Barrett Pond Questions and Answers, 2015 CSLAP

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

A1. Lake conditions in 2015 were close to normal in Barrett Pond- high water clarity, low nutrient and algae levels, and favorable water quality and recreational assessments. No invasive species have been found in the lake, and no harmful algal blooms were reported in 2015.

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

A2. The 2015 sampling did not find any problems that warrant additional investigation. Chloride levels in the lake were indicative of only minor impacts from road salt runoff.

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

A3. Barrett Pond continues to have more favorable water quality conditions than other nearby lakes- higher clarity and fewer problems with invasive weeds. This is likely due to deeper water and perhaps less lake usage.

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

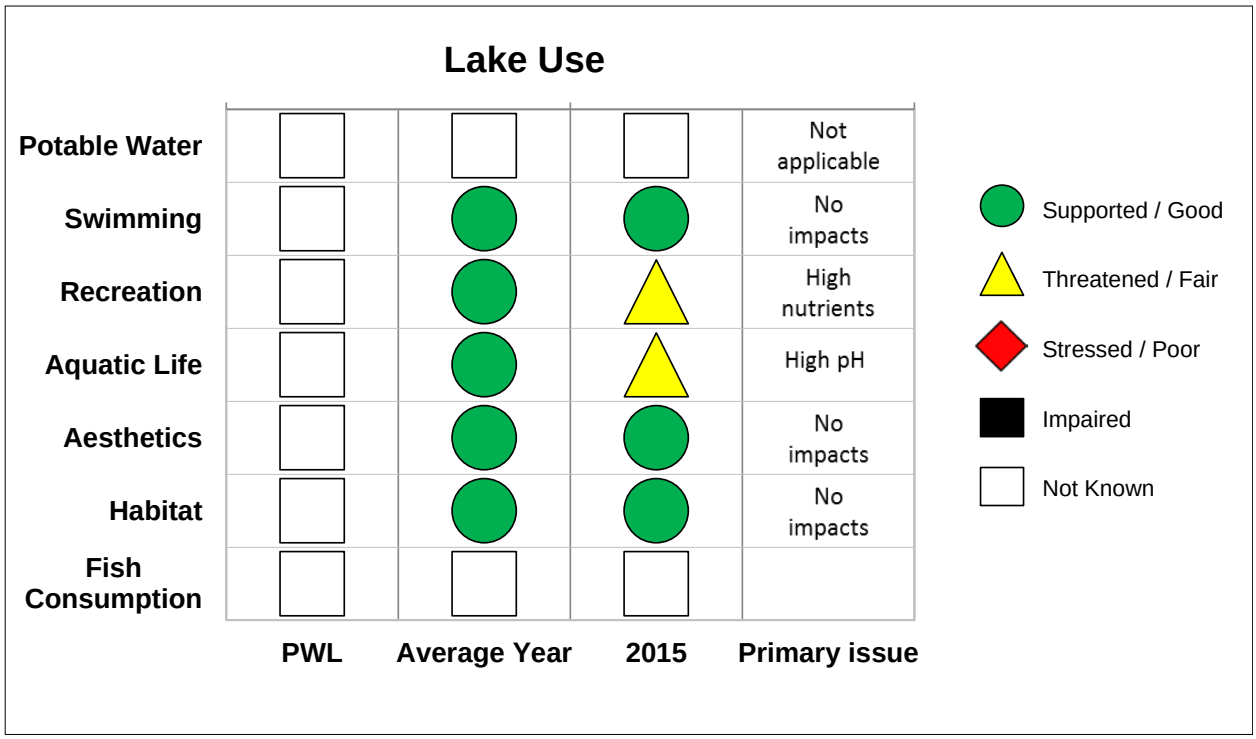
A4. Most of the lake's parameters were with the range of expected year to year variability. Water clarity has increased over the last five years, while calcium has decreased. Small changes in ammonia, NOx, N:P ratios, deepwater TP, and lake perception have not been statistically significant.

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

A5. There is no indication of any water quality or use problems, although some measures of water quality (such as bacteria levels) are not measured through CSLAP. Nutrient levels are low enough to indicate a low susceptibility to algae blooms, and the lack of invasive weeds limits impacts from excessive weeds.

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

A6. Any on-going activities that have kept nutrient levels low should continue to be used by lake residents. 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 will help to maintain good water quality. Lake residents should continue to keep outside boats from entering the lake to reduce the risk of new invasive species, since nearby lakes harbor invasives.



CSLAP 2015 Lake Water Quality Summary:
Barrett Pond

General Lake Information

Location	Town of Kent
County	Putnam
Basin	Lower Hudson River
Size	29.2 hectares (72.2 acres)
Lake Origins	Natural
Watershed Area	170.0 hectares (420.2 acres)
Retention Time	1.7 years
Mean Depth	4.9 meters
Sounding Depth	11.4 meters
Public Access?	None?
Major Tributaries	None; Minor Tribs to West Branch Reservoir
Lake Tributary To…	Minor Tribs to West Branch Reservoir to West Branch Croton R, Middle, and tribs
WQ Classification	B
Lake Outlet Latitude	41.435042
Lake Outlet Longitude	-73.734831
Sampling Years	2011-2015
2015 Samplers	Dora Keller
Main Contact	David Africk

Lake Map

Background

Barrett Pond is a 72 acre Class B pond in the town of Kent, Putnam County. Barrett Pond has been sampled through the Citizens Statewide Lake Assessment Program (CSLAP) since 2011.

It is one of 15 CSLAP lakes among the more than 265 lakes found in Putnam County, and one of 67 CSLAP lakes among the nearly 3700 lakes and ponds in the Lower Hudson River drainage basin

Lake Uses

Barrett Pond is a Class B pond, meaning the best intended uses are contact recreation – swimming and bathing, and non contact recreation – boating and fishing, aquatic life, and aesthetics. There is no public access to the pond. Barrett Pond is connected to the West Branch Reservoir via a ½ mile tributary.

With help from county Federated Sportsmen, the West Branch Reservoir was stocked between January 1 – December 31, 2010, with over 5,000 brown trout and approximately 1,500 landlocked salmon and over 4,000 brown trout in April, 2011. Other fish in the lake include pickerel, largemouth bass, bullhead, pumpkinseed and perch.

All New York State fishing regulations are applicable at Barrett Pond; no lake- or county-specific regulations have been developed.

There are no lake-specific fish consumption advisories on Barrett Pond.

Historical Water Quality Data

CSLAP sampling was conducted on Barrett Pond for the first time in 2011. The most recent CSLAP report for Barrett Pond will be found on the NYSFOLA website at http://nysfola.mylaketown.com and on the NYSDEC web page at http://www.dec.ny.gov/lands/77821.html.

Lake Association and Management History

The China Barrett Association, founded in 1990, is the current association for the lake. Additional information about use and access to China Pond can be found at www.thesedgewoodclub.com.

Summary of 2015 CSLAP Sampling Results

Evaluation of 2015 Annual Results Relative to 2011-2014

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 – Barrett Pond” section in Appendix C.

Evaluation of Eutrophication Indicators

Secchi disk transparency were slightly higher than normal in 2015, consistent with increasing water clarity readings over the last several years. However, algae levels (measured by

chlorophyll *a*) were also slightly higher than usual, and phosphorus readings were close to normal in 2015, and neither of these indicators has exhibited any change since 2012.

Algae levels did not exhibit any clear seasonal changes in 2015, although they usually are highest in late summer and fall. This is coincident with higher fall nutrient levels, although these readings typically decrease during the summer (as in 2015). Water clarity readings usually decrease slightly during the summer, although water clarity rose slightly into the fall in 2015.

Secchi disk transparency, chlorophyll *a* levels, and total phosphorus readings in each CSLAP sampling season were typical of *mesotrophic*, or moderately productive lakes, and these readings were mostly similar in all five years of CSLAP sampling. The trophic state index (TSI) evaluation suggests that each of these trophic indicators is "internally consistent"—that is, each indicator could be predicted by looking at the other indicators. Water clarity readings are slightly higher than expected given the nutrient and algae levels in the lake- this may suggest that clarity is not highly susceptible to small changes in algae levels. Overall trophic conditions are summarized in the Lake Scorecard and Lake Condition Summary Table.

Evaluation of Potable Water Indicators

Algae levels are probably not 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, and deepwater ammonia levels are low, indicating that deepwater intakes might not exhibit any problems. Phosphorus levels in the bottom water are slightly higher than those measured at the lake surface, and were slightly higher than usual in 2015. However, the lake is not classified for potable water use. 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 levels have decreased slightly over the last few years, and these readings have been consistently too low to sustain zebra mussel colonization. These exotic animals have not been reported in the lake. Ammonia readings have increased slightly and NOx readings have decreased slightly in recent years. Conductivity and TN readings were slightly higher than usual in 2015. None of the other limnological indicators have exhibited any clear changes over the last five years. Overall limnological conditions are summarized in the Lake Scorecard and Lake Condition Summary Table.

Chloride levels in the 2015 samples, conducted for the first time through CSLAP and cited in Appendix A, ranged from 8 to 9 mg/l. These values fall within the "minor 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 lower than the range of values found in most NYS lakes, including those in the Finger Lakes region. These readings are also typical of lakes with only limited road salting. Additional data will help to determine if these represent normal readings for the lake.

Evaluation of Biological Condition

Phytoplankton, zooplankton, macrophyte, and macroinvertebrate data have not been collected through CSLAP at Barrett Pond. The fluoroprobe screening conducted through CSLAP from 2012 to 2015 indicate either very low algae levels or a low percentage of blue green algae. The 2015 results indicate that the algae community is dominated by green algae, particularly in mid-

summer, although as in previous years, overall algae levels are low and continue to be typical of moderately productive lakes.

Evaluation of Lake Perception

Water quality assessments indicated that the lake most frequently exhibited “not quite crystal clear water”, consistent with the measured water quality conditions. Aquatic plants grow to the lake surface at times during the summer, although it is not known if exotic or invasive plants are found in the lake. Recreational assessments were highly favorable, consistent with the lack of observable problems with excessive weed growth, and consistent with the observable water quality conditions. Recreational assessments have improved slightly over the last several years, coincident with a slight decrease in aquatic plant coverage. However, the 2015 perception results were similar to those reported from 2011-2014. Overall lake perception is summarized in the Lake Scorecard and Lake Condition Summary Table.

