Lake Pleasure Questions and Answers, 2015 CSLAP

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

A1. Water quality conditions in Lake Pleasure were similar in 2015 and 2014. Water clarity was higher (in 2015) due to much lower algae levels, but nutrient levels were also higher. This suggests all indicators vary from year to year.

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

A2. Chloride sampling results are typical of lakes with moderate to significant impacts from road salt runoff, although these impacts have not been measured or reported..

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

A3. Lake Pleasure has similar water clarity, algae and nutrient levels, to most lakes in the area, and shoreline blooms were not reported in the lake (as in many of these other lakes). Plants grow to the surface later in the summer, and excessive weed are more likely to affect recreational use than does water quality concerns.

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

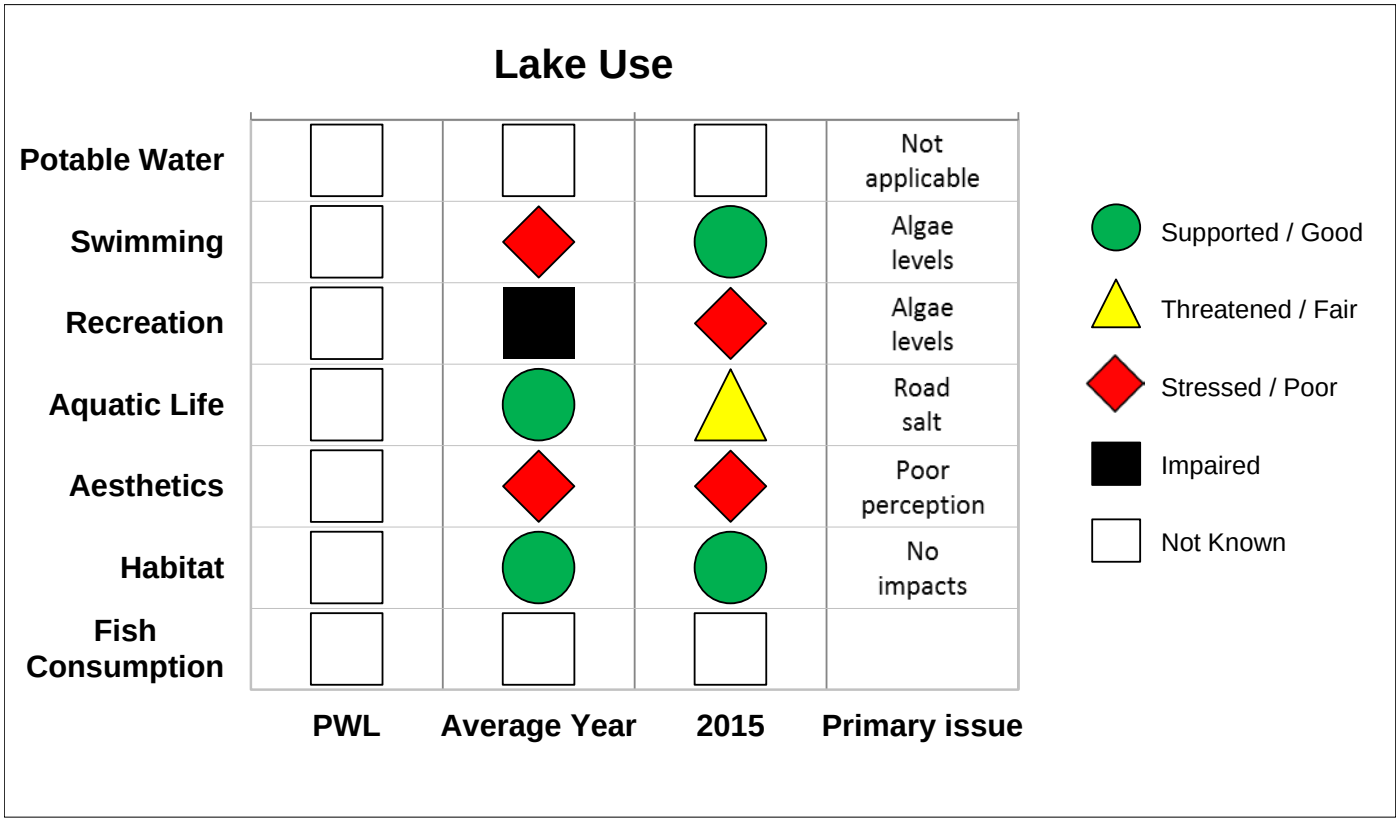
A4. With only two years of CSLAP data, trends cannot be evaluated. The lake exhibited mostly similar water quality conditions when last sampled by DEC in the early 2000s and in both CSLAP sampling seasons.

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

A5. Lake Pleasure may be susceptible to shoreline algae blooms, although these weren't reported in 2014 or 2015. Lake residents should be on the lookout, and should avoid exposure to, these blooms. The presence of water chestnut and dense growth of Eurasian watermilfoil may also indicate a susceptibility to invasive weed introductions.

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 new AIS were recently reported in the lake.



CSLAP 2015 Lake Water Quality Summary:
Pleasure Lake

General Lake Information

Location	Town of Fallsburg
County	Sullivan
Basin	Delaware River
Size	88.1 hectares (217.6 acres)
Lake Origins	Artificial, created by 35ft high by 470ft wide earthen/concrete dam (1875)
Watershed Area	5350 hectares (13,215 acres)
Retention Time	0.09 years (estimated)
Mean Depth	3.2 meters (estimated)
Sounding Depth	7.7 meters
Public Access?	none
Major Tributaries	Beaver Kill and one unnamed tributaries
Lake Tributary To…	Beaver Kill to Neversink River to Delaware River
WQ Classification	B (contact recreation = swimming)
Lake Outlet Latitude	41.69657
Lake Outlet Longitude	-74.62852
Sampling Years	2014-2015
2015 Samplers	Bob McPhillips, Mike Meier, Bob Scott
Main Contact	Mike Meier

Lake Map

Background
Pleasure Lake is a 218 acre, class B lake found in the Town of Fallsburg 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 nearly 725 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
Pleasure Lake is a Class B lake; this means that the best intended use for the lake is for contact recreation—swimming and bathing, non-contact recreation—boating and fishing; aesthetics and aquatic life. There is no public access to the lake.

It is not known by the report authors if Pleasure Lake 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 Pleasure Lake.

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

Historical Water Quality Data
CSLAP sampling was conducted on Pleasure Lake 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.

DEC sampled the lake as part of the Lake Classification and Inventory (LCI) survey of the Delaware River basin in 2005. This monitoring found slightly higher lake productivity than was measured through CSLAP- water clarity was slightly lower (in 2005), due to higher algae and nutrient levels. It also found no oxygen in the bottom waters of the lake.

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
Pleasure Lake is served by the Fallsburg Fishing & Boating Club. The club maintains a web page at http://www.pleasurelake.org/. The public portion of the web page identifies events and safety tips; additional information about the lake and a summary of club activities can be accessed through the private portion of the web page. There is no public access to the lake.

Summary of 2015 CSLAP Sampling Results

Evaluation of 2015 Annual Results
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 –

Pleasure Lake" section in Appendix C. Since this is the first year of CSLAP sampling in Pleasure Lake, no comparisons are (yet) possible.

Evaluation of Eutrophication Indicators

It is not yet known if the 2014 and 2015 data are representative of normal conditions in the lake. Pleasure Lake exhibited slightly elevated phosphorus levels, resulting in periodically elevated algae levels and low water clarity. Water clarity readings were slightly higher in 2015 than in 2014, due to much lower algae levels. However, phosphorus readings were slightly lower in 2015 than in 2014, suggesting that the changes from 2014 to 2015 with each of these indicators might be within the normal range of variability for the lake.

