Lake Peekskill Questions and Answers, 2015 CSLAP

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

A1. Water quality conditions in Lake Peekskill have been less favorable in recent years, including 2015. Water clarity has been lower, probably due to higher nutrient levels and patchy algae growth. Shoreline blue green algae blooms were reported along the north shoreline in 2015, different locations than in previous years.

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

A2. Chloride testing results were typical of lakes with high 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. Lake Peekskill had lower water clarity, and higher nutrient and algae levels, than the typical lake in the area. Aquatic plant coverage was much lower than in these other lakes; it is not known if this reflects active management.

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

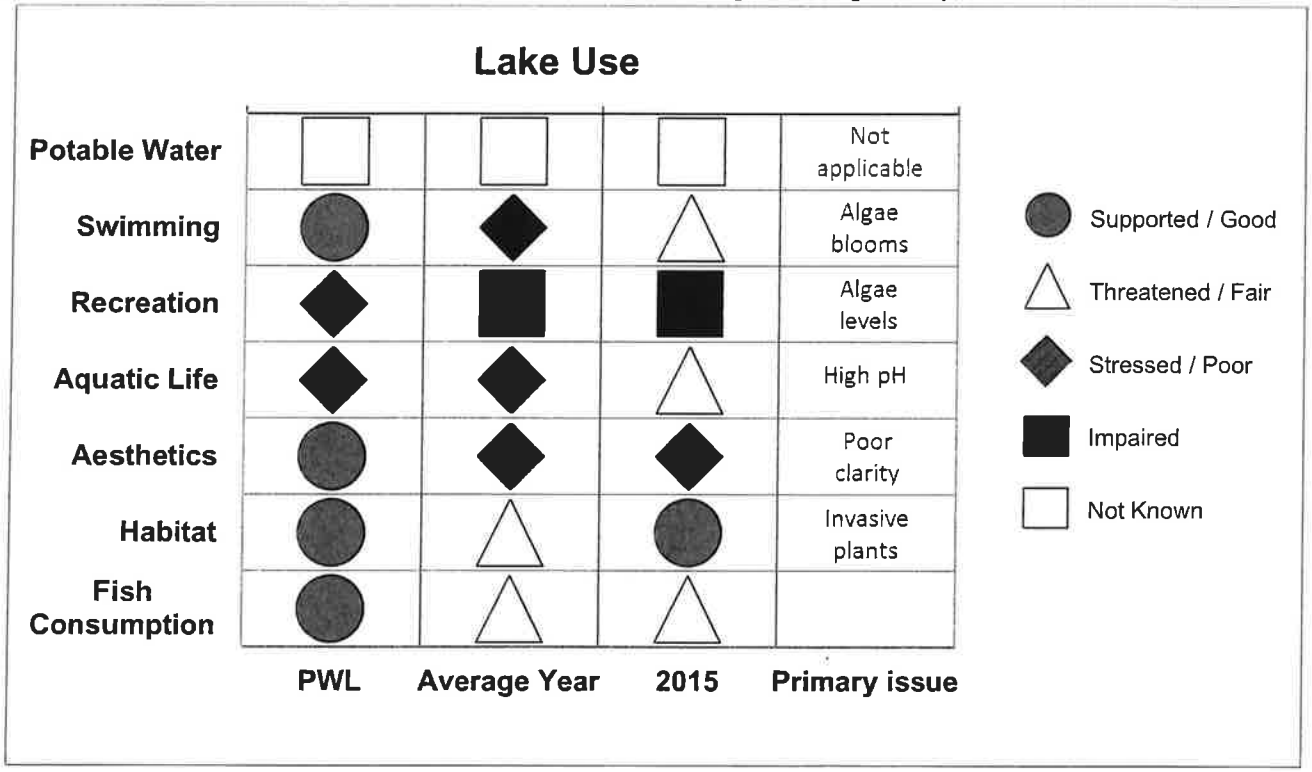
A4. Phosphorus readings in the lake have increased over the last two decades, probably contributing to a decrease in water clarity over the same period (and despite the lack of a consistent change in algae levels). This may also be related to a long-term increase in conductivity, suggesting nutrient and sediment loading from the watershed.

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

A5. Lake Peekskill is highly susceptible to shoreline blue green algae blooms, consistent with moderate to high nutrient and open water algae levels. The lack of aquatic plant growth in the last few years suggests that the lake may have shifted to dominance by algae, which might create further challenges for long-term reduction of blooms. The lake association should identify and address any shoreline or near watershed sources of nutrients and sediment.

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.



CSLAP 2015 Lake Water Quality Summary:
Lake Peekskill

General Lake Information

Location	Town of Putnam Valley
County	Putnam
Basin	Lower Hudson River
Size	23.3 hectares (57.6 acres)
Lake Origins	Natural
Watershed Area	286 hectares (706.4 acres)
Retention Time	0.5 years
Mean Depth	3.7 meters
Sounding Depth	7.5 meters
Public Access?	no
Major Tributaries	no named tribs
Lake Tributary To...	unnamed outlet to Peekskill Hollow Creek to Annsville Creek to Hudson River
WQ Classification	B (contact recreation = swimming)
Lake Outlet Latitude	41.337
Lake Outlet Longitude	-73.880
Sampling Years	1990-1994, 1996, 1998, 2000-2010, 2012, 2014-2015
2015 Samplers	Rosanne Walsh, David Mei
Main Contact	Ted Muniak

Lake Map

Background

Lake Peekskill is a 57 acre, class B lake found in the Town of Putnam Valley in Putnam County, in the lower Hudson River region of New York State. It was first sampled as part of CSLAP in 1990.

It is one of 15 CSLAP lakes among the more than 250 lakes and ponds found in Putnam County, and one of 67 CSLAP lakes among the more than 3680 lakes and ponds in the Lower Hudson River drainage basin.

Lake Uses

Lake Peekskill is a Class B lake; this means that the best intended use for the lake is for contact recreation—swimming and bathing—and non-contact recreation—boating and aesthetics, although the lake is for aesthetics and by aquatic life. The lake is used by lake residents and invited guests for a variety of recreational purposes—the lake has no public access.

The state does not stock Lake Peekskill; it is not known if any private stocking occurs.

General statewide fishing regulations are applicable in Lake Peekskill.

Historical Water Quality Data

CSLAP sampling was conducted on Lake Peekskill from 1990 to 1994, 1996, 1998, 2000 to 2010, 2012, and from 2014 to 2015. The CSLAP reports for each of the past several years can be found on the NYSFOLA website at http://nysfola.mylaketown.com. The most recent reports for Lake Peekskill can also be found on the NYSDEC web page at http://www.dec.ny.gov/lands/77848.html.

Lake Peekskill was not sampled through any of the major NYS monitoring programs prior to CSLAP. It is not known if private monitoring has been conducted to support resource management (water or fisheries).

Lake Association and Management History

Lake Peekskill is represented by the Lake Peekskill Improvement District (and Preservation Committee). In addition to involvement in CSLAP, the district is involved in a boat tagging program (to keep track of residential boats) and other lake management activities.

It is not known if the district or preservation committee maintains a website.

Summary of 2015 CSLAP Sampling Results

Evaluation of 2015 Annual Results Relative to 1990-2014

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 Peekskill" section in Appendix C.

Evaluation of Eutrophication Indicators

Lake Peekskill was probably more productive than usual in 2015. Water clarity readings were lower than usual, and have decreased since the early 1990s. This is consistent with a long-term increase in total phosphorus readings and slightly higher than normal phosphorus readings in 2015. However, algae levels (as measured by chlorophyll *a*) were close to normal in 2015, and these readings have not changed significantly over the last 25 years.

Lake productivity usually increases during the summer, as manifested in decreasing clarity from increasing algae levels from June through October. However, while phosphorus readings decreased after July of 2015, neither water clarity nor chlorophyll *a* exhibited any clear seasonal changes in 2015.

The lake can usually be characterized as *mesoeutrophic*, based on water clarity (typical of *mesotrophic* lakes), chlorophyll *a* and total phosphorus readings (both typical of *eutrophic* lakes). 2014 and 2015 conditions were more typical of *eutrophic* lakes. The trophic state indices (TSI) evaluation suggests that algae levels are often slightly higher than expected given the phosphorus and water clarity readings in the lake. This suggests that algae growth may be patchy, consistent with periodic reports of algae blooms. Overall trophic conditions are summarized on the Lake Scorecard and Lake Condition Summary Table.

Evaluation of Potable Water Indicators

Algae levels are regularly high enough to render the lake susceptible to taste and odor compounds or elevated DBP (disinfection by product) compounds that could affect the potability of the water, although the lake is not classified for this purpose. Lake Peekskill appears to be thermally stratified, at least occasionally during the summer, based on limited deepwater sampling data. The limited deepwater phosphorus data indicates that any deeper intakes may be compromised for potable water use, due to depressed oxygen levels. 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 readings have increased over the last twenty years, and were higher than normal in 2014 and 2015. It is not known to what extent the rise in conductivity is related to the increase in phosphorus levels (and recent increase in ammonia levels). Calcium and total nitrogen readings were slightly higher than usual in 2015, but neither indicator has exhibited any long-term trends.

It is likely that the small changes in most of these indicators from year to year represent normal variability.

Chloride levels in the 2015 samples, collected for the first time through CSLAP and cited in Appendix A, were 130 mg/l. These values fall within the range of "major" road salt runoff levels cited by the New Hampshire DES. These readings are below the state potable water quality standard of 250 mg/l but well above the typical 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

The fluoroprobe screening samples analyzed by SUNY ESF demonstrated some dense algae communities dominated by blue green algae, and others controlled by other algae species. In 2014, open water total and blue green algae levels decreased later in the summer, and exhibited low toxin levels. In 2015, the highest algae levels were dominated by green algae. However, shoreline bloom samples, along the western shoreline and southwest corner of the lake in previous years, and along the northern shoreline in 2015, had consistently high blue green algae levels and some high toxin levels.

Very limited macrophyte surveys have been conducted through CSLAP at Lake Peekskill. These surveys found a small number of native plant species, but no evidence of either exotic or protected plants. The very limited dataset and modified floristic quality index (FQI) calculations indicate that the quality of the aquatic plant community was "excellent", but this assessment should be updated with a more complete survey (and may be inaccurate given the paucity of plants reported in recent years).

Zooplankton and macroinvertebrate surveys have not been conducted through CSLAP. The composition of the fish community is not known, although it is likely that Lake Peekskill supports a warmwater fishery. DEC investigated a phytoplankton bloom and reports of brown bullhead deformities in 1991; fish samples indicated that this was a "benign papillomas".

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

Evaluation of Lake Perception

Recreational and water quality assessments were more favorable than usual in 2015, despite lower water clarity and higher phosphorus readings. However, these assessments have been highly favorable since the early 1990s, consistent with regular reports of "green water" in some years. Plant coverage again decreased in 2015.

Recreational assessments usually degrade from early to mid-summer, and then stay stable through the end of the sampling season. In 2014 and 2015, these assessments improved later in

the summer, after the late July north shoreline blue green algae bloom. Overall lake perception is summarized on the Lake Scorecard and Lake Condition Summary Table.