Evaluation of Local Climate Change

It is not yet known if local climate change can be evaluated through CSLAP temperature readings- no clear temperature trends have been apparent over the last five years.

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. However, phycocyanin readings have been consistently below the levels indicating susceptibility for harmful algal blooms (HABs), and fluoroprobe chlorophyll data indicate a low susceptibility to harmful algae blooms. Algae samples from the open water and (very few instances of) shoreline blooms show microcystin levels below the levels needed to support safe swimming, consistent with the 2013-2015 findings that the algae community is comprised primarily of green algae, not blue green algae.

Lake Condition Summary

Category	Indicator	Min	11-15 Avg	Max	2015 Avg	Classification	2015 Change?	Long-term Change?
Eutrophication Indicators	Water Clarity	2.60	4.27	5.45	4.56	Mesotrophic	Within Normal Range	Increasing Slightly
	Chlorophyll *a*	0.30	3.96	16.90	4.26	Mesotrophic	Within Normal Range	No Change
	Total Phosphorus	0.006	0.015	0.029	0.015	Mesotrophic	Within Normal Range	No Change
Potable Water Indicators	Hypolimnetic Ammonia	0.01	0.04	0.38	0.04	Close to Surface NH4 Readings	Within Normal Range	Not known
	Hypolimnetic Arsenic							Not known
	Hypolimnetic Iron							Not known
	Hypolimnetic Manganese							Not known
Limnological Indicators	Hypolimnetic Phosphorus	0.013	0.045	0.151	0.065	Close to Surface TP Readings	Higher than Normal	Not known
	Nitrate + Nitrite	0.00	0.01	0.04	0.01	Low NOx	Within Normal Range	No Change
	Ammonia	0.01	0.03	0.09	0.03	Low Ammonia	Within Normal Range	No Change
	Total Nitrogen	0.12	0.39	0.64	0.43	Low Total Nitrogen	Higher than Normal	No Change
	pH	6.75	7.81	9.21	7.87	Alkaline	Within Normal Range	No Change
	Specific Conductance	57	136	222	154	Intermediate Hardness	Higher than Normal	No Change
	True Color	2	10	16	9	Intermediate Color	Within Normal Range	No Change
	Calcium	3.0	9.4	20.3	9.1	Not Susceptible to Zebra Mussels	Within Normal Range	Decreasing Slightly
Lake Perception	WQ Assessment	1	1.8	2	1.8	Not Quite Crystal Clear	Within Normal Range	No Change
	Aquatic Plant Coverage	1	2.4	3	2.1	Subsurface Plant Growth	More Favorable Than Normal	No Change
	Recreational Assessment	1	1.8	3	1.8	Excellent	Within Normal Range	No Change
Biological Condition	Phytoplankton					Open water-low blue green algae biomass	Not known	Not known
	Macrophytes					Excellent 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					Coldwater fishery?	Not known	Not known
	Invasive Species					None observed	Not known	Not known
Local Climate Change	Air Temperature	17	24.3	30	24.8		Within Normal Range	No Change
	Water Temperature	20	24.9	29	26.4		Higher Than Normal	No Change
Harmful Algal Blooms	Open Water Phycocyanin	-1	3	10	2	No readings indicate high risk of BGA	Not known	Not known
	Open Water FP Chl.a	0	2	9	1	No readings indicate high algae levels	Not known	Not known
	Open Water FP BG Chl.a	0	0	1	0	No readings indicate high BGA levels	Not known	Not known
	Open Water Microcystis	<DL	0.2	1.7	<DL	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
	Screening FP Chl.a					No shoreline blooms sampled for FP	Not known	Not known
	Screening FP BG Chl.a					No shoreline blooms sampled for FP	Not known	Not known
	Shoreline Microcystis	<DL	1.6	1.6		At times measurable shoreline bloom MC-LR	Not known	Not known
	Shoreline Anatoxin a	<DL	<DL	<DL		Shoreline bloom Anatoxin-a consistently not detectable	Not known	Not known

Evaluation of Lake Condition Impacts to Lake Uses

Barrett Pond is listed on the 2008 Lower Hudson River basin Priority Waterbody List (PWL) as "unassessed".

Potable Water (Drinking Water)

The CSLAP dataset at Barrett Pond, including water chemistry data, physical measurements, and volunteer samplers' perception data, is inadequate to evaluate the use of the lake for potable water, and the lake is not used for this purpose. The limited CSLAP indicators suggest that any "unofficial" potable water use of the lake might be supported.

Public Bathing

The CSLAP dataset at Barrett Pond, including water chemistry data, physical measurements, and volunteer samplers' perception data, suggests that swimming and contact recreation should be fully supported.

Recreation (Swimming and Non-Contact Uses)

The CSLAP dataset on Barrett Pond, including water chemistry data, physical measurements, and volunteer samplers' perception data, suggest that contact and non-contact recreation should be fully supported, although this use may at times be *threatened* by excessive nutrients.

Aquatic Life

The CSLAP dataset on Barrett Pond, including water chemistry data, physical measurements, and volunteer samplers' perception data, suggest that aquatic life should be fully supported, although this use may at times be *threatened* by elevated pH. Actual aquatic life impacts have not been reported or measured in the lake. Additional data are needed to evaluate the food and habitat conditions for aquatic organisms in the lake.

Aesthetics and Habitat

The CSLAP dataset on Barrett Pond, including water chemistry data, physical measurements, and volunteer samplers' perception data, suggest that aesthetics and habitat should be fully supported.

Fish Consumption

There are no fish consumption advisories posted for Barrett Pond.

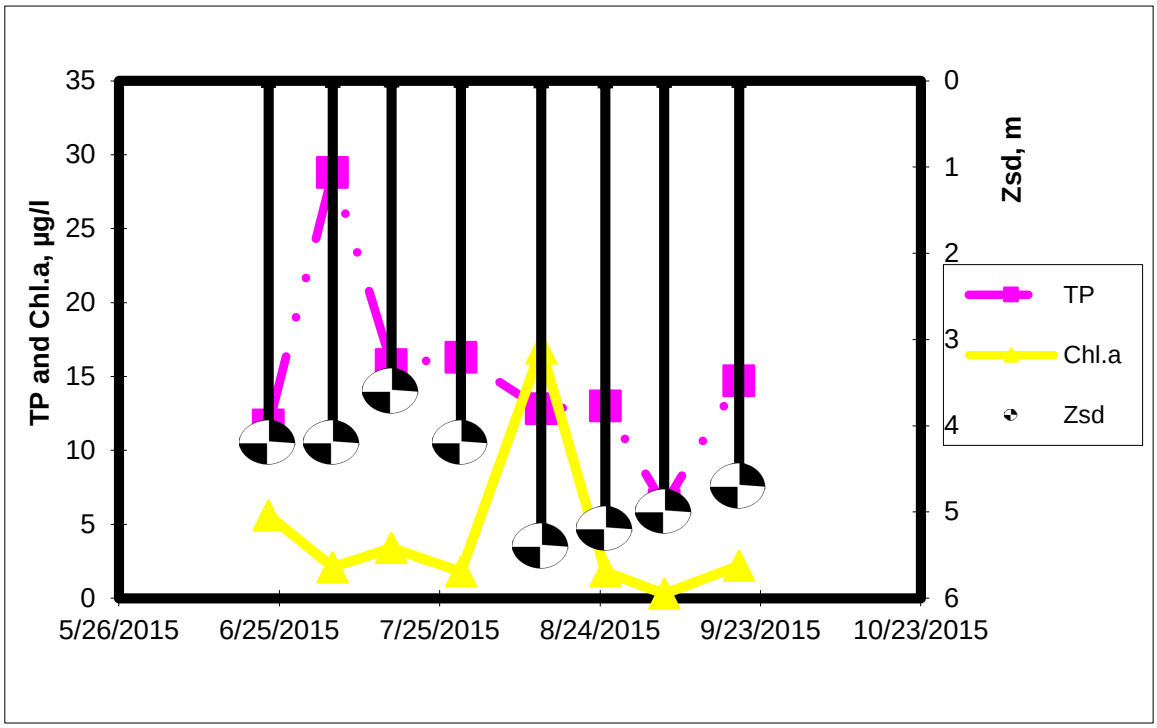
Additional Comments and Recommendations

Barrett Pond continues to exhibit favorable water quality and overall lake condition, due to low nutrient levels and the lack of invasive plants. Any nutrient control measures instituted by lake community members- septic management, reduction of shoreline erosion, minimal fertilization, etc.- should continue to be conducted to maintain favorable lake conditions.

