Ulster Heights Lake Questions and Answers, 2015 CSLAP

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

A1. Conditions in Ulster Heights Lake were probably close to normal in 2015. Algae levels were lower than usual, although water clarity and nutrient levels were close to normal, and there was no evidence of shoreline blue green algae blooms. However, water quality and recreational assessments were slightly less favorable, and plant coverage was slightly greater.

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

A2. Chloride sampling results were typical of lakes with low impacts from road salt runoff, and no biological impacts were reported or measured.

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

A3. Ulster Heights Lake had lower water clarity, but lower algae and nutrient readings than the typical nearby lake in 2015. Color readings ("brownness") is slightly higher than in other nearby lakes. Plant coverage was higher than in many nearby lakes in 2015.

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

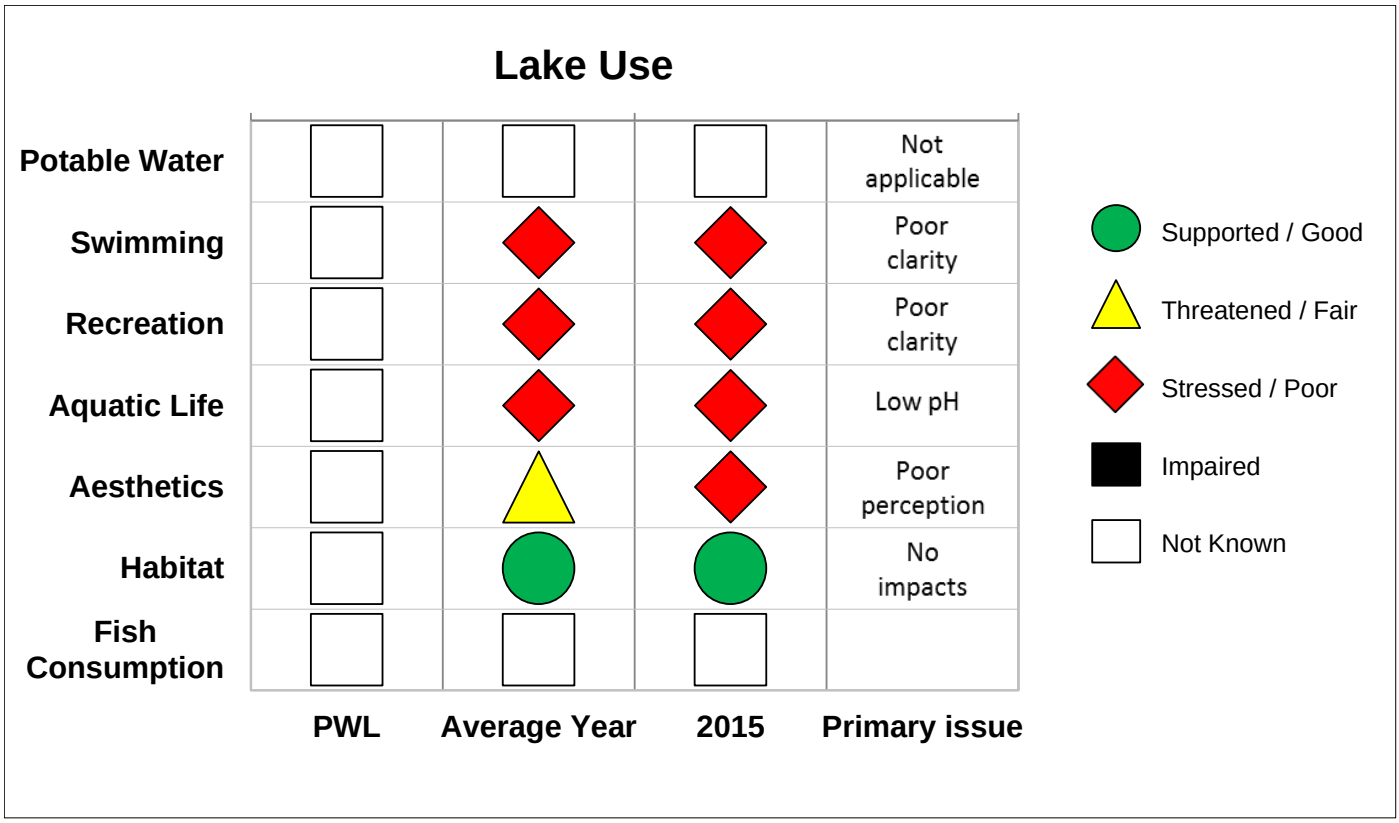
A4. Ammonia is the only CSLAP indicator that has exhibited clear long term trends (increases). Water clarity has also increased slightly, while the other indicators have varied from year to year.

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

A5. Ulster Heights Lake appears to be susceptible to shoreline blue green algae blooms, although the trigger point for these blooms is not known, and no blooms were reported in 2015. Any nutrient sources along the shoreline or in the watershed (eroding shorelines, sediment,…) should be identified and reduced working with local agencies.

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

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



CSLAP 2015 Lake Water Quality Summary:
Ulster Heights Lake

General Lake Information

Location	Town of Wawarsing
County	Ulster
Basin	Lower Hudson River
Size	21.5 hectares (52.8 acres)
Lake Origins	Augmented by Dam
Watershed Area	2,380 hectares (5,878 acres)
Retention Time	0.02 years
Mean Depth	1.4 meters
Sounding Depth	4.3 meters
Public Access?	no
Major Tributaries	Botsford Brook
Lake Tributary To…	Botsford Brook to Beer Kill to Sandburg Creek to Rondout Creek to Hudson River
WQ Classification	B (contact recreation = swimming)
Lake Outlet Latitude	41.748
Lake Outlet Longitude	-74.438
Sampling Years	2007-2012, 2014-2015
2015 Samplers	Gil Podorson and John Sweeney
Main Contact	Gil Podorson

Lake Map

Background

Ulster Heights Lake is a 205 acre, class B lake found in the Town of Wawarsing in Ulster County, in the lower Hudson River valley portion of New York State. Ulster Heights Lake was first sampled as part of CSLAP in 2007.

It is the only CSLAP lake among the more than 430 lakes and ponds found in Ulster County, and one of 67 CSLAP lakes among the more than 3680 lakes and ponds in the Lower Hudson River drainage basin.

Lake Uses

Ulster Heights Lake is a Class B lake; this means that the best intended use for the lake is for contact recreation—swimming and bathing, non-contact recreation—boating and fishing, aesthetics, and aquatic life. The lake is used by lake residents and invited guests for boating and swimming, through residential shoreline access to the lake. There is no public access to the lake.

Ulster Heights Lake is not stocked by the state. It is not known by the report author if private fish stocking occurs in Ulster Heights Lake.

General statewide fishing regulations are applicable in Ulster Heights Lake.

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

Historical Water Quality Data

CSLAP sampling was conducted on Ulster Heights Lake from 2007 to 2012, and in 2014 to 2015. The CSLAP reports for each of the past several years can be found on the NYSFOLA website at http://nysfola.mylaketown.com. The most recent CSLAP report and scorecard for Ulster Heights Lake can also be found on the NYSDEC web page at http://www.dec.ny.gov/lands/77832.html.

Ulster Heights Lake has not been sampled through any of the statewide water quality monitoring programs prior to CSLAP. However, Ulster Heights Lake was sampled through the Adirondack Lake Survey Corporation (ALSC) study of approximately 300 “downstate” lakes in 1987. This study showed water quality conditions comparable to those measured through CSLAP. Some of these results are discussed in more detail below.

Neither the inlets to nor the outlet (Botsford Brook) has been monitored through the NYSDEC Rotating Intensive Basins (RIBS) or stream biomonitoring programs.

Lake Association and Management History

Ulster Heights Lake is served by the Ulster Heights Lake Inc. It is not known to what extent the lake association is involved in lake management or if it maintains a web site, although the lake association has applied for a drawdown permit.

Summary of 2015 CSLAP Sampling Results

Evaluation of 2015 Annual Results Relative to 2007-2014

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 – Ulster Heights Lake" section in Appendix C.

Evaluation of Eutrophication Indicators

Chlorophyll *a* levels (as a measure of algae) were slightly lower than normal in 2015, despite phosphorus and water clarity readings that were close to normal. Water clarity, and perhaps algae levels, continues to be strongly influenced by dissolved organic matter (as measured by water color). Water clarity has decreased slightly since 2007, although phosphorus and chlorophyll *a* readings have varied inconsistently from year to year. These "inconsistencies" suggest that these trophic indicators are frequently variable in Ulster Heights Lake.

Water clarity is typically lower in late summer into the fall, consistent with an increase in phosphorus and algae levels over the same (but slightly earlier) period. In 2015, water clarity increased during the summer, consistent with a rise in phosphorus readings (although algae levels did not vary in a predictable way over the summer).

