

Indian Lake Questions and Answers, 2015 CSLAP

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

A1. Water clarity was again much higher than usual (water clarity in 2014 and 2015 was more similar to historical readings), and aquatic plant coverage was also lower than normal. Deepwater nutrient levels were much higher than normal, but deep samples did not exhibit a strong hydrogen sulfide odor that usually indicates oxygen deficits.

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

A2. Chloride testing results were typical of lakes with low to moderate impacts from road salt runoff. The testing results did not find any water chemistry changes that may have triggered the recent rise in water clarity, suggesting that the changes are due to changes in food web dynamics or other biological factors.

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

A3. Indian Lake had much higher water clarity, and much lower nutrient levels and algae levels, than other nearby lakes. Aquatic plant coverage was lower than in many of these other lakes. The lake was more typical of an interior Adirondack lake in the last two years.

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

A4. Prior to 2014, the lake appeared to be exhibiting an increase in lake productivity- decreasing water clarity and increasing nutrient and algae levels- but this “trend” was reversed in 2014 and 2015. It is not known if this change was temporary or an indication of a return to more “normal” conditions in the lake.

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

A5. Water quality conditions were highly favorable in the last two years, and indicated a fairly low susceptibility to blooms, but the risk for extensive invasive weed growth may be high.

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

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

Lake Use				
	PWL	Average Year	2015	Primary issue
Potable Water				Algae levels
Swimming				No impacts
Recreation				Nutrients
Aquatic Life				High pH
Aesthetics				Poor perception
Habitat				No impacts
Fish Consumption				

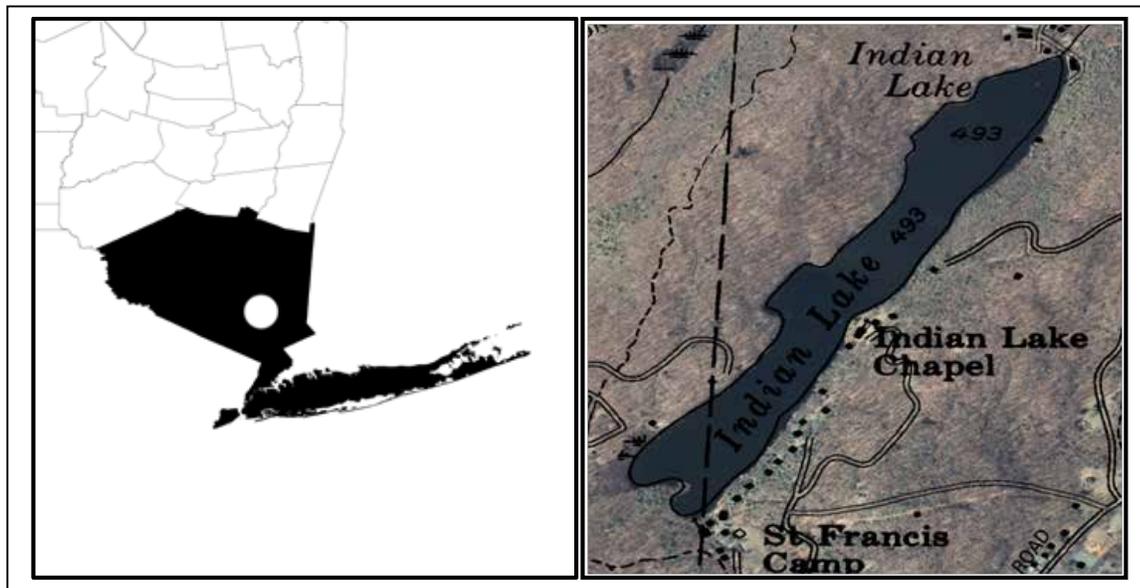
 Supported / Good
 Threatened / Fair
 Stressed / Poor
 Impaired
 Not Known

CSLAP 2015 Lake Water Quality Summary: Indian Lake

General Lake Information

Location	Town of Putnam Valley
County	Putnam
Basin	Lower Hudson River
Size	20.7 hectares (51.1 acres)
Lake Origins	Natural
Watershed Area	88.8 hectares (219.3 acres)
Retention Time	5 years
Mean Depth	9.2 meters
Sounding Depth	19 meters
Public Access?	no
Major Tributaries	no named tribs
Lake Tributary To...	unnamed outlet to Canopus Creek to Sprout Brook to Hudson River
WQ Classification	A (potable water)
Lake Outlet Latitude	41.378
Lake Outlet Longitude	-73.883
Sampling Years	1994-1996, 1998-2001, 2003-2011, 2013-2015
2015 Samplers	Ingrid Caruso Gersin, John Christian, Lynn and Phil Amman
Main Contact	Ingrid Caruso Gersin

Lake Map



Background

Indian Lake is a 51 acre, class A 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 1994.

It is one of 15 CSLAP lakes among the more than 265 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

Indian Lake is a Class A lake; this means that the best intended use for the lake is for potable water—drinking—although the lake also supports contact recreation—swimming and bathing—and non-contact recreation—boating, angling, and aesthetics. The lake is used by lake residents and invited guests for non-power boating and swimming. There is no public access to the lake.

It is not known if private stocking efforts occur at Indian Lake.

General statewide fishing regulations are applicable in Indian Lake.

Historical Water Quality Data

CSLAP sampling was conducted on Indian Lake from 1994 to 1996, 1998 to 2001, 2003 to 2011, and 2013 to 2015. The CSLAP reports for each of the past several years can be found on the NYSFOLA website at <http://nysfola.mylaketown.com>. The most recent CSLAP reports for Indian Lake can also be found on the NYSDEC web page at <http://www.dec.ny.gov/lands/77848.html>.

Indian Lake was sampled as part of the Adirondack Lake Survey Corporation (ALSC) survey of about 1500 Adirondack and downstate lakes in the mid to late 1980s. These data show that water clarity was lower in this 1987 survey, coincident with higher phosphorus readings and higher pH. These readings do not appear to be within the range found in the last nine years of CSLAP sampling, suggesting an improvement in water quality (as manifested by an increase in water transparency and decrease in phosphorus readings) since at least the mid-1980s.

None of the unnamed ephemeral tributaries, nor the outlet of the lake have been monitored through the NYSDEC Rotating Intensive Basins (RIBS) program or the state stream macroinvertebrate monitoring program. The lake has not been sampled by DEC fisheries staff in support of fish stocking activities or any other statewide monitoring programs.

Lake Association and Management History

Indian Lake is served by the Indian Lake Association. It is not known to what extent the lake association is involved in management activities for the lake, or if the lake association maintains a web site.

Summary of 2015 CSLAP Sampling Results

Evaluation of 2015 Annual Results Relative to 1994-2014

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 – Indian Lake” section in Appendix C.

Evaluation of Eutrophication Indicators

Water clarity readings were substantially higher than normal in 2014 and 2015- the highest annual average since sometime before 1994. This was consistent with much lower than normal algae (chlorophyll *a*) readings and slightly lower than normal phosphorus readings. However, deepwater phosphorus (and ammonia) readings were also much higher than normal in both years, but this did not affect surface phosphorus readings at any time during the summer. None of the other water quality indicators exhibited similar changes.

Algae levels are highest later in the summer in the typical year, but neither water clarity nor phosphorus exhibits similar seasonal changes. In 2015, water clarity was highest after mid-July (when algae levels are usually highest, although algae levels were low throughout 2015), and phosphorus readings actually increased (slightly) as clarity increased. These phenomenon suggest that other factors, such as changes in the food web or predator impacts, may have been driving these changes.

The lake can be characterized as *mesotrophic*, or moderately productive, based on water clarity, chlorophyll *a*, and total phosphorus readings (all typical of *mesotrophic* lakes) during most years, but all indicators were more typical of *oligotrophic* lakes in 2015. The trophic state indices (TSI) show that algae levels are often slightly lower than expected given the phosphorus and water clarity readings. Overall trophic conditions are summarized on the Lake Scorecard and Lake Condition Summary Table.

Evaluation of Potable Water Indicators

Algae levels may be high enough at times 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 this was not apparent in 2014 or 2015. Deepwater phosphorus and ammonia levels were highly elevated in 2014 and 2015. This is usually indicative of depressed deepwater oxygen levels, but the CSLAP samplers reported a noticeable lack of deepwater anoxic “smell” (hydrogen sulfide). The recent data suggests that deepwater intakes might be adequate to support potable water use, although there may occasionally be taste and odor issues. Potable water conditions, at least as measurable through CSLAP, are summarized in the Lake Scorecard and Lake Condition Summary Table.

Evaluation of Limnological Indicators

Calcium readings were slightly higher than normal in 2015, but each of the other limnological indicators appeared to be similar to those measured in previous years. Color readings have been higher in recent years, most likely due to the 2002 change in laboratories. None of the other limnological indicators has exhibited any clear long-term trends. It is likely that the small changes in most of these limnological indicators have been within the normal range of variability in the lake.

Chloride levels in the 2015 samples, collected for the first time through CSLAP and cited in Appendix A, ranged from 5 to 18 mg/l. These values fall within the “minor” to “moderate” road salt runoff levels cited by the New Hampshire DES. These readings are well below the state potable water quality standard of 250 mg/l and within the range of values found in most NYS lakes. These readings suggest a low likelihood of biological impacts from road salt. Additional data will help to determine if these represent normal readings for the lake.

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

Evaluation of Biological Condition

Macrophyte surveys were conducted through the ALSC study of Indian Lake in 1987. At least 21 aquatic plant species have been found, including at least one exotic plant species (*Lythrum sp.*, probably purple loosestrife). The modified floristic quality index (FQI) for the lake indicates that the quality of the aquatic plant community is “fair”; however, it is not known if this plant community has changed significantly in the last twenty-five years.

The ALSC study also found an abundance of intolerant macroinvertebrates, indicating good benthic health. The composition of the fish community is comprised of at least four warmwater fish species, at least one coolwater fish species, and at least one coldwater fish species. This suggests that the lake can most likely be characterized as a coolwater to coldwater fishery, although the inventory of fish species in the lake is no doubt incomplete. The ALSC study found a high percentage of fish species characteristic of lakes with relatively low biotic index.

Zooplankton have not been evaluated through CSLAP in Indian Lake. The phycocyanin data from 2009 and 2010 indicate high susceptibility to blue green algae blooms, but this was not apparent in the recent fluoroprobe samples analyzed by SUNY ESF, which showed low total and blue green algae levels. The algae community appears to be comprised of a mix of algae species, particularly green algae.

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

Evaluation of Lake Perception

Water quality and recreational assessment were more favorable than normal in 2014, consistent with the more favorable water quality conditions. Aquatic plant coverage was less extensive than usual in 2014; this may have also contributed to more favorable recreational assessments. None of these indicators exhibit any clear seasonal trends, and none have changed significantly since the mid-1990s. Overall lake perception is summarized on the Lake Scorecard and Lake Condition Summary Table.

Evaluation of Local Climate Change

Air and water temperature readings in the summer index period were slightly higher than normal in 2015. Surface water temperature readings have increased slightly, while deepwater temperatures have decreased slightly, particularly in the last two years. It is not known if this is an indication of local climate change or if these indicators are sensitive enough to measure small but real changes in local climate conditions.

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 have indicate low susceptibility for harmful algal blooms (HABs), consistent with the very high water clarity and low algae levels. Toxin levels in the open water (mid-lake) samples have been consistently low over the last several years.

