

Robinson Pond Questions and Answers, 2015 CSLAP

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

A1. Conditions in Robinson Pond were probably close to normal in 2015. Algae levels were slightly lower than usual, but phosphorus readings were higher and water clarity was close to normal. No shoreline blooms were reported, but aquatic plant coverage was slightly higher than usual.

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

A2. Chloride sampling results were typical of lakes with moderate to high impacts from road salt runoff, although no biological impacts were reported or measured.

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

A3. Robinson Pond had similar water clarity, algae and nutrient readings than the typical nearby lake. Plant coverage was similar to plant coverage in many nearby lakes in 2015, perhaps in response to lack of management.

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

A4. pH has been lower in the last few years than two decades ago, although these readings are still acceptable for aquatic organisms. Phosphorus readings have increased in the last few years, perhaps consistent with a rise in conductivity over the same period. Water temperatures have also risen over the same period.

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

A5. Robinson Pond 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.

Lake Use				
	PWL	Average Year	2015	Primary issue
Potable Water	□	□	□	Not applicable
Swimming	◆	◆	▲	Algae levels
Recreation	■	■	■	Algae levels
Aquatic Life	◆	◆	▲	High pH
Aesthetics	◆	◆	◆	Invasive plants
Habitat	◆	▲	▲	Invasive plants
Fish Consumption	□	▲	□	

●	Supported / Good
▲	Threatened / Fair
◆	Stressed / Poor
	Impaired
	Not Known

CSLAP 2015 Lake Water Quality Summary: Robinson Pond

General Lake Information

Location	Town of Copake
County	Columbia
Basin	Lower Hudson River
Size	46.6 hectares (115.1 acres)
Lake Origins	Augmented by 17ft high by 80ft wide earthen dam (1915)
Watershed Area	9,061 hectares (22,380 acres)
Retention Time	0.04 years
Mean Depth	4 meters
Sounding Depth	9 meters
Public Access?	town beach
Major Tributaries	Roeliff Jansen Kill
Lake Tributary To...	Roeliff Jansen Kill to Hudson River
WQ Classification	B(T) (contact recreation = swimming)
Lake Outlet Latitude	42.113
Lake Outlet Longitude	-73.564
Sampling Years	1989-1993, 2007-2012, 2014-2015
2015 Samplers	Gary Menchen
Main Contact	Gary Menchen

Lake Map



Background

Robinson Pond is a 115 acre, class B(T) lake found in the Town of Copake in Columbia County in the Capital District region of New York State. It was first sampled as part of CSLAP in 1989.

It is one of five CSLAP lakes among the nearly 450 lakes and ponds found in Columbia County, and one of 67 CSLAP lakes among the more than 3680 lakes and ponds in the Lower Hudson River drainage basin.

Lake Uses

Robinson Pond is a Class B(T) lake; this means that the best intended use for the lake is for contact recreation—swimming and bathing, non-contact recreation—boating and fishing, aquatic life, and aesthetics. The (T) designation refers to the support of trout. The lake is used by lake residents and invited guests for swimming, power boating, and fishing. There is no public access to the lake, although lake community residents use a lake association beach and clubhouse for recreational activities.

The state does not stock Robinson Pond; it is not known if any private stocking occurs.

General statewide fishing regulations are applicable in Robinson Pond.

Historical Water Quality Data

CSLAP sampling was conducted on Robinson Pond from 1989 to 1993, 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 Robinson Pond can also be found on the NYSDEC web page at <http://www.dec.ny.gov/lands/77877.html>.

Robinson Pond was sampled by the NYSDEC as part of the state Lake Classification and Inventory (LCI) survey, the state ambient lake monitoring program, one time in 1984. Water quality conditions appeared to be comparable to those measured through CSLAP.

The Ro Jan Kill was sampled through NYSDEC RIBS monitoring program in 2008 at Dales Bridge Road. The Ro Jan Kill has also been sampled by the NYSDEC as part of the small lakes TMDL (total maximum daily load) project used to evaluate the magnitude of nutrient sources entering lakes that have been identified as impaired due to excessive nutrients.

Coliform testing is conducted to support the swimming beach. The results from this sampling are not available through CSLAP. Limited water quality monitoring has been conducted by Allied Biological in support of the development of a lake management plan for the lake—these results (and the Plan) are summarized at <http://www.taconicshores.org/LakeMgmtPlanFINAL.pdf>.

Lake Association and Management History

Robinson Pond is served by the Taconic Shores Property Owners Association. The lake association is involved in a variety of lake management and social activities, including:

- Aquatic plant management for Eurasian watermilfoil and water chestnut, using Navigate (2,4-D) and Aquathol K, both applied by Allied Biological, and aquatic weed harvesting, using a HydroMate. This replaces the benthic barriers, winter drawdown and fluridone

treatment attempted at the lake in previous years. Hand pulling and raking activities will likely continue on a local basis.

- Participate in CSLAP
- Stock herbivorous beetles through a program run by Cornell University to control Purple loosestrife infestations
- Enforce the TSPOA Rule requiring lakefront property owners to have vegetation barriers along their shorelines (this will help to minimize runoff into the lake which is a likely source of the existing nutrient load in the lake)
- Educate TSPOA residents on the identification of European carp and encourage removal of these carp from the lake
- Development of a Rules and Regulations handbook that outlines proper lake stewardship, including septic management

The Taconic Shores Property Owners Association maintains a website at <http://www.taconicshores.org/>.

Summary of 2015 CSLAP Sampling Results

Evaluation of 2015 Annual Results Relative to 1989-2014

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 – Robinson Pond” section in Appendix C.

Evaluation of Eutrophication Indicators

Algae levels (as measured by chlorophyll *a*) were slightly lower than usual in 2015, although phosphorus readings were higher than usual. Water clarity was close to normal, suggesting that the changes in each of these indicators is typically within the normal and expected range of variability for the lake. However, these indicators have varied, without any clear trends, in sync with each other over the last two decades—in general, as nutrients increase, algae levels increase, and water clarity decreases- although phosphorus readings have increased somewhat over the last five years.

Lake productivity usually increases from June through August, as manifested in lower water clarity and higher nutrient and algae levels. Productivity then decreases in the fall. This seasonal pattern was also apparent in 2014 and 2015.

The lake can be characterized as *eutrophic*, or highly productive, based on total phosphorus, water clarity, and chlorophyll *a* readings (all typical of *eutrophic* lakes). The trophic state indices (TSI) evaluation for the last several years suggests that water clarity readings are slightly higher than expected given the nutrient and algae levels in the lake. This suggests that algal blooms in Robinson Pond may be sporadic (and they were not apparent in 2014 and 2015). Overall trophic conditions are summarized on the Lake Scorecard and Lake Condition Summary Table.

Evaluation of Potable Water Indicators

Algae levels are high enough to render the lake susceptible to taste and odor compounds or elevated DBP (disinfection by product) compounds that could affect the potability of the water, but the lake is not used for these purposes. The lake is only weakly stratified, although

hypolimnetic phosphorus and ammonia readings are higher than those measured at the lake surface. This indicates that surface water intakes used “unofficially” for potable water cannot be dropped below the zone in which algae grow most strongly (due to depth mixing in the lake). Potable water conditions, at least as measurable through CSLAP, are summarized in the Lake Scorecard and Lake Condition Summary Table.

Evaluation of Limnological Indicators

pH has been lower since the early 1990s, and lower readings were apparent in 2014 and 2015, although no recent trends have been apparent. Color readings were lower than normal in 2015, and the increase in water color after 2002 may be due to the change in laboratories. Conductivity readings have increased since about 2000, and were also higher than usual in 2015. Ammonia readings have also increased over the same period, although they were close to normal in 2015.

Chloride levels in the 2015 samples, collected for the first time through CSLAP and cited in Appendix A, ranged from 35 to 39 mg/l. These values fall within the “major” road salt runoff levels cited by the New Hampshire DES. These readings are well below the state potable water quality standard of 250 mg/l but above the range of values found in most NYS lakes. These readings suggest a moderate to high likelihood of biological impacts from road salt. Additional data will help to determine if these represent normal readings for the lake.

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

Evaluation of Biological Condition

The fluoroprobe samples analyzed by SUNY ESF indicate both lower algae levels and a lower percentage of blue green algae in early summer, and higher total and blue green chlorophyll readings sometime after early summer (mid-summer in some years, late summer and fall in other years). In 2014, the algal community was comprised of primarily green algae and other non-blue green species, consistent with lower overall algae and nutrient levels, while blue green algae dominated the samples at the end of 2015. Blue green algae has often been a significant part of shoreline algal blooms, but this was not apparent in the last two years (no blue green blooms were documented in either year).

The macrophyte surveys conducted by Allied Biological and historical CSLAP plant survey data identified at least 13 aquatic plant species, including at least three exotic plant species (*Myriophyllum spicatum*, Eurasian watermilfoil; *Najas minor*, brittle naiad; and *Trapa natans*, water chestnut). In addition, the list of exotic wetlands plants includes at least purple loosestrife (*Lythrum salicaria*). The modified floristic quality index (FQI) data indicate that the quality of the aquatic plant community is “fair.”

The 1992 zooplankton sample found that the lake zooplankters are dominated by cladocera, typical of more productive CSLAP lakes. It is not known if this is representative of normal conditions in the lake.

The composition of the fish community is not known, although it is likely that the lake fishery can be described as warmwater.

Macroinvertebrate surveys were conducted by the NYSDEC in 2012. The results from this survey have yet been compiled.

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

Evaluation of Lake Perception

Recreational assessments were more favorable in 2015, consistent with lower algae levels. Plant coverage was much higher than usual, most likely due to changes in plant management. Water quality assessments are typically best in late summer, although these assessments degraded during the summer of 2015 (and with a seasonal increase in plant coverage resulted in seasonally degrading recreational assessments). Overall lake perception is summarized on the Lake Scorecard and Lake Condition Summary Table.

Evaluation of Local Climate Change

Water temperature readings in the summer index period were slightly higher than usual in 2014 and 2015, and these readings have increased slightly in the last few years. Annual changes in surface water temperatures are generally synchronized with annual changes in bottom water temperatures, although deepwater temperatures have decreased slightly in the last few years. It is not yet known if this lack of significant water temperature changes over this period provides any insights about 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 indicate algae levels that at times are close to the threshold for harmful algal blooms (HABs), and an increasing risk of blue green algae dominance within shoreline blooms and in the open water later in the summer. Algal toxins data indicate low levels of microcystis in the open water, but (at times) highly elevated levels of several algal toxins in blooms. No surface blooms were reported in 2015. However, lake residents are advised to avoid contact with surface scums or heavily discolored water often associated with blue green algae blooms.

