

Augur Lake Questions and Answers, 2015 CSLAP

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

A1. Conditions in Augur Lake were probably less favorable than usual in 2015. Algae levels were slightly higher than usual, due to higher phosphorus readings. This resulted in less favorable lake perception (recreation and water quality), and perhaps led to a widespread shoreline bloom.

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

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

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

A3. Augur Lake had slightly lower water clarity, and higher algae and nutrient readings than the typical nearby lake. Plant coverage was similar to plant coverage in many nearby lakes in 2015.

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

A4. Phosphorus and ammonia readings have increased in the last few years. Most of the other changes in the CSLAP sampling indicators have probably been within the normal range of variability for the lake.

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

A5. Augur Lake appears to be susceptible to shoreline blue green algae blooms, although the trigger point for these blooms is not known, and it does not appear that the widespread blooms in 2015 was dominated by blue green algae. Any nutrient sources along the shoreline or in the watershed (eroding shorelines, sediment,...) should be identified and reduced working with local agencies.

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 maintain 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				Algae levels
Swimming				No impacts
Recreation				Algae levels
Aquatic Life				High pH
Aesthetics				Poor perception
Habitat				Invasive plants
Fish Consumption				

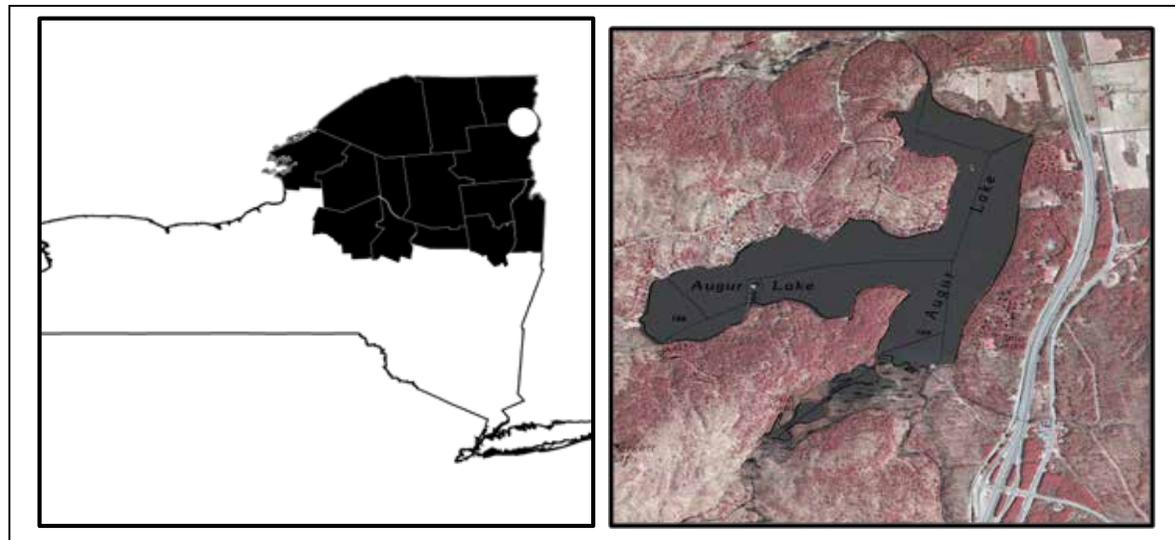
Supported / Good
 Threatened / Fair
 Stressed / Poor
 Impaired
 Not Known

CSLAP 2015 Lake Water Quality Summary: Augur Lake

General Lake Information

Location	Town of Chesterfield
County	Essex
Basin	Lake Champlain
Size	152.8 hectares (377.4 acres)
Lake Origins	Natural; augmented by an earthen dam (90 feet long, 2 feet high, built 1900)
Watershed Area	1,133.9 hectares (2,800.7 acres)
Retention Time	1.1 years
Mean Depth	3.0 meters
Sounding Depth	6.4 meters
Public Access?	no
Major Tributaries	Cassidy Brook, McGuire Brook (from Bitternut Pond)
Lake Tributary To...	Mud Brook to Ausable River to Lake Champlain
WQ Classification	A (potable water)
Lake Outlet Latitude	44.470
Lake Outlet Longitude	-73.495
Sampling Years	1997-2001, 2003-2013, 2015
2015 Samplers	Paul Knott
Main Contact	Paul Knott

Lake Map



Background

Augur Lake is a 377-acre lake located in the Town of Chesterfield in Essex County, in the northeastern Adirondack Region of New York State. It was first sampled through CSLAP in 1997.

It is one of nine CSLAP lakes among the more than 515 lakes and ponds found in Essex County, and one of 17 CSLAP lakes among the nearly 650 lakes and ponds in the Lake Champlain River drainage basin.

Lake Uses

Augur Lake is a Class A lake, meaning that its best intended use is for potable water (drinking), contact recreation (swimming) and non-contact recreation (fishing and boating), aquatic life, and aesthetic purposes). The lake is used by lake residents for a variety of recreational purposes, but there is not access available to the general public.

NYSDEC's Bureau of Fisheries reports that the lake maintains a population of smallmouth bass, northern pike, brown bullhead, yellow perch, golden shiner, walleye and black crappie. Walleye were stocked privately in the mid-1970s

General statewide fishing regulations are applicable in Augur Lake. However, trout fishing season is April 1st to October 15th; while there are no minimum size limits, daily takes are limited to five brook trout less than eight inches long. Yellow perch and sunfish can be caught all year, with no size or take limits.

Historical Water Quality Data

CSLAP sampling was conducted on Augur Lake each year from 1997 to 2001, from 2003 to 2013, and in 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 for Augur Lake will also be found on the NYSDEC web page at <http://www.dec.ny.gov/lands/77872.html>.

Augur Lake was not sampled as part of any of the major statewide NYSDEC monitoring programs prior to CSLAP. However, the lake was sampled as part of the pilot NYSDEC biomonitoring program within NYSDEC's Lake Classification and Inventory (LCI) survey in 2008. This data showed water quality conditions very similar to those measured through CSLAP, confirming the accuracy of the data collected by CSLAP sampling volunteers. It also showed very low levels of dissolved phosphorus, iron, manganese and other anions and cations not presented here. The depth profile data also showed an oxygen deficit, but not anoxic (oxygen depleted) conditions in the waters near the lake bottom, and only slight thermal stratification. This was confirmed with the deepwater phosphorus data collected through CSLAP, as discussed later in this report. It is not known if local monitoring has been conducted as a fisheries management tool, or to evaluate swimming conditions in the lake.

The major Augur Lake tributaries (Cassidy Brook and McGuire Brook from Butternut Pond) and the Augur Lake outlet (Mud Brook) have not been monitored through NYSDEC's Rotating Intensive Basin Studies (RIBS), and no sites have been sampled through the state stream macroinvertebrate monitoring program. The lake has also not been sampled through any of the state fisheries monitoring programs.

Lake Association and Management History

The Augur Lake Property Owners Association (ALPOA) was founded in 1970 when Eurasian watermilfoil was discovered in the lake. In 1978, ALPOA purchased a used mechanical weed harvester to combat the milfoil. Concerns about liability from operating the harvester prompted formal incorporation of the association in 1979. ALPOA joined the NYSFOLA in 1984 to explore lake management options and benefit from the experiences of other NYS lake associations. Bottom matting (benthic barriers) have been used by individual residents to manage dense shoreline weed growth.

ALPOA received a permit from NYSDEC and the Adirondack Park Agency to stock 2,250 sterile grass carp to control excessive weeds (Eurasian watermilfoil); the first 750 carp were stocked in July 1998. This eventually included the installation of fish barriers to prevent their migration out of the lake, and a monitoring program conducted by Adirondack Ecologists. ALPOA also participated in the Adirondack Lake Assessment Program (ALAP) conducted by Paul Smiths College in 2008.

ALPOA conducts a variety of lake and watershed management activities to improve lake conditions. A septic management educational program was initiated in 1993, and leach fields were tested in 1994; lake residents were provided dye for free by the lake association. Lakefront residents are encouraged to clean boat props on entry and exit from the lake, and exotic species signage was posted at common access points in the mid-1990s. Grass carp have been stocked periodically by ALPOA over the last fifteen years. An overall lake management plan for the lake was developed in 2005.

In addition to nuisance weeds, lake residents express at least occasional concern about foaming and bacteria.

ALPOA maintains a website at <http://www.augurlake.net/>.

Summary of 2015 CSLAP Sampling Results

Evaluation of 2015 Annual and Monthly Results Relative to 2006-2013

The summer (mid-June through mid-September) average readings are compared to historical averages for all CSLAP sampling seasons in the “Lake Condition Summary” table, and are compared to individual historical CSLAP sampling seasons in the “Long Term Data Plots – Augur Lake” section in Appendix D.

Evaluation of Eutrophication Indicators

Algae and nutrient levels were slightly higher in 2015 than in the typical CSLAP sampling season, but this did not result in a change in water clarity. The rise in phosphorus was part of a larger trend over the last decade, although neither algae levels nor deepwater phosphorus readings exhibited similar changes.

Lake productivity typically increases during the summer, as manifested by increasing algae and nutrient levels and decreasing water clarity. These seasonal trends were also apparent in 2015; it is not known if this was in response to very heavy rains early in the summer.

The lake continues to be characterized as *mesoeutrophic*, based on water clarity and total phosphorus readings typical of *mesotrophic* lakes, and chlorophyll *a* readings typical of *eutrophic* lakes. In 2015, both phosphorus and chlorophyll *a* levels were typical of *eutrophic* lakes. The trophic state indicators (TSI) evaluation suggests that algae levels (chlorophyll *a*) are regularly higher than expected given the nutrient levels in the lake, mostly consistent with the seasonal observation of the sensitivity of algae growth to small seasonal increases on phosphorus. Overall trophic conditions are summarized on the Lake Scorecard and Lake Condition Summary Table.

Evaluation of Potable Water Indicators

Algae levels are at times high enough to render the lake susceptible to taste and odor compounds or elevated disinfection by product (DBP) compounds that could affect the potability of the water, although it is not known if these impacts occur. Deepwater phosphorus and ammonia readings are low and similar to those measured at the lake surface, and deepwater iron, manganese and arsenic levels are below the state water quality standards (although these were not measured in the last few years). This suggests minimal impact for deepwater potable water intakes. Potable water conditions, at least as measurable through CSLAP, are summarized in the Lake Scorecard and Lake Condition Summary Table.

Evaluation of Limnological Indicators

Conductivity, ammonia and pH readings were higher than normal in 2015, particularly color in early summer, and the higher ammonia and pH readings may be part of a longer trend. Conductivity readings have decreased slightly over the last decade (though not in 2015). Total nitrogen readings have also increased slightly in recent years, though not in 2015, and NO_x readings dropped in 2015 as part of a longer-term trend. Only the rise in ammonia has been statistically significant, but even the present readings are still low.

Chloride levels in the 2015 samples, collected for the first time through CSLAP and cited in Appendix A, ranged from 38 to 41 mg/l. These values fall within the “moderate” to “major” road salt runoff levels cited by the New Hampshire DES. These readings are well below the state potable water quality standard of 250 mg/l and within than the range of values found in most NYS lakes. These readings suggest a moderate likelihood of biological impacts from road salt. Additional data will help to determine if these represent normal readings for the lake

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

Evaluation of Biological Condition

Phytoplankton, zooplankton and macroinvertebrate data have not been collected through CSLAP at Augur Lake. Fluoroprobe algae levels measured by SUNY ESF in the last several years indicate low to moderate levels of algae and relatively low levels of blue green algae in most open water samples. The algal community is comprised of a mix of algae types. A widespread shoreline bloom sampled in 2015 did not show high blue green algae levels, although it is not known if these lower blue green algae levels were representative of conditions at that time.