Algae levels increase through late summer, consistent with a drop in water clarity. However, phosphorus readings do not exhibit clear seasonal changes. These trends were generally apparent in 2015, but most of the lake changes occurred in early summer.

The lake can be characterized as *eutrophic*, or highly productive, based on water clarity, total phosphorus readings, and chlorophyll *a* readings (all typical of *eutrophic* lakes), although chlorophyll *a* and Secchi disk transparency readings in 2015 were more typical of *mesotrophic* lakes. The trophic state indices (TSI) evaluation suggests that each of these indicators are "internally" consistent-that is, each can be predicted from the other indicators. 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 samples showed high ammonia levels, consistent with regular reports of a rotten egg odor in the bottom samples. However, deepwater phosphorus levels were not nearly as high, suggesting some migration of phosphorus from bottom to surface waters during the summer. Potable water conditions, at least as measurable through CSLAP, are summarized in the Lake Scorecard and Lake Condition Summary Table.

Evaluation of Limnological Indicators

Pleasure Lake can be characterized as circumneutral (near neutral pH) lake with intermediate hardness and color, and low to moderate total nitrogen levels; the latter is consistent with moderate to high algae levels. However, NOx and ammonia readings are low, which commonly occurs in eutrophic lakes. Conductivity readings were slightly higher in 2015, but the other limnological indicators were similar in 2014 and 2015.

Chloride levels in the 2015 samples, collected for the first time through CSLAP and cited in Appendix A, ranged from 41 to 43 mg/l. These values fall within the range of "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 above the range of values found in most NYS lakes. These readings suggest a moderate to high 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 moderate to high algae levels. The dominance of blue green algae increases over the summer and increases as total algae levels rise. No shoreline blooms were reported, although the lake may be susceptible to these shoreline blooms.

Water chestnut was reported in the lake, and there was some effort to remove these plants. The balance of the aquatic plant community is not yet known.

DEC sampling found oxygen depletion near the lake bottom- this may impact aquatic life. This was consistent with the observations by the CSLAP samplers.

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 “excellent” to “slightly impaired” for most recreational uses, an assessment that are in the expected range given the seasonally high algae levels and the periodic reports of “definite algae greenness”. Aquatic plants grow to the lake surface as the summer progresses; the 2015 field reports suggest that the plant community is dominated by Eurasian watermilfoil. “Excessive weeds” were more frequently cited than was “poor water clarity” as impacting recreational conditions. 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. 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 at times approached (but stayed below) levels associated with harmful algal blooms (HABs) in the main body of the lake, but shoreline blooms were not reported. Neither microcystin-LR (liver toxin) nor anatoxin-a (nerve toxin) were detected in any open water samples in 2014 or 2015. Lake residents and pets should still avoid exposure to any discolored water or surface scums on the lake.

Lake Condition Summary

Category	Indicator	Min	Overall Avg	Max	2015 Avg	Classification	2015 Change?	Long-term Change?
Eutrophication Indicators	Water Clarity	0.75	1.83	2.90	2.30	Eutrophic	Higher than in 2014	
	Chlorophyll *a*	2.30	11.51	28.60	5.30	Eutrophic	Lower than in 2014	
	Total Phosphorus	0.016	0.021	0.040	0.023	Eutrophic	Higher than in 2014	
Potable Water Indicators	Hypolimnetic Ammonia	0.04	0.31	0.79	0.31	Elevated Deepwater NH4	Close to 2014	
	Hypolimnetic Arsenic							
	Hypolimnetic Iron							
	Hypolimnetic Manganese							
Limnological Indicators	Hypolimnetic Phosphorus	0.000	0.012	0.033	0.009	Close to Surface TP Readings	Lower than in 2014	
	Nitrate + Nitrite	0.01	0.04	0.19	0.02	Low NOx	Lower than in 2014	
	Ammonia	0.02	0.05	0.13	0.04	Low Ammonia	Close to 2014	
	Total Nitrogen	0.25	0.49	0.77	0.41	Low Total Nitrogen	Lower than in 2014	
	pH	6.50	7.35	8.43	7.33	Circumneutral	Close to 2014	
	Specific Conductance	86	142	187	148	Intermediate Hardness	Higher than in 2014	
	True Color	11	23	33	22	Intermediate Color	Close to 2014	
	Calcium	6.3	6.8	7.2	7.0	Not Susceptible to Zebra Mussels	Higher than in 2014	
Lake Perception	WQ Assessment	1	2.5	3	2.6	Not Quite Crystal Clear	Close to 2014	
	Aquatic Plant Coverage	2	2.5	3	2.6	Surface Plant Growth	Close to 2014	
	Recreational Assessment	1	2.3	3	2.6	Excellent	Less favorable than in 2014	
Biological Condition	Phytoplankton					Open water-moderate blue algae biomass		
	Macrophytes					Excellent quality of the aquatic plant community		
	Zooplankton					Not measured through CSLAP		
	Macroinvertebrates					Not measured through CSLAP		
	Fish					Warmwater fishery		
	Invasive Species					Water chestnut, Eurasian watermilfoil		
Local Climate Change	Air Temperature	15	21.5	27	21.9		Higher than in 2014	
	Water Temperature	18	22.9	27	23.9		Higher than in 2014	
Harmful Algal Blooms	Open Water Phycocyanin	3	33	63	23	No readings indicate high risk of BGA		
	Open Water FP Chl.a	1	8	17	4	Few readings indicate high algae levels		
	Open Water FP BG Chl.a	0	6	16	2	Few readings indicate high BGA levels		
	Open Water Microcystis	<DL	<DL	0.3	<DL	Low to undetectable open water microcystins		
	Open Water Anatoxin a	<DL	<DL	<DL	<DL	Open water Anatoxin-a consistently not 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

Pleasure Lake 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 Pleasure Lake, including water chemistry data, physical measurements, and volunteer samplers' perception data, is inadequate to evaluate the use of the lake for potable water, and the lake is not used for this purpose. The high algae levels and deepwater oxygen deficits indicate threats to any "unofficial" potable water use.

Public Bathing

The CSLAP dataset at Pleasure Lake, including water chemistry data, physical measurements, and volunteer samplers' perception data, suggests that public bathing, if conducted at a public swimming beach, would be *stressed* due to periodically low water clarity, excessive algae and nutrient levels. However, these impacts were not apparent in 2015. 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 Pleasure Lake, including water chemistry data, physical measurements, and volunteer samplers' perception data, suggest that recreation may be *stressed* to *impaired* by excessive algae, although it is not yet known which of these assessments best characterize normal conditions in the lake.

Aquatic Life

The CSLAP dataset on Pleasure Lake, including water chemistry data, physical measurements, and volunteer samplers' perception data, suggest that aquatic life should be supported, although this use may be *threatened* by road salt runoff and invasive species (water chestnut and 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 Pleasure Lake, including water chemistry data, physical measurements, and volunteer samplers' perception data, suggest that aesthetics are *poor* due to poor lake perception. It is not yet known if dense Eurasian watermilfoil growth routinely affects lake habitat.

Fish Consumption

There are no fish consumption advisories posted for Pleasure Lake.

