	2.30	1.5	0.020	0.02	0.20	0.75	83.20	22	7.93	67		8.20	
196	Grass L	10/15/2009	15.0	2.00	1.5	0.017	0.04	0.04	0.47	59.05	21	7.60	66		3.60	
196	Grass L	6/15/2010	15.0	3.60	1.5	0.018	0.01	0.02	0.59	74.42	10	8.18	82	14.5	5.00	
196	Grass L	7/1/2010	16.5	3.90		0.016	0.02	0.02	0.43	59.03	15	8.31	75		0.40	
196	Grass L	7/15/2010	13.8	4.10		0.017	0.01	0.02	0.47	61.42	16	9.21	71		0.30	
196	Grass L	8/1/2010	15.2	4.40		0.014	0.01	0.02	0.50	80.72	12	8.69	87		0.70	
196	Grass L	8/15/2010	15.2	3.33		0.019	0.03	0.03	0.41	48.14	16	9.16	78	10.8	0.20	
196	Grass L	9/1/2010	14.5	3.00	1.5	0.014	0.01	0.03	0.44	68.36	22	8.78	78		2.30	
196	Grass L	9/15/2010	15.0	3.40		0.018	0.02	0.03	0.66	79.66	18	7.30	83		16.50	
196	Grass L	7/1/2011	15.4	4.40		0.013	0.01	0.03	0.40	67.68	18	9.51	70	12.7	0.05	
196	Grass L	7/16/2011	15.4	4.75		0.013	0.03	0.02	0.37	62.64	18	7.62	60		0.30	
196	Grass L	8/2/2011	15.2	5.90		0.024	0.02	0.02	0.45	41.68	20	7.99	74		0.80	
196	Grass L	8/15/2011	15.5	3.35	1.5	0.017	0.01	0.01	0.45	57.69	22	8.00	94		0.90	
196	Grass L	9/2/2011	15.0	3.10		0.028	0.02	0.01	0.59	45.70	12	7.67	73	10.3	0.80	
196	Grass L	9/17/2011	15.0	2.45		0.029	0.01	0.02	0.51	38.44	19	7.11	75		4.60	
196	Grass L	10/16/2011	15.0	2.65	1.5	0.017	0.01	0.02	0.50	66.53	16	7.83	76		5.20	
196	Grass L	7/1/2013	15.6	4.20	1.0	0.018	0.01	0.01	0.39	46.51	28	7.85	78		0.30	
196	Grass L	7/1/2013			bloom											

LNum	PName	Date	Zbot	Zsd	Zsamp	Tot.P	NO3	NH4	TDN	TN/TP	TColor	pH	Cond25	Ca	Chl.a	Cl
196	Grass L	7/14/2013	15.5	4.70	1.0	0.017		0.01	0.41	53.36	16	7.46	78		0.30	
196	Grass L	8/1/2013	15.2	3.55	1.0	0.015			0.54	77.79	14	8.73	78		0.30	
196	Grass L	8/17/2013	15.5	2.80	1.0	0.020	0.01	0.02	0.53	58.44	36	7.81	74		0.20	
196	Grass L	9/1/2013	15.7	4.00	1.5	0.014			0.54	81.77	14	8.73	79		2.60	
196	Grass L	9/17/2013	15.5	2.45	2.0	0.034	0.01	0.05			29	7.46	82		2.30	
196	Grass L	9/19/2013			Bloom											
196	Grass L	9/19/2013			Bloom											
196	Grass L	10/1/2013			bloom											
196	Grass L	10/3/2013	15.0	4.00	1.0	0.025			0.54	48.01	15	8.07	112		10.20	
196	Grass L	10/17/2013	15.5	3.55	1.5	0.013			0.50	87.02	44	7.50	97		5.10	
196	Grass L	7/2/2014	15.3	3.10	0.0	0.012	0.01	0.01	0.43	77.92	15	8.00	72	6.7	0.40	
196	Grass L	7/16/2014	15.3	3.95	1.0	0.010			0.45	94.13	16	7.90	72		0.50	
196	Grass L	8/1/2014	15.3	2.90	0.0	0.013	0.01	0.02	0.49	85.90	12	7.70	130		1.00	
196	Grass L	8/14/2014	15.0	2.70	3.0	0.013			0.46	76.17	12	7.59	59		1.30	
196	Grass L	9/1/2014	15.6	2.65	1.0	0.016	0.01	0.05	0.50	69.06	13	8.15	71	11.3	2.20	
196	Grass L	9/15/2014	15.6	2.05	1.0	0.017			0.54	72.00	13	7.38	77		3.70	
196	Grass L	9/15/2014			bloom											
196	Grass L	10/1/2014	15.4	3.10	1.3	0.014	0.01	0.09	0.44	67.68	12	7.33	74		1.90	
196	Grass L	10/15/2014			bloom											
196	Grass L	7/1/2015	15.8	3.50	1.5	0.016	0.02	0.05	0.61	39.12	17	7.49	79	7.9	3.30	
196	Grass L	7/16/2015	15.3	4.20	1.5	0.011			0.50	47.00	15	7.90	56		1.60	
196	Grass L	7/31/2015	15.3	3.70	1.5	0.015	0.03	0.05	0.44	29.88	15	8.23	74		0.90	5
196	Grass L	8/15/2015	15.3	2.70	1.5	0.010			0.53	50.86	12	8.99	79			
196	Grass L	9/1/2015	15.3	2.20	1.5		0.01	0.06	0.54	7.58	10	9.10	65	18.1	12.90	
196	Grass L	9/15/2015	15.4	2.50	1.5				0.90	22.04	11	8.51	78		8.60	
196	Grass L	10/1/2015	15.4	3.50	1.5	0.013	0.02	0.12	0.81	63.40	10	7.50	86		2.00	5
196	Grass L	7/1/2015	15.8	3.50	1.5	0.016	0.02	0.05	0.61	39.12	17	7.49	79	7.9	3.30	
LNum	PName	Date	Zbot	Zsd	Zsamp	Tot.P	NO3	NH4	TDN	TN/TP		NO2	Fe	Mn	As	
196	Grass L	6/1/2004	15.5		15.5	0.014	0.17	0.01	0.53	39.1						
196	Grass L	6/15/2004	15.2		15.2		0.02	0.02	1.09							
196	Grass L	6/30/2004	15.2		15.2	0.027	0.40	0.08	1.27	47.8						
196	Grass L	7/14/2004	15.2		13.7	0.115	0.04	0.25	0.47	4.1						
196	Grass L	7/30/2004	15.2		14.9	0.027	0.01	0.60	0.40	15.0						
196	Grass L	8/15/2004	15.2		15.2	0.146	0.01	0.06	0.45	3.1						
196	Grass L	9/2/2004			16.2	0.029	0.01	0.32								
196	Grass L	9/16/2004			15.6	0.063	0.11	0.11	0.52	8.2						
196	Grass L	5/27/2006	15.3		15.3	0.016	0.03	0.06								
196	Grass L	6/28/2006	15.3		15.3	0.042										
196	Grass L	7/16/2006	15.2		15.2	0.024										
196	Grass L	8/1/2006	15.2		15.0	0.026										
196	Grass L	8/15/2006	14.9		14.9	0.150										
196	Grass L	9/1/2006	15.2		15.2	0.000										
196	Grass L	9/15/2006	15.0		13.5	0.100										
196	Grass L	10/1/2006	15.0			0.294										
196	Grass L	10/14/2006	15.0			0.328										
196	Grass L	7/16/2007	15.8		15.8	0.051										
196	Grass L	8/1/2007			15.2	0.027										
196	Grass L	8/15/2007	15.2		15.2	0.025										
196	Grass L	9/2/2007	15.2			0.027										
196	Grass L	9/16/2007	15.5			0.062										
196	Grass L	9/30/2007	15.2		15.2	0.153										
196	Grass L	10/15/2007	15.2			0.171										
196	Grass L	7/1/2008	15.4			0.029										
196	Grass L	7/15/2008	15.0			0.048										
196	Grass L	7/30/2008	15.4			0.089										
196	Grass L	8/16/2008	15.2			0.037										
196	Grass L	9/1/2008	15.0			0.068										
196	Grass L	9/15/2008	15.0			0.022										
196	Grass L	10/15/2008	14.5			0.182										
196	Grass L	06/16/2009	15.0			0.067		0.28								
196	Grass L	07/01/2009	15.3			0.100		0.36								
196	Grass L	07/15/2009	15.2		15.0	0.059		0.41								
196	Grass L	08/01/2009	15.3		15.3	0.144		0.06								
196	Grass L	08/15/2009	15.3		15.3	0.169		1.30								
196	Grass L	09/01/2009	15.0			0.099		0.50								
196	Grass L	10/01/2009	15.0			0.203		0.91								