Lake Condition Summary

Category	Indicator	Min	Overall Avg	Max	2015 Avg	Classification	2015 Change?	Long-term Change?
Eutrophication Indicators	Water Clarity	0.23	1.86	4.28	2.06	Eutrophic	Within Normal Range	No Change
	Chlorophyll <i>a</i>	0.10	24.09	92.80	17.89	Eutrophic	Within Normal Range	No Change
	Total Phosphorus	0.009	0.038	0.220	0.046	Eutrophic	Within Normal Range	No Change
Potable Water Indicators	Hypolimnetic Ammonia	0.01	0.48	5.51	0.69	Elevated Deepwater NH4	Higher than Normal	Not known
	Hypolimnetic Arsenic							Not known
	Hypolimnetic Iron							Not known
	Hypolimnetic Manganese							Not known
Limnological Indicators	Hypolimnetic Phosphorus	0.016	0.084	0.540	0.066	Close to Surface TP Readings	Within Normal Range	Not known
	Nitrate + Nitrite	0.00	0.33	1.40	0.46	Intermediate NOx	Within Normal Range	No Change
	Ammonia	0.01	0.06	0.21	0.07	Low Ammonia	Within Normal Range	Not yet known
	Total Nitrogen	0.53	0.94	1.79	0.93	Intermediate Total Nitrogen	Within Normal Range	Not yet known
	pH	5.82	7.82	8.99	7.59	Alkaline	Within Normal Range	No Change
	Specific Conductance	142	278	377	325	Hardwater	Higher than Normal	No Change
	True Color	2	28	153	10	Intermediate Color	Within Normal Range	No Change
	Calcium	20.2	30.4	39.3	21.0	Highly Susceptible to Zebra Mussels	Within Normal Range	Not yet known
Lake Perception	WQ Assessment	1	3.0	5	2.8	Definite Algal Greenness	Within Normal Range	No Change
	Aquatic Plant Coverage	1	2.2	4	2.8	Subsurface Plant Growth	Within Normal Range	No Change
	Recreational Assessment	2	3.3	5	3.0	Slightly Impaired	Within Normal Range	No Change
Biological Condition	Phytoplankton					Dominated by green algae?	Not known	Not known
	Macrophytes					Fair quality of the aquatic plant community	Not known	Not known
	Zooplankton					Dominated by cladocera?	Not known	Not known
	Macroinvertebrates					Not evaluated through CSLAP	Not known	Not known
	Fish					Warmwater fishery?	Not known	Not known
	Invasive Species					European ear snail, Eurasian watermilfoil, water chestnut, curly leafed pondweed, brittle naiad, purple loosestrife	Not known	Not known
Local Climate Change	Air Temperature	10	24.3	36	26.0		Within Normal Range	Increasing Slightly
	Water Temperature	11	22.7	29	24.3		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	1	47	236	29	Most readings indicate low risk of BGA	Not known	Not known
	Open Water FP Chl.a	0	17	237	7	Some readings indicate high algae levels	Not known	Not known
	Open Water FP BG Chl.a	0	6	73	4	Few readings indicate high BGA levels	Not known	Not known
	Open Water Microcystis	<DL	<DL	0.5	<DL	Low to undetectable open water microcystins	Not known	Not known
	Open Water Anatoxin a	<DL	<DL	0.6	<DL	Open water Anatoxin-a at times detectable	Not known	Not known
	Shoreline Phycocyanin					No shoreline blooms sampled for PC	Not known	Not known
	Shoreline FP Chl.a	0	68	187		Most readings indicate high algae levels	Not known	Not known
	Shoreline FP BG Chl.a	0	7	26		Few readings indicate high BGA levels	Not known	Not known
	Shoreline Microcystis	<DL	20.9	168.6		Occasionally very high 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

Robinson Pond is presently among the lakes listed on the 2008 Lower Hudson River drainage basin Priority Waterbody List (PWL); the lake is listed as having recreation *impaired*, and public bathing, aesthetics and aquatic life *stressed*. The PWL listing for Robinson Pond is listed in Appendix B.

Potable Water (Drinking Water)

The CSLAP dataset at Robinson 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. Algae levels are consistently high enough in the surface waters to impact any use of the lake for potable water.

Public Bathing

The CSLAP dataset at Robinson Pond, 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 excessive algae, shoreline and open water algae blooms, and poor water clarity, although impacts may be lower in some years. 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 Robinson Pond, including water chemistry data, physical measurements, and volunteer samplers' perception data, suggest that recreation may be *impaired* by excessive algae, periodic shoreline algae blooms, and excessive surface growth of aquatic plants. However, this impact varies depending of the extent and effectiveness of plant management actions at the lake.

Aquatic Life

The CSLAP dataset on Robinson Pond, including water chemistry data, physical measurements, and volunteer samplers' perception data, suggest that aquatic life may be *stressed* by deepwater anoxia, the presence of invasive plants, and occasionally elevated pH, and *threatened* by road

salt runoff and perhaps occasionally by algal blooms. Additional data are needed to evaluate the food and habitat conditions for aquatic organisms in the lake.

Aesthetics and Habitat

The CSLAP dataset on Robinson Pond, including water chemistry data, physical measurements, and volunteer samplers' perception data, suggest that aesthetics may be *poor* due to excessive weeds and algae, as indicated by regular reports by CSLAP volunteers that the lake "looks bad". Habitat may be *fair* due to excessive invasive weeds.

Fish Consumption

There are no fish consumption advisories posted for Robinson Pond.

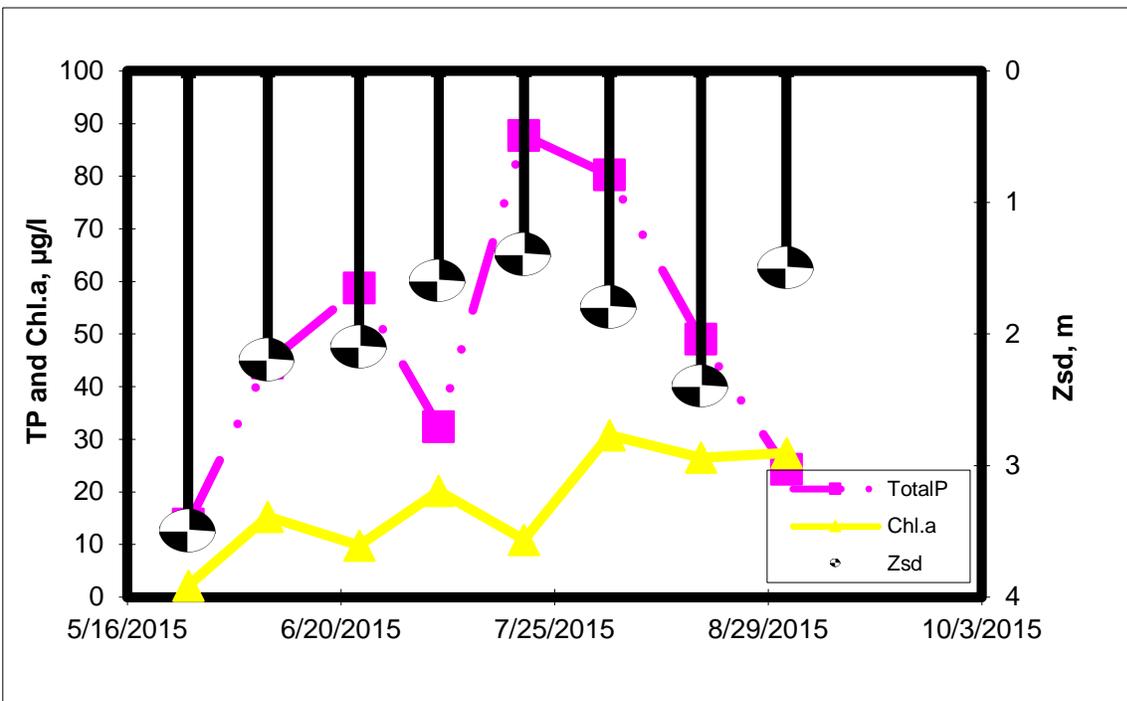
Additional Comments and Recommendations

Lake residents should continue to report and avoid exposure to surface scums or heavily discolored water associated with blue green algae blooms.

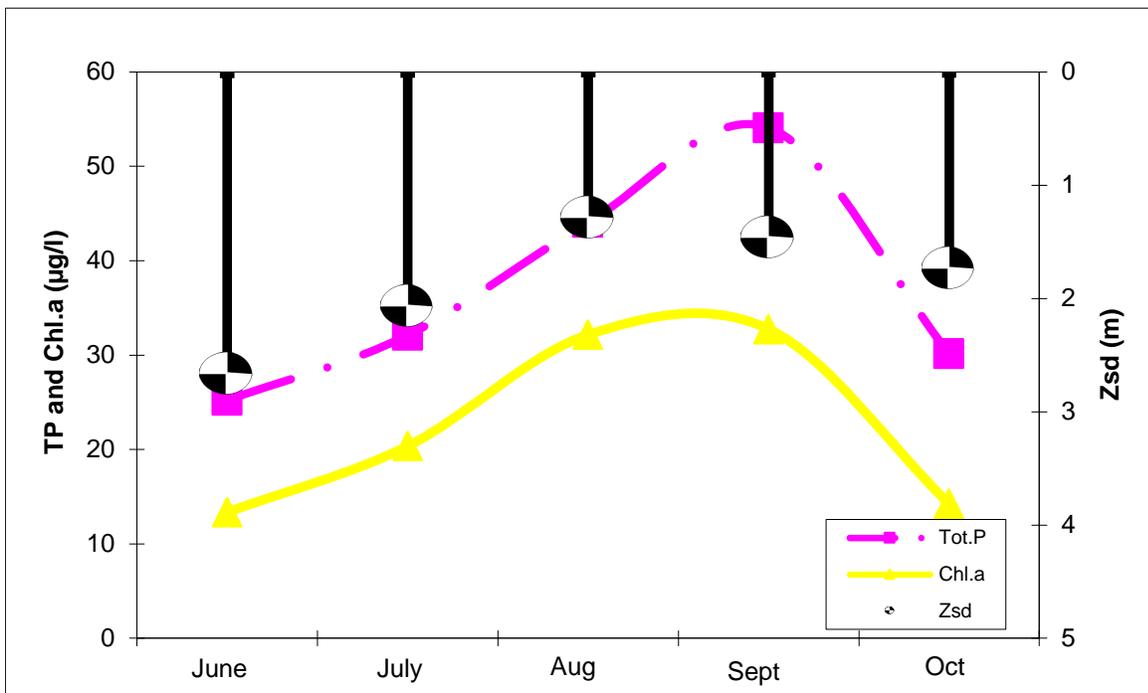
Aquatic Plant IDs-2015

None submitted for identification.