Macrophyte surveys have been conducted through CSLAP and as part of the DEC biomonitoring study. Plant survey data indicates at least 11 different aquatic plant species, two of which are

protected (*Potamogeton diversifolius*, or threadleaf pondweed, and *Megalodonta beckii*, or water marigold) and one of which is exotic (*Myriophyllum spicatum*, or Eurasian watermilfoil). The modified floristic quality index (FQI) rating for the lake indicates “fair” quality of the aquatic plant community.

DEC’s biomonitoring survey results continue to be evaluated. These data suggest that a small number of macroinvertebrate classes are found, particularly in the COTE (Coleoptera, Odonate, Tricoptera, and Ephemeroptera), a measure of sensitive macroinvertebrates, and therefore one measure of community health) category, indicating favorable water quality conditions. The Hilsenhoff biotic index (HBI) is high, indicating that the organisms found in the lake may be tolerant of pollution. No single organism dominates the macroinvertebrate community, suggesting relatively high diversity.

No information is available on the fish community in Augur Lake, although it is suspected that the lake maintains at least a warmwater and coolwater fishery.

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

Evaluation of Lake Perception

Water quality assessments were slightly less favorable than normal in 2013 and 2015, particularly in the fall when algae levels were highest. This resulted in poor recreational assessments. These indicators have degraded slightly in recent years, also coincident with more extensive weed growth.

These assessments degrade over the course of a typical summer, consistent with seasonally increasing lake productivity, and consistent with seasonal changes in water quality assessments in 2013 and 2015. The least favorable recreational assessments in the lake are often closely tied to “poor water clarity”, “excessive algae” or “excessive weeds”. Overall lake perception is summarized on the Lake Scorecard and Lake Condition Summary Table.

Evaluation of Local Climate Change

Air and water temperature readings were higher than usual in 2015, but water temperatures have not changed significantly over the last two decades (at least as measured through CSLAP).

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 at times approach the thresholds for harmful algal blooms (HABs), although no actual blooms have been documented in recent years. An analysis of algae samples indicates microcystin readings below the levels needed to support safe swimming in the open water, but occasionally elevated readings in shoreline blooms. The shoreline bloom sample in 2015 showed low blue green algae and toxin levels; it is not known if this was representative of conditions at that time. Lake residents are advised to avoid direct contact with any shoreline blooms.

Lake Condition Summary

Category	Indicator	Min	Annual Avg	Max	2015 Avg	Classification	2015 Change?	Long-term Change?
Eutrophication Indicators	Water Clarity	1.05	2.82	5.50	2.79	Mesotrophic	Within Normal Range	No Change
	Chlorophyll <i>a</i>	0.40	8.71	39.90	11.20	Eutrophic	Within Normal Range	No Change
	Total Phosphorus	0.006	0.018	0.047	0.022	Mesotrophic	Within Normal Range	Increasing Slightly
Potable Water Indicators	Hypolimnetic Ammonia	0.01	0.05	0.21	0.05	Close to Surface NH4 Readings	Within Normal Range	Not known
	Hypolimnetic Arsenic	0.34	0.76	1.10		Low Deepwater Arsenic Levels		
	Hypolimnetic Iron	0.01	0.14	0.53		Low Iron Levels		
	Hypolimnetic Manganese	0.01	0.11	0.57		Low Manganese Levels		
Limnological Indicators	Hypolimnetic Phosphorus	0.012	0.022	0.092	0.018	Close to Surface TP Readings	Within Normal Range	Not known
	Nitrate + Nitrite	0.00	0.01	0.06	0.00	Low NOx	Lower Than Normal	No Change
	Ammonia	0.00	0.02	0.08	0.03	Low Ammonia	Higher than Normal	Increasing Significantly
	Total Nitrogen	0.01	0.39	0.94	0.43	Low Total Nitrogen	Within Normal Range	No Change
	pH	6.37	7.77	9.04	7.93	Alkaline	Within Normal Range	No Change
	Specific Conductance	59	187	270	198	Intermediate Hardness	Within Normal Range	No Change
	True Color	1	13	42	9	Intermediate Color	Within Normal Range	No Change
	Calcium	10.1	15.7	20.2	10.9	May be Susceptible to Zebra Mussels	Lower Than Normal	No Change
Lake Perception	WQ Assessment	1	2.5	4	2.8	Definite Algal Greenness	Within Normal Range	No Change
	Aquatic Plant Coverage	1	2.9	4	3.0	Surface Plant Growth	Within Normal Range	No Change
	Recreational Assessment	1	2.8	4	3.1	Slightly Impaired	Within Normal Range	No Change
Biological Condition	Phytoplankton					Open water-low blue green algae biomass; Shoreline-moderate blue algae in bloom	Not known	Not known
	Macrophytes					Fair quality of aquatic plant community	Not known	Not known
	Zooplankton					Not measured through CSLAP	Not known	Not known
	Macroinvertebrates					Low COTE but high diversity scores	Not known	Not known
	Fish					Not known	Not known	Not known
	Invasive Species					Eurasian watermilfoil	Not known	Not known
Local Climate Change	Air Temperature	5	24.1	37	26.3		Higher Than Normal	No Change
	Water Temperature	12	22.0	29	23.1		Higher Than Normal	No Change

Category	Indicator	Min	Annual Avg	Max	2015 Avg	Classification	2015 Change?	Long-term Change?
Harmful Algal Blooms	Open Water Phycocyanin	0	34	232	16	Most readings indicate low risk of BGA	Not known	Not known
	Open Water FP Chl.a	2	5	16	4	Few readings indicate high algae levels	Not known	Not known
	Open Water FP BG Chl.a	0	2	9	1	No readings indicate high BGA levels	Not known	Not known
	Open Water Microcystis	<DL	0.2	0.9	<DL	Mostly undetectable open water MC-LR	Not known	Not known
	Open Water Anatoxin a	<DL	<DL	0.0	<DL	Open water Anatoxin-a at times detectable	Not known	Not known
	Shoreline Phycocyanin					No shoreline blooms sampled	Not known	Not known
	Screening FP Chl.a	7.3	7.3	7.3	7.3	No readings indicate high algae levels	Not known	Not known
	Screening FP BG Chl.a	7.2	7.2	7.2	7.2	No readings indicate high BGA levels	Not known	Not known
	Shoreline Microcystis	<DL	22.2	64.9	<DL	Occasionally very high shoreline bloom MC-LR	Not known	Not known
	Shoreline Anatoxin a	<DL	<DL	<DL	<DL	Shoreline bloom Anatoxin-a consistently not detectable	Not known	Not known

Evaluation of Lake Condition Impacts to Lake Uses

Augur Lake is presently among the lakes listed on the Lake Champlain drainage basin Priority Waterbodies List (PWL 2009), with *recreation* listed as *stressed* due to excessive weed growth. The PWL listing for the lake is in Appendix C.

Potable Water (Drinking Water)

The CSLAP dataset at Augur Lake, including water chemistry data, physical measurements, and volunteer samplers' perception data, is inadequate to evaluate the use of Augur Lake for potable water. Surface water quality data indicates that algae levels may be high enough to *stress* potable water intake, although deepwater intakes are less likely to be affected.

Public Bathing

The CSLAP dataset at Augur Lake, including water chemistry data, physical measurements, and volunteer samplers' perception data, suggests that public bathing, if conducted at a public swimming beach, might be supported. This use may be *threatened* by excessive algae and weeds, although the lack of open water or shoreline blooms in the last few years indicates limited bathing threats. Additional information about bacteria levels is needed to determine if pathogens impact swimming.

Recreation (Swimming and Non-Contact Uses)

The CSLAP dataset on Augur Lake, including water chemistry data, physical measurements, and volunteer samplers' perception data, suggest that recreation may be *impaired* by excessive algae and *stressed* by excessive weeds- it is not known if excessive weed growth is associated with Eurasian watermilfoil or native plants.

Aquatic Life

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

Aesthetics and Habitat

The CSLAP dataset on Augur Lake, including water chemistry data, physical measurements, and volunteer samplers' perception data, suggest that aesthetics may be *poor* due to excessive algae and weeds, and periodic shoreline algal blooms, leading to periodic reports of poor recreational perceptions. Habitat may be *fair* due to invasive weeds.

Fish Consumption

Fish consumption advisories are not posted for Augur Lake.

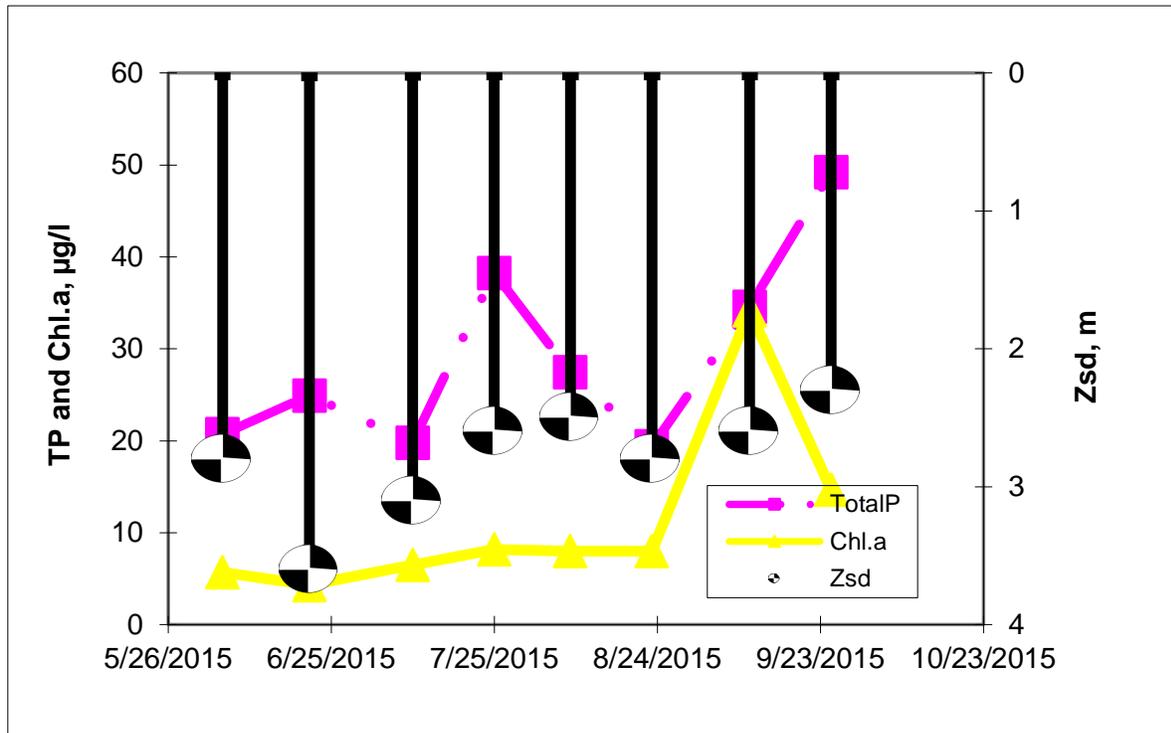
Additional Comments and Recommendations

The biological condition of the lake will be further assessed when the evaluation of DEC's lake biomonitoring study is completed. Lake residents are advised to report (and avoid) any shoreline algae blooms, particularly if they exhibit characteristics of blue-green algae blooms.