LNum	PName	Date	Zbot	Zsd	Zsamp	Tot.P	NO3	NH4	TDN	TN/TP		NO2	Fe	Mn	As	Cl
196	Grass L	10/15/2009	15.0			0.087		0.48								
196	Grass L	6/15/2010	15.0			0.071										
196	Grass L	7/1/2010	16.5		16.5	0.005										
196	Grass L	7/15/2010	13.8		13.8	0.054										
196	Grass L	8/1/2010	15.2		15.2	0.025										
196	Grass L	8/15/2010	15.2		15.5	0.077										
196	Grass L	9/1/2010	14.5			0.015										
196	Grass L	9/15/2010	15.0		15.0	0.214										
196	Grass L	7/1/2011	15.4		15.4	0.071						0.01				
196	Grass L	7/16/2011	15.4			0.101						0.01				
196	Grass L	8/2/2011	15.2		15.2	0.057										
196	Grass L	8/15/2011	15.5			0.082						0.01				
196	Grass L	9/2/2011	15.0			0.084						0.01				
196	Grass L	9/17/2011	15.0			0.032						0.01				
196	Grass L	10/16/2011	15.0			0.068						0.01				
196	Grass L	7/2/2014			15.3	0.023		0.18								
196	Grass L	7/16/2014			15.3	0.064										
196	Grass L	8/1/2014			15.3	0.148		0.61								
196	Grass L	8/14/2014			15.3	0.102										
196	Grass L	9/1/2014			15.6	0.179		0.97								
196	Grass L	9/15/2014			15.6	0.166										
196	Grass L	10/1/2014			15.4	0.052		1.20								
196	Grass L	7/1/2015				0.076										
196	Grass L	7/16/2015				0.096										
196	Grass L	7/31/2015				0.090		0.67								
196	Grass L	8/15/2015				0.094										
196	Grass L	9/1/2015				0.175		0.89								
196	Grass L	9/15/2015				0.199										
196	Grass L	10/1/2015				0.249		1.45								

LNum	PName	Date	Site	TAir	TH20	QA	QB	QC	QD	QF	QG	AQ-PC	AQ-Chla	MC-LR	Ana-a	Cylin	FP-Chl	FP-BG	HAB form	Shore HAB
196	Grass L	6/1/2004	epi	7	18	1	3	1	56											
196	Grass L	6/15/2004	epi	19	22	3	3	2	8											
196	Grass L	6/30/2004	epi	13	20	2	3	2	2											
196	Grass L	7/14/2004	epi	21	23	2	3	2	0											
196	Grass L	7/30/2004	epi	23	24	2	3	3	0											
196	Grass L	8/15/2004	epi	17	22	3	3	3	38											
196	Grass L	9/2/2004	epi	11		2	3	2	2											
196	Grass L	9/16/2004	epi	20		3	3	3	13											
196	Grass L	6/18/2005	epi	15	18															
196	Grass L	7/1/2005	epi	30	27	2	3	3	2											
196	Grass L	7/15/2005	epi	28	26	2	3	3	2											
196	Grass L	8/1/2005	epi	24	25	3	3	3	2											
196	Grass L	8/15/2005	epi	23	26	3	3	3	2											
196	Grass L	9/1/2005	epi	21	23	3	3	3	1											
196	Grass L	9/15/2005	epi	20	23	2	3	2	0											
196	Grass L	5/27/2006	epi	20	20	2	2	1	0											
196	Grass L	6/28/2006	epi	24																
196	Grass L	7/16/2006	epi	31	26	2	3	1	25											
196	Grass L	8/1/2006	epi	26	27	4	3	3	0											
196	Grass L	8/15/2006	epi	22	21	3	3	1	1											
196	Grass L	9/1/2006	epi	20	21	3	3	2	6											
196	Grass L	9/15/2006	epi	17	18	2	2	2	5											
196	Grass L	10/1/2006	epi	13	15	2	2	2	5											
196	Grass L	10/14/2006	epi	8	12	3	3	2	15											
196	Grass L	7/1/2007	epi	15	23	3	3	2	0											
196	Grass L	7/16/2007	epi	16	23	2	3	1	1											
196	Grass L	8/1/2007	epi	28	27	2	3	1	2											
196	Grass L	8/15/2007	epi	22	24	2	3	2	23											
196	Grass L	9/2/2007	epi	18	22	2	3	2	8											
196	Grass L	9/16/2007	epi	19	19	2	2	1	2											
196	Grass L	9/30/2007	epi	13	19	2	2	2	8											
196	Grass L	10/15/2007	epi	13	16	3	3	2	0											

LNum	PName	Date	Site	TAir	TH20	QA	QB	QC	QD	QF	QG	AQ-PC	AQ-Chla	MC-LR	Ana-a	Cylin	FP-Chl	FP-BG	HAB form	Shore HAB
196	Grass L	7/1/2008	epi	21	24	2	3	2	0											
196	Grass L	7/15/2008	epi	23	24	2	3	2	0											
196	Grass L	7/30/2008	epi	22	24	3	3	2	12											
196	Grass L	8/16/2008	epi	17	23	3	3	2	0											
196	Grass L	9/1/2008	epi	26	23	3	3	2	12											
196	Grass L	9/15/2008	epi	18	21	3	3	3	0											
196	Grass L	10/15/2008	epi	10	14	3	3	2	2											
196	Grass L	06/16/2009	epi	25	21	2	2	2	0											
196	Grass L	07/01/2009	epi	24	24															
196	Grass L	07/15/2009	epi	18	21	3	3	2	18											
196	Grass L	08/01/2009	epi	19	24	2	3	3	1											
196	Grass L	08/15/2009	epi	22	26	3	3	2	12											
196	Grass L	09/01/2009	epi	18	21	2	3	3	12											
196	Grass L	10/01/2009	epi	8	15	3	3	2	5			163.2								
196	Grass L	10/15/2009	epi	2	11	2	2	2	5											
196	Grass L	6/15/2010	epi	19	20	2	3	3	2	0	4									
196	Grass L	7/1/2010	epi	16	22	2	3	2	5	0	0									
196	Grass L	7/15/2010	epi	24	26	3	3	2	0	4	4									
196	Grass L	8/1/2010	epi	22	24	3	3	2	28	4	4	71.58								
196	Grass L	8/15/2010	epi	24	24	1	3	2	0	0	0	121.20								
196	Grass L	9/1/2010	epi	26	24	2	1	1	0	0	0	94.12								
196	Grass L	9/15/2010	epi	16	18	2	2	1	0	0	0									
196	Grass L	7/1/2011	epi	19	22	2	1	2	0	0	0	7.70	2.90							
196	Grass L	7/16/2011	epi	27	26	2	2	2	0	0	0	9.50	1.90							
196	Grass L	8/2/2011	epi	24	26	2	2	1	0	0	0	14.80	3.60							
196	Grass L	8/15/2011	epi	19	23	2	2	2	0	0	0	36.90	4.10							
196	Grass L	9/2/2011	epi	24	22	2	2	1	0	0	0	42.00	3.40							
196	Grass L	9/17/2011	epi	18	19	3	1	2	0	0	0	38.90	3.50							
196	Grass L	10/16/2011	epi	13	15	3	2	2	5	0	0	63.90	5.00							
196	Grass L	7/1/2013	epi	19	24	2	3	2	0	4		2.60	2.80	<0.30	<0.650		1.40	1.10	I	
196	Grass L	7/1/2013	epi											<0.60	<1.010					
196	Grass L	7/14/2013	epi	27	27	2	2	1	0	0	0								I	
196	Grass L	8/1/2013	epi	22	24	2	3	2	0	4	0	4.90	1.90	0.36	<0.390		2.50	0.10	F	E
196	Grass L	8/17/2013	epi	24	23	3	3	2	1	0	0			<0.30	<1.240		7.40	4.30		
196	Grass L	9/1/2013	epi	26	24	3	2		1	0	0								F	
196	Grass L	9/17/2013	epi	16	19	3	3	2	1	0	0								B	
196	Grass L	9/19/2013	epi											<0.06						
196	Grass L	9/19/2013	epi											<0.06						
196	Grass L	10/1/2013	epi											<0.60	<21.210		2075	2075		
196	Grass L	10/3/2013	epi	19	18	3	3	3	4	4	0			<0.30	<0.100		7.80	1.70	D	
196	Grass L	10/17/2013	epi	15	16	2	2	2	0	4	0	20.40	1.10	<0.30	<0.090		4.10	3.80	H	
196	Grass L	7/2/2014	epi	26	26	2	2	2	0	0	0								i	i
196	Grass L	7/16/2014	epi	18	23	2	2	2	0	0	0			<0.90						
196	Grass L	8/1/2014	epi	24	23	2	2	2	0	0	0								i	
196	Grass L	8/14/2014	epi	17	21	2	2	2	5	0	0								i	i
196	Grass L	9/1/2014	epi	23	23	2	2	2	0	0	0	19.70	0.40	<0.29	<0.14	<0.002	6.60	3.70		f
196	Grass L	9/15/2014	epi	18	18	3	2	3	1	1	1			<0.59	<0.12	<0.001	42.60	30.40	bd	
196	Grass L	9/15/2014	epi											<0.97	<0.08	<0.002	182.60	176.00		
196	Grass L	10/1/2014	epi	13	18	3	2	2	15	0	0			<0.59	<0.12	<0.001	5.10	3.50		
196	Grass L	10/15/2014	epi											<0.95	<0.06	<0.001	7.30	3.80		
196	Grass L	6/1/2004	hypo		7															
196	Grass L	6/15/2004	hypo		8															
196	Grass L	6/30/2004	hypo		7															
196	Grass L	7/14/2004	hypo		8															
196	Grass L	8/15/2004	hypo		7															
196	Grass L	9/2/2004	hypo		9															
196	Grass L	9/16/2004	hypo		8															
196	Grass L	6/18/2005	hypo		15															
196	Grass L	7/1/2005	hypo		15															
196	Grass L	8/15/2005	hypo		15															
196	Grass L	5/27/2006	hypo		10															