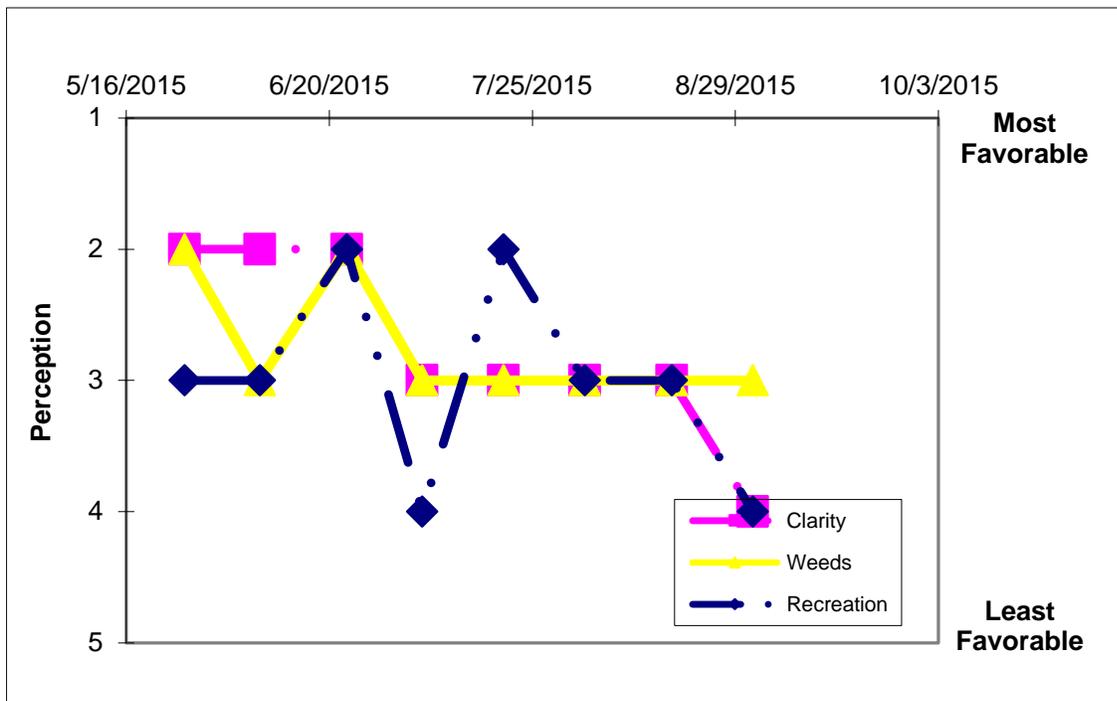
Time Series: Trophic Indicators, 2015



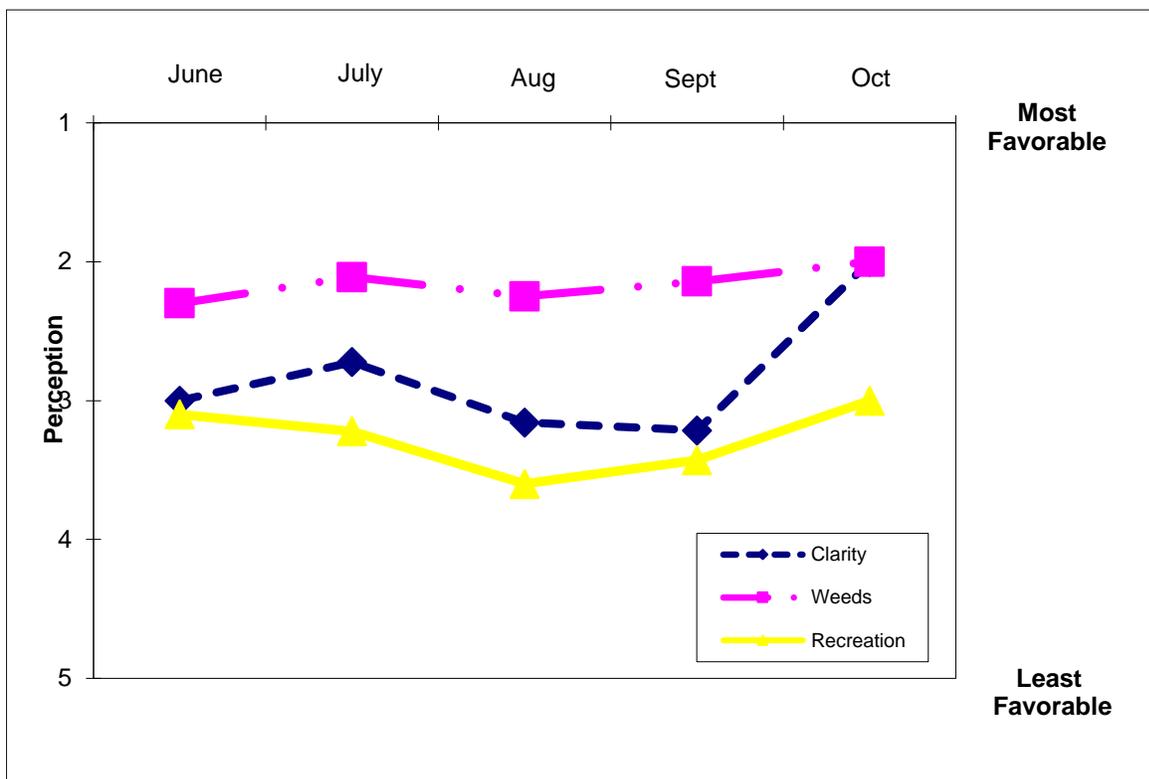
Time Series: Trophic Indicators, Typical Year (1989-2015)



Time Series: Lake Perception Indicators, 2015



Time Series: Lake Perception Indicators, Typical Year (1989-2015)



Appendix A- CSLAP Water Quality Sampling Results for Robinson Pond

LNum	PName	Date	Zbot	Zsd	Zsamp	Tot.P	NO3	NH4	TDN	TN/TP	TColor	pH	Cond25	Ca	Chl.a	Cl
59	Robinson P	7/18/1989	7.9	2.36	1.5	0.035	0.71				15	7.95	313		27.80	
59	Robinson P	8/2/1989	7.9	2.13	1.5	0.023	0.53				7	8.36	326		11.10	
59	Robinson P	8/16/1989	7.8	1.60	1.5	0.027	0.15				8	8.56	317		14.10	
59	Robinson P	8/30/1989	7.9	0.53	1.5	0.015	0.01				20	7.50	309			
59	Robinson P	9/13/1989	7.6	1.86	1.5	0.033	0.10				13	8.45	314		14.20	
59	Robinson P	9/26/1989	7.7	1.30	1.5	0.031	0.14				10	8.43	315		19.10	
59	Robinson P	10/5/1989	7.8	1.25	1.5	0.030	0.19				8	8.48	321		17.20	
59	Robinson P	10/13/1989	7.4	1.37	1.5	0.027	0.15				4	8.26	324			
59	Robinson P	6/26/1990	7.9	3.05	1.5	0.046	1.40				10	7.77	310		7.86	
59	Robinson P	7/10/1990	7.9	3.22	1.5	0.023	1.20				10	8.67	315		16.30	
59	Robinson P	7/24/1990	7.9	1.77	1.5	0.022	0.64				8	8.35	294		12.00	
59	Robinson P	8/8/1990	8.4	1.30	1.5	0.033	0.26				13	8.44	246		21.30	
59	Robinson P	8/21/1990	8.1	0.91	1.5	0.031	0.32				13	8.52	243		43.50	
59	Robinson P	9/4/1990	8.7	1.52	1.5	0.043	0.08				8	8.42	269		25.90	
59	Robinson P	9/18/1990	7.9	1.45	1.5	0.033	0.36				10	8.28	294		38.10	
59	Robinson P	10/2/1990	8.0	1.22	1.5	0.031	0.13				11	8.48	295		29.40	
59	Robinson P	6/26/1991	8.0	3.05	1.5	0.019	0.54				14	8.79	273		9.49	
59	Robinson P	7/9/1991	7.9	1.83	1.5	0.023	0.31				5	8.62	275		20.40	
59	Robinson P	7/24/1991	7.9	1.22	1.5	0.050	0.02				5	8.92	239		15.50	
59	Robinson P	8/6/1991	7.7	1.05	1.5	0.045	0.01				11	8.33	251		49.10	
59	Robinson P	8/20/1991	8.2	1.04	1.5	0.036	0.01				10	8.11	240		51.40	
59	Robinson P	9/3/1991	7.9	1.48	1.5	0.044	0.01				14	8.20	265		30.20	
59	Robinson P	9/17/1991	8.0	1.14	1.5	0.060	0.01				14	8.56				
59	Robinson P	9/30/1991	7.9	0.91	1.5	0.061	0.22				17	7.82	289		43.60	
59	Robinson P	6/3/1992	8.0	1.22	1.5	0.036	0.82				15	8.04	298		26.80	
59	Robinson P	6/16/1992	7.9	2.44	1.5	0.017	0.59				9	8.43	309		8.04	
59	Robinson P	6/27/1992	7.9	1.83	1.5	0.025	0.42				10	8.33	323		12.50	
59	Robinson P	7/14/1992	7.4	3.02	1.5	0.018	0.13				9	7.80	287		4.70	
59	Robinson P	7/27/1992	7.6	3.38	1.5	0.017	0.05				6	8.04	276		6.63	
59	Robinson P	8/19/1992	7.8	0.64	1.5	0.082	0.01				9	8.64	246		10.70	
59	Robinson P	8/26/1992	7.8	1.36	1.5	0.029	0.01				8	8.48	224		29.00	
59	Robinson P	9/8/1992	7.6	0.61	1.5	0.085	0.01				10	8.80	240		62.90	
59	Robinson P	6/13/1993	7.6	3.75	1.5	0.012	0.70				4	5.82	326		4.63	
59	Robinson P	6/27/1993	7.5	4.25	1.5	0.017	0.42				7	8.64	306		5.74	
59	Robinson P	7/12/1993	7.6	3.05	1.5	0.020	0.11				7	8.98	259		5.99	
59	Robinson P	7/25/1993	7.2	1.52	1.5	0.024	0.01				3	8.99	257		20.20	
59	Robinson P	8/9/1993	7.4	1.34	1.5	0.030	0.01				5	8.32	264		21.40	
59	Robinson P	8/23/1993	7.8	1.74	1.5	0.045	0.01				6	8.67	258		19.80	
59	Robinson P	9/6/1993	7.7	1.05	1.5	0.071	0.01				12	8.76	268		62.90	
59	Robinson P	9/19/1993	7.7	1.07	1.5	0.079	0.02				14	8.26	308		35.70	
59	Robinson P	6/25/2007	9.5	1.95		0.033	0.44	0.02	1.04	69.6	57	7.8	377	35.1	10.03	
59	Robinson P	7/9/2007		1.80	1.80	0.042	0.21	0.02	1.57	83.7	61	8.2	254		0.10	
59	Robinson P	7/23/2007	9.0	1.20	1.20	0.070	0.08	0.06	0.82	26.0	69	7.4	293		9.66	
59	Robinson P	8/7/2007				0.083	0.01	0.02	1.00	26.7	153	8.0	218		0.59	
59	Robinson P	8/20/2007		1.80	1.80	0.070	0.02	0.02	0.61	19.3	70	7.7	208	29.7	55.76	
59	Robinson P	9/4/2007		1.81	1.81	0.066	0.00	0.01	0.82	27.5	32	7.5	255		77.96	
59	Robinson P	9/17/2007		1.21	1.21	0.220	0.09	0.11	0.76	7.7	68	7.7	318		0.10	
59	Robinson P	10/1/2007		2.31	2.31	0.039	0.03	0.12	0.79	45.1	56	8.0	334		0.40	
60	Robinson P	6/16/2008	8.5	0.90		0.035	0.61	0.02	0.90	56.20	60	7.58	163	30.4	6.51	
60	Robinson P	6/30/2008	8.8	0.85		0.018	0.29	0.02	1.14	141.17	47	7.57	142		46.00	
60	Robinson P	7/14/2008	3.0	2.96		0.021	0.63	0.07	0.93	99.67	37	7.40	272		8.02	
60	Robinson P	7/28/2008	8.8	1.40		0.035	0.38	0.05	0.63	39.71	27	7.68	290		83.84	
60	Robinson P	8/11/2008	9.0	1.10		0.042	0.25	0.04	0.77	40.33	29	7.26	263	33.2	49.36	
60	Robinson P	8/25/2008	8.6	1.75		0.031	0.45	0.20	0.95	67.63	53	7.27	279		12.54	
60	Robinson P	9/8/2008	8.8	1.74		0.031	0.31	0.06	0.80	55.84	62	7.07	268		39.63	
60	Robinson P	9/22/2008	8.9	1.74		0.033	0.48	0.06	0.84	55.59	37	7.40	298		28.82	
59	Robinson P	6/15/2009	8.5	1.80	1.50	0.013	0.45	0.06	0.69	118.46	67	6.64	186	29.0	13.10	
59	Robinson P	6/29/2009		2.20	1.50	0.018	0.70	0.02	1.04	128.42	61	7.26	212		5.57	
59	Robinson P	7/25/2009	9.4	3.20		0.011	0.35	0.04	0.56	113.46	32	7.33	165			
59	Robinson P	8/15/2009	9.4	1.35		0.038	0.78	0.05	1.11	63.86	50	7.29	155			
59	Robinson P	8/30/2009	8.4	2.35		0.025	0.89	0.16	1.31	113.64	61	6.99	229	39.3		
59	Robinson P	9/14/2009	7.4	2.50		0.050	0.71	0.03	1.06	46.96	73	7.03	176		9.10	
59	Robinson P	10/5/2009	7.3	2.50		0.024	0.68	0.16	1.15	106.23	40	7.28	246		9.98	