Evaluation of Local Climate Change

Water temperatures have decreased slightly since the early 1990s, although they were higher than the long-term average for the lake in 2014. It is not known if this is an indication of local climate change or if these changes cannot be well evaluated 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 exceed the threshold for harmful algal blooms (HABs), especially along the shoreline. An analysis of algae samples indicates microcystin and anatoxin-a levels below the levels needed to support safe swimming in open water sampling. However, shoreline blooms show elevated liver toxin levels, at times above the WHO criteria for unsafe swimming. Lake residents are advised to avoid contact with shoreline blooms or discolored water, since higher risk is associated with these visible bloom conditions.

Lake Condition Summary

Category	Indicator	Min	Overall Avg	Max	2015 Avg	Classification	2015 Change?	Long-term Change?
Eutrophication Indicators	Water Clarity	0.85	2.06	4.50	1.70	Mesotrophic	Within Normal Range	Decreasing Slightly
	Chlorophyll *a*	0.29	12.98	47.20	11.92	Eutrophic	Within Normal Range	No Change
	Total Phosphorus	0.003	0.030	0.190	0.033	Eutrophic	Within Normal Range	Increasing Slightly
Potable Water Indicators	Hypolimnetic Ammonia							Not known
	Hypolimnetic Arsenic							Not known
	Hypolimnetic Iron							Not known
	Hypolimnetic Manganese							Not known
Limnological Indicators	Hypolimnetic Phosphorus							Not known
	Nitrate + Nitrite	0.00	0.02	0.15	0.01	Low NOx	Within Normal Range	No Change
	Ammonia	0.00	0.05	0.44	0.04	Low Ammonia	Within Normal Range	No Change
	Total Nitrogen	0.01	0.50	1.03	0.60	Intermediate Total Nitrogen	Within Normal Range	No Change
	pH	6.62	7.83	9.33	7.89	Alkaline	Within Normal Range	No Change
	Specific Conductance	143	339	611	550	Hardwater	Higher than Normal	Increasing Significantly
	True Color	2	12	98	13	Intermediate Color	Within Normal Range	No Change
	Calcium	16.7	23.4	29.2	27.6	Highly Susceptible to Zebra Mussels	Within Normal Range	No Change
Lake Perception	WQ Assessment	1	2.6	5	1.7	Definite Algal Greenness	More Favorable Than Normal	No Change
	Aquatic Plant Coverage	1	1.6	4	1.0	Subsurface Plant Growth	Within Normal Range	No Change
	Recreational Assessment	1	2.5	5	1.5	Excellent	More Favorable Than Normal	No Change

Category	Indicator	Min	Overall Avg	Max	2015 Avg	Classification	2015 Change?	Long-term Change?
Biological Condition	Phytoplankton					Open water-high blue green algae biomass	Not known	Not known
	Macrophytes					Poor quality of the aquatic plant community	Not known	Not known
	Zooplankton					Not measured through CSLAP	Not known	Not known
	Macroinvertebrates					Not measured through CSLAP	Not known	Not known
	Fish					Warmwater fishery	Not known	Not known
	Invasive Species					Eurasian watermilfoil	Not known	Not known
Local Climate Change	Air Temperature	5	24.9	38	26.0		Within Normal Range	No Change
	Water Temperature	10	24.1	30	25.8		Higher Than Normal	No Change
Harmful Algal Blooms	Open Water Phycocyanin	7	70	440	16	Some readings indicate high risk of BGA	Not known	Not known
	Open Water FP Chl.a	0	20	100	6	Some readings indicate high algae levels	Not known	Not known
	Open Water FP BG Chl.a	0	9	71	0	Few readings indicate high BGA levels	Not known	Not known
	Open Water Microcystis	<DL	<DL	0.5	<DL	Low to undetectable open water microcystins	Not known	Not known
	Open Water Anatoxin a	<DL	<DL	<DL	<DL	Open water Anatoxin-a consistently not detectable	Not known	Not known
	Shoreline Phycocyanin					No shoreline blooms sampled for PC	Not known	Not known
	Shoreline FP Chl.a	7.6	2037	12250	319	Most readings indicate high algae levels	Not known	Not known
	Shoreline FP BG Chl.a	0.6	1939	12019	211	Most readings indicate high BGA levels	Not known	Not known
	Shoreline Microcystis	<DL	68.4	362.5	<DL	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

The 2008 NYSDEC Priority Waterbody Listings (PWL) for the Lower Hudson River drainage basin indicate that *recreation* and *aquatic life* in Lake Peekskill may be *stressed* by poor cover (due to habitat modification). The 2008 PWL listing for the lake is shown in Appendix B.

Potable Water (Drinking Water)

The CSLAP dataset at Lake Peekskill, 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 classified for this use. These data suggest that any "unofficial" use of the lake for potable water may be compromised by excessive algae.

Public Bathing

The CSLAP dataset at Lake Peekskill, including water chemistry data, physical measurements, and volunteer samplers' perception data, suggests that public bathing, if conducted at a public swimming beach, is *stressed* by excessive algae, shoreline algae blooms, excessive nutrients, and poor water clarity. Bacterial data are needed to evaluate the safety of the lake for swimming.

Recreation (Swimming and Non-Contact Uses)

The CSLAP dataset on Lake Peekskill, including water chemistry data, physical measurements, and volunteer samplers' perception data, suggest that recreation may be *impaired* by excessive

algae and shoreline blue green algae blooms, although these impacts are more apparent in some years.

Aquatic Life

The CSLAP dataset on Lake Peekskill, 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. 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 Peekskill, including water chemistry data, physical measurements, and volunteer samplers' perception data, suggest that aesthetics are at times *poor* due to poor water clarity and shoreline blue green algae blooms. Habitat may at times be only *fair* due to invasive weeds, although aquatic plant was lower than usual in 2015.

Fish Consumption

There is no fish consumption advisories posted for Lake Peekskill.

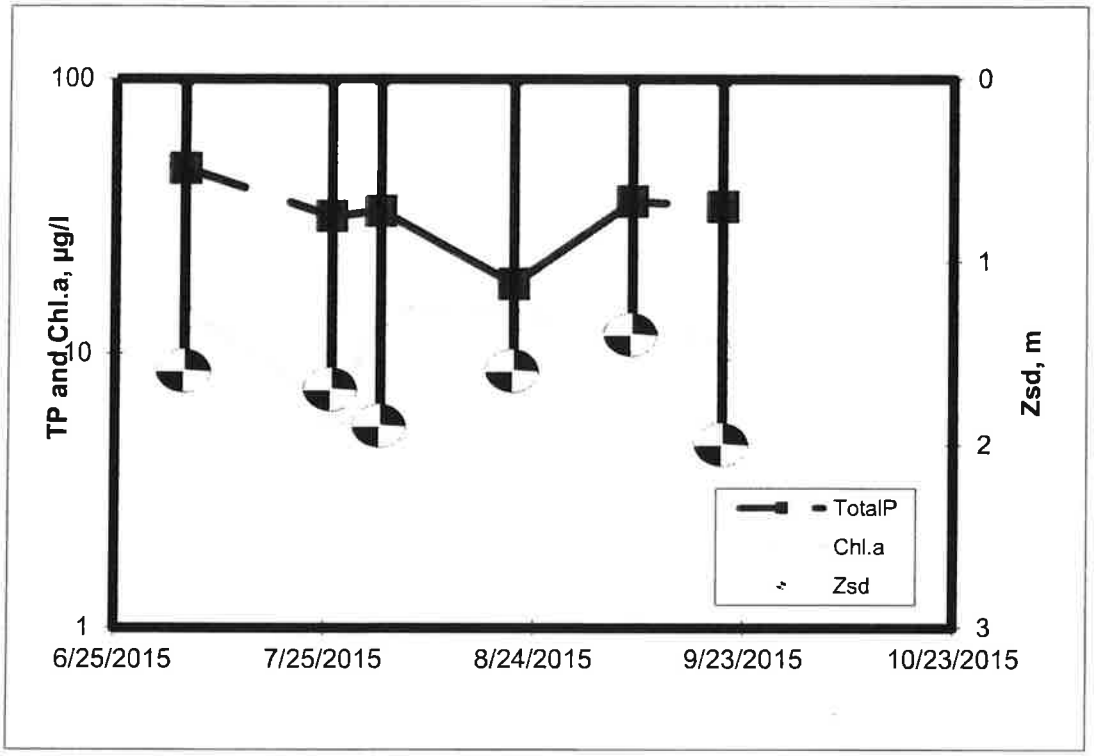
Additional Comments and Recommendations

It is not known if any exotic plant species have been introduced to the lake; the sampling volunteers should conduct any aquatic plant inventory. Lake residents are also advised to report and sample any shoreline blooms, and all residents should avoid exposure to these blooms, given potentially elevated toxin levels.

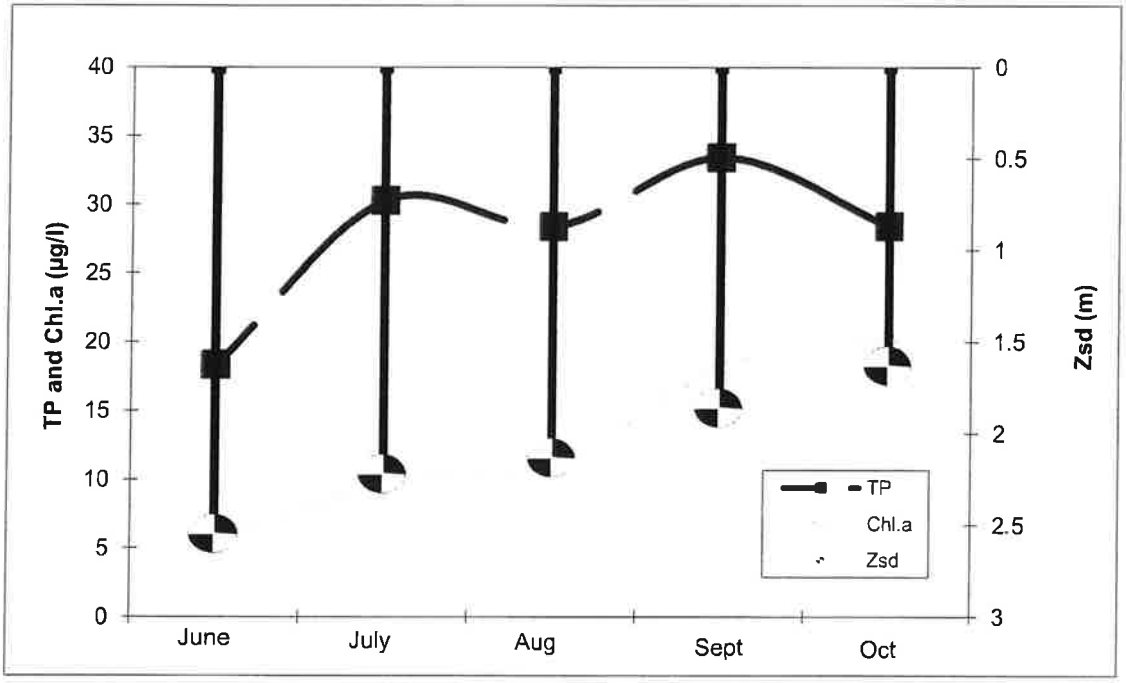
Aquatic Plant IDs-2015

None submitted for identification in 2015.