LNum	PName	Date	Site	TAir	TH20	QA	QB	QC	QD	QF	QG	AQ-PC	AQ-Chla	MC-LR	Ana-a	Cylin	FP-Chl	FP-BG	HAB form	Shore HAB
196	Grass L	6/28/2006	hypo		11															
196	Grass L	7/16/2006	hypo		10															
196	Grass L	8/1/2006	hypo		10															
196	Grass L	8/15/2006	hypo		9															
196	Grass L	9/1/2006	hypo		8															
196	Grass L	9/15/2006	hypo		8															
196	Grass L	10/1/2006	hypo		8															
196	Grass L	10/14/2006	hypo		7															
196	Grass L	7/1/2007	hypo		7															
196	Grass L	8/1/2007	hypo		8															
196	Grass L	8/15/2007	hypo		8															
196	Grass L	9/30/2007	hypo		7															
196	Grass L	7/1/2008	hypo		6															
196	Grass L	7/15/2008	hypo		7															
196	Grass L	7/30/2008	hypo		7															
196	Grass L	8/16/2008	hypo		7															
196	Grass L	9/1/2008	hypo		7															
196	Grass L	9/15/2008	hypo		7															
196	Grass L	10/15/2008	hypo		6															
196	Grass L	06/16/2009	hypo		7															
196	Grass L	07/01/2009	hypo		8															
196	Grass L	07/15/2009	hypo		9															
196	Grass L	08/01/2009	hypo		8															
196	Grass L	08/15/2009	hypo		8															
196	Grass L	09/01/2009	hypo		8															
196	Grass L	10/01/2009	hypo		7															
196	Grass L	10/15/2009	hypo		8															
196	Grass L	6/15/2010	hypo		7															
196	Grass L	7/1/2010	hypo		7															
196	Grass L	7/15/2010	hypo		10															
196	Grass L	8/1/2010	hypo		7															
196	Grass L	8/15/2010	hypo		9															
196	Grass L	9/1/2010	hypo		9															
196	Grass L	9/15/2010	hypo		7															
196	Grass L	7/1/2011	hypo		9															
196	Grass L	7/2/2014	hypo		9															
196	Grass L	7/16/2014	hypo		9															
196	Grass L	8/1/2014	hypo		7															
196	Grass L	8/14/2014	hypo		7															
196	Grass L	9/1/2014	hypo		8															
196	Grass L	9/15/2014	hypo		8															
196	Grass L	10/1/2014	hypo		7															

Legend Information

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

Appendix B- Priority Waterbody Listing for Grass Lake

Grass Lake (0906-0060) MinorImpacts

Waterbody Location Information

Revised: 11/13/2008

Water Index No: SL-25- 7/P1- 5-P51
Hydro Unit Code: 04150303/080 **Str Class:** C
Waterbody Type: Lake
Waterbody Size: 18.4 Acres
Seg Description: entire lake

Drain Basin: Saint Lawrence River
Indian River
Reg/County: 6/Jefferson Co. (23)
Quad Map: MUSKELLUNGE LAKE (D-18-4)

Water Quality Problem/Issue Information

(CAPS indicate MAJOR Use Impacts/Pollutants/Sources)

Use(s) Impacted	Severity	Problem Documentation
Aquatic Life	Stressed	Suspected
Recreation	Stressed	Suspected

Type of Pollutant(s)
Known: - - -
Suspected: NUTRIENTS (phosphorus)
Possible: D.O./Oxygen Demand

Source(s) of Pollutant(s)
Known: - - -
Suspected: - - -
Possible: AGRICULTURE

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: n/a

Further Details

Overview
Aquatic life support and recreational uses in Grass Lake are thought to experience minor impacts due to nutrient loadings from nonpoint sources in the watershed.

Water Quality Sampling
Grass Lake has been sampled as part of the NYSDEC Citizen Statewide Lake Assessment Program (CSLAP) beginning in 2004 and continuing through the present. An Interpretive Summary report of the findings of this sampling was published in 2008. These data indicate that the lake continues to be best characterized as mesotrophic, or moderately productive. This level of productivity is typical of lakes with intermediate water transparency, nutrient (primarily phosphorus) levels, and moderate susceptibility to algal blooms. Water quality conditions in the lake have been fairly stable over the last four years. Phosphorus levels in the lake occasionally exceed the state guidance values indicating impacted/stressed recreational uses. Corresponding transparency measurements typically exceed what is recommended minimum for swimming beaches. Measurements of pH typically fall within the state water quality range of 6.5 to 8.5, but with occasional values falling both above and below this range. The lake water is weakly colored, but color does not limit water transparency. (DEC/DOW, BWAM/CSLAP, February 2008)

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 very favorable in recent years. The recreational suitability of the lake is described most frequently as "excellent." The lake itself is most often described as "not quite crystal clear" or "having a definite algal greenness," an assessment that is somewhat less favorable than expected given the water quality measurements. Assessments have noted that aquatic plants typically grow to the lake surface, but not densely, and "excessive weed growth" and "poor water clarity" are only occasionally identified as impacting recreational uses of the lake. (DEC/DOW, BWAM/CSLAP, February 2008)

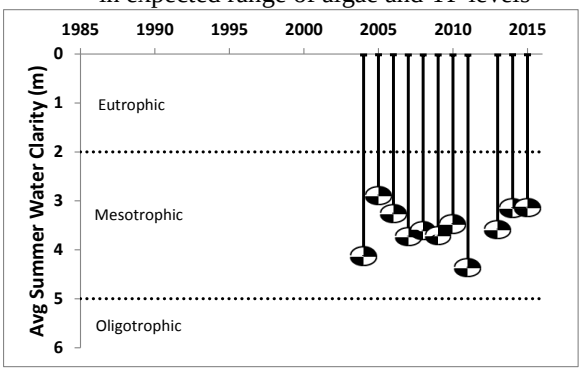
Lake Uses

This lake waterbody is designated class C, suitable for general recreation and aquatic life support, but not as a drinking water supply or public bathing. 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.

