Lake DeVenoge Questions and Answers, 2015 CSLAP

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

A1. Lake DeVenoge has favorable water quality conditions, leading to highly favorable recreational and water quality assessments. No shoreline blooms were reported. These conditions were very similar in 2015 and 2014.

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

A2. Chloride sampling results are typical of lakes with moderate to elevated impacts from road salt runoff, although no biological impacts have been reported or measured.

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

A3. Lake DeVenoge has slightly higher water clarity, and lower algae and nutrient levels, than most lakes in the area, and shoreline blooms were not reported in the lake. No invasive plants were reported at the lake.

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

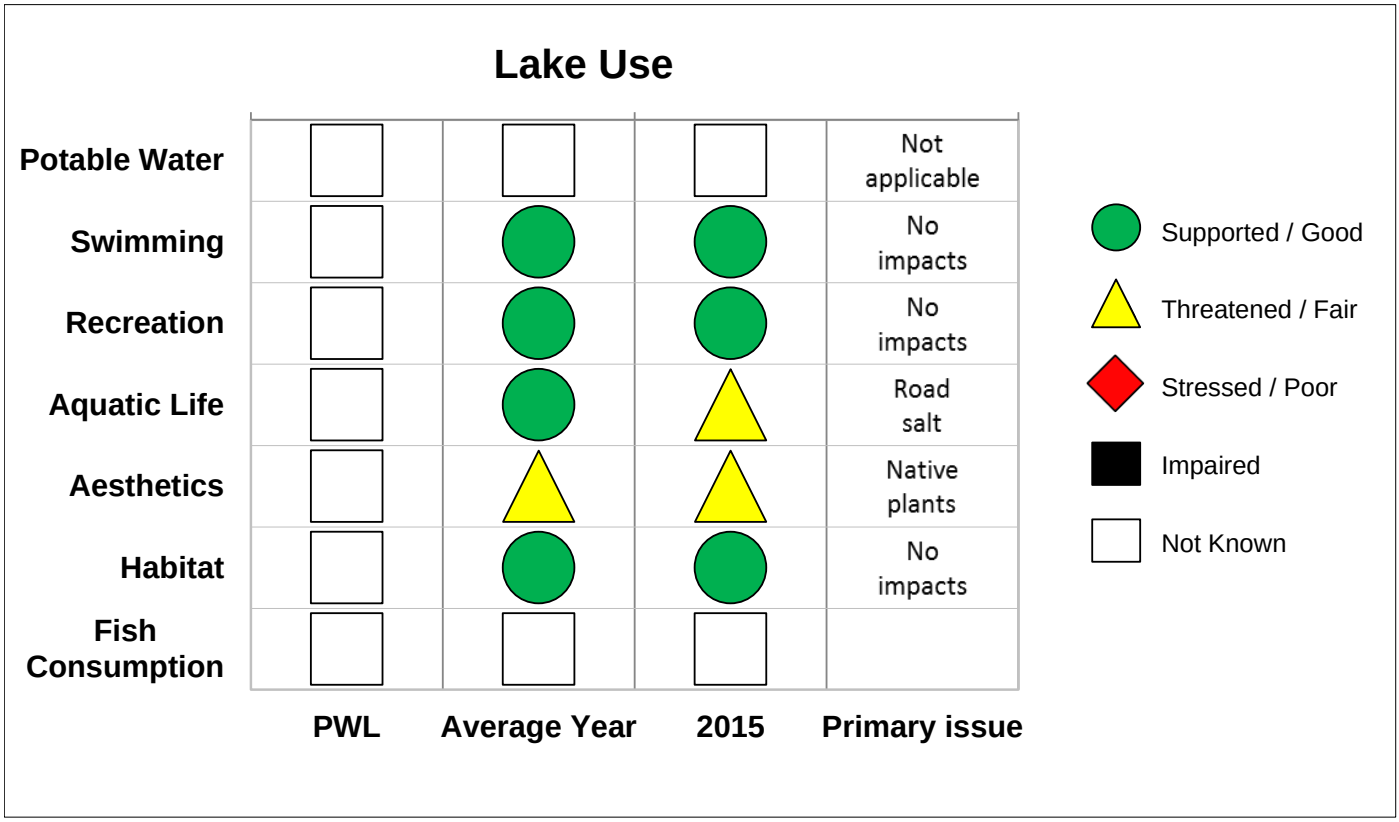
A4. Trends can't be evaluated with only two years of data. Water clarity was slightly higher in 2015 than in 2014, consistent with lower algae levels. Plant coverage may have been slightly higher, and temperatures were slightly higher in 2015.

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

A5. Lake DeVenoge may not be susceptible to shoreline algae blooms, based on lake water chemistry. However, lake residents should be on the lookout, and should avoid exposure to, these blooms.

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

A6. Individual stewardship activities such as pumping your septic system, growing a buffer of native plants next to the water bodies, and reducing erosion from shoreline properties and runoff into the lake should be continued to maintain water quality 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.

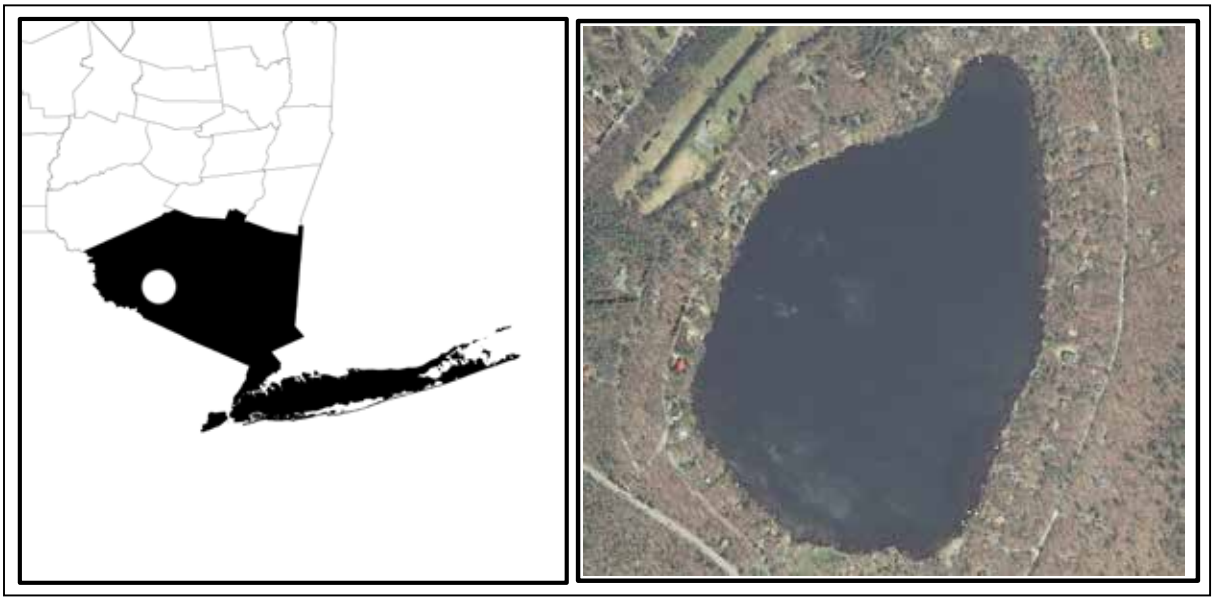


CSLAP 2015 Lake Water Quality Summary:
Lake Devenoge

General Lake Information

Location	Towns of Lumberland and Highland
County	Sullivan
Basin	Delaware River
Size	29.1 hectares (71.9 acres)
Lake Origins	Natural
Watershed Area	Not yet determined
Retention Time	Not yet determined
Mean Depth	8 meters (estimated)
Sounding Depth	16.5 meters
Public Access?	none
Major Tributaries	No permanent inlets
Lake Tributary To…	Unnamed outlet to Mill Creek to Delaware River
WQ Classification	B (contact recreation = swimming)
Lake Outlet Latitude	41.521527
Lake Outlet Longitude	-74.839772
Sampling Years	2014-2015
2015 Samplers	Bud Wilson, Rory Wade, Jim Rizzi, and Gary Padian
Main Contact	Bud Wilson

Lake Map



Background
Lake Devenoge is a 72 acre, class B lake found in the Towns of Lumberland and Highland in Sullivan County, in the Catskill region of New York State. It was first sampled as part of CSLAP in 2014.