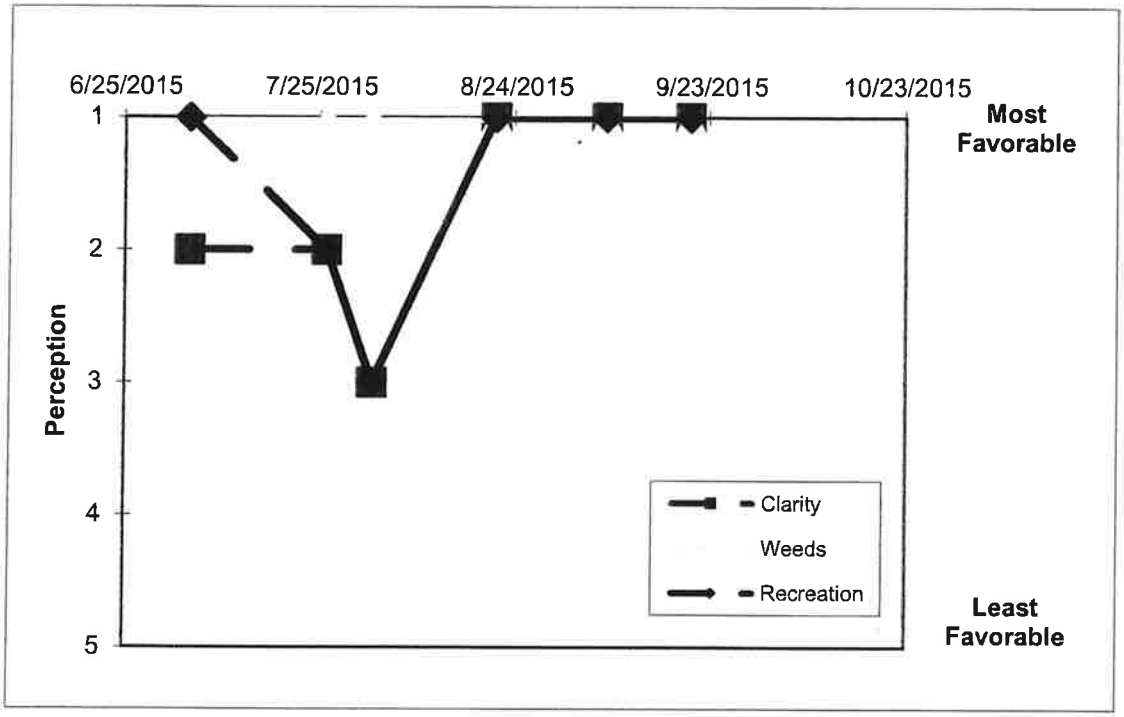
Time Series: Trophic Indicators, 2015



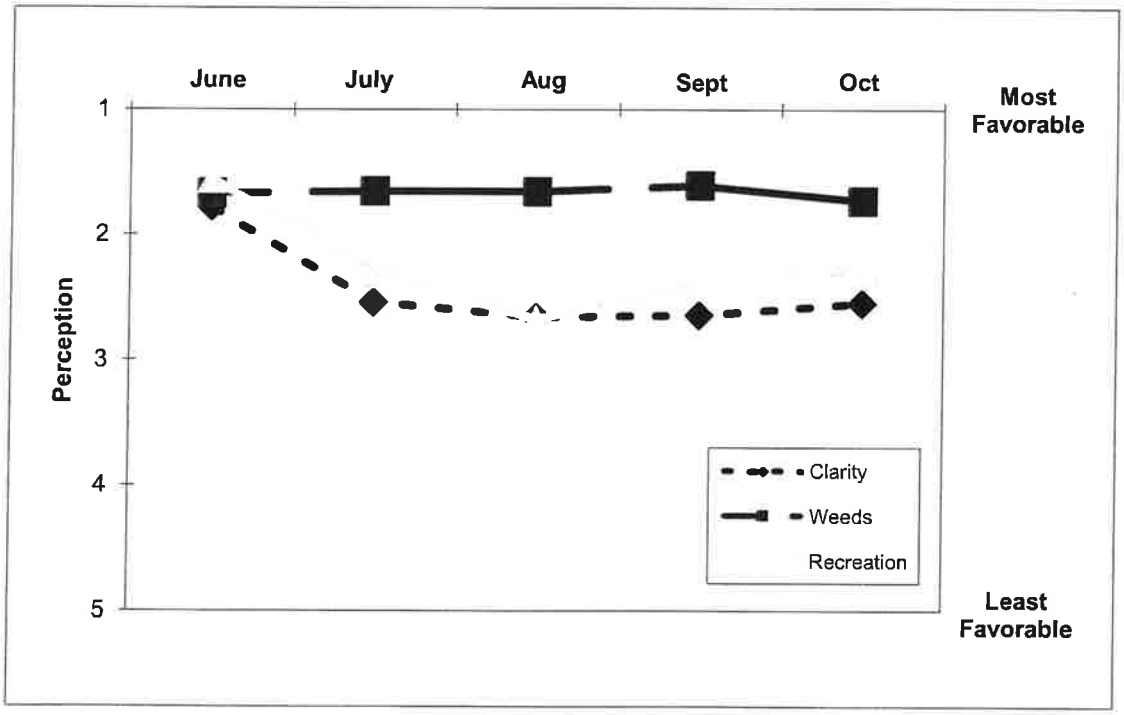
Time Series: Trophic Indicators, Typical Year (1990-2015)



Time Series: Lake Perception Indicators, 2015



Time Series: Lake Perception Indicators, Typical Year (1990-2015)



Appendix A- CSLAP Water Quality Sampling Results for Lake Peekskill

LNum	PName	Date	Zbot	Zsd	Zsamp	Tot.P	NO3	NH4	TDN	TN/TP	TColor	pH	Cond25	Ca	Chl.a	Cl
73	L Peekskill	7/8/1990	7.5	3.38	1.5	0.013	0.05				8	7.33	206		4.07	
73	L Peekskill	7/22/1990	7.8	4.13	1.5	0.013	0.02				7	7.56	180		5.74	
73	L Peekskill	8/5/1990	8.0	3.50	1.5	0.015	0.01				8	8.01	190		6.96	
73	L Peekskill	8/19/1990	6.8	3.00	1.5	0.015	0.01				11	7.87	165		9.40	
73	L Peekskill	9/10/1990	7.6	2.38	1.5	0.021	0.01				18	7.90	143		21.30	
73	L Peekskill	9/24/1990	7.6	1.63	1.5	0.027	0.01				15	7.76	176		31.00	
73	L Peekskill	10/7/1990	7.6	1.63	1.5	0.018	0.01				19	7.83	145		31.00	
73	L Peekskill	7/22/1991	6.5	2.71	1.5	0.019	0.01				11	8.51	188		7.81	
73	L Peekskill	7/28/1991	6.5	1.58	1.5	0.033	0.01				10	7.89	183		13.20	
73	L Peekskill	8/4/1991	6.8	1.58	1.5	0.030	0.01					8.20	152		8.74	
73	L Peekskill	8/11/1991	7.0	2.00	1.5	0.023	0.01				11	7.67	198		13.20	
73	L Peekskill	8/18/1991	7.0	2.00	1.5	0.014	0.01				10	7.89	149		8.28	
73	L Peekskill	8/25/1991	7.3	2.00	1.5	0.026	0.01				12	7.39	162		14.30	
73	L Peekskill	9/2/1991	7.0	3.00	1.5	0.020	0.01				7	7.85	199		10.30	
73	L Peekskill	9/8/1991	7.0	2.00	1.5	0.024	0.01				6	8.00	199		11.10	
73	L Peekskill	9/15/1991	7.0	1.50	1.5	0.021	0.02				6	7.87	163		21.70	
73	L Peekskill	6/7/1992	7.0	2.00	1.5	0.031	0.01				12	7.81	211		9.30	
73	L Peekskill	6/20/1992	8.3	2.00	1.5	0.023					6	7.88	213		13.00	
73	L Peekskill	7/5/1992	8.0	2.63	1.5	0.015	0.01				7	7.81	214		15.50	
73	L Peekskill	7/19/1992	8.0	2.00	1.5	0.018					10	7.80	212		9.60	
73	L Peekskill	8/2/1992	8.0	2.00	1.5	0.022	0.01				8	7.71	214		11.60	
73	L Peekskill	8/16/1992	8.5	2.50	1.5	0.016					8	7.68	216		9.18	
73	L Peekskill	8/30/1992	8.0	3.88	1.5	0.018	0.01				9	7.88	215		3.58	
73	L Peekskill	9/13/1992	8.0	3.00	1.5	0.023	0.01					7.88	214			
73	L Peekskill	6/20/1993	8.0	2.63	1.5	0.018					7	8.82	269		3.16	
73	L Peekskill	6/27/1993	8.5	2.25	1.5	0.018	0.01				6	8.71	269		4.46	
73	L Peekskill	7/11/1993	7.3	2.50	1.5	0.009					3	8.80	270		4.00	
73	L Peekskill	7/25/1993	8.1	3.13	1.5	0.013	0.01				2	8.40	265		47.20	
73	L Peekskill	8/8/1993	8.0	3.50	1.5	0.017					4	7.49	276		4.72	
73	L Peekskill	8/22/1993	7.8	4.50	1.5	0.011	0.01				4	7.90	272		6.20	
73	L Peekskill	9/5/1993	8.0	4.00	1.5	0.015					5	7.80	272		6.38	
73	L Peekskill	9/26/1993	7.1	3.00	1.5	0.014	0.03				6	7.91	272		19.80	
73	L Peekskill	6/11/1994	8.0	3.00	1.5	0.013	0.01				3	7.90	290		5.97	
73	L Peekskill	6/19/1994	8.1	2.88	1.5	0.007					4	8.29	286		6.18	
73	L Peekskill	7/10/1994	8.0	3.50	1.5	0.009	0.01				2	9.08	276		11.60	
73	L Peekskill	7/26/1994	7.8	2.38	1.5	0.012					2	8.96	278		3.94	
73	L Peekskill	8/7/1994	7.5	3.25	1.5	0.020	0.01				2	7.39	284		6.18	
73	L Peekskill	8/21/1994	8.0	3.50	1.5	0.010	0.01				8	7.89	281		4.71	
73	L Peekskill	9/4/1994	8.0	3.50	1.5	0.010	0.01					7.54	281			
73	L Peekskill	7/14/1996		2.00	1.5		0.01				10	7.19	291		1.80	
73	L Peekskill	8/25/1996		1.50		0.026	0.01				10	7.86	303		13.80	
73	L Peekskill	9/15/1996	8.0	1.50	1.5	0.036	0.01				10	7.15	303		31.40	
73	L Peekskill	10/6/1996	8.0	1.50	1.5	0.022	0.01				6	7.04	294		38.10	
73	L Peekskill	6/28/1998	7.0	4.00	1.5	0.028	0.01				3	6.79	275		4.20	
73	L Peekskill	7/19/1998	6.5	3.13	1.5	0.015	0.01				5	7.77	276		8.84	
73	L Peekskill	7/26/1998	7.0	2.50	1.5		0.01				2	8.19	279		19.60	
73	L Peekskill	8/2/1998	7.0	1.50	1.5	0.039	0.01				18	7.60	278		33.80	
73	L Peekskill	9/10/2000		2.00	1.5	0.042	0.01				9	7.62	278		19.20	
73	L Peekskill	9/24/2000		1.38	1.5	0.034	0.01				9	7.89	274		33.90	
73	L Peekskill	7/1/2001		2.00	1.5	0.020	0.01				8	8.51	310			
73	L Peekskill	7/15/2001	3.2	1.80	1.5	0.029	0.01				7	7.66	313		13.60	
73	L Peekskill	7/29/2001	4.2	1.60	1.5	0.034	0.01				5	6.73	323		8.20	
73	L Peekskill	8/12/2001	4.0	2.10	1.5	0.025	0.01				8	8.02	320		23.91	
73	L Peekskill	6/23/2002	6.8	1.95	1.3	0.027	0.10	0.03	0.69	25.88	5	7.83	337		2.71	
73	L Peekskill	7/7/2002	6.6	1.20	1.2	0.025	0.00	0.04			11	6.62	350		2.45	
73	L Peekskill	7/21/2002	3.9	1.06	1.5	0.025	0.03	0.07	0.51	20.40	11	8.98	353		7.23	
73	L Peekskill	8/4/2002	4.1	1.17	1.5	0.028	0.00	0.01	0.55	19.47	9	9.33	347		2.11	
73	L Peekskill	8/18/2002	4.2	1.50	1.5	0.024	0.00	0.04	0.66	27.04	7	8.96	349		5.72	
73	L Peekskill	9/2/2002	4.2	1.70	1.5	0.027	0.00	0.03			10	7.59	354		8.64	
73	L Peekskill	9/16/2002	4.7	2.15	1.5	0.034	0.00	0.05	0.54	15.95	11	7.28	367		7.19	
73	L Peekskill	10/6/2002	5.5	1.80	1.5	0.011	0.05	0.06	0.64	56.78	4	8.06	266		0.29	
73	L Peekskill	7/13/2003	4.1	2.91	1.5	0.015	0.035	0.083	0.58	39.9	3	7.5	438	24	3.54	
73	L Peekskill	7/30/2003	6.7	3.05	1.5	0.012	0.010	0.019	0.10	8.3	9	7.6	430		1.78	