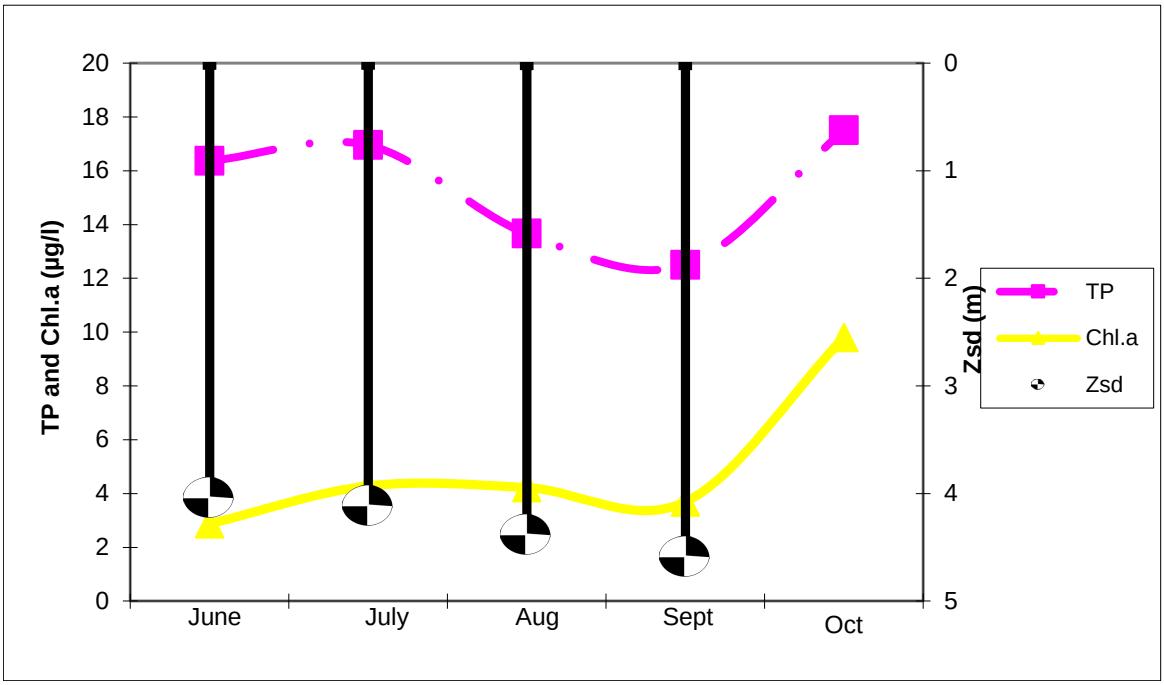
Aquatic Plant IDs-2015

No aquatic plants submitted for identification

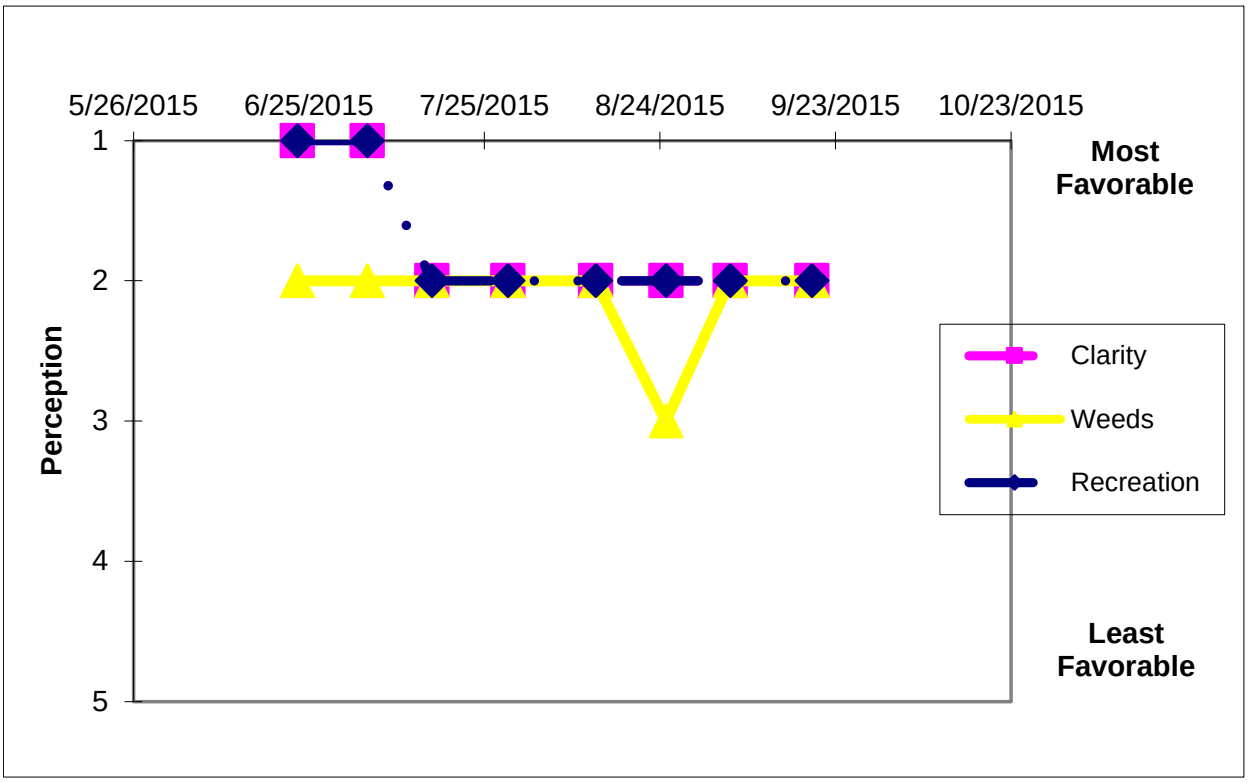
Time Series: Trophic Indicators, 2015



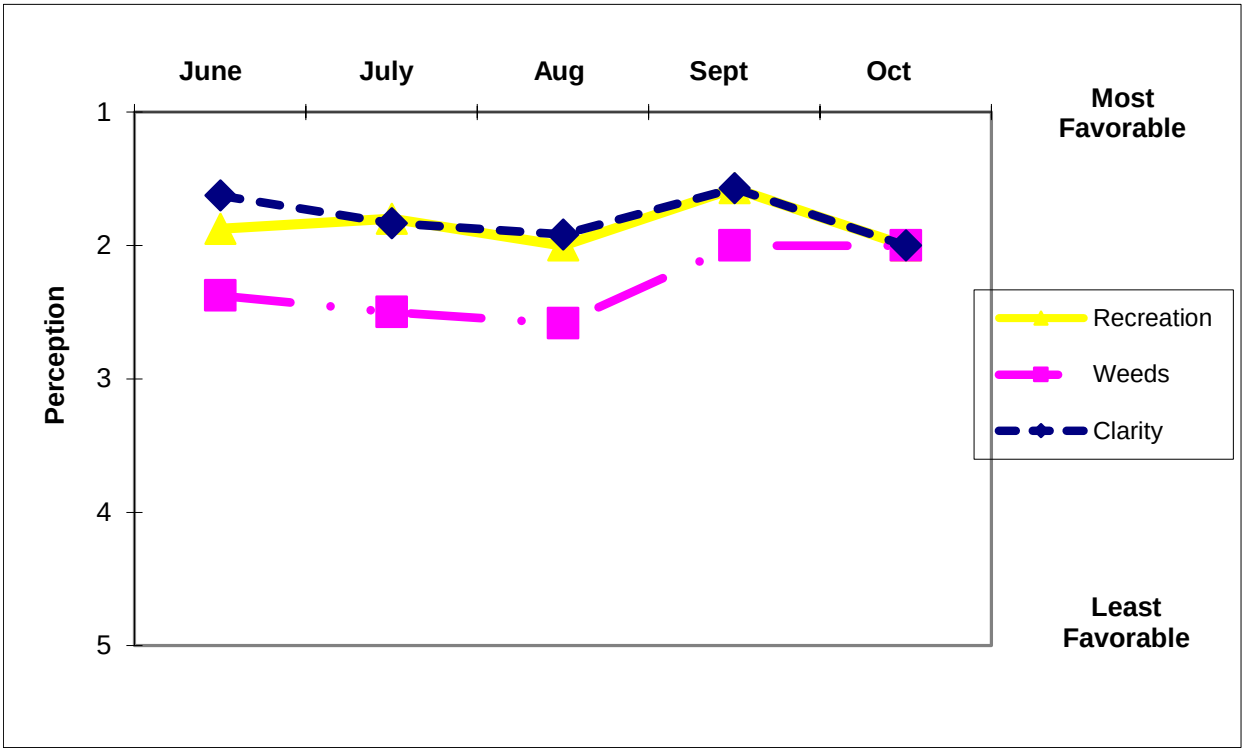
Time Series: Trophic Indicators, Typical Year (2011-2015)



Time Series: Lake Perception Indicators, 2015



Time Series: Lake Perception Indicators, Typical Year (2011-2015)