It is one of nine CSLAP lakes among the more than 720 lakes and ponds found in Sullivan County, and one of 15 CSLAP lakes among the nearly 1000 lakes and ponds in the Delaware River drainage basin.

Lake Uses
Lake Devenoge is a Class B lake; this means that the best intended use for the lake is for contact recreation—swimming and bathing, non-contact recreation—boating and fishing; aesthetics and aquatic life. There is no public access to the lake.

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

General statewide fishing regulations are applicable in Lake Devenoge.

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

Historical Water Quality Data
CSLAP sampling was conducted on Lake Devenoge for the first time in 2014. The CSLAP reports for the lake can be found on the NYSFOLA website at http://nysfola.mylaketown.com, and the most recent CSLAP report can be found on the NYSDEC web page at http://www.dec.ny.gov/lands/77829.html.

Lake Devenoge has not been sampled through any previous NYS monitoring programs.

The Beaver Kill sampling through the NYSDEC stream biomonitoring program, at most locations well downstream of the lake, found “non impacted” conditions.

Lake Association and Management History
Lake Devenoge is served by the Lake DeVenoge Property Owners Association. The lake community was developed in the early 1930s as a vacation community and was served by a golf course. There is no public access to the lake, and gasoline powered motors are prohibited. The lake supports largemouth bass and rainbow trout. The Association maintains a website at http://lakedevenoge.com/.

Summary of 2015 CSLAP Sampling Results

Evaluation of 2015 Annual Results Relative to 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 – Lake Devenoge” section in Appendix C.

Evaluation of Eutrophication Indicators

Lake Devenoge exhibits fairly low phosphorus levels, resulting in low algae levels and moderately high water clarity readings. These readings were fairly similar in 2014 and 2015; water clarity was slightly higher in 2015 and algae levels were slightly lower in 2015. Deepwater phosphorus readings are only slightly higher than those measured at the lake surface, suggesting that internal nutrient loading (from deep sediments to the overlying waters) may be low.

Water clarity, algae levels (as measured by chlorophyll *a*) and phosphorus readings decreased through mid to late summer (phosphorus levels decreased throughout the sampling season), and then clarity and algae levels increased slightly in September.

The lake can be characterized as *mesoligotrophic*, or moderately unproductive, based on water clarity, chlorophyll *a* (both typical of *mesotrophic* lakes) and total phosphorus readings (typical of *oligotrophic* lakes). The trophic state indices (TSI) evaluation suggests that phosphorus readings are slightly lower than expected given the algae levels and water clarity readings in the lake. This suggests that small changes in phosphorus may lead to large changes in algae levels and water transparency. Overall trophic conditions are summarized on the Lake Scorecard and Lake Condition Summary Table.

Evaluation of Potable Water Indicators

Algae levels are high enough to render the lake susceptible to taste and odor compounds or elevated DBP (disinfection by product) compounds that could affect the potability of the water, but the lake is not used for drinking water. Deepwater ammonia readings are much higher than those measured at the lake surface, although these readings were slightly lower in 2015, indicating some deepwater anoxia (oxygen depression). This would affect any “unofficial” use of deepwater 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

Lake Devenoge can be characterized as an alkaline lake with intermediate hardness and color, and low nitrogen levels. Each of these readings were similar in 2015 and 2014.

Chloride levels in the 2015 samples, collected for the first time through CSLAP and cited in Appendix A, ranged from 29 to 36 mg/l. These values fall within the low end of the range for “major” road salt runoff levels cited by the New Hampshire DES. These readings are well below the state potable water quality standard of 250 mg/l but at or above the typical range of values found in most NYS lakes. These readings suggest a moderate likelihood of biological impacts from road salt. Additional data will help to determine if these represent normal readings for the lake

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

Evaluation of Biological Condition

It is not known if phytoplankton, zooplankton, macrophyte, or macroinvertebrate studies have been conducted at the lake. The fluoroprobe data indicates low algae levels, and low levels of blue green algae. Algal communities are comprised primarily of green algae and diatoms. No shoreline blooms have been detected. These readings were very similar in 2015 and 2014.

The deepwater ammonia readings and odor in the bottom samples indicate low oxygen levels near the lake bottom- this may impact aquatic life.

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

Evaluation of Lake Perception

The lake is most often described as “could not be nicer” for most recreational uses, due to water quality conditions described as “crystal clear”. This is mostly consistent with (if slightly more favorable than) the measured water quality conditions in the lake. Aquatic plants usually grow below the lake surface; plant coverage might have been somewhat more extensive in 2015 than in 2014. It is not known if any exotic or invasive plants have been found in the lake. Additional years of data will help to determine if these assessments are representative of normal conditions in the lake. Overall lake perception is summarized on the Lake Scorecard and Lake Condition Summary Table.

Evaluation of Local Climate Change

It is not yet known if air or water temperature readings have exhibited any clear long-term changes, if these readings could indicate local climate change or if any changes can be evaluated through CSLAP. Both air and water temperatures were slightly higher in 2015 than in 2014.

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 algae readings are well below thresholds defining harmful algal blooms (HABs) in the main body of the lake, and no shoreline blooms have been reported. Both microcystin-LR (liver toxin) and anatoxin-a (nerve toxin) levels are at levels well below the World Health Organization (WHO) recommended threshold for supporting safe swimming.

Lake Condition Summary

Category	Indicator	Min	Overall Avg	Max	2015 Avg	Classification	2015 Change?	Long-term Change?
Eutrophication Indicators	Water Clarity	2.90	3.71	4.90	3.95	Mesotrophic	Higher in 2015	
	Chlorophyll *a*	0.50	3.05	7.00	2.08	Mesotrophic	Lower in 2015	
	Total Phosphorus	0.003	0.009	0.013	0.010	Oligotrophic	Similar in both years	
Potable Water Indicators	Hypolimnetic Ammonia	0.10	0.26	0.49	0.19	Elevated Deepwater NH4	Lower in 2015	
	Hypolimnetic Arsenic							
	Hypolimnetic Iron							
	Hypolimnetic Manganese							
Limnological Indicators	Hypolimnetic Phosphorus	0.000	0.021	0.076	0.022	Close to Surface TP Readings	Similar in both years	
	Nitrate + Nitrite	0.00	0.00	0.01	0.00	Low NOx	Similar in both years	
	Ammonia	0.01	0.03	0.06	0.04	Low Ammonia	Similar in both years	
	Total Nitrogen	0.19	0.30	0.52	0.31	Low Total Nitrogen	Similar in both years	
	pH	6.94	7.57	8.23	7.61	Alkaline	Similar in both years	
	Specific Conductance	112	131	157	132	Intermediate Hardness	Similar in both years	
	True Color	4	8	13	6	Uncolored	Similar in both years	
	Calcium	4.3	4.4	4.7	4.5	Not Susceptible to Zebra Mussels	Similar in both years	
Lake Perception	WQ Assessment	1	1.0	1	1.0	Crystal Clear	Similar in both years	
	Aquatic Plant Coverage	1	2.6	4	3.0	Surface Plant Growth	More coverage in '15	
	Recreational Assessment	1	1.3	2	1.4	Could Not Be Nicer	Similar in both years	
Biological Condition	Phytoplankton					Open water-low blue green algae biomass		
	Macrophytes					Excellent quality of the aquatic plant community		
	Zooplankton					Not measured through CSLAP		
	Macroinvertebrates					Not measured through CSLAP		
	Fish					Coldwater fishery		
	Invasive Species					None observed		
Local Climate Change	Air Temperature	11	22.4	33	24.0		Higher in 2015	
	Water Temperature	19	24.2	28	25.4		Higher in 2015	
Harmful Algal Blooms	Open Water Phycocyanin	0	3	24	2	No readings indicate high risk of BGA		
	Open Water FP Chl.a	0	1	2	1	No readings indicate high algae levels		
	Open Water FP BG Chl.a	0	0	0	0	No readings indicate high BGA levels		
	Open Water Microcystis	<DL	<DL	0.8	<DL	Low to undetectable open water microcystins		
	Open Water Anatoxin a	<DL	<DL	0.0	<DL	Open water Anatoxin-a at times detectable		
	Shoreline Phycocyanin					No shoreline blooms sampled for PC		
	Screening FP Chl.a					No shoreline blooms sampled for FP		
	Screening FP BG Chl.a					No shoreline blooms sampled for FP		
	Shoreline Microcystis					No shoreline bloom MC-LR data		
	Shoreline Anatoxin a					No shoreline bloom anatoxin data		

Evaluation of Lake Condition Impacts to Lake Uses

Lake Devenoge is presently listed on the 2002 Delaware River drainage basin Priority Waterbody List (PWL) as "unassessed". However, it is cited on the 2014 federal 303d list as "impaired" due to high phosphorus.