The lake can be characterized as *mesoeutrophic,* or moderately to highly productive, based on chlorophyll *a* (typical of *mesotrophic* lakes), water clarity and total phosphorus readings (typical of *eutrophic* lakes). The trophic state indices (TSI) evaluation suggests that algae levels are slightly lower than in other lakes with similar phosphorus and water clarity readings, also reflecting the influence of water color on these indicators. Overall trophic conditions are summarized on the Lake Scorecard and Lake Condition Summary Table.

Evaluation of Potable Water Indicators

Algae levels are usually 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, although high color readings indicate high levels of organic matter that could produce these DBPs. The lake is not classified for use for drinking water, so these impacts are unlikely to occur. Potable water conditions, at least as measurable through CSLAP, are summarized in the Lake Scorecard and Lake Condition Summary Table.

Evaluation of Limnological Indicators

Ammonia and total nitrogen levels and conductivity were higher than usual in 2015, while color readings were lower than normal. Ammonia and color readings have increased slightly since 2007. None of the other limnological indicators has exhibited any long-term trends, and it is likely that the small changes in most of these 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, were about 13 mg/l. These values fall within the low end of "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 below the range of values found in most NYS lakes.

These readings suggest a low to moderate likelihood of biological impacts from road salt. Additional data will help to determine if these represent normal readings for the lake.

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

Evaluation of Biological Condition

Macrophyte surveys were conducted through the Adirondack Lake Survey Corporation (ALSC) study of the lower Hudson River basin in 1987. Plants were only identified down to genus, so it is not known how many individual plant species are found in the lake. However, it is likely that the *Myriophyllum* identification corresponds to Eurasian watermilfoil (*Myriophyllum spicatum*), an exotic plant species. The ALSC study found at least 16 (and probably more) plant species. The modified floristic quality indices (FQI) for the lake indicate that the quality of the aquatic plant community is probably "excellent".

The ALSC study also looked at macroinvertebrates, although taxa counts were not provided. These results showed a relatively large number of *Ephemeroptera, Trichoptera, Odonate* (ETO) taxa, associated with good water quality, but a high percentage of tolerant organisms, suggesting that the benthic community may be threatened.

The composition of the fish community (as determined in the ALSC study) is comprised of at least nine warmwater fish species and at least two coolwater fish species. This suggests that the lake can most likely be characterized as a warmwater fishery. A relatively high percentage of less favorable fish species, using an index for biological integrity (IBI), suggests that the fisheries condition may be threatened.

Phytoplankton and zooplankton have not been evaluated through CSLAP in Ulster Heights Lake. The fluoroprobe screening results from SUNY ESF indicate a low percentage of blue green algae within the open water and shoreline algae communities in the lake. No shoreline blooms have been reported in at least the last few years, perhaps indicating that water color prevents excessive algae growth.

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

Evaluation of Lake Perception

Recreational assessments were slightly less favorable than usual in 2015, due to higher plant coverage and slightly less favorable water quality assessments (despite similar water clarity and lower algae levels). These assessments are usually stable over the summer, although plant coverage did increase slightly during the summer of 2015. Overall lake perception is summarized on the Lake Scorecard and Lake Condition Summary Table.

Evaluation of Local Climate Change

Water temperature readings have not changed significantly since the late 2000s. It is not yet known if air or water temperature readings have exhibited any long-term trends or if temperatures are a good measure of local climate change.

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 been below the threshold for harmful algal blooms (HABs) in the open water, but were highly elevated in blooms prior to 2012. However, no shoreline blooms have been reported or measured since then. An analysis of algae samples indicated microcystin levels well below the levels needed to support safe swimming.

Lake Condition Summary

Category	Indicator	Min	Overall Avg	Max	2015 Avg	Classification	2015 Change?	Long-term Change?
Eutrophication Indicators	Water Clarity	0.38	1.31	2.30	1.28	Eutrophic	Within Normal Range	No Change
	Chlorophyll *a*	0.80	5.78	10.82	6.78	Mesotrophic	Within Normal Range	No Change
	Total Phosphorus	0.017	0.026	0.037	0.028	Eutrophic	Within Normal Range	No Change
Potable Water Indicators	Hypolimnetic Ammonia							
	Hypolimnetic Arsenic							
	Hypolimnetic Iron							
	Hypolimnetic Manganese							
Limnological Indicators	Hypolimnetic Phosphorus							
	Nitrate + Nitrite	0.00	0.02	0.12	0.01	Low NOx	Within Normal Range	No Change
	Ammonia	0.00	0.03	0.05	0.03	Low Ammonia	Higher than Normal	Increasing Significantly
	Total Nitrogen	0.30	0.54	0.68	0.58	Intermediate Total Nitrogen	Higher than Normal	No Change
	pH	6.09	7.04	9.19	6.89	Circumneutral	Within Normal Range	No Change
	Specific Conductance	29	51	85	59	Softwater	Higher than Normal	No Change
	True Color	22	80	194	69	Colored	Within Normal Range	No Change
	Calcium	2.7	4.3	5.7	4.2	Not Susceptible to Zebra Mussels	Within Normal Range	No Change
Lake Perception	WQ Assessment	1	2.2	3	2.4	Not Quite Crystal Clear	Within Normal Range	No Change
	Aquatic Plant Coverage	1	2.9	4	3.2	Surface Plant Growth	Within Normal Range	No Change
	Recreational Assessment	1	2.1	5	2.4	Excellent	Within Normal Range	No Change
Biological Condition	Phytoplankton					Open water-low blue green algae biomass; Shoreline-low blue green algae in bloom	Not known	Not known
	Macrophytes					Excellent 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					Warmwater fishery	Not known	Not known
	Invasive Species					Eurasian watermilfoil?	Not known	Not known
Local Climate Change	Air Temperature	10	25.2	36	26.4		Within Normal Range	No Change
	Water Temperature	10	22.7	28	22.8		Within Normal Range	No Change

Category	Indicator	Min	Overall Avg	Max	2015 Avg	Classification	2015 Change?	Long-term Change?
Harmful Algal Blooms	Open Water Phycocyanin	2	7	17	5	No readings indicate high risk of BGA	Not known	Not known
	Open Water FP Chl.a	1	3	3	3	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	<DL	0.7	<DL	Low to undetectable open water microcystins	Not known	Not known
	Open Water Anatoxin a	<DL	<DL	<DL	<DL	Open water Anatoxin-a consistently not detectable	Not known	Not known
	Shoreline Phycocyanin	1470.0	4281.0	7092.0		All readings indicate high risk of BGA	Not known	Not known
	Shoreline FP Chl.a	4.2	4.2	4.2		No readings indicate high algae levels	Not known	Not known
	Shoreline FP BG Chl.a	1.9	1.9	1.9		No readings indicate high BGA levels	Not known	Not known
	Shoreline Microcystis	<DL	<DL	<DL		Shoreline bloom MC-LR consistently not detectable	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

Ulster Heights Lake is not listed among the lakes on the 2008 Lower Hudson River drainage basin Priority Waterbody List (PWL).

Potable Water (Drinking Water)

The CSLAP dataset at Ulster Heights Lake, including water chemistry data, physical measurements, and volunteer samplers' perception data, is inadequate to evaluate the use of the lake for potable water, and the lake is not used for this purpose. The algae levels in the lake suggest that the "unofficial" potable water use should not be affected.

Public Bathing

The CSLAP dataset at Ulster Heights Lake, including water chemistry data, physical measurements, and volunteer samplers' perception data, suggests that public bathing, if conducted at a public swimming beach, may be *stressed* by reduced water clarity and elevated nutrient levels. 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 Ulster Heights Lake, including water chemistry data, physical measurements, and volunteer samplers' perception data, suggest that recreation may be *stressed* by poor clarity and excessive nutrients, and this use may ultimately be *threatened* by exotic plants, such as Eurasian watermilfoil.

Aquatic Life

The CSLAP dataset on Ulster Heights Lake, including water chemistry data, physical measurements, and volunteer samplers' perception data, suggest that aquatic life may be *stressed* by low pH. Additional data are needed to evaluate the food and habitat conditions for aquatic organisms in the lake.