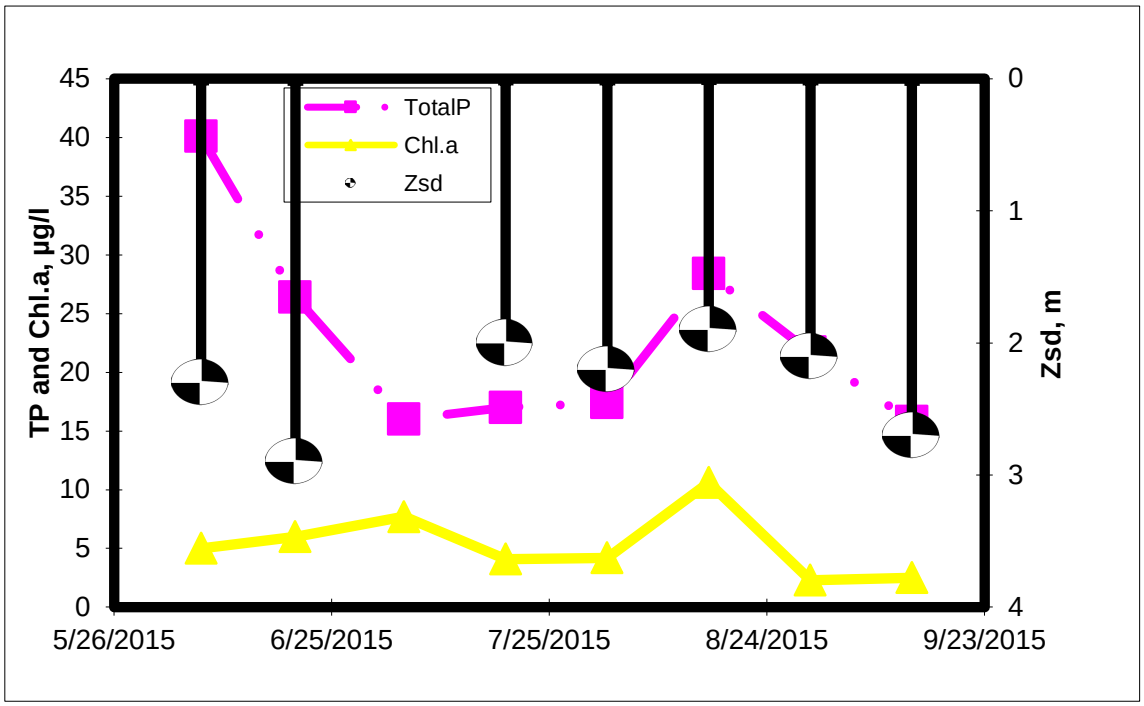
Additional Comments and Recommendations

Aquatic plant surveys should be conducted at Pleasure Lake to determine if whether native or exotic plants dominate the aquatic plant community. Shoreline surveillance should continue to look for the presence of shoreline algae blooms.

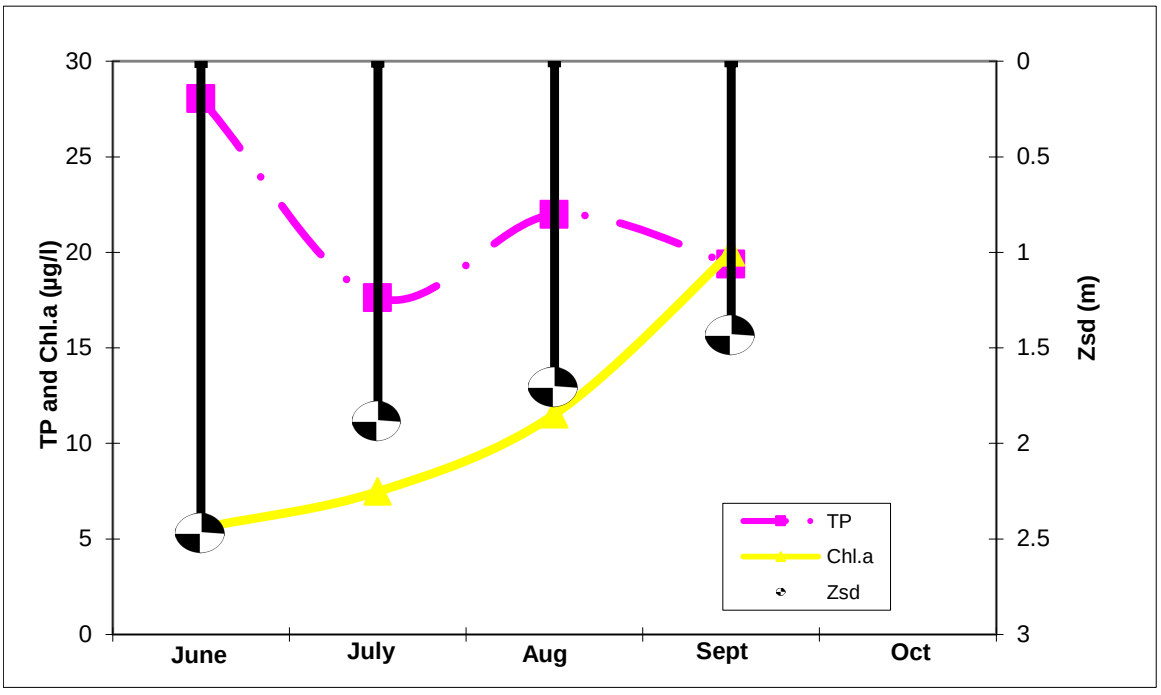
Aquatic Plant IDs-2015

Eurasian watermilfoil (*Myriophyllum spicatum*), an invasive plant, was identified from the lake in 2015.