Lake Condition Summary

Category	Indicator	Min	Annual Avg	Max	2015 Avg	Classification	2015 Change?	Long-term Change?
Eutrophication Indicators	Water Clarity	0.75	4.25	7.75	5.89	Mesotrophic	Higher Than Normal	No Change
	Chlorophyll <i>a</i>	0.05	5.52	36.90	0.91	Mesotrophic	Lower Than Normal	No Change
	Total Phosphorus	0.006	0.016	0.040	0.013	Mesotrophic	Within Normal Range	No Change
Potable Water Indicators	Hypolimnetic Ammonia	0.00	0.30	2.06	0.71	Elevated Deepwater NH4	Higher than Normal	Not known
	Hypolimnetic Arsenic	0.70	1.07	1.30		Elevated Deepwater As		Not known
	Hypolimnetic Iron	0.01	0.08	0.32		Low Iron Levels		Not known
	Hypolimnetic Manganese	0.06	0.12	0.19		Low Manganese Levels		Not known
Limnological Indicators	Hypolimnetic Phosphorus	0.011	0.091	0.849	0.252	Elevated Deepwater TP	Higher than Normal	Not known
	Nitrate + Nitrite	0.00	0.02	0.13	0.01	Low NOx	Within Normal Range	No Change
	Ammonia	0.00	0.03	0.31	0.04	Low Ammonia	Within Normal Range	No Change
	Total Nitrogen	0.01	0.46	1.06	0.40	Low Total Nitrogen	Within Normal Range	No Change
	pH	6.11	7.58	9.53	7.58	Alkaline	Within Normal Range	No Change
	Specific Conductance	20	62	89	64	Softwater	Within Normal Range	No Change
	True Color	1	12	45	9	Intermediate Color	Within Normal Range	Increasing Slightly
	Calcium	4.7	7.5	19.6	12.4	Not Susceptible to Zebra Mussels	Higher than Normal	No Change
	Lake Perception	WQ Assessment	1	1.6	4	1.0	Not Quite Crystal Clear	More Favorable Than Normal
Aquatic Plant Coverage		1	2.7	4	1.0	Surface Plant Growth	More Favorable Than Normal	No Change
Recreational Assessment		1	1.3	4	1.0	Could Not Be Nicer	Within Normal Range	No Change
Biological Condition	Phytoplankton					Open water-low blue green algae biomass	Not known	Not known
	Macrophytes					Fair quality of the aquatic plant community	Not known	Not known
	Zooplankton					Not evaluated through CSLAP	Not known	Not known
	Macroinvertebrates					Not evaluated through CSLAP	Not known	Not known
	Fish					Coolwater to coldwater fishery?	Not known	Not known
	Invasive Species					Purple loosestrife?	Not known	Not known
Local Climate Change	Air Temperature	10	23.4	36	30.1		Higher Than Normal	No Change
	Water Temperature	16	23.9	30	26.0		Higher Than Normal	No Change

Category	Indicator	Min	Annual Avg	Max	2015 Avg	Classification	2015 Change?	Long-term Change?
Harmful Algal Blooms	Open Water Phycocyanin	0	67	782	3	Some readings indicate high risk of BGA	Not known	Not known
	Open Water FP Chl.a	0	1	2	1	No readings indicate high algae levels	Not known	Not known
	Open Water FP BG Chl.a	0	0	0	0	No readings indicate high BGA levels	Not known	Not known
	Open Water Microcystis	<DL	0.2	0.4	<0.30	Mostly undetectable open water MC-LR	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					No shoreline blooms sampled for FP	Not known	Not known
	Shoreline FP BG Chl.a					No shoreline blooms sampled for FP	Not known	Not known
	Shoreline Microcystis					No shoreline bloom MC-LR data	Not known	Not known
	Shoreline Anatoxin a					No shoreline bloom anatoxin data	Not known	Not known

Evaluation of Lake Condition Impacts to Lake Uses

Indian Lake is presently among the lakes listed on the 2007 Lower Hudson River Basin Priority Waterbody List (PWL), with “no known impacts” reported. The PWL listing for Indian Lake is listed in Appendix B.

Potable Water (Drinking Water)

The CSLAP dataset at Indian Lake, including water chemistry data, physical measurements, and volunteer samplers’ perception data, is inadequate to evaluate the use of the lake for potable water. High algae levels and periodic (historical) shoreline blooms may *threaten* the use of the lake for potable water due to the production of disinfection-by-products when chlorinating the water supply. However, these impacts were not likely in 2015 due to low algae levels. Elevated deepwater ammonia or other pollutants may *threaten* use of the bottom waters of the lake for potable water.

Public Bathing

The CSLAP dataset at Indian Lake, including water chemistry data, physical measurements, and volunteer samplers’ perception data, suggests that public bathing, if conducted at a public bathing beach, should be fully supported. This use may occasionally be *threatened* by occasionally excessive algae levels and poor perception of water quality conditions. 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 Indian Lake, including water chemistry data, physical measurements, and volunteer samplers’ perception data, suggest that recreation should be fully supported, although this use at times may be *threatened* by elevated nutrient levels.

Aquatic Life

The CSLAP dataset on Indian Lake, including water chemistry data, physical measurements, and volunteer samplers’ perception data, suggest that aquatic life may be *stressed* by elevated pH and deepwater anoxia (no oxygen), and *threatened* by road salt runoff, although these impacts vary

from year to year. Additional data are needed to evaluate the food and habitat conditions for aquatic organisms in the lake.

Aesthetics and Habitat

The CSLAP dataset on Indian Lake, including water chemistry data, physical measurements, and volunteer samplers' perception data, suggest that aesthetics should be fully supported, although aesthetics may at times be *threatened* by excessive algae. Habitat appears to be good.

Fish Consumption

There are no fish consumption advisories posted for Indian Lake.

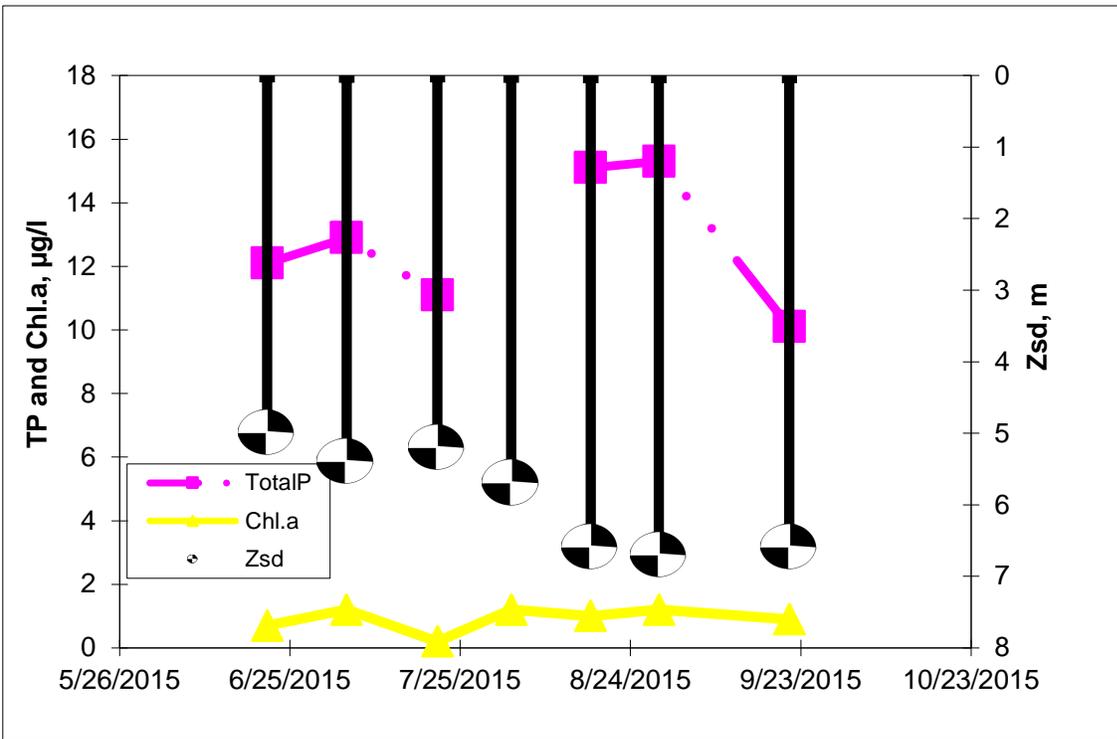
Additional Comments and Recommendations

An updated aquatic plant survey may help to determine if the aquatic plant community has been invaded by exotic aquatic plant species. Lake residents are advised to report and avoid exposure to any shoreline blooms, particularly those that bear the characteristics of a blue green algae bloom.

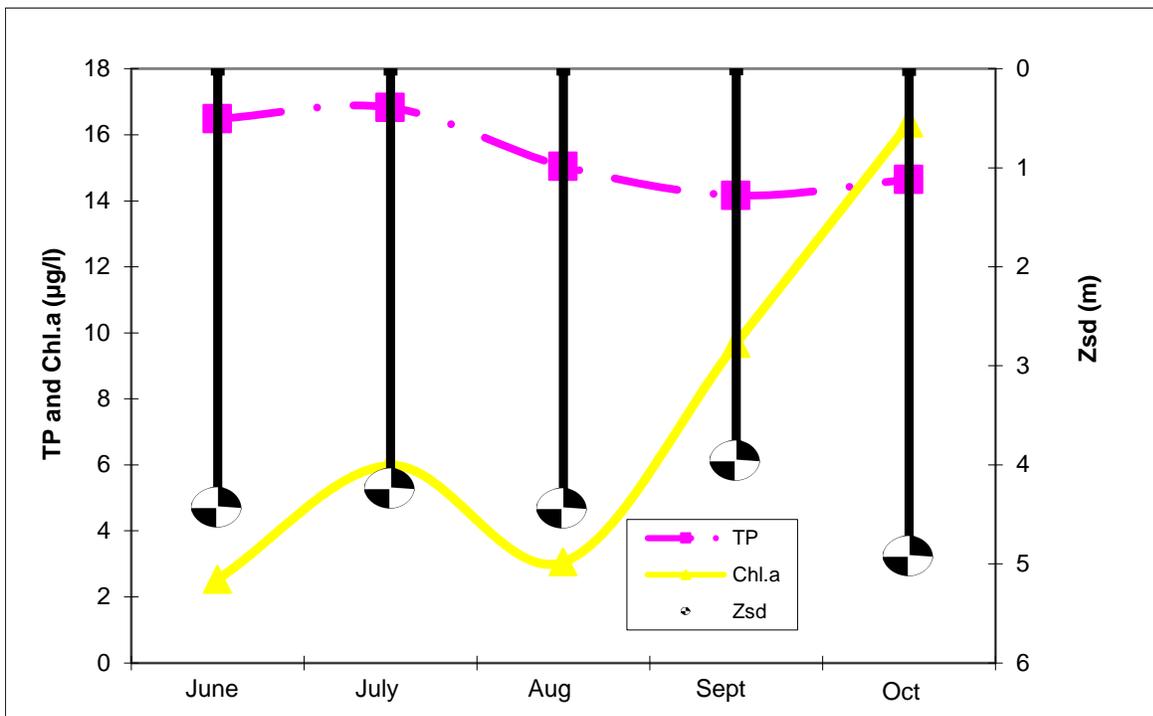
Aquatic Plant IDs-2015

None submitted for identification in 2015.