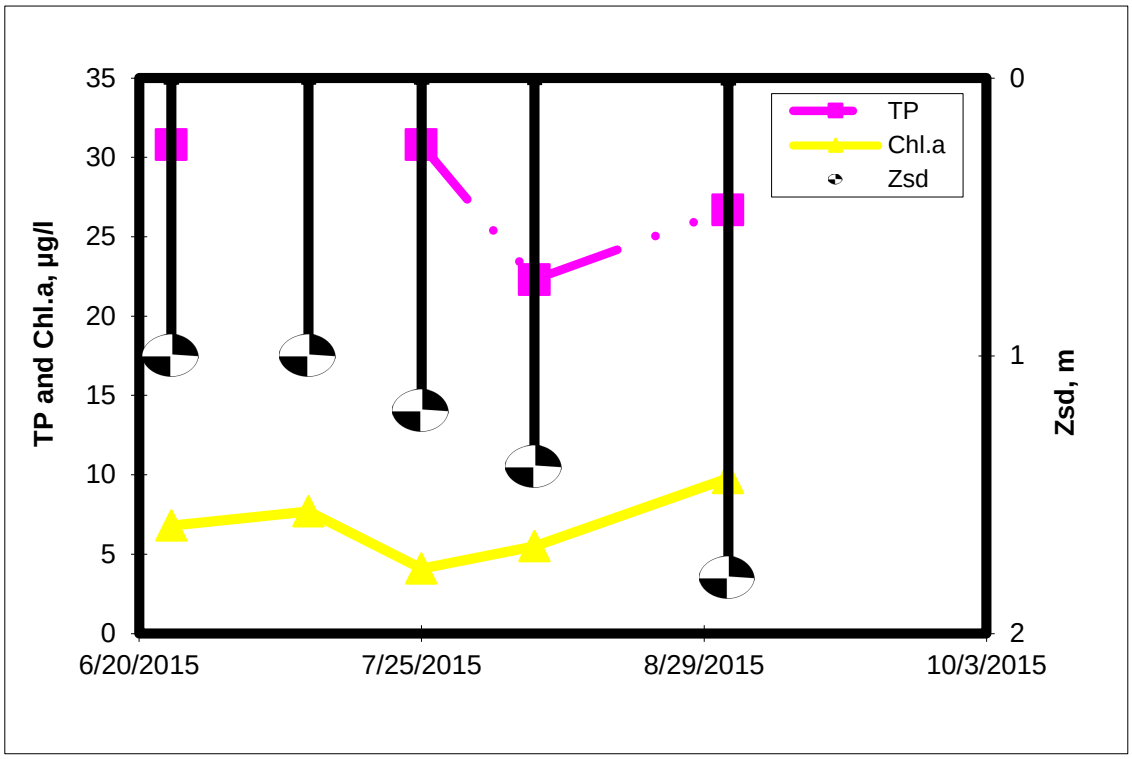
Aesthetics and Habitat
The CSLAP dataset on Ulster Heights Lake, including water chemistry data, physical measurements, and volunteer samplers' perception data, suggest that aesthetics may be *poor* due to poor lake perception. Habitat may be *fair* due to invasive plants.

Fish Consumption
There are no fish consumption advisories posted for Ulster Heights Lake.

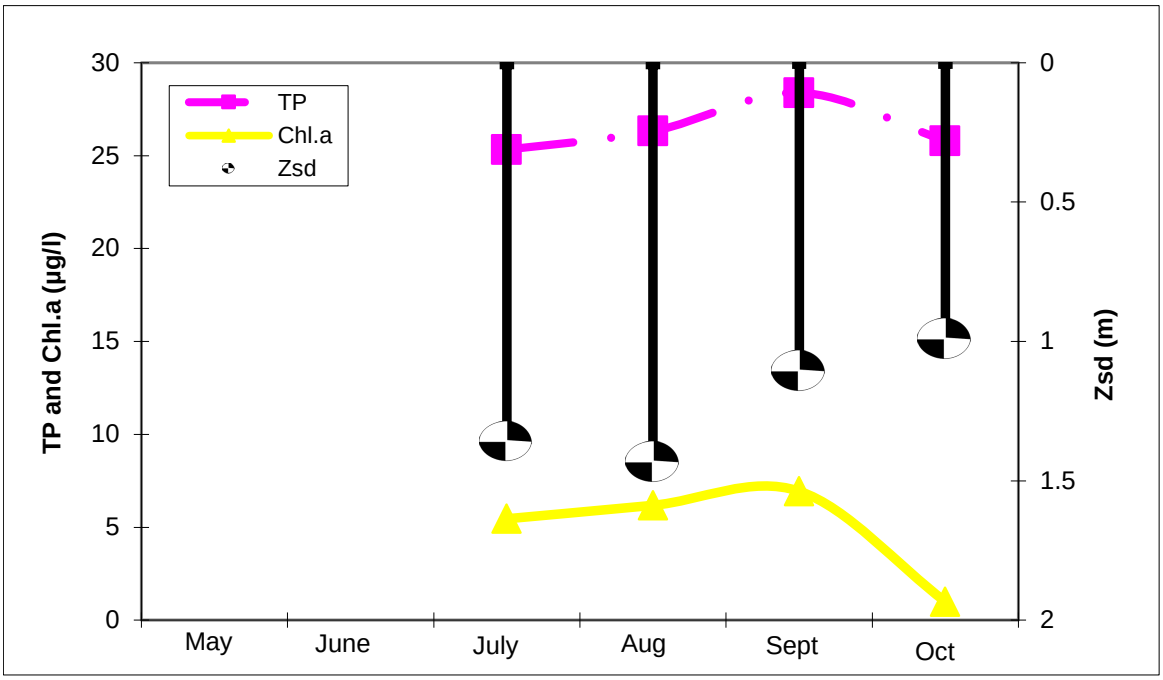
Additional Comments and Recommendations
Aquatic plant monitoring in Ulster Heights Lake may be useful in determining if Eurasian watermilfoil occurs and if the plant community is more strongly affected by native or invasive plants. Lake residents should report and avoid exposure to any surface scums or heavily discolored water associated with potential harmful algae blooms.

Aquatic Plant IDs-2015
None submitted for identification in 2015.

