

Kasoag Lake Questions and Answers, 2015 CSLAP

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

A1. Both water clarity and algae levels were higher than usual in both 2014 and 2015; the latter is consistent with higher than normal phosphorus readings. Although fanwort was reported growing densely in several locations in the lake, it is not known if this was denser than either Eurasian watermilfoil or native plant growth in recent years.

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

A2. Chloride sampling results were typical of lakes with only minor impacts from road salt runoff. The fanwort levels in the lake appear to be on the rise.

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

A3. Kasoag Lake had slightly lower water clarity, but slightly higher algae levels and similar nutrient readings, than most other nearby lakes. Aquatic plant coverage was slightly less extensive than in many other nearby lakes, perhaps due to herbicide treatments in recent years.

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

A4. Water clarity dropped slightly from 2001 to 2012 in response to higher nutrient and algae levels, but clarity has increased in the last few years (in response to much higher algae levels). Phosphorus readings have increased in the last decade. Lake perception has been more favorable in recent years, despite the recent introduction of fanwort- this may be due to higher clarity and recent herbicide treatments.

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

A5. Kasoag Lake does not appear to be highly susceptible to shoreline blue green algae blooms. The slight drop in water clarity for the decade prior to 2012 may represent normal variability, and clarity has increased recently, but this pattern (and the continuing slight increase in nutrient levels) should continue to be evaluated. Lake residents should look for any nearby nutrient sources that could explain the slightly higher phosphorus readings. Sources of the recent fanwort introduction should also be evaluated, particularly to be sure it was not an intentional aquaria introduction.

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

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

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

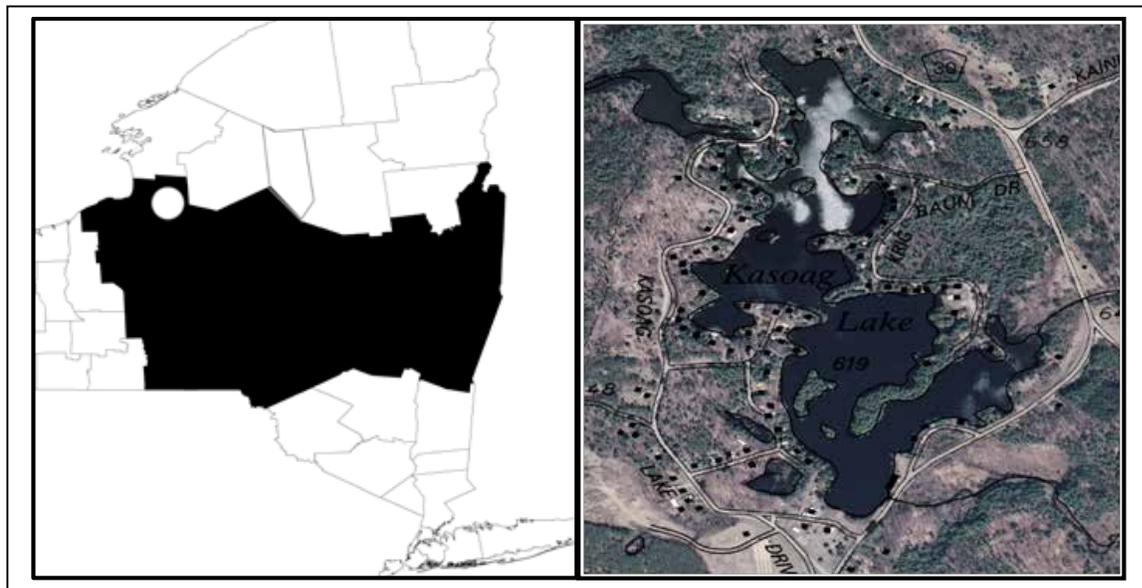
Supported / Good
 Threatened / Fair
 Stressed / Poor
 Impaired
 Not Known

CSLAP 2015 Lake Water Quality Summary: Kasoag Lake

General Lake Information

Location	Town of Williamstown
County	Oswego
Basin	Seneca/Oneida/Oswego Rivers
Size	23.3 hectares (57.6 acres)
Lake Origins	Augmented by 10ft by 180ft earthen dam (1820)
Watershed Area	2,269 hectares (5,604 acres)
Retention Time	0.02 years
Mean Depth	2.1 meters
Sounding Depth	4.5 meters
Public Access?	very limited
Major Tributaries	no named tribs
Lake Tributary To...	West Branch Fish Creek to Fish Creek to Oneida Lake to.....to Lake Ontario
WQ Classification	B (contact recreation = swimming)
Lake Outlet Latitude	43.468
Lake Outlet Longitude	-75.923
Sampling Years	1991-1995, 2001-2010, 2012-2015
2015 Samplers	Vince Cardinal and Bob Thompson
Main Contact	Vince Cardinal

Lake Map



Background

Kasoag Lake is a 58 acre, class B lake found in the Town of Williamstown in Oswego County, in the Tug Hill region of New York State. It was first sampled as part of CSLAP in 1991.

It is one of five CSLAP lakes among the more than 270 lakes and ponds found in Oswego County, and one of 13 CSLAP lakes among the more than 960 lakes and ponds in the Oswego River drainage basin.

Lake Uses

Kasoag Lake is a Class B lake; this means that the best intended use for the lake is for contact recreation—swimming and bathing, non-contact recreation—boating, aquatic life and aesthetics. However, the lake is used by lake residents and invited guests for swimming and non-power boating. There is only limited public access to the lake.

Kasoag Lake is stocked annually by the state, with 1,000 six inch rainbow trout and 2,600 nine inch rainbow trout stocked annually. It is not known if private stocking occurs.

General statewide fishing regulations are applicable in Kasoag Lake. In addition, open season for trout lasts from April 1st through October 15th, with no size limit, but a daily take limit of five fish. Ice fishing is permitted. Fish species in the lake include brown bullhead, chain pickerel, largemouth bass, pumpkinseed sunfish, rainbow trout, smallmouth bass, walleye, and yellow perch.

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

Historical Water Quality Data

CSLAP sampling was conducted on Kasoag Lake from 1991 to 1995, 2001 to 2010, and 2012 to 2015. The CSLAP reports for each of the past several years can be found on the NYSFOLA website at <http://nysfola.mylaketown.com>. The most recent CSLAP report and scorecard for Kasoag Lake can also be found on the NYSDEC web page at <http://www.dec.ny.gov/lands/77850.html>.

Kasoag Lake was not sampled as part of any of the major New York State monitoring programs prior to CSLAP. It is not known if local or NYSDEC regional fisheries monitoring may have been conducted to support fisheries management activities on the lake.

Neither the inlets to nor the outlet (West Branch of Fish Creek) of the lake has been monitored through the NYSDEC Rotating Intensive Basins (RIBS) or stream biomonitoring programs.

Lake Association and Management History

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

- limited public access is available for non-power boating and fishing
- there is an abundance of panfish- crappies, bass, northern pike
- the conservation association produces a twice annual newsletter- Kasoag Lake Courier
- the water keeper and lake community is in the process of developing a lake management plan
- weed harvesting is conducted

- lake cleanup and stump marking occurs annually
- fishing clinic is conducted
- signage /boat checking occurs at a bass tournament

Additional information about Kasoag Lake can be found at <http://www.kasoagonline.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 – Kasoag Lake” section in Appendix C.

Evaluation of Eutrophication Indicators

Each of the measured trophic indicators (Secchi disk transparency, chlorophyll *a*, and total phosphorus) was slightly higher than normal in 2014 and 2015. Water clarity decreased slightly from the early 2000s to 2010, but has increased slightly in the last few years. Phosphorus readings and algae levels have steadily increased over the last fifteen years, and algae levels have been substantially higher in the last two years. This suggests that the lake is becoming slightly more productive, and therefore more susceptible to algae blooms and invasive plant growth.

Lake productivity increases slightly from May through September, as indicated by increasing nutrient and algae levels, but productivity does not increase in the fall. This seasonal increase in lake productivity was apparent in late summer into the fall in 2014 and 2015.

The lake can be characterized as *mesotrophic*, or moderately productive, based on water clarity, chlorophyll *a*, and total phosphorus readings (all typical of *mesotrophic* lakes). The trophic state indices (TSI) evaluation suggests that each of these trophic indicators is “internally consistent”—each of these indicators is in the expected range given the readings of the other indicators (although algae levels were much higher than expected in 2015). Overall trophic conditions are summarized on the Lake Scorecard and Lake Condition Summary Table.

Evaluation of Potable Water Indicators

Algae levels are usually 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 (although higher algae levels were apparent in 2015), and the lake is not classified for use for drinking water. Potable water conditions, at least as measurable through CSLAP, are summarized in the Lake Scorecard and Lake Condition Summary Table.

Evaluation of Limnological Indicators

There was a slight decrease in pH in 2014 and 2015. The lower pH was part of a (slight) trend since the early 1990s (along with a slight drop in conductivity over the same period), but it is not expected that this is related to the slight rise in phosphorus over the last decade. 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, were approximately 5 mg/l. These values fall within 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 phytoplankton sampling conducted in 1992 indicated relatively low algal biomass dominated by golden brown algae and green algae. These algae levels were typical of normal readings in the lake, but it is not known if the algal community composition in this sample was normal (recent samples were dominated by green algae and diatoms). The fluoroprobe screening samples analyzed by SUNY ESF in recent years indicated low levels of algae and low levels of blue green algae, although algae levels increase slightly during the summer. The shoreline bloom sample in 2013 was dominated by green algae; no shoreline blooms were reported in 2014 or 2015.

Zooplankton surveys conducted in 1992 indicated a very high abundance of rotifers; Kasoag Lake is slightly less productive than other CSLAP lakes with a similar abundance of rotifers.

The composition of the fish community includes at least four warmwater fish species and at least three coolwater fish species. This suggests that the lake is typical of a coolwater fishery, although it is likely that this represents an incomplete inventory of fish in the lake.

Macroinvertebrate surveys have not been conducted through CSLAP at Kasoag Lake. Aquatic plant survey work conducted as part of the aquatic herbicide (Endothall) treatments in 2014 confirmed the presence of both Eurasian watermilfoil (*Myriophyllum spicatum*) and fanwort (*Cabomba caroliniana*) at the lake. The latter plant has not been found in many NYS lakes north of Long Island or in any nearby waterbodies.

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

Evaluation of Lake Perception

“Excessive weed growth” is usually cited as the primary influence on recreational assessments, but these conditions improved in response to the Endothall treatment and the higher water clarity. The more favorable recreational assessments were also consistent with the higher water quality. Although heavy fanwort growth was reported in multiple locations in the lake in 2015, it is not known if weed growth was heavier than in previous years. Water quality and recreational assessments have been slightly more favorable than in recent years. Overall lake perception is summarized on the Lake Scorecard and Lake Condition Summary Table.

Evaluation of Local Climate Change

Water temperatures in the summer index period (June through September) were higher than normal in 2014 and 2015, but neither air nor water temperature readings has changed

significantly over the last twenty years. It is not known if this is an indication of the lack of local climate change or represents normal variability.

Evaluation of Algal Toxins

Algal toxin levels can vary significantly within blooms and from shoreline to lake, and the absence of toxins in a sample does not indicate safe swimming conditions. Fluoroprobe sampling results have been below the levels associated with harmful algal blooms (HABs). Algal toxin levels were very low to undetectable in all open water samples. The sampled shoreline bloom in 2013 was comprised primarily of green algae, and therefore had low algal toxin levels.