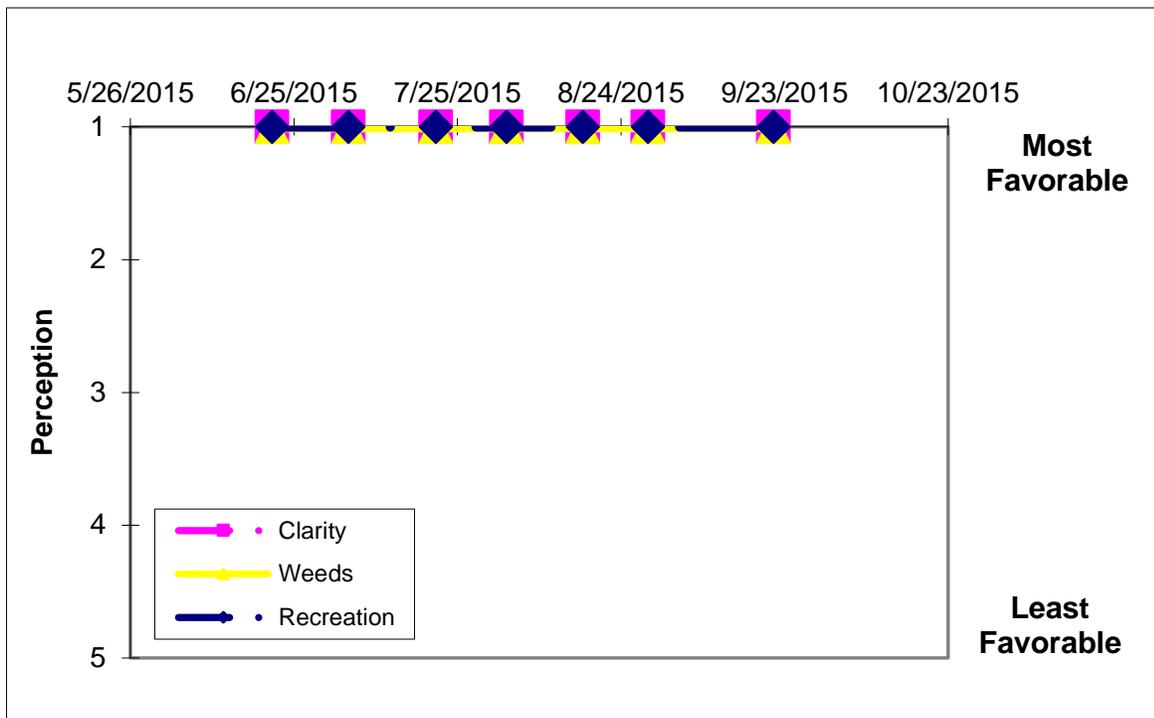
Time Series: Trophic Indicators, 2015



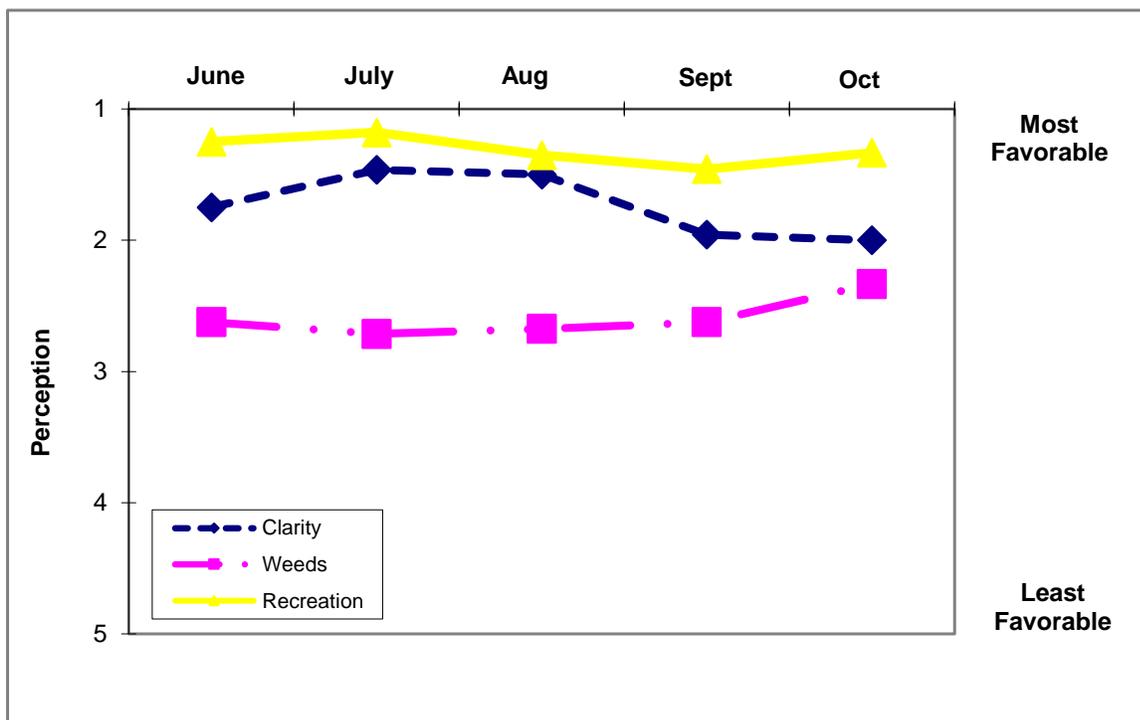
Time Series: Trophic Indicators, Typical Year (1994-2015)



Time Series: Lake Perception Indicators, 2015



Time Series: Lake Perception Indicators, Typical Year (1994-2015)



Appendix A- CSLAP Water Quality Sampling Results for Indian Lake

LNum	PName	Date	Zbot	Zsd	Zsamp	Tot.P	NO3	NH4	TDN	TN/TP	TColor	pH	Cond25	Ca	Chl.a	Cl
113	Indian L-P	8/6/1994				0.007	0.01				6	7.63	65		2.76	
113	Indian L-P	8/20/1994	18.0	5.75	1.5	0.009	0.01				8	7.44	65		3.05	
113	Indian L-P	9/3/1994	19.0	5.50	1.5	0.010	0.01				6	7.38	65		2.33	
113	Indian L-P	7/9/1995	6.0	3.51	1.5	0.013	0.01				5	7.52	71		4.60	
113	Indian L-P	7/22/1995	4.1	3.00	1.5	0.014	0.01					7.69	70		4.25	
113	Indian L-P	9/30/1995	10.0	3.00	1.5	0.013	0.01				5	7.29	71		7.04	
113	Indian L-P	7/7/1996	19.0	2.00	1.5	0.016	0.01				5	7.30	65		32.00	
113	Indian L-P	7/14/1996	19.3	4.50	1.5	0.016	0.01				10	7.10	63		2.10	
113	Indian L-P	7/27/1996	20.0	3.50	1.5	0.013	0.01				5	7.24	65		5.40	
113	Indian L-P	8/10/1996			1.5	0.016	0.01				5	7.10	66		5.90	
113	Indian L-P	7/11/1998	17.4	3.51	1.5		0.01				4	7.06	64		2.05	
113	Indian L-P	8/8/1998		5.88	1.3		0.01				4	7.57	64		6.10	
113	Indian L-P	8/22/1998	12.2	4.60	5.5		0.01				4	9.04	68		4.65	
113	Indian L-P	9/6/1998		5.18	1.5	0.011	0.01				8	7.42	65		11.50	
113	Indian L-P	9/19/1998		4.50	1.5	0.013	0.01				6	7.58	66		4.38	
113	Indian L-P	6/27/1999		3.00	1.5	0.014					9	7.78	69		4.22	
113	Indian L-P	7/24/1999	11.0	2.88	1.5	0.010					7	7.68	68			
113	Indian L-P	8/7/1999	18.3	5.50	1.5	0.012					7	7.36	68		5.30	
113	Indian L-P	7/9/2000	19.0	4.75	1.5	0.011	0.06				6	7.87	66		2.27	
113	Indian L-P	9/16/2000		3.50	1.5	0.015	0.01				9	7.84	66			
113	Indian L-P	10/14/2000		3.66	1.5	0.022					7	7.72	67			
113	Indian L-P	8/4/2001		4.42	1.5	0.011	0.01				6	7.64	62			
113	Indian L-P	8/18/2001		3.65	1.5	0.012	0.01				6	7.75	68			
113	Indian L-P	6/24/2003	15.5	3.60	1.5	0.030	0.01	0.02	0.28	9.28	10	6.24	71	6.9		
113	Indian L-P	7/14/2003	17.5	4.65	1.5	0.022	0.01	0.00	0.25	11.61	13	7.35	65		36.84	
113	Indian L-P	7/22/2003		5.05	1.5	0.010	0.01	0.05	0.36	37.57					7.79	
113	Indian L-P	8/5/2003	15.5	5.40	1.5	0.011	0.00	0.31	0.32	5.57	19	7.21	64	6.8	4.93	
113	Indian L-P	8/20/2003	17.5	4.35	1.5		0.00	0.02	0.36	11.54	20	7.21	64		1.94	
113	Indian L-P	9/7/2003	17.0	5.70	1.5	0.015	0.03	0.01			14	7.22	65		12.79	
113	Indian L-P	9/28/2003	16.0	5.95	3	0.009	0.01	0.00	0.02	2.56	11	7.30	63		25.25	
113	Indian L-P	6/6/2004	17.5	5.50	1.5	0.015	0.01	0.02			7	6.93	70		0.50	
113	Indian L-P	6/27/2004	19.0	6.25	1.5	0.008	0.01	0.01	0.33	41.93	11	7.06	70		7.50	
113	Indian L-P	7/11/2004	16.0	6.38	1.5	0.009	0.03	0.01	0.35	39.50	7	6.85	73		18.40	
113	Indian L-P	7/25/2004	17.0	4.38	1.5	0.013	0.01	0.01	0.01	0.38	13	7.76	75		13.30	
113	Indian L-P	8/8/2004	15.5	3.00	1.5	0.012	0.04	0.02	0.39	31.71	9	7.39	61	10.3		
113	Indian L-P	8/22/2004	15.5	3.13	1.5	0.012	0.06	0.04	0.50	43.34	19	7.68	71		1.43	
113	Indian L-P	9/6/2004	15.5	5.38	1.5	0.015	0.01	0.04	0.37	24.94	14	6.85	61		1.40	
113	Indian L-P	9/20/2004	15.0	2.25	1.5	0.016	0.04	0.06	0.55	33.50	13	7.34	59		2.80	
113	Indian L-P	6/12/2005	15.5+	4.25	3.5	0.012	0.01	0.01	0.27	22.05	19	6.61	55	8.2	2.02	
113	Indian L-P	6/27/2005	15.5+	4.25	3.5	0.017	0.01	0.01	0.26	14.98		7.46	63		0.05	
113	Indian L-P	7/17/2005	15.5+	4.00	1.5	0.018	0.01	0.01	0.24	13.21	7	8.13	62		0.47	
113	Indian L-P	7/31/2005	15.5+	3.75	1.5	0.018	0.05	0.02	0.51	28.35	20	7.63	57		2.25	
113	Indian L-P	8/16/2005	15.5+	4.38	1.5	0.016	0.07	0.01	0.32	19.92	9	6.83	66	6.8	4.09	
113	Indian L-P	9/5/2005	15.5+	3.00	1.5	0.016	0.02	0.03	0.45	28.80	3	7.34	63		1.06	
113	Indian L-P	9/18/2005	16.5	2.88	1.5	0.015	0.01	0.01	0.53	35.46	21	7.80	41		7.15	
113	Indian L-P	10/1/2005	17.0	3.38	1.5	0.013	0.03	0.01	0.40	30.67	20	6.83	67		7.96	
113	Indian L-P	6/25/2006	15.5	6.00	1.5	0.018	0.03	0.03			7	7.17		6.6	3.03	
113	Indian L-P	7/7/2006	15.5	5.00	1.5	0.013	0.01	0.01			11	7.67	62		2.29	
113	Indian L-P	7/23/2006	17.5	4.75	1.5	0.014	0.01	0.03			25	7.32	65		1.35	
113	Indian L-P	8/6/2006	16.0	5.75	1.5	0.016	0.01	0.04			29	7.47	65		1.22	
113	Indian L-P	8/20/2006	17.0	4.50	1.5	0.011	0.01	0.02			10	7.67	60	6.7	1.27	
113	Indian L-P	9/4/2006	17.0	3.25	1.5	0.012					1	7.55	64		10.62	
113	Indian L-P	9/16/2006	17.0	3.88		0.017	0.01	0.03			8	7.53	57		11.95	
113	Indian L-P	9/29/2006	17.0	3.63		0.017	0.03	0.09			13	7.91	62		6.36	
113	Indian L-P	7/8/2007	15.5	5.00	1.5	0.040	0.01	0.04	0.68	38.01	25	8.41	80	7.3	0.62	
113	Indian L-P	7/22/2007	17.0	4.75	1.5	0.024	0.01	0.01	0.61	57.45	9	7.84	55		3.13	
113	Indian L-P	7/29/2007	17.5	5.38	1.5	0.018	0.01	0.01	0.67	84.17	12	8.72	63		1.85	
113	Indian L-P	8/5/2007	17.0	5.75	1.5	0.019	0.01	0.01	0.64	73.38	10	7.71	58		1.54	
113	Indian L-P	8/11/2007	17.0	5.00	1.5	0.018	0.01	0.02	0.57	70.59	9	7.81	74	6.7	3.66	
113	Indian L-P	8/19/2007	18.5	4.13	1.5	0.016	0.02	0.02	0.65	90.63	10	7.28	33		3.04	
113	Indian L-P	9/2/2007	17.0	4.00	1.5	0.017	0.06	0.12	0.73	97.04	17	8.51	56		0.64	
113	Indian L-P	9/16/2007	17.5	3.03	1.5	0.021	0.01	0.02	0.68	73.53	10	7.95	63		12.55	
113	Indian L-P	6/7/2008	18.0	4.13	1.5	0.020	0.04	0.02	0.49	53.62	10	7.50	72	7.4	6.51	