Potable Water (Drinking Water)

The CSLAP dataset at Lake Devenoge, 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. Deepwater intakes may be compromised for any "unofficial" use due to elevated deepwater oxygen levels.

Public Bathing

The CSLAP dataset at Lake Devenoge, including water chemistry data, physical measurements, and volunteer samplers' perception data, suggests that public bathing, if conducted at a public swimming beach, would likely be supported. 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 Lake Devenoge, including water chemistry data, physical measurements, and volunteer samplers' perception data, suggest that recreation is supported.

Aquatic Life

The CSLAP dataset on Lake Devenoge, including water chemistry data, physical measurements, and volunteer samplers' perception data, suggest that aquatic life is supported, although this use may be *threatened* by road salt runoff and by oxygen deficits in the bottom waters. Additional data are needed to evaluate the food and habitat conditions for aquatic organisms in the lake.

Aesthetics and Habitat

The CSLAP dataset on Lake Devenoge, including water chemistry data, physical measurements, and volunteer samplers' perception data, suggest that aesthetics should be good, and habitat should be good.

Fish Consumption

There are no fish consumption advisories posted for Lake Devenoge.

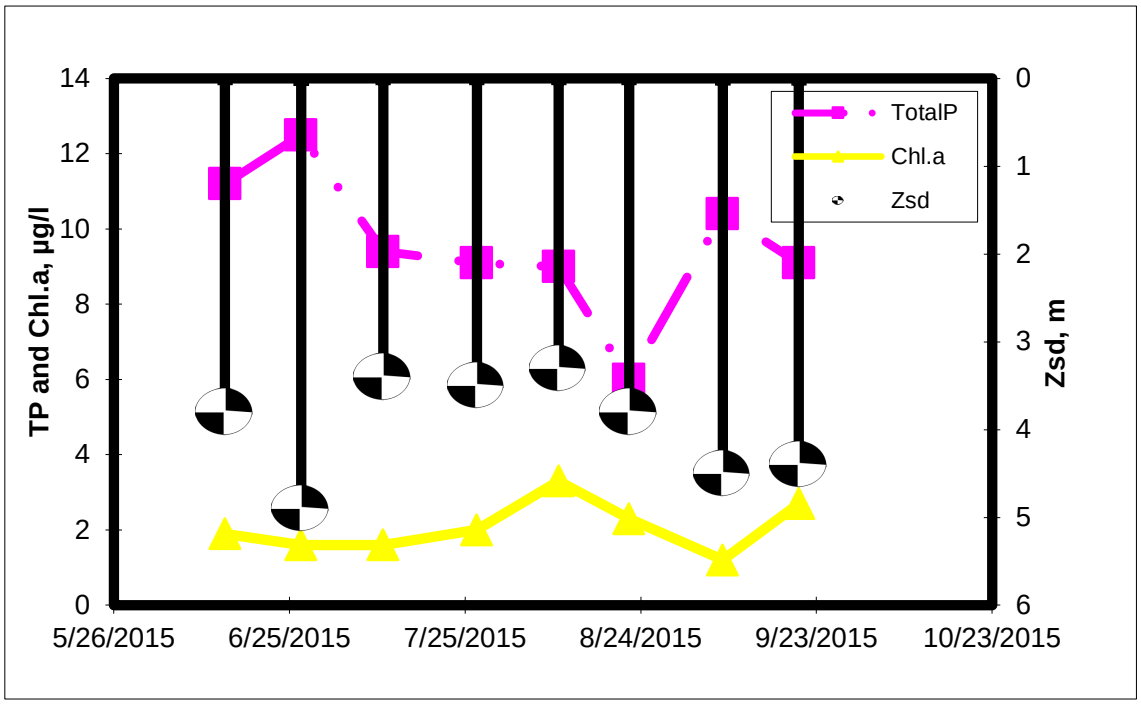
Additional Comments and Recommendations

Aquatic plant surveys should be conducted at Lake Devenoge to determine if other invasive species found in nearby lakes, including Eurasian watermilfoil, are present in the lake. Shoreline surveillance should continue to look for the presence of shoreline algae blooms.

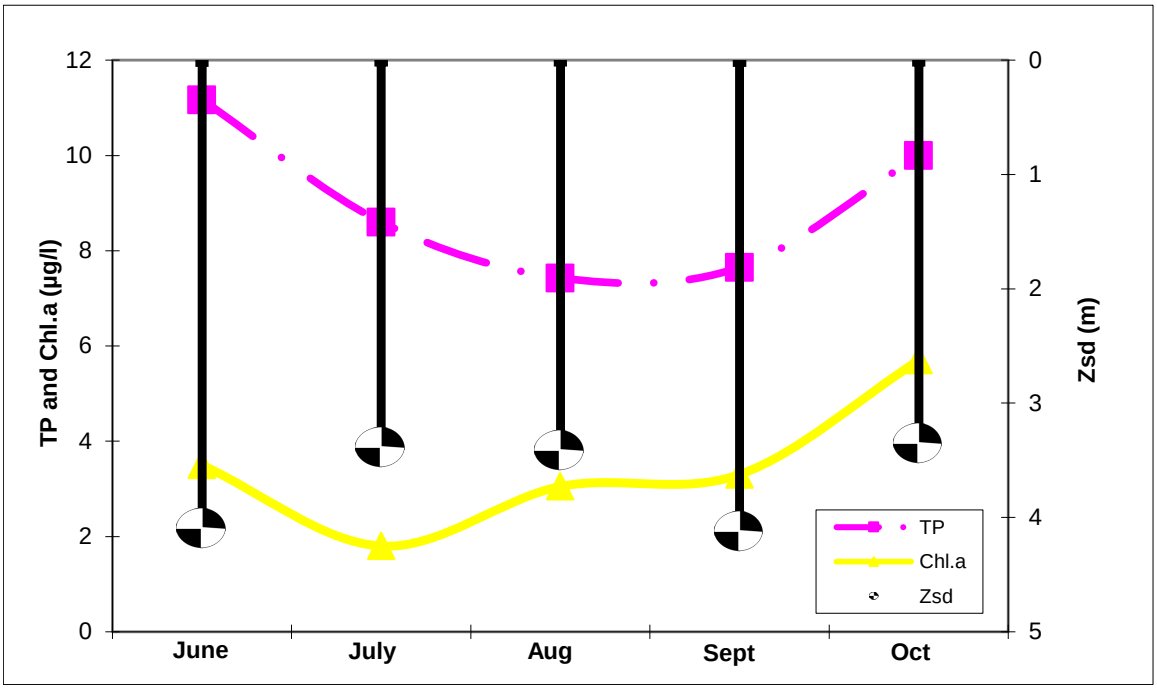
Aquatic Plant IDs-2015

No aquatic plants were submitted for identification in 2015.