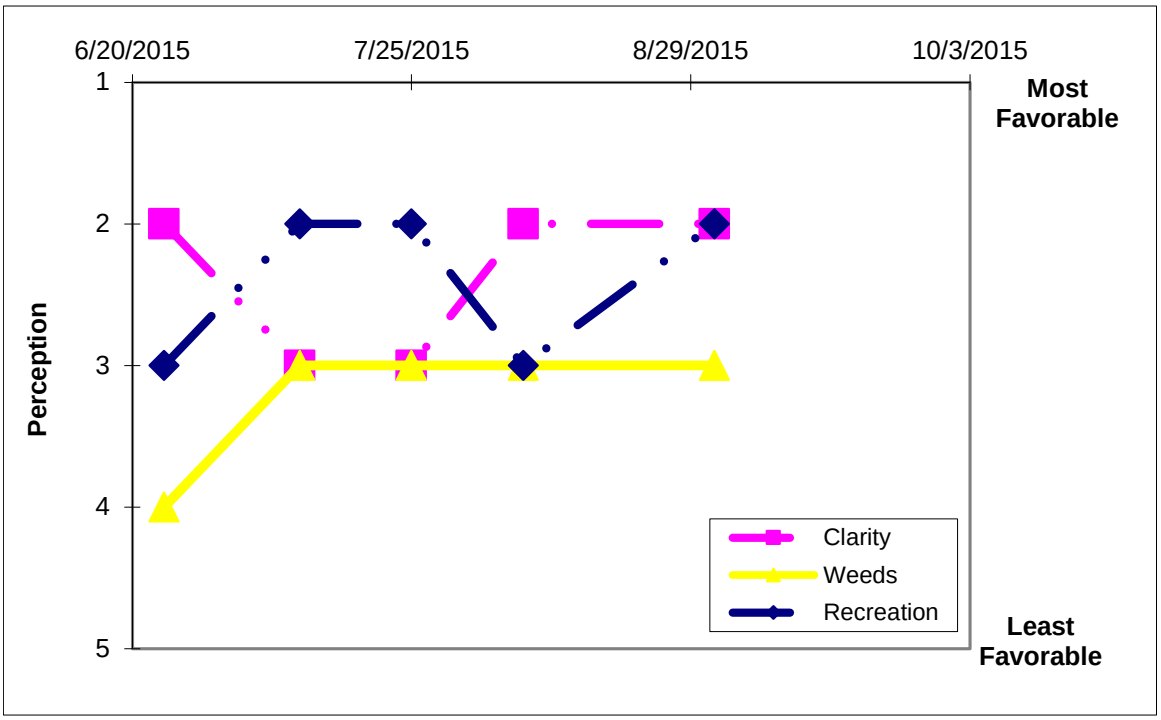
Time Series: Trophic Indicators, 2015



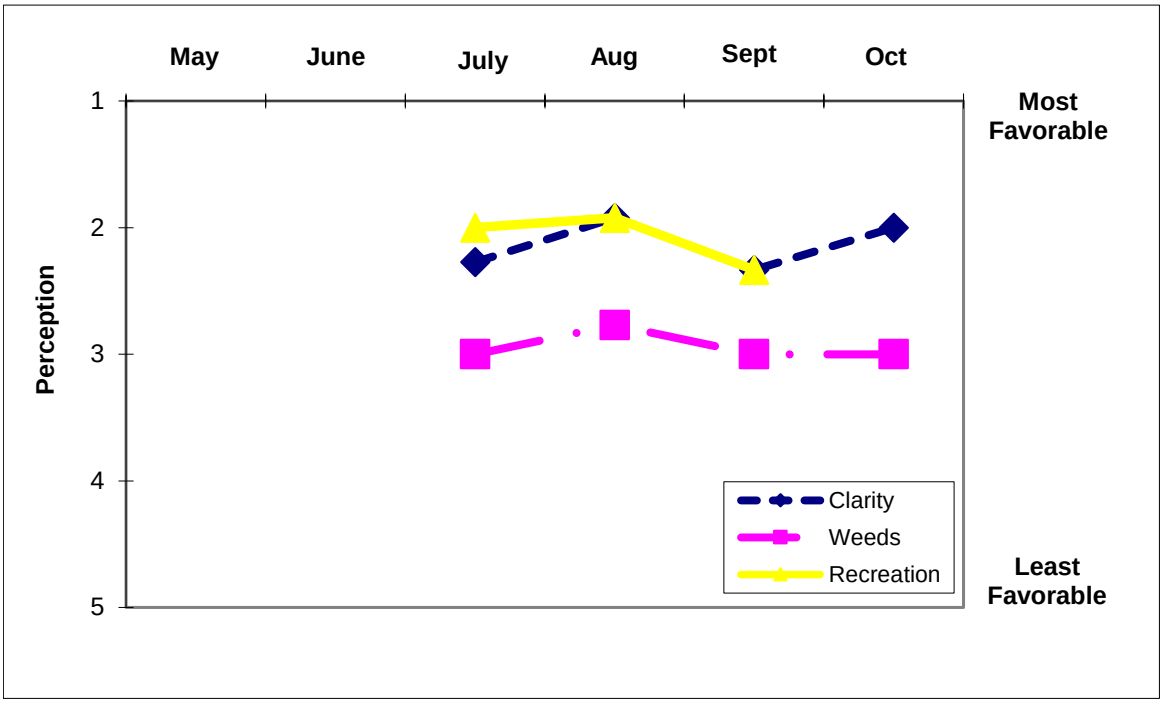
Time Series: Trophic Indicators, Typical Year (2007-2015)



Time Series: Lake Perception Indicators, 2015



Time Series: Lake Perception Indicators, Typical Year (2007-2015)



Appendix A- CSLAP Water Quality Sampling Results for Ulster Heights Lake

LNum	PName	Date	Zbot	Zsd	Zsamp	Tot.P	NO3	NH4	TDN	TN/TP	TColor	pH	Cond25	Ca	Chl.a	Cl
211	Ulster Heights L	7/2/2007	3.6	1.78	1.5	0.022	0.01	0.02	0.53	52.6	34	9.19	48		6.53	
211	Ulster Heights L	7/19/2007	3.5	1.10	1.5	0.021	0.03	0.03	0.55	59.3	48	7.62	51		6.58	
211	Ulster Heights L	7/29/2007	3.5	1.08		0.017	0.01	0.02	0.59	76.7	50	6.68	50		10.82	
211	Ulster Heights L	8/16/2007	3.7	1.68	1.5	0.018	0.02	0.01	0.45	56.0	49	7.18	42		4.22	
211	Ulster Heights L	8/27/2007	3.5	2.30	1.5	0.019	0.00	0.02	0.62	74.3	54	6.82	53	5.0	5.54	
211	Ulster Heights L	7/20/2008	3.5	1.34	1.5	0.031	0.01	0.01	0.43	30.80	34	7.01	48	4.4	5.05	
211	Ulster Heights L	7/26/2008	3.0	1.20	1.5	0.029	0.02	0.02	0.56	42.07	112	6.09	29		3.94	
211	Ulster Heights L	8/9/2008	3.4	1.23	1.0	0.029	0.01	0.01	0.43	32.99	91	6.26	38		6.73	
211	Ulster Heights L	8/25/2008	3.4	1.05	1.5	0.026	0.00	0.00	0.47	39.26	80	7.01	52		5.54	
211	Ulster Heights L	9/13/2008	3.6	1.40		0.025	0.00	0.03	0.30	26.30	68	6.72	57	2.7	4.44	
211	Ulster Heights L	08/18/2009	3.4	1.05	1.5	0.035	0.02	0.02	0.59	37.07	186	6.77	35	4.7	9.70	
211	Ulster Heights L	09/01/2009	3.3	0.96	1.5	0.032	0.05	0.04	0.67	46.49	194	7.30	44		6.00	
211	Ulster Heights L	09/21/2009	2.3	1.00	1.5	0.034	0.04	0.05	0.56	35.88	114	7.78	38		8.10	
211	Ulster Heights L	10/12/2009	1.8	0.78	1.5	0.029	0.01	0.01	0.34	26.32	142	6.78	41		1.20	
211	Ulster Heights L	7/5/2010	3.1	1.63	1.5	0.024	0.07	0.03	0.45	42.05	37	7.52	54	3.8	7.90	
211	Ulster Heights L	7/18/2010	3.0	1.30	1.5	0.037	0.02	0.02	0.56	33.06	48	7.16	58		3.40	
211	Ulster Heights L	8/1/2010	3.1	1.68	1.5	0.030	0.01	0.03	0.56	41.06	63	6.70	85		5.80	
211	Ulster Heights L	8/15/2010	3.0	1.62	1.5	0.030	0.03	0.01	0.67	49.52	66	6.70	63		7.30	
211	Ulster Heights L	8/15/2010	grab	bloom												
211	Ulster Heights L	8/15/2010	grab	bloom												
211	Ulster Heights L	8/29/2010	3.3	1.65	1.5	0.024	0.03	0.04	0.61	56.73	54	6.50	83	5.6	4.60	
211	Ulster Heights L	9/11/2010				0.027	0.02	0.04	0.52	42.36	63	6.45	71		7.80	
211	Ulster Heights L	7/17/2011	3.3	1.38	1.5	0.021	0.01	0.02	0.51	54.79	94	6.83	42	5.7	4.50	
211	Ulster Heights L	8/1/2011	3.2	1.34	1.5	0.027	0.12	0.04	0.63	50.98	87	7.36	50		7.30	
211	Ulster Heights L	8/22/2011	3.5	1.13	1.5	0.021	0.03	0.02	0.52	53.80	120	6.71	33		2.80	
211	Ulster Heights L	10/2/2011	3.6	1.21	1.5	0.023	0.01	0.02	0.60	57.05	155	7.20	35		0.80	
211	Ulster Heights L	7/2/2012														
211	Ulster Heights L	7/2/2012	3.1	1.13	1.5	0.023	0.01	0.05	0.67	62.52	70	6.90	46	3.3	3.20	
211	Ulster Heights L	7/21/2012	2.9	1.80	1.5	0.023	0.01	0.02	0.46	44.19	51	7.59	41		6.80	
211	Ulster Heights L	8/5/2012	2.6	1.34	1.5	0.031	0.01	0.02	0.47	32.94	58	7.62	56		6.00	
211	Ulster Heights L	8/21/2012	3.4	1.38	1.5	0.025	0.01	0.02	0.46	40.42	55	7.64	55		5.70	
211	Ulster Heights L	9/11/2012	2.0	0.38	1.5	0.025	0.01	0.03	0.52	45.04	22	7.54	58	4.8	5.50	
211	Ulster Heights L	7/15/2014	3.6	1.25	1.5	0.032	0.01	0.03	0.58	40.39	160	6.66	34	3.5	1.30	
211	Ulster Heights L	8/8/2014	3.3	1.20	1.5	0.028			0.51	40.41	85	6.61	49		9.10	
211	Ulster Heights L	6/24/2015	3.5	1.00	1.5	0.031	0.01	0.04	0.52	16.72	55	7.51	57	4.0	6.80	
211	Ulster Heights L	7/11/2015	3.7	1.00	1.5				0.61	6.28	110	6.59	53		7.70	
211	Ulster Heights L	7/25/2015	3.1	1.20	1.5	0.031	0.01	0.03	0.49	15.78	48	6.82	59		4.10	12.6
211	Ulster Heights L	8/8/2015	3.4	1.40	1.5	0.022			0.63	28.43	70	7.03	62		5.50	
211	Ulster Heights L	9/1/2015	3.4	1.80	1.4	0.027	0.02	0.03	0.68	25.43	60	6.48	63	4.5	9.80	