Lake Condition Summary

Category	Indicator	Min	Overall Avg	Max	2015 Avg	Classification	2015 Change?	Long-term Change?
Eutrophication Indicators	Water Clarity	2.25	3.67	5.50	4.18	Mesotrophic	Higher Than Normal	No Change
	Chlorophyll <i>a</i>	0.05	3.88	63.20	12.08	Mesotrophic	Higher than Normal	No Change
	Total Phosphorus	0.002	0.012	0.033	0.015	Mesotrophic	Higher than Normal	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	0.03	0.19	0.02	Low NOx	Within Normal Range	No Change
	Ammonia	0.01	0.03	0.09	0.03	Low Ammonia	Within Normal Range	No Change
	Total Nitrogen	0.06	0.38	0.91	0.41	Low Total Nitrogen	Within Normal Range	No Change
	pH	5.68	7.78	8.58	7.56	Alkaline	Within Normal Range	No Change
	Specific Conductance	66	122	167	114	Softwater	Within Normal Range	No Change
	True Color	5	22	69	23	Intermediate Color	Within Normal Range	No Change
	Calcium	8.9	15.3	19.8	12.1	May be Susceptible to Zebra Mussels	Lower Than Normal	No Change
	Lake Perception	WQ Assessment	1	2.2	3	2.1	Not Quite Crystal Clear	Within Normal Range
Aquatic Plant Coverage		1	3.1	5	2.9	Surface Plant Growth	Within Normal Range	No Change
Recreational Assessment		1	2.6	4	1.9	Slightly Impaired	More Favorable Than Normal	No Change
Biological Condition	Phytoplankton					Open water-low blue green algae biomass; Shoreline-low blue green algae in bloom	Not known	Not known
	Macrophytes					Fair quality of the aquatic plant community	Not known	Not known
	Zooplankton					Dominated by rotifers	Not known	Not known
	Macroinvertebrates					Not measured through CSLAP	Not known	Not known
	Fish					Coolwater fishery	Not known	Not known
	Invasive Species					Fanwort, Eurasian watermilfoil	Not known	Not known
Local Climate Change	Air Temperature	5	22.3	35	22.8		Within Normal Range	No Change
	Water Temperature	10	21.8	29	23.0		Within Normal Range	No Change

Category	Indicator	Min	Annual Avg	Max	2015 Avg	Classification	2015 Change?	Long-term Change?
Harmful Algal Blooms	Open Water Phycocyanin	0	4	20	4	No readings indicate high risk of BGA	Not known	Not known
	Open Water FP Chl.a	0	3	20	3	Few readings indicate high algae levels	Not known	Not known
	Open Water FP BG Chl.a	0	0	1	0	No readings indicate high BGA levels	Not known	Not known
	Open Water Microcystis	<DL	<DL	0.4	<DL	Low to undetectable open water microcystins	Not known	Not known
	Open Water Anatoxin a	<DL	<DL	<DL	<DL	Open water Anatoxin-a consistently not detectable	Not known	Not known
	Shoreline Phycocyanin					No shoreline blooms sampled for PC	Not known	Not known
	Shoreline FP Chl.a	3439	3439	3439		All readings indicate very high algae levels	Not known	Not known
	Shoreline FP BG Chl.a	0	0	0		No readings indicate high BGA levels	Not known	Not known
	Shoreline Microcystis	<DL	0.3	0.3		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

Kasoag Lake is among the lakes on the 2008 Oswego (Oneida) River drainage basin Priority Waterbody List (PWL), with recreation listed as *stressed* due to excessive algae and weeds. The PWL listing for Kasoag Lake is provided in Appendix B.

Potable Water (Drinking Water)

The CSLAP dataset at Kasoag 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. There is no evidence that any potable water impacts occur for any "unofficial" use of the lake for drinking.

Public Bathing

The CSLAP dataset at Kasoag 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 fully supported, although 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 Kasoag Lake, including water chemistry data, physical measurements, and volunteer samplers' perception data, suggest that recreation would have been *impaired* in 2015 due to elevated algae levels, although these were not typical for the lake. This use may be *threatened* by excessive growth of Eurasian watermilfoil and perhaps fanwort. The herbicide-driven reduction in plant coverage resulted in fewer impacts to recreational uses.

Aquatic Life

The CSLAP dataset on Kasoag Lake, including water chemistry data, physical measurements, and volunteer samplers' perception data, suggest that aquatic life should be fully supported, although this use may be *threatened* by exotic plants (Eurasian watermilfoil and fanwort). Additional data are needed to evaluate the food and habitat conditions for aquatic organisms in the lake.

Aesthetics and Habitat

The CSLAP dataset on Kasoag Lake, including water chemistry data, physical measurements, and volunteer samplers' perception data, suggest that aesthetics and habitat may at times be *stressed* by excessive weeds (particularly Eurasian watermilfoil and fanwort) and *threatened* by shoreline (green) algae blooms.

Fish Consumption

There are no fish consumption advisories posted for Kasoag Lake.

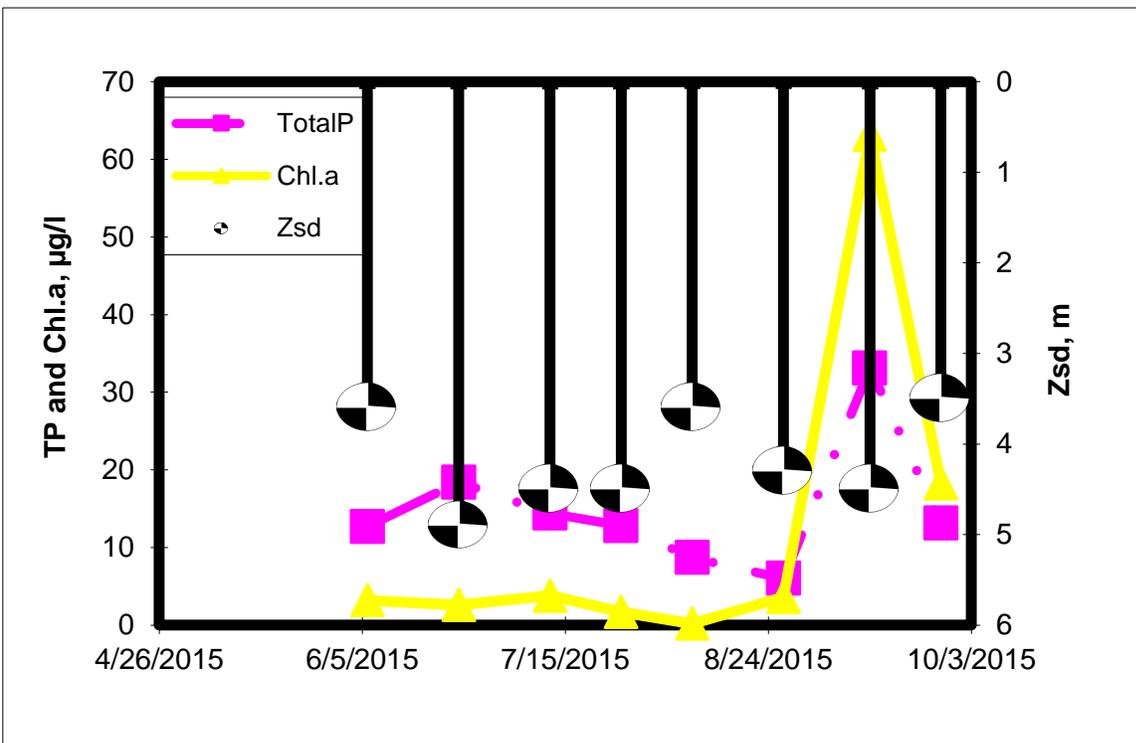
Additional Comments and Recommendations

Lake residents are encouraged to report and avoid exposure to any shoreline blue green algae blooms, and to document the spread of fanwort in the lake and out of the lake into downstream waterbodies (including Oneida Lake).

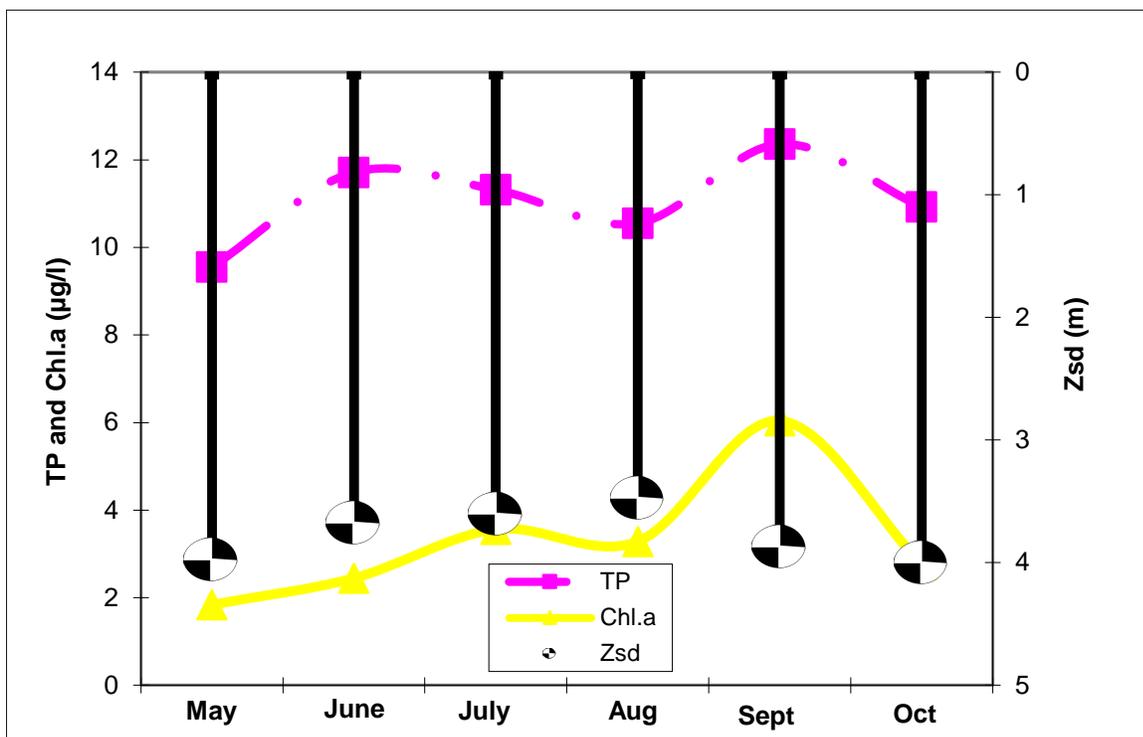
Aquatic Plant IDs-2015

None submitted for identification in 2015.