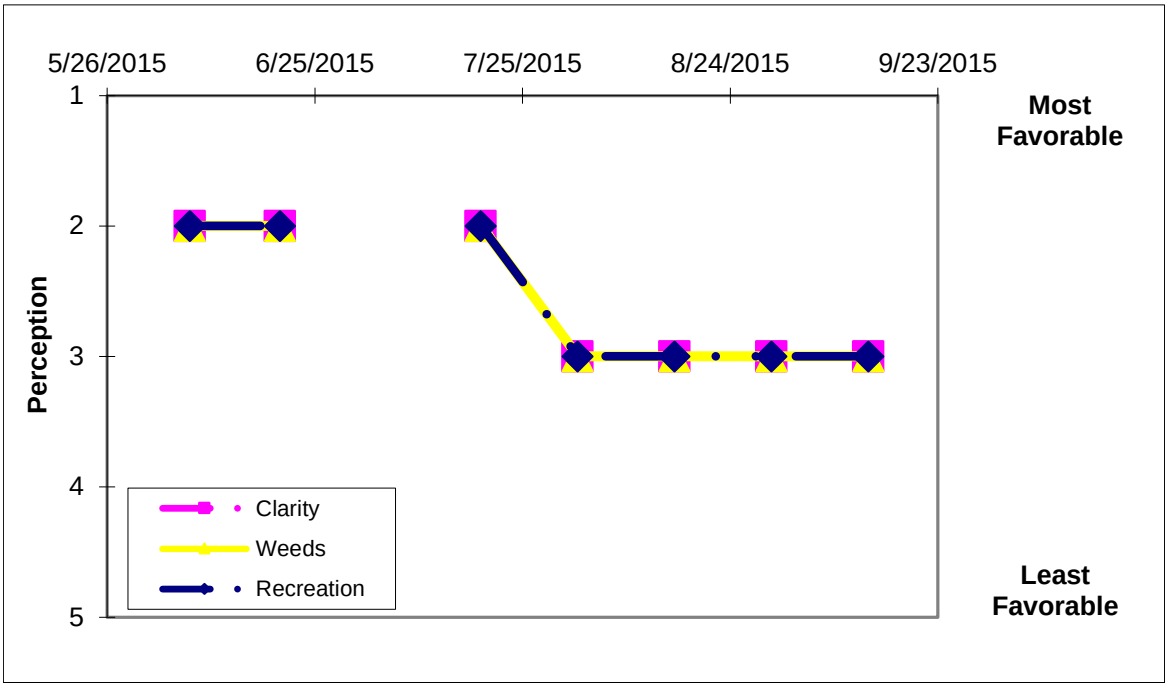
Time Series: Trophic Indicators, 2015



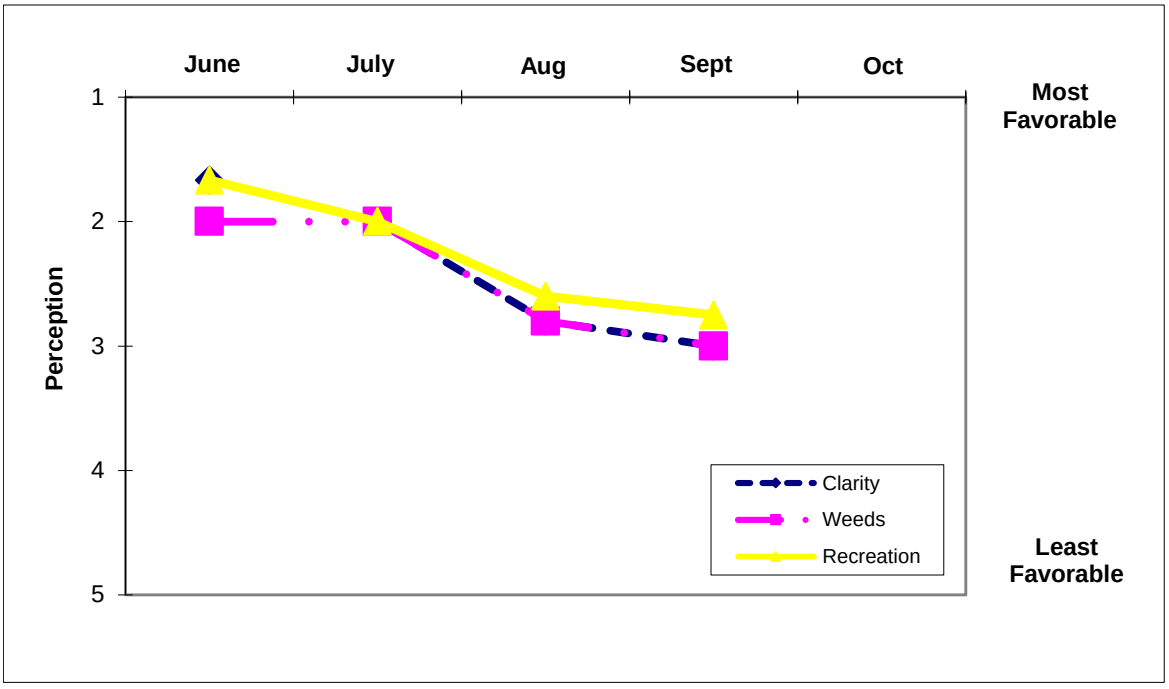
Time Series: Trophic Indicators, Typical Year (2014-2015)



Time Series: Lake Perception Indicators, 2015



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



Appendix A- CSLAP Water Quality Sampling Results for Pleasure Lake

LNum	PName	Date	Zbot	Zsd	Zsamp	Tot.P	NO3	NH4	TDN	TN/TP	TColor	pH	Cond25	Ca	Chl.a	Cl
238	Pleasure Lake	6/22/2014	7.2	2.23	1.5	0.018	0.02	0.02	0.35	43.75	24	7.31	153	6.3	5.70	
238	Pleasure Lake	7/6/2014	7.4	1.85	1.5	0.019			0.43	50.86	25	7.41	135		6.50	
238	Pleasure Lake	7/20/2014	7.7	1.80	1.5	0.019	0.01	0.04	0.51	59.37	33	7.59	98		11.60	
238	Pleasure Lake	8/3/2014	7.3	1.35	1.5	0.020			0.58	64.44	15	7.70	126		17.40	
238	Pleasure Lake	8/17/2014	7.2	1.00	1.5	0.023	0.19	0.10	0.57	54.95	33	7.23	187	6.8	23.10	
238	Pleasure Lake	9/7/2014	7.2	1.10	1.5	0.021			0.67	71.77	11	8.43	155		25.80	
238	Pleasure Lake	9/14/2014	7.1	0.75	1.5	0.021	0.01	0.13	0.77	82.45	33	6.50	116		28.60	
238	Pleasure Lake	9/28/2014	7.1	1.20	1.5	0.021			0.70	74.80	16	6.79	112		23.10	
238	Pleasure Lake	6/7/2015	7.4	2.30	1.5	0.040	0.02	0.03	0.25	6.26	19	6.92	86	6.9	5.00	
238	Pleasure Lake	6/20/2015	7.3	2.90	1.5	0.026			0.32	12.01	17	7.09	130		6.00	
238	Pleasure Lake	7/5/2015				0.016	0.01	0.05	0.45	2.84	25	6.87	172		7.70	41.8
238	Pleasure Lake	7/19/2015	7.5	2.00	1.5	0.017			0.44	25.94	27	6.92	180		4.10	
238	Pleasure Lake	8/2/2015	7.3	2.20	1.5	0.017	0.01	0.03	0.38	21.67	28	7.71	156	7.2	4.20	
238	Pleasure Lake	8/16/2015	7.6	1.90	1.5	0.028			0.44	15.60	25	7.50	135		10.60	
238	Pleasure Lake	8/30/2015	7.3	2.10	1.5	0.022	0.02	0.04	0.49	22.35	15	7.86	159		2.30	43.1
238	Pleasure Lake	9/13/2015	7.3	2.70	1.5	0.016			0.53	33.48	21	7.75	164		2.50	
238	Pleasure Lake	6/22/2014			5.5											
238	Pleasure Lake	7/6/2014			5.9	0.008										
238	Pleasure Lake	7/20/2014			6.2	0.018		0.79								
238	Pleasure Lake	8/3/2014			5.8	0.027										
238	Pleasure Lake	8/17/2014			5.7	0.006		0.04								
238	Pleasure Lake	9/7/2014			5.7	0.005										
238	Pleasure Lake	9/14/2014			5.6	0.023		0.12								
238	Pleasure Lake	9/28/2014			5.6	**0.022**										
238	Pleasure Lake	6/7/2015			5.9	0.033		0.18								
238	Pleasure Lake	6/20/2015			5.8	0.000										
238	Pleasure Lake	7/5/2015			6.0	0.007		0.30								
238	Pleasure Lake	7/19/2015			5.6	0.001										
238	Pleasure Lake	8/2/2015			5.8	0.003		0.47								
238	Pleasure Lake	8/16/2015			6	0.000										
238	Pleasure Lake	8/30/2015			6	0.006		0.29								
238	Pleasure Lake	9/13/2015			6	0.019										