LNum	PName	Date	Site	TAir	TH20	QA	QB	QC	QD	QF	QG	AQ-PC	AQ-Chla	MC-LR	Ana-a	Cylin	FP-Chl	FP-BG	HAB form	Shore HAB
211	Ulster Heights L	7/2/2007	epi	22	22	3	3	2	2											
211	Ulster Heights L	7/19/2007	epi	23	25	3	3	2	25											
211	Ulster Heights L	7/29/2007	epi	28	25	3	3	3	2											
211	Ulster Heights L	8/16/2007	epi	25	24	3	3	3	2											
211	Ulster Heights L	8/27/2007	epi	23	23	2	3	2	2											
211	Ulster Heights L	7/20/2008	epi	31	28	2	3	2	2											
211	Ulster Heights L	7/26/2008	epi	23	20	2	4	2	2											
211	Ulster Heights L	8/9/2008	epi	21	24	2	3	2	0											
211	Ulster Heights L	8/25/2008	epi	24	25	2	3	2	25											
211	Ulster Heights L	9/13/2008	epi	26	21	3	3	2	25											
211	Ulster Heights L	08/18/2009	epi	34	23	2	3	2	2					0.00						
211	Ulster Heights L	09/01/2009	epi	28	20	2	3	1	2											
211	Ulster Heights L	09/21/2009	epi	21	17	3	3	5	8			15.73		0.00						
211	Ulster Heights L	10/12/2009	epi	10	10	2	3		8			11.58								
211	Ulster Heights L	7/5/2010	epi	31	26	1	3	2	0	0	0									
211	Ulster Heights L	7/18/2010	epi	30	28	1	3	2	0	0	0									
211	Ulster Heights L	8/1/2010	epi	25	24	2	3	2	2	0	0									
211	Ulster Heights L	8/15/2010	epi	27	24	2	3	2	0	0	0	17.00		0.00						
211	Ulster Heights L	8/15/2010	epi									7092		0.13						
211	Ulster Heights L	8/15/2010	epi									1470		0.03						
211	Ulster Heights L	8/29/2010	epi	29	22	1	2	1	0	0	0									
211	Ulster Heights L	9/11/2010	epi			1	2	1	0	0	0									
211	Ulster Heights L	7/17/2011	epi	36	25	3	3	2	1	0	0	8.10	9.70							
211	Ulster Heights L	8/1/2011	epi	28	25	2	3	2	0	0	0	10.60	8.00	<0.30	<0.178					
211	Ulster Heights L	8/22/2011	epi	22	23	2	3	2	2	0	0	10.00	13.80						i	
211	Ulster Heights L	8/22/2011	epi											0.00						
211	Ulster Heights L	10/2/2011	epi											0.00						
211	Ulster Heights L	10/2/2011	epi	15	16	2	3	2	125	0	0	7.30	10.90							
211	Ulster Heights L	7/2/2012	epi											<0.30	<0.820		4.20	1.92		
211	Ulster Heights L	7/2/2012	epi	28	27	2	3	1	0	0	0	6.90	0.90	<0.30	<0.410		1.87	0.10	FI	
211	Ulster Heights L	7/21/2012	epi	27	25	2	2	2	0	0	0	1.70	0.90	<0.30	<0.328		2.46	0.00		
211	Ulster Heights L	8/5/2012	epi	28	26	2	3	2	2	0	0	5.60	1.20	<0.30	<0.659		3.14	0.00		
211	Ulster Heights L	8/5/2012	epi									3.33		<0.001						
211	Ulster Heights L	8/21/2012	epi	28		1	1	1	0	0	0	5.70	1.10	<0.30	<0.552		3.07	1.13	I	
211	Ulster Heights L	8/26/2012	epi									3.00		<0.007						
211	Ulster Heights L	9/11/2012	epi	15		3	4	3	12	0	0	5.50	0.90	0.44	<3.299		2.46	1.18	I	
211	Ulster Heights L	7/15/2014	epi	24	20	3	3	2	12	0	0	5.10	0.80	<0.39	<0.03	<0.001	3.29	0.00	I	i
211	Ulster Heights L	8/8/2014	epi	22	24	2	3	2	2	0	0	2.20	0.80	<0.28	<0.05	<0.001	2.43	0.00	I	
211	Ulster Heights L	6/24/2015	epi	22		2	4	3	1	0	0	6.20	1.00	0.74	<0.007	<0.000	2.76	0.00		
211	Ulster Heights L	7/11/2015	epi	31	22	3	3	2	2	0	0	3.10	1.20	<1.01	<0.003	<0.011	3.35	0.00	I	
211	Ulster Heights L	7/25/2015	epi	25	23	3	3	2	12	0	0	7.00	1.10	<0.30	<0.002	<0.014	2.63	0.00	I	I
211	Ulster Heights L	8/8/2015	epi	26	23	2	3	3	2	0	0	2.80	0.20		-		1.46	0.14	I	I
211	Ulster Heights L	9/1/2015	epi	28	23	2	3	2	2	0	0			<0.49	<0.031	<0.028	3.30	0.00	I	I

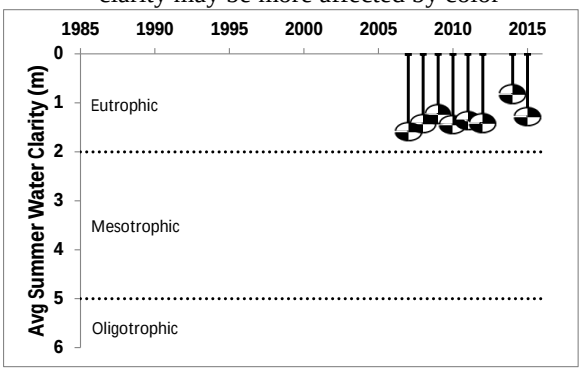
Legend Information

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

Appendix C- Long Term Trends, Ulster Heights Lake

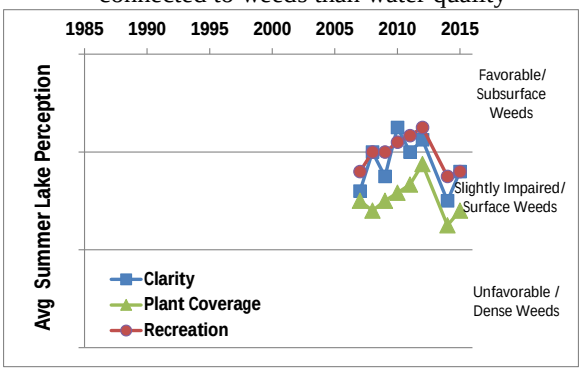
Long Term Trends: Water Clarity

- Slight decrease 2007-15
- Most readings typical of *eutrophic* lakes, but clarity may be more affected by color



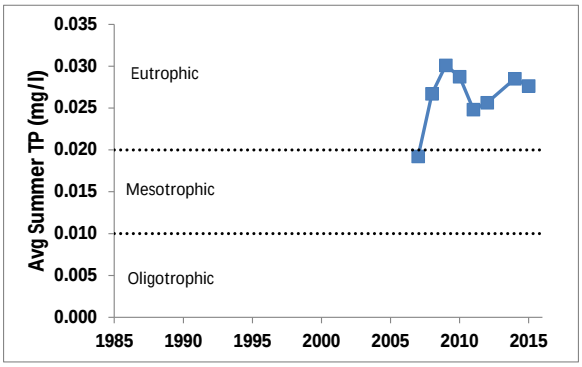
Long Term Trends: Lake Perception

- Improved 2007-12; less favorable 2014-15
- Recreational perception more closely connected to weeds than water quality



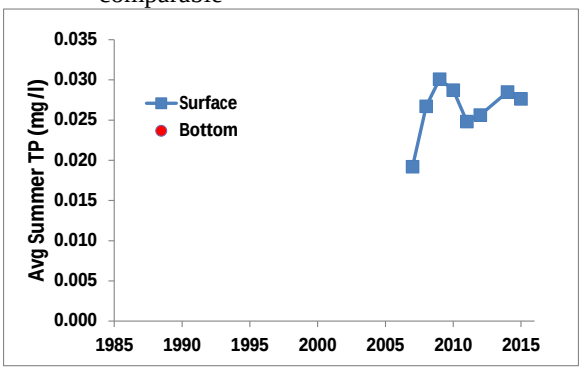
Long Term Trends: Phosphorus

- Higher TP after ’07, but stable since
- Most readings typical of *eutrophic* lakes



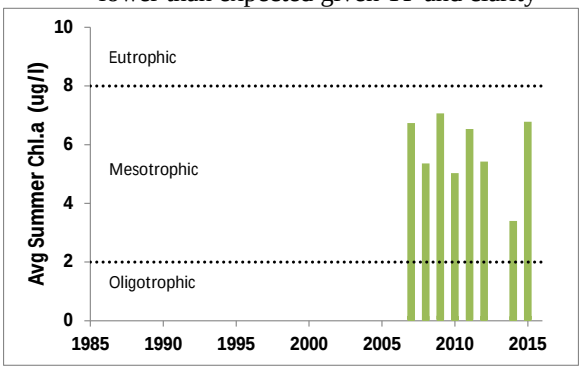
Long Term Trends: Bottom Phosphorus

- No deepwater samples in shallow lakes
- Likely that surface and bottom TP levels are comparable



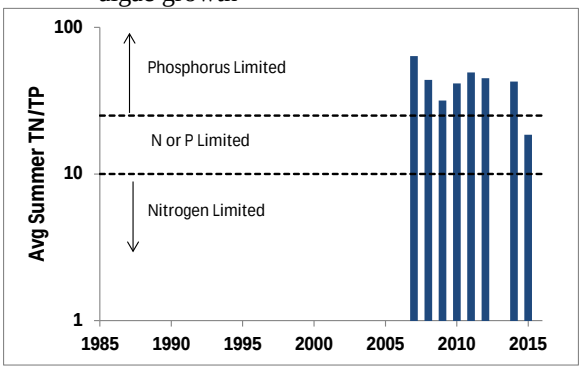
Long Term Trends: Chlorophyll a

- Apparently variable readings
- Most readings typical of *mesotrophic* lakes; lower than expected given TP and clarity