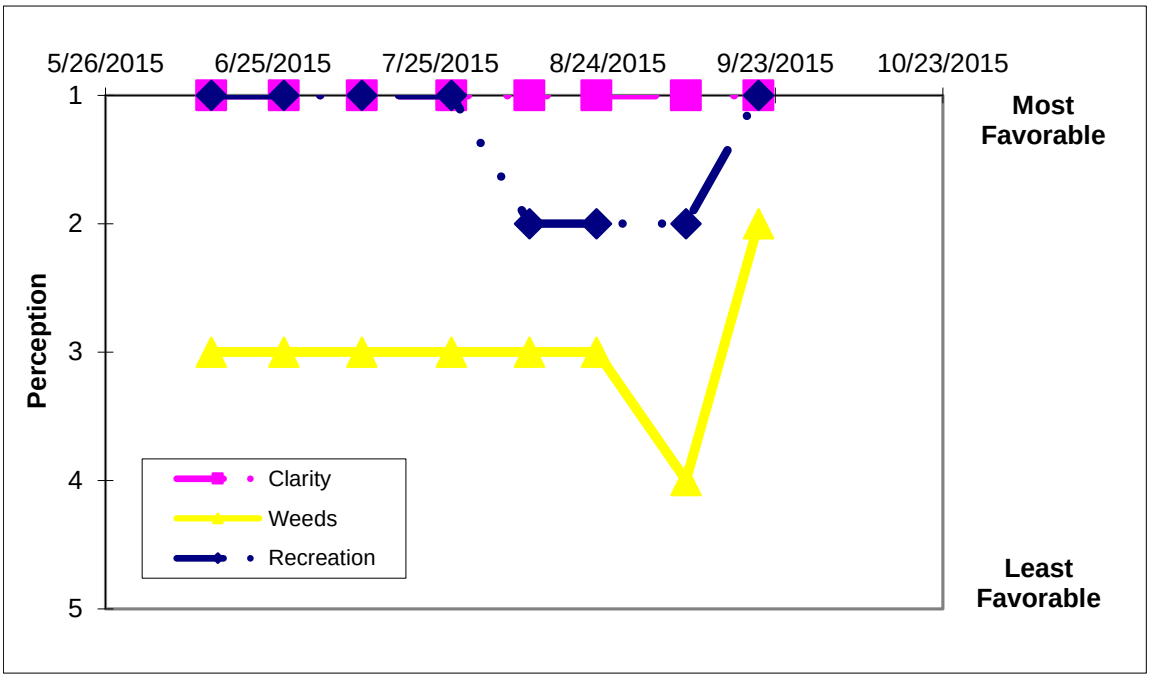
Time Series: Trophic Indicators, 2015



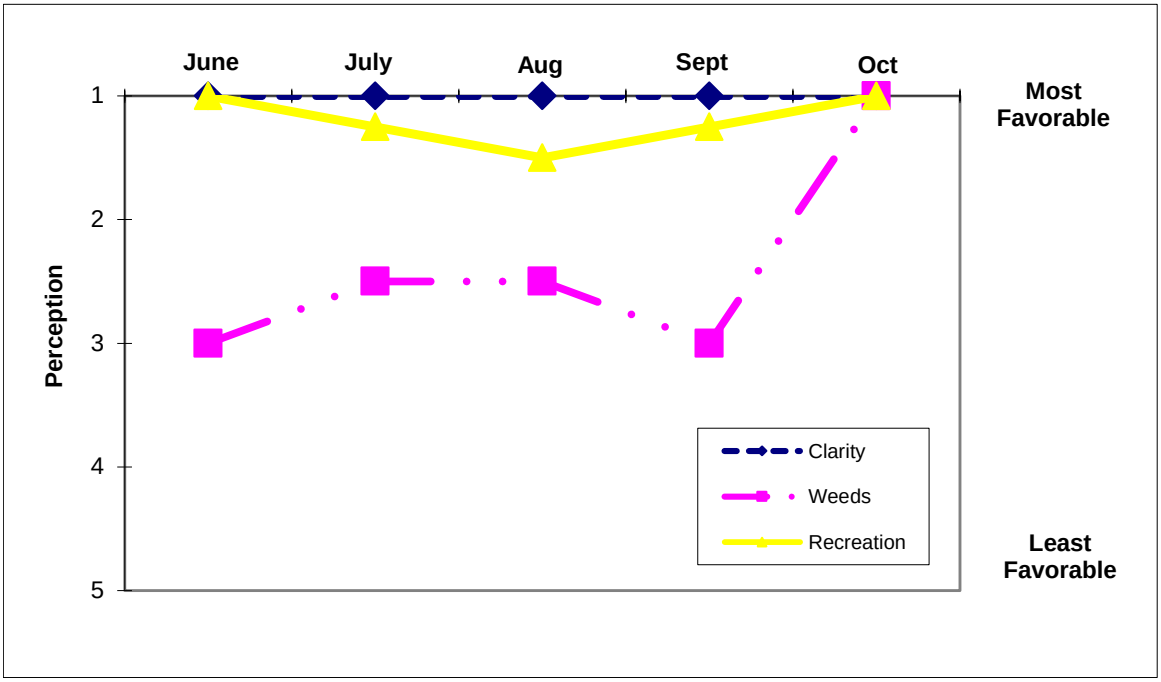
Time Series: Trophic Indicators, Typical Year (2014-2015)



Time Series: Lake Perception Indicators, 2015



Time Series: Lake Perception Indicators, Typical Year (2014-2015)



Appendix A- CSLAP Water Quality Sampling Results for Lake Devenoge

LNum	PName	Date	Zbot	Zsd	Zsamp	Tot.P	NO3	NH4	TDN	TN/TP	TColor	pH	Cond25	Ca	Chl.a	Cl
243	Lake Devenoge	6/29/2014	16.2	3.60	1.5	0.010	0.01	0.03	0.3	68.92	9	7.40	121		7.0	
243	Lake Devenoge	7/13/2014	16.1	3.45	1.5	0.009			0.3	80.41	8	7.83	126		0.5	
243	Lake Devenoge	7/27/2014	16.1	3.20	1.5	0.007	0.01	0.03	0.3	96.86	10	6.98	127		3.1	
243	Lake Devenoge	8/10/2014	16.1	3.65	1.5	0.007			0.3	95.44	12	6.94	126		2.9	
243	Lake Devenoge	8/23/2014	16.3	2.90	1.5	0.008	0.01	0.01	0.3	87.42	7	7.58	157	4.3	3.7	
243	Lake Devenoge	9/8/2014	16.3	4.70	1.5	0.003			0.3	176.00	9	7.04	125		3.4	
243	Lake Devenoge	9/22/2014	16.4	2.90	1.5	0.008	0.01	0.02	0.3	73.14	13	8.23	117		5.9	
243	Lake Devenoge	10/5/2014	16.2	3.35	1.5	0.010			0.2	53.90	11	8.17	131	4.4	5.7	
243	Lake Devenoge	6/14/2015	16.1	3.80	1.5	0.011	0.00	0.02	0.3	24.73	4	7.01	140	4.7	1.9	
243	Lake Devenoge	6/27/2015	16.2	4.90	1.5	0.013			0.2	18.08	4	7.42	134		1.6	
243	Lake Devenoge	7/11/2015	16.5	3.40	1.5	0.009	0.00	0.06	0.4	42.23	4	8.06	129		1.6	35.6
243	Lake Devenoge	7/27/2015	16.1	3.50	1.5	0.009			0.5	57.25	7	7.62	141		2.0	
243	Lake Devenoge	8/10/2015	16.3	3.30	1.5	0.009	0.01	0.04	0.4	48.11	9	7.83	142	4.3	3.3	
243	Lake Devenoge	8/22/2015	16.3	3.80	1.5	0.006			0.2	39.00	6	7.66	120		2.3	
243	Lake Devenoge	9/7/2015	16.1	4.50	1.5	0.010	0.00	0.04	0.2	19.90	6	7.87	112		1.2	29.6
243	Lake Devenoge	9/20/2015	16.1	4.40	1.5	0.009			0.2	20.55	4	7.40	141		2.7	
243	Lake Devenoge	6/29/2014			14.7	0.010		0.17								
243	Lake Devenoge	7/13/2014			14.6	0.014										
243	Lake Devenoge	7/27/2014			14.4	0.076		0.26								
243	Lake Devenoge	8/10/2014			14.6	0.006										
243	Lake Devenoge	8/23/2014			14.8	0.001		0.38								
243	Lake Devenoge	9/8/2014			14.8	0.001										
243	Lake Devenoge	9/22/2014			14.9	0.026		0.49								
243	Lake Devenoge	10/5/2014			14.5	0.030										
243	Lake Devenoge	6/14/2015			14.6	0.000		0.10								
243	Lake Devenoge	6/27/2015			14.7	0.008										
243	Lake Devenoge	7/11/2015			15.0	0.021		0.23								
243	Lake Devenoge	7/27/2015			14.6	0.034										
243	Lake Devenoge	8/10/2015			14.8	0.027		0.21								
243	Lake Devenoge	8/22/2015			14.8	0.015										
243	Lake Devenoge	9/7/2015			14.6	0.030		0.23								
243	Lake Devenoge	9/20/2015			14.6	0.039										