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
238	Pleasure Lake	6/22/2014	epi	26	24	1	2	1	0	0	0	2.50	0.40	<0.58	<0.44	<0.002	1.70	0.20	f	f
238	Pleasure Lake	7/6/2014	epi	25	24	2	2	2	0	0	0	13.80	0.50	<0.62	<0.03	<0.002	3.90	2.30	i	i
238	Pleasure Lake	7/20/2014	epi	22	25	2	2	2	0	0	0	25.70	0.60	<0.39	<0.21	<0.003	7.30	5.70	i	i
238	Pleasure Lake	8/3/2014	epi	23	24	2	3	2	2	0	0	50.30	0.50	<0.33	<0.01	<0.002	13.30	11.80	i	i
238	Pleasure Lake	8/17/2014	epi	19	21	3	2	2	1	0	0	63.30	0.60	<0.39	<0.03	<0.001	14.30	12.50	i	i
238	Pleasure Lake	9/7/2014	epi	21	23	3	3	3	1	7	0	61.40	0.70	<0.64	<0.14	<0.002	17.40	16.30	f	f
238	Pleasure Lake	9/14/2014	epi	15	20	3	3	2	0	0	0	56.70	0.60	<0.24	<0.03	<0.001	16.40	15.20	f	f
238	Pleasure Lake	9/28/2014	epi	19	18	3	3	3	1	4	4	47.10	0.70	<0.19	<0.12	<0.001	12.60	10.80	f	f
238	Pleasure Lake	6/7/2015	epi	17	21	2	2	2	0	0	7	20.80	0.80	<0.77	<0.126	<1.739	2.14	0.12		
238	Pleasure Lake	6/20/2015	epi	17	23	2	2	2	0	0	7	9.70	0.50	<0.55	<0.004	<0.024	1.37	0.35	F	I
238	Pleasure Lake	7/5/2015	epi																	
238	Pleasure Lake	7/19/2015	epi	23	23	2	2	2	28	0	0	8.80	0.70	<0.30	<0.009	<0.049	3.54	1.73	I	I
238	Pleasure Lake	8/2/2015	epi	26	27	3	3	3	2	7	4	4.85	0.33	<0.19	<0.004	<0.015	1.12	0.38	D	D
238	Pleasure Lake	8/16/2015	epi	17	23	3	3	3	2	7	0	54.00	2.10						I	I
238	Pleasure Lake	8/30/2015	epi	27	25	3	3	3	2	0	0			<0.49	<0.003	<0.014	4.72	3.20	I	I
238	Pleasure Lake	9/13/2015	epi	26	25	3	3	3	8	7	4	37.00	0.60	<0.27	<0.009	<0.022	9.17	7.67	F	I
238	Pleasure Lake	6/22/2014	hypo		19															
238	Pleasure Lake	7/6/2014	hypo		18															
238	Pleasure Lake	7/20/2014	hypo		18															
238	Pleasure Lake	8/3/2014	hypo		20															
238	Pleasure Lake	8/17/2014	hypo		18															
238	Pleasure Lake	9/7/2014	hypo		19															
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238	Pleasure Lake	8/2/2015	hypo		18															
238	Pleasure Lake	8/16/2015	hypo		20															
238	Pleasure Lake	8/30/2015	hypo		20															
238	Pleasure Lake	9/13/2015	hypo		17															

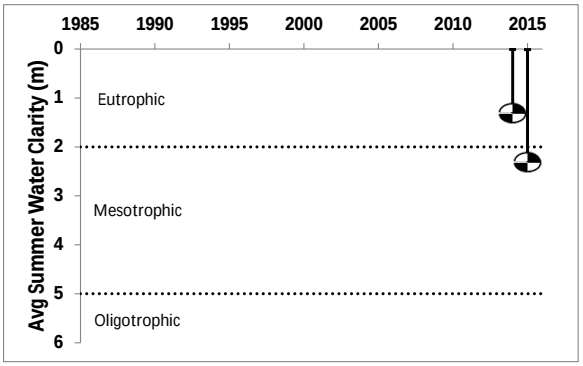
Legend Information

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: Pleasure Lake

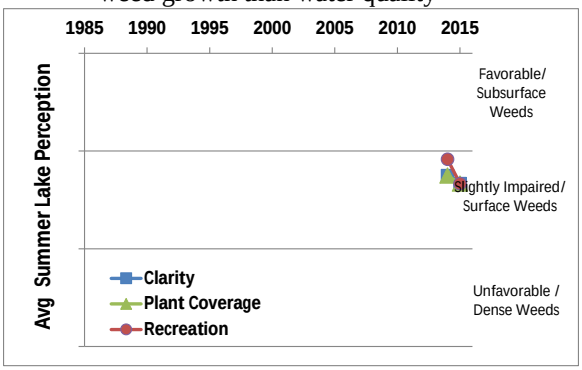
Long Term Trends: Water Clarity

- Water clarity was higher in 2015
- Most readings typical of *eutrophic* lakes



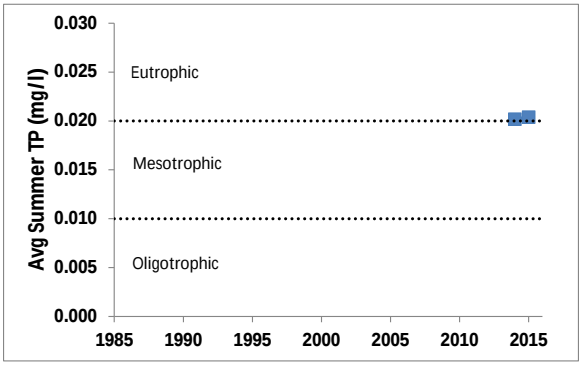
Long Term Trends: Lake Perception

- Less favorable assessments; more weeds
- Recreational perception more closely tied to weed growth than water quality



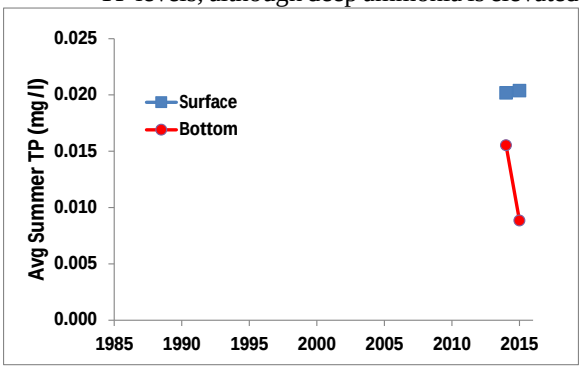
Long Term Trends: Phosphorus

- Similar readings in 2014 and 2015
- Most readings typical of *eutrophic* lakes



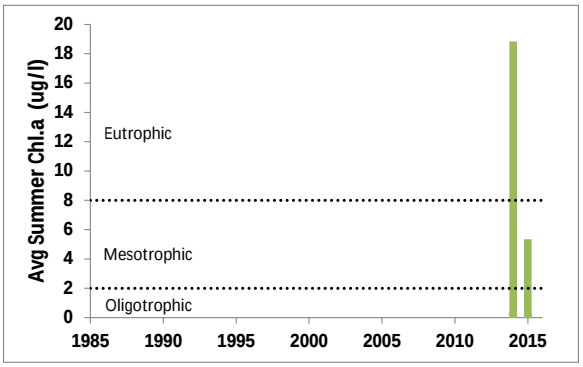
Long Term Trends: Bottom Phosphorus

- Pleasure Lake is thermally stratified
- Deepwater TP levels are lower than surface TP levels, although deep ammonia is elevated