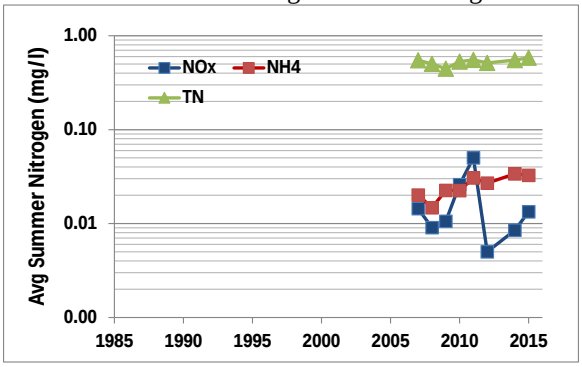
Long Term Trends: N:P Ratio

- Decrease since ’07 but probably no trend
- Most readings indicate phosphorus limits algae growth



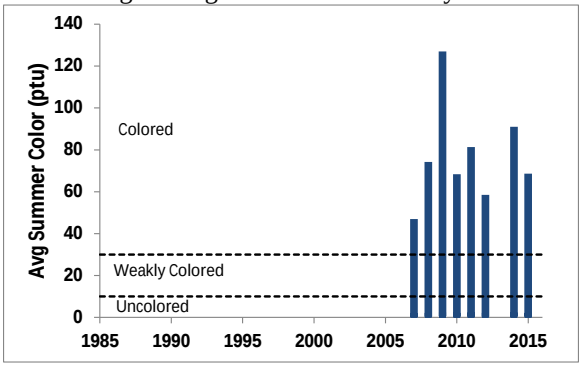
Long Term Trends: Nitrogen

- Ammonia ↑ slightly; NOx and TN stable?
- Total nitrogen slightly elevated, probably consistent with higher color readings



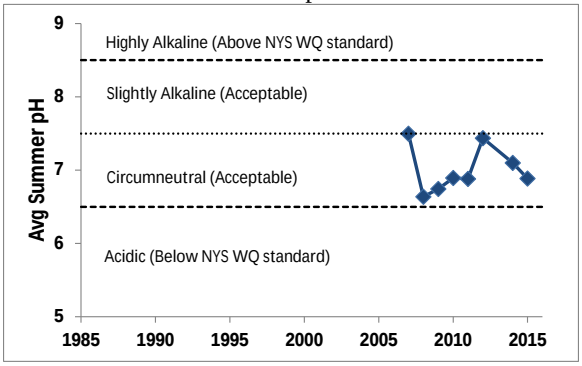
Long Term Trends: Color

- No long term trend
- Most readings typical of *highly colored* lakes, high enough to limit water clarity



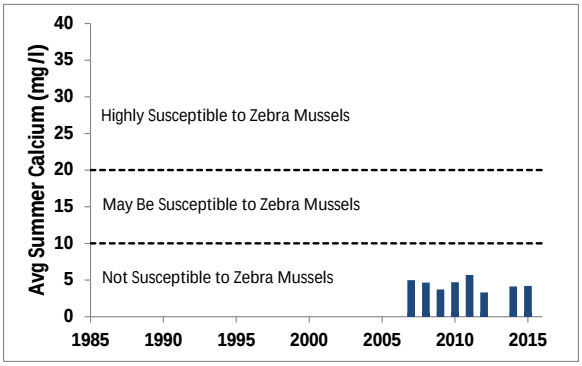
Long Term Trends: pH

- Variable pH readings, but recent drop
- Most readings typical of *circumneutral* lakes, but occasional low pH



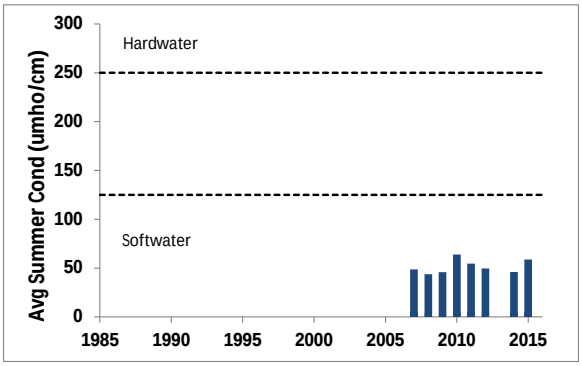
Long Term Trends: Calcium

- No long term trend
- Most readings indicate low susceptibility to zebra mussels



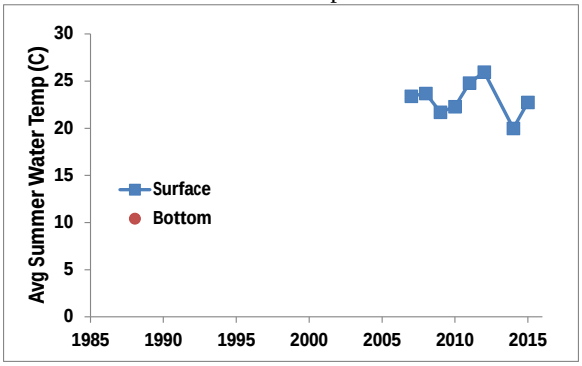
Long Term Trends: Conductivity

- No long term trend
- Most readings typical of *softwater* lakes



Long Term Trends: Water Temperature

- No long term trend; "normal" in 2015
- Bottom deepwater temperatures probably similar to surface temperatures