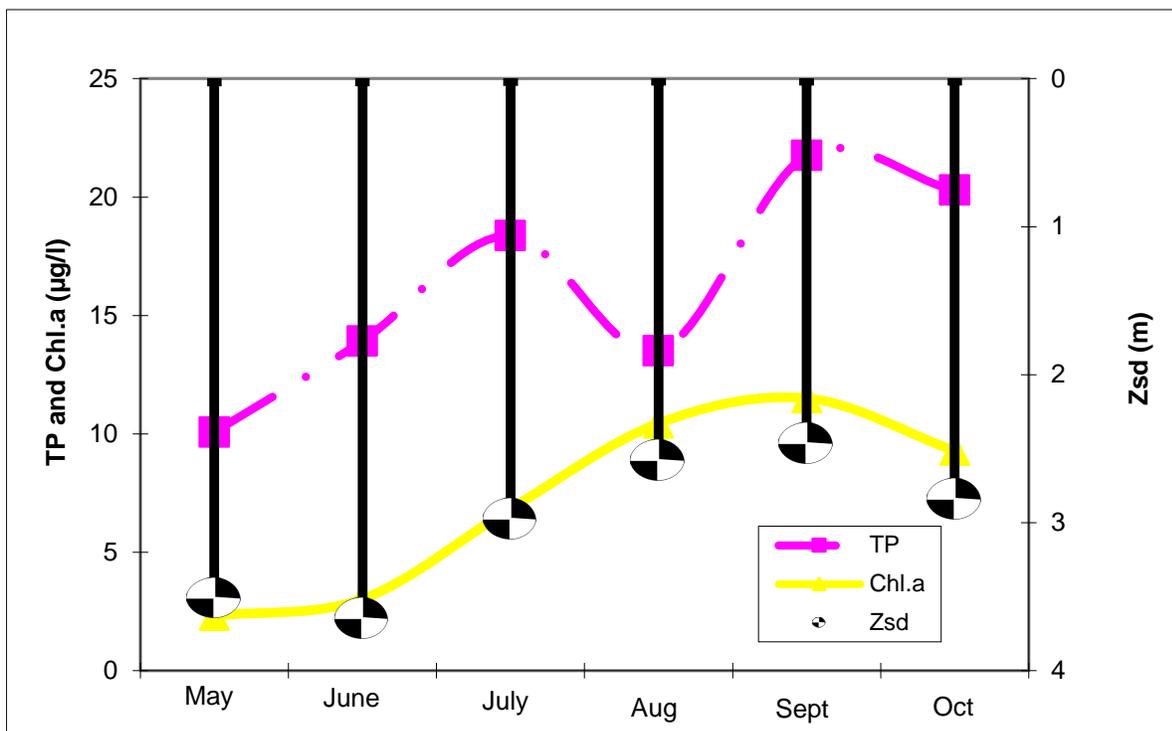
Aquatic Plant IDs-2015

None submitted for identification.

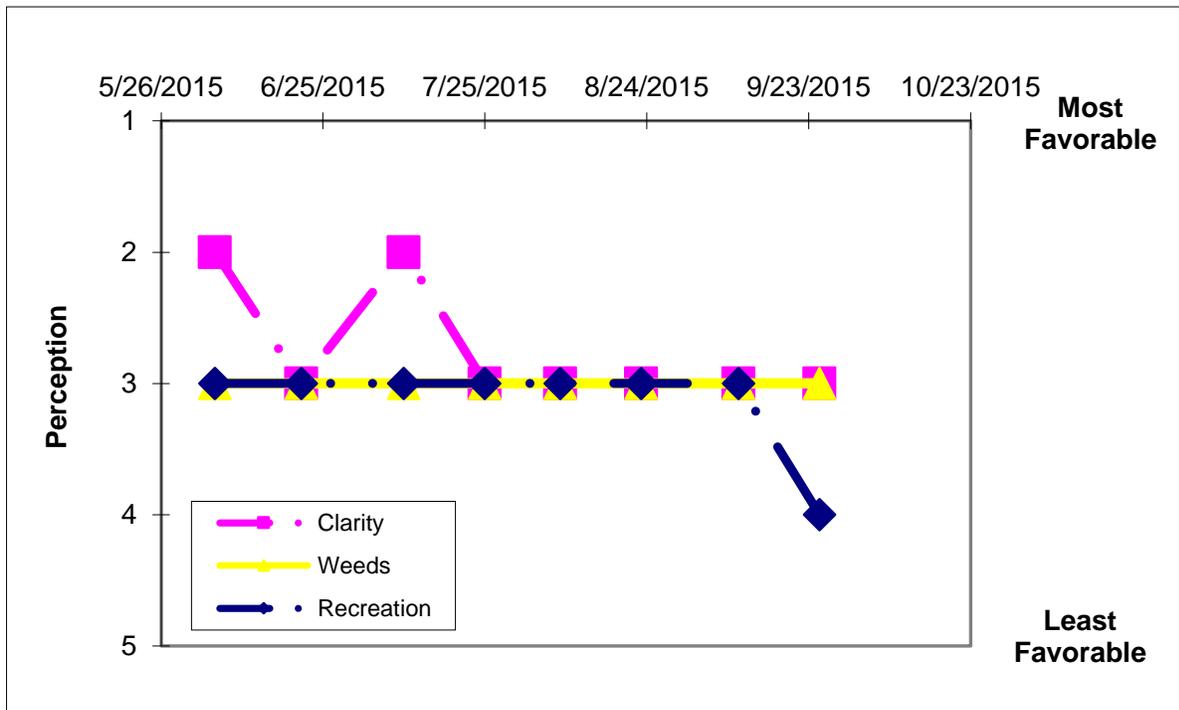
Time Series: Trophic Indicators, 2015



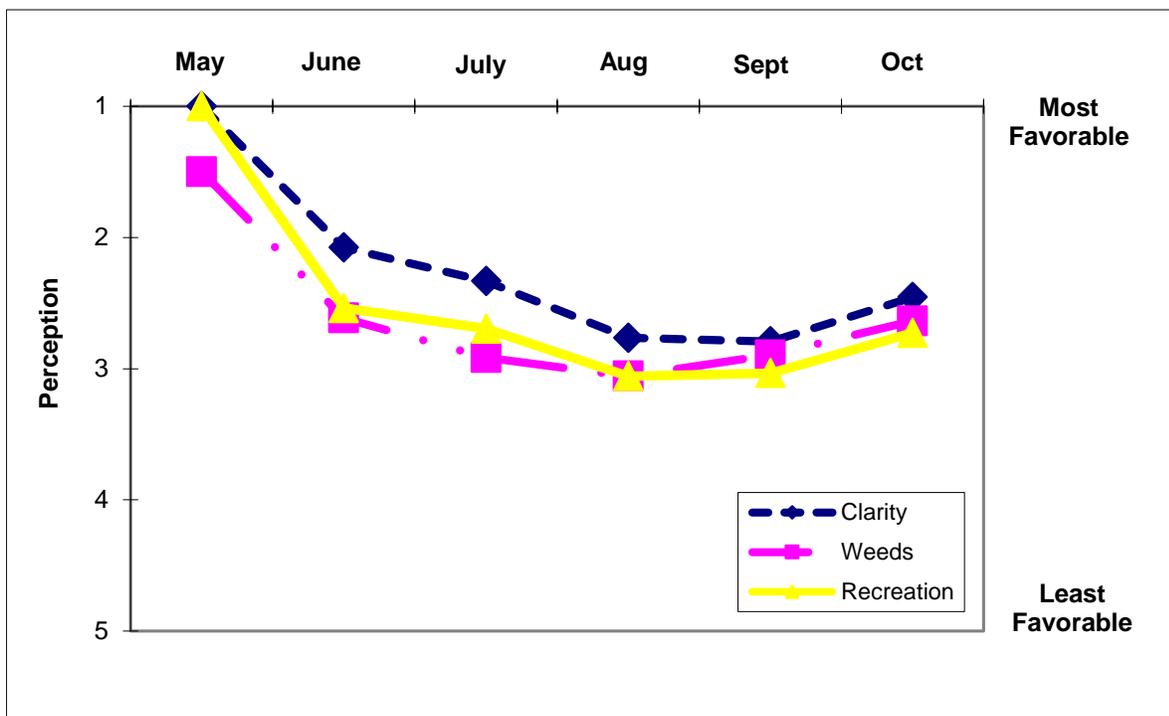
Time Series: Trophic Indicators, Typical Year (1997-2015)



Time Series: Lake Perception Indicators, 2015



Time Series: Lake Perception Indicators, Typical Year (1997-2015)