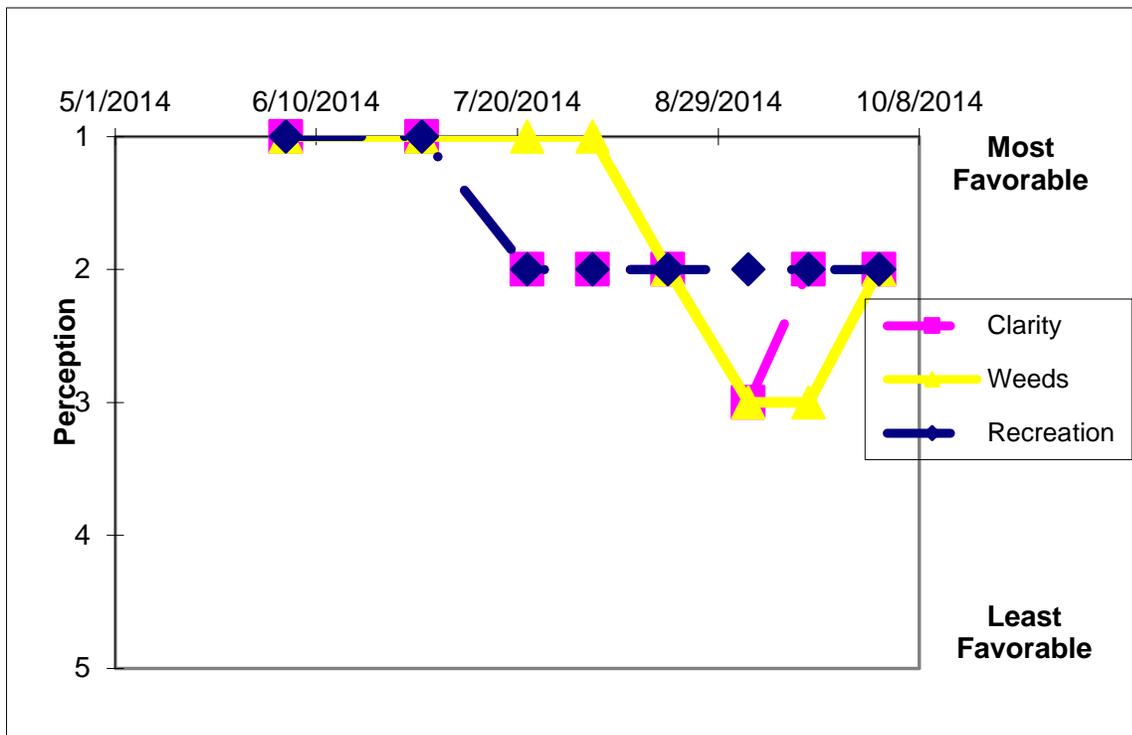
Time Series: Trophic Indicators, 2015



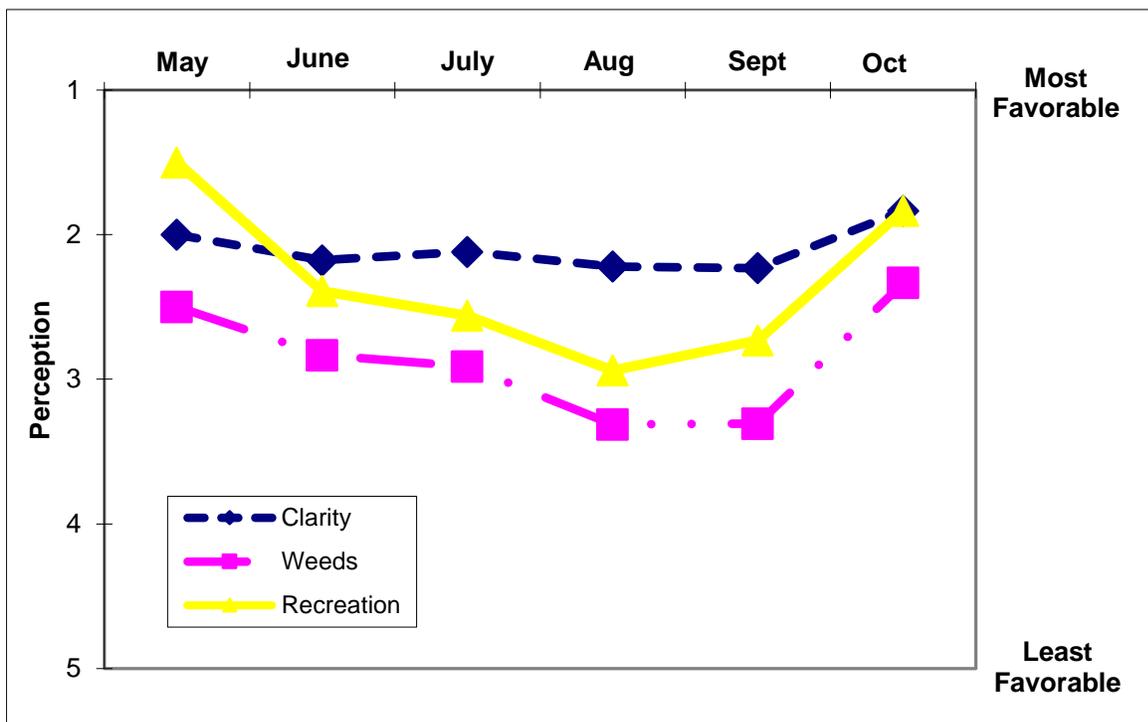
Time Series: Trophic Indicators, Typical Year (1991-2015)



Time Series: Lake Perception Indicators, 2015



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



Appendix A- CSLAP Water Quality Sampling Results for Kasoag Lake

LNum	PName	Date	Zbot	Zsd	Zsamp	Tot.P	NO3	NH4	TDN	TN/TP	TColor	pH	Cond25	Ca	Chl.a	Cl
83	Kasoag L	6/30/1991	4.5	3.38	1.5	0.020	0.03				22	8.18	129		8.93	
83	Kasoag L	7/14/1991	4.0	3.13	1.5	0.004	0.01				24	7.75	122		6.04	
83	Kasoag L	7/28/1991	4.5	4.50	1.5	0.011	0.01				18	8.05	147		2.87	
83	Kasoag L	8/11/1991		3.63	1.5	0.013	0.02				9	8.25	153		3.42	
83	Kasoag L	8/18/1991	4.3	4.25	1.5	0.009	0.02				12	8.26	152		2.78	
83	Kasoag L	9/1/1991	4.3	4.25	1.5	0.009	0.01				10	8.29	150		3.45	
83	Kasoag L	9/14/1991	4.0	4.00	1.5	0.008	0.01				6	8.23	151		3.11	
83	Kasoag L	9/29/1991	4.3	4.25	1.5	0.009	0.02				18	8.00	143		2.96	
83	Kasoag L	6/4/1992	4.0	3.00	1.5	0.014	0.09				28	8.09	115		2.27	
83	Kasoag L	6/21/1992	3.3	3.05	1.5	0.012					20	8.04	123		2.78	
83	Kasoag L	7/12/1992	4.5	3.55	1.5	0.009	0.06				18	8.25	139		3.44	
83	Kasoag L	7/26/1992	4.0	2.25	1.5	0.019					60	7.74	69		5.10	
83	Kasoag L	8/9/1992	4.5	2.75	1.5	0.020	0.03				55	7.46	70		6.66	
83	Kasoag L	8/22/1992	4.5	3.50	1.5	0.010	0.04				30	8.05	112		10.40	
83	Kasoag L	9/6/1992	4.5	3.75	1.5	0.010	0.01				29	8.01	120		4.29	
83	Kasoag L	9/20/1992	4.5	4.00	1.5	0.010					22	8.00	126		2.67	
83	Kasoag L	7/5/1993	4.5	4.00	1.5	0.015	0.05				18	8.02	114		3.19	
83	Kasoag L	7/17/1993	4.5	3.50	1.5	0.012	0.01				17	7.72	126		3.98	
83	Kasoag L	7/31/1993	4.5	3.75	1.5											
83	Kasoag L	8/14/1993	4.5	4.00	1.5	0.010	0.02				12	8.22	142		1.90	
83	Kasoag L	7/4/1994	3.5	2.50	1.5	0.014	0.06				28	7.98	119		1.51	
83	Kasoag L	7/17/1994	4.5	3.75	1.5	0.017	0.05				32	7.68	100		4.82	
83	Kasoag L	7/31/1994	4.5	3.75	1.5	0.013	0.03				18	5.68	154		8.58	
83	Kasoag L	8/14/1994	4.5	3.38		0.009	0.03				13	8.03	144		4.62	
83	Kasoag L	8/29/1994	4.5	3.50	1.5	0.009	0.03				18	7.93	135		4.44	
83	Kasoag L	9/12/1994	4.5	3.75	1.5	0.010	0.02				14	7.97	133		3.67	
83	Kasoag L	7/4/1995	4.6	2.75	1.5	0.010	0.01				20	8.18	145		17.30	
83	Kasoag L	7/16/1995	4.6	4.00	1.5	0.007	0.01				5	8.20	158		8.41	
83	Kasoag L	7/30/1995	4.3	3.90	1.5	0.014	0.03				10	7.96	155		2.32	
83	Kasoag L	8/13/1995	4.6	4.00	1.5	0.010	0.01				10	7.93	150		4.96	
83	Kasoag L	8/27/1995	4.5	3.50	1.5	0.009	0.01				5	8.28	154		4.62	
83	Kasoag L	9/10/1995	4.5			0.012	0.01				10	7.93	154		4.00	
83	Kasoag L	9/24/1995	4.9	4.90	1.5	0.008	0.03				10	7.83	152		2.76	
83	Kasoag L	7/23/2001	4.2	4.20	1.5	0.006	0.06				9	7.92	145			
83	Kasoag L	8/14/2001	3.9	3.40	1.5	0.011	0.01				11	8.38	156		0.99	
83	Kasoag L	8/27/2001	4.0	3.40		0.012	0.01				16	8.00	146		2.53	
83	Kasoag L	9/10/2001	4.1	3.90	1.5	0.008	0.02				18	7.04	134		1.73	
83	Kasoag L	10/3/2001	4.5	3.50	1.5	0.008	0.01				30	7.37	111			
83	Kasoag L	06/10/02	4.5	2.85	1.0	0.013	0.02	0.02	0.63	47.49	20	7.64	71		1.89	
83	Kasoag L	06/24/02	4.2	3.70	1.0	0.009	0.09	0.04	0.45	49.37	11	8.10	145		1.03	
83	Kasoag L	07/10/02		4.20	1.0	0.010	0.05	0.07	0.51	52.21	21	7.95	125		2.54	
83	Kasoag L	07/24/02	4.5	3.80	1.0	0.008	0.02	0.06	0.59	72.44	10	8.21	142		1.70	
83	Kasoag L	08/05/02	4.4	3.65	1.0	0.008	0.00	0.03	0.44	54.15	10	8.44	151	10.5	0.68	
83	Kasoag L	08/19/02	4.4			0.006	0.00	0.04	0.66	102.50	8	8.16	153		1.00	
83	Kasoag L	09/09/02	4.4	4.15	1.0	0.007	0.00	0.01	0.46	63.70	11	7.95	145		1.54	
83	Kasoag L	6/2/2003	4.7	3.10	1.0	0.009	0.10	0.05	0.30	35.09	25	7.65	91	11.0	2.15	
83	Kasoag L	6/16/2003	4.6	2.60	1.0	0.010	0.10	0.02	0.28	28.62	24	7.60	107		1.42	
83	Kasoag L	7/8/2003	4.5	3.50	1.0	0.014	0.08	0.02	0.32	23.26	14	8.02	134		1.27	
83	Kasoag L	7/22/2003	4.4	3.45	1.0	0.008	0.05	0.03	0.39	47.94	15	7.79	134		4.12	
83	Kasoag L	8/3/2003	4.5	3.50	1.0	0.012	0.00	0.02	0.55	45.19	17	7.99	136	17.0	1.17	
83	Kasoag L	8/19/2003	4.5	3.45	1.0	0.011	0.00	0.02	0.40	35.56	30	7.63	113		4.18	
83	Kasoag L	9/9/2003	4.5	4.05	1.0	0.018	0.03	0.02			19	7.85	134		2.79	
83	Kasoag L	9/22/2003	4.4	2.85	1.0	0.010	0.01	0.03	0.12	11.61	13	7.83	146		5.51	
83	Kasoag L	6/15/2004	4.4	3.30		0.007	0.07	0.01	0.06	8.11	20	6.67	114		3.98	
83	Kasoag L	6/29/2004	4.3	2.90	1.0	0.007	0.04	0.03	0.65	96.90	20	6.57	126		1.30	
83	Kasoag L	7/13/2004	4.5	3.60	1.0	0.006	0.03	0.02	0.49	76.17	13	7.27	120		0.54	
83	Kasoag L	7/26/2004	4.4	3.10	1.0	0.008	0.03	0.02	0.31	36.82	19	8.12	124		0.05	
83	Kasoag L	8/9/2004	4.4	3.50	1.5	0.012	0.01	0.02	0.06	4.60	28	7.73	111	17.6	3.50	
83	Kasoag L	8/24/2004	4.4	3.60	1.5	0.007	0.01	0.02	0.19	25.85	8	7.92	151		1.80	
83	Kasoag L	9/6/2004	4.6	3.50	1.5	0.010	0.01	0.01	0.41	42.90	69	7.99	80		2.60	
83	Kasoag L	9/23/2004	4.5	3.80	1.5	0.010	0.03	0.02	0.42	40.82	31	7.25	91		2.40	
83	Kasoag L	6/13/2005	4.4	4.40	1.5	0.008	0.03	0.05	0.25	30.38	7	7.97	101	18.8	1.32	
83	Kasoag L	6/27/2005	4.3	3.65	1.5	0.008	0.01	0.02	0.11	13.48	13	7.99	122		1.47	