Appendix D:
Algae Testing Results from SUNY ESF Study

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

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

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

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

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

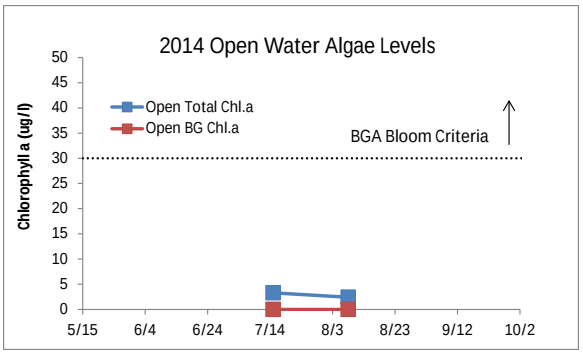


Figure D1:
2014 Open Water Total and BGA Chl.a

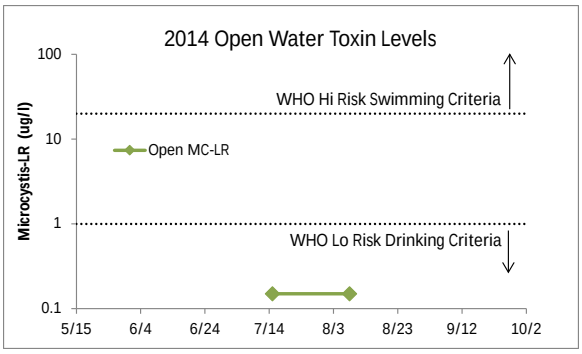


Figure D2:
2014 Open Water Microcystin-LR

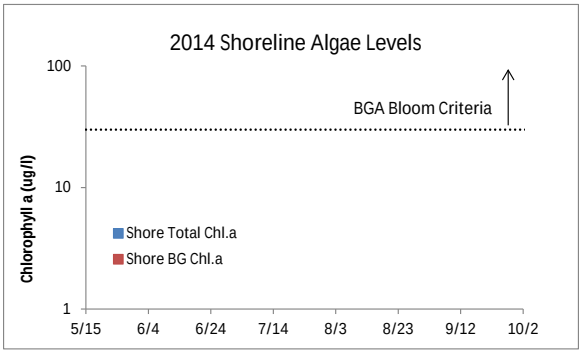


Figure D3:
2014 Shoreline Total and BGA Chl.a

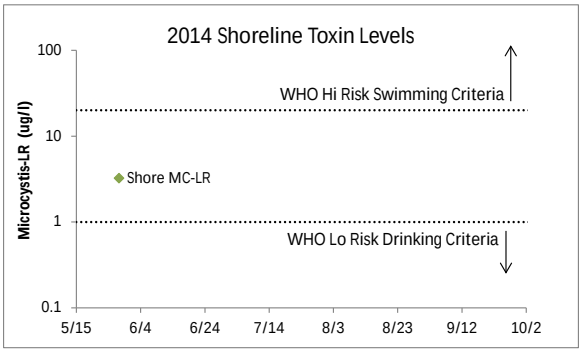


Figure D4:
2014 Shoreline Microcystin-LR

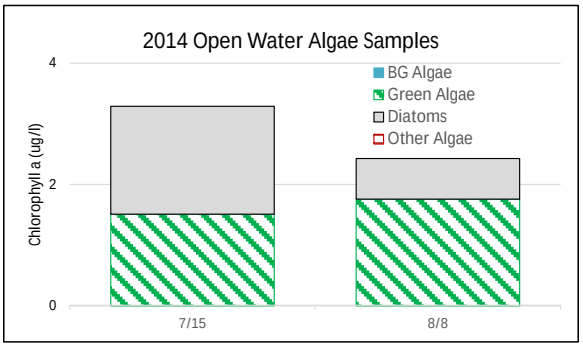


Figure D5:
2014 Open Water Algae Types

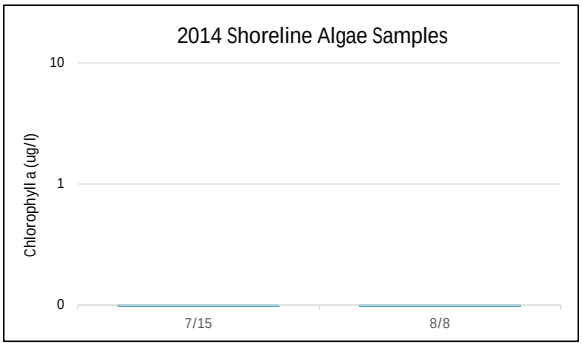


Figure D6:
2014 Shoreline Algae Types

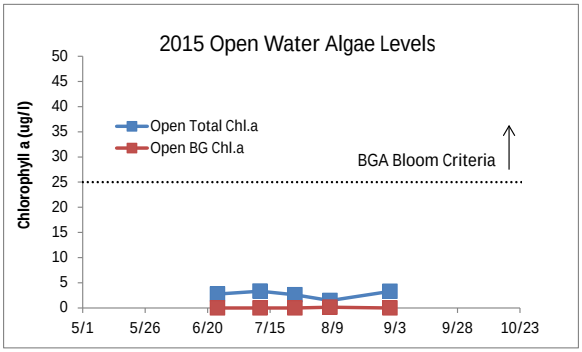


Figure D7:
2015 Open Water Total and BGA Chl.a

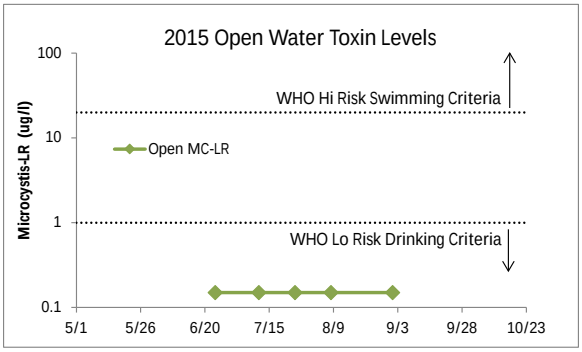


Figure D8:
2015 Open Water Microcystin-LR

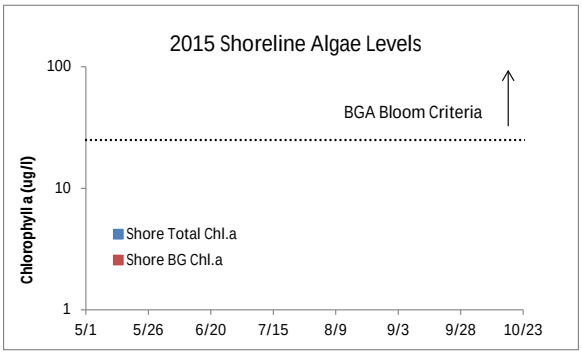


Figure D9:
2015 Shoreline Total and BGA Chl.a

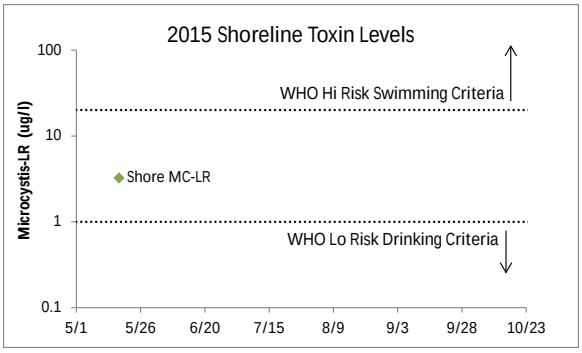


Figure D10:
2015 Shoreline Microcystin-LR

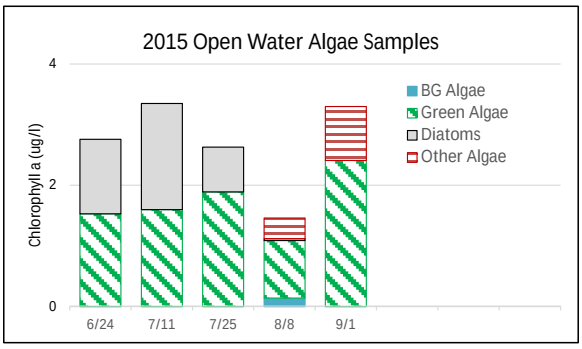


Figure D11:
2015 Open Water Algae Types

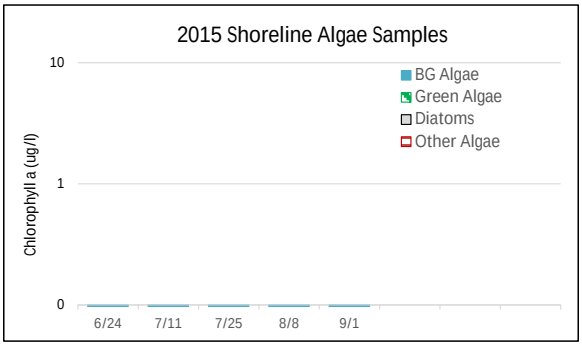


Figure D12:
2015 Shoreline Algae Types

Appendix E:
AIS Species in Ulster County

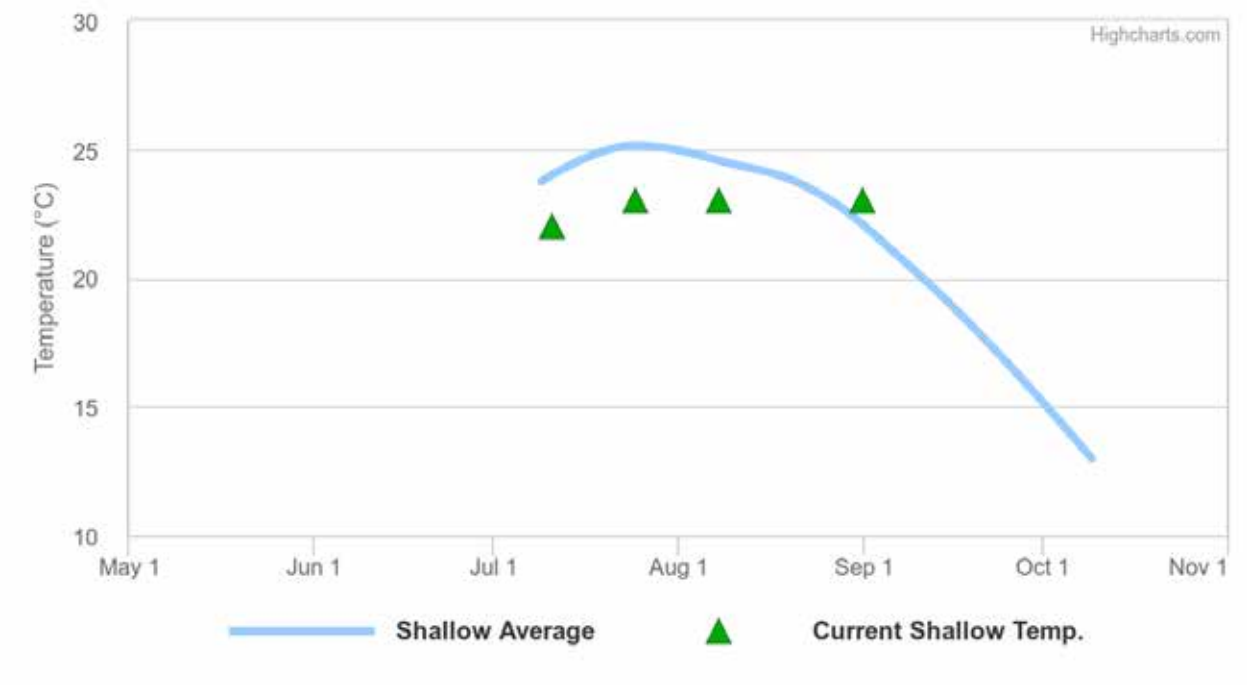
The table below shows the invasive aquatic plants and animals that have been documented in Ulster County, as cited in either the iMapInvasives database (http://www.imapinvasives.org/) or in the NYSDEC Division of Water database. These databases may include some, but not all, non-native plants or animals 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 - Ulster County			
Waterbody	**Kingdom**	**Common name**	**Scientific name**
Beaver Lake	Plant	Fanwort	*Cabomba caroliniana*
Beaver Lake	Plant	European four leaf clover	*Marsilea quadrifolia*
Beaver Lake	Plant	Brittle naiad	*Najas minor*
Beaver Lake	Plant	Watercress	*Nasturtium officinale*
Beaver Lake	Plant	Yellow floating heart	*Nymphoides peltata*
Beaver Lake	Plant	Curly leafed pondweed	*Potamogeton crispus*
Beaver Lake	Plant	Water chestnut	*Trapa natans*
Cape Pond	Plant	Water chestnut	*Trapa natans*
Chodikee Lake	Plant	Water chestnut	*Trapa natans*
Esopus Creek, Saugerties	Plant	Eurasian watermilfoil	*Myriophyllum spicatum*
Esopus Lake	Plant	Eurasian watermilfoil	*Myriophyllum spicatum*
Esopus Lake	Plant	Water chestnut	*Trapa natans*
Hudson River	Animal	Zebra mussel	*Dreissena polymorpha*
Hudson River	Plant	Water chestnut	*Trapa natans*
Hudson River, Gumaer Island	Plant	Eurasian watermilfoil	*Myriophyllum spicatum*
Hudson River, Gumaer Island	Plant	Water chestnut	*Trapa natans*
Sturgeon Pool	Animal	Common carp	*Cyprinus carpio*
Swartekill unnamed pond	Plant	Eurasian watermilfoil	*Myriophyllum spicatum*
Tillson Lake	Plant	Water chestnut	*Trapa natans*