Appendix A- CSLAP Water Quality Sampling Results for Augur Lake

LNum	Lname	Date	Zbot	Zsd	Zsamp	Tot.P	NO3	NH4	TDN	TN/TP	TColor	pH	Cond25	Ca	Chl.a	Cl
120	Augur L	6/3/1997		3.55		0.014	0.01				5	7.11	163		1.80	
120	Augur L	6/15/1997	6.0	4.80		0.010	0.01				10	7.82	164		1.67	
120	Augur L	7/6/1997	6.0	3.75	1.0	0.011	0.01				5	7.44	168		4.46	
120	Augur L	7/21/1997	6.0	2.30		0.020	0.01				10	6.76	169		9.92	
120	Augur L	8/3/1997	6.0	2.30	1.5	0.012	0.01				7	8.08	172		13.80	
120	Augur L	8/24/1997	5.9	2.08	1.5	0.015	0.01				7	7.76	174		19.50	
120	Augur L	10/13/1997		3.00			0.01				5	7.87	184		5.92	
120	Augur L	5/25/1998	6.3	3.45	1.5	0.011	0.01				9	6.70	183		1.54	
120	Augur L	7/6/1998	6.3	2.05			0.01				24	6.84	129		7.92	
120	Augur L	7/19/1998	6.1	2.75	1.0		0.01				22	7.62	127		5.36	
120	Augur L	8/9/1998	6.0	2.65	1.5		0.01				19	8.14	135		6.72	
120	Augur L	8/23/1998	5.9	2.08	1.5						12	7.14	145		7.74	
120	Augur L	9/7/1998	6.2	2.10	1.5	0.023	0.01				16	7.92	151		11.90	
120	Augur L	9/20/1998	6.2	2.25	1.5	0.016					15	7.72	153		5.03	
120	Augur L	10/12/1998	6.1	2.70	1.5	0.017						7.57	158			
120	Augur L	6/21/1999		2.95	1.5	0.015	0.01				11	7.23	193		3.66	
120	Augur L	7/18/1999	5.8	3.40		0.012	0.01				15	8.13	193		8.30	
120	Augur L	8/1/1999	5.6	3.25	1.5	0.014	0.01				8	8.65	191		6.10	
120	Augur L	9/6/1999	6.8	2.45	1.5	0.010	0.01				8	7.56	200		8.85	
120	Augur L	9/20/1999	5.5	1.90	1.5	0.019	0.01				6	7.59	205		15.00	
120	Augur L	10/10/1999	5.5	3.35	1.5	0.009	0.01				7	7.22	213		9.65	
120	Augur L	6/26/2000	5.8	4.40	1.5	0.009	0.01				13	8.00	193		1.54	
120	Augur L	7/25/2000	6.3	2.60	1.5	0.015	0.01				6	7.74	212		8.00	
120	Augur L	8/6/2000	6.0	2.00	1.5	0.008	0.01				7	7.39	204		17.70	
120	Augur L	8/30/2000	5.5	1.50	1.5	0.016	0.01				16	7.68	208		27.00	
120	Augur L	9/12/2000	5.5	1.40	1.5	0.023	0.01				10	7.89	211		35.20	
120	Augur L	10/9/2000	5.6	2.80	1.5	0.016	0.03				7				9.10	
120	Augur L	6/10/2001		2.80	1.5	0.014	0.01				12	7.18	215		4.85	
120	Augur L	7/1/2001	6.0	2.95	1.5	0.031	0.01				7	7.48	217		10.10	
120	Augur L	7/31/2001	5.8	3.25	1.5	0.018	0.01				4	8.97	227		7.05	
120	Augur L	8/12/2001		1.55	1.5	0.015	0.01				8	8.51	229		9.47	
120	Augur L	9/3/2001	5.6	1.95	1.5	0.021	0.01				7	8.00	230		15.94	
120	Augur L	7/2/2003	6.4	3.75	1.5	0.015	0.01	0.01	0.33	49.66	12	8.10	256	18.0	1.4	
120	Augur L	7/20/2003	6.1	3.35	1.5	0.018	0.00	0.04	0.42	52.53	13	7.83	270		5.1	
120	Augur L	8/4/2003	6.1	2.50	1.5	0.015	0.00	0.00	0.14	21.07	14	8.48	260		5.3	
120	Augur L	8/17/2003	6.1	2.55	1.5	0.017	0.00	0.00	0.30	39.76	11	8.25	253		5.8	
120	Augur L	8/31/2003	6.1	1.80	1.5	0.019	0.02	0.01	0.33	38.41	12	7.59	255	18.0	13.8	
120	Augur L	9/13/2003	6.1	1.65	1.5	0.019	0.00	0.01	0.17	20.14	15	8.58	250		18.0	
120	Augur L	9/27/2003	6.1	1.80	1.5	0.021	0.01	0.02	0.17	17.63	12	7.75	269		0.5	
120	Augur L	10/13/2003	6.1	2.85	1.5	0.017	0.00	0.00	0.24	30.59	11	7.43	270		5.4	
120	Augur L	6/22/2004	6.1	4.60	1.5	0.011	0.01	0.01	0.42	84.98	13	6.99	240		1.3	
120	Augur L	7/8/2004		5.50	1.5	0.006	0.01	0.01	0.31	117.13	13	7.09	231		4.1	
120	Augur L	7/18/2004		3.50	1.5	0.006	0.02	0.01	0.44	152.15	22	6.87	137		1.2	
120	Augur L	8/1/2004		3.80	1.5	0.016			0.81	112.92	23	7.66	232		5.8	
120	Augur L	8/15/2004	6.4	4.60	1.5		0.01	0.01	0.31		27	7.74	242	18.5	3.1	
120	Augur L	8/28/2004		3.80		0.009	0.01	0.01	0.22	54.30	6	8.24	222		3.8	
120	Augur L	9/12/2004	6.1	3.00	1.5	0.010	0.01	0.02	0.44	94.40	12	7.61	231		0.4	
120	Augur L	9/26/2004	6.1	4.30	1.5	0.011	0.02	0.02	0.23	47.21	9	8.3	204			
120	Augur L	5/30/2005	6.4	3.58		0.009	0.01	0.01	0.01	1.21	9	6.37	136	16.0	3.1	
120	Augur L	6/12/2005	6.8	3.20	3.0	0.008	0.01	0.01	0.25	64.66	15	7.60	178			
120	Augur L	6/26/2005	6.7	3.15	3.1	0.008		0.01	0.01	1.34	15	7.42	161		4.5	
120	Augur L	7/10/2005	6.7	3.00	3.0	0.008	0.02	0.01	0.24	63.18	1	7.50	172		2.0	
120	Augur L	7/24/2005	6.4	3.25		0.012	0.02	0.01	0.23	43.20	26	7.58	157	14.1	2.5	
120	Augur L	8/7/2005		3.15	3.1	0.011	0.01	0.01	0.19	37.86	6	8.20	210		3.4	
120	Augur L	8/21/2005	6.7	2.20	3.1	0.017	0.01	0.01	0.17	22.61	24	7.23	208		0.5	
120	Augur L	9/4/2005	6.4	2.40	3.1	0.017	0.01	0.01	0.21	27.15	16	7.63	196		12.0	
120	Augur L	6/22/2006	7.7	3.85	3.0	0.012	0.038	0.02	0.41	75.24	14	8.11	174	13	1.99	
120	Augur L	7/9/2006	6.6	3.75	3.1	0.011	0.012	0.02	0.40	81.45	20	7.49	167		5.42	
120	Augur L	7/23/2006	6.7	2.75	2.9	0.011	0.023	0.02	0.77	160.34	23	7.6	161		5.73	
120	Augur L	8/13/2006	6.8	2.50	3.0	0.014	0.063	0.05	0.64	97.92	5	7.85	220		16.6	
120	Augur L	9/1/2006	6.5	2.75	3.0	0.019	0.011	0.01	0.26	30.04	11	8.19	174	20	1.32	
120	Augur L	9/10/2006	6.0	2.70	3.0	0.014	0.016	0.03	0.48	78.25	6	7.81	213		6.55	
120	Augur L	9/22/2006	6.3	2.80	3.0	0.017	0.007	0.02	0.52	65.61	18	7.59	185		7.79	

LNum	Lname	Date	Zbot	Zsd	Zsamp	Tot.P	NO3	NH4	TDN	TN/TP	TColor	pH	Cond25	Ca	Chl.a	Cl
120	Augur L	10/7/2006	6.5	3.40	3.0	0.015	0.006	0.02	0.35	52.90	10	6.98	222		4.26	
120	Augur L	7/1/2007	6.1	3.75	3.0	0.016	0.05	0.02	0.86	121.41	19	8.16	173	17.2	6.22	
120	Augur L	7/14/2007	6.4	3.10	6.4	0.016	0.00	0.01	0.59	79.95	12	9.04	167		9.84	
120	Augur L	8/5/2007	6.2	3.20	3.2	0.015	0.01	0.02	0.59	84.98	19	7.89	186		6.38	
120	Augur L	8/12/2007	6.1	2.90	3.0	0.016	0.01	0.02	0.57	78.09	14	7.66	179		6.46	
120	Augur L	8/21/2007	6.1	2.55	3.0	0.021		0.02			9	8.49	153	15.9	9.62	
120	Augur L	9/1/2007	6.0	2.45	3.0	0.018	0.00	0.02	0.44	53.08	17	8.00	180		9.35	
120	Augur L	9/8/2007	6.0	2.45	3.0	0.019	0.01	0.05	0.56	65.23	15	7.27	160		6.73	
120	Augur L	9/16/2007	6.1	2.50	3.0	0.019	0.01	0.08	0.49	56.86	17	7.04	124		7.53	
120	Augur L	7/5/2008	6.2	2.45	3.0	0.018	0.02	0.02	0.27	33.15	13	8.45	184	16.4	9.03	
120	Augur L	7/15/2008	6.1	2.15	3.0	0.016	0.00	0.01	0.22	30.09	10	7.87	151		9.23	
120	Augur L	8/9/2008	6.4	2.70	3.0	0.016	0.00	0.01	0.34	46.07	10	7.00	162		10.20	
120	Augur L	8/17/2008	6.3	2.60	3.0	0.017	0.00	0.03	0.22	28.81	10	7.24	185		10.13	
120	Augur L	8/23/2008	6.3	2.45	3.0	0.031	0.00	0.02	0.29	20.28	15	7.90	206	16.0	10.03	
120	Augur L	8/31/2008	6.4	2.55	3.0	0.028	0.01	0.00	0.21	16.77	9	7.96	216		7.42	
120	Augur L	9/8/2008	6.1	2.50	3.0	0.016	0.00	0.03	0.32	43.07	11	7.35	204		11.21	
120	Augur L	10/12/2008				0.017	0.02	0.01	0.25	33.69	8	7.53	217		5.92	
120	Augur L	06/07/2009	6.8	4.25		0.014	0.02	0.03	0.36	56.08	13	8.74	196	16.3	1.53	
120	Augur L	07/05/2009	6.5	2.60		0.017	0.02	0.03	0.27	34.70	12	6.93	202		8.24	
120	Augur L	07/17/2009	6.4	2.50		0.014	0.01	0.02	0.26	41.29	19	8.09	144		12.22	
120	Augur L	07/28/2009	6.4	2.85		0.013	0.01	0.02	0.26	46.29	20	8.02	143		6.61	
120	Augur L	08/12/2009	6.6	2.65		0.014	0.01	0.03	0.33	52.57	13	8.22	133	14.5	8.60	
120	Augur L	08/12/2009	grab		bloom											
120	Augur L	08/12/2009	grab		bloom											
120	Augur L	08/25/2009	6.4	3.40		0.016	0.01	0.04	0.34	48.83	15	7.96	190		6.10	
120	Augur L	09/09/2009	6.5	3.35		0.017	0.02	0.02	0.45	59.90	22				6.50	
120	Augur L	09/20/2009	6.4	3.05		0.023	0.01	0.02	0.43	40.43	11	8.23	211		7.03	
120	Augur L	7/3/2010	6.4	2.45		0.016	0.01	0.02	0.23	31.23	11	7.70	218	17.4	10.60	
120	Augur L	7/20/2010	6.4	3.20	1.5	0.018	0.02	0.03	0.27	32.21	10	7.21	209		4.00	
120	Augur L	7/31/2010	6.1	2.45	1.5	0.017	0.02	0.02	0.34	43.11	14	7.84	163		7.00	
120	Augur L	8/14/2010	6.4	3.05	1.5	0.015	0.04	0.02	0.35	51.68	10	7.63	224		7.20	
120	Augur L	8/27/2010	6.3	2.50	1.5	0.024	0.02	0.02	0.41	37.74	16	8.17	234	17.2	9.20	
120	Augur L	9/13/2010	5.8	2.20	1.5	0.022	0.01	0.02	0.45	45.41	11	8.54	179		11.40	
120	Augur L	9/23/2010	5.8	2.55	1.5	0.030	0.02	0.03	0.42	30.42	4	7.53	250		11.50	
120	Augur L	10/10/2010	6.8	2.70	1.5	0.020	0.06	0.02	0.47	50.36	9	7.59	231		11.90	
120	Augur L	7/3/2011	5.8	2.75	1.5	0.020	0.01	0.02	0.22	24.20	11	7.75	147	10.7	0.70	
120	Augur L	7/17/2011	6.4	2.30	1.5	0.024	0.01	0.02	0.45	40.84	10	7.59	155		9.30	
120	Augur L	7/30/2011	6.4	1.65	1.5	0.026	0.02	0.02	0.66	56.68	13	8.43	147		17.60	
120	Augur L	8/14/2011	6.4	1.05	1.5	0.030	0.03	0.04	0.94	69.49	17	8.63	159		39.90	
120	Augur L	8/26/2011	6.4	1.75	1.5	0.047	0.01	0.05	0.88	41.31	10	7.26	159	15.1	28.60	
120	Augur L	9/10/2011	6.6	2.40	1.5	0.028	0.03	0.04	0.61	47.96	20	7.75	135		16.10	
120	Augur L	9/25/2011	6.4	2.25		0.029	0.02	0.01	0.38	29.46	21	8.81	59		15.00	
120	Augur L	10/9/2011	grab		bloom											
120	Augur L	10/9/2011	6.6	2.30	1.5	0.031	0.05	0.04	0.56	39.77	24	7.87	133		16.00	
120	Augur L	7/3/2012	6.5	2.80	1.5	0.021	0.01	0.02	0.49	51.83	15	6.75	157	16.7	7.50	
120	Augur L	7/15/2012	6.5	2.55	1.5	0.024	0.01	0.08	0.27	25.03	10	8.00	153		5.20	
120	Augur L	7/28/2012	6.5	2.50	1.5	0.030	0.01	0.02	0.55	40.49	12	8.40	179		10.60	
120	Augur L	8/14/2012	6.5	2.40	1.5	0.027	0.01	0.02	0.53	43.26	11	7.76	189		10.50	
120	Augur L	8/27/2012	6.5	2.65	1.5	0.025	0.01	0.02	0.52	46.21	8	7.42	186	17.4	5.00	
120	Augur L	9/13/2012	6.5	3.15	1.5	0.025	0.01	0.02	0.26	22.98	7	7.22	221		8.80	
120	Augur L	9/27/2012	6.5	2.70	1.5	0.025	0.01	0.03	0.44	38.28	7	7.05	128		7.50	
120	Augur L	10/13/2012	6.5	2.95	1.5	0.025	0.01	0.02	0.55	48.54	8	8.16	125		6.40	
120	Augur L	6/30/2013	6.6	3.50	1.5	0.016	0.01	0.03	0.51	70.76	23	7.99	151		3.40	
120	Augur L	7/20/2013	6.3	3.80	1.5	0.027			0.44	35.40	42	8.58	137		1.50	
120	Augur L	7/31/2013	6.3	3.80	1.5	0.020	0.02	0.04	0.26	29.07	20	8.65	143			
120	Augur L	8/17/2013	6.3	2.50	1.5	0.020					11	7.84	120		8.00	
120	Augur L	9/2/2013	6.6	2.55	1.5	0.021	0.01	0.02	0.50	53.54	21	8.66	167		8.20	
120	Augur L	9/18/2013	6.6	1.65	1.5	0.022			0.34	34.88	14	7.67	175		19.20	
120	Augur L	10/2/2013	6.3	2.85	1.5	0.021	0.01	0.04	0.57	58.98	12	7.53	178		12.20	
120	Augur L	10/16/2013	6.4	2.40	1.5	0.022			0.48	47.65	13	7.43	178		15.30	
120	Augur L	6/5/2015	6.5	2.80	1.5	0.016	0.00	0.02	0.29	18.41	6	7.26	227	10.1	5.70	
120	Augur L	6/21/2015	6.5	3.60	1.5	0.019			0.34	17.94	6	7.86	222		4.30	
120	Augur L	7/10/2015	6.8	3.10	1.5	0.015			0.37	24.67	14	7.46	176		6.50	38.6
120	Augur L	7/25/2015	6.5	2.60	1.5	0.029			0.34	11.76	12	7.92	201		8.20	
120	Augur L	8/8/2015	6.5	2.50	1.5	0.021	0.00	0.03	0.64	30.58	11	7.95	221	11.6	8.00	
120	Augur L	8/23/2015	6.5	2.80	1.5	0.015			0.53	36.19	13	8.36	154		8.00	