Appendix A- CSLAP Water Quality Sampling Results for Barrett Pond

LNum	PName	Date	Zbot	Zsd	Zsamp	Tot.P	NO3	NH4	TDN	TN/TP	TColor	pH	Cond25	Ca	Chl.a	Cl
229	Barrett Pond	6/15/2011	10.9	3.30	1.5	0.013	0.01	0.03	0.30	51.7	14	7.69	151	8.3	1.90	
229	Barrett Pond	6/29/2011	10.7	3.00		0.014	0.01	0.02	0.29	46.6	13	8.35	143		1.40	
229	Barrett Pond	7/10/2011	10.7	3.20	1.5	0.013	0.01	0.01	0.51	85.8	12	7.06	117		2.10	
229	Barrett Pond	7/26/2011	10.2	3.85	1.5	0.013	0.04	0.03	0.45	74.3	11	8.35	156		6.70	
229	Barrett Pond	8/8/2011	10.7	3.65	1.5	0.022	0.01	0.02	0.37	37.4	8	7.84	167	20.3	3.40	
229	Barrett Pond	8/22/2011		4.93		0.009	0.01	0.01	0.39	99.5	14	7.75	143			
229	Barrett Pond	9/13/2011	11.4	3.30	1.5	0.012	0.01	0.02	0.12	21.3	15	8.18	140		5.00	
229	Barrett Pond	10/2/2011				0.018	0.01	0.03	0.34	42.2	13	6.75	141		9.80	
229	Barrett Pond	6/16/2012	13.8	3.65	1.5	0.026	0.03	0.04	0.62	53.1	9	7.75	127	9.4	2.60	
229	Barrett Pond	7/1/2012	13.0	4.55	1.5	0.018	0.01	0.01	0.30	36.9	9	8.82	57		13.30	
229	Barrett Pond	7/13/2012	11.0	4.40	1.5	0.019	0.01	0.03	0.29	33.3	11	7.64	140		2.40	
229	Barrett Pond	7/28/2012	9.6	4.05	1.5	0.016	0.01	0.02	0.49	67.1	7	7.50	135		2.70	
229	Barrett Pond	8/11/2012	10.2	3.50	1.5	0.015	0.01	0.02	0.40	59.9	10	7.09	137	6.7	5.30	
229	Barrett Pond	8/24/2012	10.0	4.15	1.5	0.013	0.01	0.02	0.33	55.3	16	7.59	134		0.70	
229	Barrett Pond	9/8/2012	11.0	4.30	1.5	0.017	0.01	0.03	0.37	47.3	13	8.41	107		3.50	
229	Barrett Pond	9/23/2012	12.0	4.83	1.5	0.014	0.01	0.02	0.64	103.3	12	7.50	115		5.90	
229	Barrett Pond	6/6/2013	10.0	4.58	1.5	0.017	0.03	0.03	0.55	70.2		7.55	59		1.30	
229	Barrett Pond	6/27/2013		3.85	1.5	0.014			0.31	48.5	11	8.16	134		4.00	
229	Barrett Pond	7/10/2013		4.85	1.5	0.015	0.01	0.02	0.27	39.4	13	7.84	113		3.60	
229	Barrett Pond	7/24/2013		3.80	1.5	0.016			0.40	56.8	8	8.31	137			
229	Barrett Pond	8/6/2013	11.0	2.60	1.5	0.015	0.01	0.09	0.34	50.3	6	8.51	132			
229	Barrett Pond	8/18/2013	11.0	4.55	1.5	0.016					11	8.02	121		1.10	
229	Barrett Pond	8/31/2013	11.2	4.65	1.5	0.010	0.01	0.01	0.38	84.7	11	8.23	136		1.90	
229	Barrett Pond	9/11/2013	11.2	4.55	1.5	0.009			0.39	91.4	9	7.79	131		3.40	
229	Barrett Pond	6/1/2014	11.0	4.80	1.5	0.021	0.02	0.03	0.46	49.7	16	7.18	158	2.95	3.80	
229	Barrett Pond	6/19/2014	12.5	4.95	1.5	0.015			0.36	52.2	6	7.13	147		2.40	
229	Barrett Pond	7/6/2014	11.5	4.25	1.5	0.017	0.01	0.02	0.38	49.5	8	7.26	133		4.70	
229	Barrett Pond	7/21/2014	11.5	4.45	1.5	0.017			0.35	46.4	6	7.23	139		2.90	
229	Barrett Pond	8/5/2014	12.0	4.40	1.5	0.011	0.01	0.02			2	8.64	146	9.25	4.20	
229	Barrett Pond	8/16/2014	11.5	4.25	1.5	0.018			0.49	61.0	7	7.70	145		4.20	
229	Barrett Pond	8/29/2014	9.5	5.40	1.5	0.011	0.01	0.04	0.25	50.1	7	7.88	123		2.70	
229	Barrett Pond	9/13/2014		5.45	1.5	0.014			0.41	64.3	12	7.61	152		5.50	
229	Barrett Pond	6/23/2015	13.6	4.20	1.5	0.012	0.00	0.03	0.40	33.8	8	7.72	161	8.85	5.60	
229	Barrett Pond	7/5/2015	10.9	4.20	1.5	0.029			0.58	20.1	12	7.38	128		2.10	
229	Barrett Pond	7/16/2015	10.5	3.60	1.5	0.016	0.01	0.03	0.48	30.4	11	7.35	158		3.40	32.6
229	Barrett Pond	7/29/2015	13.6	4.20	1.5	0.016			0.42	25.5	12	7.83	167		1.80	
229	Barrett Pond	8/13/2015	10.0	5.40	1.5	0.013	0.01	0.04			10	8.40	222	9.26	16.90	
229	Barrett Pond	8/25/2015	10.2	5.20	1.5	0.013			0.43	33.3	7	7.57	77		1.80	
229	Barrett Pond	9/5/2015	9.5	5.00	1.5	0.006	0.01	0.03	0.35	54.9	8	9.21	157		0.30	31.1
229	Barrett Pond	6/29/2011	10.7		10.7	0.023		0.02								
229	Barrett Pond	7/10/2011	10.7		10.0	0.020		0.01								
229	Barrett Pond	7/26/2011	10.2		10.0	0.028		0.02								
229	Barrett Pond	8/8/2011	10.7		9.5	0.037		0.04								
229	Barrett Pond	8/22/2011			11.0	0.037		0.03								
229	Barrett Pond	9/13/2011	11.4		10.0	0.025		0.02								
229	Barrett Pond	10/2/2011				0.026		0.08								
229	Barrett Pond	6/16/2012			12.0	0.068		0.03								
229	Barrett Pond	7/1/2012			12.0	0.075		0.01								
229	Barrett Pond	7/13/2012			10.0	0.035		0.03								
229	Barrett Pond	8/11/2012			8.0											
229	Barrett Pond	8/24/2012			10.0											
229	Barrett Pond	9/9/2012			10.0	0.043		0.06								
229	Barrett Pond	6/6/2013			9.5	0.022		0.02								
229	Barrett Pond	6/27/2013			10.0	0.032										
229	Barrett Pond	7/10/2013			9.0	0.033		0.02								
229	Barrett Pond	7/24/2013			10.0	0.031										
229	Barrett Pond	8/6/2013			10.0	0.026		0.02								
229	Barrett Pond	8/18/2013			9.5	0.028										
229	Barrett Pond	8/31/2013			10.0	0.144		0.24								
229	Barrett Pond	9/11/2013			10.2	0.019										
229	Barrett Pond	6/1/2014			9.0	0.028		0.03								
229	Barrett Pond	6/19/2014			11.0	0.063										
229	Barrett Pond	7/6/2014			8.0	0.080		0.06								
229	Barrett Pond	7/21/2014			9.9	0.063										

LNum	PName	Date	Zbot	Zsd	Zsamp	Tot.P	NO3	NH4	TDN	TN/TP	TColor	pH	Cond25	Ca	Chl.a	Cl
229	Barrett Pond	8/5/2014			8.5	0.023		0.03								
229	Barrett Pond	8/16/2014			10.5	0.025										
229	Barrett Pond	8/29/2014			9.5	0.017		0.03								
229	Barrett Pond	9/13/2014			8.0	0.018										
229	Barrett Pond	6/25/2015			7.0	0.030		0.04								
229	Barrett Pond	7/5/2015			9.7	0.139										
229	Barrett Pond	7/16/2015			10.0	0.151		0.38								
229	Barrett Pond	7/29/2015			10.5	0.029										
229	Barrett Pond	8/13/2015			9.0	0.032		0.03								
229	Barrett Pond	8/25/2015			8.5	0.013										
229	Barrett Pond	9/5/2015			7.5	0.023		0.03								
229	Barrett Pond	9/17/2015			8.0	0.101										