LNum	PName	Date	Site	TAir	TH20	QA	QB	QC	QD	QF	QG	AQ-PC	AQ-Chla	MC-LR	Ana-a	Cylin	FP-Chl	FP-BG	HAB form	Shore HAB
243	Lake Devenoge	6/29/2014	epi	24	25	1	3	1	0	0	0	0.1	0.8	<1.60	<0.48	<0.002	1.9	0.0	i	
243	Lake Devenoge	7/13/2014	epi	25	25	1	1	1	0	0	0	1.2	0.6	<0.40	<0.21	<0.003	1.9	0.0	i	
243	Lake Devenoge	7/27/2014	epi	23	26	1	3	2	0	0	0	1.7	0.3	<0.63	<0.03	<0.001	0.9	0.0	i	f
243	Lake Devenoge	8/10/2014	epi	28	25	1	3	1	0	0	0	0.1	0.3	<0.28	<0.05	<0.001	0.9	0.0	i	i
243	Lake Devenoge	8/23/2014	epi	21	23	1	1	1	0	0	0	23.9	0.4				0.5	0.0	i	
243	Lake Devenoge	9/8/2014	epi	19	24	1	3	1	0	0	0	2.2	0.20	<0.64	<0.03	<0.001	0.2	0.0	i	
243	Lake Devenoge	9/22/2014	epi	16	20	1	3	1	2	0	0	0.3	0.2	<0.48	<0.04	<0.001	0.5	0.0	i	i
243	Lake Devenoge	10/5/2014	epi	11	19	1	1	1	0	0	0	0.9	0.3	<0.73	<0.12	<0.001	1.6	0.0	i	
243	Lake Devenoge	6/14/2015	epi	33	28	1	3	1	0	0	0	4.9	0.5	<0.86	<0.027	<0.318	0.7	0.0	I	I
243	Lake Devenoge	6/27/2015	epi	19	26	1	3	1	0	0	0	3.4	0.3	<0.86	<0.007	<0.000	0.6	0.0	I	I
243	Lake Devenoge	7/11/2015	epi	28	25	1	3	1	0	0	0	4.5	0.3	<1.01	0.00	<0.011	0.8	0.0	I	I
243	Lake Devenoge	7/27/2015	epi	20	25	1	3	1	0	0	0	0.05	0.05	<0.19	<0.002	<0.014	0.0	0.0	I	I
243	Lake Devenoge	8/10/2015	epi	23	25	1	3	2	5	0	0	1.5	0.7	<0.44	<0.035	<0.023	1.8	0.0	I	I
243	Lake Devenoge	8/22/2015	epi	23	26	1	3	2	2	2	0	2.1	0.2	<0.28	<0.003	<0.010	0.9	0.0	I	I
243	Lake Devenoge	9/7/2015	epi	23	25	1	4	2	28	0	0	0.05	0.4	<0.39	<0.004	<0.012	1.0	0.0	I	I
243	Lake Devenoge	9/20/2015	epi	23	23	1	2	1	0	0	0	0.05	0.4	<0.30	<0.007	<0.035	1.8	0.0	I	I
243	Lake Devenoge	6/29/2014	hypo		7															
243	Lake Devenoge	7/13/2014	hypo		16															
243	Lake Devenoge	7/27/2014	hypo		10															
243	Lake Devenoge	8/10/2014	hypo		13															
243	Lake Devenoge	8/23/2014	hypo		8															
243	Lake Devenoge	9/8/2014	hypo		8															
243	Lake Devenoge	9/22/2014	hypo		7															
243	Lake Devenoge	10/5/2014	hypo		8															
243	Lake Devenoge	6/14/2015	hypo		8															
243	Lake Devenoge	6/27/2015	hypo		8															
243	Lake Devenoge	7/11/2015	hypo		8															
243	Lake Devenoge	7/27/2015	hypo		8															
243	Lake Devenoge	8/10/2015	hypo		10															
243	Lake Devenoge	8/22/2015	hypo		12															
243	Lake Devenoge	9/7/2015	hypo		10															
243	Lake Devenoge	9/20/2015	hypo		8															

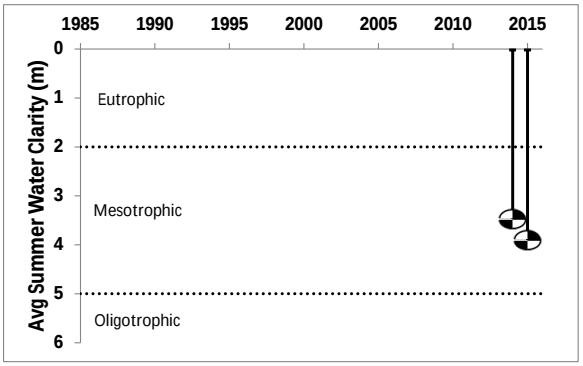
Legend Information

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

Appendix C: Long Term Trends: Lake Devenoge

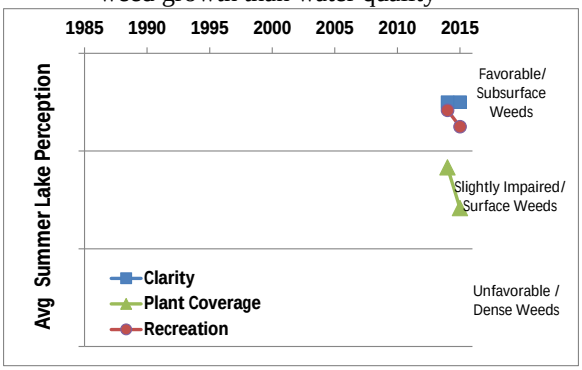
Long Term Trends: Water Clarity

- Slightly lower in 2015
- Most readings typical of *mesotrophic* lakes



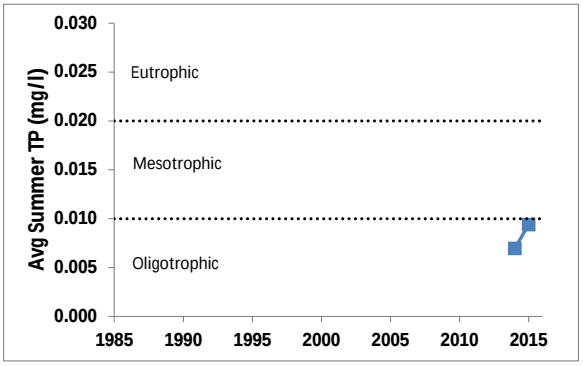
Long Term Trends: Lake Perception

- Higher weed coverage; less favorable recr.
- Recreational perception more closely tied to weed growth than water quality



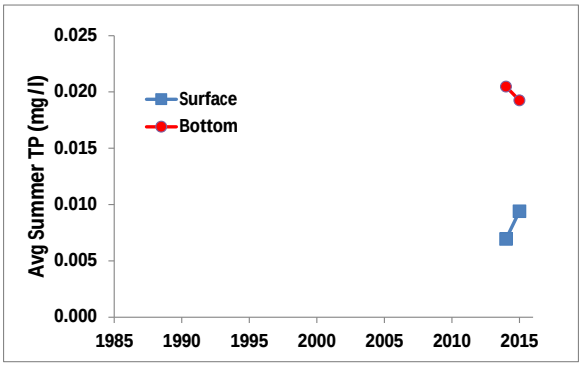
Long Term Trends: Phosphorus

- Higher TP in 2015
- Most readings typical of *oligotrophic* lakes



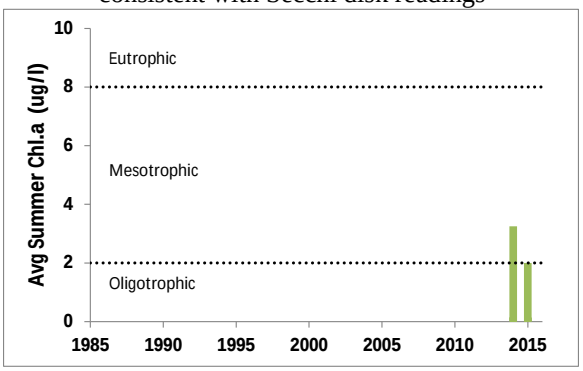
Long Term Trends: Bottom Phosphorus

- Lake Devenoge is thermally stratified
- Deepwater TP levels are only slightly higher than surface TP levels and lower in 2015



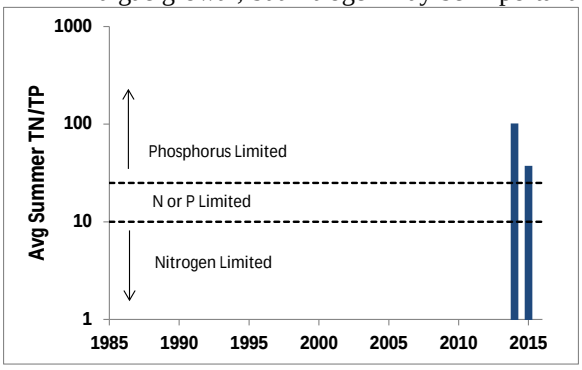
Long Term Trends: Chlorophyll a

- Lower algae levels 2015 despite ↑TP
- Most readings typical of *mesotrophic* lakes, consistent with Secchi disk readings