LNum	PName	Date	Zbot	Zsd	Zsamp	Tot.P	NO3	NH4	TDN	TN/TP	TColor	pH	Cond25	Ca	Chl.a	Cl
83	Kasoag L	7/12/2005	4.5	3.20	1.5	0.009	0.03	0.01	0.35	36.51	7	7.50	120			
83	Kasoag L	7/25/2005	4.4	3.20	1.5	0.009	0.01	0.01	0.27	29.94	21	7.75	116		2.79	
83	Kasoag L	8/8/2005	4.5	3.40	1.5	0.009	0.02	0.01	0.45	50.46	66	7.95		16.3	3.48	
83	Kasoag L	8/23/2005	4.4	3.30	1.5	0.010	0.05	0.01	0.16	16.96	21	7.65	114		3.17	
83	Kasoag L	9/5/2005	4.5	2.70	1.5	0.013	0.01	0.01	0.17	13.74	30	8.13	99		4.54	
83	Kasoag L	9/21/2005	4.4	3.50	1.5	0.010	0.01	0.02	0.12	11.48	27	7.95	126		1.42	
83	Kasoag L	5/28/2006	4.3	3.95	1.5	0.008	0.05	0.04	0.43	118.90	13	7.92	113	15.1	2.68	
83	Kasoag L	6/13/2006	4.4	4.05	1.5	0.010	0.05	0.04	0.41	92.01	15	7.85	92		1.79	
83	Kasoag L	7/4/2006	4.4	3.15	1.5	0.012	0.02	0.03	0.41	74.63	21	7.35	100		4.12	
83	Kasoag L	7/23/2006	4.5	2.90	1.5	0.012	0.02	0.02	0.69	124.90	31	7.84	109		3.22	
83	Kasoag L	8/6/2006	4.5	3.15	1.5	0.002	0.01	0.02	0.75	688.78	41	7.25	97	12.8	1.96	
83	Kasoag L	8/22/2006	4.5	3.50	1.5	0.019	0.01	0.03	0.64	75.05	31	8.05	109		1.51	
83	Kasoag L	6/27/2007	4.4	3.50	1.5	0.011	0.05	0.03	0.63	125.3		8.12	66	15.5	2.45	
83	Kasoag L	7/17/2007	4.8	3.88	1.5	0.010	0.04	0.04	0.50	112.7	18	8.05	101		1.73	
83	Kasoag L	8/5/2007	4.5	4.25	1.5	0.008	0.01	0.01	0.64	171.7	18	8.36	104		1.59	
83	Kasoag L	8/21/2007	4.4	2.60	1.5	0.009	0.02	0.03	0.63	157.3	16	7.42	117		3.05	
83	Kasoag L	9/3/2007	4.3	4.00	1.5	0.009	0.01	0.03	0.41	106.1	12	7.82	119	19.4	1.91	
83	Kasoag L	9/25/2007	4.4	4.10	1.5	0.015	0.01	0.09	0.49	71.8	17	7.28	137		5.77	
83	Kasoag L	6/10/2008	4.4	4.00	1.0	0.012	0.05	0.03	0.91	170.74	14	7.93	130	14.5	1.16	
83	Kasoag L	6/24/2008	4.5	4.05	2.0	0.009	0.05	0.02	0.28	66.88	23	8.20	116		1.38	
83	Kasoag L	7/14/2008	4.5	3.80	2.0	0.014	0.08	0.04	0.46	73.65	24	8.25	102		1.77	
83	Kasoag L	7/27/2008	4.4	2.85	2.0	0.009	0.04	0.02	0.17	39.54	21	7.92	85		1.59	
83	Kasoag L	8/12/2008	4.3	3.55	2.0	0.009	0.02	0.05	0.25	59.42	15	7.43	123	16.5	1.09	
83	Kasoag L	8/24/2008	4.3	2.45	2.0	0.012	0.00	0.04	0.33	61.92	17	8.03	91		1.53	
83	Kasoag L	9/7/2008	4.2	3.15	2.0	0.010	0.00	0.02	0.28	63.91	21	7.96	114		2.33	
83	Kasoag L	9/24/2008	4.4	3.60	2.0	0.012	0.01	0.03	0.30	57.59	22	7.82	120		0.10	
83	Kasoag L	06/12/2009	4.3	3.60	2.0	0.018	0.14	0.03	0.42	51.70	21	7.47	147	19.8	3.04	
83	Kasoag L	07/05/2009	4.3	3.50	2.0	0.013	0.05	0.02	0.26	44.00	38	7.74	131		1.76	
83	Kasoag L	07/23/2009	4.2	3.15	2.0	0.011	0.02	0.02	0.26	53.37	28	8.00	113		1.82	
83	Kasoag L	08/09/2009	4.3	3.35	2.0	0.014	0.01	0.01	0.29	46.23	41	7.75	75		2.15	
83	Kasoag L	08/23/2009	4.2	3.35	2.0	0.016	0.02	0.01	0.24	33.28	40	8.05	93	15.4	3.60	
83	Kasoag L	09/07/2009	4.1	3.15	2.0	0.011	0.01	0.01	0.29	57.16	25	8.20	93		14.30	
83	Kasoag L	10/08/2009	4.2	3.20	2.0	0.010	0.04	0.02	0.27	62.56	29	7.72	81		0.80	
83	Kasoag L	10/20/2009	4.4	3.10		0.011	0.10	0.02	0.27	55.20	30	7.78	127		4.00	
83	Kasoag L	5/31/2010	4.0	4.00		0.011	0.02	0.03	0.39	76.70	22	8.31	151	19.5	1.00	
83	Kasoag L	6/21/2010	5.0	5.00		0.020	0.03	0.03			20	8.58	118		2.30	
83	Kasoag L	7/8/2010	4.8	4.20		0.011	0.02	0.02	0.29	55.98	26	8.05	70		2.90	
83	Kasoag L	7/23/2010	5.5	4.75	2.0	0.018	0.01	0.02	0.40	49.44	39	7.84	96		0.40	
83	Kasoag L	9/13/2010	5.5	4.65	2.0	0.017	0.02	0.06	0.50	66.40	34	7.65	154	19.7	2.80	
83	Kasoag L	9/26/2010	6.0	5.50	2.0	0.016	0.02	0.03	0.34	47.90	20	7.44	152		3.20	
83	Kasoag L	10/10/2010	6.5	5.50	2.0	0.017	0.07	0.04	0.31	45.60	35	7.24	149		2.60	
83	Kasoag L	10/18/2010	5.5	4.75	2.0	0.009	0.19	0.07	0.34	74.04	23	7.34	154		2.80	
83	Kasoag L	6/23/2012	4.5	4.10	1.5	0.013	0.02	0.03	0.35	59.98	26	8.23	100	11.4	2.50	
83	Kasoag L	7/7/2012	4.4	3.70	1.5	0.013	0.01	0.01	0.46	78.55	17	8.34	107		6.40	
83	Kasoag L	7/21/2012	4.5	3.00	1.5	0.010	0.01	0.03	0.26	58.00	12	7.34	116		1.20	
83	Kasoag L	8/11/2012	4.3	3.70	1.5	0.015	0.01	0.02	0.27	38.50	14	7.81	126		2.30	
83	Kasoag L	8/25/2012	4.4	2.80	1.5	0.013	0.01	0.01	0.40	67.53	8	6.91	141	19.0	2.00	
83	Kasoag L	9/9/2012	4.3	3.40	1.5	0.011	0.01	0.03	0.34	66.00	22	7.41	143		2.70	
83	Kasoag L	9/29/2012	4.3	4.20	1.5	0.009	0.01	0.02	0.18	42.58	12	6.96	128		1.20	
83	Kasoag L	6/23/2012	4.5	4.10	1.5	0.013	0.02	0.03	0.35	59.98	26	8.23	100	11.4	2.50	
83	Kasoag L	7/6/2013	4.6	3.20	1.5	0.014	0.04	0.01	0.22	34.15	34	7.80	107		2.60	
83	Kasoag L	7/21/2013	5.0	3.50	1.5	0.021			0.85	90.09	24	7.16	162		6.40	
83	Kasoag L	8/4/2013	5.0	2.90	1.5	0.009	0.01	0.02	0.28	66.96	33	7.61	103			
83	Kasoag L	8/18/2013	4.3	4.00	1.5	0.013			0.50	85.13	25	7.50	121		2.40	
83	Kasoag L	8/19/2013														
83	Kasoag L	9/1/2013	5.0	3.35	1.5	0.010	0.01	0.02	0.32	67.90	22	8.57	134		2.30	
83	Kasoag L	9/15/2013	4.5	3.85	1.5	0.014			0.37	56.82	16	7.63	135		13.60	
83	Kasoag L	9/29/2013	4.5	4.20	1.5	0.009	0.01	0.01	0.31	77.54	16	7.31	143		2.20	
83	Kasoag L	10/20/2013	4.5	3.95	1.5	0.011			0.37	77.75	27	7.30	132		3.60	
83	Kasoag L	6/4/2014	4.6	4.40	1.5	0.012	0.03	0.03	0.31	58.29	28	7.31	102	12.4	2.40	
83	Kasoag L	7/1/2014	4.6	4.60	1.5	0.013			0.38	63.19	29	7.88	106		5.00	
83	Kasoag L	7/22/2014	4.5	3.75	1.5	0.011	0.01	0.04	0.24	48.40	18	7.51	118		1.30	
83	Kasoag L	8/4/2014	4.5	3.65	1.5	0.012			0.32	56.52	10	7.62	167		2.60	
83	Kasoag L	8/19/2014	4.5	3.40	1.5	0.018	0.01	0.03	0.38	47.63	36	7.17	115	11.2	15.80	
83	Kasoag L	9/4/2014	4.5	3.90	1.5	0.022			0.39	38.55	44	7.84	79		2.70	
83	Kasoag L	9/16/2014	4.5	3.90	1.5	0.020	0.03	0.03	0.31	34.54	33	7.55	116		7.00	

LNum	PName	Date	Zbot	Zsd	Zsamp	Tot.P	NO3	NH4	TDN	TN/TP	TColor	pH	Cond25	Ca	Chl.a	Cl
83	Kasoag L	9/30/2014	4.5	3.60	1.5	0.014			0.33	50.00	23	7.05	101		6.30	
83	Kasoag L	6/6/2015	4.5	3.60	1.5	0.013	0.06	0.02	0.44	34.80	27	7.34	113	8.85	3.20	
83	Kasoag L	6/24/2015	4.9	4.90	1.5	0.018			0.42	22.55	32	7.19	83		2.60	
83	Kasoag L	7/12/2015	4.5	4.50	1.5	0.014	0.02	0.04	0.41	28.75	35	7.25	92		3.80	5.0
83	Kasoag L	7/26/2015	4.5	4.50	1.5	0.013			0.39	30.23	24	7.03	120		1.70	
83	Kasoag L	8/9/2015	4.5	3.60	1.5	0.009	0.01	0.03	0.38	44.02	11	7.96	142	15.4	0.20	
83	Kasoag L	8/27/2015	4.3	4.30	1.5	0.006			0.40	65.83	17	7.79	132		3.60	
83	Kasoag L	9/13/2015	4.5	4.50	1.5	0.033	0.01	0.03	0.28	8.46	18	7.87	103		63.20	5.0
83	Kasoag L	9/27/2015	4.5	3.50	1.5	0.013			0.54	40.99	20	8.07	123		18.30	