LNum	Lname	Date	Zbot	Zsd	Zsamp	Tot.P	NO3	NH4	TDN	TN/TP	TColor	pH	Cond25	Ca	Chl.a	Cl
120	Augur L	9/10/2015	6.5	2.60	1.5	0.026	0.01	0.05	0.48	18.47	5	8.54	167		34.20	40.7
120	Augur L	9/25/2015			bloom											
120	Augur L	9/25/2015	6.5	2.30	1.5	0.037			0.46	12.28	7	8.08	220		14.70	

LNum	Lname	Date	Zbot	Zsd	Zsamp	Tot.P	NO3	NH4				NO2	Fe	Mn	As
120	Augur L	9/7/1998				0.012									
120	Augur L	9/20/1998				0.016									
120	Augur L	10/12/1998				0.014									
120	Augur L	7/5/2008	6.2			0.020									
120	Augur L	7/15/2008	6.1			0.018									
120	Augur L	8/9/2008	6.4			0.016									
120	Augur L	8/17/2008	6.3			0.018									
120	Augur L	8/23/2008	6.3			0.027									
120	Augur L	8/31/2008	6.4			0.017									
120	Augur L	9/8/2008	6.1			0.015									
120	Augur L	10/12/2008				0.016									
120	Augur L	06/07/2009	6.8		6	0.018		0.03							
120	Augur L	07/05/2009	6.5		6	0.021									
120	Augur L	07/17/2009	6.4		5	0.018		0.04							
120	Augur L	07/28/2009	6.4		5	0.027									
120	Augur L	08/12/2009	6.6		5	0.027		0.21				0.53	0.57	0.34	
120	Augur L	08/25/2009	6.4		5	0.092									
120	Augur L	09/09/2009	6.5		5	0.030		0.03				0.10	0.10	0.80	
120	Augur L	09/20/2009	6.4		5	0.020									
120	Augur L	7/3/2010	6.4		5.0	0.018		0.02							
120	Augur L	7/31/2010	6.1		4.5	0.026		0.02							
120	Augur L	8/27/2010	6.3		4.8	0.019		0.02				0.14	0.05	1.10	
120	Augur L	9/13/2010	5.8		4.3							0.20	0.05		
120	Augur L	9/23/2010	5.8		4.5	0.028		0.04							0.34
120	Augur L	7/3/2011	5.8	2.75	4.3	0.025		0.02				0.01	0.04		
120	Augur L	7/30/2011	6.4	1.65	5.0	0.028		0.01				0.01	0.06		
120	Augur L	8/26/2011	6.4	1.75	5.0	0.046		0.20				0.01	0.13	1.00	
120	Augur L	9/25/2011	6.4	2.25	4.9	0.023		0.02				0.01	0.01	1.00	
120	Augur L	7/3/2012			5.0	0.023		0.06							
120	Augur L	7/15/2012			5.0										
120	Augur L	7/28/2012			5.0	0.025		0.15							
120	Augur L	8/14/2012			5.0										
120	Augur L	8/27/2012			6.5	0.026		0.03							
120	Augur L	9/13/2012			5.0										
120	Augur L	9/27/2012			5.0	0.024		0.01							
120	Augur L	10/13/2012			5.0										
120	Augur L	6/30/2013			5.1	0.017		0.04							
120	Augur L	7/17/2013			4.8										
120	Augur L	7/31/2013			4.8	0.016		0.04							
120	Augur L	8/17/2013			4.8										
120	Augur L	9/2/2013			5.1	0.013		0.06							
120	Augur L	9/18/2013			5.1										
120	Augur L	10/2/2013			4.8	0.017		0.05							
120	Augur L	10/16/2013													

LNum	PName	Date	Site	TAir	TH20	QA	QB	QC	QD	QF	QG	AQ-PC	AQ-Chla	MC-LR	Ana-a	Cyl	FP-Chl	FP-BG	HAB form	Shore HAB
120	Augur L	6/3/1997	epi	20	19	2	2	2	6											
120	Augur L	6/15/1997	epi	20	22	2	2	4	2											
120	Augur L	7/6/1997	epi	27	24	2	4	3	2											
120	Augur L	7/21/1997	epi	15	24	3	4	4	25											
120	Augur L	8/3/1997	epi	29	23	3	4	3	25											
120	Augur L	8/24/1997	epi	24	23	2	3	3	2											
120	Augur L	10/13/1997	epi	20	15	2	2	1	5											
120	Augur L	5/25/1998	epi	25	20	1	2	1	25											
120	Augur L	7/6/1998	epi	24	22	3	3	3	12											
120	Augur L	7/19/1998	epi	30	26	2	3	3	2											
120	Augur L	8/9/1998	epi	30	26	2	4	3	25											
120	Augur L	8/23/1998	epi	23	22	3	4	4	1235											

LNum	PName	Date	Site	TAir	TH20	QA	QB	QC	QD	QF	QG	AQ-PC	AQ-Chla	MC-LR	Ana-a	Cyl	FP-Chl	FP-BG	HAB form	Shore HAB
120	Augur L	9/7/1998	epi	23	23	4	3	4	12345											
120	Augur L	9/20/1998	epi	18	20	2	3	3	235											
120	Augur L	10/12/1998	epi	15	14	2	4	4	1245											
120	Augur L	6/21/1999	epi	32	21	2	4	3	2											
120	Augur L	7/18/1999	epi	29	25	3	4	4	2											
120	Augur L	8/1/1999	epi		27	3	4	4	2											
120	Augur L	9/6/1999	epi	27	24	3	4	4	12345											
120	Augur L	9/20/1999	epi	20	18															
120	Augur L	10/10/1999	epi	10	16	2	2	2	25											
120	Augur L	6/26/2000	epi	28	18	2	3	3	25											
120	Augur L	7/25/2000	epi	29	17	4	4	3	123											
120	Augur L	8/6/2000	epi	22	24	3	3	4	1235											
120	Augur L	8/30/2000	epi	27	23	4	3	4	234											
120	Augur L	9/12/2000	epi	22	20	4	4	4	12345											
120	Augur L	10/9/2000	epi	5	12	3	2	3	125											
120	Augur L	6/10/2001	epi	26	19	2	3	3	2											
120	Augur L	7/1/2001	epi	21	19	3	1	2	5											
120	Augur L	7/31/2001	epi	30	23	2	2	2	3											
120	Augur L	8/12/2001	epi	30	23	3	2	2	3											
120	Augur L	9/3/2001	epi	19	20	3	2	2	13											
120	Augur L	7/2/2003	epi	26	25	2	3	3	2											
120	Augur L	7/20/2003	epi	23	24	2	4	3	234											
120	Augur L	8/4/2003	epi	27	25	2	3	4	1234											
120	Augur L	8/17/2003	epi	25	25	2	4	3	234											
120	Augur L	8/31/2003	epi	20	21		4	4	25											
120	Augur L	9/13/2003	epi	22	20	3	3	3	25											
120	Augur L	9/27/2003	epi	22	18	3	3	3	5											
120	Augur L	10/13/2003	epi	15	14	1	2	2	5											
120	Augur L	6/22/2004	epi	23	22	2	2	2	0											
120	Augur L	7/8/2004	epi	22	22	2	3	2	5											
120	Augur L	7/18/2004	epi	27	23	2	3	2	0											
120	Augur L	8/1/2004	epi	30	25	2	3	2	0											
120	Augur L	8/15/2004	epi	22	22	3	3	3	38											
120	Augur L	8/28/2004	epi	26	24	2	3	3	23											
120	Augur L	9/12/2004	epi	28	20	2	2	2	0											
120	Augur L	9/26/2004	epi	17	18	2	2	2	58											
120	Augur L	5/30/2005	epi	25	17		1	1	5											
120	Augur L	6/12/2005	epi	32	24	2	2	1	6											
120	Augur L	6/26/2005	epi	31	26	3	3	2	0											
120	Augur L	7/10/2005	epi	25	24	2	3	1	0											
120	Augur L	7/24/2005	epi	24	27	2	2	1	0											
120	Augur L	8/7/2005	epi	29	27	3	3	1	0											
120	Augur L	8/21/2005	epi	27	24	3	3	3	123											
120	Augur L	9/4/2005	epi	18	22	3	3	2	3											
120	Augur L	6/22/2006	epi	22	23	1	1	1	0											
120	Augur L	7/9/2006	epi	31	24	2	1	1	0											
120	Augur L	7/23/2006	epi	27	25	2	2	2	5											
120	Augur L	8/13/2006	epi	23	24	3	2	2	2											
120	Augur L	9/1/2006	epi	24	20	2	3	3	2											
120	Augur L	9/10/2006	epi	15	20	2	3	3	23											
120	Augur L	9/22/2006	epi	18	18	3	3	3	23											
120	Augur L	10/7/2006	epi	17	15	2	3	3	23											
120	Augur L	7/1/2007	epi	19	23	2	3	3	23											
120	Augur L	7/14/2007	epi	23	23	2	3	2	23											
120	Augur L	8/5/2007	epi	23	26	3	3	3	23											
120	Augur L	8/12/2007	epi	29	24	3	3	3	23											
120	Augur L	8/21/2007	epi	22	22	3	3	3	23											
120	Augur L	9/1/2007	epi	23	22	3	3	3	25											
120	Augur L	9/8/2007	epi	30	23	2	3	3	2											
120	Augur L	9/16/2007	epi	16	19	2	3	3	2											
120	Augur L	7/5/2008	epi	25	24	2	3	3	2											