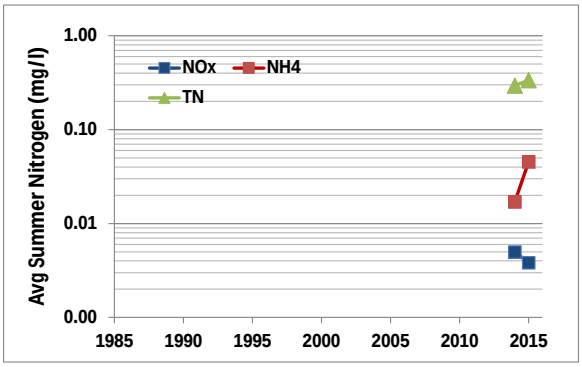
Long Term Trends: N:P Ratio

- Decreasing N:P
- Most readings indicate phosphorus limits algae growth, but nitrogen may be important



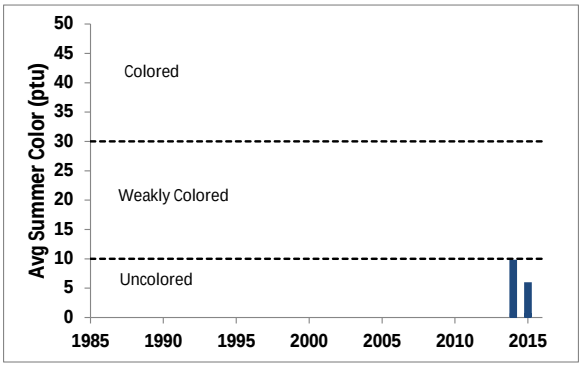
Long Term Trends: Nitrogen

- Higher TN and NH4; lower NOx in 2015
- Relatively low total nitrogen, ammonia and NOx



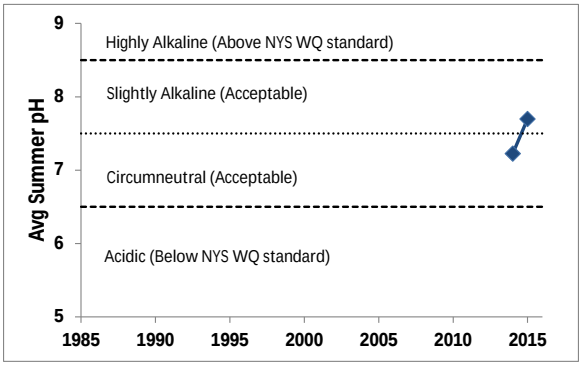
Long Term Trends: Color

- Lower color in 2015
- Most readings typical of *weakly colored* to *uncolored* lakes



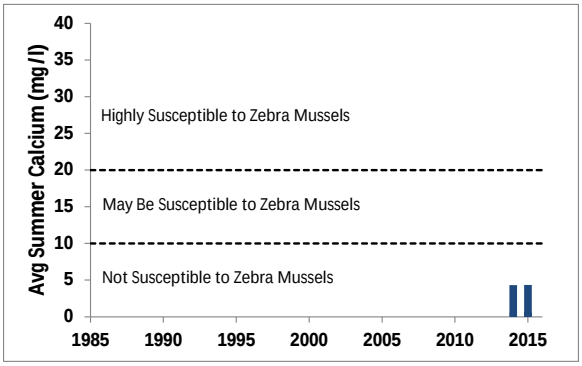
Long Term Trends: pH

- Slightly higher pH in 2015
- Most readings typical of *circumneutral* lakes



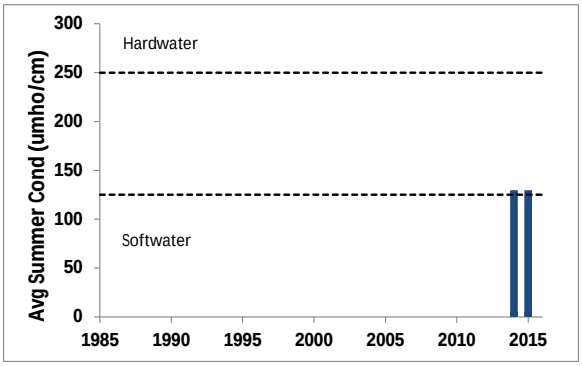
Long Term Trends: Calcium

- Similar calcium in both years
- 2014 data indicate low susceptibility to zebra mussels



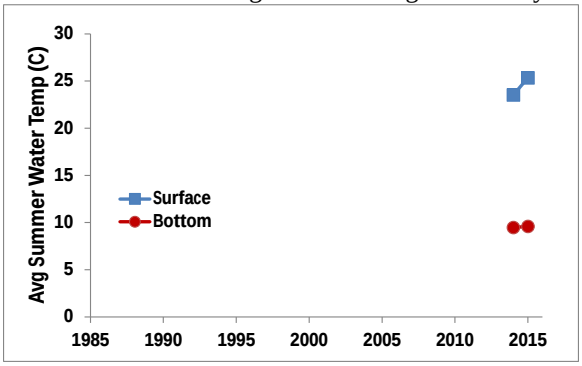
Long Term Trends: Conductivity

- Similar conductivity in 2015 and 2016
- Most readings typical of lakes with *intermediate* hardness



Long Term Trends: Water Temperature

- Higher surface T, similar bottom T in 2015
- Deepwater temperature much lower than surface readings due to strong thermal layers