LNum	PName	Date	Zbot	Zsd	Zsamp	Tot.P	NO3	NH4	TDN	TN/TP	TColor	pH	Cond25	Ca	Chl.a	Cl
73	L Peekskill	8/18/2003	3.9	2.83	1.5	0.015	0.003	0.011	0.34	23.1	4	7.3	420		3.22	
73	L Peekskill	9/7/2003	3.9	1.95	1.5	0.022	0.037	0.012			11	7.5	434		16.43	
73	L Peekskill	9/28/2003	3.8	1.88		0.021	0.098	0.040	0.43	20.7	8	7.5	416	24	13.80	
73	L Peekskill	10/13/2003	3.5	2.27	1.5	0.003	0.009	0.007	0.16	45.8	11	7.3	436			
73	L Peekskill	10/26/2003	4.8	1.85												
73	L Peekskill	11/9/2003	2.9	2.02	1.5											
73	L Peekskill	7/25/2004	6.2	1.60	1.5		0.01	0.01	0.01		20	7.88	494	29.1	1.7	
73	L Peekskill	8/9/2004	4.4	1.40	1.5	0.028	0.04	0.02	0.36	12.79	12	8.05	322		8.9	
73	L Peekskill	8/15/2004	4.7	1.60	1.5	0.026	0.09	0.04	0.34	12.76	8	8.41	382		10.0	
73	L Peekskill	8/22/2004	4.7	1.50	1.5	0.027	0.07	0.02	0.56	21.02	19	7.70	346		15.6	
73	L Peekskill	7/25/2005	3.7	1.95	1.0	0.017	0.08	0.01	0.17	10.48	14	8.56	346	19.8	2.8	
73	L Peekskill	8/3/2005	6.9	2.34	1.5	0.037	0.01	0.01	0.20	5.30	18	8.46	410		1.0	
73	L Peekskill	8/18/2005	7.4	1.80	1.5	0.032	0.07	0.01	0.25	7.71	8	8.39	388		1.8	
73	L Peekskill	9/1/2005	7.2	1.52	1.5	0.046	0.02	0.01	0.15	3.33	12	8.53	398		14.3	
73	L Peekskill	9/11/2005	7.2	1.15	1.5	0.047	0.01	0.01	0.16	3.43	6	7.76	378	16.7	36.9	
73	L Peekskill	9/24/2005	7.3	1.08	1.5	0.045	0.01	0.01	0.21	4.54	10	8.02	409		26.0	
73	L Peekskill	10/30/2005	8.9	1.69	1.5	0.038	0.10	0.44	0.61	15.95		7.60	349		14.6	
73	L Peekskill	7/9/2006	7.5	1.50	1.5	0.049	0.01	0.10	0.75	33.59	17	8.37	368	20.0	7.08	
73	L Peekskill	8/13/2006	5.5	1.04	1.5	0.041	0.02	0.06	0.71	38.30	8	8.08	408		23.74	
73	L Peekskill	9/4/2006	7.1	1.17	1.5	0.045	0.02	0.09	0.74	36.45	7	7.15	388		36.96	
73	L Peekskill	9/17/2006	6.9	1.37	1.5	0.049	0.02	0.14	1.00	45.07	27	7.39	331		19.11	
73	L Peekskill	8/5/2007	4.0	2.33	1.5	0.033	0.00	0.02	0.95	62.94		8.08	370	20.9		
73	L Peekskill	8/12/2008	7.0	1.30	1.5	0.038	0.01	0.02	0.39	22.64	10	8.33	393	21.9	17.19	
73	L Peekskill	8/18/2008	3.0	1.43	1.5	0.048	0.01	0.02	0.39	17.54	24	8.06	351		2.24	
73	L Peekskill	9/2/2008	7.5	1.80	1.5	0.023	0.01	0.00	0.39	37.20	8	7.84	390		11.63	
73	L Peekskill	9/10/2008	7.4	1.75	1.5	0.061	0.00	0.01	0.33	11.96	19	7.52	558		10.56	
73	L Peekskill	9/17/2008	5.5	1.60	1.5	0.053	0.01	0.01	0.32	13.33	7	7.86	389	21.3	6.34	
73	L Peekskill	9/29/2008	6.8	1.40	1.5	0.031	0.01	0.05	0.50	34.95	16	7.81	392		21.04	
73	L Peekskill	10/6/2008	4.0	1.20	3.0	0.029	0.01	0.02	0.34	25.82	7	7.14	387		24.56	
73	L Peekskill	10/13/2008	6.3	1.45	1.5		0.02	0.00	0.44		50	7.31	340		23.72	
73	L Peekskill	07/27/2009	6.3	2.45	2.0	0.030	0.05	0.04	0.46	33.33	26	7.47	333	25.6	1.46	
73	L Peekskill	08/04/2009	6.4	2.20	1.5	0.048	0.04	0.02	0.34	15.59	21	7.61	289		6.33	
73	L Peekskill	08/18/2009	7.1	2.40	1.5	0.022	0.02	0.03	0.36	35.16	13	7.68	306		5.80	
73	L Peekskill	09/01/2009	6.2	1.75	1.5	0.030	0.04	0.04	0.39	28.30	8	7.13	396		12.70	
73	L Peekskill	09/15/2009	7.0	1.20	1.5	0.048	0.01	0.01	0.40	18.03	24	7.57	345	28.0	10.60	
73	L Peekskill	09/29/2009	4.5	1.65	1.5	0.047	0.01	0.03	0.39	18.43	48	7.35	435		1.75	
73	L Peekskill	10/13/2009	6.0	1.35	1.5	0.037	0.01	0.07	0.51	30.42	20	6.90	314		15.20	
73	L Peekskill	6/21/2010	7.1	2.25	1.5	0.030	0.01	0.01			14	7.89	440	29.2	5.50	
73	L Peekskill	7/7/2010	6.5	1.35	1.5	0.032	0.02	0.02	0.49	34.22	11	8.64	482		8.70	
73	L Peekskill	7/27/2010	6.1	1.30	1.5	0.032	0.01	0.02			11	8.52	482		12.90	
73	L Peekskill	8/10/2010	7.0	2.00	1.5	0.024	0.02	0.01	0.39	35.29	10	8.23	503		6.40	
73	L Peekskill	9/7/2010	7.0	1.65	1.5	0.031	0.02	0.02	0.44	30.79	98	8.12	498	24.0	9.20	
73	L Peekskill	9/15/2010	8.0	1.70	1.5	0.033	0.01	0.05	0.79	52.42	12	7.24	501		12.30	
73	L Peekskill	10/12/2010	4.0	1.50	1.5	0.036	0.09	0.19	0.71	42.79	14	7.26	476		10.20	
73	L Peekskill	7/13/2012	4.1	2.80	1.5	0.190	0.03	0.05	0.50	5.79	13	8.87	383	20.7	2.60	
73	L Peekskill	8/24/2012	3.5	1.90	2.0	0.075	0.03	0.02	0.70	20.56	10	8.38	372		2.70	
73	L Peekskill	9/25/2012	3.8	2.15	1.5	0.038	0.01	0.02	0.23	13.42	12	6.80	377		19.60	
73	L Peekskill	10/10/2012	3.9	1.85	2.0	0.033	0.07	0.23	0.57	38.08	19	8.10	369		16.30	
73	L Peekskill	10/25/2012	3.1	2.20	2.1	0.034	0.15	0.15	0.62	40.30	12	7.25	364	19.6	14.90	
73	L Peekskill	7/18/2014	6.3	1.30	1.5	0.031	0.01	0.03	0.45	32.15	9	7.50	481	21.9	15.30	
73	L Peekskill	7/22/2014														
73	L Peekskill	8/2/2014	6.3	0.85	1.5	0.043			0.90	46.63	4	7.96	497		39.60	
73	L Peekskill	8/18/2014	6.3	1.45	1.5	0.055	0.01	0.05	1.01	39.91	7	7.30	484		34.10	
73	L Peekskill	8/18/2014														
73	L Peekskill	9/1/2014	6.3	1.40	1.5	0.049			0.67	29.75	11	7.50	509		32.70	
73	L Peekskill	9/1/2014														
73	L Peekskill	9/15/2014	6.2	1.15	1.5	0.034	0.01	0.03	0.82	52.72	9	7.49	486	23.6	21.00	
73	L Peekskill	9/15/2014														
73	L Peekskill	9/30/2014	6.2	1.65	1.5	0.032			0.56	38.95	7	7.25	502		30.70	
73	L Peekskill	9/30/2014														
73	L Peekskill	10/21/2014														
73	L Peekskill	10/21/2014	5.6	1.15	1.5	0.050	0.02	0.28	1.03	44.74	11	7.24	454		24.40	
73	L Peekskill	7/5/2015	7.3	1.60	1.5	0.047	0.01	0.05	0.73	34.21	23	7.63	384	27.7	14.20	
73	L Peekskill	7/26/2015	7.3	1.70	1.5	0.032			0.46	31.89	11	8.31	592		6.30	
73	L Peekskill	7/26/2015														
73	L Peekskill	8/2/2015	7.3	1.90	1.5	0.033	0.01	0.03	0.61	40.28	7	8.03	573		14.40	138.3