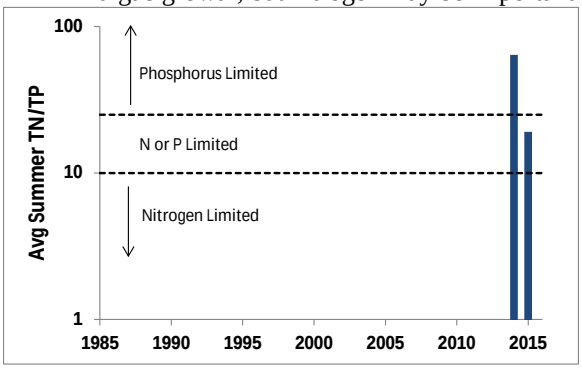
Long Term Trends: Chlorophyll a

- Much lower algae levels in 2015
- Most readings typical of *mesoeutrophic* lakes with seasonal increases



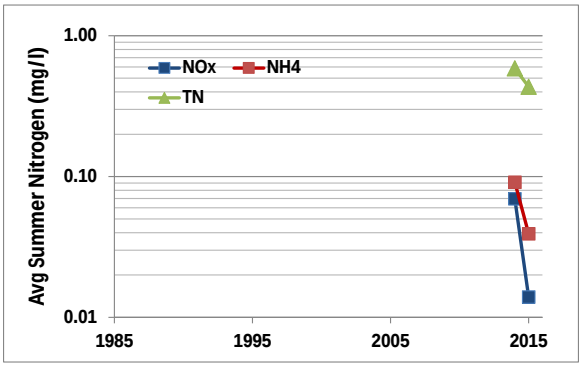
Long Term Trends: N:P Ratio

- Much lower ratios in 2015
- Most readings indicate phosphorus limits algae growth, but nitrogen may be important



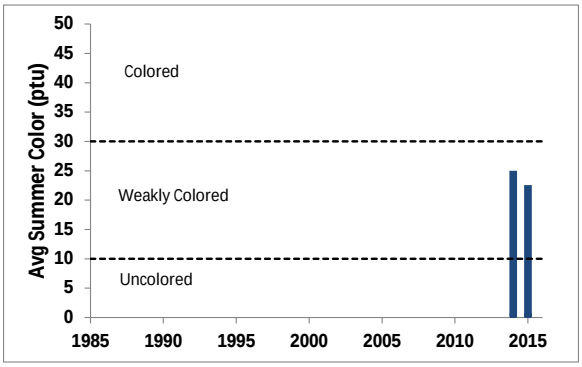
Long Term Trends: Nitrogen

- All forms of N lower in 2015 than in 2014
- Relatively high total nitrogen, but low ammonia and NOx



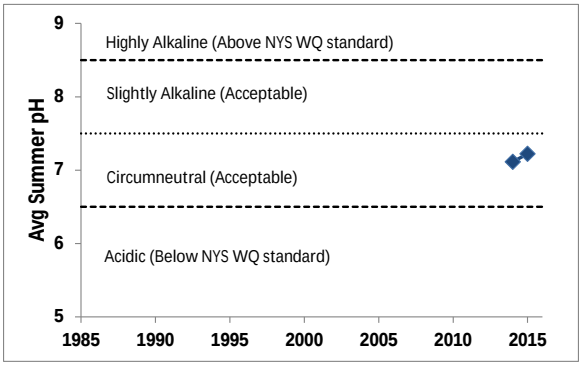
Long Term Trends: Color

- Mostly similar color 2015 and 2014
- Most readings typical of *weakly colored* lakes



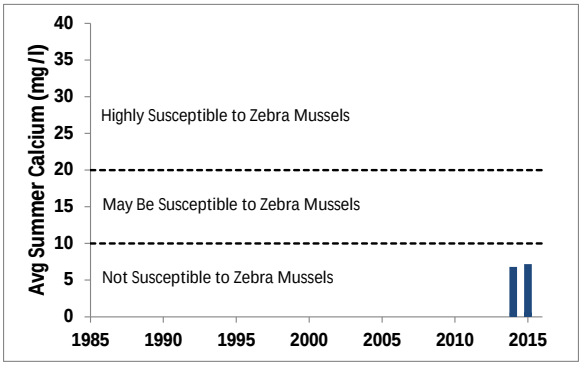
Long Term Trends: pH

- Similar pH readings in 2015 and 2014
- Most readings typical of *circumneutral* lakes



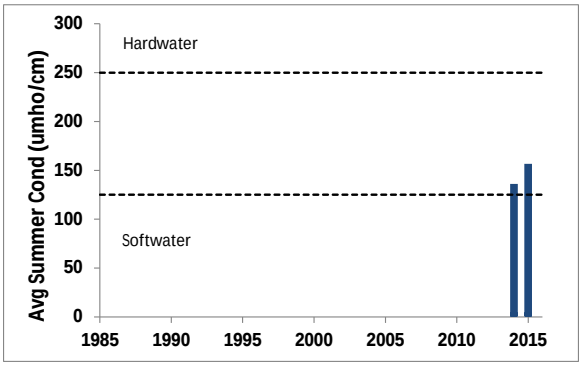
Long Term Trends: Calcium

- Similar calcium readings in 2015 and 2014
- 2014 data indicate low susceptibility to zebra mussels



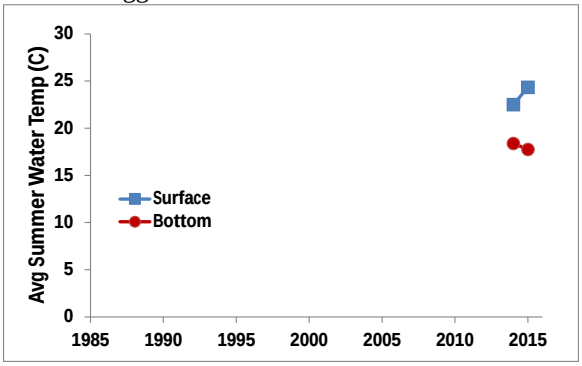
Long Term Trends: Conductivity

- Higher conductivity in 2015 and 2014
- Most readings typical of lakes with *softwater* to *intermediate* hardness



Long Term Trends: Water Temperature

- Higher surface T but lower bottom T in '15
- Deepwater temps similar to surface readings; suggests weak thermal stratification



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.