Appendix D:
Algae Testing Results from SUNY ESF Study

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

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

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

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

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

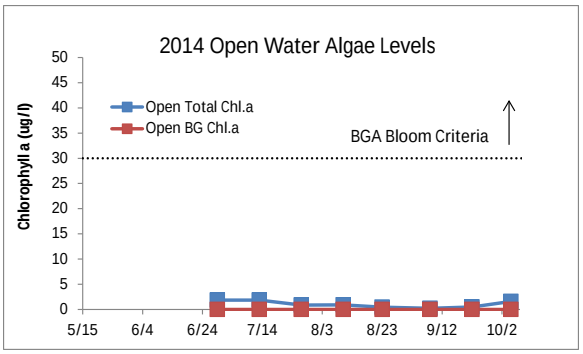


Figure D1:
2014 Open Water Total and BGA Chl.a

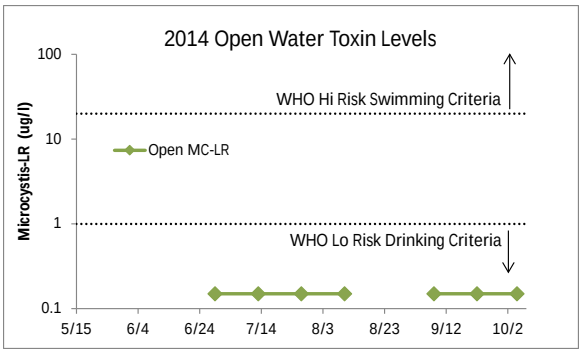


Figure D2:
2014 Open Water Microcystin-LR

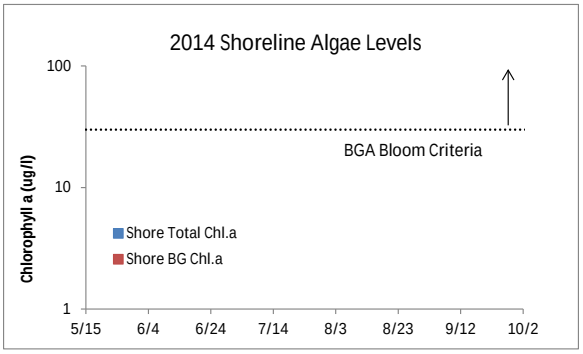


Figure D3:
2014 Shoreline Total and BGA Chl.a

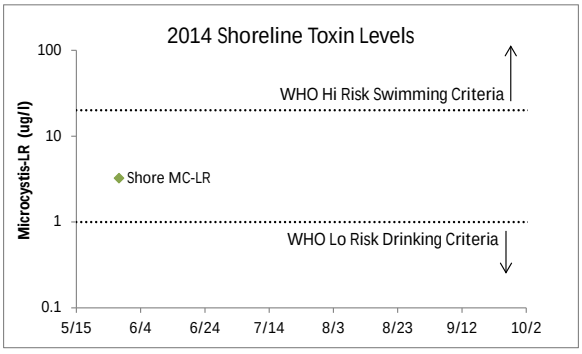


Figure D4:
2014 Shoreline Microcystin-LR

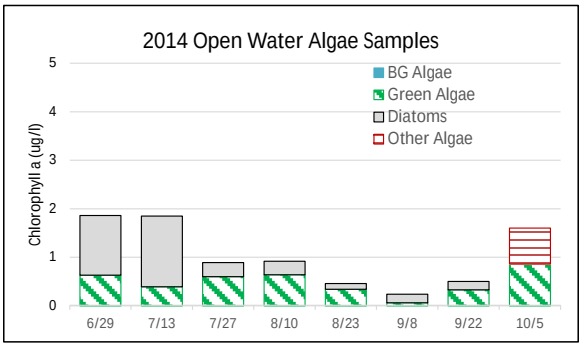


Figure D5:
2014 Open Water Algae Types

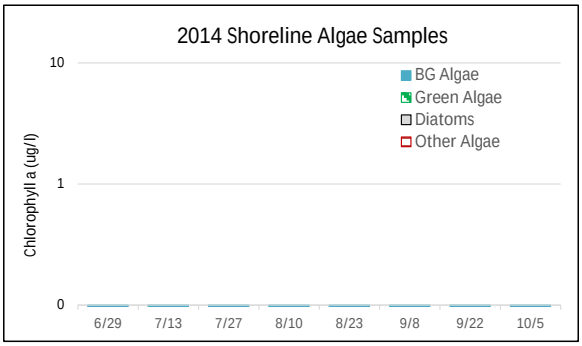


Figure D6:
2014 Shoreline Algae Types

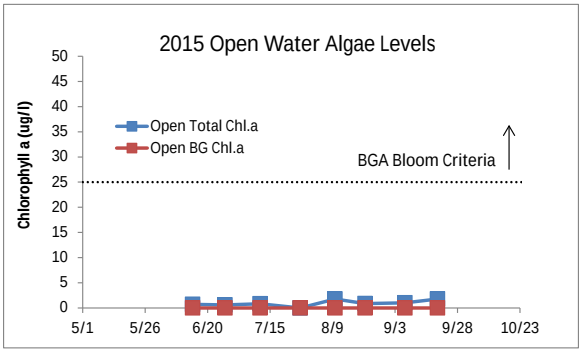


Figure D7:
2015 Open Water Total and BGA Chl.a

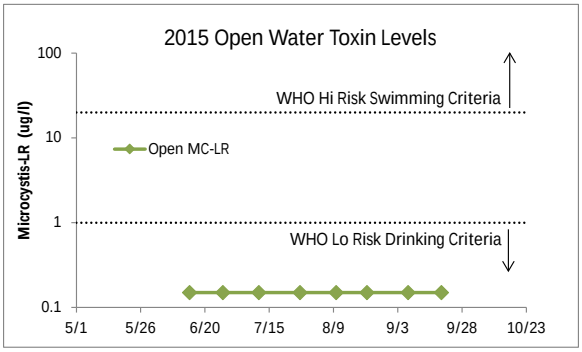


Figure D8:
2015 Open Water Microcystin-LR

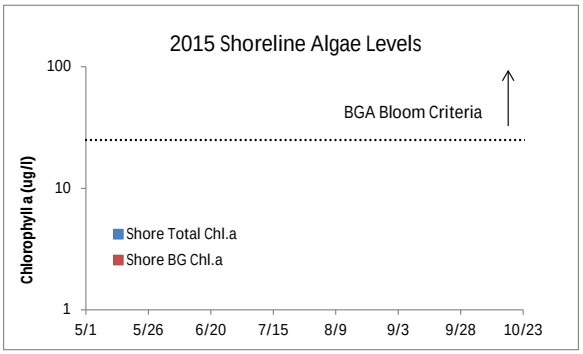


Figure D9:
2015 Shoreline Total and BGA Chl.a

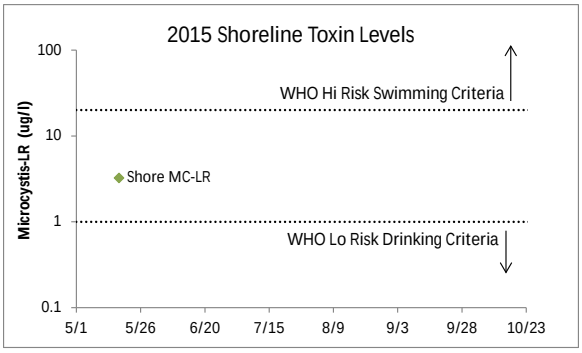


Figure D10:
2015 Shoreline Microcystin-LR

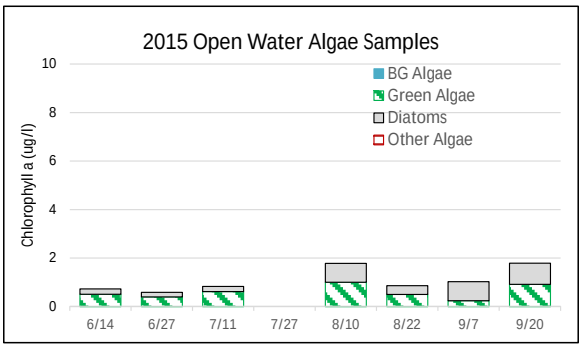


Figure D11:
2015 Open Water Algae Types

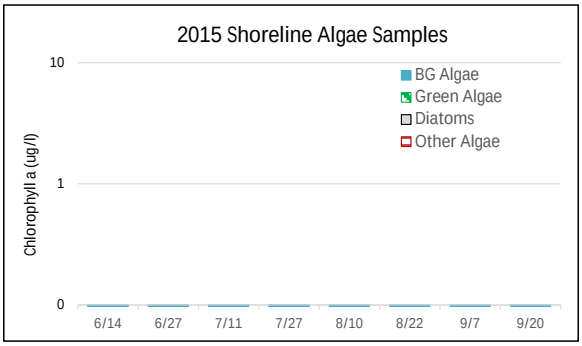


Figure D12:
2015 Shoreline Algae Types

Appendix E:
AIS Species in Sullivan County

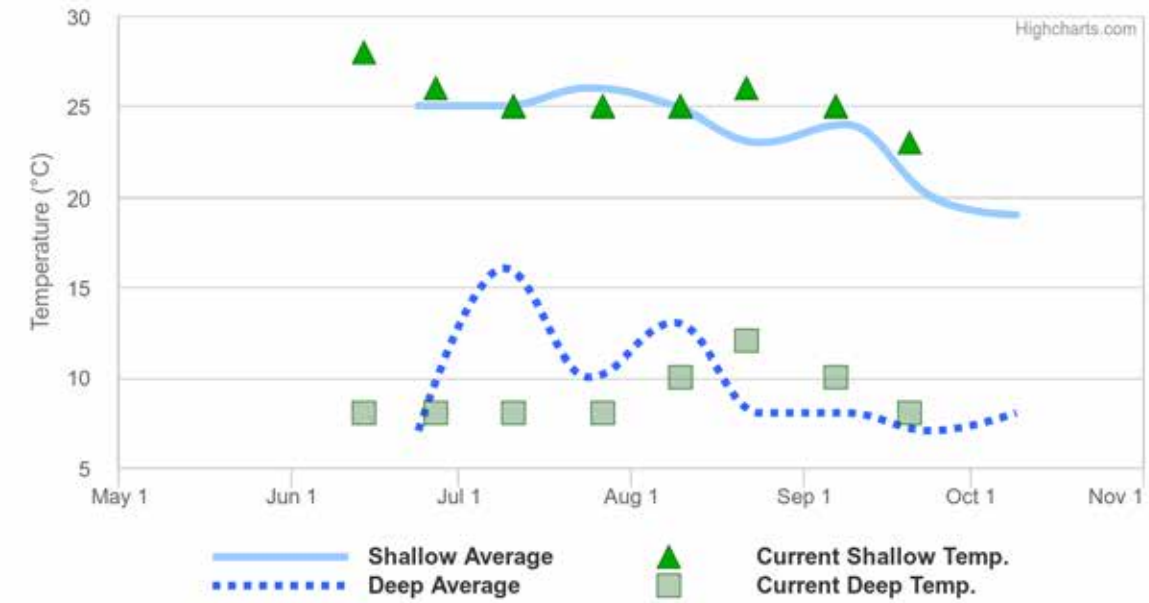
The table below shows the invasive aquatic plants and animals that have been documented in Sullivan County, as cited in either the iMapInvasives database (http://www.imapinvasives.org/) or in the NYSDEC Division of Water database. These databases may include some, but not all, non-native plants or animals 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 - Sullivan County			
Waterbody	**Kingdom**	**Common name**	**Scientific name**
Beaverman Lake	Plant	European frogbit	*Hydrocharis morsus-ranae*
Black Lake	Plant	Water chestnut	*Trapa natans*
Cliff Lake	Plant	Fanwort	*Cabomba caroliniana*
Kiamesha Lake	Plant	Eurasian watermilfoil	*Myriophyllum spicatum*
Martin Lake	Plant	Fanwort	*Cabomba caroliniana*
Morningside Lake	**Plant**	**Water chestnut**	***Trapa natans***
Morningside Lake	**Plant**	**Curly leafed pondweed**	***Potamogeton crispus***
Pleasure Lake	**Plant**	**Eurasian watermilfoil**	***Myriophyllum spicatum***
Pleasure Lake	Plant	Water chestnut	*Trapa natans*
Rio Reservoir	**Animal**	**Green sunfish**	***Lepomis cyanellus***
Sackett Lake	Plant	Curly leafed pondweed	*Potamogeton crispus*
Saint Josephs Lake	Plant	Floating primrose willow	*Ludwigia peploides ssp. glabrescens*
Silver Lake	Plant	Curly leafed pondweed	*Potamogeton crispus*
Silver Lake	Plant	Water chestnut	*Trapa natans*
Swan Lake	Plant	Curly leafed pondweed	*Potamogeton crispus*
Swan Lake	Plant	Water chestnut	*Trapa natans*
Swinging Bridge Reservoir	Animal	Common carp	*Cyprinus carpio*
Swinging Bridge Reservoir	**Animal**	**Green sunfish**	***Lepomis cyanellus***
Waneta Lake	Plant	Eurasian watermilfoil	*Myriophyllum spicatum*
White Lake	Plant	Eurasian watermilfoil	*Myriophyllum spicatum*