Appendix C- Long Term Trends: Grass Lake

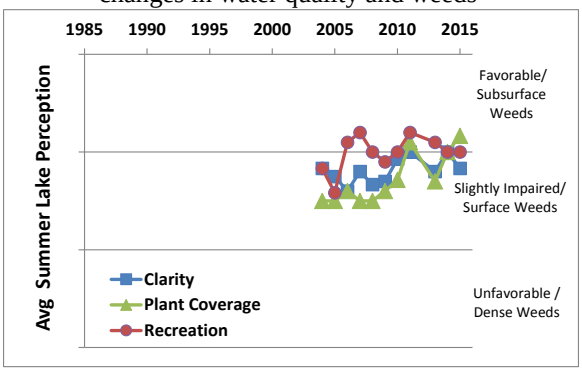
Long Term Trends: Water Clarity

- No clear trends, but recent decrease
- Most readings typical of *mesotrophic* lakes, in expected range of algae and TP levels



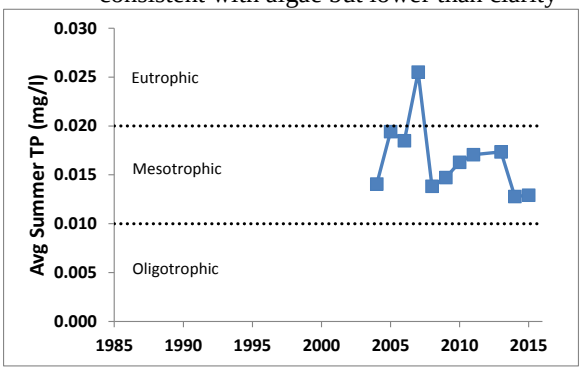
Long Term Trends: Lake Perception

- ↓ weed coverage; ↑ WQ and recreation
- Recreational perception closely linked to changes in water quality and weeds



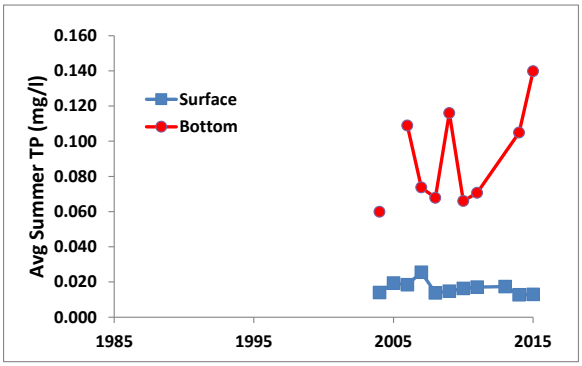
Long Term Trends: Phosphorus

- No clear trends, but slight ↓ since mid-00s
- Most readings typical of *mesotrophic* lakes, consistent with algae but lower than clarity



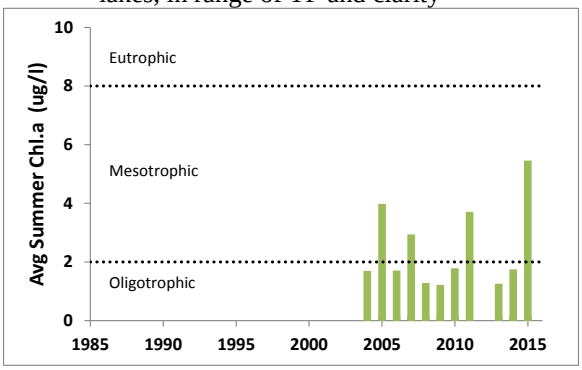
Long Term Trends: Bottom Phosphorus

- Bottom TP variable; at times very high
- Bottom TP readings suggest moderate to high internal nutrient load



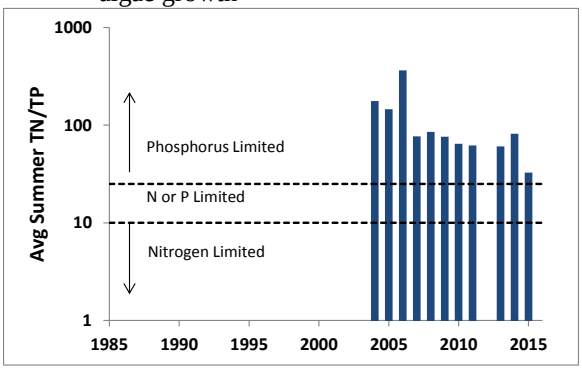
Long Term Trends: Chlorophyll a

- Low open water algae most years
- Most readings typical of *mesoligotrophic* lakes, in range of TP and clarity



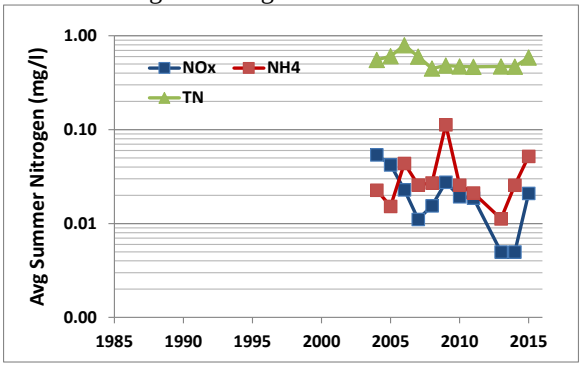
Long Term Trends: N:P Ratio

- Decreasing ratios
- Most readings indicate phosphorus limits algae growth



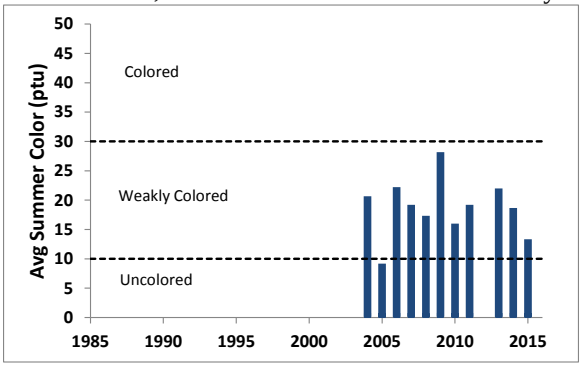
Long Term Trends: Nitrogen

- No trends apparent, but drop in NOx
- Generally low NOx, ammonia, and total nitrogen readings



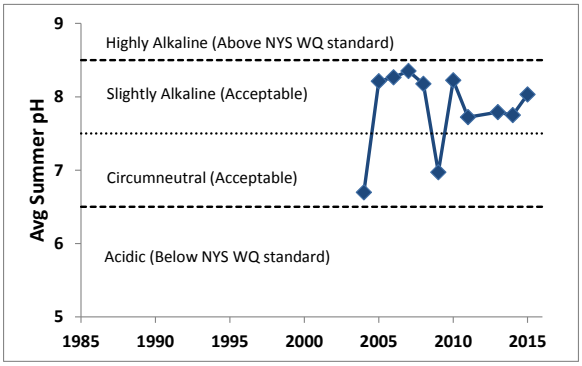
Long Term Trends: Color

- No clear trends; variable year to year
- Most readings typical of *weakly colored* lakes; no evidence that color affects clarity



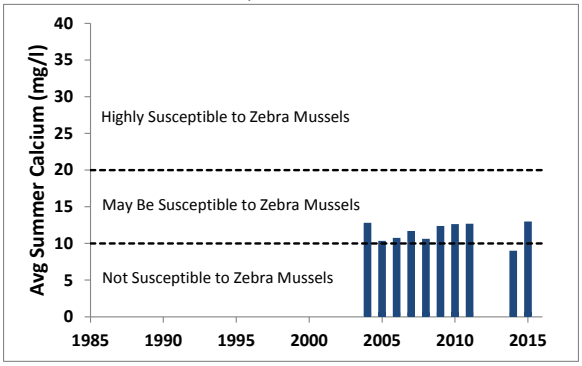
Long Term Trends: pH

- Highly variable year to year
- Most readings typical of *circumneutral* to *alkaline* lakes