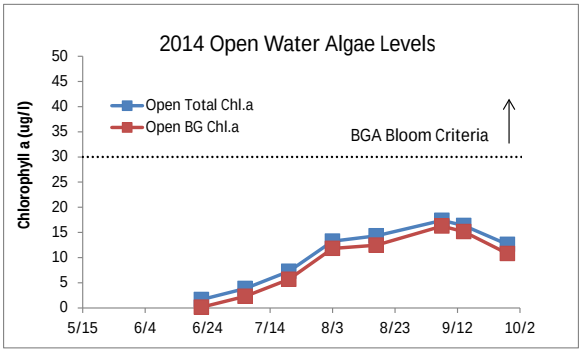


Figure D1:
2014 Open Water Total and BGA Chl.a

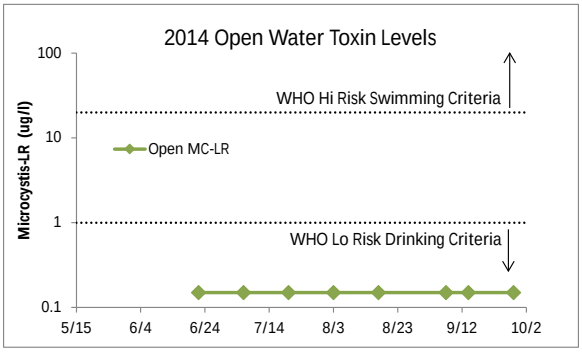


Figure D2:
2014 Open Water Microcystin-LR

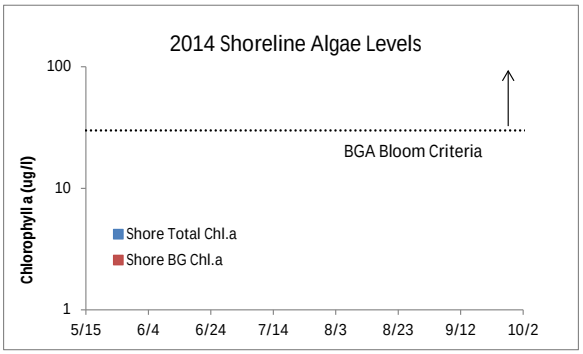


Figure D3:
2014 Shoreline Total and BGA Chl.a

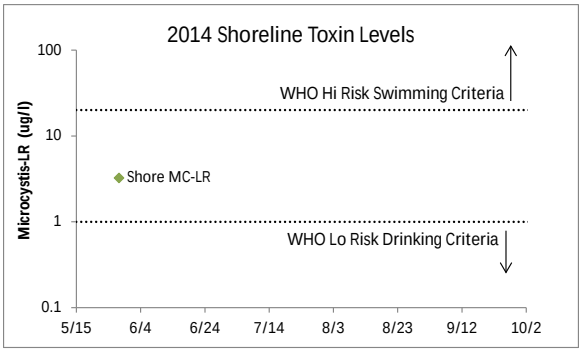


Figure D4:
2014 Shoreline Microcystin-LR

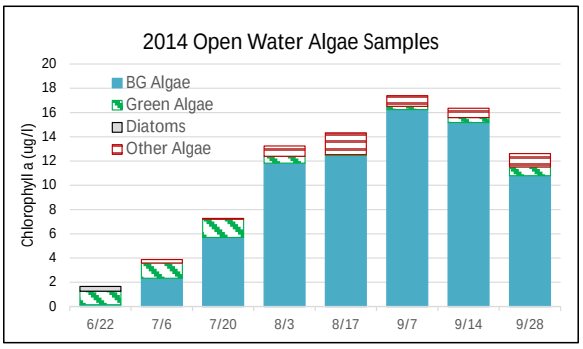


Figure D5:
2014 Open Water Algae Types

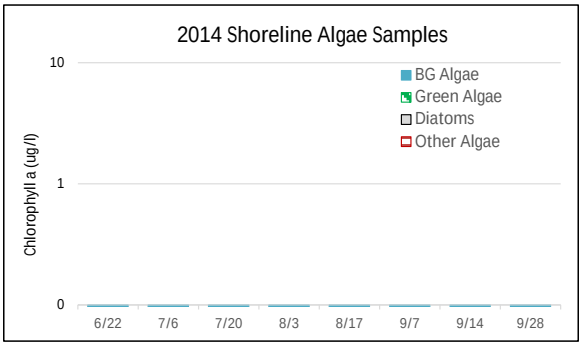


Figure D6:
2014 Shoreline Algae Types

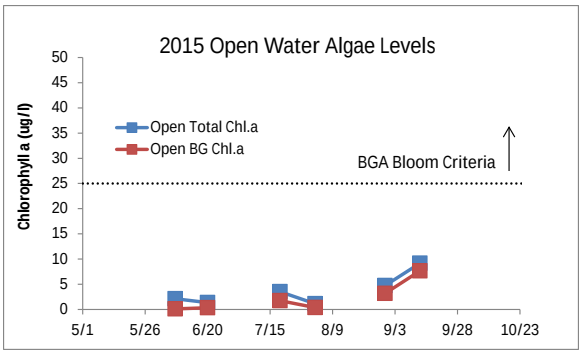


Figure D7:
2015 Open Water Total and BGA Chl.a

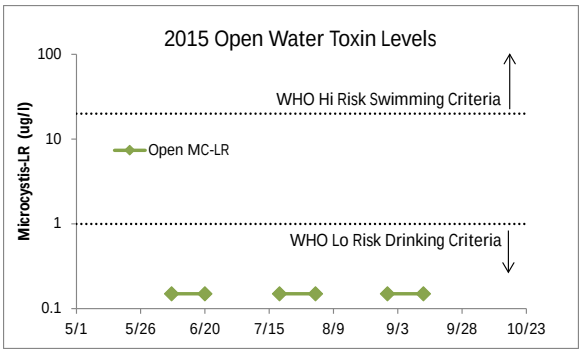


Figure D8:
2015 Open Water Microcystin-LR

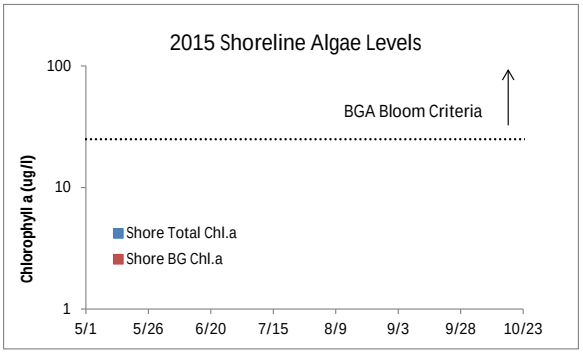


Figure D9:
2015 Shoreline Total and BGA Chl.a

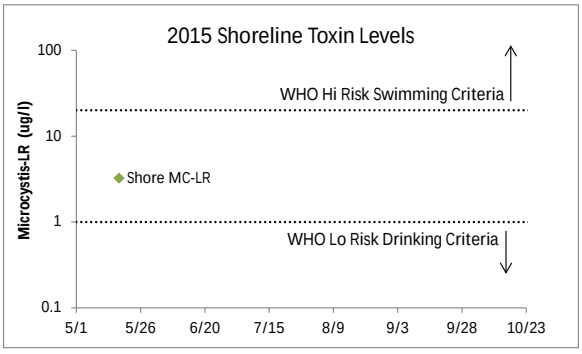


Figure D10:
2015 Shoreline Microcystin-LR

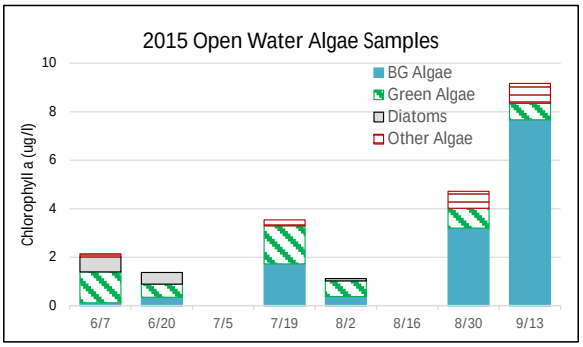


Figure D11:
2015 Open Water Algae Types

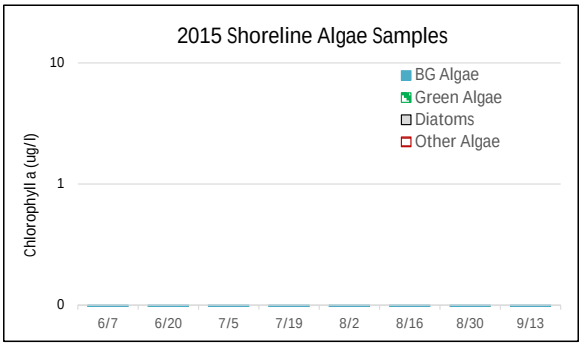


Figure D12:
2015 Shoreline Algae Types

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.