LNum	PName	Date	Type	TAir	TH20	QA	QB	QC	QD	QF	QG	AQ-PC	AQ-Chla	MC-LR	Ana-a	Cyl	FP-Chl	FP-BG	HAB-form	Shore HAB
83	Kasoag L	6/30/1991	Epi	24	25															
83	Kasoag L	7/14/1991	Epi	25	23															
83	Kasoag L	7/28/1991	Epi	20	25															
83	Kasoag L	8/11/1991	Epi	20	16															
83	Kasoag L	8/18/1991	Epi	25	26															
83	Kasoag L	9/1/1991	Epi	20	25															
83	Kasoag L	9/14/1991	Epi	16	19															
83	Kasoag L	9/29/1991	Epi	14	14															
83	Kasoag L	6/4/1992	Epi	25	22															
83	Kasoag L	6/21/1992	Epi	10	18															
83	Kasoag L	7/12/1992	Epi	24	21	2	3	3												
83	Kasoag L	7/26/1992	Epi	19	19															
83	Kasoag L	8/9/1992	Epi	24	20	3	3	2	125											
83	Kasoag L	8/22/1992	Epi	28	21	2	3	3	2											
83	Kasoag L	9/6/1992	Epi	24	22	2	3	3	2											
83	Kasoag L	9/20/1992	Epi	21	19															
83	Kasoag L	7/5/1993	Epi	26	24	2	3	3												
83	Kasoag L	7/17/1993	Epi	20	24															
83	Kasoag L	7/31/1993	Epi	19	22															
83	Kasoag L	8/14/1993	Epi	24	23															
83	Kasoag L	7/4/1994	Epi	30	24	3	3	2	2											
83	Kasoag L	7/17/1994	Epi	27	22	2	2	1	2											
83	Kasoag L	7/31/1994	Epi	28	25	2	2	2	2											
83	Kasoag L	8/14/1994	Epi	21	22	3	3	2	1											
83	Kasoag L	8/29/1994	Epi	20	22	3	2	2	2											
83	Kasoag L	9/12/1994	Epi	16	18	2	2	2	2											
83	Kasoag L	7/4/1995	Epi	24	23	2	3	2	2											
83	Kasoag L	7/16/1995	Epi	25	26	2	3	2	2											
83	Kasoag L	7/30/1995	Epi	26	22	2	3	3	2											
83	Kasoag L	8/13/1995	Epi	20	25	2	4	4	2											
83	Kasoag L	8/27/1995	Epi	24	23	3	4	4	2											
83	Kasoag L	9/24/1995	Epi	15	16	2	4	4	2											
83	Kasoag L	7/23/2001	Epi	24	25	2	4	4	2											
83	Kasoag L	8/14/2001	Epi	29	26	3	4	4	12											
83	Kasoag L	8/27/2001	Epi	21	23	3	4	4	24											
83	Kasoag L	9/10/2001	Epi	21	22	3	4	4	24											
83	Kasoag L	10/3/2001	Epi	23	15	2	3	3	2											
83	Kasoag L	06/10/02	Epi	28	21		3	4	2											
83	Kasoag L	06/24/02	Epi	29	20	3	4	4	124											
83	Kasoag L	07/10/02	Epi	19	21	3	4	4	246											
83	Kasoag L	07/24/02	Epi	23	18	2	4	4	24											
83	Kasoag L	08/05/02	Epi	27	23	2	4	4	2											
83	Kasoag L	08/19/02	Epi	18	26	2	4	4	2											
83	Kasoag L	09/09/02	Epi	28	25	3	4	4	23											
83	Kasoag L	6/2/2003	Epi	16	14	2	3	2	15											
83	Kasoag L	6/16/2003	Epi	23	18	3	2	3	125											
83	Kasoag L	7/8/2003	Epi	28	24	2	3	3	26											
83	Kasoag L	7/22/2003	Epi	22	22	2	3	3	25											
83	Kasoag L	8/3/2003	Epi	29	24	2	3	3	26											
83	Kasoag L	8/19/2003	Epi	22	24	2	4	3	2											

LNum	PName	Date	Type	TAir	TH20	QA	QB	QC	QD	QE	QF	QG	AQ-PC	AQ-Chla	MC-LR	Ana-a	Cyl	FP-Chl	FP-BG	HAB-form	Shore HAB
83	Kasoag L	9/9/2003	Epi	25	21	3	4	4	2												
83	Kasoag L	9/22/2003	Epi	18	19																
83	Kasoag L	6/15/2004	Epi	27	21	2	2	2	0												
83	Kasoag L	6/29/2004	Epi	23	19	2	3	2	2												
83	Kasoag L	7/13/2004	Epi	21	21	2	3	3	25												
83	Kasoag L	7/26/2004	Epi	20	22	3	3	3	2												
83	Kasoag L	8/9/2004	Epi	22	23	2	3	3	2												
83	Kasoag L	8/24/2004	Epi	18	18	2	4	3	2												
83	Kasoag L	9/6/2004	Epi	23	21	2	4	3	2												
83	Kasoag L	9/23/2004	Epi	21	18	2	4	3	2												
83	Kasoag L	6/13/2005	Epi	28	26	3	3	3	236												
83	Kasoag L	6/27/2005	Epi	29	26	2	3	3	2												
83	Kasoag L	7/12/2005	Epi	29	26	2	3	3	2												
83	Kasoag L	7/25/2005	Epi	29	27	3	3	3	26												
83	Kasoag L	8/8/2005	Epi	28	26	2	3	3	2												
83	Kasoag L	8/23/2005	Epi	20	23	2	4	3	2												
83	Kasoag L	9/5/2005	Epi	22	21	3	3	3	2												
83	Kasoag L	9/21/2005	Epi	22	20	3	4	3	2												
83	Kasoag L	5/28/2006	Epi	21	18	2	2	2	2												
83	Kasoag L	6/13/2006	Epi	21	16	2	2	2	28												
83	Kasoag L	7/4/2006	Epi	27	23	2	2	3	2												
83	Kasoag L	7/23/2006	Epi	24	23	3	2	2	258												
83	Kasoag L	8/6/2006	Epi	28	24	2	3	3	2												
83	Kasoag L	8/22/2006	Epi	26	22	2	4	4	24												
83	Kasoag L	6/27/2007	Epi	28	23	3	4	3	2												
83	Kasoag L	7/17/2007	Epi	27	23	2	4	2	2												
83	Kasoag L	8/5/2007	Epi	27	26	2	4	4	268												
83	Kasoag L	8/21/2007	Epi		21	3	4	3	1256												
83	Kasoag L	9/3/2007	Epi	22	22	2	4	4	26												
83	Kasoag L	9/25/2007	Epi	21	19	2	5	4	248												
83	Kasoag L	6/10/2008	Epi	28	23	2	2	2	26												
83	Kasoag L	6/24/2008	Epi	20	22	2	3	3	2												
83	Kasoag L	7/14/2008	Epi	24	23	1	4	3	2												
83	Kasoag L	7/27/2008	Epi	24	24	2	4	3	2												
83	Kasoag L	8/12/2008	Epi	21	21	2	4	4	25												
83	Kasoag L	8/24/2008	Epi	27	21	2	4	4	2												
83	Kasoag L	9/7/2008	Epi	18	20	2	5	4	2												
83	Kasoag L	9/24/2008	Epi	17	16	2	3	2	28												
83	Kasoag L	06/12/2009	Epi	19	17	2	4	3	2												
83	Kasoag L	07/05/2009	Epi	24	21	2	3	3	2												
83	Kasoag L	07/23/2009	Epi	26	23	2	3	2	2												
83	Kasoag L	08/09/2009	Epi	21	21	2	3	3	2												
83	Kasoag L	08/23/2009	Epi	27	24	2	3	2	2												
83	Kasoag L	09/07/2009	Epi	22	22	2	3	3	2				20.1								
83	Kasoag L	10/08/2009	Epi	15	14	1	3	2	0				8.2								
83	Kasoag L	10/20/2009	Epi	11	10	2	3	1	2												
83	Kasoag L	5/31/2010	Epi	21	25	2	3	1	2	0	0										
83	Kasoag L	6/21/2010	Epi	27	25	2	3	2	2	0	0										
83	Kasoag L	7/8/2010	Epi	35	29	2	3	2	2	0	0										
83	Kasoag L	7/23/2010	Epi	24	25	2	3	2	2	0	0										
83	Kasoag L	9/13/2010	Epi	17	21	2	3	1	0	0	0										
83	Kasoag L	9/26/2010	Epi	18	18	2	1	2	2	0	0										
83	Kasoag L	10/10/2010	Epi	17	15	2	1	1	8	0	0										
83	Kasoag L	10/18/2010	Epi	5	10	2	1	2	8	0	0										
83	Kasoag L	6/23/2012	Epi	24	24	2	3	2	0	0	0				<0.30	<0.428					
83	Kasoag L	7/7/2012	Epi	25	27	2	3	3	3	0	0	13.00	0.40	<0.30	<0.410		0.67	0.42			
83	Kasoag L	7/21/2012	Epi	19	27	2	3	2	2	0	0	0.50	0.40	<0.30	<0.585		0.41	0.15	I		
83	Kasoag L	8/11/2012	Epi	22	26	2	3	2	2	0	0	4.40	0.30	<0.30	<0.537		2.21	0.83	I		
83	Kasoag L	8/25/2012	Epi	15	23	2	3	2	23	0	0	3.20	0.40	<0.30	<0.551		2.39	1.14	I		
83	Kasoag L	9/9/2012	Epi	16	22	2	3	2	2	0	0	4.90	0.40	<0.30	<0.580		1.10	0.76	I		
83	Kasoag L	9/29/2012	Epi	15	16							1.80	0.30	<0.30	<3.205		0.77	0.40			

LNum	PName	Date	Type	TAir	TH20	QA	QB	QC	QD	QF	QG	AQ-PC	AQ-Chla	MC-LR	Ana-a	Cyl	FP-Chl	FP-BG	HAB-form	Shore HAB
83	Kasoag L	7/6/2013	Epi	31	27	2	3	2	27	0	0	2.40	1.50	<0.30	<0.510		1.50	0.00	G	G
83	Kasoag L	7/21/2013	Epi	21	29	2	3	2	0	0	0	6.50	2.20	<0.30	<0.910		2.80	0.40	G	G
83	Kasoag L	8/4/2013	Epi	20	24	2	3	2	2	0	0	2.80	1.30	<0.30	<0.390		0.70	0.00	G	G
83	Kasoag L	8/18/2013	Epi	20	21	2	3	2	2	4	4	4.30	1.40	<0.30	<0.510		0.70	0.00	eg	eg
83	Kasoag L	8/19/2013	bloom											0.31	<0.080		3439	0.00	e	
83	Kasoag L	9/1/2013	Epi	27	24	2	3	2	2	0	4	1.70	1.20	0.43	<0.570		19.50	0.00	G	G
83	Kasoag L	9/15/2013	Epi	9	16	2	3	2	2	4	4	2.50	3.80	0.22	<19.130		3.20	0.00	G	G
83	Kasoag L	9/29/2013	Epi	11	16	2	3	2	2	0	0	1.30	1.20	<0.30	<0.050		0.80	0.00	G	G
83	Kasoag L	10/20/2013	Epi	5	14	2	3	2	0	0	0	2.40	1.80	<0.30	<0.090		1.10	0.00	l	l
83	Kasoag L	6/4/2014	Epi	24	20	1	1	1	0	0	0	0.20	1.10	<0.37	<0.09	<0.001	0.39	0.00	i	i
83	Kasoag L	7/1/2014	Epi	30	28	1	1	1	0	0	0	2.60	0.50	<0.48	<0.48	<0.002	1.38	0.00	i	i
83	Kasoag L	7/22/2014	Epi	29	28	2	1	2	0	0	0	3.60	0.30	<0.39	<0.03	<0.001	0.91	0.00	i	i
83	Kasoag L	8/4/2014	Epi	22	25	2	1	2	0	0	0	2.70	0.40	<0.33	<0.01	<0.002	1.60	0.00	i	i
83	Kasoag L	8/19/2014	Epi	22	23	2	2	2	0	0	0			<0.39	<0.03	<0.001	3.76	0.00	i	i
83	Kasoag L	9/4/2014	Epi	26	24	3	3	2	0	0	0	2.90	0.80	<0.29	<0.14	<0.002	2.90	0.00	i	i
83	Kasoag L	9/16/2014	Epi	14	18	2	3	2	0	0	0	2.20	0.70	<0.24	<0.03	<0.001	3.74	0.00	i	i
83	Kasoag L	9/30/2014	Epi	20	20	2	2	2	0	0	0	2.10	0.50	<0.19	<0.12	<0.001	3.33	0.00	i	i
83	Kasoag L	6/6/2015	Epi	24	22	2	3	1	0	0	0	5.90	1.30	<0.77	<0.126	<1.739	1.40	0.00	l	l
83	Kasoag L	6/24/2015	Epi	23	23	2	3	1	8	0	0	5.20	0.80	<0.55	<0.004	<0.024	2.40	0.00	l	l
83	Kasoag L	7/12/2015	Epi	27	24	3	2	3	12	0	0	5.90	0.70	<0.30	<0.005	<0.028	1.80	0.00	l	l
83	Kasoag L	7/26/2015	Epi	28	26	2	3	2	2	0	0	4.10	0.50	<0.30	<0.002	<0.014	1.10	0.00	l	l
83	Kasoag L	8/9/2015	Epi	27	25	2	3	2	2	0	0	0.05	0.50	<0.18	<0.002	<0.009		0.00	l	l
83	Kasoag L	8/27/2015	Epi	18	23	2	3	2	2	0	0	6.90	0.90	<0.50	<0.007	<0.040	2.20	0.00	l	l
83	Kasoag L	9/13/2015	Epi	15	21	2	3	2	2	0	0	1.00	4.90	<0.27	<0.009	<0.022	10.80	0.70	l	l
83	Kasoag L	9/27/2015	Epi	20	20	2	3	2	2	0	0	3.90	1.00	<0.58	<0.082	<0.016	3.30	0.00	l	l