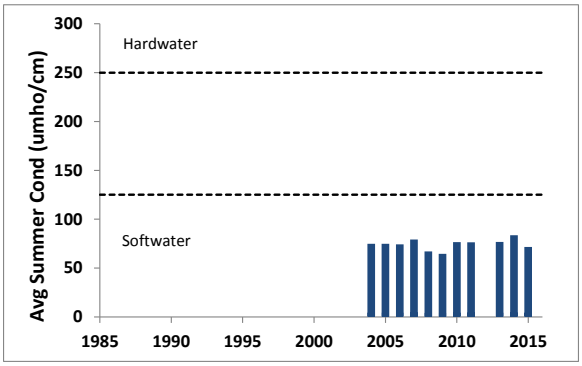
Long Term Trends: Calcium

- No trends apparent
- Most readings indicate low susceptibility to zebra mussels, which are not found in lake



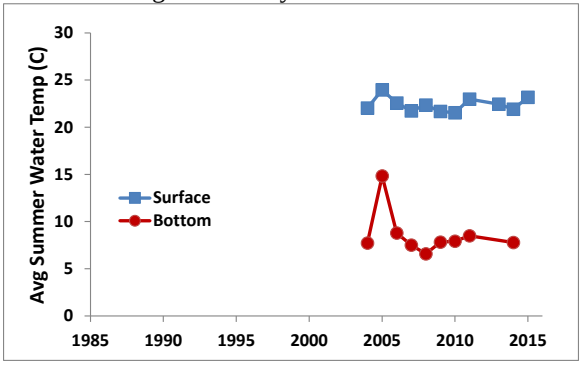
Long Term Trends: Conductivity

- Consistent and low readings
- Most readings typical of lakes with *soft water*



Long Term Trends: Water Temperature

- No trends apparent in surface temperatures
- Much colder bottom temperatures indicate strong 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.