LNum	PName	Date	Zbot	Zsd	Zsamp	Tot.P	NO3	NH4	TDN	TN/TP	TColor	pH	Cond25	Ca	Chl.a	Cl
60	Robinson P	6/8/2010	8.5	3.60		0.026	0.62	0.21	1.40	118.38	80	7.64	317	34.4	0.10	
60	Robinson P	6/21/2010	8.7	1.78		0.022	0.74	0.03	1.22	121.90	66	7.93	298		2.60	
60	Robinson P	7/5/2010	8.8	1.59		0.024	0.44	0.02	0.74	67.83	132	7.75	278		17.50	
60	Robinson P	7/19/2010	8.5	1.75		0.040	0.10	0.02	0.53	28.97	18	7.65	262		21.70	
60	Robinson P	8/2/2010	8.2	1.10		0.075	0.02	0.07	0.62	18.15	81	7.52	298	32.8	20.70	
60	Robinson P	8/16/2010	8.3	0.65		0.045	0.01	0.02	0.74	36.05	41	8.64	305		30.90	
60	Robinson P	8/30/2010	8.7	0.90		0.036	0.02	0.02	0.54	32.94	46	7.80	291		22.90	
60	Robinson P	9/13/2010	8.3	0.86		0.041	0.16	0.07	0.57	30.54	42	7.32	264		6.50	
59	Robinson P	6/6/2011	8.5	3.55		0.013	0.64	0.04	1.06	186.21	32	7.55	274	33.6	6.30	
59	Robinson P	6/20/2011	8.5	3.92		0.017	0.81	0.06	1.03	133.03	46	6.26	341		18.10	
59	Robinson P	7/5/2011	8.6	2.70		0.017	0.89	0.07	1.21	158.87	24	7.79	299		7.60	
59	Robinson P	7/18/2011		2.65		0.023	0.51	0.04	0.96	93.43	47	7.52	296		26.70	
59	Robinson P	7/18/2011?	grab	bloom												
59	Robinson P	8/1/2011	7.8	0.23		0.029	0.17	0.02	1.05	79.83	36	7.60	292	33.2	92.80	
59	Robinson P	8/15/2011		1.15		0.047	0.06	0.01	0.81	37.77	37	7.54	273		66.10	
59	Robinson P	8/15/2011?	grab	bloom												
59	Robinson P	8/29/2011	8.5	0.60		0.073	0.34	0.07	0.94	28.28	36	6.95	193		15.00	
59	Robinson P	8/29/2011	grab	bloom												
59	Robinson P	9/12/2011	8.6	1.12		0.009	0.76	0.03	1.79	441.48	25	7.12	251		24.10	
59	Robinson P	9/12/2011?	grab	bloom												
59	Robinson P	6/4/2012	7.5	3.17		0.021	0.37	0.10	0.70	72.81	26	7.24	263	33.6		
59	Robinson P	6/4/2012	grab	bloom												
59	Robinson P	6/25/2012	8.8	3.17	1.50	0.018	0.33	0.10	0.80	97.36	24	7.17	228		31.10	
59	Robinson P	6/25/2012	grab	bloom												
59	Robinson P	7/9/2012	8.8	2.25	1.50	0.029	0.15	0.02	0.74	56.29	29	7.17	290		28.10	
59	Robinson P	7/9/2012	grab	bloom												
59	Robinson P	7/23/2012	8.7	0.75	1.50	0.026	0.01	0.02	0.97	83.69	27	7.63	268		46.80	
59	Robinson P	8/6/2012	8.9	0.85	1.50	0.043	0.05	0.05	0.79	40.46	32	7.81	258	23.8	36.00	
59	Robinson P	8/6/2012	grab	bloom												
59	Robinson P	8/28/2012	8.7	0.64	1.50	0.065	0.01	0.04	1.04	34.87	16	8.03	251		83.60	
59	Robinson P	9/4/2012	8.7	0.75	1.50	0.060	0.01	0.04	0.91	33.31	15	8.03	283		65.30	
59	Robinson P	9/4/2012	grab	bloom												
59	Robinson P	9/17/2012	8.7	1.40	1.50	0.039	0.03	0.11	0.89	50.55	14	7.30	323		35.80	
59	Robinson P	6/2/2014	8.8	4.28	1.5	0.013	0.66	0.05	0.98	160.90	13	8.03	306	28.8	5.40	
59	Robinson P	6/2/2014														
59	Robinson P	6/16/2014	8.0	4.25	1.5	0.023			1.05	100.83	17	7.17	319		11.10	
59	Robinson P	6/30/2014	8.6	1.96	1.5	0.037	0.49	0.18	1.12	67.26	21	7.18	256		44.10	
59	Robinson P	7/14/2014	8.8	1.46	1.5	0.046			1.02	48.65	13	8.00	278		19.00	
59	Robinson P	7/28/2014	8.6	1.51	1.5	0.038	0.54	0.04	1.71	98.08	10	7.42	267	28.3	38.60	
59	Robinson P	8/11/2014	8.7	2.16	1.5	0.021			0.96	98.69	2	7.25	315		9.40	
59	Robinson P	8/25/2014	8.6	1.61	1.5	0.029	0.56	0.01	0.97	72.73	7	7.01	321		11.70	
59	Robinson P	9/8/2014	7.9	3.72	1.5	0.023			0.77	75.25	7	7.47	316		7.80	
59	Robinson P	5/26/2015	8.5	3.50	1.5	0.013	0.58	0.03	0.82	62.77	9	7.37	327	21.8	2.20	
59	Robinson P	6/8/2015	8.5	2.20	1.5	0.042			1.00	23.92	7	7.45	337		15.30	
59	Robinson P	6/23/2015	8.6	2.10	1.5	0.055	0.55	0.17	1.00	18.14	10	7.36	329		9.80	35.2
59	Robinson P	7/6/2015	8.6	1.60	1.5	0.030			0.98	32.38	13	7.57	311		20.20	
59	Robinson P	7/20/2015	8.8	1.40	1.5	0.082	0.62	0.04	1.34	16.29	12	7.34	313	20.2	10.90	
59	Robinson P	8/3/2015	8.7	1.80	1.5	0.075			0.87	11.59	10	7.58	330		30.80	
59	Robinson P	8/18/2015	8.7	2.40	1.5	0.046	0.09	0.04	0.66	14.32	9	8.12	335		26.50	38.7
59	Robinson P	9/1/2015	8.7	1.50	1.5	0.023			0.81	35.68	12	7.90	322		27.40	
60	Robinson P	6/16/2008				0.167										
60	Robinson P	6/30/2008				0.058										
60	Robinson P	7/14/2008				0.131										
60	Robinson P	7/28/2008				0.057										
60	Robinson P	8/11/2008				0.062										
60	Robinson P	8/25/2008				0.048										
60	Robinson P	9/8/2008				0.500										
60	Robinson P	9/22/2008				0.030										
59	Robinson P	06/15/2009	8.5		8.3	0.030		0.06								
59	Robinson P	06/29/2009			8.6	0.022		0.05								
59	Robinson P	07/25/2009	9.4		6.0	0.040		0.05								
59	Robinson P	08/15/2009	9.4		7.5	0.084		0.02								
59	Robinson P	08/30/2009	8.4		6.5	0.050		0.16								
59	Robinson P	09/14/2009	7.4		6.0	0.094		0.14								
59	Robinson P	10/05/2009	7.3		6.0	0.032		0.25								
60	Robinson P	6/8/2010	8.5		8.5	0.034		0.15								