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	HABform	Shore HAB
229	Barrett Pond	6/15/2011	surf	24	20	1	2	2	0	0	0	7.00	3.10							
229	Barrett Pond	6/29/2011	surf	26	25	2	3	3	8	0	0	9.70	4.90							
229	Barrett Pond	7/10/2011	surf	27	26	2	3			4	0	6.20	1.70							
229	Barrett Pond	7/26/2011	surf	29	27	2	3		0	0	0	5.10	2.98	0.15	<0.5	<0.1				
229	Barrett Pond	7/26/2011	surf											1.34	<0.4	<0.1				
229	Barrett Pond	8/8/2011	surf	28	26	2	3	3	238	4	4	7.90	7.10							
229	Barrett Pond	8/22/2011	surf	27	26	1	2	1	0	0	0									
229	Barrett Pond	9/13/2011	surf	25	24	2	3	2	28	0	0	6.50	5.80							
229	Barrett Pond	10/2/2011	surf			2	2	2	0	0	0	7.30	2.90							
229	Barrett Pond	6/16/2012	surf	28	26	2	2	1	0	4	4	0.60	0.80	<0.30	<0.413		0.51	0.00	EI	
229	Barrett Pond	7/1/2012	surf	25	25	1	3	2	0	4	4	-0.5	0.30	0.35	<0.392		0.68	0.25	E	
229	Barrett Pond	7/13/2012	surf	30		2	2	2	0	0	0	1.10	0.40	<0.30	<0.423		2.04	0.48	E	
229	Barrett Pond	7/28/2012	surf	22	25	2	3	2	0	0	0	2.80	0.50	<0.30	<0.292		2.34	0.98	I	
229	Barrett Pond	8/11/2012	surf	26	27	2	3	2	2	0	0	4.40	0.50	<0.30	<0.537		2.80	1.19	I	
229	Barrett Pond	8/24/2012	surf	20	26	2	3	2	0	0	0	0.90	0.30	0.34	<0.725		1.99	1.26	I	
229	Barrett Pond	9/8/2012	surf	24	24	2	2	2	0	0	0	2.00	0.80	<0.30	<0.725		3.08	0.36	I	
229	Barrett Pond	9/23/2012	surf	17	20	1	1	1	0	0	0	2.60	0.80	<0.30	<3.299		2.59	0.00	I	
229	Barrett Pond	6/6/2013	surf	22	21	2	2	2	0	0	0	0.05	0.60	<0.30	<0.440		0.20	0.00		
229	Barrett Pond	6/27/2013	surf	22	25	2	3	2	0	0	0	1.50	1.20	<0.30	<0.650		1.60	0.00	I	I
229	Barrett Pond	7/10/2013	surf	24	28	2	2	2	0	0	0	2.60	1.50	<0.30	<0.370		1.50	0.20	I	I
229	Barrett Pond	7/24/2013	surf	21	22	2	2	2	0	6	4	2.90	5.70	<0.30	<0.400		5.30	0.00	E	I
229	Barrett Pond	8/6/2013	surf	24	25	2	1	2	1	0	0	3.80	7.20	1.72	<0.400		8.90	0.00	I	I
229	Barrett Pond	8/18/2013	surf	24	24	2	3	2	0	0	0	2.80	3.30	<0.30	<0.390		2.20	0.00	I	I
229	Barrett Pond	8/31/2013	surf	25	25	2	3	2	0	0	0	3.00	1.60	<0.30	<1.100		1.50	0.00	I	
229	Barrett Pond	9/11/2013	surf	27	26	1	2	1	0	0	0	3.00	1.90	<0.30	<19.130		1.70	0.00	I	
229	Barrett Pond	6/1/2014	surf	23	22	1	2	2	0	0	0	0.6	1.2	<0.53			1.0	0.0	I	I
229	Barrett Pond	6/19/2014	surf	22	25	2	3	2	0	0	0	1.0	0.2	<0.58	<0.440		0.5	0.0	I	I
229	Barrett Pond	7/6/2014	surf	26	25	2	3	1	0	0	0	2.1	0.6	<0.62	<0.030		2.1	0.0	I	I
229	Barrett Pond	7/21/2014	surf	26	26	2	3	2	0	0	0	0.7	0.3	<0.60			0.90	0.0	I	I
229	Barrett Pond	8/5/2014	surf	27	26	2	3	2	0	0	0	2.8	0.4	<0.60			1.40	0.0	I	I
229	Barrett Pond	8/16/2014	surf	19	24	2	3	2	0	0	0			<0.40			1.6	0.3	I	I
229	Barrett Pond	8/29/2014	surf	22	25	2	2	2	0	0	0	1.3	0.10	<0.60			0.70	0.0	I	I
229	Barrett Pond	9/13/2014	surf	23	23	1	2	1	0	0	0	2.9	0.4	<0.30			1.60	0.1	I	I
229	Barrett Pond	6/23/2015	surf	25	25	1	2	1	0	0	0	1.8	0.5	<0.55	<0.004	<0.024	1.4	0.0	I	I
229	Barrett Pond	7/5/2015	surf	25	25	1	2	1	0	0	0	3.6	0.3	<0.63	<0.010	<32.565	0.9	0.0	I	I
229	Barrett Pond	7/16/2015	surf	18	26	2	2	2	0	0	0	3.9	0.6	<0.30	<0.004	<0.015	1.1	0.3	I	I
229	Barrett Pond	7/29/2015	surf	28	29	2	2	2	0	0	0	0.1	0.5	<0.19	<0.002	<0.014	1.2	0.0	I	I
229	Barrett Pond	8/13/2015	surf	25	26	2	2	2	0	0	0	3.9	0.5	<0.44	<0.002	<0.014	1.3	0.0	I	I
229	Barrett Pond	8/25/2015	surf	26	27	2	3	2	8	0	0	0.3	0.1	<0.21	<0.003	<0.010	1.6	0.1	I	I
229	Barrett Pond	9/5/2015	surf	26	27	2	2	2	0	0	0	2.9	0.6	<0.30	<0.007	<0.035	1.9	0.2	I	I
229	Barrett Pond	9/19/2015	surf	25	26	2	2	2	0	0	0	0.7	0.2	<0.30	<0.007	<0.035	1.0	0.2	I	I
229	Barrett Pond	6/29/2011	bot		10															
229	Barrett Pond	7/10/2011	bot		10															
229	Barrett Pond	7/26/2011	bot		12															
229	Barrett Pond	8/8/2011	bot		12															
229	Barrett Pond	8/22/2011	bot		10															
229	Barrett Pond	9/13/2011	bot		14															
229	Barrett Pond	6/16/2012	bot		11															
229	Barrett Pond	7/1/2012	bot		9															
229	Barrett Pond	7/13/2012	bot		10															
229	Barrett Pond	8/11/2012	bot		10															
229	Barrett Pond	8/24/2012	bot		10															
229	Barrett Pond	9/9/2012	bot		10															
229	Barrett Pond	6/6/2013	bot		8															
229	Barrett Pond	6/27/2013	bot		10															
229	Barrett Pond	7/10/2013	bot		9															
229	Barrett Pond	7/24/2013	bot		10															
229	Barrett Pond	8/6/2013	bot		10															
229	Barrett Pond	8/18/2013	bot		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
229	Barrett Pond	8/31/2013	bot		11															
229	Barrett Pond	9/11/2013	bot		14															
229	Barrett Pond	6/1/2014	bot		10															
229	Barrett Pond	6/19/2014	bot		10															
229	Barrett Pond	7/6/2014	bot		10															
229	Barrett Pond	7/21/2014	bot		11															
229	Barrett Pond	8/5/2014	bot		14															
229	Barrett Pond	8/16/2014	bot		13															
229	Barrett Pond	8/29/2014	bot		13															
229	Barrett Pond	9/13/2014	bot		14															
229	Barrett Pond	6/25/2015	bot		11															
229	Barrett Pond	7/5/2015	bot		10															
229	Barrett Pond	7/16/2015	bot		9															
229	Barrett Pond	7/29/2015	bot		9															
229	Barrett Pond	8/13/2015	bot		10															
229	Barrett Pond	8/25/2015	bot		12															
229	Barrett Pond	9/5/2015	bot		15															
229	Barrett Pond	9/17/2015	bot		13															

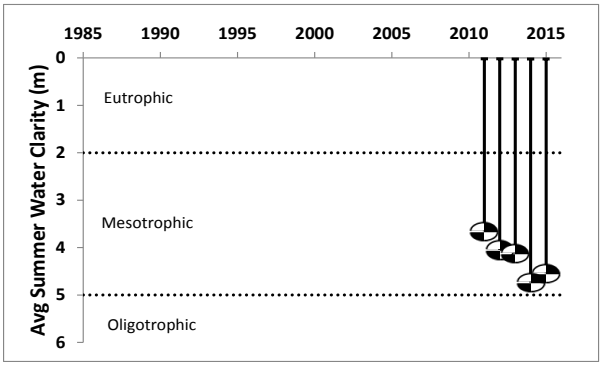
Legend Information

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 (mg/l), chloride (mg/l)	1 mg/l	none
Chl.a	chlorophyll a (ug/l)	0.01 ug/l	none
Fe	iron (mg/l)	0.1 mg/1	1.0 mg/l (S)
Mn	manganese (mg/l)	0.01 mg/l	0.3 mg/l (S)
As	arsenic (ug/l)	1 ug/l	10 ug/l (S)
AQ-PC	Phycocyanin (aquaflor) (unitless)	1 unit	none
AQ-Chl	Chlorophyll *a* (aquaflor) (ug/l)	1 ug/l	none
MC-LR	Microcystis-LR (ug/l)	0.01 ug/l	1 ug/l potable (C) 20 ug/l swimming (C)
Ana	Anatoxin-a (ug/l)	variable	none
Cyl	Cylindrospermposin (ug/l)	0.1 ug/l	none
FP-Chl, FP-BG	Fluoroprobe total chlorophyll, fluoroprobe blue-green chlorophyll (ug/l)	0.1 ug/l	none
Lake Assessment			
QA	water quality assessment; 1 = crystal clear, 2 = not quite crystal clear, 3 = definite algae greenness, 4 = high algae levels, 5 = severely high algae levels		
QB	aquatic plant assessment; 1 = no plants visible, 2 = plants below surface, 3 = plants at surface, 4 = plants dense at surface, 5 = surface plant coverage		
QC	recreational assessment; 1 = could not be nicer, 2 = excellent, 3 = slightly impaired, 4 = substantially impaired, 5 = lake not usable		
QD	reasons for recreational assessment; 1 = poor water clarity, 2 = excessive weeds, 3 = too much algae, 4 = lake looks bad, 5 = poor weather, 6 = litter/surface debris, 7 = too many lake users, 8 = other		
QF, QG	Health and safety issues today (QF) and past week (QG); 0 = none, 1 = taste/odor, 2 = GI illness humans/animals, 3 = swimmers itch, 4 = algae blooms, 5 = dead fish, 6 = unusual animals, 7 = other		
HAB form, Shore HAB	HAB evaluation; A = spilled paint, B = pea soup, C = streaks, D = green dots, E = bubbling scum, F = green/brown tint, G = duckweed, H = other, I = no bloom		

Appendix C- Long Term Plots: Barrett Pond

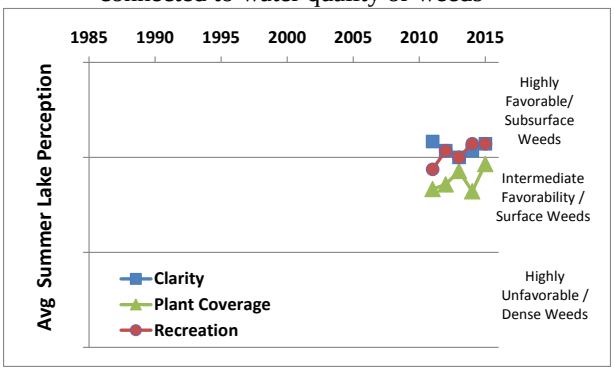
Long Term Trends: Water Clarity

- Clarity increase; may be part of a trend
- Most readings typical of *mesotrophic* lakes



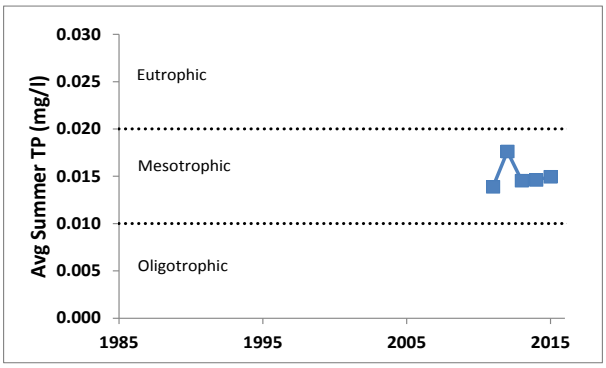
Long Term Trends: Lake Perception

- Perception stable/favorable; drop in weeds?
- Recreational perception only weakly connected to water quality or weeds



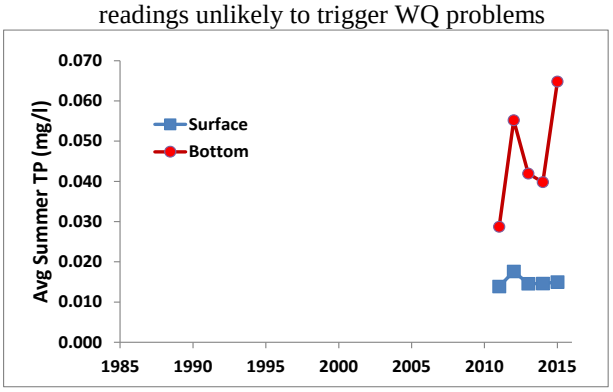
Long Term Trends: Phosphorus

- Fairly stable phosphorus readings
- Most readings typical of *mesotrophic* lakes