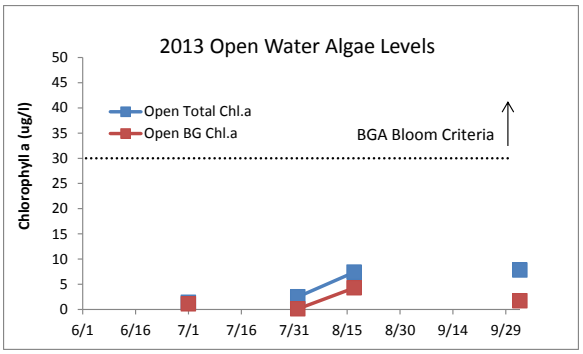


Figure D1:
2013 Open Water Total and BGA Chl.a

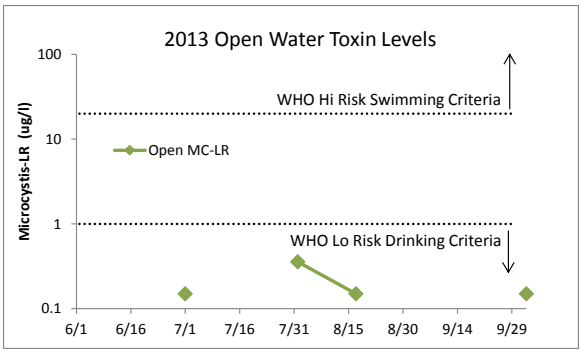


Figure D2:
2013 Open Water Microcystin-LR

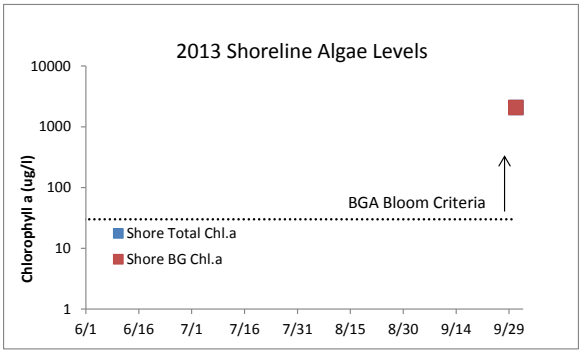


Figure D3:
2013 Shoreline Total and BGA Chl.a

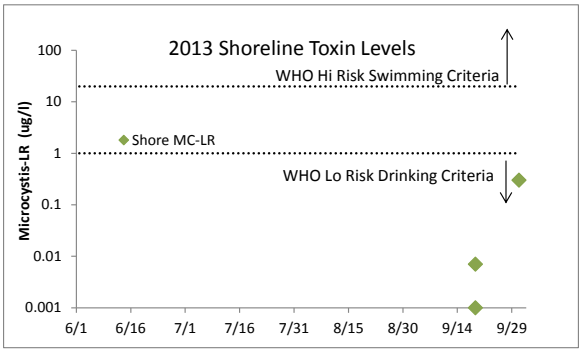


Figure D4:
2013 Shoreline Microcystin-LR

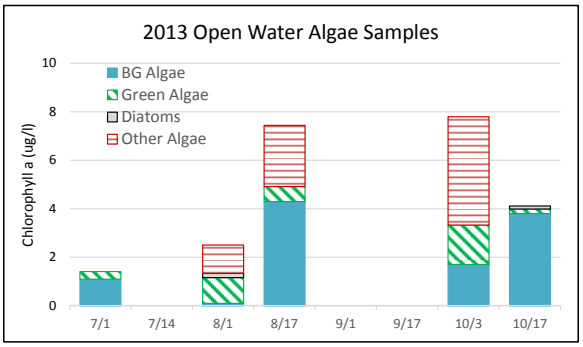


Figure D5:
2013 Open Water Algae Types

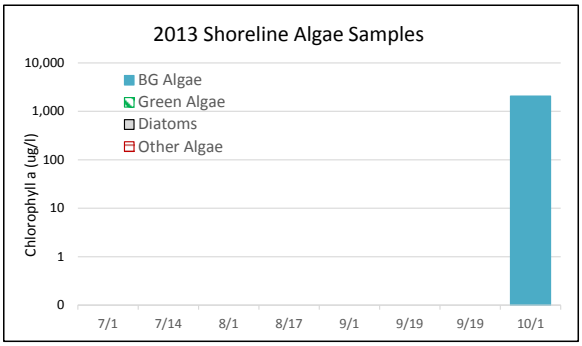


Figure D6:
2013 Shoreline Algae Types

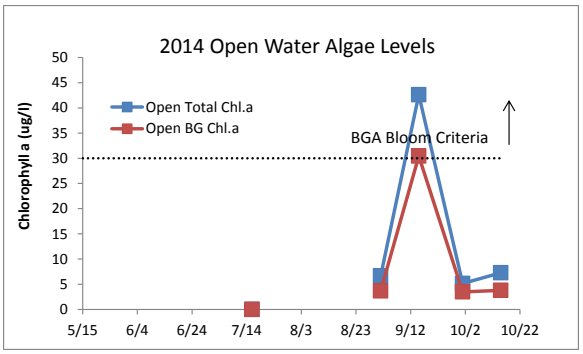


Figure D7:
2014 Open Water Total and BGA Chl.a

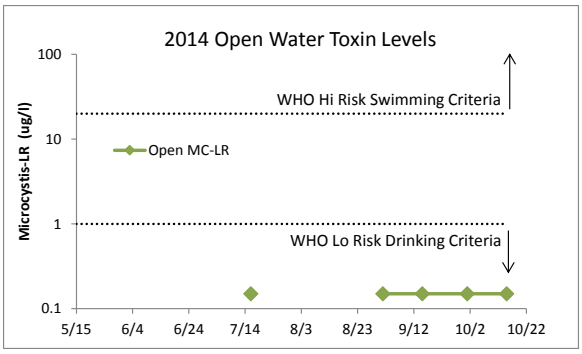


Figure D8:
2014 Open Water Microcystin-LR

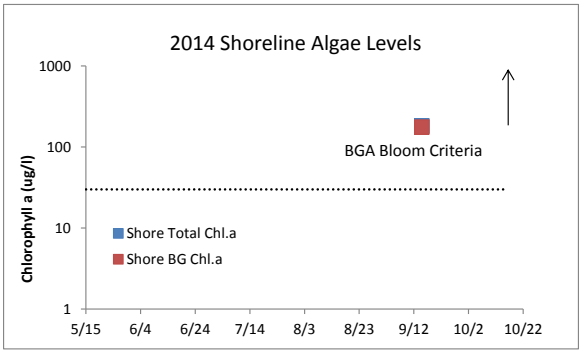


Figure D9:
2014 Shoreline Total and BGA Chl.a

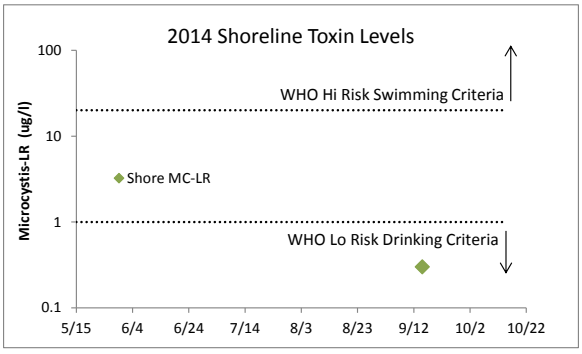


Figure D10:
2014 Shoreline Microcystin-LR

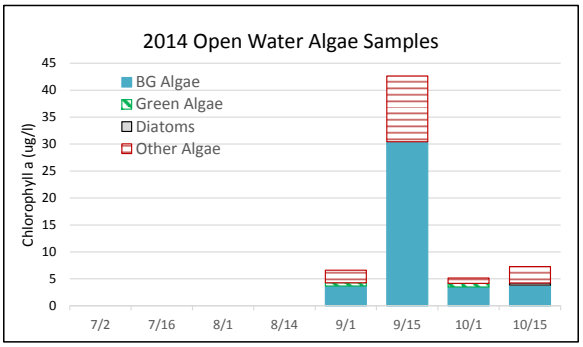


Figure D11:
2014 Open Water Algae Types

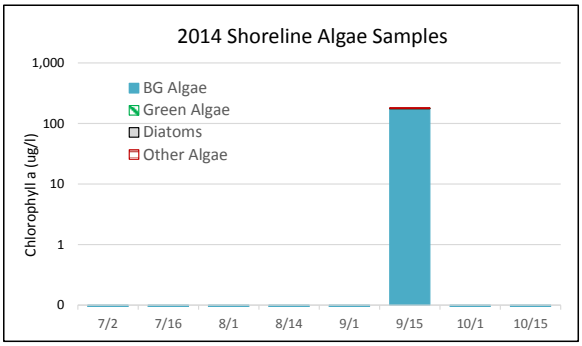


Figure D12:
2014 Shoreline Algae Types

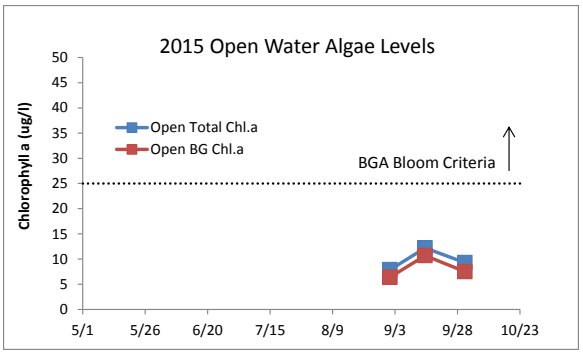


Figure D13:
2015 Open Water Total and BGA Chl.a

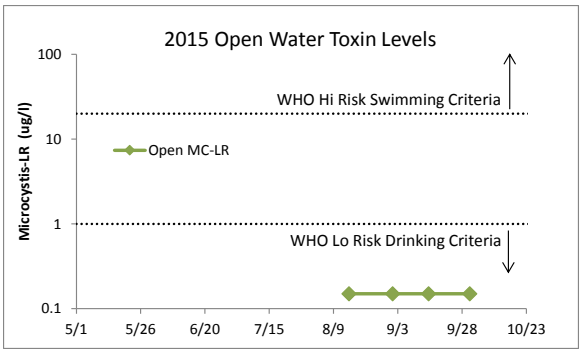


Figure D14:
2015 Open Water Microcystin-LR

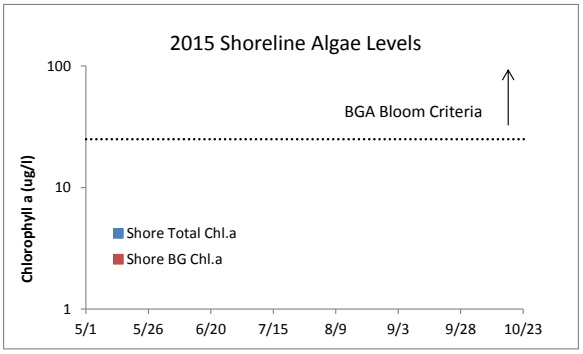


Figure D15:
2015 Shoreline Total and BGA Chl.a

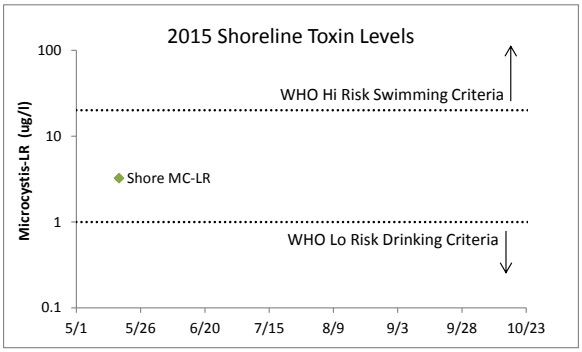


Figure D16:
2015 Shoreline Microcystin-LR

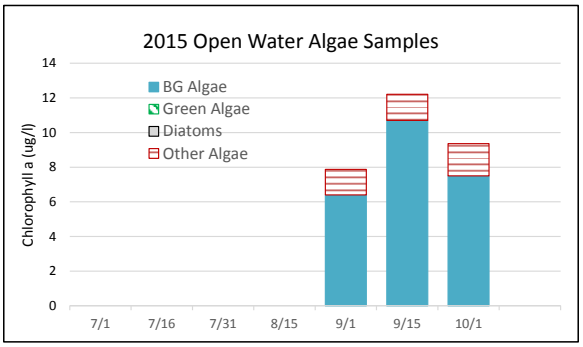


Figure D17:
2015 Open Water Algae Types

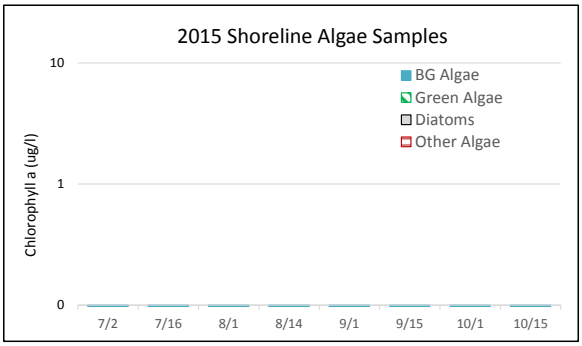


Figure D18:
2015 Shoreline Algae Types

Appendix E:
AIS Species in Jefferson/St. Lawrence Counties

The table below shows the invasive aquatic plants and animals that have been documented in Jefferson or St. Lawrence 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.