LNum	PName	Date	Zbot	Zsd	Zsamp	Tot.P	NO3	NH4	TDN	TN/TP	TColor	pH	Cond25	Ca	Chl.a	Cl
113	Indian L-P	7/1/2008	19.0	0.75	1.5	0.024	0.03	0.07	0.89	81.52	14	9.53	41		15.78	
113	Indian L-P	7/28/2008	19.0	3.25	1.5	0.017	0.03	0.05	1.06	135.72	12	8.35	30		5.09	
113	Indian L-P	8/2/2008	16.0	2.88	1.5	0.018	0.07	0.05	0.56	69.00	8	8.36	39		4.97	
113	Indian L-P	8/13/2008	19.0	3.38	1.5	0.021	0.02	0.04	0.42	45.34	3	8.35	29	6.9	7.11	
113	Indian L-P	8/30/2008	19.0	2.38	1.5	0.015	0.01	0.01	0.45	64.43	8	8.46	38		15.22	
113	Indian L-P	9/6/2008	19.0	2.75	1.5	0.016	0.01	0.02	0.51	69.82	9	8.64	50		11.30	
113	Indian L-P	9/30/2008		3.50	1.5	0.018	0.02	0.02	0.39	47.75	10	6.24	60		12.27	
113	Indian L-P	07/06/2009		3.20	2	0.017	0.01	0.01	0.27	36.53	17	7.89	44	5.5	2.24	
113	Indian L-P	07/16/2009	17.0	3.50	2	0.022	0.01	0.01	0.34	34.63	9	6.11	48		5.61	
113	Indian L-P	08/01/2009	19.5	4.50	2	0.019	0.04	0.03	0.33	38.44	15	7.02	52		2.71	
113	Indian L-P	08/10/2009	21.0	4.00	2	0.016	0.03	0.05	0.34	46.46	22	7.27	59		0.50	
113	Indian L-P	08/19/2009	18.5	3.50	2	0.015	0.03	0.02	0.30	44.74	24	7.24	54	6.4	1.40	
113	Indian L-P	08/31/2009	20.0	3.00	2	0.016	0.05	0.01	0.48	66.14	25	7.86	56		4.90	
113	Indian L-P	09/15/2009	18.0	1.00	2	0.024	0.01	0.01	0.71	65.08	13	8.74	49		28.20	
113	Indian L-P	09/25/2009	19.0	1.50	2	0.018	0.03	0.03	0.73	89.47	15	8.38	57		26.56	
113	Indian L-P	6/16/2010	20.0	3.00	1.5	0.017	0.10	0.30			12	7.25	64		0.50	
113	Indian L-P	6/29/2010	17.0	5.25	1.5	0.017	0.04	0.02			6	7.70	67		2.70	
113	Indian L-P	7/15/2010	19.0	4.00	1.5	0.022	0.07	0.03	0.54	53.67	12	6.94	67		3.30	
113	Indian L-P	7/27/2010	20.0	4.00	1.5	0.014	0.01	0.02				8.80	68		3.50	
113	Indian L-P	8/10/2010	17.0	4.00	1.5	0.015	0.02	0.02	0.37	55.67	14	6.98	71	6.7	0.30	
113	Indian L-P	8/24/2010	18.0	4.00	1.5	0.014	0.03	0.04	0.29	46.23	11	7.06	66		4.10	
113	Indian L-P	9/7/2010	20.0	3.50	1.5	0.016	0.02	0.02	0.36	48.35	5	7.44	63		2.60	
113	Indian L-P	9/20/2010	19.0	4.00	1.5	0.014	0.02	0.03	0.40	63.43	12	7.32	66		3.70	
113	Indian L-P	6/7/2011	19.0	3.00	1.5	0.018	0.01	0.03	0.41	49.50	22	8.18	79	5.6	2.20	
113	Indian L-P	6/21/2011	20.0	3.00	1.5	0.023	0.02	0.04	0.39	36.76	9	8.57	78		1.80	
113	Indian L-P	7/5/2011	19.0	4.25	1.5	0.020	0.01	0.08	0.95	10.27	7	7.42	70		0.80	
113	Indian L-P	7/19/2011	19.0	5.00	1.5	0.018	0.01	0.01	0.37	45.86	13	8.79	85		0.30	
113	Indian L-P	8/2/2011	18.0	3.50	1.5	0.019	0.13	0.02	0.55	64.15	16	7.02	65	11.6	0.30	
113	Indian L-P	8/16/2011	18.5	3.00	1.5	0.018	0.01	0.01	0.35	42.79	19	7.54	63		0.90	
113	Indian L-P	8/31/2011	19.5	3.00	1.5	0.015	0.04	0.03	0.41	61.63	45	6.20	59		0.10	
113	Indian L-P	9/17/2011	19.0	2.50	1.5	0.019	0.01	0.02	0.45	53.75	17	7.21	60		5.50	
113	Indian L-P	6/7/2011	19.0	3.00	1.5	0.018	0.01	0.03	0.41	49.50	22	8.18	79	5.6	2.20	
113	Indian L-P	6/15/2013	30.0	5.63	1.5	0.008	0.01	0.02	0.40	107.28		7.09	63			
113	Indian L-P	6/30/2013	30.0	4.00	2.0	0.026			0.38	31.83	24	7.55	76			
113	Indian L-P	7/13/2013	30.0	4.50	1.5	0.030	0.02	0.03	0.50	36.76	19	7.28	66			
113	Indian L-P	7/28/2013	30.0	3.50	1.5	0.014			0.59	92.95	17	8.73	79			
113	Indian L-P	8/8/2013		3.50	1.6	0.020	0.03	0.04	0.48	53.54	19	8.98	64			
113	Indian L-P	8/22/2013	30.0	3.50	1.5	0.023			0.48	45.87	11	8.78	89			
113	Indian L-P	9/7/2013	30.0	2.50	1.5	0.033	0.01	0.02	0.49	32.64	15	7.45	64		7.70	
113	Indian L-P	9/22/2013	30.0	2.00	1.5	0.013			0.64	107.80	15	8.10	33		36.90	
113	Indian L-P	6/23/2014	27.9	5.10	1.5	0.008	0.00	0.05	0.28	80.10	6	6.85	64	5.17	1.20	
113	Indian L-P	7/16/2014	29.5	6.75	1.5	0.008			0.29	77.00	8	7.71	59		0.20	
113	Indian L-P	7/30/2014	30.0	6.00	1.5	0.012	0.01	0.03	0.32	60.88	2	6.86	20		0.20	
113	Indian L-P	8/11/2014	28.0	6.50	1.5	0.006			0.26	91.49	8	7.78	58		0.20	
113	Indian L-P	8/25/2014	28.0	6.65	1.5	0.006	0.01	0.01	0.35	121.87	9	7.49	55	4.68	0.80	
113	Indian L-P	9/10/2014	27.8	6.80	1.5	0.010			0.33	73.63	11	6.78	58		0.60	
113	Indian L-P	9/20/2014	27.4	6.75	1.5	0.006	0.01	0.02	0.27	91.44	12	7.69	62		1.10	
113	Indian L-P	10/14/2014	27.5	7.75	1.5	0.009			0.19	46.44	8	7.17	61		0.70	
113	Indian L-P	6/21/2015	27.9	5.00	1.5	0.012	0.02	0.03	0.27	22.40	6	7.89	64	19.6	0.70	
113	Indian L-P	7/5/2015	27.7	5.40	1.5	0.013			0.49	37.83	12	7.03	63		1.20	
113	Indian L-P	7/21/2015	30.0	5.20	1.5	0.011	0.01	0.03	0.40	36.22	12	7.50	70		0.20	17.5
113	Indian L-P	8/3/2015	26.9	5.70	1.5				0.39		12	7.38	73		1.20	
113	Indian L-P	8/17/2015	28.0	6.60	1.5	0.015	0.02	0.03	0.39	25.89	7	7.87	63	5.26	1.00	
113	Indian L-P	8/29/2015	27.8	6.70	1.5	0.015			0.45	29.41	7	7.55	47		1.20	
113	Indian L-P	9/21/2015	27.8	6.60	1.5	0.010	0.01	0.04			10	7.86	66		0.90	5.0
113	Indian L-P	6/24/2003			20.7	0.029	0.02	0.04	0.26	8.82						
113	Indian L-P	7/14/2003			15.5	0.027	0.06	0.00	0.35	13.20						
113	Indian L-P	7/22/2003			15.5	0.026	0.11	0.13	0.38	14.70						
113	Indian L-P	8/5/2003			16.0	0.058	0.02	0.03	0.29	26.61						
113	Indian L-P	8/20/2003			16.0	0.030	0.01	0.07	0.39	12.91						
113	Indian L-P	9/7/2003			16.0	0.043	0.05	0.09								
113	Indian L-P	9/28/2003			14.0	0.045	0.01	0.14	0.32	7.15						
113	Indian L-P	6/12/2005			15.5	0.022										
113	Indian L-P	6/27/2005			15.5	0.027										
113	Indian L-P	7/17/2005			15.5	0.032										
113	Indian L-P	7/31/2005			15.5	0.025										

LNum	PName	Date	Zbot	Zsd	Zsamp	Tot.P	NO3	NH4				NO2	Fe	Mn	As
113	Indian L-P	8/16/2005			15.5	0.039									
113	Indian L-P	9/5/2005			15.5	0.062									
113	Indian L-P	9/18/2005			15.5	0.041									
113	Indian L-P	10/1/2005			15.5	0.045									
113	Indian L-P	6/25/2006	15.5		15.5	0.028									
113	Indian L-P	7/7/2006	15.5		15.5	0.032									
113	Indian L-P	7/23/2006	17.5		15.5	0.067									
113	Indian L-P	8/6/2006	16.0		15.5	0.034									
113	Indian L-P	8/20/2006	17.0		15.5	0.029									
113	Indian L-P	9/4/2006	17.0		15.5	0.038									
113	Indian L-P	9/16/2006	17.0		15.5	0.037									
113	Indian L-P	9/29/2006	17.0		15.5	0.043									
113	Indian L-P	7/8/2007	15.5		15.5	0.032									
113	Indian L-P	7/22/2007	17.0		15.5	0.031									
113	Indian L-P	7/29/2007	17.5		16.0	0.042									
113	Indian L-P	8/5/2007	17.0		15.5	0.058									
113	Indian L-P	8/11/2007	17.0		16.5	0.037									
113	Indian L-P	8/19/2007	18.5		17.0	0.041									
113	Indian L-P	9/2/2007	17.0		15.5	0.031									
113	Indian L-P	9/16/2007	17.5			0.041									
113	Indian L-P	6/7/2008	18.0		16.0	0.027									
113	Indian L-P	7/1/2008	19.0		17.5	0.071									
113	Indian L-P	7/28/2008	19.0		18.0	0.032									
113	Indian L-P	8/2/2008	16.0		16.0	0.027									
113	Indian L-P	8/13/2008	19.0		17.0	0.034									
113	Indian L-P	8/30/2008	19.0		17.0	0.033									
113	Indian L-P	9/6/2008	19.0		17.0	0.041									
113	Indian L-P	9/30/2008				0.034									
113	Indian L-P	07/06/2009				0.027		0.01							
113	Indian L-P	07/16/2009	17.0		16	0.040		0.16							
113	Indian L-P	08/01/2009	19.5		17	0.042		0.11							
113	Indian L-P	08/10/2009	21.0		20	0.028		0.10							
113	Indian L-P	08/19/2009	18.5		17	0.042		0.03				0.10	0.10	1.30	
113	Indian L-P	08/31/2009	20.0		19	0.015		0.02							
113	Indian L-P	09/15/2009	18.0		17	0.051		0.30				0.12	0.10	1.30	
113	Indian L-P	09/25/2009	19.0		18	0.049		0.32							
113	Indian L-P	6/16/2010	20.0		18.5	0.027		0.08				0.03			
113	Indian L-P	7/15/2010	19.0		17.5	0.024		0.05				0.03			
113	Indian L-P	8/10/2010	17.0		15.5	0.045		0.29				0.03	0.15		
113	Indian L-P	8/24/2010	18.0		16.5									1.10	
113	Indian L-P	9/7/2010	20.0		18.5	0.076		0.44				0.32	0.19	0.70	
113	Indian L-P	6/7/2011	19.0		17.5	0.028		0.04				0.01	0.06		
113	Indian L-P	7/5/2011	19.0		17.5	0.094		0.29				0.01	0.14		
113	Indian L-P	8/2/2011	18.0		16.5	0.042		0.17				0.14	0.10	1.00	
113	Indian L-P	8/31/2011	19.5		17.0	0.027		0.06				0.01	0.10	1.00	
113	Indian L-P	6/15/2013				0.041		0.03							
113	Indian L-P	7/13/2013				0.027		0.03							
113	Indian L-P	8/8/2013				0.100		0.04							
113	Indian L-P	9/7/2013				0.011		0.01							
113	Indian L-P	6/23/2014			26.4	0.265		1.02							
113	Indian L-P	7/16/2014			28.0	0.451									
113	Indian L-P	7/30/2014			27.0	0.231		0.97							
113	Indian L-P	8/11/2014			26.5	0.327									
113	Indian L-P	8/25/2014			26.5	0.499		1.58							
113	Indian L-P	9/10/2014			26.3	0.339									
113	Indian L-P	9/20/2014			25.9	0.271		1.16							
113	Indian L-P	10/14/2014			26.0	0.268									
113	Indian L-P	6/21/2015			25.4	0.129		0.28							
113	Indian L-P	7/5/2015			26.2	0.097									
113	Indian L-P	7/21/2015			25.0	0.104		0.26							
113	Indian L-P	8/3/2015			25.4	0.154									
113	Indian L-P	8/17/2015			26.5	0.074		0.23							
113	Indian L-P	8/29/2015			26.3	0.360									
113	Indian L-P	9/21/2015			26.3	0.849		2.06							