LNum	PName	Date	Site	TAir	TH20	QA	QB	QC	QD	QF	QG	AQ-PC	AQ-Chla	MC-LR	Ana-a	Cyl	FP-Chl	FP-BG	HAB form	Shore HAB
120	Augur L	7/15/2008	epi	26	24	2	3	3	2											
120	Augur L	8/9/2008	epi	27	24	2	2	3	2											
120	Augur L	8/17/2008	epi	26	23	2	2	3	258											
120	Augur L	8/23/2008	epi	27	23	2	3	3	2											
120	Augur L	8/31/2008	epi	26	23	3	3	3	28											
120	Augur L	9/8/2008	epi	25	23	2	3	3	238											
120	Augur L	10/12/2008	epi																	
120	Augur L	06/07/2009	epi	21	18	2	3	3	2											
120	Augur L	07/05/2009	epi	25	23	2	3	3	12											
120	Augur L	07/17/2009	epi	26	22	3	3	3	1235											
120	Augur L	07/28/2009	epi	29	24	2	3	3	25											
120	Augur L	08/12/2009	epi	25	25	3	3	3	23					0.14						
120	Augur L	08/12/2009	bloom											0.03						
120	Augur L	08/12/2009	bloom											0.8						
120	Augur L	08/25/2009	epi	27	25	3	3	3	23											
120	Augur L	09/09/2009	epi	25	21	3	3	3	2											
120	Augur L	09/20/2009	epi	17	18	3	3	3	2			69.53		0.38						
120	Augur L	7/3/2010	epi	32	24	2	3	3	2	0	0									
120	Augur L	7/20/2010	epi	27	26	2	3	3	2	0	0									
120	Augur L	7/31/2010	epi	25	26	2	3	3	2	0	0	44.99								
120	Augur L	8/14/2010	epi	29	26	3	3	3	2	0	0	60.00		0.03						
120	Augur L	8/27/2010	epi	25	25	3	3	3	12	4	0									
120	Augur L	9/13/2010	epi	20	20	3	3	3	12	4	4	232.00		0.07						
120	Augur L	9/23/2010	epi	16	18	3	3	3	1	0	0									
120	Augur L	10/10/2010	epi	22	16	3	3	3	12	0	0	120.00		0.06						
120	Augur L	7/3/2011	epi	26	24	2	3	2	2	0	0	9.50	2.80							
120	Augur L	7/17/2011	epi	31	26	3	3	3	12	0	0	18.00	2.80	0.15	<0.9	<0.2			fi	
120	Augur L	7/30/2011	epi	28	28	3	3	3	12	0	0	103.80	7.10	0.38					fi	
120	Augur L	8/14/2011	epi	28	25	3	3	3	13	4	4	11.70	1.30	0.15	<0.4	<0.1			fi	
120	Augur L	8/26/2011	epi	25	23	3	2	3	1	4	0	108.10	14.10						f	
120	Augur L	9/10/2011	epi	23	22	3	2	3	1	0	0	56.50	10.60							
120	Augur L	9/25/2011	epi	25	21	2	2	3	0	0	0	35.30	13.60							
120	Augur L	10/9/2011	bloom											64.90					bf	
120	Augur L	10/9/2011	epi	22	15	3	2	3	13	0	0	49.60	10.60							
120	Augur L	7/3/2012	epi	33	26	2	2	3	1	0	0	2.60	1.20	<0.30	<0.392		3.43	0.48	I	
120	Augur L	7/15/2012	epi	32	27	3	3	3	1	0	0	13.40	0.80	<0.30	<0.423		3.90	1.90	FI	
120	Augur L	7/28/2012	epi	5	26	2	3	3	1	0	0	22.40	1.20	<0.30	<0.330		5.53	1.97	I	
120	Augur L	8/14/2012	epi	28	26	3	3	3	1	0	0	17.10	1.20	0.62	<0.552		4.72	2.57	F	
120	Augur L	8/27/2012	epi	25	24	3	3	3	0	0	0	7.60	1.10	<0.30	<0.642		3.97	0.33	FI	
120	Augur L	9/13/2012	epi	26	22	3	3	3	12	0	0	7.50	1.00	<0.30	<3.205		2.95	0.52	FI	
120	Augur L	9/27/2012	epi	15	18	3	3	3	12	0	0	11.20	0.90	<0.30	<3.205		1.74	0.00		
120	Augur L	10/13/2012	epi	15	13	3	3	3	12	0	0	5.30	1.20	<0.30	<3.205		3.55	0.73		
120	Augur L	6/30/2013	epi	27	24	2	3	3	2	0	0	5.30	1.20	<0.30	<3.205		3.55	0.73	I	I
120	Augur L	7/20/2013	epi	37	29	2	3	3	2	0	0	2.80	1.60	<0.30	<0.510		2.90	0.30	FI	I
120	Augur L	7/31/2013	epi	29	25	3	3	3	12	0	0	4.90	1.50	<0.30	<0.910		2.80	1.00	F	F
120	Augur L	8/17/2013	epi	26	22	3	4	4	2	0	0	8.80	2.60	<0.30	<0.380		4.10	0.70	F	I
120	Augur L	9/2/2013	epi	26	24	3	3	4	2	0	0	24.60	5.60	<0.30	<0.390		8.90	2.60	F	F
120	Augur L	9/18/2013	epi	22	18	4	3	3	123	4	4	27.60	2.40	<0.30	<1.100		5.80	3.00	F	I
120	Augur L	10/2/2013	epi	23	18	3	3	3	12	0	0	63.30	6.50	<0.30	<19.130		15.90	9.20	F	
120	Augur L	10/16/2013	epi	18	16	3	3	3	2	0	0	55.70	2.50	<0.30	<0.090		9.60	7.00	I	I
120	Augur L	6/5/2015	epi	26	20	2	3	3	25	0	0	4.80	0.60	<0.77	<0.126	<1.739	1.88	0.00	F	I
120	Augur L	6/21/2015	epi	25	23	3	3	3	2	0	0	2.70	0.70	<0.59	<0.004	<0.001	1.81	0.00	F	I
120	Augur L	7/10/2015	epi	31	24	2	3	3	2	0	0	8.60	0.70	<1.01	<0.003	<0.011	3.12	0.00	I	I
120	Augur L	7/25/2015	epi	27	24	3	3	3	2	0	0	22.90	0.50	<0.30	<0.002	<0.014	4.28	1.27	F	I
120	Augur L	8/8/2015	epi	26	24	3	3	3	12	0	0	11.30	0.90	<1.13	<0.003	<0.013	3.20	0.00	F	I
120	Augur L	8/23/2015	epi	32	26	3	3	3	12	0	0	0.05	0.20	<0.21	<0.003	<0.010	3.85	1.13	F	I
120	Augur L	9/10/2015	epi	26	25	3	3	3	2	0	0	39.20	0.70	<0.37	0.00	<0.022	7.06	2.47	F	I
120	Augur L	9/25/2015	bloom											<1.20	<0.164	<0.032	7.33	7.18		
120	Augur L	9/25/2015	epi	17	19	3	3	4	23	4	4	35.70	1.10	<0.30	<0.007	<0.035	7.77	3.58	CF	CF
120	Augur L	9/2/2013			22															
120	Augur L	9/18/2013			19															

LNum	PName	Date	Site	TAir	TH20	QA	QB	QC	QD	QF	QG	AQ-PC	AQ-Chla	MC-LR	Ana-a	Cyl	FP-Chl	FP-BG	HAB form	Shore HAB
120	Augur L	10/2/2013			18															
120	Augur L	10/16/2013			16															
120	Augur L	6/5/2015			19															
120	Augur L	6/21/2015			22															
120	Augur L	7/10/2015			23															
120	Augur L	7/25/2015			24															
120	Augur L	8/8/2015			24															
120	Augur L	8/23/2015			25															
120	Augur L	9/10/2015			24															
120	Augur L	9/25/2015			19															

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 Waterbodies Listing for Augur Lake

Augur Lake (1004-0050)

Minor Impacts

Waterbody Location Information

Revised: 03/05/2009

Water Index No:	C- 25- 8-P213	Drain Basin:	Lake Champlain
Hydro Unit Code:	02010004/070	Str Class:	A
Waterbody Type:	Lake (Unknown Trophic)	Reg/County:	5/Essex Co. (16)
Waterbody Size:	359.9 Acres	Quad Map:	WILLSBORO (D-27-0) ...
Seg Description:	entire lake		

Water Quality Problem/Issue Information

(CAPS indicate MAJOR Use Impacts/Pollutants/Sources)

Use(s) Impacted	Severity	Problem Documentation
Recreation	Stressed	Known

Type of Pollutant(s)

Known: ALGAL/WEED GROWTH, PROBLEM SPECIES (Eurasian milfoil)
Suspected: ---
Possible: Nutrients

Source(s) of Pollutant(s)

Known: HABITAT MODIFICATION
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
TMDL/303d Status: n/a

Resolution Potential: Medium

Further Details

Overview

Public bathing and other recreational uses (swimming, fishing, boating) in Augur Lake are thought to be stressed by excessive weed growth in the lake, primarily invasive species (Eurasian milfoil). These conditions were reported by the Essex County WQCC and also verified by the Darrin Freshwater Institute, as noted in recent CSLAP Reports.

Water Quality Sampling

Augur Lake has been sampled as part of the NYSDEC Citizen Statewide Lake Assessment Program (CSLAP) beginning in 1997 and continuing through the present. An Interpretive Summary report of the findings of this sampling was published in 2007. These data indicate that the lake continues to be best characterized as mesotrophic, or moderately productive. Indicators have been more favorable in recent years, but these changes may be within the natural variability of the lake. Phosphorus levels in the lake occasionally exceed the state guidance values indicating impacted/stressed recreational uses. However, corresponding transparency measurements consistently exceed the recommended minimum for swimming beaches. Measurements of pH typically fall within the state water quality standard range of 6.5 to 8.5. The lake water is slightly to moderately colored, but this appears to be reflective of natural conditions in the watershed. (DEC/DOW, BWAM/CSLAP, February 2007)

Recreational Assessment

Public perception of the lake and its uses is also evaluated as part of the CSLAP program. This assessment indicates recreational suitability of the lake is generally favorable, and more so in recent years. The recreational suitability of the lake is described most frequently as "excellent" or only "slightly" impacted. The lake itself is most often described as "not quite crystal clear" or as "having a definite algal greenness." Assessments have noted that aquatic plants consistently grow to the lake surface and often the growth is dense, impacting recreational uses. Aquatic plants include invasives; Eurasian milfoil has been verified by the Darrin Freshwater Institute. (DEC/DOW, BWAM/CSLAP, February 2007)

Lake Uses

This lake waterbody is designated class A, suitable for use as a water supply, public bathing beach, general recreation and aquatic life support. 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.

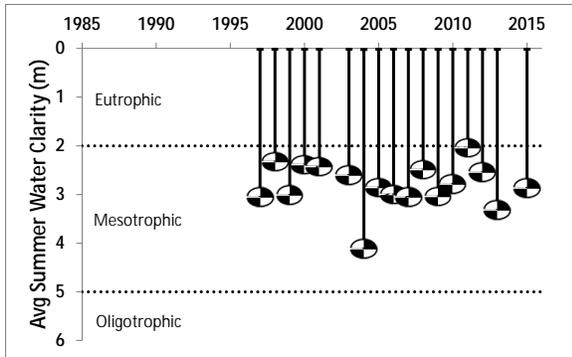
Segment Description

This segment includes the entire area of Augur Lake (P213).