LNum	PName	Date	Zbot	Zsd	Zsamp	Tot.P	NO3	NH4	TDN	TN/TP	TColor	pH	Cond25	Ca	Chl.a	Cl
60	Robinson P	6/21/2010	8.7		8.5	0.025		0.36								
60	Robinson P	7/5/2010	8.8		8.8	0.028		0.03								
60	Robinson P	7/19/2010	8.5		8.5	0.037		0.01								
60	Robinson P	8/2/2010	8.2		8.2	0.072		0.10								
60	Robinson P	8/16/2010	8.3		8.3	0.121		0.48								
60	Robinson P	8/30/2010	8.7		8.7	0.037		0.06								
60	Robinson P	9/13/2010	8.3		8.3	0.041		0.06								
60	Robinson P	6/6/2011	8.5	3.55		0.026		0.08								
60	Robinson P	6/20/2011	8.5	3.92		0.030		0.29								
60	Robinson P	7/5/2011	8.6	2.70		0.452		3.52								
60	Robinson P	7/18/2011		2.65	7.9	0.026		0.04								
60	Robinson P	8/1/2011	7.8	0.23	7.8	0.071		0.23								
60	Robinson P	8/15/2011		1.15		0.046		0.06								
60	Robinson P	8/29/2011	8.5	0.60	8.5	0.065		0.09								
60	Robinson P	9/12/2011	8.6	1.12		0.540		5.51								
60	Robinson P	6/4/2012			7.5	0.033		0.36								
60	Robinson P	6/25/2012			8.8	0.040		0.29								
60	Robinson P	7/9/2012			8.8	0.042		0.14								
60	Robinson P	7/23/2012			8.7	0.035		0.43								
60	Robinson P	8/6/2012			8.9	0.065		0.10								
60	Robinson P	8/28/2012			8.7	0.091		0.29								
60	Robinson P	9/4/2012			8.7	0.195		1.74								
60	Robinson P	9/17/2012			8.7	0.043		0.44								
60	Robinson P	6/2/2014			8.8	0.016		0.06								
60	Robinson P	6/16/2014				0.034										
60	Robinson P	6/30/2014				0.039		0.21								
60	Robinson P	7/14/2014			8.8	0.234										
60	Robinson P	7/28/2014			8.6	0.047		0.12								
60	Robinson P	8/11/2014				0.026										
60	Robinson P	8/25/2014			8.6	0.037		0.07								
60	Robinson P	9/8/2014				0.045										
60	Robinson P	5/26/2015			8.3	0.051		1.44								
60	Robinson P	6/8/2015			8.4	0.044										
60	Robinson P	6/23/2015			8.5	0.062		0.38								
60	Robinson P	7/6/2015			7.6	0.067										
60	Robinson P	7/20/2015			8.8	0.062		0.54								
60	Robinson P	8/3/2015			8.7	0.075										
60	Robinson P	8/17/2015			8.7	0.084		0.41								
60	Robinson P	9/1/2015			8.7	0.084										

LNum	PName	Date	Site	TAir	TH20	QA	QB	QC	QD	QFQG	AQ-PC	AQ-Chla	MC-LR	Ana-a	Cyl	FP-Chl	FP-BG	HAB-form	Shore HAB
59	Robinson P	7/18/1989	epi	27	21														
59	Robinson P	8/2/1989	epi	25	24														
59	Robinson P	8/16/1989	epi	26	23														
59	Robinson P	8/30/1989	epi	24	22														
59	Robinson P	9/13/1989	epi	26	22														
59	Robinson P	9/26/1989	epi	18	18														
59	Robinson P	10/5/1989	epi	14	14														
59	Robinson P	10/13/1989	epi	20	15														
59	Robinson P	6/26/1990	epi	17	21														
59	Robinson P	7/10/1990	epi	24	24														
59	Robinson P	7/24/1990	epi	23	25														
59	Robinson P	8/8/1990	epi	24	23														
59	Robinson P	8/21/1990	epi	19	20														
59	Robinson P	9/4/1990	epi	19	20														
59	Robinson P	9/18/1990	epi	14	16														
59	Robinson P	10/2/1990	epi	16	16														
59	Robinson P	6/26/1991	epi	24	23														
59	Robinson P	7/9/1991	epi	20	22														
59	Robinson P	7/24/1991	epi	25	26														
59	Robinson P	8/6/1991	epi	19	22														
59	Robinson P	8/20/1991	epi	20	21														
59	Robinson P	9/3/1991	epi	18	20														

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
59	Robinson P	9/17/1991	epi	22	21															
59	Robinson P	9/30/1991	epi	10	12															
59	Robinson P	6/3/1992	epi	18	11	3	1	2	1											
59	Robinson P	6/16/1992	epi	17	21	3	2	3	14											
59	Robinson P	6/27/1992	epi	21	22	3	3	3	21											
59	Robinson P	7/14/1992	epi	25	24	2	3	3	2											
59	Robinson P	7/27/1992	epi	17	22	2	3	3	24											
59	Robinson P	8/19/1992	epi	20	20	3	3	3	145											
59	Robinson P	8/26/1992	epi	22	22	3	3	4	124											
59	Robinson P	9/8/1992	epi	24	22	3	3	3	124											
59	Robinson P	6/25/2007	epi	24		2	3	3	346											
59	Robinson P	7/9/2007	epi	24	23	1	2	2												
59	Robinson P	7/23/2007	epi	32	27	1	3	3	234											
59	Robinson P	8/7/2007	epi	24	23	3	3	4	12346											
59	Robinson P	8/20/2007	epi	25	24	3	4	4	1234											
59	Robinson P	9/4/2007	epi	24	23															
59	Robinson P	9/17/2007	epi	25	23	2	3	3	2											
59	Robinson P	10/1/2007	epi	17	18	3	3	3	25											
60	Robinson P	6/16/2008	epi	31	27	5	2	4	1346											
60	Robinson P	6/30/2008	epi	36	25	4	2	4	234											
60	Robinson P	7/14/2008	epi	28	26	3	2	4	345											
60	Robinson P	7/28/2008	epi	33	25	4	2	4	1345											
60	Robinson P	8/11/2008	epi	23	22		2	4	346											
60	Robinson P	8/25/2008	epi	24	19	4	1	4	134											
60	Robinson P	9/8/2008	epi	27	23	4	2	4	134											
60	Robinson P	9/22/2008	epi	20	18	3	2	4	134											
59	Robinson P	6/15/2009	epi	23	21	4	2	4	3456											
59	Robinson P	6/29/2009	epi	27	23	3	2	4	1345											
59	Robinson P	7/25/2009	epi	22		1	2	3	348											
59	Robinson P	8/15/2009	epi	23	19	2	2	3	1											
59	Robinson P	8/30/2009	epi	21	20	2	1	3	0											
59	Robinson P	9/14/2009	epi	18	15	2	2	3	2			76.92								
59	Robinson P	10/5/2009	epi	17	14	2	2	4	256			73.06								
60	Robinson P	6/8/2010	epi	22	23	2	3	3	35	4	0									
60	Robinson P	6/21/2010	epi	29	25	4	3	3	134	45										
60	Robinson P	7/5/2010	epi	35	28	3	3	3	3	45										
60	Robinson P	7/19/2010	epi	30	29	4	2	4	134											
60	Robinson P	8/2/2010	epi	29	27	3	3	4	1235	0	0									
60	Robinson P	8/16/2010	epi	30		3	3	4	1235											
60	Robinson P	8/30/2010	epi	33	27	4	4	4	234	5	5	199.20								
60	Robinson P	9/13/2010	epi	22	27	5	4	4	1234											
59	Robinson P	6/6/2011	epi	32	24	4	3	4	34	4										
59	Robinson P	6/20/2011	epi	26	22	4	2	4	3	4	4	8.70	2.10							
59	Robinson P	7/5/2011	epi	30	22	4	1	3	34	4	4	4.80	2.60							
59	Robinson P	7/18/2011	epi	30	27	5	1	4	345	4	4	20.00	2.90	0.39						
59	Robinson P	7/18/2011?	bloom											35.94	<5	<0.4				
59	Robinson P	8/1/2011	epi	33	28	4	1	4	134			44.10	13.30							
59	Robinson P	8/15/2011	epi	21	26	4	2	4	1345	4	4	54.80	11.30							
59	Robinson P	8/15/2011?	bloom									168.58	toxic	<0.1						
59	Robinson P	8/29/2011	epi	26	26	4	1	5	146	12	5	28.90	10.90							
59	Robinson P	8/29/2011	epi									1.63	<0.8	<0.1						
59	Robinson P	9/12/2011	epi	28	22	4	2	5	134	4	4	28.70	25.40							
59	Robinson P	9/12/2011?	bloom									0.37	<2	<0.1						
59	Robinson P	6/4/2012	epi	20	18	2	2	3	35	4	4			<0.30	<0.417					E
59	Robinson P	6/4/2012	bloom											<0.60	<0.715					
59	Robinson P	6/25/2012	epi	21	23	4	2	3	35	4	0	4.50	1.20	<0.30	<0.410		2.28	0.45		EI
59	Robinson P	6/25/2012	bloom											<0.60	<0.820		3.26	1.06		E
59	Robinson P	7/9/2012	epi	30	28	2	1	2	0	0	0	47.00	1.10	<0.30	<0.392		6.54	2.96		A
59	Robinson P	7/9/2012	bloom											<0.30	<0.820		16.87	7.52		
59	Robinson P	7/23/2012	epi	28	28	2	1	3	15	0	0	235.70	33.00	<0.30	<0.328		237.00	73.00		I
59	Robinson P	8/6/2012	epi	27	28	3	2	3	1	4	0	105.60	4.00	<0.30	<0.330		16.14	9.07		F