LNum	PName	Date	Site	TAir	TH20	QA	QB	QC	QD	QF	QG	AQ-PC	AQ-Chla	MC-LR	Ana-a	Cyl	FP-Chl	FP-BG	HAB form	Shore HAB
113	Indian L-P	8/6/1994	Epi			1	3	1												
113	Indian L-P	8/20/1994	Epi	25	24	2	3	1	6											
113	Indian L-P	9/3/1994	Epi	19	22	1	3	1	6											
113	Indian L-P	7/9/1995	Epi	21	24	1	1	1	0											
113	Indian L-P	7/22/1995	Epi	29	27															
113	Indian L-P	9/30/1995	Epi	17	16	3	3	1												
113	Indian L-P	7/7/1996	Epi	26	24	2	3	1												
113	Indian L-P	7/14/1996	Epi	25	24	1	1	1												
113	Indian L-P	7/27/1996	Epi	28	20															
113	Indian L-P	8/10/1996	Epi																	
113	Indian L-P	7/11/1998	Epi	25	24	1	3	1												
113	Indian L-P	8/8/1998	Epi	23	18	2	3	1												
113	Indian L-P	8/22/1998	Epi	16	20															
113	Indian L-P	9/6/1998	Epi	24	21															
113	Indian L-P	9/19/1998	Epi	22	17	2	3	2												
113	Indian L-P	6/27/1999	Epi	36	24	2	3	1												
113	Indian L-P	7/24/1999	Epi	28	24															
113	Indian L-P	8/7/1999	Epi	21	27	1	3	1	1234											
113	Indian L-P	7/9/2000	Epi	20	24	1	3	1												
113	Indian L-P	9/16/2000	Epi	16	22	1	3	1												
113	Indian L-P	10/14/2000	Epi	24	16	2	3	1												
113	Indian L-P	8/4/2001	Epi	26	23	2	3	2	6											
113	Indian L-P	8/18/2001	Epi	30	25															
113	Indian L-P	6/24/2003	Epi	28	22	2	3	2	0											
113	Indian L-P	7/14/2003	Epi	18	24	1	3	1	8											
113	Indian L-P	7/22/2003	Epi	19	25	1	3	1	8											
113	Indian L-P	8/5/2003	Epi	20	24	1	3	1	8											
113	Indian L-P	8/20/2003	Epi	19	26	2	4	3	28											
113	Indian L-P	9/7/2003	Epi	15	21	1	3	1	8											
113	Indian L-P	9/28/2003	Epi	20	21	1	2	1	8											
113	Indian L-P	6/6/2004	Epi	13	18	2	2	1	5											
113	Indian L-P	6/27/2004	Epi	17	23	2	3	1	8											
113	Indian L-P	7/11/2004	Epi	20	24	1	3	1	8											
113	Indian L-P	7/25/2004	Epi	18	23	2	3	1	58											
113	Indian L-P	8/8/2004	Epi	14	20	2	2	2	8											
113	Indian L-P	8/22/2004	Epi	12	22	2	3	1	8											
113	Indian L-P	9/6/2004	Epi	12	23	2	2	1	8											
113	Indian L-P	9/20/2004	Epi	19	21	2	3	2	0											
113	Indian L-P	6/12/2005	Epi	23	25	3	3	2	0											
113	Indian L-P	6/27/2005	Epi	21	26	3	3	2	27											
113	Indian L-P	7/17/2005	Epi	21	23	2	3	2	25											
113	Indian L-P	7/31/2005	Epi	24	27	1	3	1	0											
113	Indian L-P	8/16/2005	Epi	22	27	2	3	1	5											
113	Indian L-P	9/5/2005	Epi	18	22	2	3	1	8											
113	Indian L-P	9/18/2005	Epi	19	23	3	3	2	0											
113	Indian L-P	10/1/2005	Epi	12	19	3	3	2	0											
113	Indian L-P	6/25/2006	Epi	21	24	2	3	1	5											
113	Indian L-P	7/7/2006	Epi	19	26	2	3	1	0											
113	Indian L-P	7/23/2006	Epi	10	24	2	3	1	5											
113	Indian L-P	8/6/2006	Epi	22	26	1	3	1	0											
113	Indian L-P	8/20/2006	Epi	24	26	2	3	1	0											
113	Indian L-P	9/4/2006	Epi	18	24	2	3	2	5											
113	Indian L-P	9/16/2006	Epi	20	20	2	3	2	2											
113	Indian L-P	9/29/2006	Epi	14	18	2	3	2	5											
113	Indian L-P	7/8/2007	Epi	22	26	2	3	1	8											
113	Indian L-P	7/22/2007	Epi	26	24	2	3	1	8											
113	Indian L-P	7/29/2007	Epi	23	27	2	3	1	0											
113	Indian L-P	8/5/2007	Epi	25	27	2	3	1	8											
113	Indian L-P	8/11/2007	Epi	16	24	2	3	2	0											
113	Indian L-P	8/19/2007	Epi	20	24	2	3	1	8											
113	Indian L-P	9/2/2007	Epi	17	26	2	3	1	8											

LNum	PName	Date	Site	TAir	TH2O	QA	QB	QC	QD	QF	QG	AQ-PC	AQ-Chla	MC-LR	Ana-a	Cyl	FP-Chl	FP-BG	HAB form	Shore HAB
113	Indian L-P	9/16/2007	Epi	12	21	3	2	2	0											
113	Indian L-P	6/7/2008	Epi	20	21	2	2	2	0											
113	Indian L-P	7/1/2008	Epi	26	26	4	3	4	134											
113	Indian L-P	7/28/2008	Epi	24	26	2	3	2	12											
113	Indian L-P	8/2/2008	Epi	23	26	3	3	2	13											
113	Indian L-P	8/13/2008	Epi	19	23	3	3	2	1											
113	Indian L-P	8/30/2008	Epi	22	23	3	3	3	13											
113	Indian L-P	9/6/2008	Epi	24	26	3	3	3	1											
113	Indian L-P	9/30/2008	Epi	22	24															
113	Indian L-P	07/06/2009	Epi	28	24															
113	Indian L-P	07/16/2009	Epi	26	26	1	3	1	0											
113	Indian L-P	08/01/2009	Epi	31	27	1	3	1	0											
113	Indian L-P	08/10/2009	Epi	35	28	1	2	1	0											
113	Indian L-P	08/19/2009	Epi	28	28	1	3	1	0											
113	Indian L-P	08/31/2009	Epi	24	25	1	3	1	0											
113	Indian L-P	09/15/2009	Epi	28	23	4	3	2	3			289.6								
113	Indian L-P	09/25/2009	Epi	19	20	4	3	2	13			782.3								
113	Indian L-P	6/16/2010	Epi	26	23	1	3	1	0	0	0									
113	Indian L-P	6/29/2010	Epi	31	20	1	3	1	0	0	0									
113	Indian L-P	7/15/2010	Epi	30	28	1	3	1	0	0	0									
113	Indian L-P	7/27/2010	Epi	31	29															
113	Indian L-P	8/10/2010	Epi	31	29	1	3	1	0	0	0									
113	Indian L-P	8/24/2010	Epi	20	22	1	3	4	5	0	0	107.60								
113	Indian L-P	9/7/2010	Epi	30	25	1	3	1	0	0	0	124.90								
113	Indian L-P	9/20/2010	Epi	25	20	1	3	1	0	0	0									
113	Indian L-P	6/7/2011	Epi	32	26	1	3	1	0	0	0									
113	Indian L-P	6/21/2011	Epi	30	26	1	3	1	5	0	0	12.80								
113	Indian L-P	7/5/2011	Epi	32	27	1	3	1	0	0	0	5.00								
113	Indian L-P	7/19/2011	Epi	31	30	1	3	1	0	0	0	7.60								
113	Indian L-P	8/2/2011	Epi	32	30	1	3	1	0	0	0	7.00								
113	Indian L-P	8/16/2011	Epi	25	25	1	3	1	0	0	0	10.50								
113	Indian L-P	8/31/2011	Epi	27	25	1	3	1	0	0	0	6.40								
113	Indian L-P	9/17/2011	Epi	17	21	2	3	1	5	0	0	26.10								
113	Indian L-P	6/15/2013	Epi	22	19	1	3	1	0	0	0	0.60	1.60	<0.30	<0.440		1.100	0.00	i	i
113	Indian L-P	6/30/2013	Epi	26	29	3	3	1	0	0	0	0.80	0.90	<0.30	<0.510				i	
113	Indian L-P	7/13/2013	Epi	21	28	2	3	1	0	0	0			<0.30	<0.910					
113	Indian L-P	7/28/2013	Epi	26	26	1	3	1	0	0	0			<0.30	<0.400					
113	Indian L-P	8/8/2013	Epi	25	26	1	3	1	0	0	0			<0.30	<0.380					
113	Indian L-P	8/22/2013	Epi	24	25	1	3	1	0	0	0			0.40	<0.570					
113	Indian L-P	9/7/2013	Epi	24	24	1	3	1	0	0	0									
113	Indian L-P	9/22/2013	Epi	14	20	2	3	1	0	0	0									
113	Indian L-P	7/16/2014	Epi	30	28	1	1	1	0	0	0	0.90	0.20	<0.58	<0.44	<0.002	0.48	0.00	i	
113	Indian L-P	7/30/2014	Epi	24	25	1	3	1	0	0	0	1.10	0.20	<0.71	<0.48	<0.001	0.30	0.00	i	
113	Indian L-P	8/11/2014	Epi	28	25	1	3	1	0	0	0	1.20	0.10	<0.33	<0.01	<0.002	0.42	0.00	i	i
113	Indian L-P	8/25/2014	Epi	27	26	1	1	1	0	0	0	0.20	0.10	<0.26	<0.10	<0.002	0.33	0.00	i	i
113	Indian L-P	9/10/2014	Epi	27	24	1	1	1	0	0	0	14.30	0.40	<1.06	<0.16	<0.002	1.50	0.00	i	i
113	Indian L-P	9/20/2014	Epi	28	25	1	1	1	0	0	0	0.40	0.20	<0.24	<0.03	<0.001	0.77	0.00	i	i
113	Indian L-P	10/14/2014	Epi	21	20	1	1	1	0	0	0	2.00	0.20	<0.48	<0.04	<0.001	0.83	0.00	i	i
113	Indian L-P	7/16/2014	Epi	25	16	1	1	1	0	0	0	5.10	0.20	<0.73	<0.06	<0.001	0.27	0.00	i	i
113	Indian L-P	6/21/2015	Epi	30	26	1	1	1	0	0	0	2.60	0.20	<0.59	<0.004	<0.024	0.50	0.00	i	i
113	Indian L-P	7/5/2015	Epi	29	27	1	1	1	0	0	0	1.60	0.20	<0.86	<0.008	<0.046	0.80	0.30	i	i
113	Indian L-P	7/21/2015	Epi	35	27	1	1	1	0	0	0	6.00	0.10				0.60	0.00	i	i
113	Indian L-P	8/3/2015	Epi	31	27	1	1	1	0	0	0	3.90	0.40	<1.13	<0.003	<0.013	0.40	0.00	i	i
113	Indian L-P	8/17/2015	Epi	34	27	1	1	1	0	0	0	0.50	0.30	<0.65	0.00	<0.015	0.20	0.00	i	i
113	Indian L-P	8/29/2015	Epi	29	26	1	1	1	0	0	0			<0.49	<0.003	<0.014	0.50	0.00	i	i
113	Indian L-P	9/21/2015	Epi	23	22	1	1	1	0	0	0	0.05	0.30	<0.30	0.00	<0.035	0.50	0.10	i	i
113	Indian L-P	6/24/2003	Hypo		14															
113	Indian L-P	7/14/2003	Hypo		9															
113	Indian L-P	7/22/2003	Hypo		11															
113	Indian L-P	8/5/2003	Hypo		12															
113	Indian L-P	8/20/2003	Hypo		11															