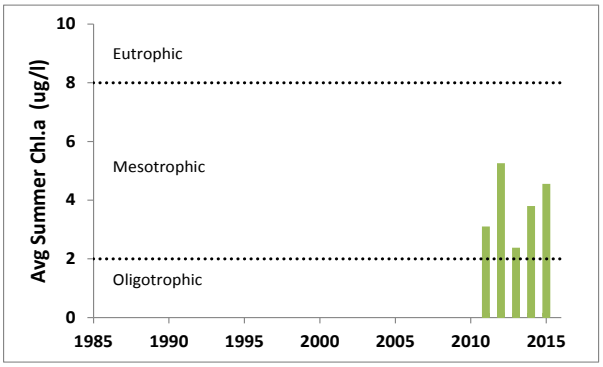
Long Term Trends: Bottom Phosphorus

- Bottom TP higher than surface; big 2015 ↑ ?
- Difference between surface and bottom readings unlikely to trigger WQ problems



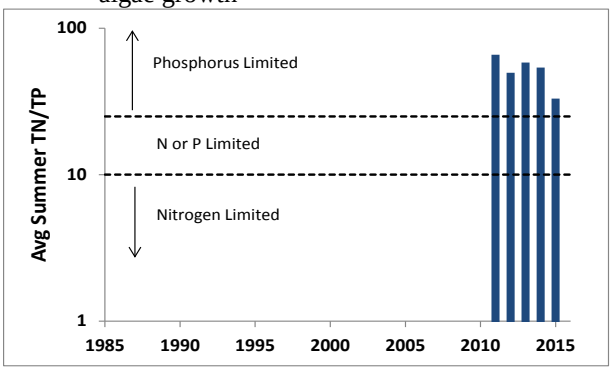
Long Term Trends: Chlorophyll a

- Slightly variable over last several years
- Most readings typical of *mesotrophic* lakes



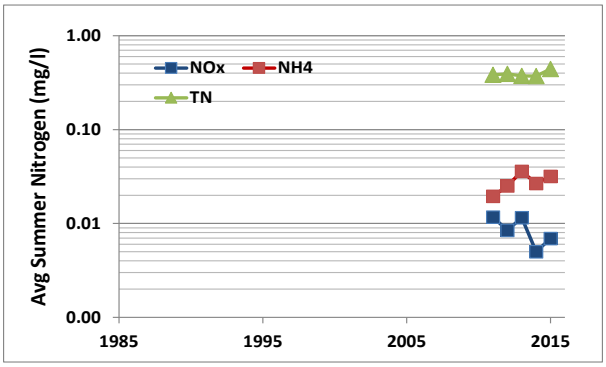
Long Term Trends: N:P Ratio

- Stable N:P ratios; slightly lower in 2015
- Most readings indicate phosphorus may limit algae growth



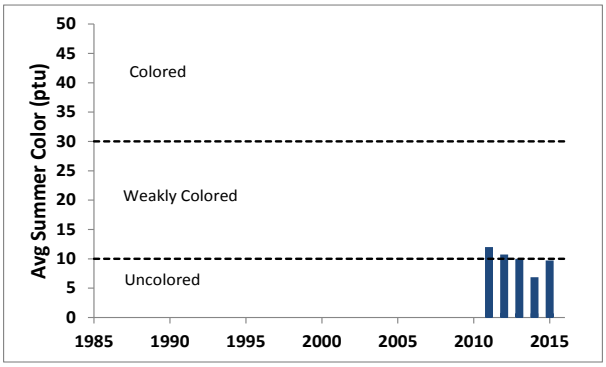
Long Term Trends: Nitrogen

- Slightly ↓ NOx and ↑ NH4 levels
- All nitrogen readings remain low



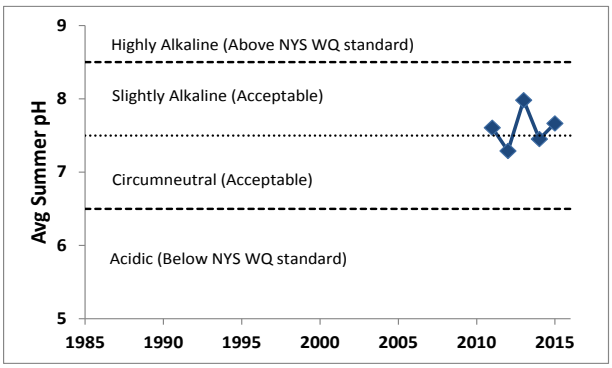
Long Term Trends: Color

- Slightly decreasing water color readings
- Most readings typical of *weakly* to *uncolored* lakes



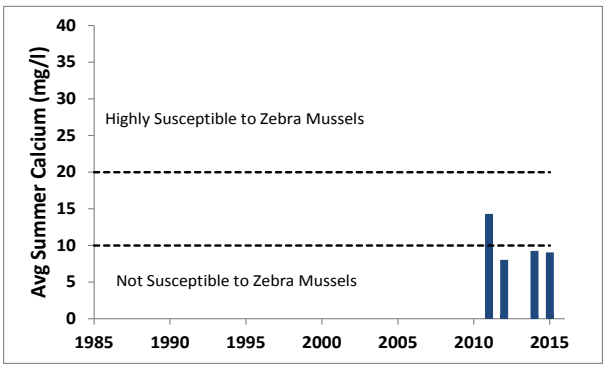
Long Term Trends: pH

- Slightly variable pH readings
- Most readings typical of slightly alkaline to *circumneutral* lakes



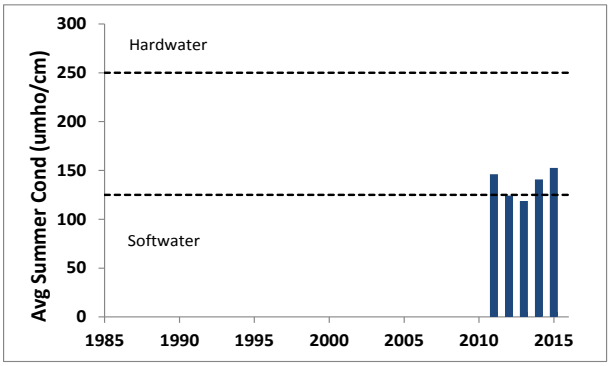
Long Term Trends: Calcium

- No trends apparent
- Most readings indicate low susceptibility to zebra mussels



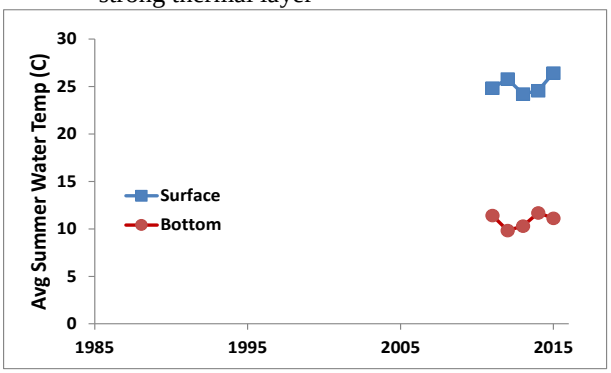
Long Term Trends: Conductivity

- Fairly stable conductivity readings
- Most readings typical of *softwater* lakes



Long Term Trends: Water Temperature

- No clear trend for surface or bottom T
- Fairly low deepwater temperature indicates strong thermal layer



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.