Appendix C- Long Term Trends for Augur Lake

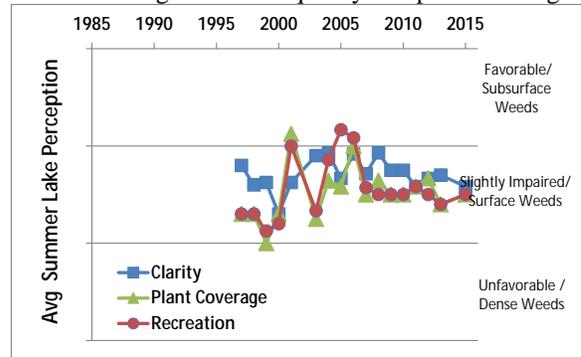
Long Term Trends: Water Clarity

- No long term trend, and fairly stable
- Most readings typical of *mesotrophic* lakes



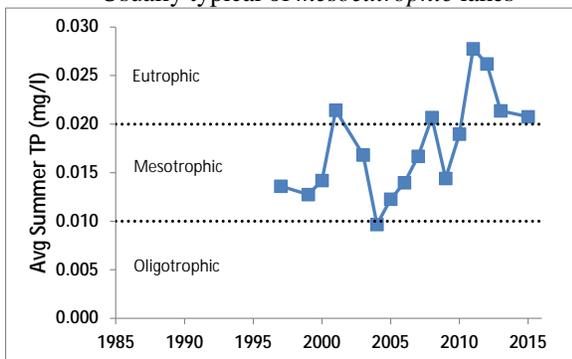
Long Term Trends: Lake Perception

- No long term trends; recent deg. recreation
- Recreational perception connected to changes in water quality and plant coverage



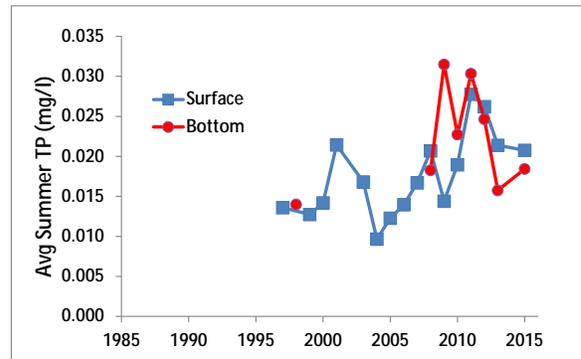
Long Term Trends: Phosphorus

- General increase in TP since mid-2000s, but decrease since early 2010s
- Usually typical of *mesoeutrophic* lakes



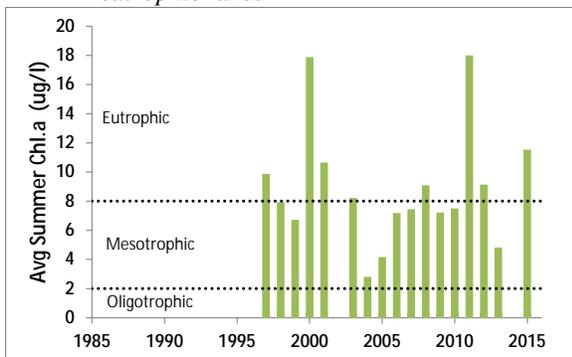
Long Term Trends: Bottom Phosphorus

- Bottom TP close to surface TP readings
- Does not appear to have resulted in increase in surface TP levels



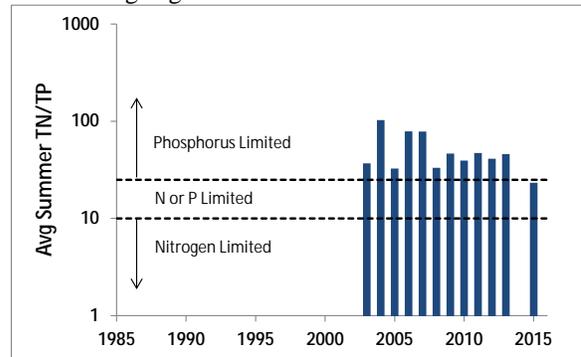
Long Term Trends: Chlorophyll a

- No long term trend; higher readings in 2013
- Most readings typical of *mesotrophic* to *eutrophic* lakes



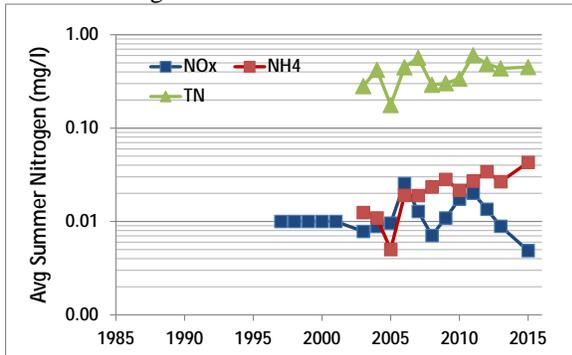
Long Term Trends: N:P Ratio

- Slight decrease in mid-2000s
- Most readings indicate phosphorus limits algae growth



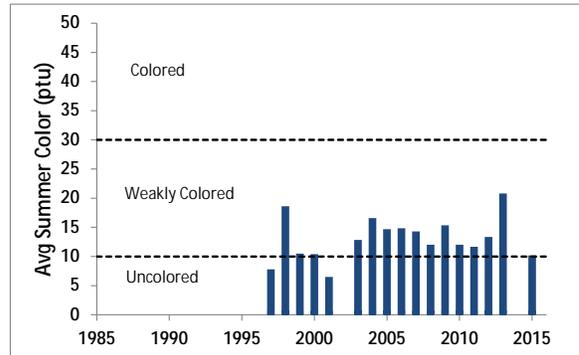
Long Term Trends: Nitrogen

- NH₄ ↑; slight ↑TN and slight ↓ NO_x
- Moderately low nitrate, ammonia and total nitrogen



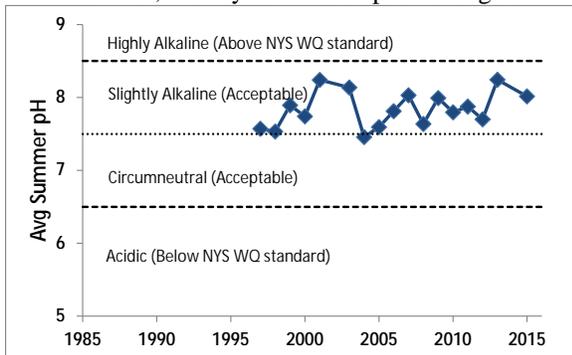
Long Term Trends: Color

- No long term trend
- Most readings typical of *uncolored* to *weakly colored* lakes



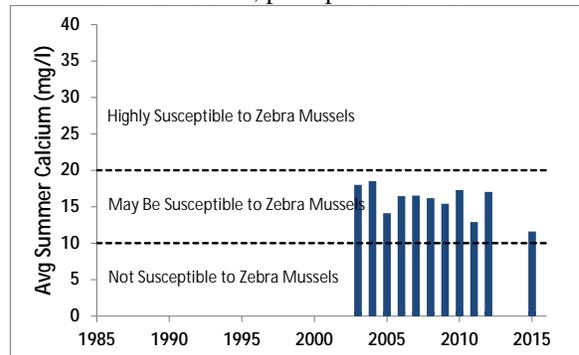
Long Term Trends: pH

- General increase in pH since mid-2000s
- Most readings typical of *slightly alkaline* lakes, usually within acceptable ranges



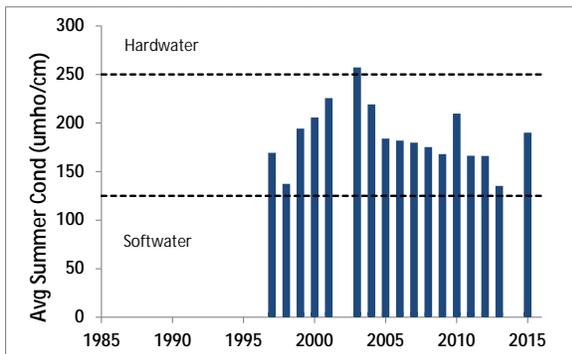
Long Term Trends: Calcium

- No long term trend, but lower in 2015
- Most readings indicate some susceptibility to zebra mussels, perhaps near inlets



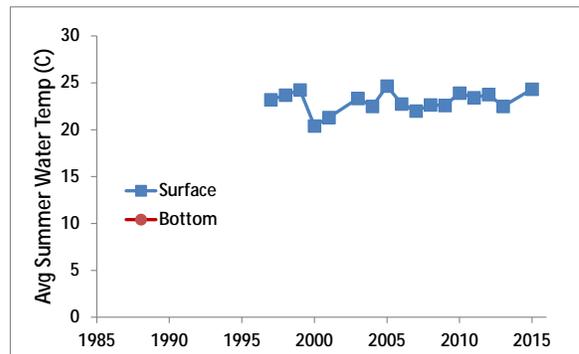
Long Term Trends: Conductivity

- ↓ in recent years though slight rise in 2015
- Most readings typical of lakes with intermediate hardness



Water Temperature: Long Term Trends:

- No long-term trends in surface temperature
- No deepwater temperature data available



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.