LNum	PName	Date	Zbot	Zsd	Zsamp	Tot.P	NO3	NH4	TDN	TN/TP	TColor	pH	Cond25	Ca	Chl.a	Cl
73	L Peekskill	8/21/2015	7.2	1.60	1.5	0.018			0.69	85.30	23	7.95	543		13.80	
73	L Peekskill	9/7/2015	7.1	1.40	1.5	0.036	0.00	0.04	0.48	29.74	7	7.69	611	27.4	12.00	
73	L Peekskill	9/20/2015	7.1	2.00	1.5	0.034			0.65	41.82	5	7.74	600		10.80	
73	L Peekskill	7/26/1998	7.0		6.0	0.053										
73	L Peekskill	9/4/2006				0.924										
73	L Peekskill	9/17/2006				0.139										
73	L Peekskill	8/5/2007				0.159										

LNum	PName	Date	Zsamp	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
73	L Peekskill	7/8/1990	epi																	
73	L Peekskill	7/22/1990	epi	26	28															
73	L Peekskill	8/5/1990	epi	24	28															
73	L Peekskill	8/19/1990	epi	21	27															
73	L Peekskill	9/10/1990	epi	25	23															
73	L Peekskill	9/24/1990	epi	14	19															
73	L Peekskill	10/7/1990	epi	25	19															
73	L Peekskill	7/22/1991	epi	27	29															
73	L Peekskill	7/28/1991	epi	28	25															
73	L Peekskill	8/4/1991	epi	23	26															
73	L Peekskill	8/11/1991	epi	28	28															
73	L Peekskill	8/18/1991	epi	26	27															
73	L Peekskill	8/25/1991	epi	20	24															
73	L Peekskill	9/2/1991	epi	17	23															
73	L Peekskill	9/8/1991	epi	21	25															
73	L Peekskill	9/15/1991	epi	19	22															
73	L Peekskill	6/7/1992	epi	26	21	2	2	2	0											
73	L Peekskill	6/20/1992	epi	25	23	2	2	2	5											
73	L Peekskill	7/5/1992	epi	24	24	2	3	2												
73	L Peekskill	7/19/1992	epi	26	25	2	1	2	5											
73	L Peekskill	8/2/1992	epi	24	23	3	3	3	26											
73	L Peekskill	8/16/1992	epi	19	25	3	3	2	5											
73	L Peekskill	8/30/1992	epi	24	25	1	2	1	0											
73	L Peekskill	9/13/1992	epi	20	26	2	3	3	2											
73	L Peekskill	6/20/1993	epi	27	28	2	1	1	56											
73	L Peekskill	6/27/1993	epi	23	28	1	3	1												
73	L Peekskill	7/11/1993	epi	26	29	2	3	2												
73	L Peekskill	7/25/1993	epi	34	26	3	2	1	1											
73	L Peekskill	8/8/1993	epi	21	25	2	2	2	6											
73	L Peekskill	8/22/1993	epi	27	22	1	4	3	2											
73	L Peekskill	9/5/1993	epi	22	27	1	3	2	2											
73	L Peekskill	9/26/1993	epi	21	20	2	3	2	5											
73	L Peekskill	6/11/1994	epi	22	23	1	1	1	5											
73	L Peekskill	6/19/1994	epi	38	29	3	1	2	1											
73	L Peekskill	7/10/1994	epi	32	28	2	3	3	2											
73	L Peekskill	7/26/1994	epi	33	27	4	4	3	2											
73	L Peekskill	8/7/1994	epi	22	25	2	4	3	2											
73	L Peekskill	8/21/1994	epi	27	26	1	3	2												
73	L Peekskill	9/4/1994	epi	25	27	1	3	2	2											
73	L Peekskill	7/14/1996	epi	28	26	3	1	3	1											
73	L Peekskill	8/25/1996	epi	27	26															
73	L Peekskill	9/15/1996	epi	15	18	2	1	2	6											
73	L Peekskill	10/6/1996	epi	7	16	2	1	1	5											
73	L Peekskill	6/28/1998	epi	21	24	1	1	1												
73	L Peekskill	7/19/1998	epi	26	26	1	1	1												
73	L Peekskill	7/26/1998	epi	25	25	1	1	1												
73	L Peekskill	8/2/1998	epi	27	26	3	1	2	1											
73	L Peekskill	9/10/2000	epi	27	26															
73	L Peekskill	9/24/2000	epi	25	22															
73	L Peekskill	7/1/2001	epi	28	27	3	1	2												
73	L Peekskill	7/15/2001	epi	27	24	2	1	2												
73	L Peekskill	7/29/2001	epi	27	26	3	1	2												

LNum	PName	Date	Zsamp	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
73	L Peekskill	8/12/2001	epi	24	28	2	1	2												
73	L Peekskill	6/23/2002	epi	33	26	2	1	2												
73	L Peekskill	7/7/2002	epi	29	27	3	1	2												
73	L Peekskill	7/21/2002	epi	29	28	3	1	2												
73	L Peekskill	8/4/2002	epi	35	30	3	1	2												
73	L Peekskill	8/18/2002	epi	35	29	3	1	2												
73	L Peekskill	9/2/2002	epi	19	21	3	1	2												
73	L Peekskill	9/16/2002	epi	28	24	3	1	2	5											
73	L Peekskill	10/6/2002	epi	22	19	2	1	2												
73	L Peekskill	7/13/2003	epi	27	26	3	1	3	8											
73	L Peekskill	7/30/2003	epi	28	28	3	2	3												
73	L Peekskill	8/18/2003	epi	26	27	3	1	3	56											
73	L Peekskill	9/7/2003	epi	28	24	4	2	4	134											
73	L Peekskill	9/28/2003	epi	16	19	3	1	3	158											
73	L Peekskill	10/13/2003	epi	21	17	4	2	4	134											
73	L Peekskill	10/26/2003	epi	19	13	5	1	5	1345											
73	L Peekskill	11/9/2003	epi	5	10	4	1	5	1345											
73	L Peekskill	7/25/2004	epi	27	26	3	1	3	1											
73	L Peekskill	8/9/2004	epi	29	25	4	1	3	13											
73	L Peekskill	8/15/2004	epi	23	25	3	1	3	13											
73	L Peekskill	8/22/2004	epi	24	24	4	1	4	1346											
73	L Peekskill	7/25/2005	epi	31	29	3	1	4	1348											
73	L Peekskill	8/3/2005	epi	34	30	3	1	4	138											
73	L Peekskill	8/18/2005	epi	30	28	4	1	4	134											
73	L Peekskill	9/1/2005	epi	30	26	3	1	3	15											
73	L Peekskill	9/11/2005	epi	28	25	4	1	4	134											
73	L Peekskill	9/24/2005	epi	24	24	4	1	4	134											
73	L Peekskill	10/30/2005	epi	18	12	3	1	3	135											
73	L Peekskill	7/9/2006	epi	30	27	4	1	4	134											
73	L Peekskill	8/13/2006	epi	32	26	4	1	4	1											
73	L Peekskill	9/4/2006	epi	24	21	3	1	3	158											
73	L Peekskill	9/17/2006	epi	26	23	4	1	4	134											
73	L Peekskill	8/5/2007	epi	29	27	3	1	3	13											
73	L Peekskill	8/12/2008	epi	25	26	3	2	2	8											
73	L Peekskill	8/18/2008	epi	28	26	2	1	2	8											
73	L Peekskill	9/2/2008	epi	23	23	3	2	2	6											
73	L Peekskill	9/10/2008	epi	19	23	3	2	2	68											
73	L Peekskill	9/17/2008	epi	22	23	3	2	2	8											
73	L Peekskill	9/29/2008	epi	22	28	3	2	2	8											
73	L Peekskill	10/6/2008	epi	14	17	2	2	2	8											
73	L Peekskill	10/13/2008	epi	20	18	3	3	2	8											
73	L Peekskill	07/27/2009	epi	30	27	4	2	4	1368											
73	L Peekskill	08/04/2009	epi	29	26	4	2	3	1268											
73	L Peekskill	08/18/2009	epi	29	27	2	2	3	1368											
73	L Peekskill	09/01/2009	epi	24	22	3	2	3	8											
73	L Peekskill	09/15/2009	epi	28	23	2	2	2	18											
73	L Peekskill	09/29/2009	epi	19	18	3	2	4	58											
73	L Peekskill	10/13/2009	epi	16	13	3	2	3	1											
73	L Peekskill	6/21/2010	epi	32	27	2	3	2	0	7	0									
73	L Peekskill	7/7/2010	epi	29	27	2	3	2	0	45	45									
73	L Peekskill	7/27/2010	epi	31	28	3	3	4	18	46	46									
73	L Peekskill	8/10/2010	epi	32	28	2	3	2	8	57	57									
73	L Peekskill	9/7/2010	epi	29	25					4	4									
73	L Peekskill	9/15/2010	epi	20	21	1	2	1	8	0	5									
73	L Peekskill	10/12/2010	epi	17	17	3	2	2	8	5	0									
73	L Peekskill	7/13/2012	epi	32	27	2	2	2	8	13	0	8.30	0.70	<0.30	<0.392		3.40	1.10		
73	L Peekskill	8/24/2012	epi	34	27	3	2	3	348	4	4			<0.30	<0.551		1.50	0.66		
73	L Peekskill	9/25/2012	epi	22	17	4	1	3	15	0	0	91.10	90.00	<0.30	<3.205		99.52	0.00	B	
73	L Peekskill	10/10/2012	epi	24	17	3	2	2	8	0	0	439.90	3.00	0.39	<3.205		76.29	70.94	B	
73	L Peekskill	10/25/2012	epi	14	15	3	2	4	1	4	4		18.20						A	
73	L Peekskill	7/18/2014	epi	31	28	2	1	2	3	0	0	65.20	0.90	<0.39	<0.03	<0.001			i	