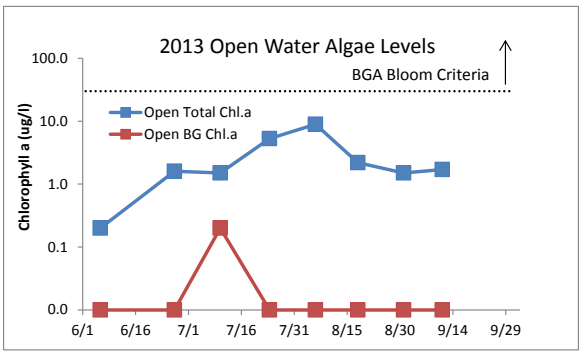


Figure D1:
2013 Open Water Total and BGA Chl.a

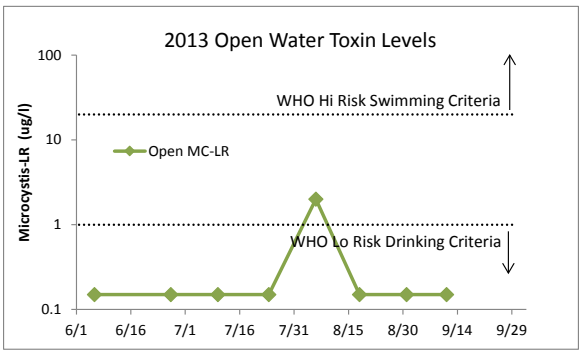


Figure D2:
2013 Open Water Microcystin-LR

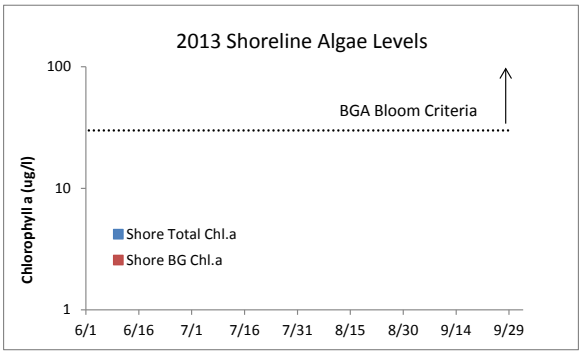


Figure D3:
2013 Shoreline Total and BGA Chl.a

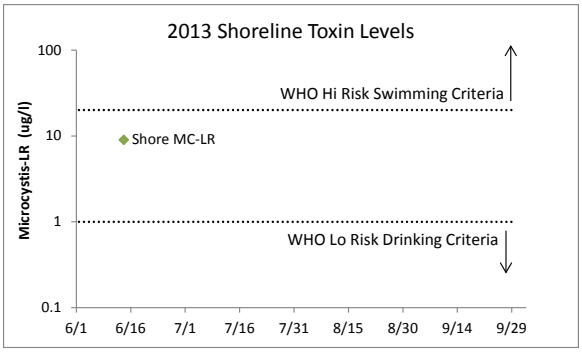


Figure D4:
2013 Shoreline Microcystin-LR

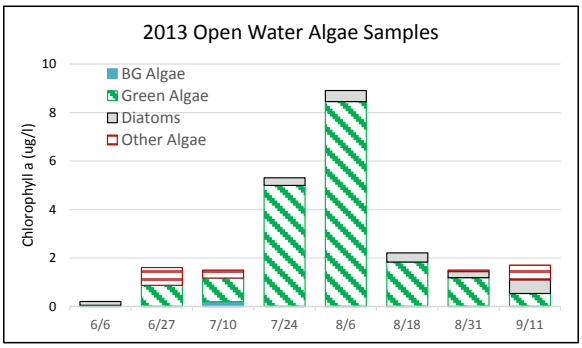


Figure D5:
2013 Open Water Algae Types

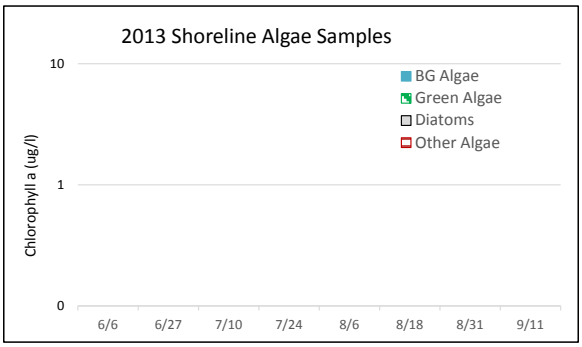


Figure D6:
2013 Shoreline Algae Types

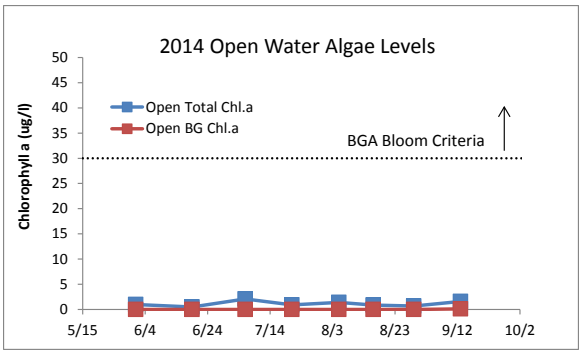


Figure D7:
2014 Open Water Total and BGA Chl.a

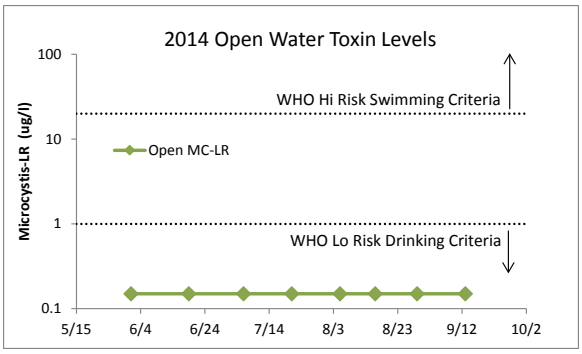


Figure D8:
2014 Open Water Microcystin-LR

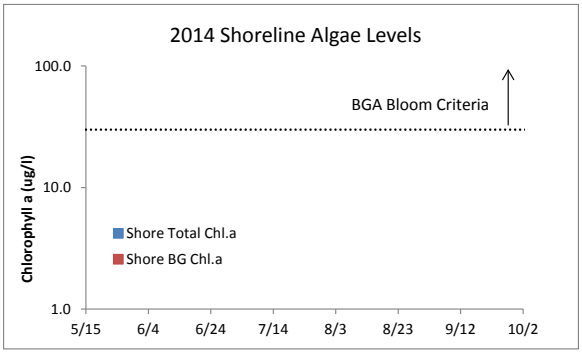


Figure D9:
2014 Shoreline Total and BGA Chl.a

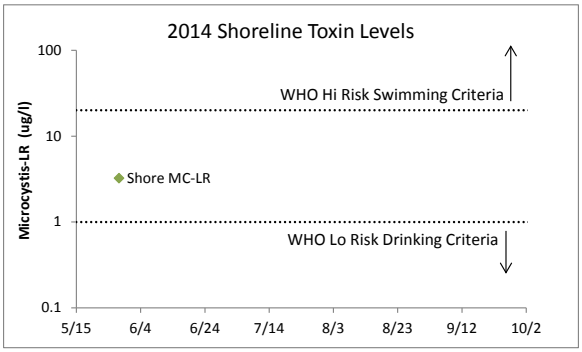


Figure D10:
2014 Shoreline Microcystin-LR

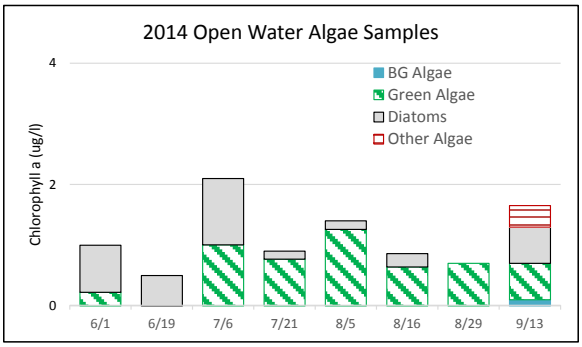


Figure D11:
2014 Open Water Algae Types

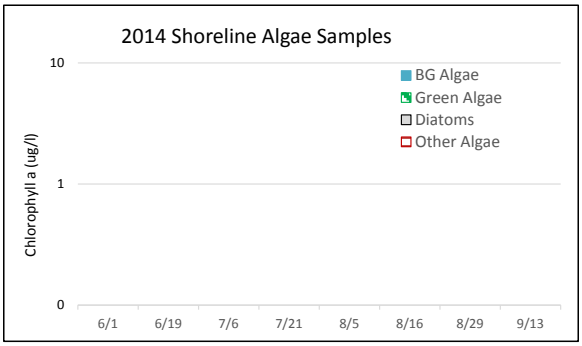


Figure D12:
2014 Shoreline Algae Types

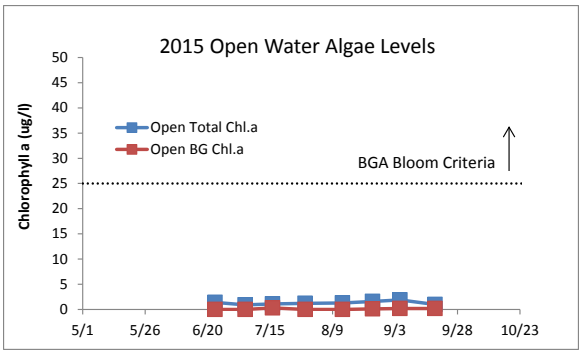


Figure D13:
2015 Open Water Total and BGA Chl.a

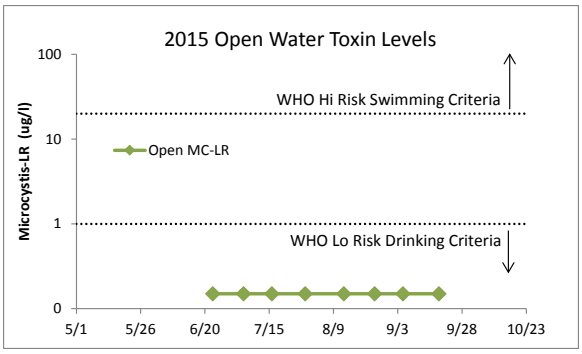


Figure D14:
2015 Open Water Microcystin-LR

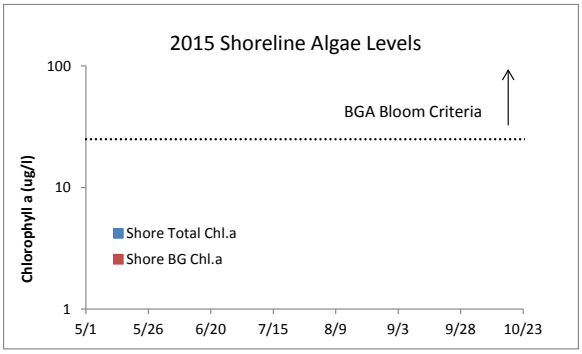


Figure D15:
2015 Shoreline Total and BGA Chl.a

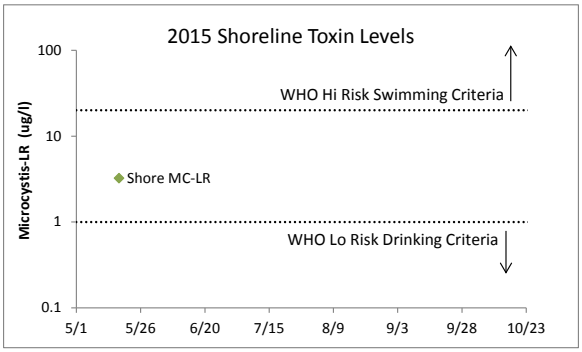


Figure D16:
2015 Shoreline Microcystin-LR

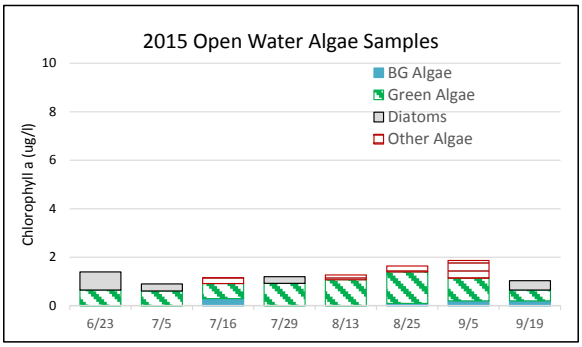


Figure D17:
2015 Open Water Algae Types

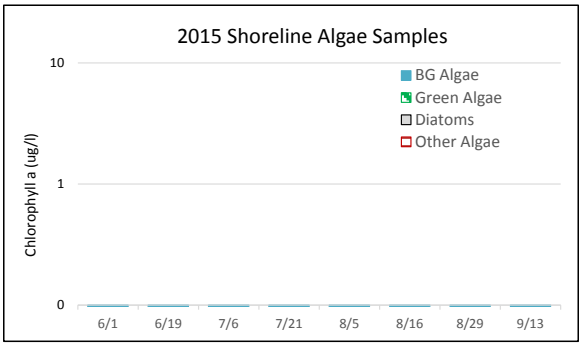


Figure D18:
2015 Shoreline Algae Types

Appendix E:
AIS Species in Putnam County

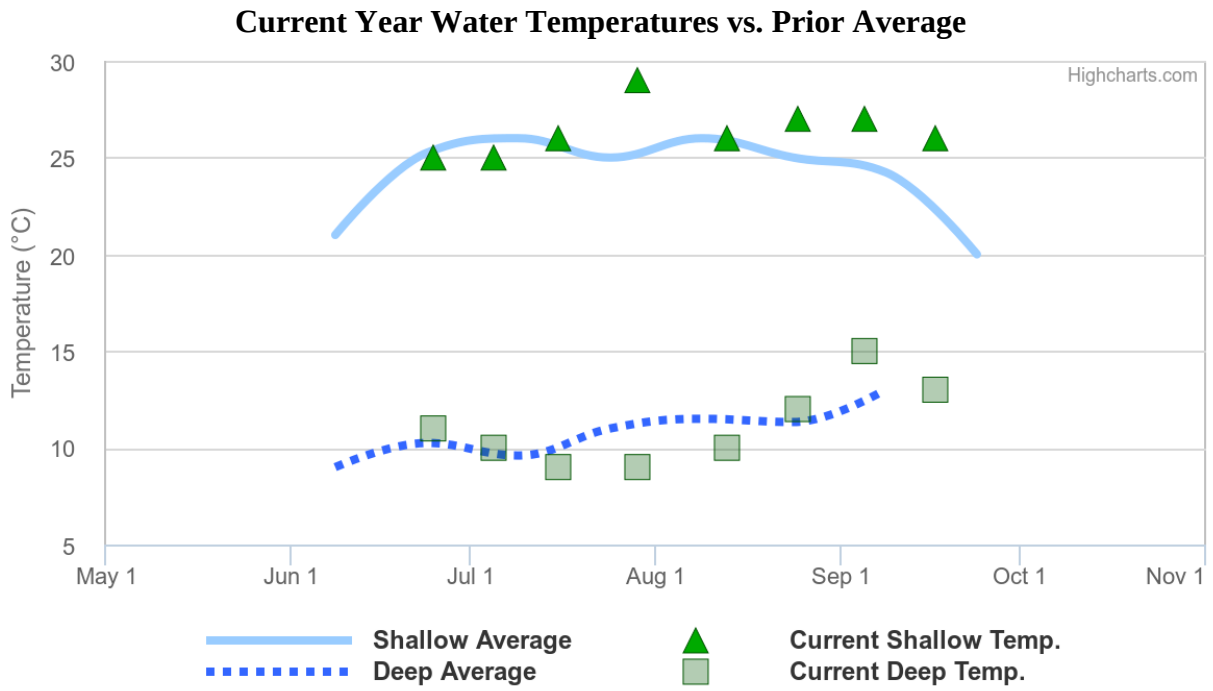