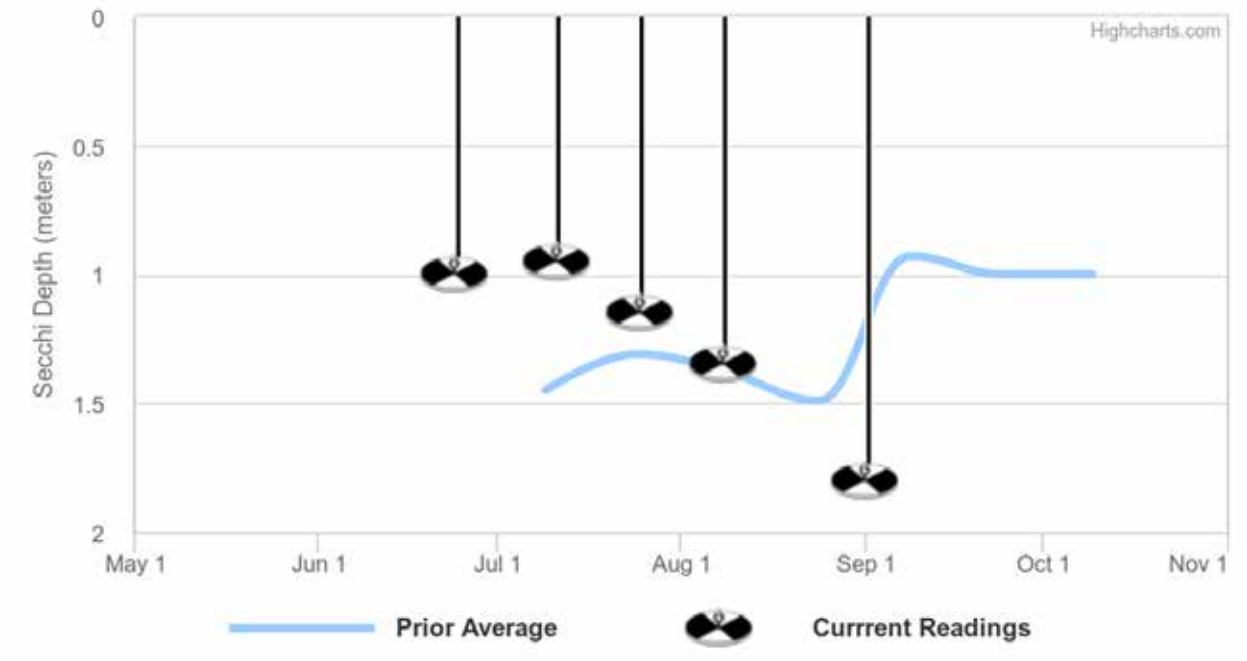
Appendix F: Current Year vs. Prior Averages for Ulster Heights Lake

Current Year Water Temperatures vs. Prior Average



There are not enough shallow water sample temperatures to determine a trend for the current year when compared to the average of readings collected from 2007 to 2014.

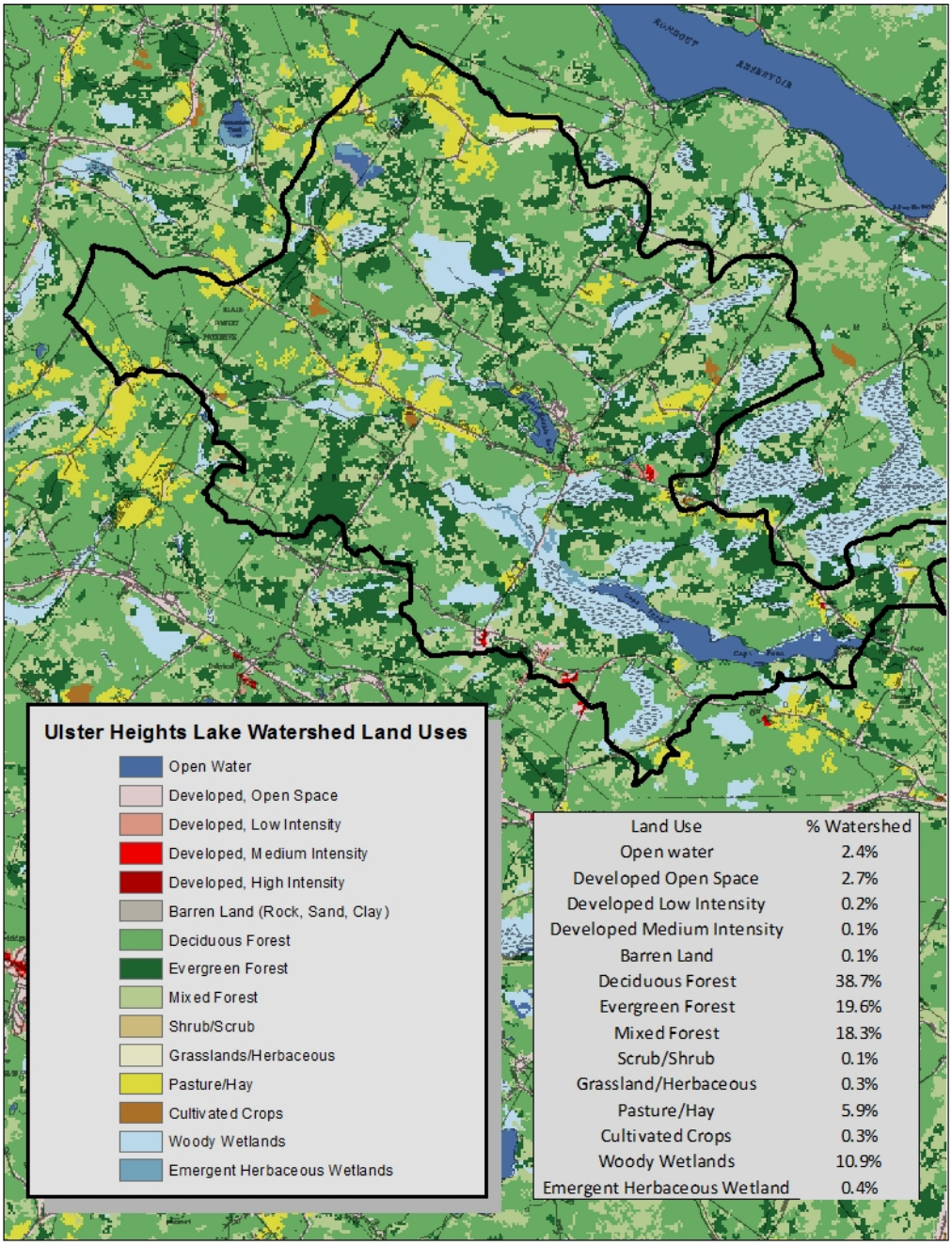
Current Year Secchi Readings vs. Prior Average



There are not enough session Secchi readings to determine a trend for the current year when compared to the average of readings collected from 2007 to 2014

Appendix G: Watershed and Land Use Map for Ulster Heights Lake

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



Land Use	% Watershed
Open water	2.4%
Developed Open Space	2.7%
Developed Low Intensity	0.2%
Developed Medium Intensity	0.1%
Barren Land	0.1%
Deciduous Forest	38.7%
Evergreen Forest	19.6%
Mixed Forest	18.3%
Scrub/Shrub	0.1%
Grassland/Herbaceous	0.3%
Pasture/Hay	5.9%
Cultivated Crops	0.3%
Woody Wetlands	10.9%
Emergent Herbaceous Wetland	0.4%