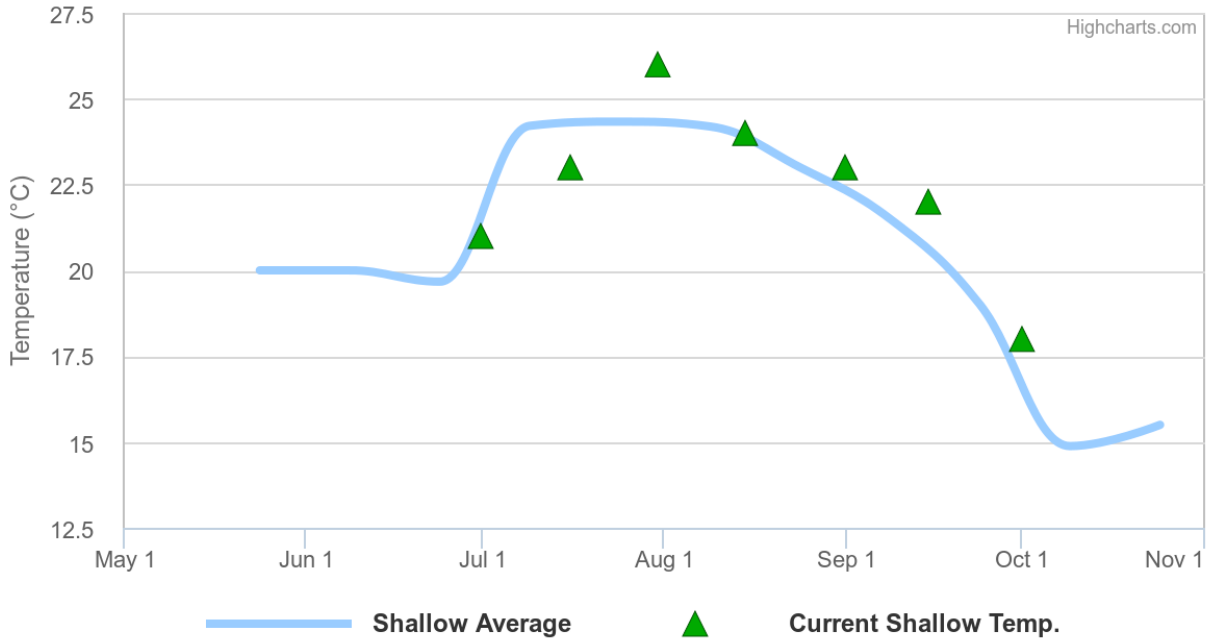
Aquatic Invasive Species – Jefferson/St. Lawrence Counties			
Waterbody	**Kingdom**	**Common name**	**Scientific name**
Arbuckle Pond	Plant	Variable watermilfoil	*Myriophyllum heterophyllum*
Black Lake	Animal	Common carp	*Cyprinus carpio*
Black Lake	Animal	Zebra mussel	*Dreissena polymorpha*
Black Lake	Plant	Eurasian watermilfoil	*Myriophyllum spicatum*
Black Lake	Plant	Curly leafed pondweed	*Potamogeton crispus*
Blake Falls Reservoir	Plant	Variable watermilfoil	*Myriophyllum heterophyllum*
Canton Wildlife Management Area	Plant	European frogbit	*Hydrocharis morsus-ranae*
Carry Falls Reservoir	Plant	Variable watermilfoil	*Myriophyllum heterophyllum*
Chaumont Pond	Plant	Variable watermilfoil	*Myriophyllum heterophyllum*
Cranberry Lake	Plant	Variable watermilfoil	*Myriophyllum heterophyllum*
Fish Creek-Black Lake	**Plant**	**European frogbit**	***Hydrocharis morsus-ranae***
Grasse River, Lampson Falls	Plant	European frogbit	*Hydrocharis morsus-ranae*
Higley Falls Reservoir	Plant	Variable watermilfoil	*Myriophyllum heterophyllum*
Jacques Cartier SP Pond	Plant	Eurasian watermilfoil	*Myriophyllum spicatum*
Little River Flow	Plant	Variable watermilfoil	*Myriophyllum heterophyllum*
Little Simon Pond	Plant	Variable watermilfoil	*Myriophyllum heterophyllum*
Lake Ontario	Plant	Eurasian watermilfoil	*Myriophyllum spicatum*
Lake Ontario	Plant	Curly leafed pondweed	*Potamogeton crispus*
Lost Pond	Plant	Variable watermilfoil	*Myriophyllum heterophyllum*
Oswegatchie River	Plant	European frogbit	*Hydrocharis morsus-ranae*
Piercefield Flow	Plant	Variable watermilfoil	*Myriophyllum heterophyllum*
Rainbow Falls Reservoir	Plant	Variable watermilfoil	*Myriophyllum heterophyllum*
St. Lawrence River	Animal	Zebra mussel	*Dreissena polymorpha*
St. Lawrence River	Plant	Eurasian watermilfoil	*Myriophyllum spicatum*

Waterbody	Kingdom	Common name	Scientific name
St. Lawrence River	Plant	Starry stonewort	*Nitellopsis obtusa*
St. Lawrence River	Plant	Curly leafed pondweed	*Potamogeton crispus*
Tupper Lake	Plant	Variable watermilfoil	*Myriophyllum heterophyllum*
Black Pond	Animal	Common carp	*Cyprinus carpio*
Black Pond	Plant	European frogbit	*Hydrocharis morsus-ranae*
Black Pond	Plant	Curly leafed pondweed	*Potamogeton crispus*
Butterfield Lake	Plant	Eurasian watermilfoil	*Myriophyllum spicatum*
Cranberry Pond	Plant	European frogbit	*Hydrocharis morsus-ranae*
Crooked Creek	Plant	European frogbit	*Hydrocharis morsus-ranae*
Floodwood Pond	Plant	Common carp	*Cyprinus carpio*
Floodwood Pond	Plant	European frogbit	*Hydrocharis morsus-ranae*
Floodwood Pond	Plant	Eurasian watermilfoil	*Myriophyllum spicatum*
Floodwood Pond	Plant	Brittle naiad	*Najas minor*
Floodwood Pond	Plant	Curly leafed pondweed	*Potamogeton crispus*
Floodwood Pond	Plant	Water chestnut	*Trapa natans*
Goose Pond	Plant	Eurasian watermilfoil	*Myriophyllum spicatum*
Hyde Lake	Plant	Eurasian watermilfoil	*Myriophyllum spicatum*
Lake of the Isles	Plant	Eurasian watermilfoil	*Myriophyllum spicatum*
Lake of the Woods	Plant	Eurasian watermilfoil	*Myriophyllum spicatum*
Lake Ontario	Plant	Flowering-rush, Flowering rush	*Butomus umbellatus*
Lake Ontario	Animal	Common carp	*Cyprinus carpio*
Lake Ontario	Animal	Quagga mussel	*Dreissena bugensis*
Lake Ontario	Animal	Zebra mussel	*Dreissena polymorpha*
Lake Ontario	Plant	European frogbit	*Hydrocharis morsus-ranae*
Lake Ontario	Plant	Eurasian watermilfoil	*Myriophyllum spicatum*
Lake Ontario	Plant	Brittle naiad	*Najas minor*
Lake Ontario	Animal	Round goby	*Neogobius melanostomus*
Lake Ontario	Plant	Starry stonewort	*Nitellopsis obtusa*
Lake Ontario	Animal	Allegheny crayfish	*Orconectes obscurus*
Lake Ontario	Plant	Curly leafed pondweed	*Potamogeton crispus*
Lake Ontario	Plant	Water chestnut	*Trapa natans*
Lakeview Pond	Animal	Common carp	*Cyprinus carpio*
Lakeview Pond	Plant	Eurasian watermilfoil	*Myriophyllum spicatum*
Lakeview Pond	Plant	Curly leafed pondweed	*Potamogeton crispus*
Lakeview Pond	**Plant**	**European frogbit**	***Hydrocharis morsus-ranae***
Millsite Lake	Plant	Eurasian watermilfoil	*Myriophyllum spicatum*
Millsite Lake	Plant	Banded mystery snail	*Viviparus georgianus*
Moon Lake	Plant	Eurasian watermilfoil	*Myriophyllum spicatum*
Moon Lake	Plant	Curly leafed pondweed	*Potamogeton crispus*
Mud Lake	Plant	Eurasian watermilfoil	*Myriophyllum spicatum*
Mud Lake	**Plant**	**European frogbit**	***Hydrocharis morsus-ranae***