LNum	PName	Date	Zsamp	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
73	L Peekskill	7/22/2014	bloom											13.90	<0.48	<0.003	1172.50	962.75		b
73	L Peekskill	8/2/2014	epi	24	26	3	1	5	1	7	7	155.50	1.00	<0.33	<0.01	<0.002	35.33	32.51	i	
73	L Peekskill	8/18/2014	epi	26	25	3	1	4	13	4	4	90.70	1.20	<0.42	<0.10	<0.002	18.89	13.46	f	abc
73	L Peekskill	8/18/2014	bloom											362.48	<0.12	<0.005	12250.00	12018.75		abc
73	L Peekskill	9/1/2014	epi	26	24	3	1	3	5	0	0	36.90	0.80	<0.25	<0.14	<0.002	13.15	9.40	bi	i
73	L Peekskill	9/1/2014	bloom											<1.27	<0.32	<0.004	7.55	4.72		i
73	L Peekskill	9/15/2014	epi	23	22	3	1	3	1	4	4	51.70	1.00	<0.24	<0.03	<0.001	16.57	10.68	fi	d
73	L Peekskill	9/15/2014	bloom											14.89	<0.05	<0.002	97.84	77.73		d
73	L Peekskill	9/30/2014	epi	20	21	1	1	1	0	0	0	17.20	1.10	<0.59	<0.12	<0.001	8.76	1.75	i	i
73	L Peekskill	9/30/2014	bloom											<0.71	<1.70	<0.003	11.96	0.56		i
73	L Peekskill	10/21/2014	bloom											86.34	<0.18	<0.012	404.00	294.50		i
73	L Peekskill	10/21/2014	epi	16	16	1	1	1	5	0	0	11.20	1.70	<0.95	<0.09	<0.006	15.55	0.00	i	i
73	L Peekskill	7/18/2014	epi	31	28	2	1	2	3	0	0	65.20	0.90	<0.39	<0.03	<0.001			i	
73	L Peekskill	7/22/2014	bloom											13.90	<0.48	<0.003	1172.50	962.75		b
73	L Peekskill	7/5/2015	epi	23	27	2	1	1	0	5		6.80	2.10	<0.86	<0.008	<0.046	9.50	0.00	I	I
73	L Peekskill	7/26/2015	epi	29	26	2	1	2	8	56	345	9.10	1.90	<0.19	<0.005	<0.020	7.18	0.00	D	H
73	L Peekskill	7/26/2015	bloom											<0.46	<0.007	<0.037	318.61	211.30		
73	L Peekskill	8/2/2015	epi	28	26	3	1	3	1368	46	46	13.43	2.10	<0.57	<0.010	<0.054	6.09	0.06	DF	DFH
73	L Peekskill	8/21/2015	epi	26	26	1	1	1	0	6		41.30	1.40	<0.28	<0.003	<0.010	0.00	0.00	I	I
73	L Peekskill	9/7/2015	epi	28	26	1	1	1	0	0	0			<0.26	<0.023	<0.086	7.24	0.00	I	I
73	L Peekskill	9/20/2015	epi	22	24	1	1	1	0	6	6	8.20	1.90	<0.30	<0.007	<0.035	7.86	0.00	I	I

Legend Information

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

Appendix B- Priority Waterbody Listing for Lake Peekskill

Lake Peekskill (1301-0147) MinorImpacts

Waterbody Location Information

Revised: 04/29/2008

Water Index No:	H- 55- 7-P171			**Drain Basin:**	Lower Hudson River
Hydro Unit Code:		**Str Class:**	B		
Waterbody Type:	Lake			**Reg/County:**	3/Putnam Co. (40)
Waterbody Size:	58.5 Acres			**Quad Map:**	PEEKSKILL (P-25-4)
Seg Description:	entire lake				

Water Quality Problem/Issue Information

(CAPS indicate MAJOR Use Impacts/Pollutants/Sources)

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

Type of Pollutant(s)

Known: ALGAL/WEED GROWTH, NUTRIENTS (phosphorus)
Suspected: - - -
Possible: - - -

Source(s) of Pollutant(s)

Known: URBAN/STORM RUNOFF
Suspected: Agriculture
Possible: - - -

Resolution/Management Information

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

Further Details

Overview
Recreational uses in Lake Peekskill are known to experience minor impacts from nutrient loadings from nonpoint sources resulting in algal growth and eutrophic conditions.

Water Quality Sampling
Lake Peekskill has been sampled as part of the NYSDEC Citizen Statewide Lake Assessment Program (CSLAP) beginning in 1990 and continuing through 2007. An Interpretive Summary report of the findings of this sampling was published in 2008. These data indicate that the lake continues to be best characterized as eutrophic, or highly productive. Phosphorus levels in the lake regularly exceed the state guidance values indicating impacted/stressed recreational uses. However corresponding transparency measurements typically meet what is the recommended minimum for swimming beaches. Measurements of pH typically fall within the state water quality range of 6.5 to 8.5. (DEC/DOW, BWAM/CSLAP, March 2008)

Recreational Assessment
Public perception of the lake and its uses is also evaluated as part of the CSLAP program. This assessment indicates

recreational suitability of the lake to be unfavorable in recent years. The recreational suitability of the lake is described most frequently as "slightly" impacted for recreational use. The lake itself is most often described as having "definite algal greenness." These assessment are consistent with measured water quality characteristics. Assessments have noted that aquatic plants do not typically grow to the lake surface and are not usually cited as impacting recreational uses. (DEC/DOW, BWAM/CSLAP, March 2008)

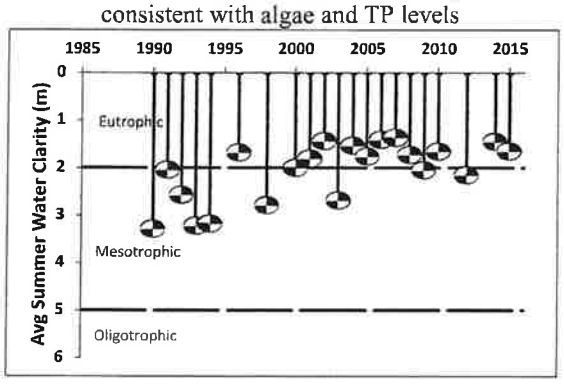
Lake Uses

This lake waterbody is designated class B, suitable for use as a public bathing beach, general recreation and aquatic life support, but not as a water supply. Water quality monitoring by NYSDEC focuses primarily on support of general recreation and aquatic life. Samples to evaluate the bacteriological condition and bathing use of the lake or to evaluate contamination from organic compounds, metals or other inorganic pollutants have not been collected as part of the CSLAP monitoring program. Monitoring to assess potable water supply and public bathing use is generally the responsibility of state and/or local health departments.

Appendix C- Long Term Trends: Lake Peekskill

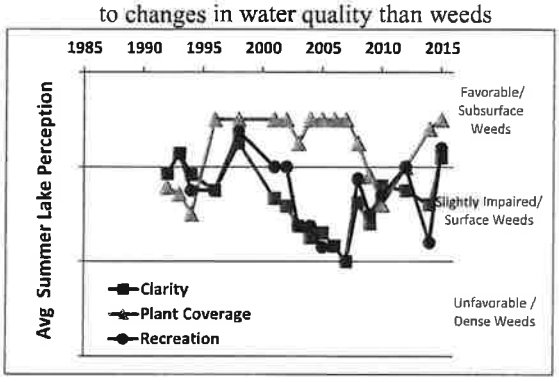
Long Term Trends: Water Clarity

- ↓ clarity 1990-2015
- Most readings now typical of *eutrophic* lakes, consistent with algae and TP levels



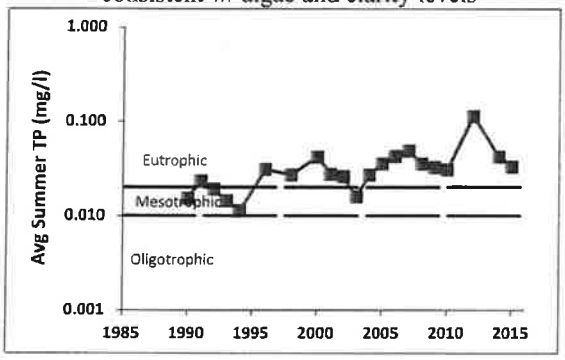
Long Term Trends: Lake Perception

- ↓ WQ/rec 98-06; ↑WQ/rec, less weeds >06
- Recreational perception more closely linked to changes in water quality than weeds



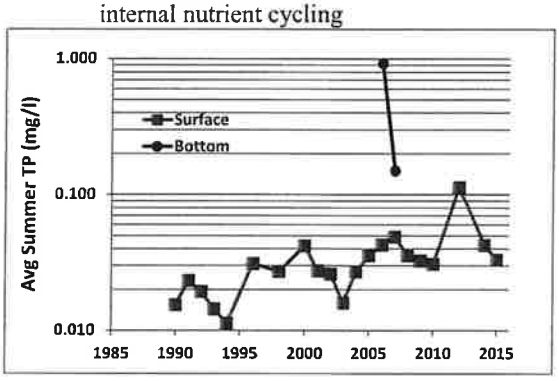
Long Term Trends: Phosphorus

- ↑ after 1990 but lower last two years
- Most readings now typical of *eutrophic* lakes, consistent w/ algae and clarity levels



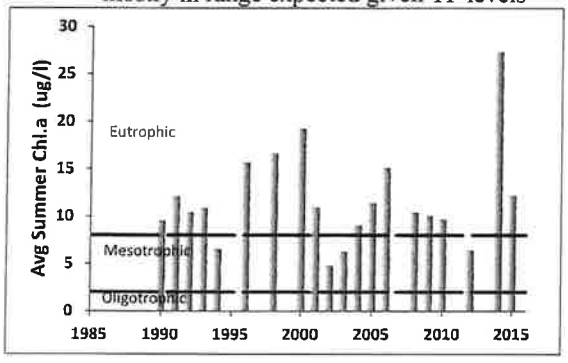
Long Term Trends: Bottom Phosphorus

- Only limited bottom TP data available
- Much higher bottom TP levels suggests some internal nutrient cycling



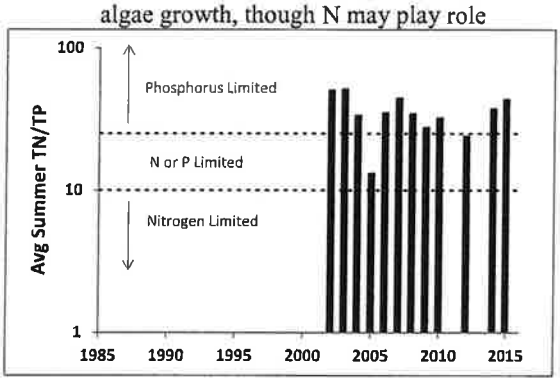
Long Term Trends: Chlorophyll a

- Variable chlorophyll a readings
- Most readings typical of *eutrophic* lakes, mostly in range expected given TP levels



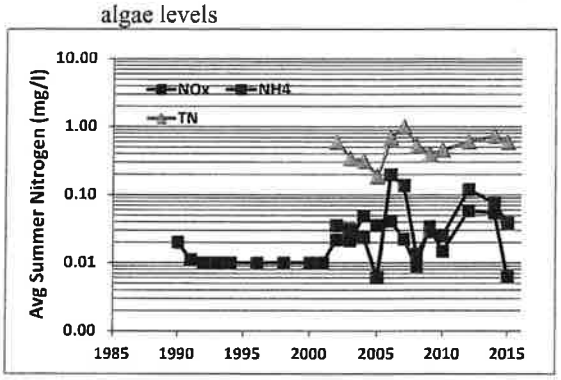
Long Term Trends: N:P Ratio

- No trends apparent
- Most readings indicate phosphorus limits algae growth, though N may play role