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
59	Robinson P	8/6/2012	bloom											<0.60	<1.974		133.80	2.33	C	
59	Robinson P	8/28/2012	epi	24	24	4	1	4	34	45	5	1.20	0.80	<0.30	<0.551		1.54	1.54	C	
59	Robinson P	9/4/2012	epi	26	26	4	1	4	135	0	0	119.00	16.80	<0.30	<0.642		15.04	15.04	B	
59	Robinson P	9/4/2012	bloom											0.78	<1.038		186.57	25.59		
59	Robinson P	9/17/2012	epi	21	22	3	1	3	1	4		176.20	1.70	0.42	<1.340		1.74	1.74	B	
59	Robinson P	6/2/2014	epi	29	23	4	2	3	23	4	0	0.70	0.90	<0.37	<0.09	<0.001	0.00	0.00	e	e
59	Robinson P	6/2/2014	epi											<1.23	<0.35	<0.003	0.06	0.00	e	e
59	Robinson P	6/16/2014	epi	28	25	2	2	2	2	0	0	1.60	0.20	<0.53	<0.08	<0.002	0.54	0.00	i	i
59	Robinson P	6/30/2014	epi	30	25	2	3	3	125	0	0	5.40	0.70	<0.62	<0.03	<0.002	2.68	0.00	i	i
59	Robinson P	7/14/2014	epi	26	27	2	2	3	1	0	0	5.10	3.80	<0.71	<0.48	<0.001	13.30	0.00	i	i
59	Robinson P	7/28/2014	epi	27	28	2	2	3	0	0	0	12.00	2.40	<0.31	0.59	<0.002	12.65	0.00	i	i
59	Robinson P	8/11/2014	epi	29	26	2	3	3	0	0	0	25.60	0.60	<0.26	<0.10	<0.002	4.20	1.44	i	i
59	Robinson P	8/25/2014	epi		25	3	2	3	4	4	4	10.00	1.20	<1.06	<0.16	<0.002	7.64	0.00	i	i
59	Robinson P	9/8/2014	epi	25	24	2	2	2	0	0	0	13.40	0.30	<0.64	<0.03	<0.001	2.58	0.69	i	i
59	Robinson P	5/26/2015	epi	28	21	2	2	3	5	5	0	27.30	0.40	<1.34	<0.032	<0.080	0.77	0.00	l	l
59	Robinson P	6/8/2015	epi	23	20	2	3	3	2	0	0	5.40	0.30	<0.55	<0.027	<0.318	0.09	0.00	l	l
59	Robinson P	6/23/2015	epi	25	24	2	2	2	2	0	0	25.10	0.80	<0.55	<0.004	<0.001	3.38	0.93	l	l
59	Robinson P	7/6/2015	epi	24	24	3	3	4	235	4	4	8.60	0.50	<0.30	<0.005	<0.028	1.55	0.51	EG	EG
59	Robinson P	7/20/2015	epi	28	27	3	3	2	23	4	0	23.80	3.90	<0.36	<0.003	<0.018	11.37	2.64	DG	D
59	Robinson P	8/3/2015	epi	26	27	3	3	3	2	4	0	54.14	1.74	<0.18	<0.002	<0.009	9.33	3.34	E	E
59	Robinson P	8/18/2015	epi	24	26	3	3	3	2	5	0	55.80	0.50	<0.33	<0.006	<0.024	6.00	4.67	E	E
59	Robinson P	9/1/2015	epi	30	25	4	3	4	1234	4	0			<0.45	<0.031	<0.028	23.45	21.36	E	E
59	Robinson P	06/15/2009	hypo		14															
59	Robinson P	06/29/2009	hypo		16															
60	Robinson P	6/21/2010	hypo		20															
60	Robinson P	7/5/2010	hypo		25															
60	Robinson P	7/19/2010	hypo		24															
60	Robinson P	8/2/2010	hypo		22															
60	Robinson P	8/30/2010	hypo		21															
60	Robinson P	9/13/2010	hypo		19															
60	Robinson P	6/6/2011	hypo		19															
60	Robinson P	7/5/2011	hypo		28															
60	Robinson P	7/18/2011	hypo		22															
60	Robinson P	8/1/2011	hypo		23															
60	Robinson P	8/15/2011	hypo		24															
60	Robinson P	8/29/2011	hypo		24															
60	Robinson P	9/12/2011	hypo		21															
60	Robinson P	6/4/2012	hypo		8															
60	Robinson P	6/25/2012	hypo		9															
60	Robinson P	7/9/2012	hypo		8															
60	Robinson P	7/23/2012	hypo		10															
60	Robinson P	8/6/2012	hypo		10															
60	Robinson P	8/28/2012	hypo		11															
60	Robinson P	9/4/2012	hypo		11															
60	Robinson P	9/17/2012	hypo		11															
60	Robinson P	6/2/2014	hypo		19															
60	Robinson P	6/16/2014	hypo		21															
60	Robinson P	6/30/2014	hypo		21															
60	Robinson P	7/14/2014	hypo		23															
60	Robinson P	7/28/2014	hypo		23															
60	Robinson P	8/11/2014	hypo		14															
60	Robinson P	8/25/2014	hypo		13															
60	Robinson P	9/8/2014	hypo		11															
60	Robinson P	5/26/2015	hypo		7															
60	Robinson P	6/8/2015	hypo		10															
60	Robinson P	6/23/2015	hypo		10															
60	Robinson P	7/6/2015	hypo		10															
60	Robinson P	7/20/2015	hypo		10															
60	Robinson P	8/3/2015	hypo		11															
60	Robinson P	8/17/2015	hypo		10															
60	Robinson P	9/1/2015	hypo		11															

Legend Information

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

Appendix B: Priority Waterbody Listing for Robinson Pond

Robinson Pond (1308-0003)

Impaired Seg

Waterbody Location Information

Revised: 05/01/2008

Water Index No:	H-188-P902	Drain Basin:	Lower Hudson River
Hydro Unit Code:	02020006/180	Str Class:	B(T) Middle Hudson River
Waterbody Type:	Lake	Reg/County:	4/Columbia Co. (11)
Waterbody Size:	113.7 Acres	Quad Map:	COPAKE (M-26-3)
Seg Description:	entire lake		

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

Use(s) Impacted	Severity	Problem Documentation
Public Bathing	Stressed	Known
Aquatic Life	Stressed	Possible
RECREATION	Impaired	Known
Aesthetics	Stressed	Known

Type of Pollutant(s)

Known: ALGAL/WEED GROWTH, NUTRIENTS (phosphorus)
Suspected: - - -
Possible: D.O./Oxygen Demand

Source(s) of Pollutant(s)

Known: HABITAT MODIFICATION
Suspected: AGRICULTURE, On-Site/Septic Syst
Possible: - - -

Resolution/Management Information

Issue Resolvability:	1 (Needs Verification/Study (see STATUS))	
Verification Status:	4 (Source Identified, Strategy Needed)	
Lead Agency/Office:	DEC/Reg4	Resolution Potential: Medium
TMDL/303d Status:	3a->1*	

Further Details

Overview

Recreational uses in Robinson Pond are considered to be impaired due to algal growth and low water transparency. Elevated nutrient (phosphorus) loads attributed to nonpoint sources are the primary contributor to recreational and aesthetic impacts. Agricultural activity and on-site (septic) systems are thought to be sources of these pollutants.

Water Quality Sampling

Robinson Pond has been sampled as part of the NYSDEC Citizen Statewide Lake Assessment Program (CSLAP) beginning in 1989 and continuing through 1993, and again in 2007. An Interpretive Summary report of the findings of this sampling was published in 2008. These data indicate that the lake continues to be best characterized as eutrophic, or highly productive, based on low water transparency, and high nutrient (primarily phosphorus) and algae levels. Phosphorus levels in the lake typically exceed the state phosphorus guidance value indicating impacted/stressed recreational uses. Corresponding transparency measurements occasionally fail to meet what is recommended for swimming beaches. Measurements of pH typically fall within the state water quality range of 6.5 to 8.5; occasional high

pH does not appear to impact aquatic life. The lake water is usually weakly colored, however during most recent sampling color was high enough to influence transparency. (DEC/DOW, BWAM/CSLAP, February 2008)

Recreational Assessment

Public perception of the lake and its uses is also evaluated as part of the CSLAP program. This most recent assessment (2005) indicates recreational suitability of the lake to be somewhat unfavorable. The recreational suitability of the lake is described most frequently as "slightly" impacted for most recreational uses. The lake itself is most often described as having "not quite crystal clear" to having "definite algae greenness," an assessment that is consistent with measured water quality characteristics. Assessments have noted that aquatic plants typically grow to the lake surface, but plant coverage is dependent upon aquatic plant management activities in the lake. (DEC/DOW, BWAM/CSLAP, February 2008)

Lake Uses

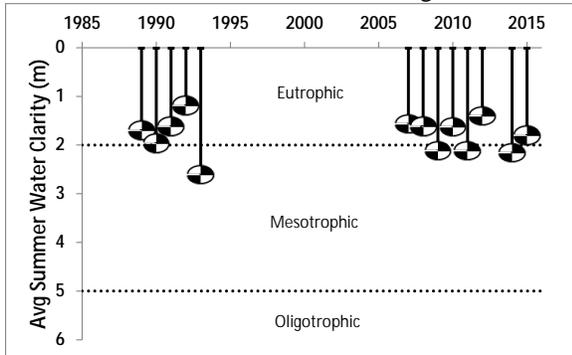
This lake waterbody is designated class B(T), suitable for use as a public bathing beach, for general recreation and aquatic life support, but not as public water supply. Water quality monitoring by NYSDEC focuses primarily on support of general recreation and aquatic life. Samples to evaluate the bacteriological condition and bathing use of the lake or to evaluate contamination from organic compounds, metals or other inorganic pollutants have not been collected as part of the CSLAP monitoring program. Monitoring to assess potable water supply and public bathing use is generally the responsibility of state and/or local health departments. Section 303(d) Listing

Robinson Pond is currently included on the NYS 2008 Section 303(d) List of Impaired Waters. The lake is included on Part 3a of the List as a Water Requiring Verification of Impairment, however this updated assessment suggests that the suspected impairments to water quality and uses are verified and it is recommended that this listing for phosphorus in the lake be moved to Part 1 of the List, indicating a waterbody with an impairment requiring TMDL development. (DEC/DOW, BWAM/WQAS, May 2008)

Appendix C- Long Term Trends: Robinson Pond

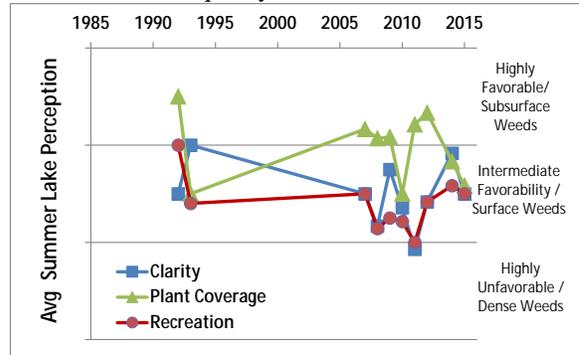
Long Term Trends: Water Clarity

- No trends apparent
- Most readings typical of *eutrophic* lakes, consistent with nutrient and algae levels



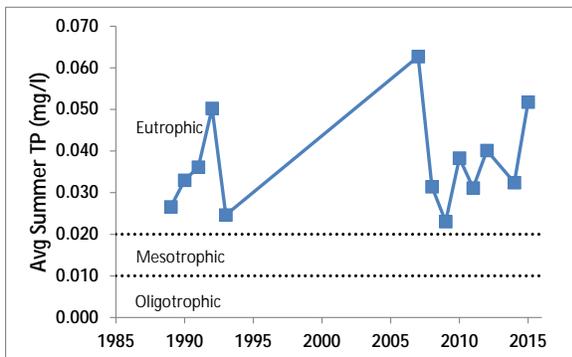
Long Term Trends: Lake Perception

- Highly variable perception; plants ↓
- Recreational perception more closely linked to water quality than to weeds