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 Kasoag Lake

Kasoag Lake (0703-0087)

Minor Impacts

Waterbody Location Information

Revised: 05/24/2007

Water Index No:	Ont 66-11-P26-24-P109	Drain Basin:	Oswego-Seneca-Oneida
Hydro Unit Code:	04140202/020	Str Class:	B
Waterbody Type:	Lake	Reg/County:	7/Oswego Co. (38)
Waterbody Size:	57.6 Acres	Quad Map:	WILLIAMSTOWN (H-17-1)
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
Suspected:	---
Possible:	---

Source(s) of Pollutant(s)

Known:	---
Suspected:	---
Possible:	---

Resolution/Management Information

Issue Resolvability:	1 (Needs Verification/Study (see STATUS))	
Verification Status:	4 (Source Identified, Strategy Needed)	
Lead Agency/Office:	ext/WQCC	Resolution Potential: Medium
TMDL/303d Status:	n/a	

Further Details

Recreational uses in Kasoag Lake are thought to experience minor impacts due to excessive aquatic weed growth.

Kasoag Lake has been sampled as part of the NYSDEC Citizen Statewide Lake Assessment Program (CSLAP) beginning in 1991 and continuing through 1995 and again from 2001 through 2005. An Interpretive Summary report of the findings of this sampling was published in 2006. These data indicate that the lake continues to be best characterized as mesotrophic, or moderately productive. More recently, lower phosphorus and algae levels suggest a move toward mesoligotrophic state, but this trend may not be statistically significant. Phosphorus levels in the lake do not exceed the state guidance values for impacted recreational uses. Corresponding transparency measurements consistently exceed what is recommended for swimming beaches. Measurements of pH typically fall within the state water quality range of 6.5 to 8.5. The lake water is moderately colored, a condition which is assumed to be natural. (DEC/DOW, BWAM/CSLAP, May 2006)

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 somewhat unfavorable, an assessment that has been consistent over the previous recent assessments. The recreational suitability of the lake is described most frequently as "slightly impaired" for most uses. The lake itself is most often described as "not quite crystal clear" to "having definite algal greenness." These

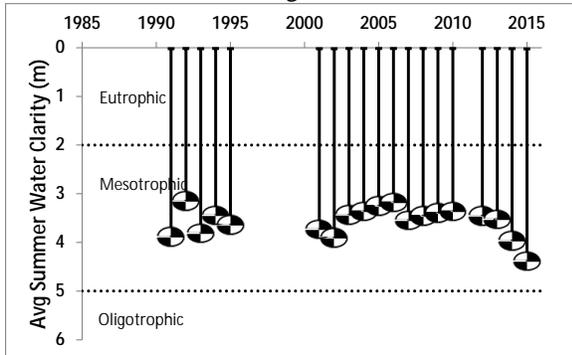
assessments are consistent with the perceived water quality conditions in the lake and its measured water quality characteristics. The assessment appear to be influenced by aquatic plants that grow o the lake surface and are often dense, though less so in recent years. (DEC/DOW, BWAM/CSLAP, May 2006)

This lake waterbody is designated class B, suitable for use as a public bathing beach, general recreation and aquatic life support, but not for a public water supply. 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: Kasoag Lake

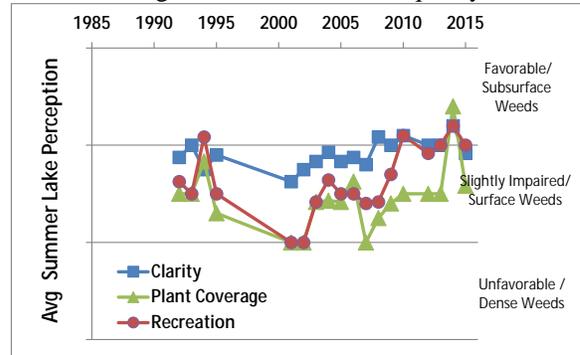
Long Term Trends: Water Clarity

- Clarity ↓ 2002-12; slight ↑ 2012-15
- Most readings typical of *mesotrophic* lakes, consistent with algae and TP levels



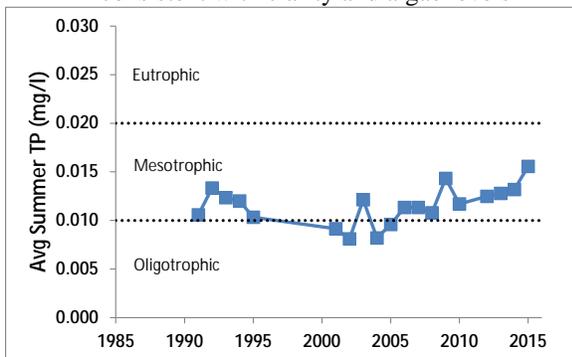
Long Term Trends: Lake Perception

- ↑ WQ and recreational perception since '00
- Recreational perception closely linked to changes in weeds and water quality



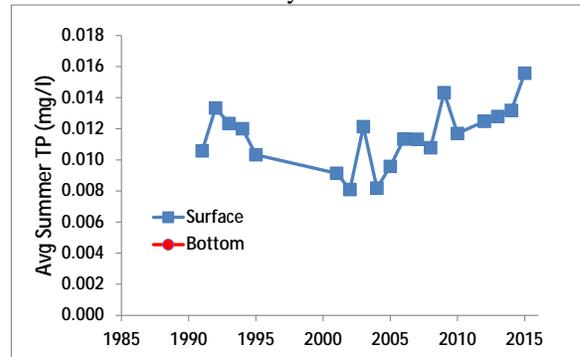
Long Term Trends: Phosphorus

- Slight increase since '01
- Most readings typical of *mesotrophic* lakes, consistent with clarity and algae levels



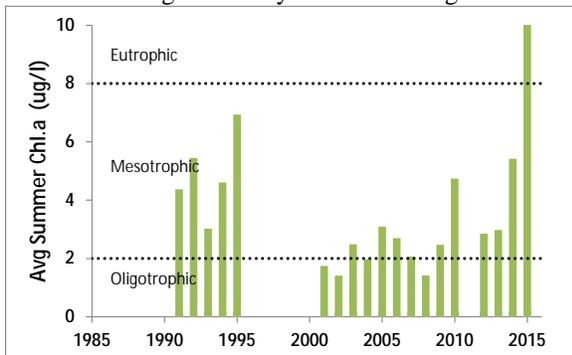
Long Term Trends: Bottom Phosphorus

- No bottom TP readings
- Likely that surface and bottom TP readings are similar in very shallow lakes



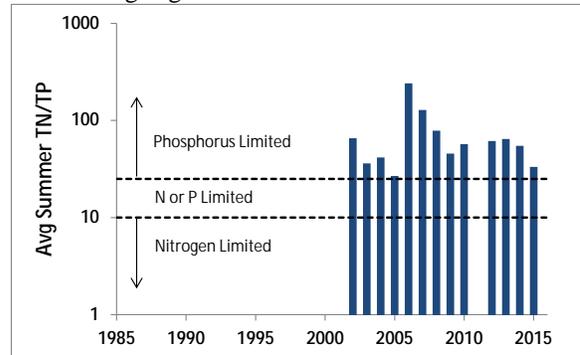
Long Term Trends: Chlorophyll a

- ↑ avg. chl in '15 due to high mid Sept. algae
- Most readings typical of *mesotrophic* lakes, in range of clarity and TP readings



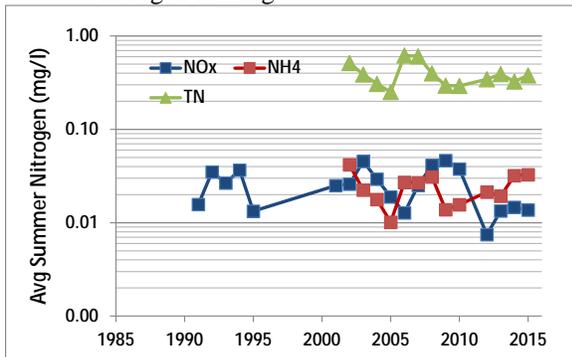
Long Term Trends: N:P Ratio

- Decrease in ratio since mid-2000s
- Most readings indicate phosphorus limits algae growth



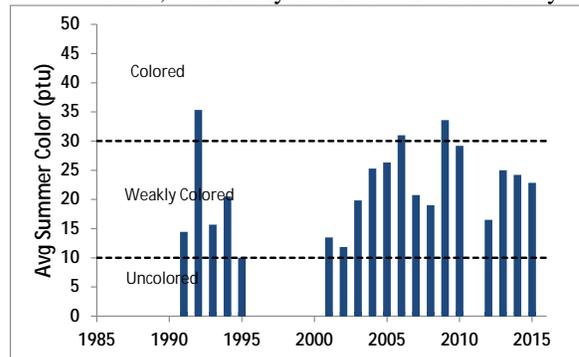
Long Term Trends: Nitrogen

- ↓ in NOx and ↑ NH4 since mid/late 2000s
- Generally low NOx, ammonia, and total nitrogen readings



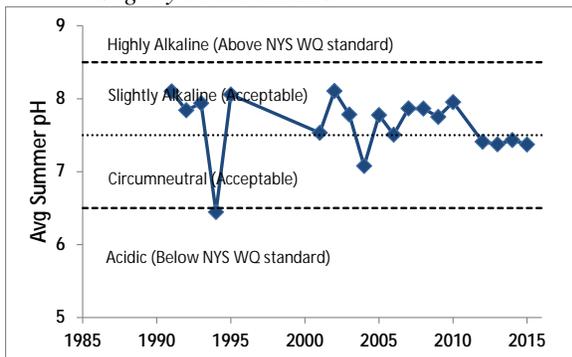
Long Term Trends: Color

- Higher since lab change in '02; varies yearly
- Most readings typical of *weakly colored* lakes, with likely no effect on water clarity



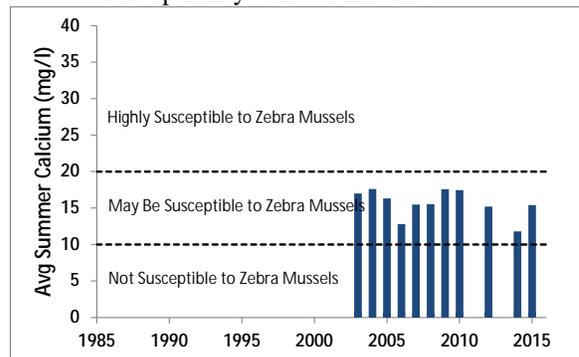
Long Term Trends: pH

- Slight drop in pH since early 1990s
- Most readings typical of *circumneutral* to *slightly alkaline* lakes