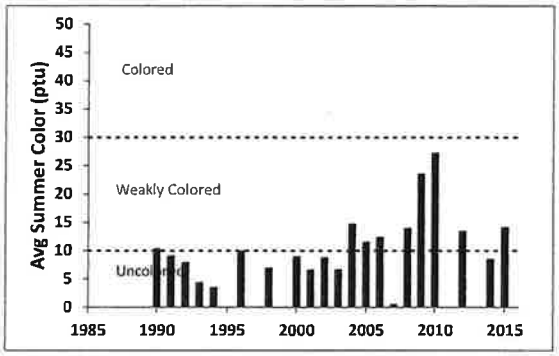
Long Term Trends: Nitrogen

- ↑ TN, NH4 since 2010; NOx variable
- Higher total nitrogen associated with higher algae levels



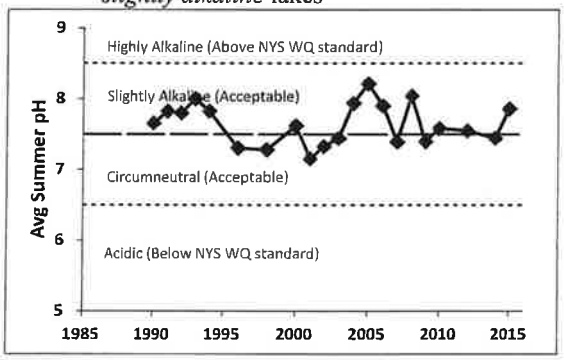
Long Term Trends: Color

- Higher color 2002-10, but drop since then
- Most readings typical of *uncolored* to *weakly colored* lakes



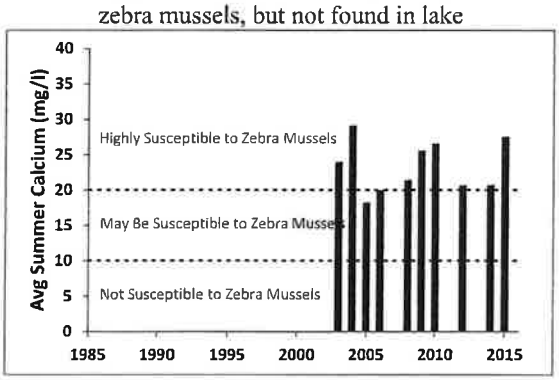
Long Term Trends: pH

- No trends apparent
- Most readings typical of *circumneutral* to *slightly alkaline* lakes



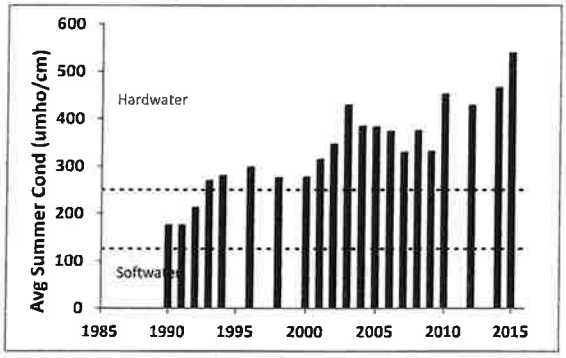
Long Term Trends: Calcium

- No trends apparent
- Appears to be moderate/high susceptibility to zebra mussels, but not found in lake



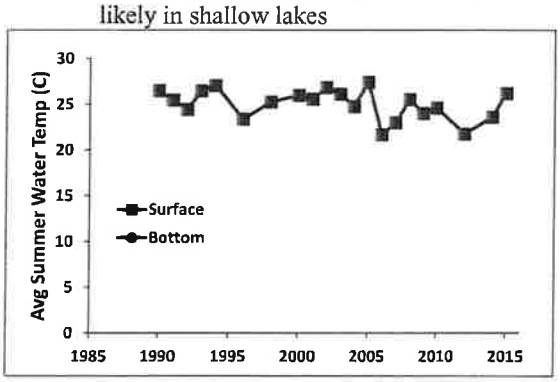
Long Term Trends: Conductivity

- Increasing readings since early 1990s
- Most readings typical of *hardwater* lakes



Long Term Trends: Water Temperature

- Slight decrease, but variable year to year
- Similar surface and deepwater temperature likely in shallow lakes