Waterbody	Kingdom	Common name	Scientific name
Muskellunge Lake	Animal	Rudd	*Scardinius erythrophthalmus*
North Colwell Pond	Plant	Brittle naiad	*Najas minor*
North Colwell Pond	Plant	Water chestnut	*Trapa natans*
North Colwell Pond	**Plant**	**Eurasian watermilfoil**	***Myriophyllum spicatum***
North Pond	**Plant**	**European frogbit**	***Hydrocharis morsus-ranae***
North Pond	**Plant**	**Eurasian watermilfoil**	***Myriophyllum spicatum***
Payne Lake	Plant	Eurasian watermilfoil	*Myriophyllum spicatum*
Payne Lake	Plant	Curly leafed pondweed	*Potamogeton crispus*
Perch Lake	**Plant**	**Eurasian watermilfoil**	***Myriophyllum spicatum***
Perch Lake	**Plant**	**Curly leafed pondweed**	***Potamogeton crispus***
Pleasant Lake	Plant	European frogbit	*Hydrocharis morsus-ranae*
Pleasant Lake	Plant	Eurasian watermilfoil	*Myriophyllum spicatum*
Red Lake	Plant	Eurasian watermilfoil	*Myriophyllum spicatum*
Red Lake	**Animal**	**Common carp**	***Cyprinus carpio***
Saint James Lake	Animal	Common carp	*Cyprinus carpio*
Saint James Lake	Plant	European frogbit	*Hydrocharis morsus-ranae*
Saint James Lake	Animal	Round goby	*Neogobius melanostomus*
Saint James Lake	Plant	Water chestnut	*Trapa natans*
Sixberry Lake	**Plant**	**Eurasian watermilfoil**	***Myriophyllum spicatum***
South Colwell Pond	Plant	European frogbit	*Hydrocharis morsus-ranae*
South Colwell Pond	Plant	Eurasian watermilfoil	*Myriophyllum spicatum*
South Colwell Pond	Plant	Curly leafed pondweed	*Potamogeton crispus*
South Colwell Pond	Plant	Water chestnut	*Trapa natans*
South Colwell Pond	**Plant**	**Brittle naiad**	***Najas minor***
St. Lawrence River	Animal	Zebra mussel	*Dreissena polymorpha*
St. Lawrence River	Plant	European frogbit	*Hydrocharis morsus-ranae*
St. Lawrence River	Plant	Eurasian watermilfoil	*Myriophyllum spicatum*
St. Lawrence River	Plant	Starry stonewort	*Nitellopsis obtusa*
St. Lawrence River	Plant	Curly leafed pondweed	*Potamogeton crispus*

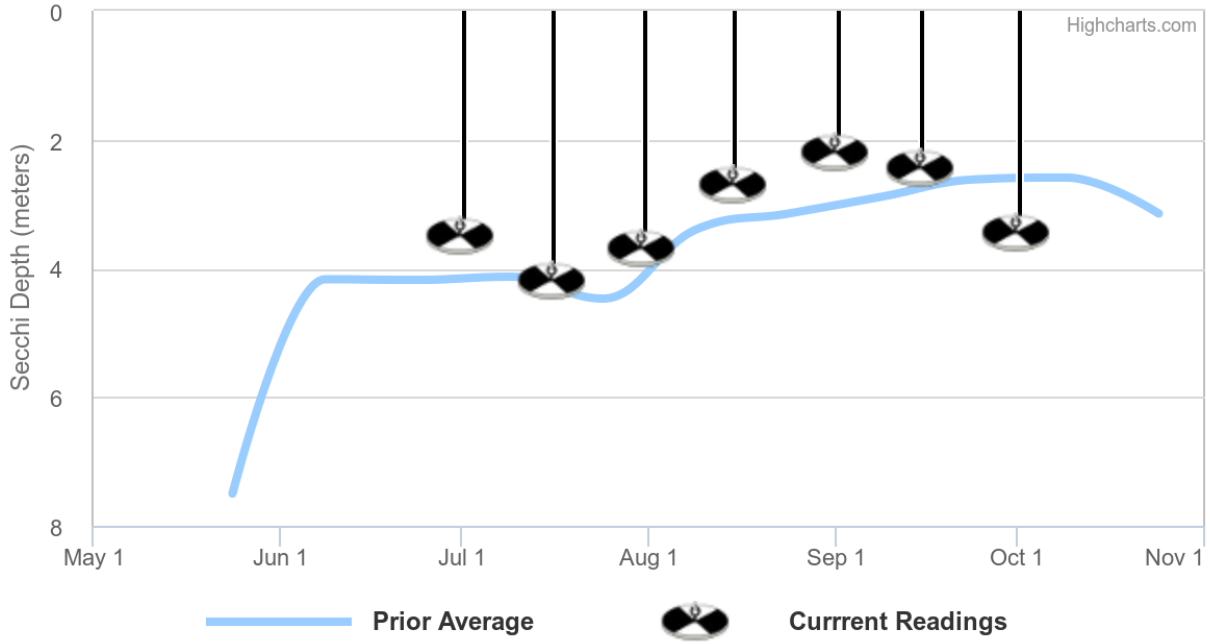
Appendix F: Current Year vs. Prior Averages for Grass Lake

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 2004 to 2014.

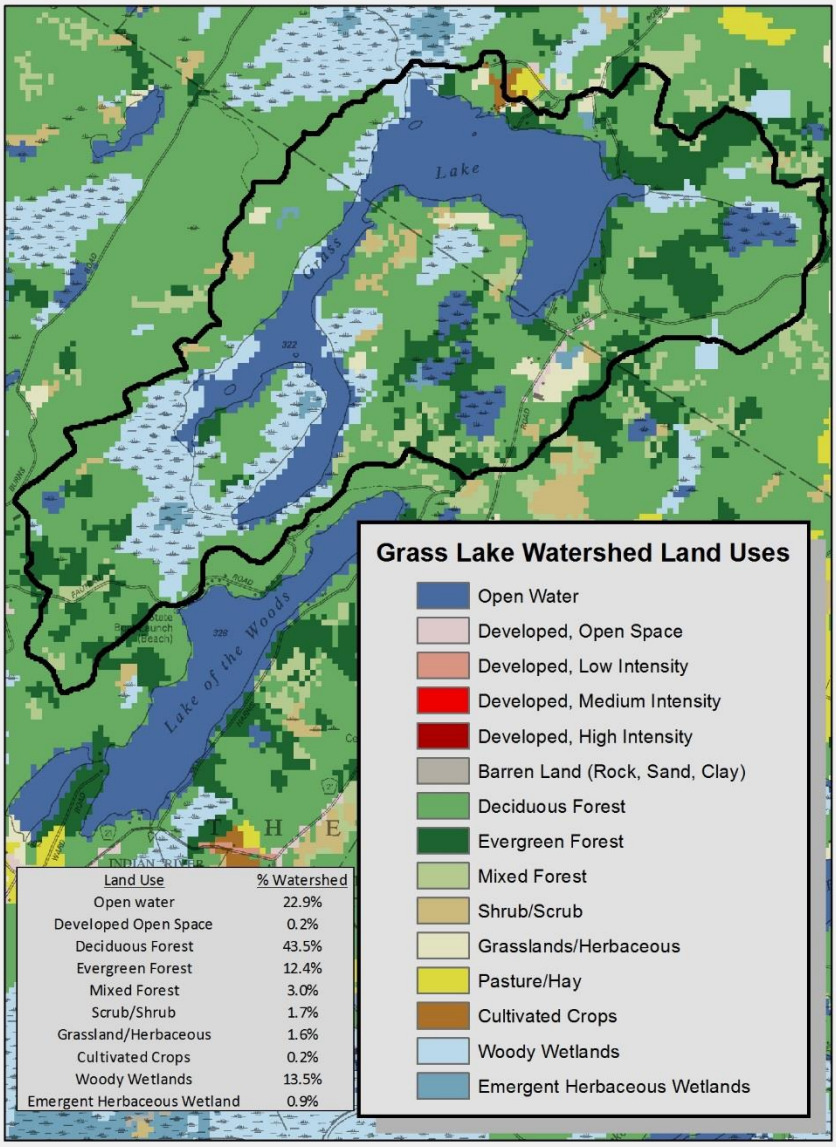
Current Year Secchi Readings vs. Prior Average



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 Grass 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.



Land Use	% Watershed
Open water	22.9%
Developed Open Space	0.2%
Deciduous Forest	43.5%
Evergreen Forest	12.4%
Mixed Forest	3.0%
Scrub/Shrub	1.7%
Grassland/Herbaceous	1.6%
Cultivated Crops	0.2%
Woody Wetlands	13.5%
Emergent Herbaceous Wetland	0.9%