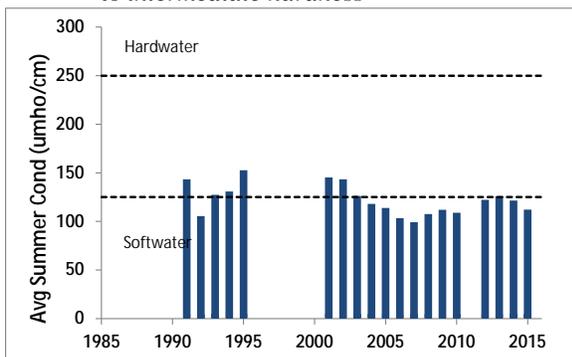
Long Term Trends: Calcium

- Slight decrease since 2010
- Most readings indicate low to moderate susceptibility to zebra mussels



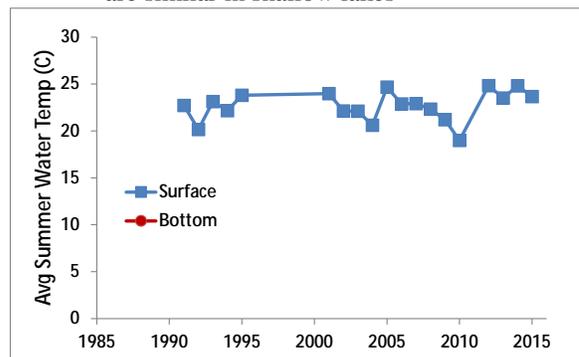
Long Term Trends: Conductivity

- ↓ since early 2000s but stable last few years
- Most readings typical of lakes with *soft water* to *intermediate hardness*



Long Term Trends: Water Temperature

- Recent ↑, but no clear long term trend
- Likely that surface and bottom temperatures are similar in shallow lakes