The table below shows the invasive aquatic plants and animals that have been documented in Putnam County, as cited in either the iMapInvasives database (http://www.imapinvasives.org/) or in the NYSDEC Division of Water database. These databases may include some, but not all, non-native plants or animals 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.

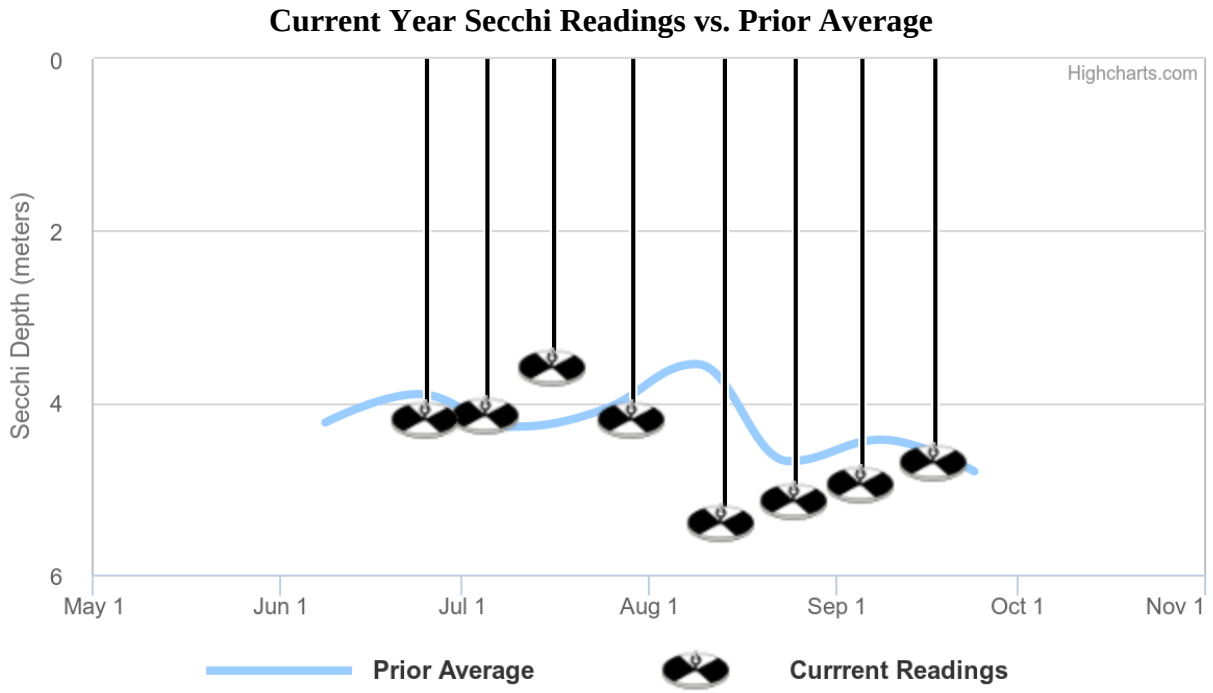
Aquatic Invasive Species - Putnam County			
Waterbody	**Kingdom**	**Common name**	**Scientific name**
Canopus Lake	Plant	Variable watermilfoil	*Myriophyllum heterophyllum*
Canopus Lake	Plant	Eurasian watermilfoil	*Myriophyllum spicatum*
Canopus Lake	Plant	Curly leafed pondweed	*Potamogeton crispus*
Croton 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*
Putnam Lake	Plant	Curly leafed pondweed	*Potamogeton crispus*
Waterbody	**Kingdom**	**Common name**	**Scientific name**
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 Barrett Pond



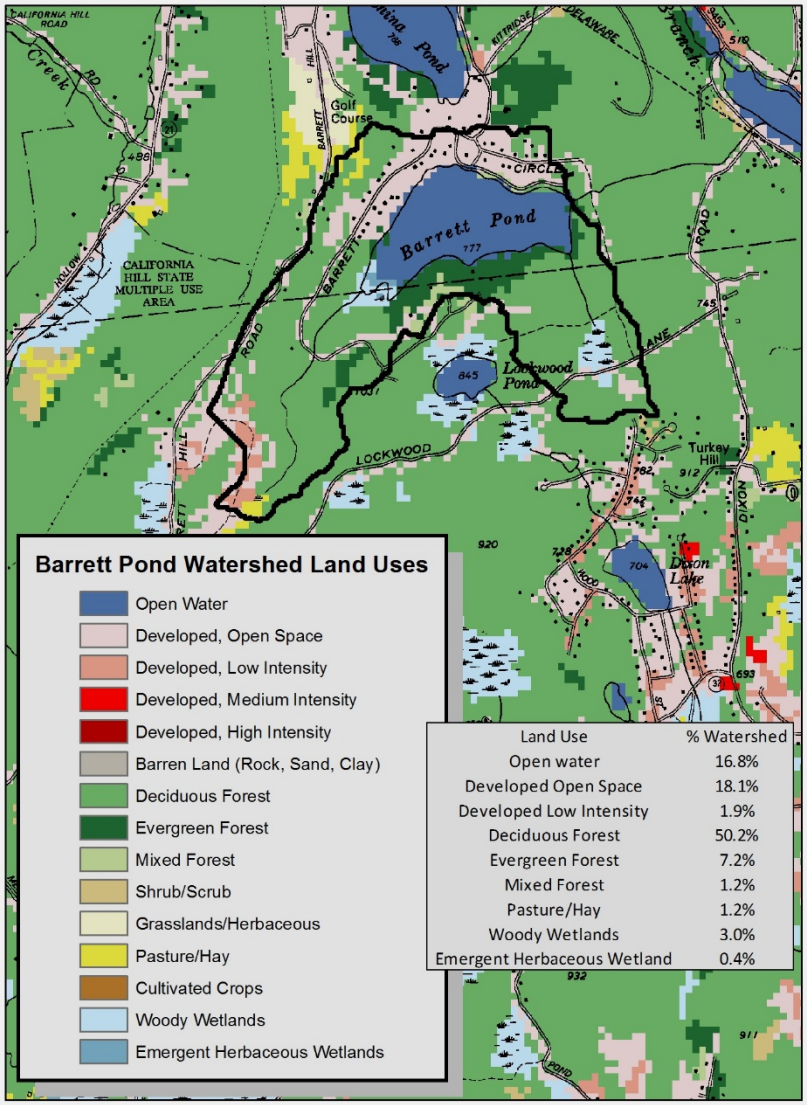
There are not enough shallow water sample temperatures to determine a trend for the current year when compared to the average of readings collected from 2011 to 2014. There are not enough deep water sample temperatures to determine a trend for the current year when compared to the average of readings collected from 2011 to 2014.



There are not enough session Secchi readings to determine a trend for the current year when compared to the average of readings collected from 2011 to 2014.

Appendix G: Watershed and Land Use Map for Barrett Pond

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



Land Use	% Watershed
Open water	16.8%
Developed Open Space	18.1%
Developed Low Intensity	1.9%
Deciduous Forest	50.2%
Evergreen Forest	7.2%
Mixed Forest	1.2%
Pasture/Hay	1.2%
Woody Wetlands	3.0%
Emergent Herbaceous Wetland	0.4%