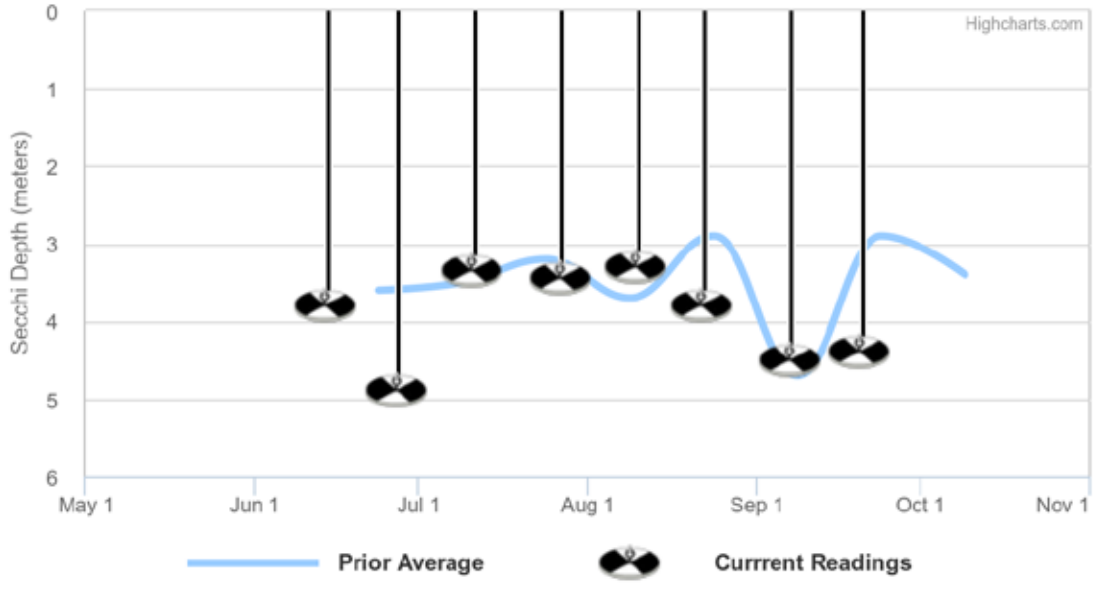
Appendix F: Current Year vs. Prior Averages for Lake DeVenoge

Current Year Water Temperatures vs. Prior Average



There are not enough shallow water sample temperatures to determine a trend for the current year when compared to the average of readings collected during 2014. 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 2014.

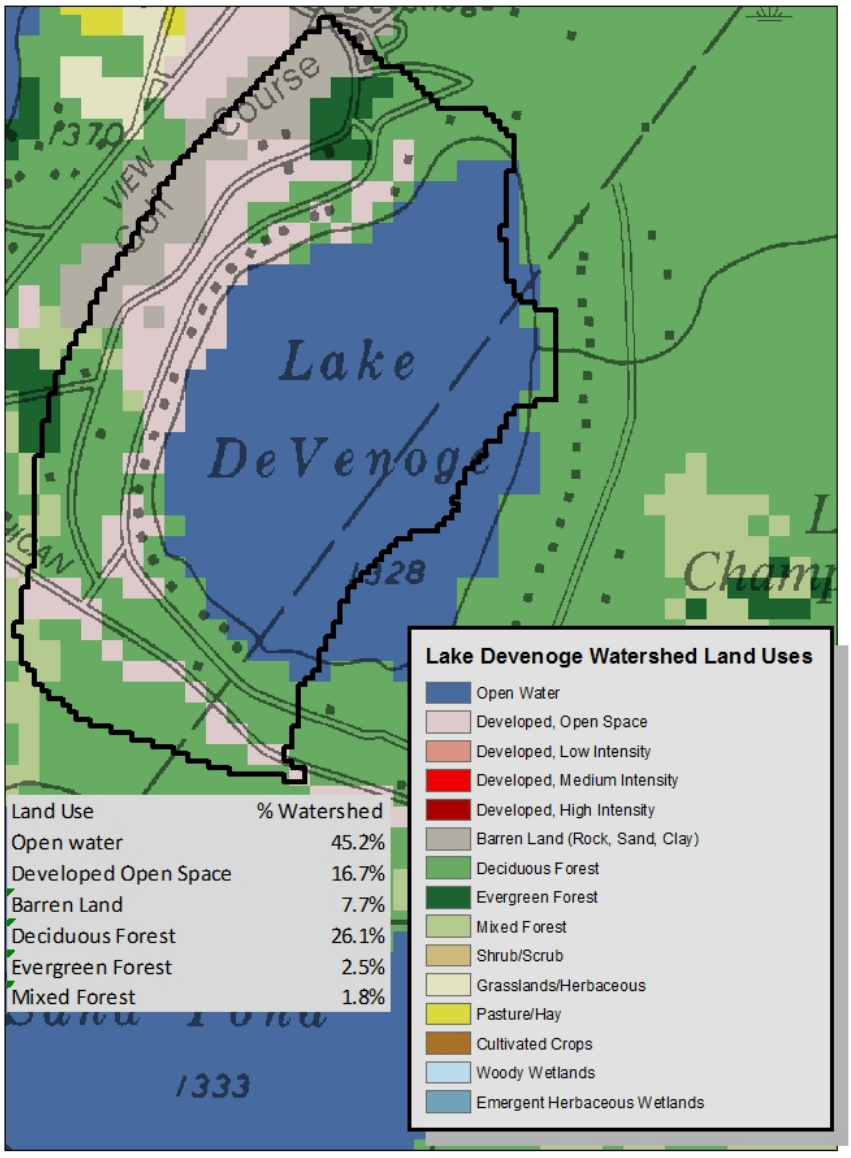
Current Year Secchi Readings vs. Prior Average



There are not enough session Secchi readings to determine a trend for the current year when compared to the average of readings collected during 2014

Appendix G: Watershed and Land Use Map for Lake DeVenoge

This watershed and land use map was developed using USGS StreamStats and ESRI ArcGIS using the 2006 land use satellite imagery. The actual watershed map and present land uses within this watershed may be slightly different due to the age of the underlying data and some limits to the use of these tools in some geographic regions and under varying flow conditions. However, these maps are intended to show the approximate extent of the lake drainage basin and the major land uses found within the boundaries of the basin.



Land Use	% Watershed
Open water	45.2%
Developed Open Space	16.7%
Barren Land	7.7%
Deciduous Forest	26.1%
Evergreen Forest	2.5%
Mixed Forest	1.8%