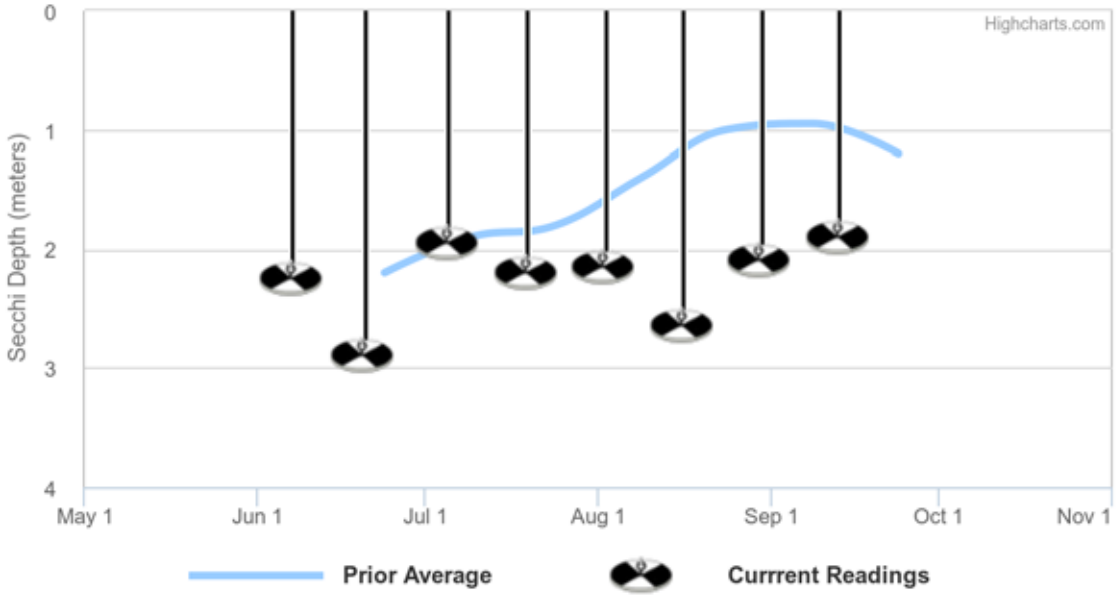
Aquatic Invasive Species - Sullivan County			
Waterbody	**Kingdom**	**Common name**	**Scientific name**
Basherkill South	**Plant**	**European frogbit**	**Hydrocharis morsus-ranae**
Beaverman Lake	Plant	European frogbit	*Hydrocharis morsus-ranae*
Black Lake	Plant	Water chestnut	*Trapa natans*
Cliff Lake	Plant	Fanwort	*Cabomba caroliniana*
Kiamesha Lake	Plant	Eurasian watermilfoil	*Myriophyllum spicatum*
Martin Lake	Plant	Fanwort	*Cabomba caroliniana*
Morningside Lake	**Plant**	**Curly leafed pondweed**	***Potamogeton crispus***
Morningside Lake	**Plant**	**Water chestnut**	***Trapa natans***
Pleasure Lake	**Plant**	**Eurasian watermilfoil**	***Myriophyllum spicatum***
Pleasure Lake	Plant	Water chestnut	*Trapa natans*
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 Pleasure Lake

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.

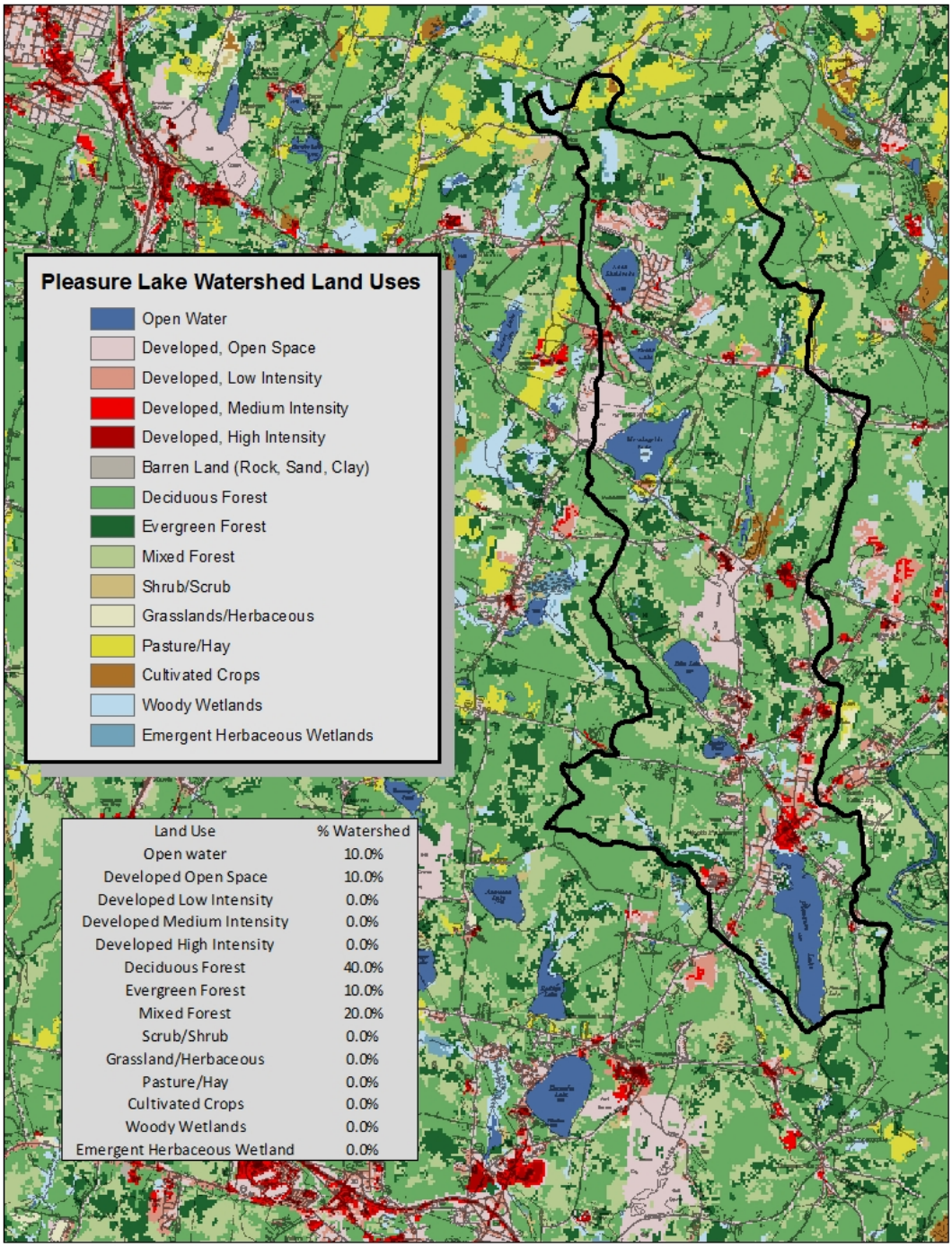
Current Year Secchi Readings vs. Prior Average



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 Pleasure Lake

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



Land Use	% Watershed
Open water	10.0%
Developed Open Space	10.0%
Developed Low Intensity	0.0%
Developed Medium Intensity	0.0%
Developed High Intensity	0.0%
Deciduous Forest	40.0%
Evergreen Forest	10.0%
Mixed Forest	20.0%
Scrub/Shrub	0.0%
Grassland/Herbaceous	0.0%
Pasture/Hay	0.0%
Cultivated Crops	0.0%
Woody Wetlands	0.0%
Emergent Herbaceous Wetland	0.0%