LNum	PName	Date	Site	TAir	TH20	QA	QB	QC	QD	QF	QG	AQ-PC	AQ-Chla	MC-LR	Ana-a	Cyl	FP-Chl	FP-BG	HAB form	Shore HAB
113	Indian L-P	9/7/2003	Hypo		9															
113	Indian L-P	9/28/2003	Hypo		9															
113	Indian L-P	6/24/2003	Hypo		28															
113	Indian L-P	6/12/2005	Hypo		16															
113	Indian L-P	6/27/2005	Hypo		11															
113	Indian L-P	7/17/2005	Hypo		11															
113	Indian L-P	7/31/2005	Hypo		18															
113	Indian L-P	8/16/2005	Hypo		10															
113	Indian L-P	9/5/2005	Hypo		8															
113	Indian L-P	9/18/2005	Hypo		8															
113	Indian L-P	10/1/2005	Hypo		7															
113	Indian L-P	6/25/2006	Hypo		12															
113	Indian L-P	7/7/2006	Hypo		12															
113	Indian L-P	7/23/2006	Hypo		11															
113	Indian L-P	8/6/2006	Hypo		11															
113	Indian L-P	8/20/2006	Hypo		11															
113	Indian L-P	9/4/2006	Hypo		11															
113	Indian L-P	7/8/2007	Hypo		12															
113	Indian L-P	7/22/2007	Hypo		12															
113	Indian L-P	7/29/2007	Hypo		10															
113	Indian L-P	8/5/2007	Hypo		12															
113	Indian L-P	8/11/2007	Hypo		8															
113	Indian L-P	8/19/2007	Hypo		9															
113	Indian L-P	9/2/2007	Hypo		11															
113	Indian L-P	9/16/2007	Hypo		8															
113	Indian L-P	6/7/2008	Hypo		9															
113	Indian L-P	7/1/2008	Hypo		12															
113	Indian L-P	7/28/2008	Hypo		12															
113	Indian L-P	8/2/2008	Hypo		12															
113	Indian L-P	8/13/2008	Hypo		9															
113	Indian L-P	8/30/2008	Hypo		9															
113	Indian L-P	9/6/2008	Hypo		10															
113	Indian L-P	07/06/2009	Hypo																	
113	Indian L-P	07/16/2009	Hypo		10															
113	Indian L-P	08/01/2009	Hypo		11															
113	Indian L-P	08/10/2009	Hypo		13															
113	Indian L-P	08/19/2009	Hypo		11															
113	Indian L-P	08/31/2009	Hypo		11															
113	Indian L-P	09/15/2009	Hypo		13															
113	Indian L-P	09/25/2009	Hypo		11															
113	Indian L-P	6/16/2010	Hypo		10															
113	Indian L-P	7/15/2010	Hypo		18															
113	Indian L-P	8/10/2010	Hypo		11															
113	Indian L-P	8/24/2010	Hypo		10															
113	Indian L-P	9/7/2010	Hypo		13															
113	Indian L-P	6/7/2011	Hypo		11															
113	Indian L-P	7/5/2011	Hypo		12															
113	Indian L-P	8/2/2011	Hypo		11															
113	Indian L-P	8/31/2011	Hypo		9															
113	Indian L-P	6/15/2013	Hypo		10															
113	Indian L-P	7/13/2013	Hypo		18															
113	Indian L-P	8/8/2013	Hypo		10															
113	Indian L-P	9/7/2013	Hypo		18															
113	Indian L-P	6/23/2014	Hypo		9															
113	Indian L-P	7/16/2014	Hypo		6															
113	Indian L-P	7/30/2014	Hypo		5															
113	Indian L-P	8/11/2014	Hypo		5															
113	Indian L-P	8/25/2014	Hypo		6															
113	Indian L-P	9/10/2014	Hypo		5															
113	Indian L-P	9/20/2014	Hypo		6															
113	Indian L-P	10/14/2014	Hypo		6															

LNum	PName	Date	Site	TAir	TH20	QA	QB	QC	QD	QF	QG	AQ-PC	AQ-Chla	MC-LR	Ana-a	Cyl	FP-Chl	FP-BG	HAB form	Shore HAB
113	Indian L-P	6/21/2015	Hypo		7															
113	Indian L-P	7/5/2015	Hypo		7															
113	Indian L-P	7/21/2015	Hypo		7															
113	Indian L-P	8/3/2015	Hypo		7															
113	Indian L-P	8/17/2015	Hypo		7															
113	Indian L-P	8/29/2015	Hypo		6															
113	Indian L-P	9/21/2015	Hypo		6															

Legend Information

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

Appendix B: Priority Waterbody Listing for Indian Lake

Indian Lake (1301-0143)

NoKnownImpct

Waterbody Location Information

Revised: 04/16/2008

Water Index No:	H- 55- 2- 4-P167	Drain Basin:	Lower Hudson River
Hydro Unit Code:		Str Class:	A
Waterbody Type:	Lake	Reg/County:	3/Putnam Co. (40)
Waterbody Size:	44.4 Acres	Quad Map:	WEST POINT (P-25-1)
Seg Description:	entire lake		

Water Quality Problem/Issue Information (CAPS indicate MAJOR Use Impacts/Pollutants/Sources)

Use(s) Impacted	Severity	Problem Documentation
NO USE IMPAIRMNT		

Type of Pollutant(s)

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

Source(s) of Pollutant(s)

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

Resolution/Management Information

Issue Resolvability:	8 (No Known Use Impairment)	
Verification Status:	(Not Applicable for Selected RESOLVABILITY)	
Lead Agency/Office:	n/a	Resolution Potential: n/a
TMDL/303d Status:	n/a	

Further Details

Water Quality Sampling

Indian Lake has been sampled as part of the NYSDEC Citizen Statewide Lake Assessment Program (CSLAP) beginning in 1994 and most recently in 2006. An Interpretive Summary report of the findings of this sampling was published in 2007. These data indicate that the lake continues to be best characterized as mesotrophic, or moderately productive. Phosphorus levels in the lake rarely exceed the state guidance values indicating impacted/stressed recreational uses. Corresponding transparency measurements meet what is recommended for swimming beaches. Measurements of pH typically fall within the state water quality range of 6.5 to 8.5. The lake water is weakly colored, and color does not influence clarity of the lake. (DEC/DOW, BWAM/CSLAP, May 2007)

Recreational Assessment

Public perception of the lake and its uses is also evaluated as part of the CSLAP program. This assessment indicates recreational suitability of the lake to be very favorable since the lake was first evaluated and continuing through the most recent assessment. The recreational suitability of the lake is described most frequently as "could not be nicer" to "excellent." The lake itself is most often described as "not quite crystal clear," an assessment that is consistent with the perceived water quality conditions in the lake and its measured water quality characteristics. Assessments have noted that aquatic plants growth does not impact lake use. (DEC/DOW, BWAM/CSLAP, May 2007)

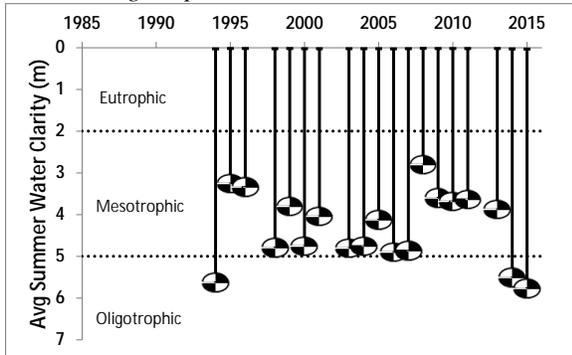
Lake Uses

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

Appendix C- Long Term Trends: Indian Lake

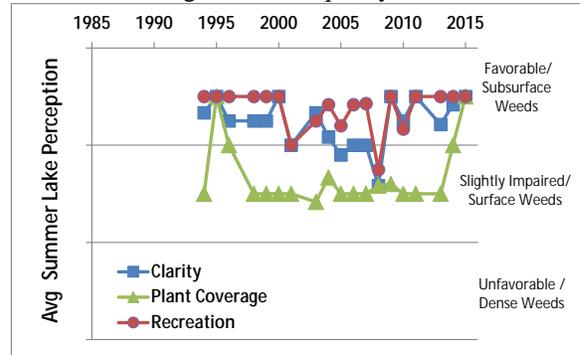
Long Term Trends: Water Clarity

- No clear trend, but very high last two years
- Most readings typical of *mesotrophic* to *oligotrophic* lakes



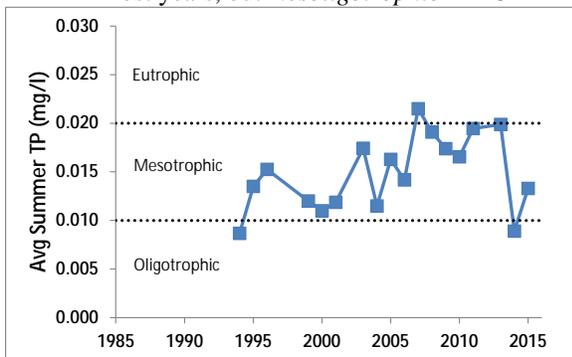
Long Term Trends: Lake Perception

- Assessments favorable, few weeds 2015
- Recreational perception may be more linked to changes in water quality than weeds



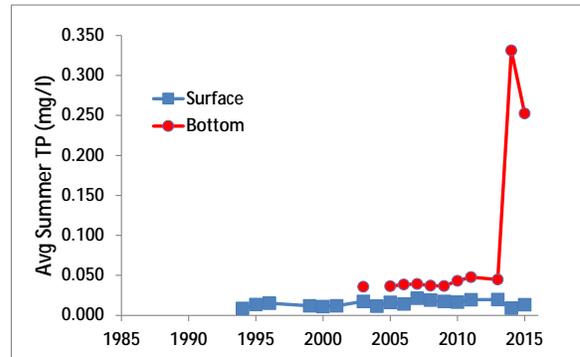
Long Term Trends: Phosphorus

- Steady ↑ 1994-2013, but ↓ '14 and '15
- Readings typical of *mesoeutrophic* lakes most years, but *mesoligotrophic* 14-15



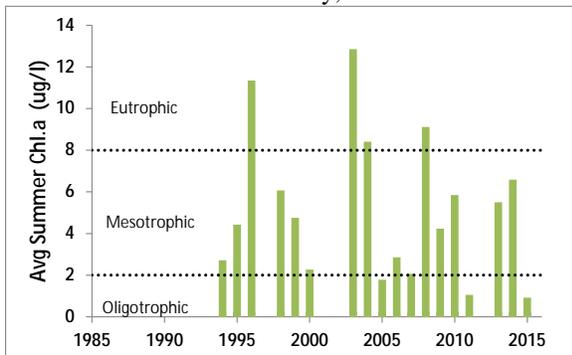
Long Term Trends: Bottom Phosphorus

- Slight ↑ 2003-13; ↑↑ deep TP/NH₄ in '14/15
- Bottom phosphorus may be one source of fall increase in surface TP



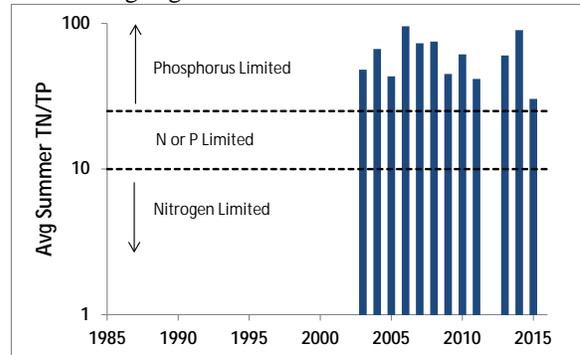
Long Term Trends: Chlorophyll a

- No trends apparent; variable year to year
- Most readings typical of *mesotrophic* lakes, consistent with clarity, lower than TP?