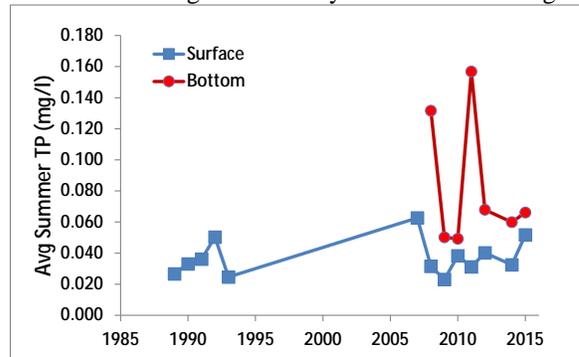
Long Term Trends: Phosphorus

- No clear trends; highly variable; recent ↑
- Most readings typical of *eutrophic* lakes



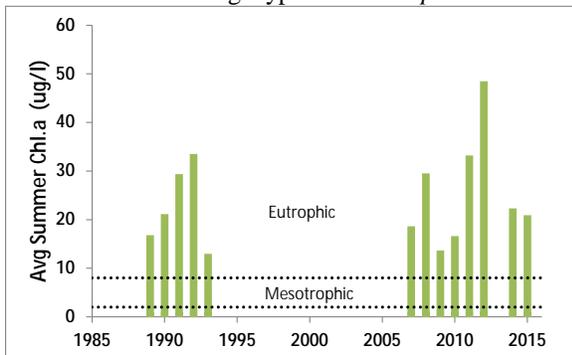
Long Term Trends: Bottom Phosphorus

- Deepwater TP levels occasionally elevated
- Readings indicate internal nutrient loading at times significant- may be linked to mixing



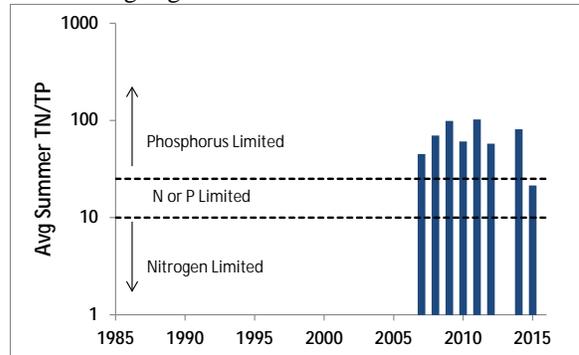
Long Term Trends: Chlorophyll a

- No clear trends; highly variable in response to copper treatments?
- Most readings typical of *eutrophic* lakes



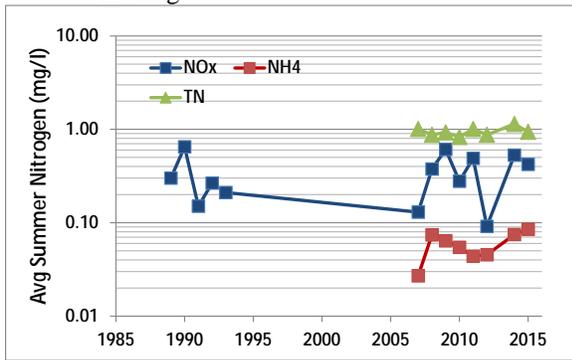
Long Term Trends: N:P Ratio

- No trends apparent, though recent decrease
- Most readings indicate phosphorus limits algae growth



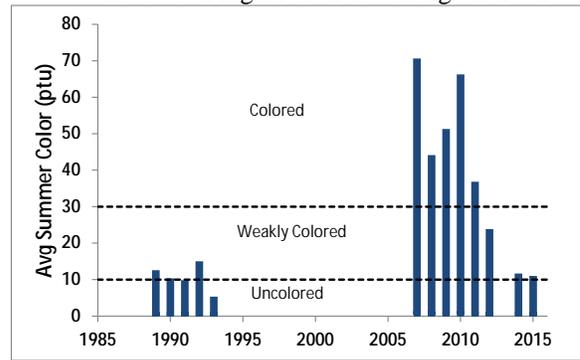
Long Term Trends: Nitrogen

- Increasing NH₄; TN and NO_x variable
- Occasionally elevated NO_x and total nitrogen readings



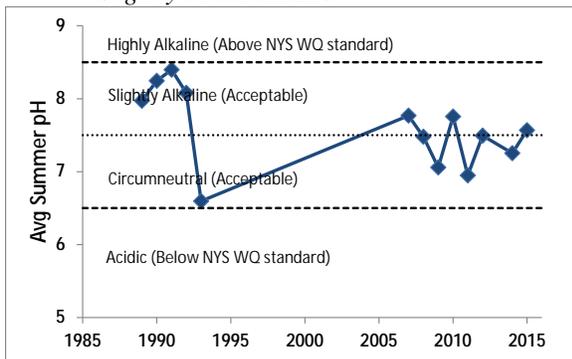
Long Term Trends: Color

- Color much higher since '02 but decreasing
- Most readings typical of *colored* lakes and have been higher after lab change in 2002



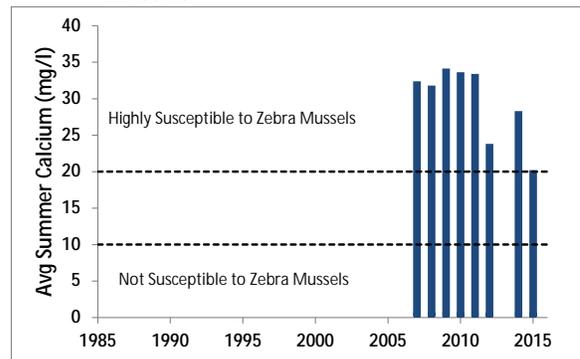
Long Term Trends: pH

- Highly variable but more recently stable
- Most readings typical of *circumneutral* to *slightly alkaline* lakes



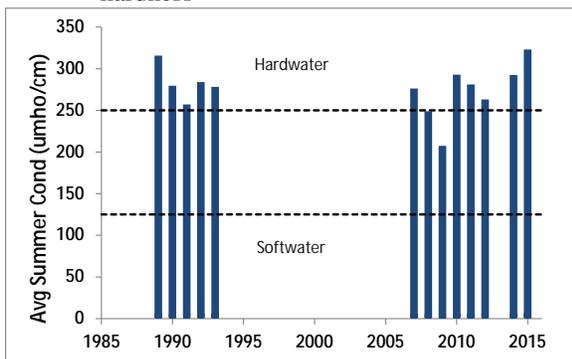
Long Term Trends: Calcium

- No trends apparent, but recent decrease
- Data indicates high susceptibility to zebra mussels



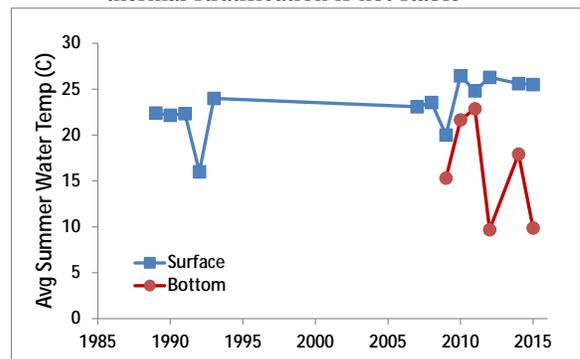
Long Term Trends: Conductivity

- No clear trends; highly variable but recent ↑
- Most readings typical of lakes with moderate hardness



Long Term Trends: Water Temperature

- Recent ↑ surface T and ↓ bottom T
- Deepwater temperatures demonstrate that thermal stratification is not stable



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.