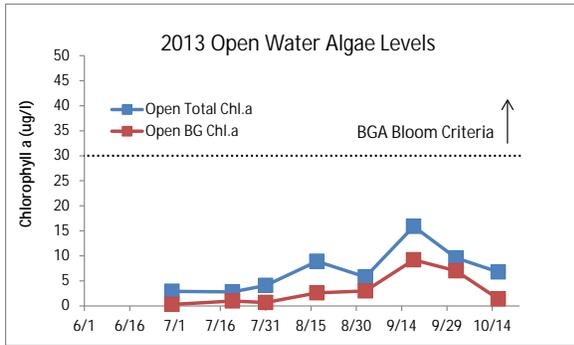


Figure D1:
2013 Open Water Total and BGA Chl.a

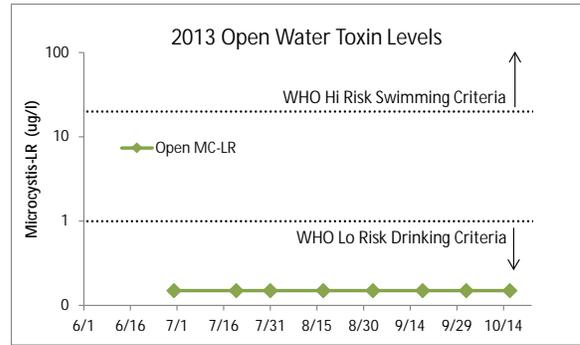


Figure D2:
2013 Open Water Microcystin-LR



Figure D3:
2013 Shoreline Total and BGA Chl.a

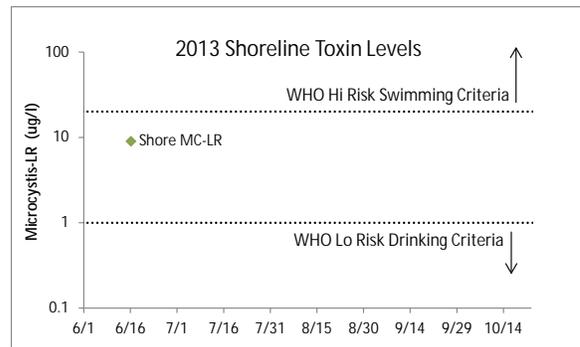


Figure D4:
2013 Shoreline Microcystin-LR

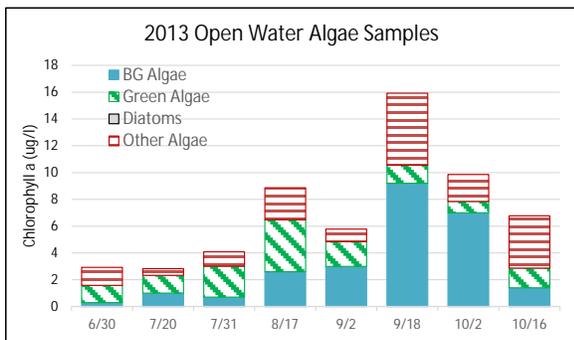


Figure D5:
2013 Open Water Algae Types

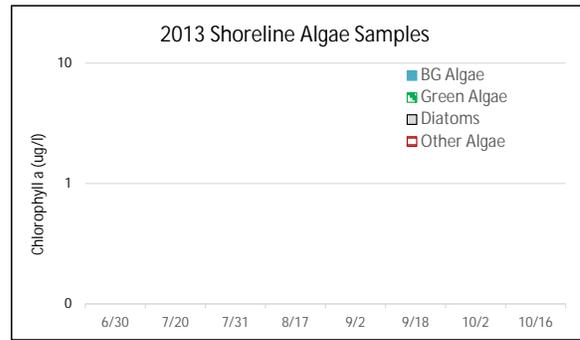


Figure D6:
2013 Shoreline Algae Types

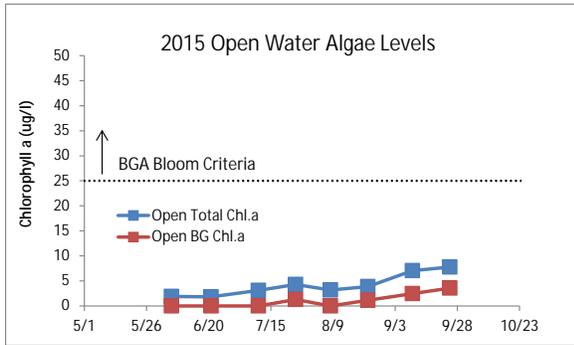


Figure D7:
2015 Open Water Total and BGA Chl.a

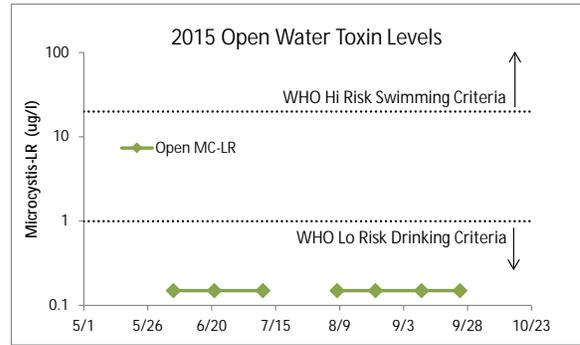


Figure D8:
2015 Open Water Microcystin-LR

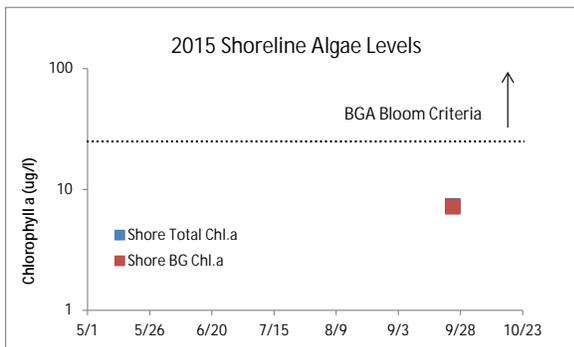


Figure D9:
2015 Shoreline Total and BGA Chl.a

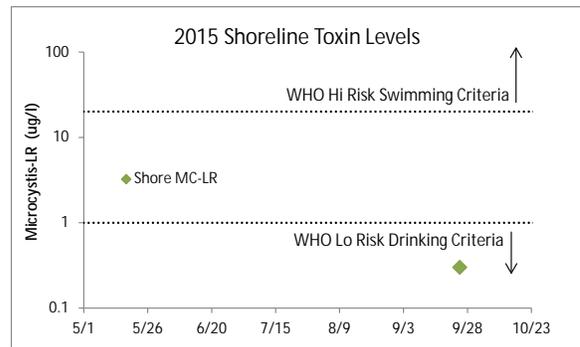


Figure D10:
2015 Shoreline Microcystin-LR

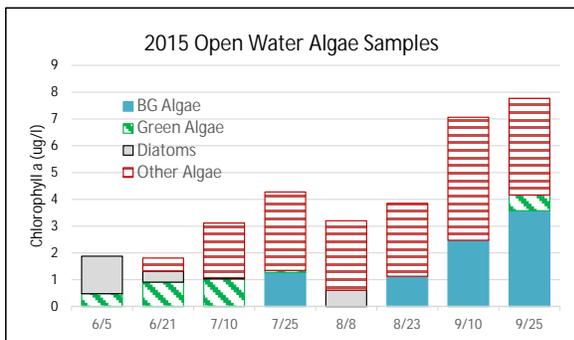


Figure D11:
2015 Open Water Algae Types

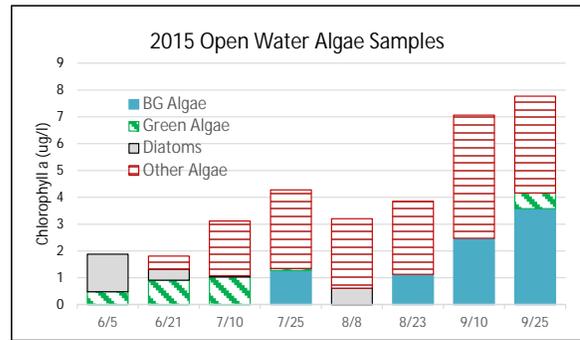


Figure D12:
2015 Shoreline Algae Types

Appendix E: AIS Species in Essex County

The table below shows the invasive aquatic plants and animals that have been documented in Essex 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 - Essex County			
Waterbody	Kingdom	Common name	Scientific name
Augur Lake	Plant	Eurasian watermilfoil	<i>Myriophyllum spicatum</i>
Bartlett Pond	Plant	Eurasian watermilfoil	<i>Myriophyllum spicatum</i>
Butternut Pond	Plant	Eurasian watermilfoil	<i>Myriophyllum spicatum</i>
Chapel Pond	Animal	Allegheny crayfish	<i>Orconectes obscurus</i>
Eagle Lake	Plant	Eurasian watermilfoil	<i>Myriophyllum spicatum</i>
Franklin Falls Pond	Plant	Eurasian watermilfoil	<i>Myriophyllum spicatum</i>
Franklin Falls Pond	Plant	Curly leafed pondweed	<i>Potamogeton crispus</i>
Franklin Falls Pond	Plant	Curly leafed pondweed	<i>Potamogeton crispus</i>
Goodnow Flowage	Plant	Brittle naiad	<i>Najas minor</i>
Highlands Forge Lake	Plant	Eurasian watermilfoil	<i>Myriophyllum spicatum</i>
Lake Champlain	Animal	Spiny waterflea	<i>Bythotrephes longimanus</i>
Lake Champlain	Animal	Zebra mussel	<i>Dreissena polymorpha</i>
Lake Champlain	Plant	Variable watermilfoil	<i>Myriophyllum heterophyllum</i>
Lake Champlain	Plant	Eurasian watermilfoil	<i>Myriophyllum spicatum</i>
Lake Champlain	Plant	Water chestnut	<i>Trapa natans</i>
Lake Eaton	Plant	European frogbit	<i>Hydrocharis morsus-ranae</i>
Lake Flower	Plant	Variable watermilfoil	<i>Myriophyllum heterophyllum</i>
Lake George	Animal	Zebra mussel	<i>Dreissena polymorpha</i>
Lake George	Plant	Eurasian watermilfoil	<i>Myriophyllum spicatum</i>
Lake George	Animal	Virile crayfish	<i>Orconectes virilis</i>
Lake George	Plant	Curly leafed pondweed	<i>Potamogeton crispus</i>
Lake Placid	Plant	Variable watermilfoil	<i>Myriophyllum heterophyllum</i>
Lake Placid	Plant	Variable watermilfoil	<i>Myriophyllum heterophyllum</i>
Lincoln Pond	Plant	Eurasian watermilfoil	<i>Myriophyllum spicatum</i>
Long Pond	Plant	Eurasian watermilfoil	<i>Myriophyllum spicatum</i>

Waterbody	Kingdom	Common name	Scientific name
Long Pond	Animal	Allegheny crayfish	<i>Orconectes obscurus</i>
Minerva Lake	Plant	Eurasian watermilfoil	<i>Myriophyllum spicatum</i>
Mirror Lake	Plant	Broadleaf Water-milfoil	<i>Myriophyllum heterophyllum</i>
Mirror Lake	Plant	Curly leafed pondweed	<i>Potamogeton crispus</i>
Nichols Pond	Animal	Allegheny crayfish	<i>Orconectes obscurus</i>
North Pond	Plant	Eurasian watermilfoil	<i>Myriophyllum spicatum</i>
Oseetah Lake	Plant	Eurasian watermilfoil	<i>Myriophyllum spicatum</i>
Paradox Lake	Plant	Eurasian watermilfoil	<i>Myriophyllum spicatum</i>
Paradox Lake	Plant	Curly leafed pondweed	<i>Potamogeton crispus</i>
Paradox Lake	Plant	Curly leafed pondweed	<i>Potamogeton crispus</i>
Penfield Pond	Plant	Eurasian watermilfoil	<i>Myriophyllum spicatum</i>
Putnam Pond	Plant	Eurasian watermilfoil	<i>Myriophyllum spicatum</i>
Rogers Pond	Plant	European frogbit	<i>Hydrocharis morsus-ranae</i>
Schroon Lake	Plant	Eurasian watermilfoil	<i>Myriophyllum spicatum</i>
Schroon Lake	Plant	Curly leafed pondweed	<i>Potamogeton crispus</i>
Schroon Lake	Animal	Rudd	<i>Scardinius erythrophthalmus</i>
Webb Royce Swamp	Plant	European frogbit	<i>Hydrocharis morsus-ranae</i>
Woodruff Pond	Plant	Eurasian watermilfoil	<i>Myriophyllum spicatum</i>

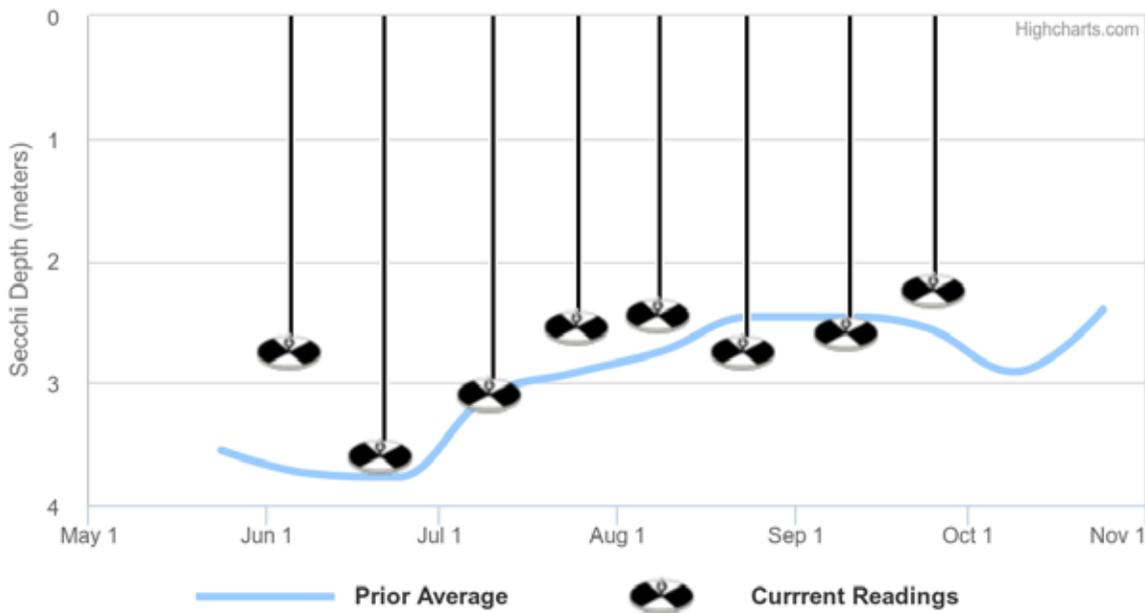
Appendix F: Current Year vs. Prior Averages for Augur Lake

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 1997 to 2013. There are not enough deep water sample temperatures to determine a trend for the current year when compared to the average of readings collected during 2013.

Current Year Secchi Readings vs. Prior Average



This year's session Secchi readings are tending to be lower than normal when compared to the average of readings collected from 1997 to 2013

Appendix G: Watershed and Land Use Map for Augur 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.