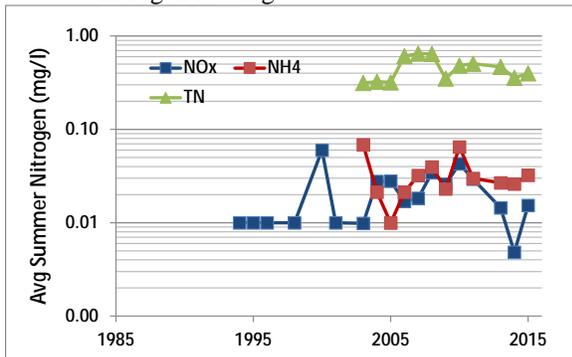
Long Term Trends: N:P Ratio

- No trends apparent; variable year to year
- Most readings indicate phosphorus limits algae growth



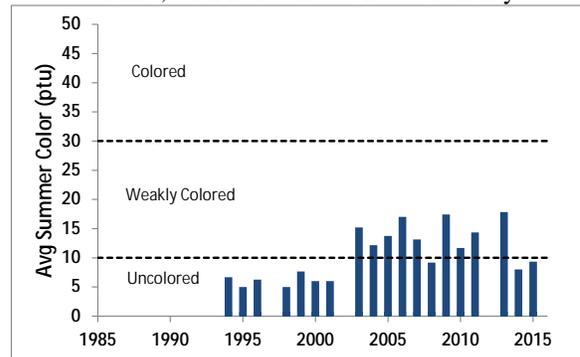
Long Term Trends: Nitrogen

- No trends apparent
- Generally low NOx, ammonia, and total nitrogen readings



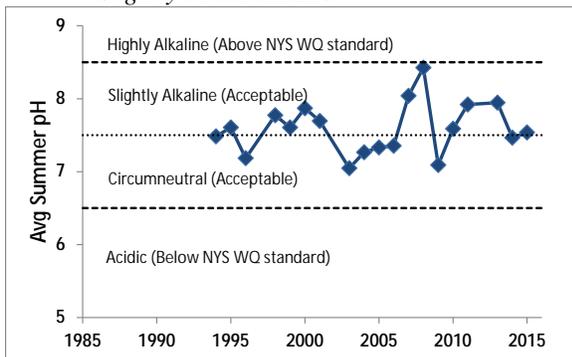
Long Term Trends: Color

- Increase after 2002 due to lab change?
- Most readings typical of *weakly colored* lakes, with little effect on water clarity



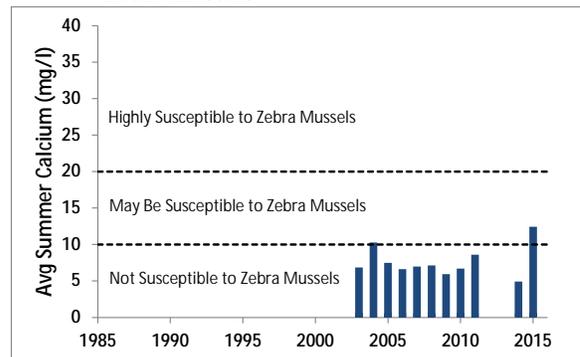
Long Term Trends: pH

- Highly variable since mid-1990s
- Most readings typical of *circumneutral* to *slightly alkaline* lakes



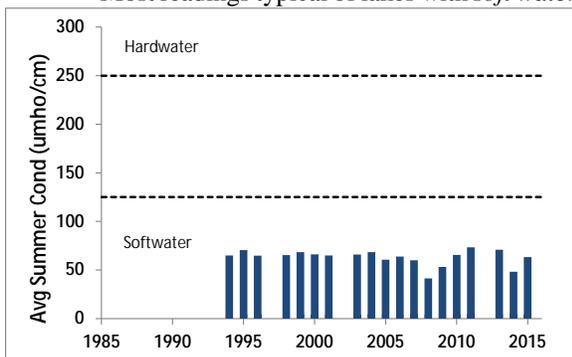
Long Term Trends: Calcium

- No trends apparent; slightly higher in 2015
- Most readings indicate low susceptibility to zebra mussels



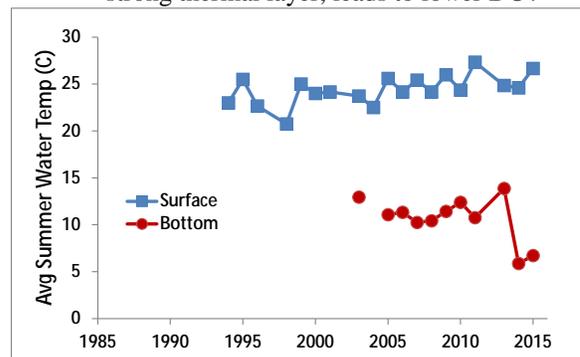
Long Term Trends: Conductivity

- No apparent trend; fairly stable long term average
- Most readings typical of lakes with *soft water*



Long Term Trends: Water Temperature

- Slight \uparrow in surface T; recent \downarrow bottom T
- Much lower bottom temperatures indicate strong thermal layer, leads to lower DO?