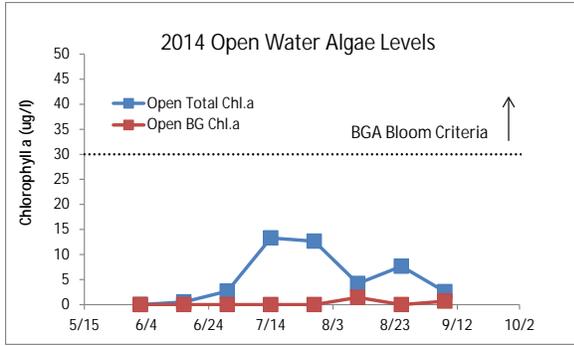


Figure D1:
2014 Open Water Total and BGA Chl.a

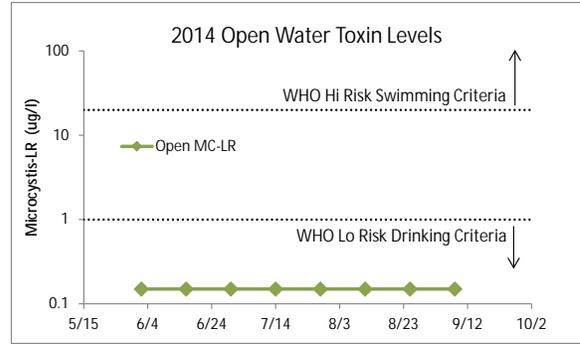


Figure D2:
2014 Open Water Microcystin-LR



Figure D3:
2014 Shoreline Total and BGA Chl.a

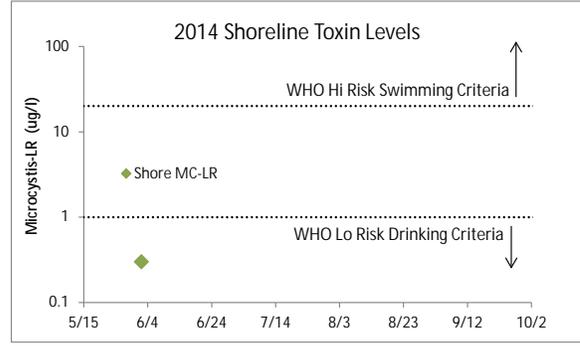


Figure D4:
2014 Shoreline Microcystin-LR

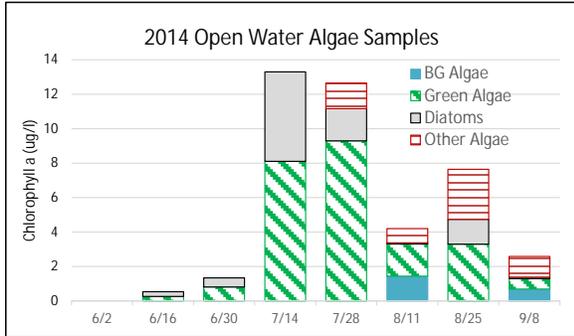


Figure D5:
2014 Open Water Algae Types

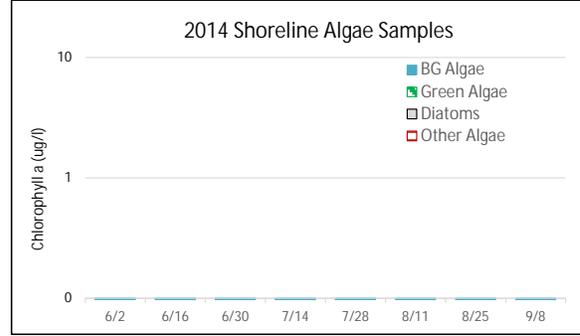


Figure D6:
2014 Shoreline Algae Types

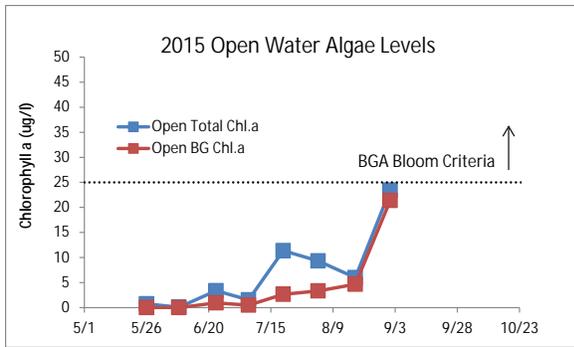


Figure D7:
2015 Open Water Total and BGA Chl.a

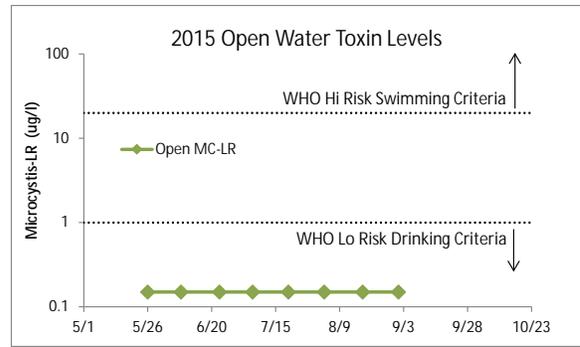


Figure D8:
2015 Open Water Microcystin-LR

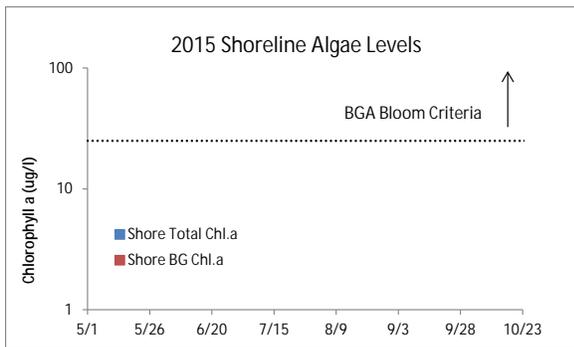


Figure D9:
2015 Shoreline Total and BGA Chl.a

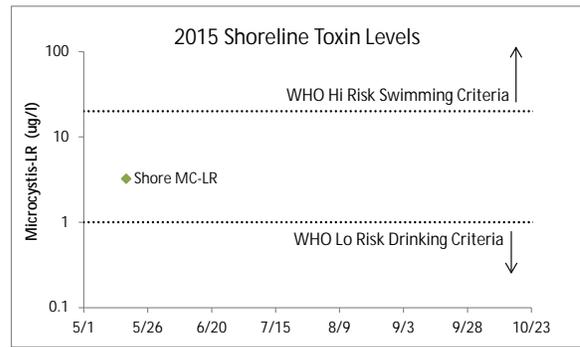


Figure D10:
2015 Shoreline Microcystin-LR

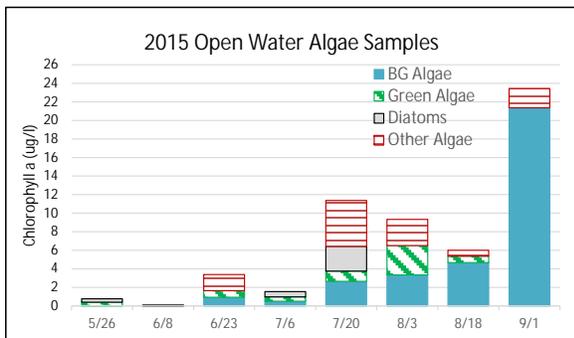


Figure D11:
2015 Open Water Algae Types

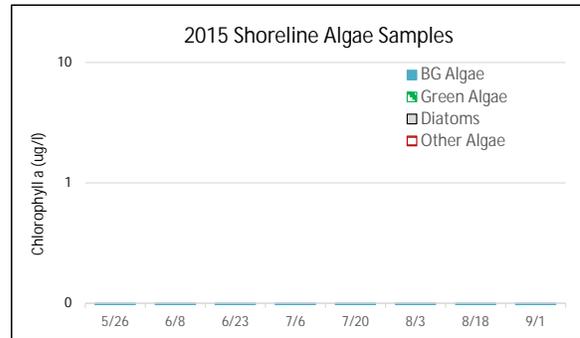


Figure D12:
2015 Shoreline Algae Types

Appendix E: AIS Species in Columbia County

The table below shows the invasive aquatic plants and animals that have been documented in Columbia 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 downinfo@dec.ny.gov.

Aquatic Invasive Species - Columbia County			
Waterbody	Kingdom	Common name	Scientific name
Beaver Pond	Plant	Water chestnut	<i>Trapa natans</i>
Beaver Pond	Plant	Water chestnut	<i>Trapa natans</i>
Copake Lake	Plant	Eurasian watermilfoil	<i>Myriophyllum spicatum</i>
Copake Lake	Plant	Curly leafed pondweed	<i>Potamogeton crispus</i>
Copake Lake	Animal	Rudd	<i>Scardinius erythrophthalmus</i>
Copake Lake	Plant	Water chestnut	<i>Trapa natans</i>
Hudson River	Animal	Zebra mussel	<i>Dreissena polymorpha</i>
Hudson River	Plant	Water chestnut	<i>Trapa natans</i>
Iron Mine Pond	Plant	Eurasian watermilfoil	<i>Myriophyllum spicatum</i>
Kinderhook Lake	Plant	Eurasian watermilfoil	<i>Myriophyllum spicatum</i>
Kinderhook Lake	Plant	Brittle naiad	<i>Najas minor</i>
Kinderhook Lake	Plant	Curly leafed pondweed	<i>Potamogeton crispus</i>
Kinderhook Lake	Plant	Water chestnut	<i>Trapa natans</i>
Lake Taghkanic	Plant	Curly leafed pondweed	<i>Potamogeton crispus</i>
Long Pond	Plant	Curly leafed pondweed	<i>Potamogeton crispus</i>
Lower Rhoda Pond	Plant	Water chestnut	<i>Trapa natans</i>
Miller Pond	Plant	Water chestnut	<i>Trapa natans</i>
Olana Pond	Plant	Eurasian watermilfoil	<i>Myriophyllum spicatum</i>
Olana Pond	Plant	Curly leafed pondweed	<i>Potamogeton crispus</i>
Olana Pond	Plant	Water chestnut	<i>Trapa natans</i>
Queechy Lake	Plant	Eurasian watermilfoil	<i>Myriophyllum spicatum</i>
Queechy Lake	Plant	Curly leafed pondweed	<i>Potamogeton crispus</i>
Queechy Lake	Animal	Banded mystery snail	<i>Viviparus georgianus</i>
Robinson Pond	Plant	Eurasian watermilfoil	<i>Myriophyllum spicatum</i>
Robinson Pond	Plant	Brittle naiad	<i>Najas minor</i>
Robinson Pond	Plant	Curly leafed pondweed	<i>Potamogeton crispus</i>
Robinson Pond	Plant	Water chestnut	<i>Trapa natans</i>

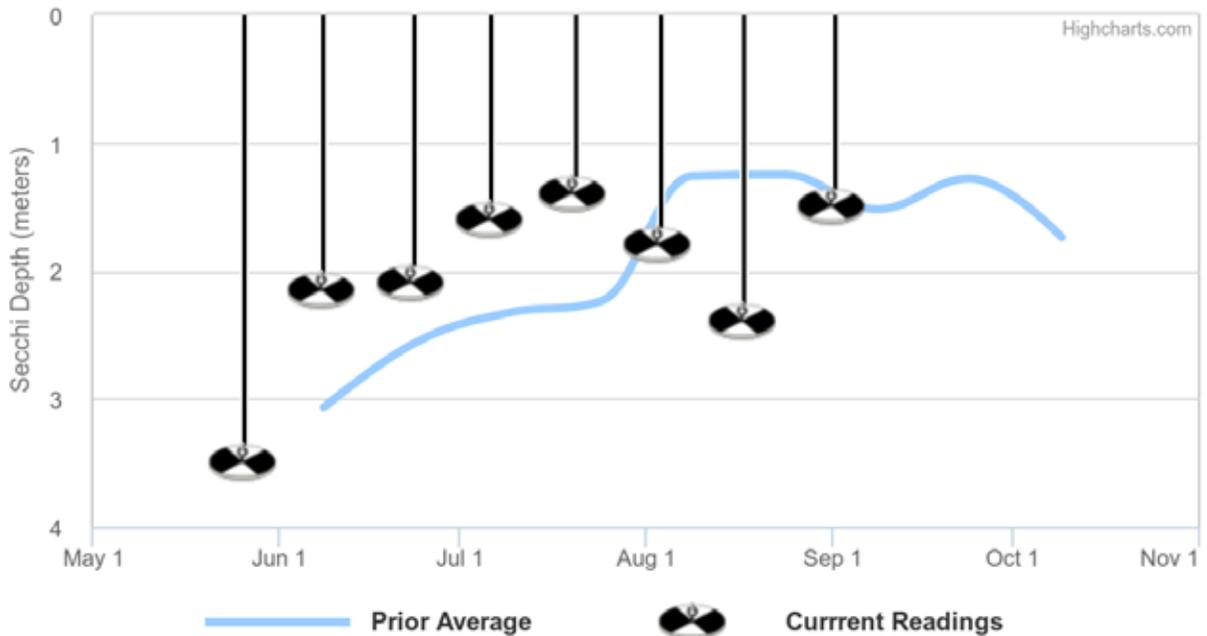
Appendix F: Current Year vs. Prior Averages for Robinson Pond

Current Year Water Temperatures vs. Prior Average



This year's shallow water sample temperatures are tending to be higher than normal when compared to the average of readings collected from 1989 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 2009 to 2014.

Current Year Secchi Readings vs. Prior Average



This year's session Secchi readings are tending to be higher than normal when compared to the average of readings collected from 1989 to 2014

Appendix G: Watershed and Land Use Map for Robinson 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.