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

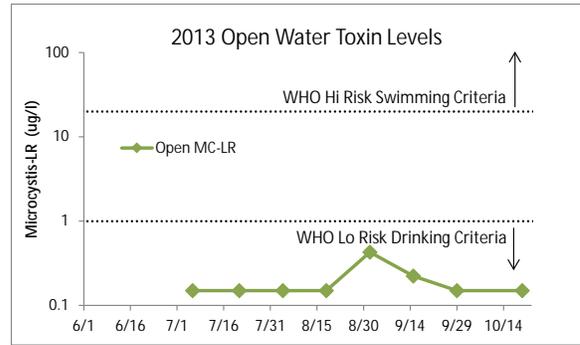


Figure D2:
2013 Open Water Microcystin-LR



Figure D3:
2013 Shoreline Total and BGA Chl.a

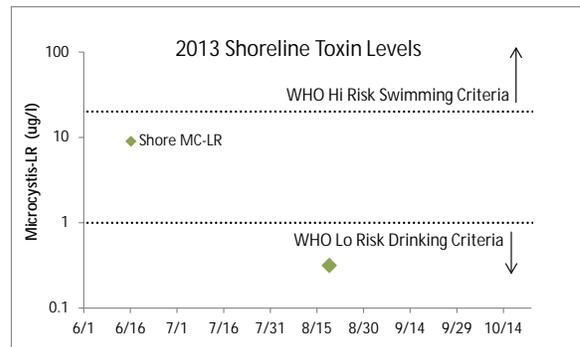


Figure D4:
2013 Shoreline Microcystin-LR

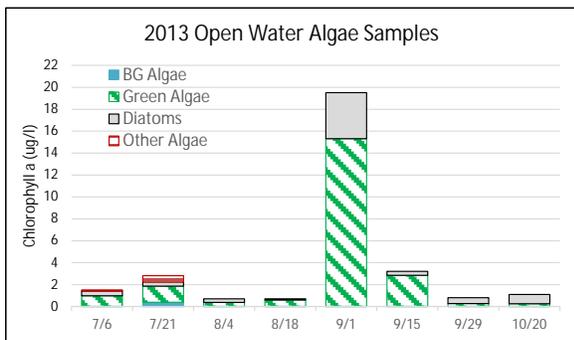


Figure D5:
2013 Open Water Algae Types

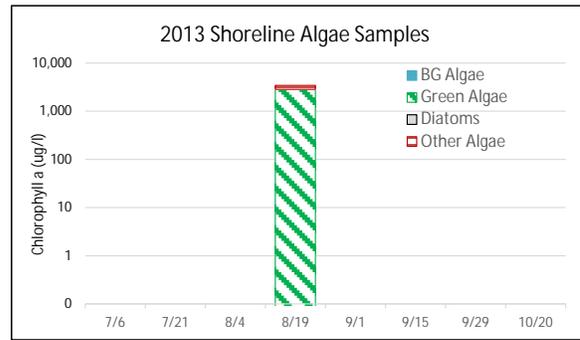


Figure D6:
2013 Shoreline Algae Types

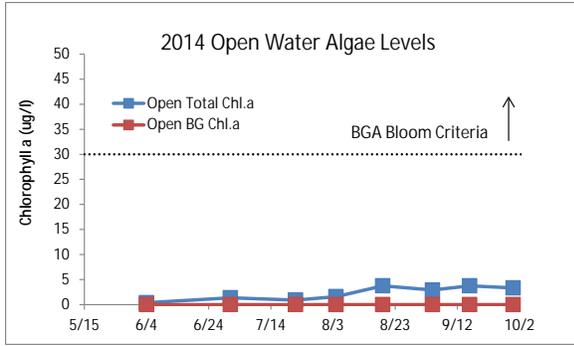


Figure D7:
2014 Open Water Total and BGA Chl.a

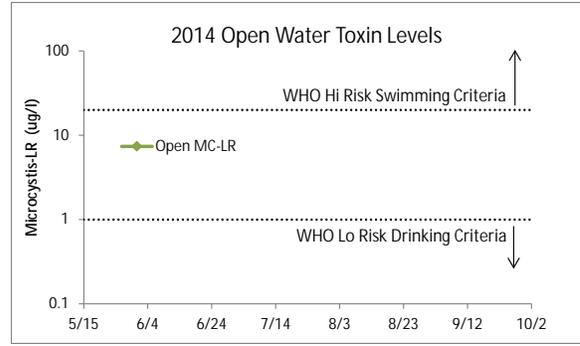


Figure D8:
2014 Open Water Microcystin-LR

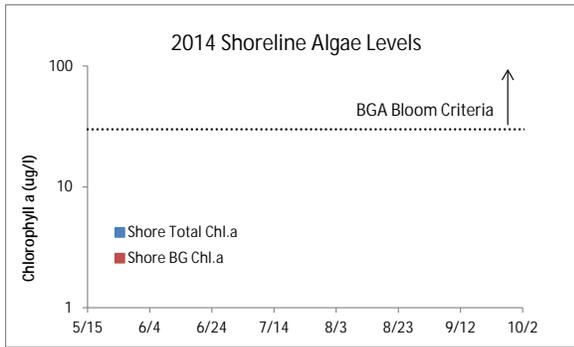


Figure D9:
2014 Shoreline Total and BGA Chl.a

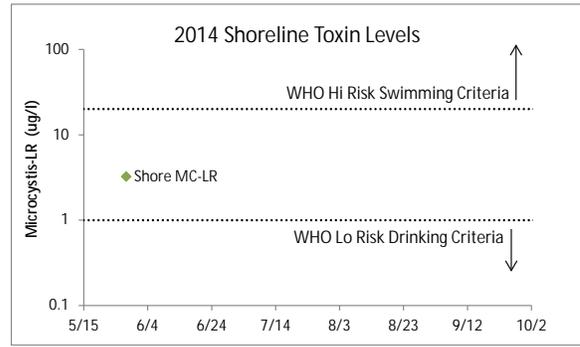


Figure D10:
2014 Shoreline Microcystin-LR

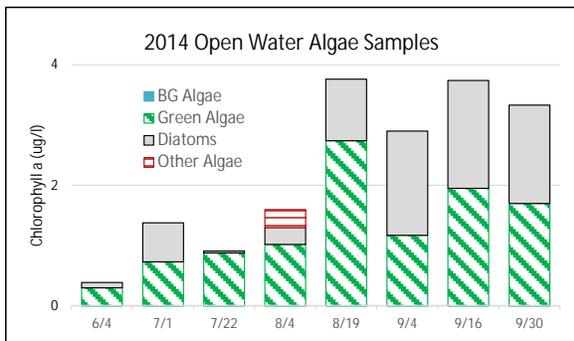


Figure D11:
2014 Open Water Algae Types

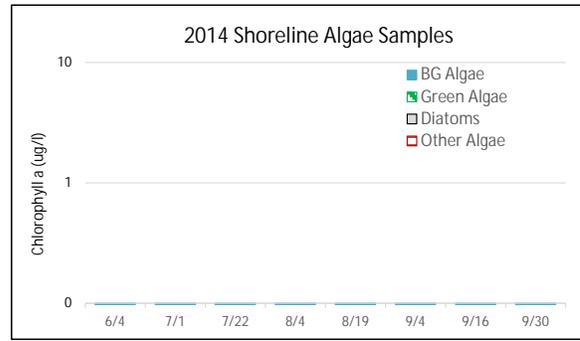


Figure D12:
2014 Shoreline Algae Types

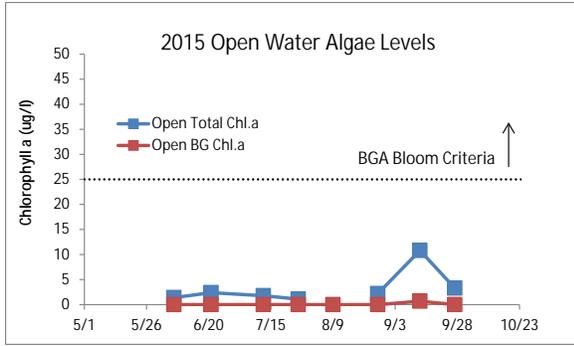


Figure D13:
2015 Open Water Total and BGA Chl.a

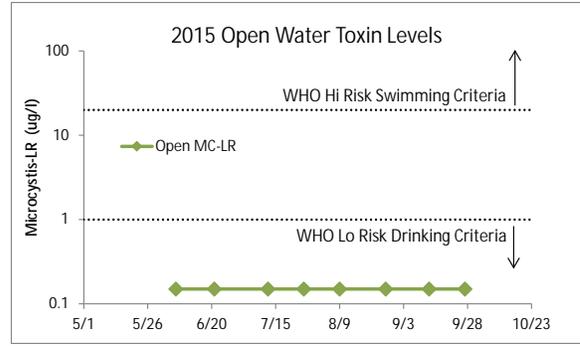


Figure D14:
2015 Open Water Microcystin-LR

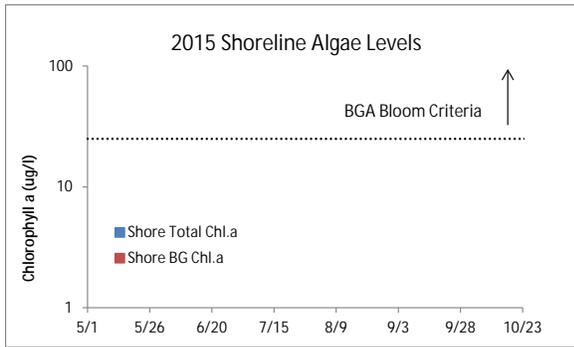


Figure D15:
2015 Shoreline Total and BGA Chl.a

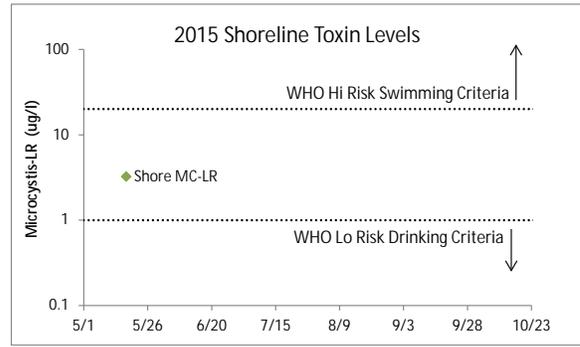


Figure D16:
2015 Shoreline Microcystin-LR

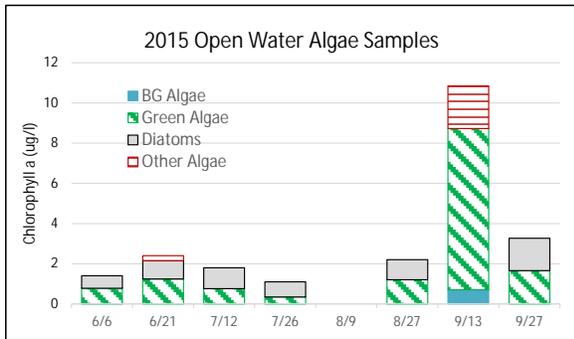


Figure D17:
2015 Open Water Algae Types

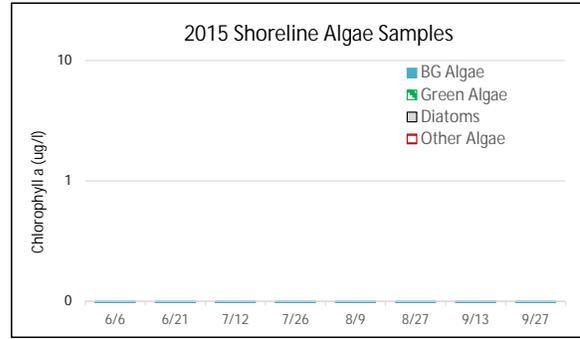


Figure D18:
2015 Shoreline Algae Types

Appendix E: AIS Species in Oswego County

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

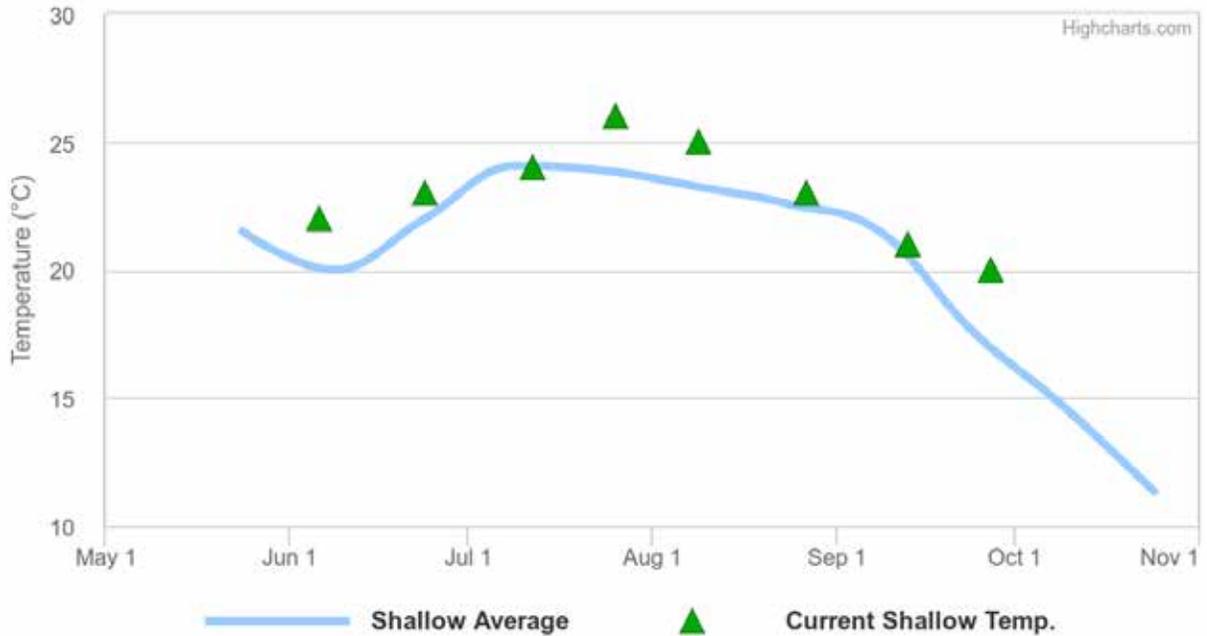
This list is not complete, but instead represents only those species that have been reported and verified within the county. If any additional aquatic invasive species (AIS) are known or suspected in these or other waterbodies in the county, this information should be reported through iMap invasives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

Aquatic Invasive Species – Oswego County			
Waterbody	Kingdom	Common name	Scientific name
Castor Pond	Plant	Eurasian watermilfoil	<i>Myriophyllum spicatum</i>
Castor Pond	Plant	Brittle naiad	<i>Najas minor</i>
Kasoag Lake	Plant	Eurasian watermilfoil	<i>Myriophyllum spicatum</i>
Kasoag Lake	Plant	Fanwort	<i>Cabomba caroliniana</i>
Lake Neatahwanta	Plant	Eurasian watermilfoil	<i>Myriophyllum spicatum</i>
Lake Neatahwanta	Plant	Water chestnut	<i>Trapa natans</i>
Lake Ontario	Animal	Common carp	<i>Cyprinus carpio</i>
Lake Ontario	Animal	Quagga mussel	<i>Dreissena bugensis</i>
Lake Ontario	Animal	Zebra mussel	<i>Dreissena polymorpha</i>
Lake Ontario	Animal	Round goby	<i>Neogobius melanostomus</i>
Lake Ontario	Animal	Mud bithynia snail	<i>Bithynia tentaculata</i>
Lake Ontario	Animal	Bloody-red shrimp	<i>Hemimysis anomala</i>
Lorton Lake	Plant	Variable watermilfoil	<i>Myriophyllum heterophyllum</i>
Lorton Lake	Plant	Brittle naiad	<i>Najas minor</i>
Mexico Pond	Plant	Fanwort	<i>Cabomba caroliniana</i>
North Sandy Pond	Plant	Brittle naiad	<i>Najas minor</i>
North Sandy Pond	Animal	Round goby	<i>Neogobius melanostomus</i>
North Sandy Pond	Animal	Zebra mussel	<i>Dreissena polymorpha</i>
North Sandy Pond	Plant	Variable watermilfoil	<i>Myriophyllum heterophyllum</i>
North Sandy Pond	Plant	Eurasian watermilfoil	<i>Myriophyllum spicatum</i>
North Sandy Pond	Plant	European frogbit	<i>Hydrocharis morsus-ranae</i>
Oneida Lake	Animal	Mud bithynia	<i>Bithynia tentaculata</i>
Oneida Lake	Animal	Chinese mystery snail	<i>Cipangopaludina chinensis</i>
Oneida Lake	Animal	Common carp	<i>Cyprinus carpio</i>

Waterbody	Kingdom	Common name	Scientific name
Oneida Lake	Animal	Quagga mussel	<i>Dreissena bugensis</i>
Oneida Lake	Animal	Zebra mussel	<i>Dreissena polymorpha</i>
Oneida Lake	Plant	European frogbit	<i>Hydrocharis morsus-ranae</i>
Oneida Lake	Plant	Eurasian watermilfoil	<i>Myriophyllum spicatum</i>
Oneida Lake	Plant	Starry stonewort	<i>Nitellopsis obtusa</i>
Oneida Lake	Plant	Curly leafed pondweed	<i>Potamogeton crispus</i>
Oneida Lake	Plant	Water chestnut	<i>Trapa natans</i>
Oneida Lake	Animal	European stream valvata	<i>Valvata piscinalis</i>
Oneida River	Plant	Water chestnut	<i>Trapa natans</i>
Oswego River	Animal	Zebra mussel	<i>Dreissena polymorpha</i>
Oswego River	Plant	Water chestnut	<i>Trapa natans</i>
Paddy's Pond	Plant	Eurasian watermilfoil	<i>Myriophyllum spicatum</i>
Panther Lake	Plant	Eurasian watermilfoil	<i>Myriophyllum spicatum</i>
Pennellville Pond	Plant	Curly leafed pondweed	<i>Potamogeton crispus</i>
Pleasant Lake	Plant	Eurasian watermilfoil	<i>Myriophyllum spicatum</i>
Pleasant Lake	Plant	Water chestnut	<i>Trapa natans</i>
Port Ontario, Lake Ontario	Plant	European frogbit	<i>Hydrocharis morsus-ranae</i>
Sage Creek	Plant	Eurasian watermilfoil	<i>Myriophyllum spicatum</i>
Salmon River Reservoir	Plant	Eurasian watermilfoil	<i>Myriophyllum spicatum</i>
Salmon River Reservoir	Plant	Variable watermilfoil	<i>Myriophyllum heterophyllum</i>
Seneca River	Plant	Water chestnut	<i>Trapa natans</i>
South Pond	Plant	Variable watermilfoil	<i>Myriophyllum heterophyllum</i>
South Pond	Plant	Eurasian watermilfoil	<i>Myriophyllum spicatum</i>
South Pond	Animal	Round goby	<i>Neogobius melanostomus</i>
South Sandy Pond	Plant	Variable watermilfoil	<i>Myriophyllum heterophyllum</i>
South Sandy Pond	Plant	Eurasian watermilfoil	<i>Myriophyllum spicatum</i>

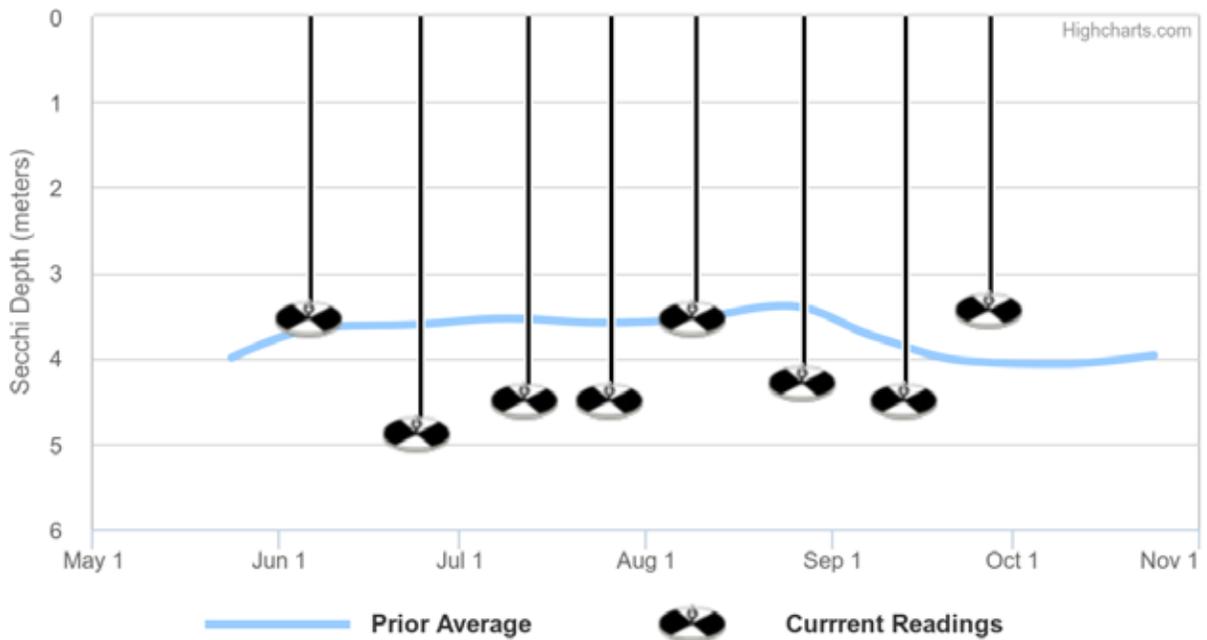
Appendix F: Current Year vs. Prior Averages for Kasoag Lake

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 Kasoag 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.