Appendix D: Algae Testing Results from SUNY ESF Study

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

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

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

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

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



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

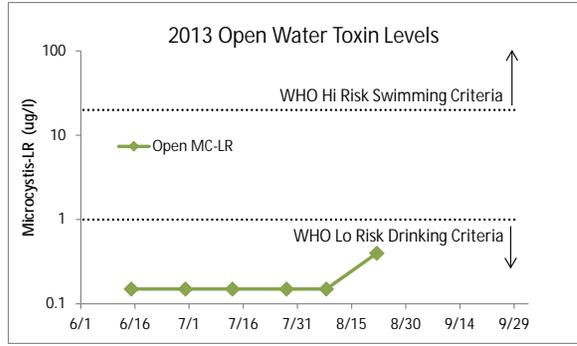


Figure D2:
2013 Open Water Microcystin-LR



Figure D3:
2013 Shoreline Total and BGA Chl.a

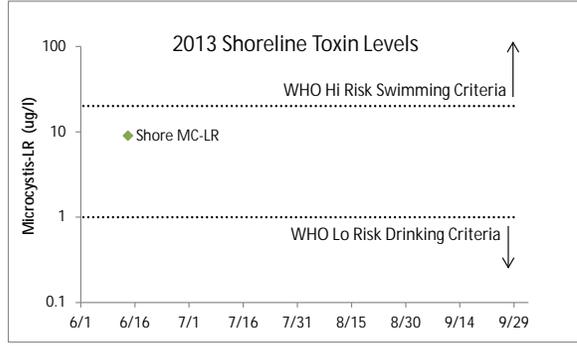


Figure D4:
2013 Shoreline Microcystin-LR

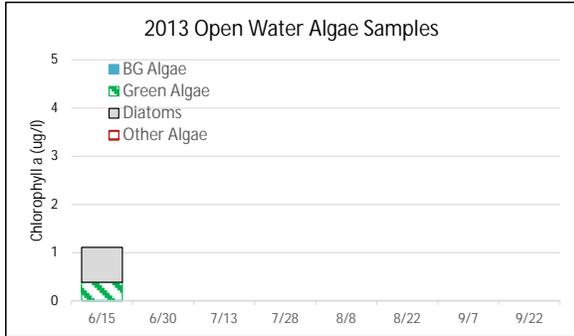


Figure D5:
2013 Open Water Algae Types

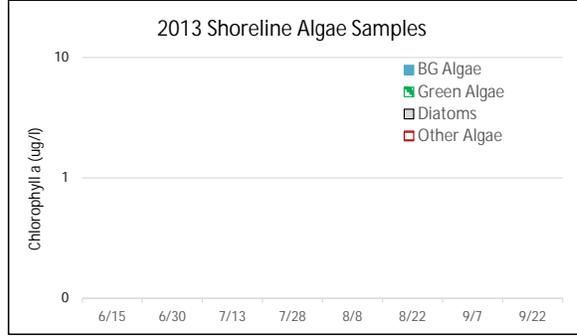


Figure D6:
2013 Shoreline Algae Types

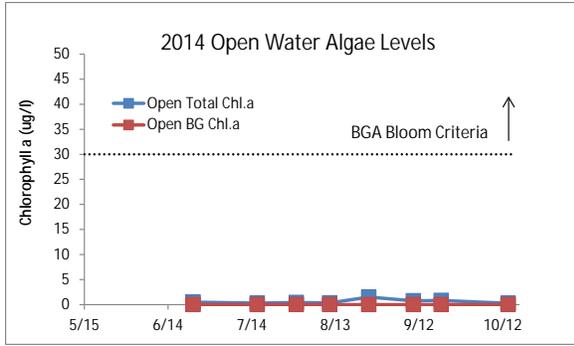


Figure D7:
2014 Open Water Total and BGA Chl.a

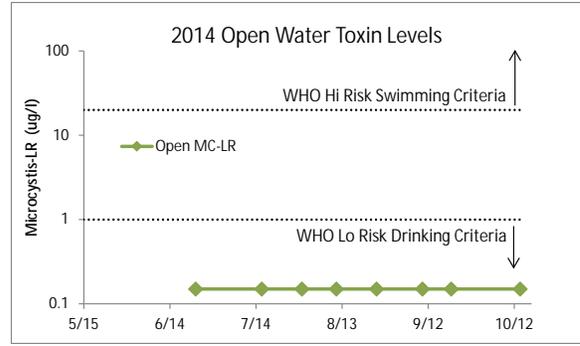


Figure D8:
2014 Open Water Microcystin-LR



Figure D9:
2014 Shoreline Total and BGA Chl.a

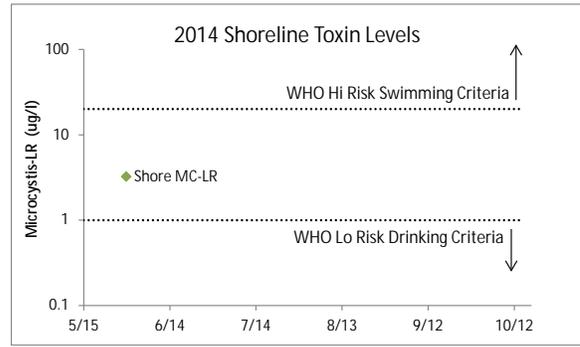


Figure D10:
2014 Shoreline Microcystin-LR

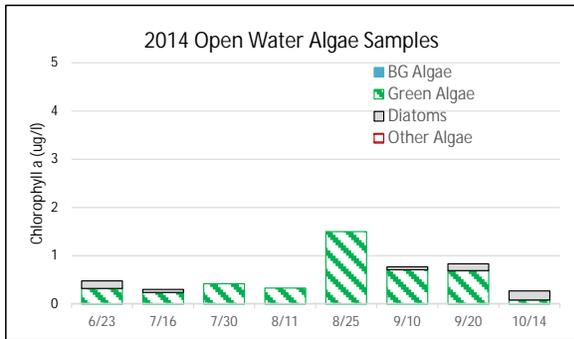


Figure D11:
2014 Open Water Algae Types

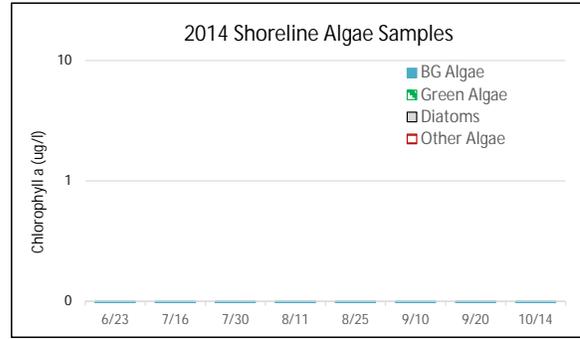


Figure D12:
2014 Shoreline Algae Types

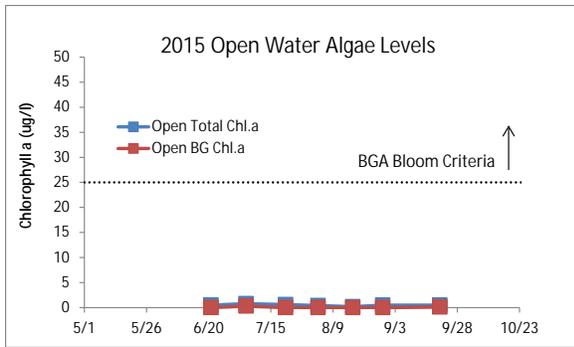


Figure D13:
2015 Open Water Total and BGA Chl.a

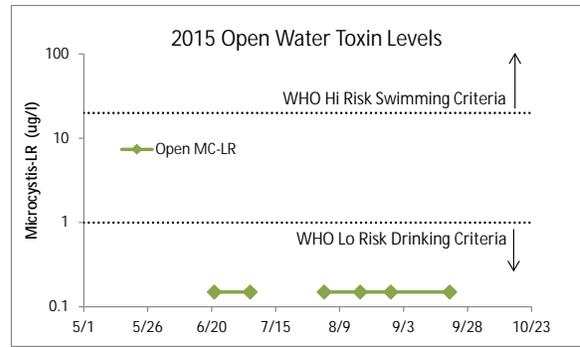


Figure D14:
2015 Open Water Microcystin-LR

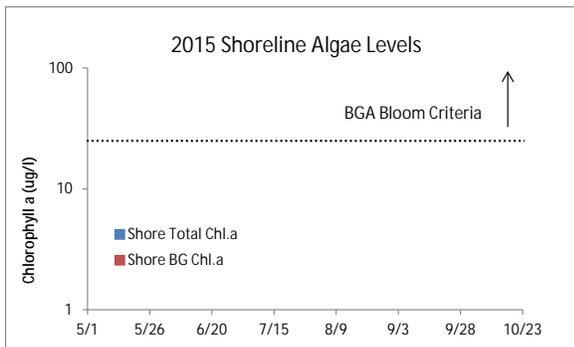


Figure D15:
2015 Shoreline Total and BGA Chl.a

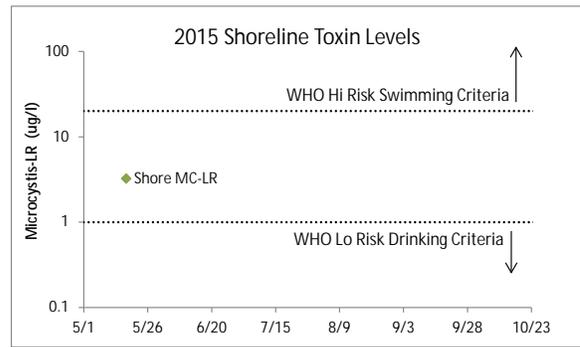


Figure D16:
2015 Shoreline Microcystin-LR

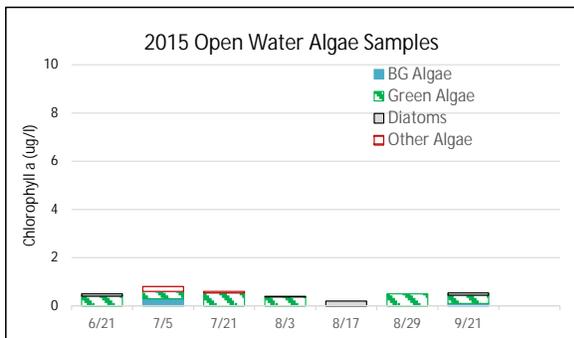


Figure D17:
2015 Open Water Algae Types

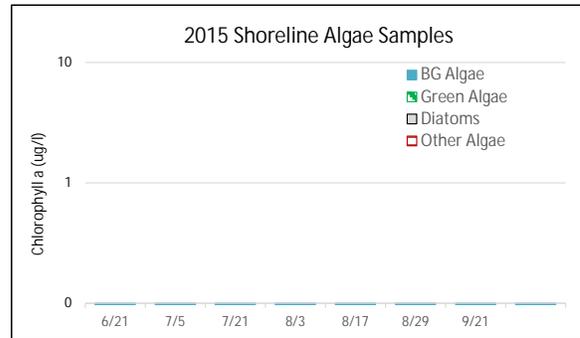


Figure D18:
2015 Shoreline Algae Types

Appendix E: AIS Species in 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).

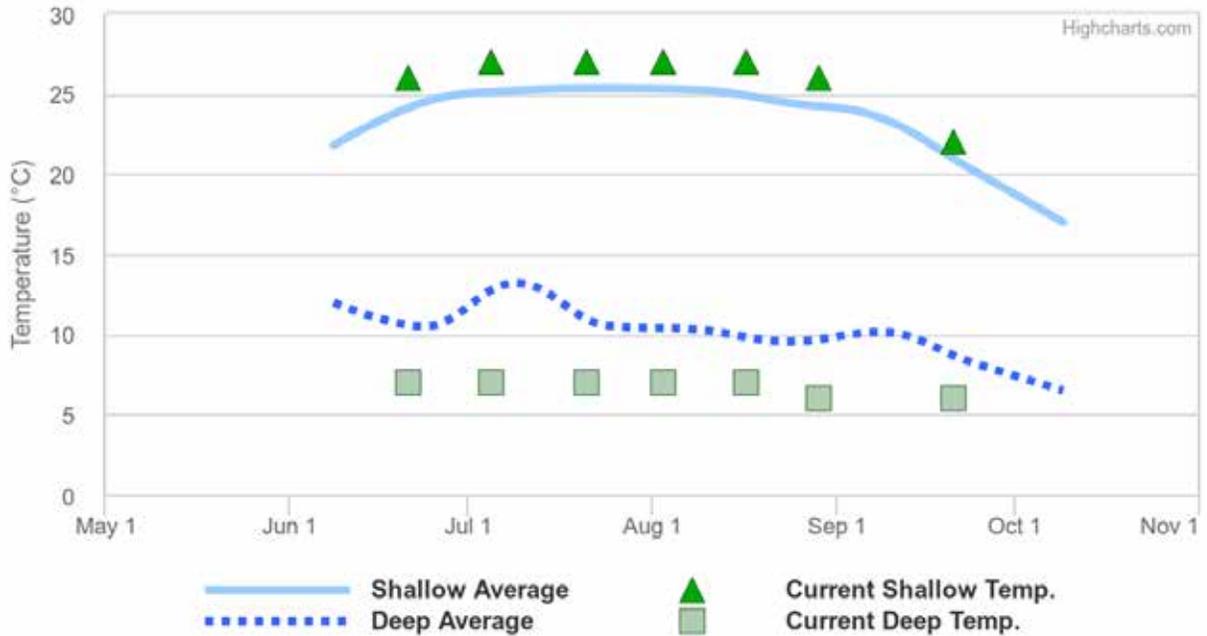
This list is not complete, but instead represents only those species that have been reported and verified within the county. If any additional aquatic invasive species (AIS) are known or suspected in these or other waterbodies in the county, this information should be reported through iMap invasives 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	<i>Myriophyllum heterophyllum</i>
Canopus Lake	Plant	Eurasian watermilfoil	<i>Myriophyllum spicatum</i>
Canopus Lake	Plant	Curly leafed pondweed	<i>Potamogeton crispus</i>
Croton Falls Reservoir	Plant	Eurasian watermilfoil	<i>Myriophyllum spicatum</i>
Duck Pond	Plant	Eurasian watermilfoil	<i>Myriophyllum spicatum</i>
Hudson River	Plant	Water chestnut	<i>Trapa natans</i>
Ice Pond	Plant	Brittle naiad	<i>Najas minor</i>
Kirk Lake	Plant	Eurasian watermilfoil	<i>Myriophyllum spicatum</i>
Lake Carmel	Plant	Eurasian watermilfoil	<i>Myriophyllum spicatum</i>
Lake Celeste	Plant	Curly leafed pondweed	<i>Potamogeton crispus</i>
Lake Mahopac	Animal	Zebra mussel	<i>Dreissena polymorpha</i>
Lake Mahopac	Plant	Eurasian watermilfoil	<i>Myriophyllum spicatum</i>
Lake Nimham	Plant	Brittle naiad	<i>Najas minor</i>
Lake Peekskill	Plant	Curly leafed pondweed	<i>Potamogeton crispus</i>
Lake Tibet	Plant	Eurasian watermilfoil	<i>Myriophyllum spicatum</i>
Lake Valhalla	Plant	Curly leafed pondweed	<i>Potamogeton crispus</i>
Loretta Lake	Plant	Eurasian watermilfoil	<i>Myriophyllum spicatum</i>
Lost Lake	Plant	Curly leafed pondweed	<i>Potamogeton crispus</i>
Oscawana Lake	Plant	Eurasian watermilfoil	<i>Myriophyllum spicatum</i>
Oscawana Lake	Plant	Water chestnut	<i>Trapa natans</i>
Palmer Lake	Plant	Eurasian watermilfoil	<i>Myriophyllum spicatum</i>
Palmer Lake	Plant	Brittle naiad	<i>Najas minor</i>
Peach Lake	Plant	Eurasian watermilfoil	<i>Myriophyllum spicatum</i>
Pelton Pond	Plant	Variable watermilfoil	<i>Myriophyllum heterophyllum</i>

Waterbody	Kingdom	Common name	Scientific name
Putnam Lake	Plant	Curly leafed pondweed	<i>Potamogeton crispus</i>
Putnam Lake	Plant	Water chestnut	<i>Trapa natans</i>
Roaring Brook Lake	Plant	Fanwort	<i>Cabomba caroliniana</i>
Roaring Brook Lake	Plant	Eurasian watermilfoil	<i>Myriophyllum spicatum</i>
Roaring Brook Lake	Plant	Curly leafed pondweed	<i>Potamogeton crispus</i>
Seven Hills Lake	Plant	Eurasian watermilfoil	<i>Myriophyllum spicatum</i>
Seven Hills Lake	Plant	Curly leafed pondweed	<i>Potamogeton crispus</i>
White Lake	Plant	Eurasian watermilfoil	<i>Myriophyllum spicatum</i>
White Lake	Plant	Curly leafed pondweed	<i>Potamogeton crispus</i>
White Pond	Plant	Eurasian watermilfoil	<i>Myriophyllum spicatum</i>
White Pond	Plant	Curly leafed pondweed	<i>Potamogeton crispus</i>
Wonder Lake	Plant	Water chestnut	<i>Trapa natans</i>

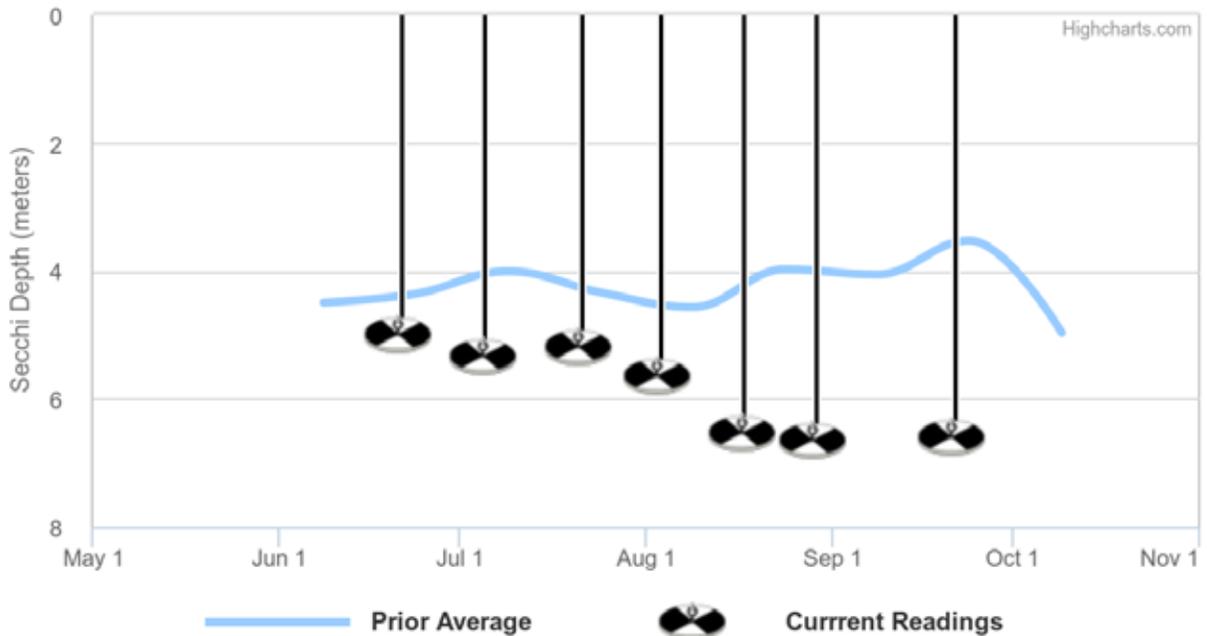
Appendix F: Current Year vs. Prior Averages for Indian Lake

Current Year Water Temperatures vs. Prior Average



This year's shallow water sample temperatures are tending to be higher than normal when compared to the average of readings collected from 1994 to 2014. This year's deep water sample temperatures are tending to be lower than normal when compared to the average of readings collected from 2005 to 2014.

Current Year Secchi Readings vs. Prior Average



This year's session Secchi readings are tending to be higher than normal when compared to the average of readings collected from 1994 to 2014

Appendix G: Watershed and Land Use Map for Indian 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.