Appendix D:
Algae Testing Results from SUNY ESF Study

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

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

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

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

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

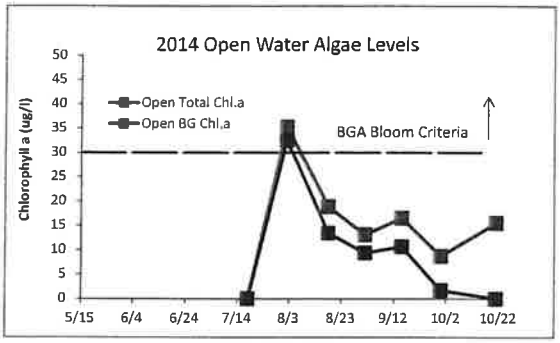


Figure D1:
2014 Open Water Total and BGA Chl.a

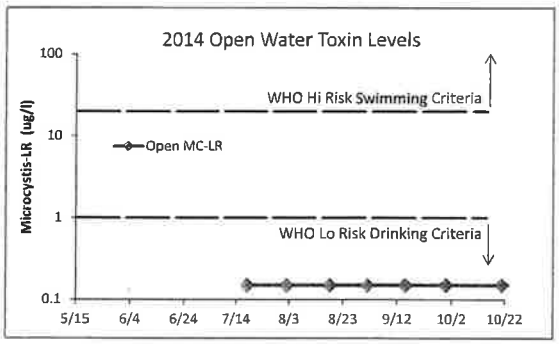


Figure D2:
2014 Open Water Microcystin-LR

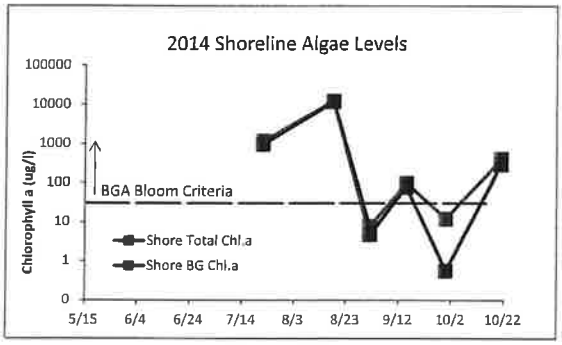


Figure D3:
2014 Shoreline Total and BGA Chl.a

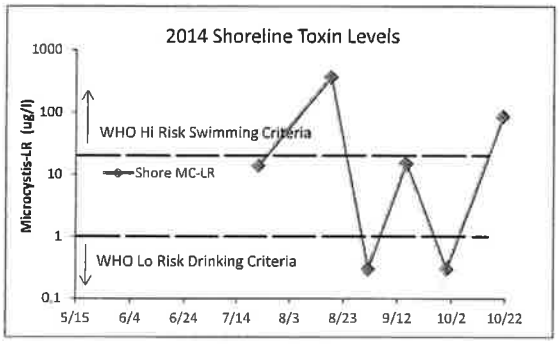


Figure D4:
2014 Shoreline Microcystin-LR

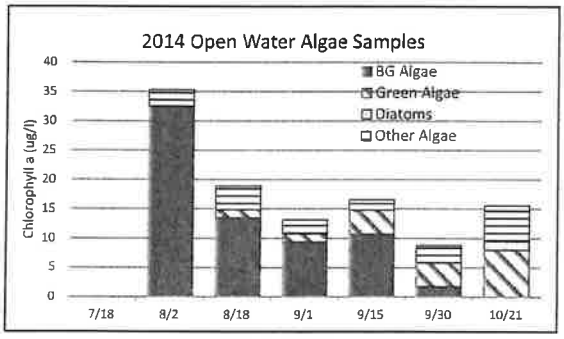


Figure D5:
2014 Open Water Algae Types

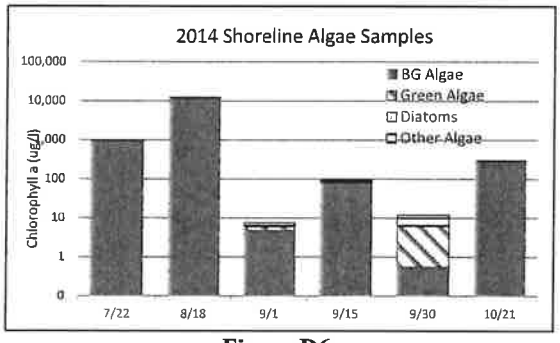


Figure D6:
2014 Shoreline Algae Types

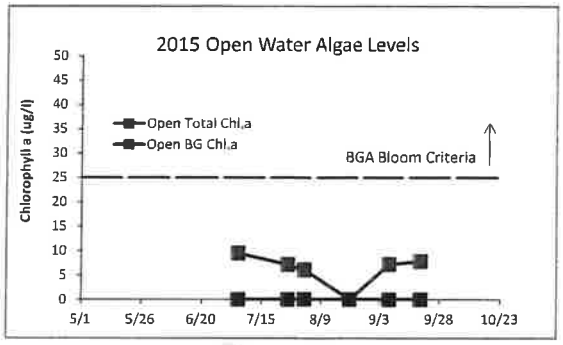


Figure D7:
2015 Open Water Total and BGA Chl.a

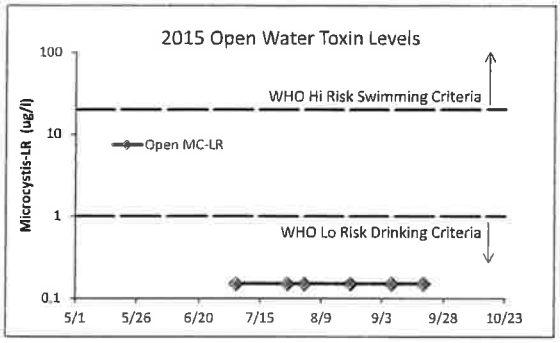


Figure D8:
2015 Open Water Microcystin-LR

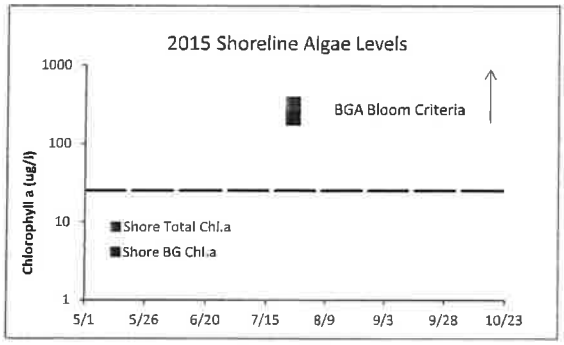


Figure D9:
2015 Shoreline Total and BGA Chl.a

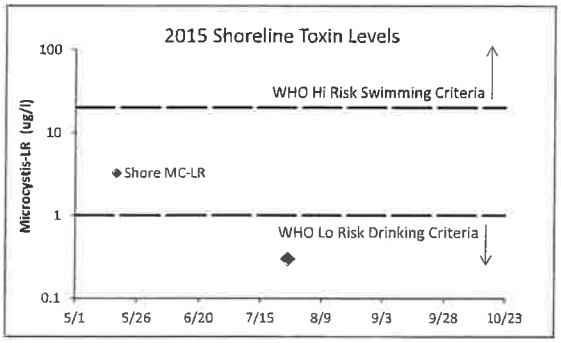


Figure D10:
2015 Shoreline Microcystin-LR

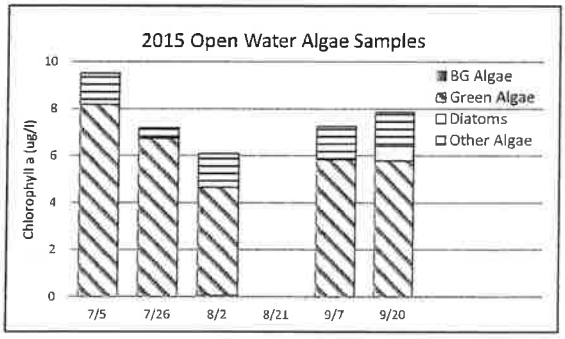


Figure D11:
2015 Open Water Algae Types

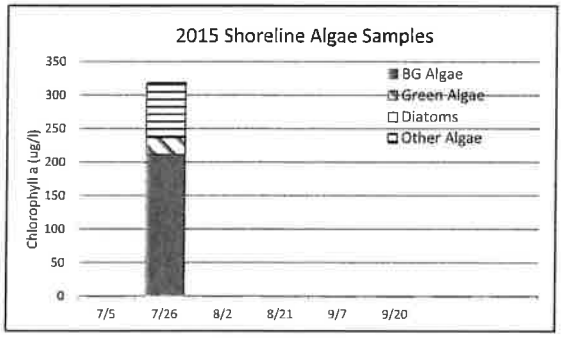


Figure D12:
2015 Shoreline Algae Types

Appendix E:
AIS Species in Putnam County

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

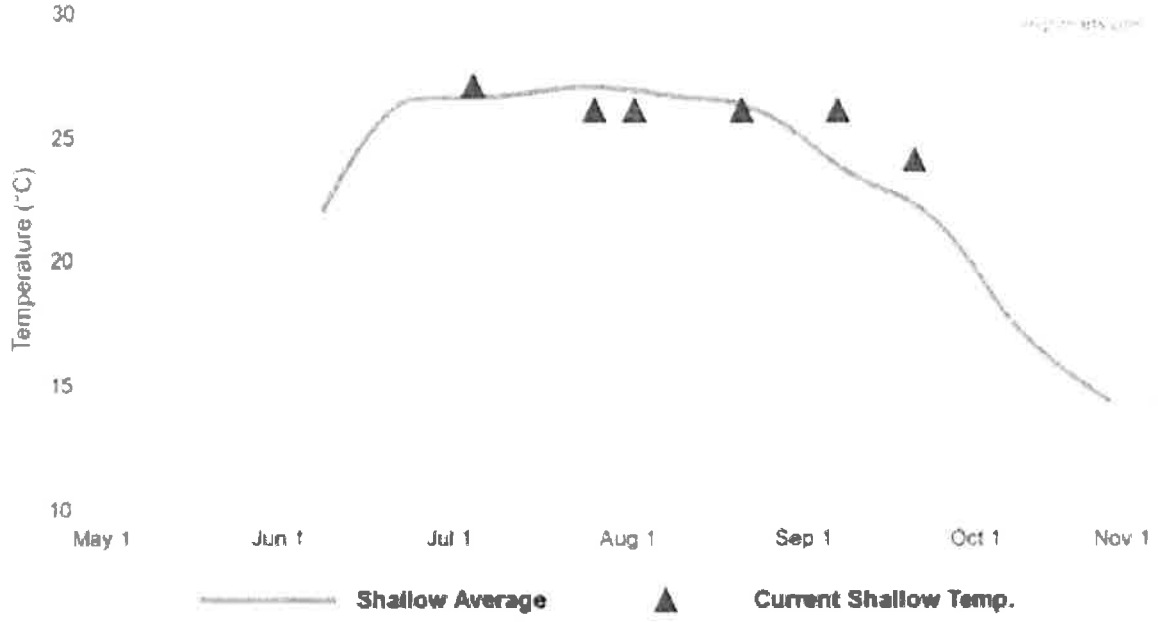
This list is not complete, but instead represents only those species that have been reported and verified within the county. If any additional aquatic invasive species (AIS) are known or suspected in these or other waterbodies in the county, this information should be reported through iMap invasives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

Aquatic Invasive Species – Putnam County			
Waterbody	**Kingdom**	**Common name**	**Scientific name**
Canopus Lake	Plant	Variable watermilfoil	*Myriophyllum heterophyllum*
Canopus Lake	Plant	Eurasian watermilfoil	*Myriophyllum spicatum*
Canopus Lake	Plant	Curly leafed pondweed	*Potamogeton crispus*
Croton Falls Reservoir	Plant	Eurasian watermilfoil	*Myriophyllum spicatum*
Duck Pond	Plant	Eurasian watermilfoil	*Myriophyllum spicatum*
Hudson River	Plant	Water chestnut	*Trapa natans*
Ice Pond	Plant	Brittle naiad	*Najas minor*
Kirk Lake	Plant	Eurasian watermilfoil	*Myriophyllum spicatum*
Lake Carmel	Plant	Eurasian watermilfoil	*Myriophyllum spicatum*
Lake Celeste	Plant	Curly leafed pondweed	*Potamogeton crispus*
Lake Mahopac	Animal	Zebra mussel	*Dreissena polymorpha*
Lake Mahopac	Plant	Eurasian watermilfoil	*Myriophyllum spicatum*
Lake Nimham	Plant	Brittle naiad	*Najas minor*
Lake Peekskill	Plant	Curly leafed pondweed	*Potamogeton crispus*
Lake Tibet	Plant	Eurasian watermilfoil	*Myriophyllum spicatum*
Lake Valhalla	Plant	Curly leafed pondweed	*Potamogeton crispus*
Loretta Lake	Plant	Eurasian watermilfoil	*Myriophyllum spicatum*
Lost Lake	Plant	Curly leafed pondweed	*Potamogeton crispus*
Oscawana Lake	Plant	Eurasian watermilfoil	*Myriophyllum spicatum*
Oscawana Lake	Plant	Water chestnut	*Trapa natans*
Palmer Lake	Plant	Eurasian watermilfoil	*Myriophyllum spicatum*
Palmer Lake	Plant	Brittle naiad	*Najas minor*
Peach Lake	Plant	Eurasian watermilfoil	*Myriophyllum spicatum*
Pelton Pond	Plant	Variable watermilfoil	*Myriophyllum heterophyllum*
Waterbody	**Kingdom**	**Common name**	**Scientific name**
Putnam Lake	Plant	Curly leafed pondweed	*Potamogeton crispus*
Putnam Lake	Plant	Water chestnut	*Trapa natans*

Roaring Brook Lake	Plant	Fanwort	*Cabomba caroliniana*
Roaring Brook Lake	Plant	Eurasian watermilfoil	*Myriophyllum spicatum*
Roaring Brook Lake	Plant	Curly leafed pondweed	*Potamogeton crispus*
Seven Hills Lake	Plant	Eurasian watermilfoil	*Myriophyllum spicatum*
Seven Hills Lake	Plant	Curly leafed pondweed	*Potamogeton crispus*
White Lake	Plant	Eurasian watermilfoil	*Myriophyllum spicatum*
White Lake	Plant	Curly leafed pondweed	*Potamogeton crispus*
White Pond	Plant	Eurasian watermilfoil	*Myriophyllum spicatum*
White Pond	Plant	Curly leafed pondweed	*Potamogeton crispus*
Wonder Lake	Plant	Water chestnut	*Trapa natans*

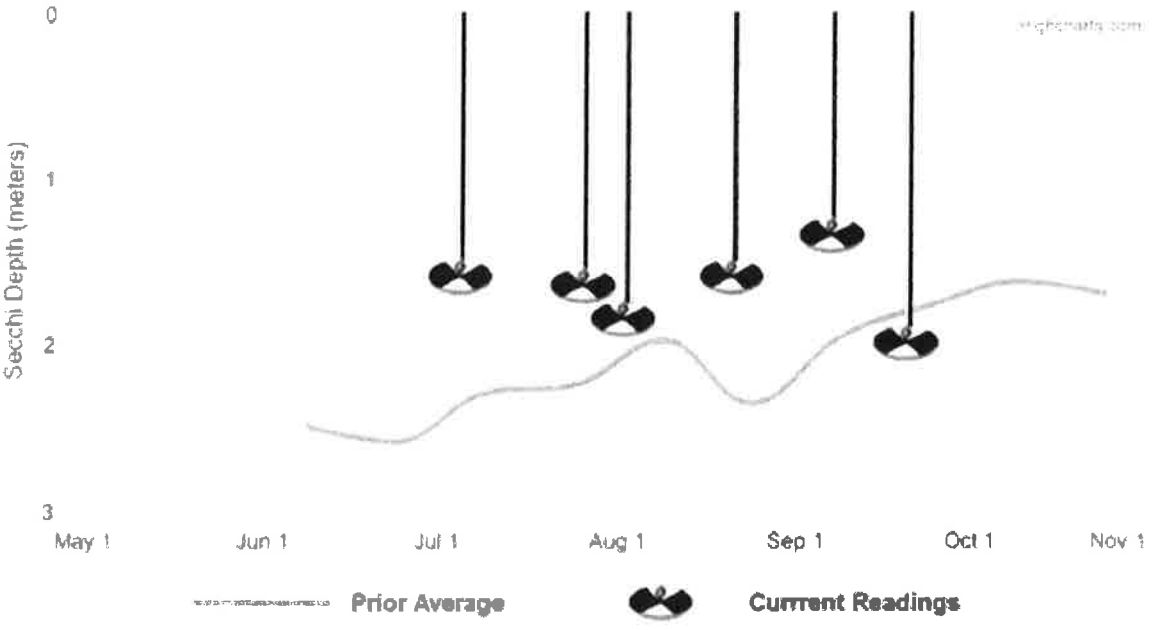
Appendix F: Current Year vs. Prior Averages for Lake Peekskill

Current Year Water Temperatures vs. Prior Average



This year's shallow water sample temperatures are about the same as the average of readings collected from 1990 to 2014.

Current Year Secchi Readings vs. Prior Average



This year's session Secchi readings are about the same as the average of readings collected from 1990 to 2014

Appendix G: Watershed and Land Use Map for Lake Peekskill

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.